Flood Vulnerability Analysis for Illinois Using a Decision-Tree Based Model for Social Vulnerability

BY

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LIST OF ABBREVIATIONS

ACS	American Community Survey
CDC	Center for Disease Control
CF	Classification Failure
DEM	Digital Elevation Model
FC	False Classification
FEMA	Federal Emergency Management Agency
FVI	Flood Vulnerability Index
HEAVY_DEV_PROP	Proportion of Heavily Developed Land Cover
HMP	Hazard Mitigation Plan
IDOT	Illinois Department of Transportation
ILHMP	Illinois Height Modernization Program
IRB	Illinois River Basin
ISGS	Illinois State Geological Survey
LiDAR	Light Detection and Ranging
Mean_El	Mean Elevation
N	Total Number of Areas
NFIP	National Flood Insurance Program
NLCD	National Land Cover Database
NRI	National Risk Index
OOR	Overall Overestimation Rate
OPR	Overall Performance Rate
OUR	Overall Underestimation Rate
PPM	Predictive Performance Matrix
SAD	Sum of Absolute Differences
SoVI®	Social Vulnerability Index - Hazard and Vulnerability Research Institute University of South Carolina
SVI	Social Vulnerability Index
UIC-SPH	University of Illinois at Chicago School of Public Health
USGS	U.S. Geological Survey

SUMMARY

With the rise of urbanization and global climate change, there has been an increase in the occurrence of natural disasters over the past 50 years. While part of this rise is due to natural events, the resulting disasters are not the outcome of geophysical occurrences by themselves. Social vulnerability describes the human aspect of vulnerability and works to identify the social conditions that leave societies susceptible to disasters.

Social vulnerability is multifactorial, and these factors vary between county, state, and local regions. Socioeconomic status is recognized to be one of the largest contributing factors to social vulnerability. Well recognized variables that impact the socioeconomic status are income and poverty level. In addition to socioeconomic status, race, gender, education, employment, age, and social dependence contribute to the vulnerability of a community.

Existing social vulnerability models commonly use percentile rank or Principal Component Analysis (PCA) methodologies to derive vulnerability indices. While multiple indices exist, there have been little to no efforts to validate them using realized losses.

In this study, the decision tree (DT) methodology is proposed as an alternative to assess flood vulnerability in Illinois, specifically in the Illinois River Basin, which is heterogenous in demographics and land use. We also derive a PCA index using the performance optimization methodology developed by the University of Illinois at Chicago - School of Public Health's (UIC-SPH) team. The predictive performance of the two derived indices and existing flood vulnerability indices for Illinois is evaluated using National Flood Insurance Program claim loss data as realized loss. The Flood Vulnerability Index derived using DT methodology (FVI.DT) has the highest overall predictive performance (87.2%). Existing FVIs for Illinois significantly under- and overestimate county level vulnerability, which implies gaps in mitigation planning and resource allocation throughout the state.

1. INTRODUCTION

With the rise of urbanization and global climate change, there has been an increase in the occurrence of natural disasters over the past 50 years (1). While part of this rise is due to natural events, the resulting disasters are not the outcome of geophysical occurrences by themselves. The impacts from these events on individuals, communities, and society are what creates these disasters (1, 2). The concept of social vulnerability has emerged in the past fifty years and has become a major framework for assessing this human component of natural disasters (3). Social vulnerability describes the human aspect of vulnerability and works to identify the social conditions that leave societies susceptible to disasters (4). The social vulnerability framework is a systemic and holistic approach that embraces the complexity of human systems (4).

Social vulnerability is multifactorial, and these factors vary between county, state, and local regions. Socioeconomic status is recognized to be one of the largest contributing factors to social vulnerability (5). Well recognized variables that impact the socioeconomic status are income and poverty level (6, 7). This is true on both micro and macro levels, and much research has been conducted on the impact of wealth and socioeconomic status on the vulnerability of individuals and communities (8,9). Along with socioeconomic status, employment and development are key factors in social vulnerability. High-density areas present complications with evacuation and communication prior to disasters, and the loss of commercial and industrial buildings may result in losses in the business community and critical infrastructure, and can prolong recovery (10, 11).

Employment and education also contribute to socioeconomic status, which in turn impacts social vulnerability. Many times, individuals or families move to hazard-prone areas to access education and employment opportunities. Often these homes are unstable and access to transportation is limited. Individuals with low-paying or unstable jobs are often unable to afford housing in low-risk areas and are less likely to be able to afford to move after a disaster (12).

Race and ethnicity are crucial components of vulnerability and are closely related to socioeconomic status in the United States (8, 9). Although legislation prohibiting discrimination based on race and ethnicity exists, institutional racism and cultural undercurrents have resulted in the stratification of social capital along race and ethnic gradients (13,14). Additionally, language and cultural barriers often impede access to information and funding after disasters. The impacts of race and socioeconomic status on social vulnerability were particularly evident in the response to Hurricane Katrina, which saw a disproportionate number of impoverished and displaced minority residents displaced (15).

Gender has a significant impact on the ability to maintain socioeconomic status. Women have fewer resources such as land and access to labor, especially after a disaster. Additionally, gendered household roles such as caregiving place unique stress on women after disasters (16). Populations with a high proportion of elderly or young individuals are more vulnerable. The number of elderly individuals has increased threefold in the United States in the past 100 years, and they generally require more assistance and may be more reluctant to leave their homes in the event of a disaster. Children also require more assistance and resources, and children's families may be placed under additional stress if school or daycare facilities become inaccessible after a disaster (7, 12).

Along with the elderly and children, those dependent on social services or individuals with special needs add to the vulnerability of a community. These individuals are likely to need more assistance during both pre- and post-disaster stages. These populations are already marginalized from society and if not identified beforehand, they may be overlooked in the post-disaster response (7, 12).

The factors discussed above are not comprehensive. Social vulnerability by nature is defined by the unique characteristics of a society which vary with geographic area and scale. Multiple frameworks exist to evaluate social vulnerability. The Hazards of Place framework was popularized by Susan Cutter and a team at the University of South Carolina. The social vulnerability index, or SoVI®, was created in 2003 by the University of South Carolina team. Forty-two socioeconomic and demographic variables were reduced into 11 factors that accounted for 76% of the variance using principal components analysis

(PCA). The 11 components were 1) personal wealth, 2) age, 3) density of the built environment, 4) single-sector economic dependence, 5) housing stock and tenancy, 6) race – African American, 7) ethnicity – Hispanic, 8) ethnicity – Native American, 9) race – Asian, 10) occupation, and 11) Infrastructure dependence (7). A positive or negative directionality was assigned to each of the components based on how they impact social vulnerability in a literature review. These 11 components allow for a robust model and a consistent set of variables to use in order to track vulnerability over time and across the United States. Cutter suggested using the SoVI® in conjunction with hazard event frequency and economic loss data to enhance mitigation planning (7). Several iterations of the SoVI® exist, including the original SoVI® 2000 with 42 variables, the SoVI® 2000 with 32 variables, the SoVI® 2006-2010, and the SoVI® 2010-2014 (18).

In addition to PCA analysis, weighted ranking and percentile ranking are commonly used in social vulnerability analysis. Ranking methodologies rely on selection of relevant variables based on literature or professional opinion (19, 20). In a 2000 study of vulnerability of populations living in hazardous zones of Georgetown County, South Carolina, Cutter et al. selected nine variables based on the existing literature. These variables were standardized by calculating a ratio of the variable inside a census block compared to the total value of that variable within Georgetown County. The standardized values for all nine variables was summed for each census block to create an aggregate value for social vulnerability (19). The U.S. Center for Disease Control (CDC) utilizes a ranked social vulnerability index. A total of 15 social variables assigned to four themes (socioeconomic status, household composition & disability, minority and language status, and housing type & transportation) are used to calculate overall vulnerability. Information obtained from the American Community Survey (ACS) is used to calculate percentile rank scores for each variable. In order to obtain the percentile rank for each theme, the percentile rank of the corresponding variables are summed (20). The overall vulnerability is found by summing the four theme ranks. This analysis is completed at the census tract and county level for each state (20). While these methods are more accessible since no statistical software is necessary, it is possible

that key indicator variables were omitted and they do not take into account the complexity of variable interaction (21). In some studies, weight is assigned to variables based on relevance and prior knowledge. While weighting may account for an increased influence of a particular variable within a study area, no reference data for weights exist (20, 22). Recent studies corroborate that percentile rank and weighted percentile rank methodologies have inferior performances compared to statistically derived models (22).

In 2020, the Federal Emergency Management Agency (FEMA) released the National Risk Index (NRI), an application developed to identify communities at risk of natural hazards. The NRI incorporates the University of South Carolina SoVI® with community resilience and expected annual losses and is publicly available for any jurisdiction. The NRI assessed 18 natural hazards that predict expected annual loss, including riverine flooding (23). In addition to the NRI, FEMA has developed the Resilience Analysis Planning Tool (RAPT) to assess socioeconomic and demographic data, physical attributes such as infrastructure, and hazard risks. RAPT utilizes historic hazard information and aims to provide insight into the interactions between infrastructure, community characteristics, and hazards (24).

Decision tree based modeling has been used to assess social vulnerability associated with natural disasters. In 2016, a team of researchers from the University of Illinois at Chicago School of Public Health (UIC-SPH) used a decision tree model to assess social vulnerability in the Houston Metropolitan Area in Texas. Decision tree models account for the heterogeneity and complexity of both the populations and hazards of the input socioeconomic variables as well as the losses due to a realization of hazards. The decision tree model proposed in the Houston study had a predictive performance rate greater than 77%, whereas the PCA based model for the same study area had a predictive performance rate of 35% (22). This study highlighted the need to validate the proposed indices since a predictive performance of 35% implies major underestimations of high-risk areas. The high-performance rate of the DT model provides confidence to legislature and public health officials when planning for disaster preparedness and mitigation.

Hazard Mitigation Plans (HMPs) are required for state, tribal, and local governments for receiving FEMA funds under the Disaster Mitigation Act of 2000. Mitigation planning is important to minimize the impact of natural hazards and disasters on people, the environment, and property (25). According to FEMA, as of December 31, 2020, 50 states have developed HMPs. 23,700 local governments and 222 tribal governments have also developed HMPs, and 85% of the population live in communities with current HMPs (26). Since the University of South Carolina's development of a social vulnerability index, not many states have incorporated social vulnerability analyses into their HMPs. According to the University of South Carolina SoVI® website, only 17 states currently employ their social vulnerability index in their HMPs (17). These states are listed below in Table I.

One likely reason states do not include social vulnerability into mitigation planning is that there is a lack of validation of these quantitative indices (27). Social vulnerability models cost money to produce, and without validation of their predictive abilities they lack practical application (28). This deficiency has been identified by Cutter and other researchers in the vulnerability field (7, 22). Currently, common practices for validating vulnerability models, especially flood vulnerability, is by qualitative comparisons and case studies (29). While some studies that assess the validity of popular social vulnerability models such as the SoVI® exist, additional research is necessary before any existing social vulnerability model is empirically accepted (28, 30).

Illinois is one of the states that utilizes the University of South Carolina SoVI® methodology in its HMP. In the 2018 Illinois HMP, two flood vulnerability analyses are discussed (31). In the 2013 Illinois Statewide Floodhazard Assessment, Remo utilized the FEMA HAZUS® program to assess potential building-related economic losses and utilized the University of South Carolina SoVI® (32).

In 2015, Remo and his team conducted a second flood vulnerability assessment, this time incorporating a social vulnerability index that was created using the University of South Carolina's methodology. The Social Vulnerability Index Remo created, called SVI, is comprised of eight components explaining 78.6% of the variability, identified using PCA. Remo utilized data from the 2000 census and used census tract-

TABLE I
STATES THAT EMPLOY SOCIAL VULNERABILITY INDICES® IN THEIR HAZARD MITIGATION PLANS

Arkansas	New York
Colorado	North Carolina
Florida	North Dakota
Georgia	Oregon
Illinois	South Carolina
Kansas	South Dakota
Mississippi	Tennessee
Missouri	West Virginia
New Mexico	
Source: SoVI® | Hazards & Vulnerability Research Institute | University of South Carolina	

level outputs to create jurisdiction and county-level SVIs. Like Cutter's 2003 SoVI®, Remo found that household income, age, and race were significant factors. To create a final Flood Vulnerability Index (FVI), this study utilized both the SVI and a flood loss index created using FEMA's HAZUS® software package (33).

Remo found that the highest FVIs were in Southern Illinois, primarily along the Mississippi and Ohio Rivers. In urban jurisdictions, like Chicago in the Northeast and East St. Louis in the Midwest, the SVI contribute to high FVI scores. While Remo created a SVI specific to Illinois, he also compared it to the SoVI® and found that they were in 80% agreement (33).

Flood vulnerability has also been assessed at the regional and county levels. The 2019 Cook County Multi-Jurisdictional Hazard Mitigation Plan utilized HAZUS-MH software to assess flood susceptibility across Cook County. The HMP uses HAZUS default vulnerability variables to assess population-level susceptibility to flooding, which include economically disadvantaged populations, population over 65 years old, and population under 16 years old (34). While the Cook County HMP does utilize the FVI developed for the statewide HMP, it focuses on the impact of urban flooding and is an example of how counties and local jurisdictions can evaluate flood vulnerability in a smaller geographic area.

1.1 Setting

In recent years, Illinois has experienced several record flooding events. While Illinois does experience flooding related to the Mississippi and Ohio Rivers that comprise the Western and Southern borders of the state, flooding in the Illinois River watershed has been particularly devastating to counties in northern and central Illinois (35). Sixteen federal disaster declarations have been declared due to flooding (36). Recent significant flood events are presented below:

- 1993: The Mississippi River flood of 1993 was devastating for Illinois. The flood has numerous causes, including weather, soil moisture, hydrologic conditions, flood stages, and levee failures. Record rainfall in Illinois combined with high soil moisture leading to increased runoff, and the River was at flood stage almost continuously from April through September. As a result, at least 16,000 people were displaced, 18 communities were severely flooded, and 17 public water supply centers were damaged or destroyed. Bridges were flooded along both the Mississippi and Illinois Rivers, and elevated water tables along the Mississippi and in the Illinois River Basin continuously discharged to the rivers and presented the opportunity for floodwater to contaminate ground water (37).

- 2002: Heavy rainstorms in Spring 2002 resulted in widespread flooding throughout Illinois. By the end of June, over $10.3 million in federal aid had been distributed to individuals and business in 68 counties and to local governments in 38 counties. Several levees, bridges, and highways were washed out, and agricultural and residential areas were flooded for long periods of time (38, 39)

- 2008: In June 2008, rainfall events in Wisconsin contributed to flooding in Northern Illinois, and as river levels rose further downstream (40). By June 24, 2008, the Governor of Illinois had declared a state disaster for 24 counties (41). Agricultural losses related to this flood were approximately $1.3 billion (40).

- 2013: Widespread rainfall in April 2013 resulted in record flooding on portions of the Des Plaines, Fox, Chicago, Vermillion, DuPage, and Illinois Rivers. This flooding resulted in approximately $375 million of damage due to flash flooding and riverine flooding. Evacuations were necessary in several counties, and major highways and waterways were closed due to flooding (35).

The U.S. Geological Survey (USGS) has delineated 33 major watershed basins in Illinois. These watersheds do not operate in isolation, and are all part of larger watersheds, such as the Illinois River Basin and Upper Mississippi River Watershed (31, 42). The Illinois River Basin covers much of northern and central Illinois and has a drainage area of approximately 28,906 square miles (42). A map of Illinois and the Illinois River basin is presented in Figure 13, Appendix A. The basin includes the area between Lake Michigan and the Mississippi River. Tributaries to the Illinois River include the Kankakee, Des Plaines, Fox, Sangamon, Vermillion, Mackinaw, and LaMoine Rivers, and the Chicago River is connected to the Illinois River via the Illinois and Michigan Canal, constructed in 1933 (43). In 2009, a trend analysis of the yearly flood peaks in 12 watersheds revealed that annual flood peaks have been increasing over the last decades. The 12 small watersheds analyzed in the study were all in Northeastern Illinois and were located in increasingly urbanizing areas (44).

The Chicago Metropolitan Agency for Planning (CMAP) developed Regional Flood Susceptibility Indexes (FSI) to assess riverine and urban flooding. Urban flooding describes flooding related to urban infrastructure and is more difficult to predict than it's riverine counterpart. The CMAP riverine and urban FVIs identified different geographic areas susceptible to each type of flooding. The areas most vulnerable to urban flooding are in Chicago and the surrounding suburbs, and Elgin, Aurora, and Joliet. A smaller geographic area is susceptible to riverine flooding, and the susceptible areas are focused around major rivers as opposed to developed areas. These two FSIs help visualize the impact that urbanization has on flood vulnerability throughout the Chicago metropolitan area (45).

The Illinois River basin encompasses both rural and urban areas and includes several large cities such as Chicago as well as agricultural lands associated with cities such as Peoria (31, 42). Due to the diversity of land use, the demographics of the counties within the Illinois River basin vary greatly. According to data obtained by the US Census QuickFacts website, the least populated county in the Illinois River Basin has 4,739 residents, and the most populated county contains 5,150,233 residents. While on average, the 76.8% of the total population of Illinois is White alone, the Illinois River Basin counties ranged from 65.4% to 94.9%. Similarly, 14.6% of the total population of Illinois identify as Black or African American alone, and the Illinois River Basin ranged from 0.4% to 23.8%. The median household income in 2019 dollars for Illinois is $65,009, and the median household income in the Illinois River Basin ranged from $44,471 to $96,563 (46).

As discussed above, the areas with the highest FVI scores in the Illinois HMP were located along the Mississippi and Ohio Rivers (33), which are along the southern and western borders of Illinois. In order to account for the complexity of Illinois' watersheds, the study area is defined as Illinois with the exception of the counties bordering the Ohio River in the Saline River/Bay Creek and Cache River watersheds. The Saline River/Bay Creek and Cache River watersheds border the Ohio River and do not contain any large urban centers (31). The study area is presented in Figure 13, Appendix A. The recent significant flood events and trends in annual flood peaks along with the demographically diverse counties highlight the need for a refined flood vulnerability analysis for Illinois, especially in the Illinois River Basin.

1.2 Objectives

The purpose of this study is to assess flood vulnerability in Illinois, specifically the Illinois River Basin, using the social vulnerability framework, and to provide validation for the results. Two models, the UIC-SPH decision tree-based model and the commonly applied PCA based model, will be applied. The validity of these models in terms of their ability to predict high-risk areas will be assessed based on FEMA's National Flood Insurance Program (NFIP) data.

The validation methodology proposed by the UIC-SPH team will be applied for a number of flood vulnerability indices for Illinois. The objective of this validation is to assess the PCA and DT derived indices in comparison to existing indices like the FEMA NRI. The target variable for comparison are the NFIP claim data recording actual flood losses within the study area. In addition, a threshold of performance is introduced for all these indices.

2. METHODS AND MATERIALS

This section discusses variable selection, data sources, methods, and validation for this study.

2.1 Variable Selection

Variables for inclusion in our models were selected based on the literature review. A total of 16 demographic indicator variables were selected for inclusion, covering four major themes commonly used in such studies (socioeconomic status, household composition & disability, minority and language status, and housing type & transportation) (6, 7, 20):

1. Percent of total population Black or African American alone;
2. Percent of total population: population in group quarters
3. Percent of civilian population 16 to 19 years: not high school graduate, not enrolled (dropped out)
4. Percent of civilian population in labor force 16 years and over: unemployed
5. Percent of households with social security income
6. Percent of households with supplemental security income (Ssi)
7. Percent married couple family with related child living below poverty level
8. Percent below poverty level: female householder with no husband present with related children under 18 years
9. Percent occupied housing units: no vehicle available
10. Percent of total population: Hispanic or Latino
11. Percent below poverty level: female householder with no husband present
12. Percent 1 year+ householder lived in renter-occupied housing units
13. Percent age 75+
14. Percent households with retirement income
15. Percent of total population over 75 years old
16. Per capita income in 2014.

In addition to the demographic variables, two geophysical variables were selected to include in the model. Elevation and land use were selected since they heavily impact the surface features of an area. Generally, floodwater flows from a higher elevation to a lower elevation. Land use impacts both the permeability and inundation of an area (47). Additionally, most flooding models take land use and elevation into account when estimated flood vulnerability (33, 44).

For the validation of the derived indices, data from FEMA's NFIP will be used. The NFIP was created in 1968 with the passing of the National Flood Insurance Act (48). The redacted claims dataset provides information about the magnitude of flood loss for a given year in a given area. While the redacted dataset does provide county and census tract level information, it does not allow for finer resolution aggregation since detailed information has been redacted to exclude personal identifiable information (49).

2.2 Data Sources

The NFIP claim data was accessed from openFEMA, which is FEMA's data delivery platform. The current NFIP Redacted Claims data is Version1 and contains over 2,000,000 claims transactions from 1975 to 2020. Only data from the State of Illinois was utilized in this study (50). After a review of the Illinois NFIP data and major flooding events in Illinois, two time periods were selected. The first time period spans from 1985 to 1999, and the second spans from 2000 to 2014. These time periods were selected because they encompass both major and minor flooding events statewide, and each has a corresponding complete census data set available (35). We evaluated NFIP data on a county-level. Only claim entries with a FIPS County Code entered was included in the study. This new total amount was normalized to the value of the 2014 U.S. dollar to allow for direct comparisons between the two groups. Illinois has 102 counties. A total of 90 counties in Illinois had NFIP claims in the two time periods; 87 counties were used in the final dataset (Table VIII and Table IX, Appendix B). A table summarizing NFIP loss data utilized in this study is provided in Table X, Appendix B.

Land cover data from the National Land Cover Database (NLCD) is developed by USGS and several partner federal agencies. The 2001 NLCD data was evaluated for this study. While 1992 NLCD data does

exist, it is not directly comparable to any later editions of NLCD, which would prejudice comparisons and inferences made between the two study groups. NLCD2001 uses a classification system that is modified from the Anderson Land Cover Classification System (51). Four classes, or values, exist to describe developed land. These classifications were further condensed into two orders; lightly developed areas and heavily developed areas. Using ArcMap10.6, these classifications were tabulated by county. The resulting counts were divided by total land-use counts, and multiplied by square mileage to calculate the approximate square mileage of lightly developed and heavily developed areas in each county. Table II below describes land use orders and classifications used in the study, and Tables XI and XII, Appendix B contain the tabulated ArcMap output and subsequent methodology used to find county-level area approximations.

TABLE II
CONSOLIDATED LAND USE VARIABLES

Order	**NLCD Class Value**	**NLCD Classification Description**
Lightly Developed	21	Developed, Open Space – areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
	22	Developed, Low Intensity – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% of total cover. These areas most commonly include single-family housing units.
Heavily Developed	23	Developed, Medium Intensity – areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
	24	Developed, High Intensity – highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80 to 100% of the total land cover.
Source: NLCD 2001 Land Cover (CONUS)		

Elevation data was obtained using the Illinois Height Modernization Program's (ILHMP) Digital Elevation Model (DEM) Light Detection and Ranging (LiDAR) collection, produced Illinois Department of Transportation (IDOT) and Illinois State Geological Survey (ISGS) (52). Using ArcMap 10.6, zonal descriptive statistics were calculated for each county. The output table from ArcMap is provided in Table XIII, Appendix B.

Socioeconomic data for each county are from the American Community Survey (ACS); 2018 release of 5-year estimates (53). The 16 variables included were selected based on literature review and the methodology used in the 2016 Sambanis study (21, 54). The variables selected are discussed above in section 2.1 and are presented below in Table 3.

TABLE III
SOCIOECONOMIC AND DEMOGRAPHIC VARIABLES SELECTED FOR INCLUSION

Category	ACS Variables Used
Age	% Age 75+
Poverty	% Married Couple Family: with Related Child Living Below Poverty Level
	% Below Poverty Level Female Householder, No Husband Present
	% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years
Education	% Civilian Population 16 to 19 Years: Not High School Graduate, Not Enrolled (Dropped Out)
	% Population 25 Years and Over: Less than High School Education
Housing	% Total Population: Population in Group Quarters
Income	Per Capita Income 2014
Race - African American	% Total Population: Black or African American Alone
Race - Hispanic	% Total Population: Hispanic or Latino
Supplemental Income	% Households: with Social Security Income
	% Households: with Retirement Income
Transportation	% Occupied Housing Units: No Vehicle Available
Unemployment	% Civilian Population in Labor Force 16 Years and Over: Unemployed

The variable categories provide ample coverage of the four major themes commonly used in such studies (socioeconomic status, household composition & disability, minority and language status, and housing type & transportation) (6, 7, 20).

2.3 Methods

To demonstrate the need for validation we will apply two methodologies for deriving a flood vulnerability index (FVI) for the selected study area.

2.3.1 Decision Tree Methodology

Decision tree (DT) models have been used since the 1960s and are widely used across disciplines due to their ease of use and predictive capabilities (55, 56). Decision tree models use machine-learning algorithms that iteratively sort the input data based on their attributes and a target variable, in this case NFIP losses (23). The goal of DT analysis is to identify a best model for dividing all input data into homogenous classes (57). For this DT model, the methodology developed by the UIC team in 2016 outlined in the Decision Tree-Based Vulnerability Classification Model was applied (22). The IBM SPSS Modeler software was utilized, and the DT model was derived with the C5.0 algorithm (55, 58). As described in a 2016 study conducted by Sambanis, the resulting classification will be a vulnerability category, or severity class (21). The resulting index will be referred to as FVI.DT.

2.3.2 Principal Component Analysis Methodology

The Principal Component Analysis (PCA) methodology is frequently used to derive social vulnerability; both the University of South Caroline SoVI® and the Illinois HMP utilize the PCA approach (7, 33). Principal component analysis is a form of inductive analysis, in which indicator input variables are aggregated into uncorrelated new variables, or Principal Components (PCs) (59). The number of PCs is less than, or equal to, the number of input variables. The first PC accounts for the largest proportion of variability in the data as possible, and each succeeding PC explains the next highest variance possible provided that they are uncorrelated to the first PC (21, 60). For this study, the PCA derivation was

performed with the IBM SPSS Modeler software using the methodology outlined in the 2016 Sambanis and UIC-SPH study (21, 57). The resulting index will be referred to as FVI.PCA.

Other methods commonly applied for social vulnerability index derivation included deductive models that select variables for inclusion based on expert opinion or literature review (59). For this study, we will only be developing the DT and PCA models since it is likely that other models' performances will be inferior to the PCA index derivation methodology (59).

2.4 Validation

An approach developed by the UIC School of Public Health (UIC-SPH) team will be applied to validate the derived FVIs. Like the 2016 and 2019 Sambanis and UIC-SPH studies, an ordinal scale will be utilized to compare the FVI and actual losses from the FEMA NFIP database. In order to utilize an ordinal scale, the FVI, representing a predicted scale of vulnerability, as well as the target variables must be transformed into m classes that represent the severity of the event or incidence (e.g., low, medium, high, severe) (21, 22). According to Sambanis 2016, "this is accomplished using a binning methodology with equal counts per bin (if the total records are even) which creates m new nominal class fields based on the values of one or more existing continuous (numeric range) fields. The equal counts approach was selected due to the lack of reliable thresholds for both comparison components" (21). In this study, the scores of the derived FVI.DT and FVI.PCA will be classified into m classes representing levels of flood vulnerability. The NFIP claim losses will be classified into m' classes representing the severity of actual losses. For practical reasons, m = m'.

The model performance evaluation will utilize a predictive performance matrix (PPM), or a m x m' confusion (or error) matrix (21, 62). We also evaluate the performance of the standard SoVI® model as utilized in the Illinois HMP and the FEMA NRI. This is accomplished by using the UIC-SPH validation methodology (21, 22, 62). We utilize the PPM, presented below in Figure 1, to assess the accuracy of our derived FVIs. In this figure, m represents the highest predicted FVI vulnerability class and m' represents the highest realized NFIP claim loss class.

The PPM identifies correctly and incorrectly classified areas from the FVI and NFIP Claim Loss classes. Correctly classified areas, where the FVI class matches the NFIP claim loss class, are contained in the diagonal elements of the PPM and their sum provide a measure of overall classification performance (OCP). The OCP rate is calculated by taking the sum of the diagonal elements and dividing by the total number of areas, N (21, 22, 62).

With the metrics proposed by the UIC-SPH team (21, 22), we can evaluate the over- and underestimation of the proposed index by using the PPM. Cells below the diagonal elements of PPM represent areas with high NFIP claim losses that were classified into a non-vulnerable class by the FVI. The sum of all areas below the diagonal elements divided by the total number of areas, N, yields the Overall Underestimation Rate (OUR). In particular areas in the highest class of NFIP claim losses but the lowest vulnerability class are represented in cell $C_{m'1}$. Sambanis and the UIC-SPH team call this particular type of underestimation Classification Failure (CF), and it can have significant public health implications in using the FVI to allocate resources. By dividing CF by the total number of areas, N, CF can be expressed as a rate (21, 22).

On the other hand, cells above the diagonal elements represent areas with low NFIP claim losses but a high vulnerability classification predicted by the FVI. The sum of all areas above the diagonal elements divided by the total number of areas, N, yields the Overall Overestimation Rate (OOR). Areas in the lowest class of NFIP claim losses but the highest FVI rank are represented in cell C_{1m}, called False Classification (FC) by the UIC-SPH team (21, 22, 62). Areas in this cell may be allocated resources that they do not need, which can lead to unnecessary waste of valuable resources. Similar to CF, FC can be divided by the total number of areas to yield an FC rate.

The OUR can identify high-risk counties that may be missed by a model, and the OOR can identify counties that are incorrectly classified as high-risk. An index that yields a high OUR or OOR has incorrectly classified areas, and if decisions are made for mitigation planning or public health protective measures based on this information, this can have devastating results. Counties that are low-risk but have been classified as high-risk may receive more assistance and resources which may go to waste. If a large

proportion of high-risk counties are misclassified as low risk, they may not have the resources or plans in place to help them pre- and post-disaster. The most extreme example of underestimation is captured by the CF rate. If a CF rate is high, it implies that many high-risk counties have not been correctly identified by the model and are therefore unlikely to receive the assistance they need.

<table>
<tr><td></td><td colspan="5">Flood Vulnerability Index Classification, j</td><td rowspan="2">Σ</td></tr>
<tr><td rowspan="6">NFIP Claim Loss, i</td><td></td><td>1</td><td>2</td><td>….</td><td>m</td></tr>
<tr><td>1</td><td>OCP_{11}</td><td>C_{12}</td><td></td><td>FC_{1m}</td><td>C_{1+}</td></tr>
<tr><td>2</td><td>C_{21}</td><td>OCP_{22}</td><td colspan="2">Overestimation</td><td>C_{2+}</td></tr>
<tr><td>…</td><td colspan="2">Underestimation</td><td>OCP…</td><td></td><td>…</td></tr>
<tr><td>m'</td><td>$CF_{m'1}$</td><td></td><td></td><td>$OCP_{m'm}$</td><td>C_{m+}</td></tr>
<tr><td colspan="2">Σ</td><td>C_{1+}</td><td>C_{2+}</td><td>…</td><td>C_{m+}</td><td>N</td></tr>
</table>

Figure 1 Predictive Performance Matrix

3. RESULTS AND DISCUSSION

3.1 Data Characteristics

The target variable for validation and DT index derivation is FEMA's NFIP claim data for the 2000-2014 period. Counties bordering the Ohio River and the ones lacking claim records (designated NA for Not Available) have been removed in order to have a meaningful zero claims threshold. In order to enroll in the NFIP program, communities must enroll and participate in the NFIP program, which requires Elevation Certificates or Floodplain Management Planning, depending on the community's designation (63). The total number of counties in the study area complying with these rules is 87 (Figure 13 and Figure 14, Appendix A). In terms of claims, these counties account for 98.7% of the 2000-2014 claims and geographically cover the majority of Illinois' surface.

Figure 14, Appendix A indicates that Cook county and its record level claims amount is likely to test the sensitivity of the two FVI derivation approaches. Cook county accounts for 33.7% of all NFIP claims in the 2000-2014 period. Validation results will be presented with and without Cook County. Figure 2 presents the counties with claims above $400,000, which represents the highest quartile of claims during the 2000-2014 period. Figure 2 and Figure 14, Appendix A corroborate that the study area contains counties with diverse socioeconomic characteristics. These characteristics will be used in the index development approach.

The UIC-SPH team introduced the inclusion of variables representing land cover characteristics while developing classification-based vulnerability indices (62). From the land cover variables, the area of highly developed areas in square miles is divided by each county's area. This proportion of the heavily developed county surface area will be used (HEAVY_DEV_PROP). Figure 3 demonstrates the influence that this variable has on the claims. Once again, Cook county was not included in Figure 4 to better understand the distribution of claims among less developed counties. Another variable introduced specifically for this study is the mean elevation (Mean_El). Conceptually, elevation has the potential to influence the severity of floods.

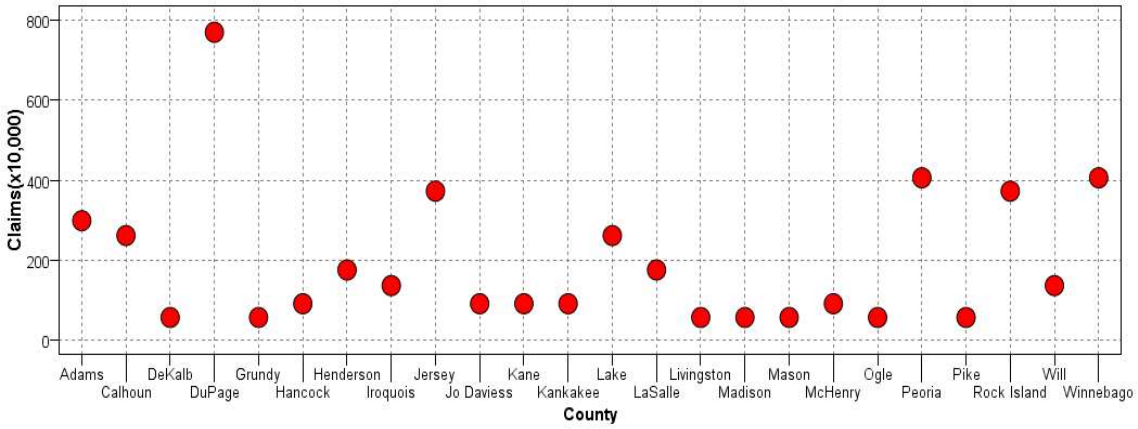

Figure 2 Claims above $400,000 by County

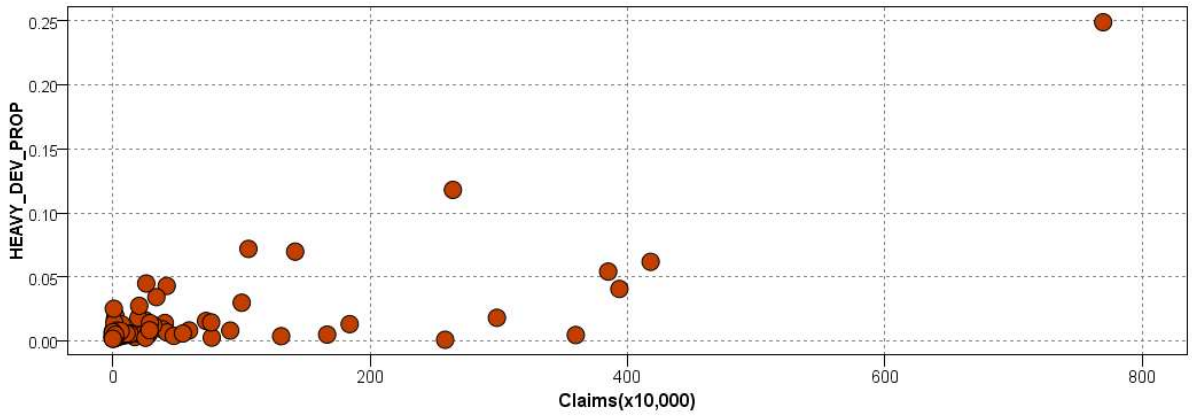

Figure 3 Proportion of Heavily Developed Areas by County

3.2 Validation of Decision Tree and PCA Models

This study followed the methodology developed by the UIC-SPH team and used a target variable and the PPM to optimize the indices regardless of the derivation approach (21, 62). The target variable for validation is FEMA's NFIP claim data for the 2000-2014 period. All economic variables have been adjusted to the 2014 U.S. dollar. The majority of input variables are in percent and include the socioeconomic and demographic variables presented in Table 3, land cover (HEAVY_DEV_PROP), and elevation (Mean_El).

3.2.1 DT Index Derivation and Validation without Cook County

The UIC-SPH validation approach, based on a target variable and the PPM, can be used to optimize the indices regardless of the derivation approach (21, 62). In order to develop the FVI.DT, the C5.0 algorithm was used with four output classes. However, as discussed in the 2016 Sambanis study, the C5.0 algorithm tends to overfit the model. In order to mitigate overfitting, the C5.0 algorithm was used with the significant only variables, identified using the importance metric for decision tree algorithms in the SPSS-Modeler (21, 64). For our FVI.DT, the sixteen input variables presented in Table III were included in the initial model. Of those sixteen variables, eight variables were significant in the DT model. These variables and their relative importance in the DT model are presented in Table IV and in Figures 19 and 20, Appendix C. The target variable for validation of the FVI.DT is FEMA's NFIP claim data for the 2000-2014 period. All economic variables have been adjusted to the 2014 U.S. dollar. The DT model takes the form of a decision tree structure (available upon request). The relative importance of each input, or predictor, variable in establishing the model structure is summarized by the importance metric (see Table IV). Figure 15, Appendix A shows the mapped FVI.DT for counties in Illinois. As evidenced in Figure 15, the majority of high-vulnerability counties identified by FVI.DT are in the Illinois River Basin and along the Mississippi River.

Figure 4 below presents the PPM for FVI.DT. The FVI.DT yields an overall classification performance rate of 87.2%. The overall overestimation rate (OOR) is 4.7% and the overall underestimation rate is

TABLE IV
INPUT VARIABLES AND THEIR RELATIVE IMPORTANCE IN THE DECISION TREE MODEL

Input Variable	Importance in DT model
% Occupied Housing Units: No Vehicle Available	0.37
% Population 25 Years and Over: Less than High School	0.20
HEAVY_DEV_PROP	0.13
% Households: with Public Assistance Income	0.12
% Total Population: Hispanic or Latino	0.09
% Civilian Population 16 to 19 Years: Not High School Graduate, Not Enrolled (Dropped Out)	0.06
% Total Population: Population in Group Quarters	0.02
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	0.01

NFIP Claim Loss	FVI.DT Classification (without Cook County)				
		1	2	3	4
	1	19	2	1	0
	2	1	19	1	0
	3	2	1	19	0
	4	1	2	0	18

OPR: 87.21%
OOR: 8.14%
OUR: 4.65%
CF: 1.16%
SAD: 18

Figure 4 Predictive Performance Matrix for FVI.DT

8.1%; the classification failure rate (CF) is 1.1%. These summary performance metrics indicate an range of performance for FVI.DT that will be judged in comparison to other FVI. The sum of absolute differences (SAD) provides another useful metric for assessing the performance of FVI.DT. In this case, the SAD is 18 and the spatial distribution of underestimated and overestimated counties is presented in Figure 16, Appendix A. The county with the highest level of underestimation is Jersey County, which is located at the confluence of the Illinois and Mississippi Rivers. The most overestimated county is Pulaski County, located on the southern tip of Illinois.

3.2.2 PCA Index Derivation and Validation without Cook County

Following the UIC-SPH methodology, "Principal Component Analysis results yield Principal Components (PCs) that can be interpreted by review of the Communalities and Components. Communalities is the proportion of each variable's variance that can be explained by the principal components" (21, 65). The primary stopping mechanism in this study for PC selection was based on eigenvalues; only components with eigenvalues greater than one were selected for inclusion. For this FVI.PCA, we used the same 16 input variables listed in Table III. The communalities matrix for the 16 components is provided in Table XIV, Appendix C. The initial FVI.PCA 16 variable data structure can be represented by five uncorrelated PCs explaining 77.4% of the variability.

The FVI.PCA was derived by adding each of the five PCs scores. The typical social vulnerability index derivation methodology changes the directionality of each component subjectively based on literature review or professional judgement. For example, a purely economic PC is expected to be negative since a high economic status implies low vulnerability. The UIC-SPH validation approach provides a better way to assign directionality for each PC with the use of the PPM.

In this case, all positive PCs yield an overall performance of 29.1%. A change of directionality for the first PC yields an OPR of 27.9%. By trial and error, we identified that a -PC1, +PC2, +PC3, -PC4, and +PC5 will yield an OPR of 37.2%. Thus, by using the SPH-UIC methodology, arbitrary interpretations of directionality are avoided and the overall predictive performance of FVI.PCA.1 is improved.

Each of the 16 components are presented in Table XV, Appendix C, with each row representing an individual component and their relative eigenvalues (66). Table XVI, Appendix C also presents the component matrix for the PCA model. The PPM for FVI.PCA is presented Figure 5. As discussed above, the OPR is 37.2%. The OUR is 29.0% and the OOR is 33.7%; the CF is 3.7%.

	FVI.PCA Classification (without Cook County)			
NFIP Claim Loss	1	2	3	4
1	9	4	6	3
2	3	9	5	4
3	6	2	7	7
4	4	6	4	7

Overall Performance Rate:	37.21%
Underestimation Error:	29.07%
Overestimation Error:	33.72%
Classification Failure:	4.65%

Figure 5 Predictive Performance Matrix for FVI.PCA

Figure 6 further clarifies the issues encountered with the PCA approach. The scores for each PC are normalized; subsequently the additive model used to derive the FVI.PCA will have a distribution resembling the normal distribution. FVI.PCA should approximate the distribution of all the claims at least in terms on location on Figure 6 (i.e., high percent claims should correspond to high FVI.PCA scores). As visible in Figure 6 below, this is not the case. The majority of high claims are located close to the horizontal line representing the average FVI.PCA scores. Underestimating the high-risk areas by 29% is a major concern. Therefore, this FVI.PCA cannot be considered as a reliable index.

One of the objectives of this study is to demonstrate the ability off the UIC-SPH validation approach to optimize and explore indices, which was first introduced in 2015 by Bakhsh and the UIC-SPH team (66). With the UIC-SPH approach, the PCA.FVI improved from a 37.2% to 43.02% OPR, with four PCs explaining 73.6% of the variability. Matrices presenting the communalities, total variance explained, and components are provided in Tables XVII, XVIII, and XIV of Appendix C. and Worth noting is the number of input variables was reduced to 14, and the directionality for each of the four PCs is -PC1, +PC2, +PC3, and -PC4. The PPM for FVI.PCA.2 is presented in Figure 7. While this FVI.PCA is an improvement, with an OPR of 43.02% and CF of 3.6%, the OOR is 29% and the OUR is 2.9%. Thus, the improved FVI.PCA

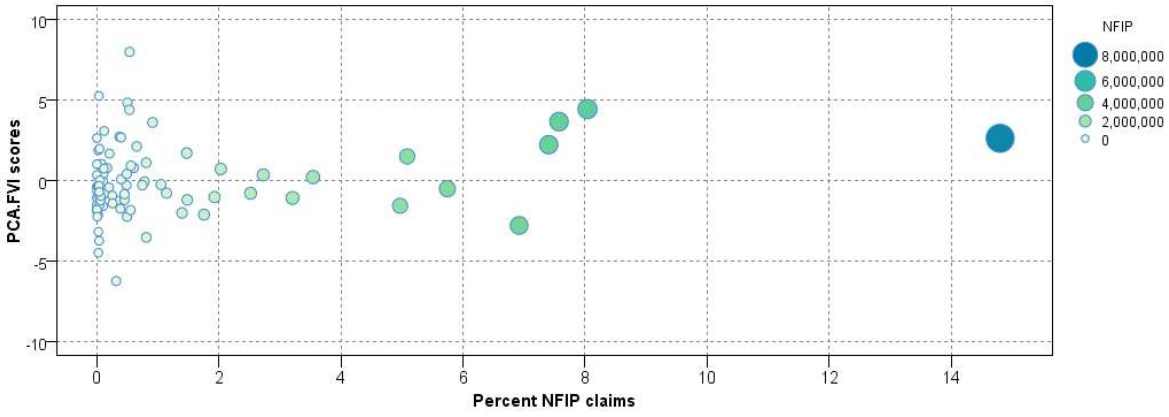

Figure 6 PCA.FVI.1 score by NFIP Claim Percentile

NFIP Claim Loss	FVI.PCA Classification (without Cook County)				
	1	2	3	4
1	10	6	5	1
2	6	8	3	4
3	4	3	9	6
4	2	4	5	10

OPR: 43.02%
OOR: 27.91%
OUR: 29.07%
CF: 2.33%
SAD: 72

Figure 7 Predictive Performance Matrix for FVI.PCA after UIC-SPH methodology applied

remains problematic in correctly identifying at-risk counties. This is further reflected in the SAD, which is 72. Figure 17, Appendix A shows the mapped FVI.PCA for counties in Illinois. Similar to FVI.DT, most of the high-vulnerability counties identified by FVI.PCA are in the Illinois River Basin and along the Mississippi River. Figure 18, Appendix A shows the spatial difference of the loss differences between NFIP claims classes and FVI.PCA vulnerability classes. As visible in Figure 18, both the incidence and magnitude of under- and overestimation is much greater than FVI.DT. The improvement in FVI.PCA is visualized further in Figure 8 since the distribution of high claim counties has moved away from the horizontal line.

3.1.1 Validation of the FVI for the Study Area

The PPM comparison of the FVI.DT and FVI.PCA substantiates that the DT approach is far superior to deriving a FVI for a region having the characteristics of the selected study area. This simple comparison does not have the characteristics of a performance threshold and it will not suffice. To establish this

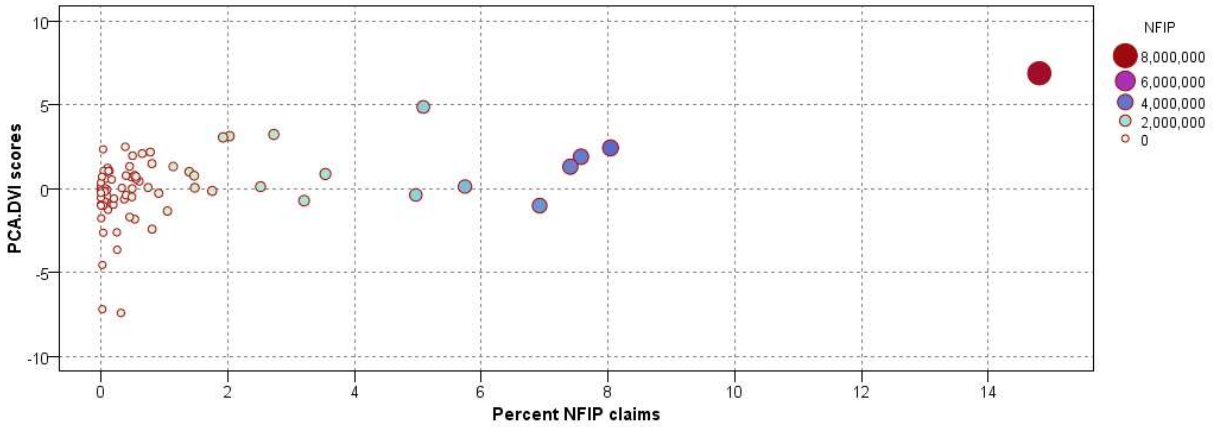

Figure 8 FVI.PCA by NFIP Claim Percentile

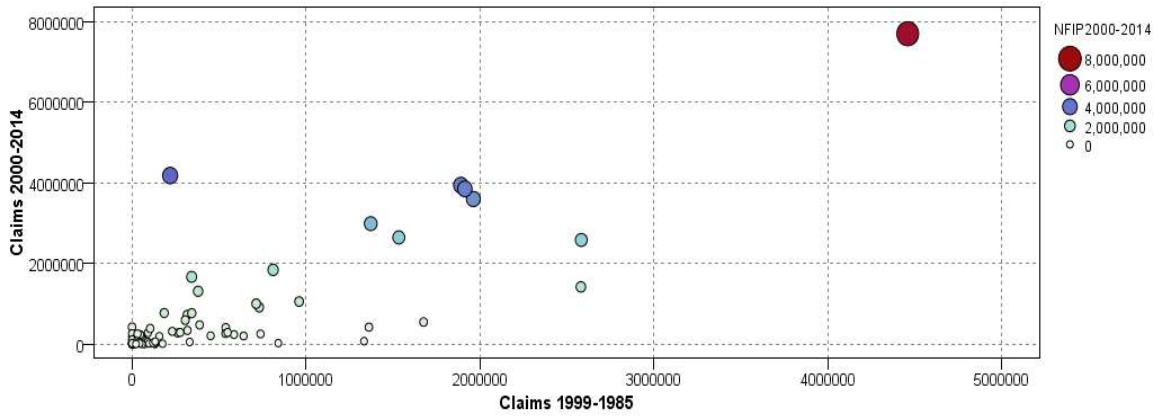

Figure 9 NFIP Claim Distribution Across the Two Time Periods

threshold the comparison between two time periods with recorded claims will be used. Figure 9 delineates the relationship of these two periods. With only one exemption, a trend seems to be established that indicates that both the previous claims from 1985-1999 can be used as a reference point for the 2000-2014 claims. Claims for both periods have been adjusted to the 2014 U.S. Dollar.

Conceptually, the flood mitigation measures implemented between the two time periods are expected to lessen the intensity of the losses and establish a relationship with a lower slope. However, better reporting, increased NFIP participation, and the likelihood of climate change-related weather events seem to be reflected in these results.

The existence of a previous loss realization will assist us in establishing the minimum performance threshold metric introduced by the UIC-SPH team (62). This performance threshold is established by comparing the two loss realizations in a PPM context. At a practical level, this performance threshold is a reasonable expectation for any FVI, especially those aspiring to contribute to HMPs or public health planning. “A vulnerability indicator based on numerous input variables and in some cases, a relatively sophisticated derivation approach is expected to perform as well as a naïve index based on a previous realization event” (62). The PPM results for these two realizations are presented in Figure 10, which establishes the performance threshold for four classes as 46.5%.

Based on this performance threshold, only the FVI.DT exceeds the minimum requirements. Table V presents a comprehensive assessment for several flood vulnerability indices. In order to accurately evaluate these indices, they are divided into two different groups based on the number of output categories. Our derived FVI.DT, FVI.PCA, and the 2013 Remo Flood Vulnerability Rating have four output categories (31, 32) In order to compare our derived FVIs to the FEMA NRI and the Illinois HMP Flood Hazard Rating, we modified the models to have three output categories (23, 31). The PPMs for each of these indices are provided in Figures 21 through 32, Appendix C.

NFIP Loss \ NFIP Claim Loss	1	2	3	4
1	11	8	3	0
2	8	8	5	0
3	3	3	8	8
4	0	2	6	13

Overall Performance Rate:	46.51%
Underestimation Error:	25.58%
Overestimation Error:	27.91%
Classification Failure:	0.00%

Figure 10 Minimum Performance Threshold Matrix

TABLE V
COMPREHENSIVE INDEX PERFORMANCE ASSESSMENT

Index	OPR	OUR	OOR	CF	SAD
4 Class					
Threshold	46.5%	25.5%	27.9%	0.0%	54
FVI.DT	87.2%	8.1%	4.7%	1.1%	18
FVI.PCA	43.0%	27.9%	29.0%	2.3%	72
IL FVA 2013	22.1%	51.2%	33.7%	5.8%	105
3 Class					
Threshold	60.5%	20.9%	19.8%	1.2%	36
FVI.DT	86.0%	11.6%	2.3%	9.3%	20
FVI.PCA	43.0%	31.4%	29.1%	4.7%	56
FEMA NRI	41.9%	34.9%	25.6%	8.1%	59
IL HMP FVI	30.2%	26.7%	43.0%	2.3%	66

As evidenced in Table V, both the Illinois HMP and 2013 Flood Vulnerability Assessment have the poorest predictive performance when using NFIP claim data as the target variable. The OUR for the 2013 flood assessment is 51.2%, this implies that about half of the counties experiencing flood losses are underestimated. The OUR and OOR for the Illinois HMP FVI are 26.7% and 43.0%, respectively. This level of under- and overestimation for a mitigation plan implies that planning and resources are not targeting the right counties in Illinois.

3.2 DT and PCA Index Derivation with Cook County

The inclusion of Cook County in the data structure creates a challenge since records for Cook County account for 33.7% of total claims for the 2000-2014 period (Table X, Appendix B). From a prediction perspective, the outcome is known since Cook County leads the state with claims. The challenge lies in assessing the sensitivity of the derivation approach. The optimized PCA.FVI index identified in Section 3.2.2 with 14 variables and -PC1, +PC2, +PC3, and -PC4 components will be used. The results for this validation are presented in Figure 11A and 11B below.

A

NFIP Claim Loss	FVI.PCA Classification (with Cook County)			
	1	2	3	4
1	9	6	5	2
2	8	5	8	1
3	4	6	5	7
4	1	5	4	11

Overall Performance Rate:	34.48%
Underestimation Error:	32.18%
Overestimation Error:	33.33%
Classification Failure:	1.15%

B

NFIP Claim Loss	FVI.PCA Classification (without Cook County)				
	1	2	3	4	
1	10	6	5	1	
2	6	8	3	4	
3	4	3	9	6	
4	2	4	5	10	

Overall Performance Rate:	43.02%
Underestimation Error:	27.91%
Overestimation Error:	29.07%
Classification Failure:	2.33%

Figure 11 PPM for FVI.PCA with Cook County (A) and PPM for FVI.PCA without Cook County (B)

The inclusion of Cook County, a high-claim outlier, has a significant impact on the diagonal elements, reducing performance to 34.48%. The OOR and OUR increase to 33.3% and 32.1%, respectively, meaning more counties are likely to be either over- or underestimated if Cook County is included.

The performance of FVI.DT with Cook County was also assessed. The results for this validation are presented below in Figures 12A and 12B. The DT approach seems to be less sensitive than the FVI.PCA, since the diagonal elements are less impacted and overall performance is only reduced to 82.76%. The OOR is increased to 5.7%, and the OUR is increased to 11.5%. The FVI.DT with Cook County still exceeds the performance threshold criteria established in Section 3.2.3.

A

NFIP Claim Loss	FVI.DT Classification (with Cook County)				
	1	2	3	4
1	19	2	1	0
2	2	18	2	0
3	1	3	18	0
4	2	2	0	17

Overall Performance Rate:	82.76%
Underestimation Error:	11.49%
Overestimation Error:	5.75%
Classification Failure:	2.30%

B

NFIP Claim Loss	FVI.DT Classification (without Cook County)				
	1	2	3	4
1	19	2	1	0
2	1	19	1	0
3	2	1	19	0
4	1	2	0	18

Overall Performance Rate:	87.21%
Underestimation Error:	8.14%
Overestimation Error:	4.65%
Classification Failure:	1.16%

Figure 12 PPM for FVI.DT with Cook County (A) and PPM for FVI.DT without Cook County (B)

3.3 Comparison of Vulnerability Classification in Terms of Input Variables

The elements of the PPM reveal real dimensions of performance in comparison to an actual event. Therefore, it is expected that beyond the derivation methodology, a high-vulnerability class will correspond to a class containing counties with high losses. Within this context, Table VI below shows the

distribution of each of the input variables and loss information throughout the four FVI.PCA output classes.

A meaningful directionality is an implicit premise of the PCA derivation approach (66). Another equally important premise is that the derived FVI will classify regions with socioeconomic characteristics that make regions vulnerable to disasters. The PCA derived FVI implies vulnerability to flood (losses) and, implicitly, the assumption is made that low socioeconomic status (SES) communities are the most vulnerable. The current study and its findings underline a different reality and confirm the findings of other studies that the PCA derived index does not identify vulnerable to a disaster (i.e., loss) areas (22, 62). A significant finding as well is that the PCA derived index identifies communities with the typical SES profiles.

From Table VI, we can see that the profile of a high-vulnerability class (Class 4) contains counties that do not exhibit typical characteristics of SES vulnerability. For example,

- Per capita income is highest for the most vulnerable class.
- Educational attainment also increases in the more vulnerable classes.
- Vehicle availability increases with vulnerability.
- Proportion of heavily developed land use increases with vulnerability.
- Percent of total population identifying as Hispanic or Latino is highest in the most vulnerable class.
- Proportion of total population in group quarters decreases in more vulnerable classes.
- Additionally, the percentage of households with public assistance income decreased in the more vulnerable classes.

This is antithetical to much of the existing social vulnerability research and the proposed conceptual frameworks (7, 11). An argument could be made that the selected directionality of the PCs are

responsible for this antithetical finding, however, the original unaltered PC model yields an index with a predictive performance less than 30% (see section 3.2.2).

TABLE VI
DISTRIBUTION AND DIRECTIONALITY OF INDICATOR VARIABLES ACROSS FVI.PCA VULNERABILITY CLASSES

FVI.PCA Class	**1**	**2**	**3**	**4**	**Directional Difference (4th - 1st)**
Number of Counties	22	21	22	21	
Mean NFIP (x10000)	$ 267.11	$316.94	$467.30	$1,389.59	$1,122.49
Total Population	516,162	453,050	1,315,945	5,114,497	4,598,335
Per Capita Income 2014	$ 22,485.69	$ 24,938.64	$ 26,296.91	$ 30,071.93	$ 7,586.25
% Occupied Housing Units: No Vehicle Available	6.724	6.277	5.977	5.504	-1.22
% Population 25 Years and Over: Less than High School Education	15.961	12.719	11.351	10.834	-5.13
HEAVY_DEV_PROP mean	0.006	0.005	0.01	0.045	0.04
% Households: with Public Assistance Income	1.893	1.633	1.63	1.581	-0.31
% Total Population: Hispanic or Latino	3.175	1.82	3.41	9.45	6.28
% Total Population: Population in Group Quarters	8.81	3.103	2.403	2.09	-6.72
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	4.747	4.235	4.632	4.138	-0.61

Table VII shows the same distribution of input variables and loss information throughout the four FVI.DT output classes. For this case, no assumption is made about the directionality of the input variables and the objective is to derive a decision tree structure that can predict the classification based on actual losses. The SES characteristics of the counties vulnerable to flooding are similar to the ones identified by the PCA methodology; however, for this index there is no conceptual antithesis. The DT based index does

not assume any *a priori* SES profile characteristics associated with vulnerability. For this study area and the flood losses realization, a relatively rich (per capita income) county is more likely to report higher losses since the underlying assets are likely to be higher. Sparsely populated counties, regardless of other SES variables, are likely to be less impacted by disasters measured in terms of losses. Percent of the total population in group quarters includes those who are incarcerated, living in nursing homes, or in university housing. For this study, areas with higher proportions of individuals living in group quarters were less vulnerable.

TABLE VII

DISTRIBUTION AND DIRECTIONALITY OF INDICATOR VARIABLES ACROSS FVI.DT VULNERABILITY CLASSES

FVI.DT Class	**1**	**2**	**3**	**4**	**Directional Difference (4th - 1st)**
Number of Counties	23	24	21	18	
Mean NFIP	$ 180.69	$ 153.98	$ 250.84	$ 2,159.73	$ 1,979.04
Total Population	662,761	761,055	1,816,604	4,159,234	3,496,473
Per Capita Income 2014	$ 24,505.31	$ 25,282.40	$ 25,656.22	$ 28,847.72	$ 4,342.41
% Occupied Housing Units: No Vehicle Available	5.408	6.247	7.267	5.55	0.14
% Population 25 Years and Over: Less than High School Education	13.036	13.18	12.635	11.888	-1.15
HEAVY_DEV_PROP mean	0.006	0.007	0.015	0.043	0.04
% Households: with Public Assistance Income	1.783	1.573	1.786	1.597	-0.19
% Total Population: Hispanic or Latino	2.727	3.345	4.268	8.272	5.55
% Total Population: Population in Group Quarters	4.427	4.631	4.898	2.218	-2.21
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	4.074	4.544	5.101	4.018	-0.06

At a practical level these findings raise the issue of appropriateness for HMP of indices based on the PCA derivation approach. These findings, in no way underestimate the importance of vulnerability as a concept, but they do imply that current methodologies are not applicable for mitigation planning or resource allocation. In order to correctly identify vulnerable areas and populations, a vulnerability index must be empirically validated. The DT derivation approach utilizes a target variable, which allows for greater predictive performance opposed to it's PCA derived counterpart.

3.5 Summary Discussion of Results and Findings

Our derived FVI.DT for the study area outperformed the optimized FVI.PCA. The UIC-SPH performance optimization methodology for PCA models is not the standard approach for deriving indices, but the optimized FVI.PCA outperformed the initial derived PCA model. The \ FVIs with the highest overall performance rates for both approaches were derived with fewer than 16 variables. This practice is in accordance with the principle of parsimony which promotes the notion of establishing models that use the smallest number of possible parameters to explain a phenomenon (67). The only way to accomplish this in the context of vulnerability studies is to use the UIC-SPH validation approach as demonstrated in this and other studies (22, 23, 55, 61).

While all of the DT socioeconomic input variables (e.g. education, housing, race, social dependence, etc.) have demonstrated impact on vulnerability, they are different from the sociodemographic variables selected by Remo's SoVI® in the 2015 Illinois Flood Vulnerability Assessment (6, 33). In the Remo model, age, white and nonwhite race, household income bracket, employment in commercial or industrial industry, and renter-occupied, owner-occupied, and vacant homes were used. Our FVI.DT model includes education, unemployment, supplemental income, and access to transportation. These significant indicator variables, along with their unique impact on vulnerability classification highlight the need for area-specific modelling to account for the nuanced interactions of socioeconomic, demographic, and geophysical condition. Applying a model that was developed for a different region or on a larger scale may miss locally significant input variables and their unique impact on vulnerability.

While many flood vulnerability indices do account for land use and geophysical conditions that contribute to hazard vulnerability, they are frequently assessed separately from social vulnerability and added in when creating a final aggregate index (6, 33). The incorporation of physical variables, such as land cover, into the vulnerability model has been utilized by the UIC-SPH team in prior studies (62). In our FVI.DT, the proportion of heavily developed land use was the third most important variable in the model (see Table 4). This is in line with much literature citing the impact of permeable surfaces and the overwhelming of drainage systems in developed areas (31, 44). Land cover was more significant than elevation in predicting flood losses in the FVI.DT. Figure 15, Appendix A, which shows the spatial distribution of the FVI.DT results, corroborates this point. Counties in the highest vulnerability class are also counties with urban or suburban centers, and are primarily located in the Illinois River Basin.

The UIC-SPH performance optimization methodology applied to FVI.PCA resulted in improved predictive performance. While many PCA models for vulnerability examine derived PCs and classify them based on type (e.g. education, socioeconomic status, race), this is not necessary when applying the UIC-SPH methodology. When optimizing models using a target variable for validation, the predictive performance is more significant than grouping the PCs by characteristics of the indicator variables and assigning directionality based on professional opinion. For example, the first two PCs in our optimized 14-variable FVI.PCA may be classified as socioeconomic status and race, but there are other variables that contribute to these components, such as access to transportation and the proportion of heavily developed land use. Instead of focusing on classifying these PCs and assigning directionality based on literature review or professional judgement, we utilize the impact on the predictive performance to determine directionality. These results are similar to other studies conducted by the UIC-SPH team (21, 22, 62, 68).

Many prior flood vulnerability studies have utilized FEMA HAZUS as a tool to estimate and delineate flood losses. HAZUS projects losses using a simulated event, and is not generally used for research purposes (31).While HAZUS does allow for user-defined inputs in the modelled events, the resulting

losses are only projections. By using actualized losses as our target variable in the FVI.DT and to validate the results, we are able to assess how the model performs to predict real flood losses.

4. LIMITATIONS

This analysis was conducted on a county level and across two time periods. NFIP claim data is only available for communities that participate in NFIP. While Illinois leads the nation in enrollment for non-coastal states, not all counties participate. NFIP enrollment is mandated for those living within FEMA designated flood areas, but recent research has pointed out that FEMA DFIRM maps are woefully out of date (69). Additionally, agricultural losses are not captured in this model. This study did not focus on the interpretation of the Decision Tree structure.

5. FURTHER RESEARCH

Based on the results of this study, recommendations for further research are presented below.

1. The applicability of DT analysis on different scales, both on a state-level and tract level.
2. The applicability of DT vulnerability models for other disasters other than flooding.
3. The applicability of DT vulnerability models for emergency and public health planning.
4. Use HAZUS loss estimations to determine the applicability of DT vulnerability models for capturing agricultural losses.
5. Use of other machine learning algorithms (e.g. Random Trees) to compare and optimize performance.

6. CONCLUSIONS

This study demonstrates the need for validation for social vulnerability indices, especially for flood vulnerability. Existing social vulnerability indices for Illinois use percentile rank or principal component analysis (PCA) methodologies and create vulnerability indices from these models. In this study, we created two new flood vulnerability indices for Illinois; one using Decision Tree methodology (FVI.DT) and one using PCA (FVI.PCA). National Flood Insurance Program (NFIP) claim data for two time periods as a metric of realized loss and was used to validate the indices and to derive minimum performance thresholds.

Our FVI.DT yielded the highest overall performance rate (87.2%), and fifteen of the nineteen counties in the highest vulnerability class were located in the Illinois River Basin. The Illinois River Basin contains both urban and rural communities and land use is diverse. The relative importance of highly developed land use in the FVI.DT model highlights the impact of urbanization on flood vulnerability. By applying the UIC-SPH performance optimization methodology to the FVI.PCA models, the overall performance rate increased from 37.21% to 43.02%. However, the overall performance rate is still below the minimum performance threshold of 46.5%.

The predictive performance of FVI.DT and FVI.PCA was compared to the performance of existing flood vulnerability indices. FVI.DT is the only index that exceeds the minimum performance threshold criteria. The current FVIs in the Illinois HMP and the 2015 Flood Vulnerability Assessment drastically under- and overestimate flood vulnerability on a county level when using NFIP claim data as an outcome. This has significant planning and public health implications for counties in Illinois. This finding highlights the need for validation of existing social vulnerability indices in order to provide confidence in practical applications.

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APPENDICES

Appendix A
Maps

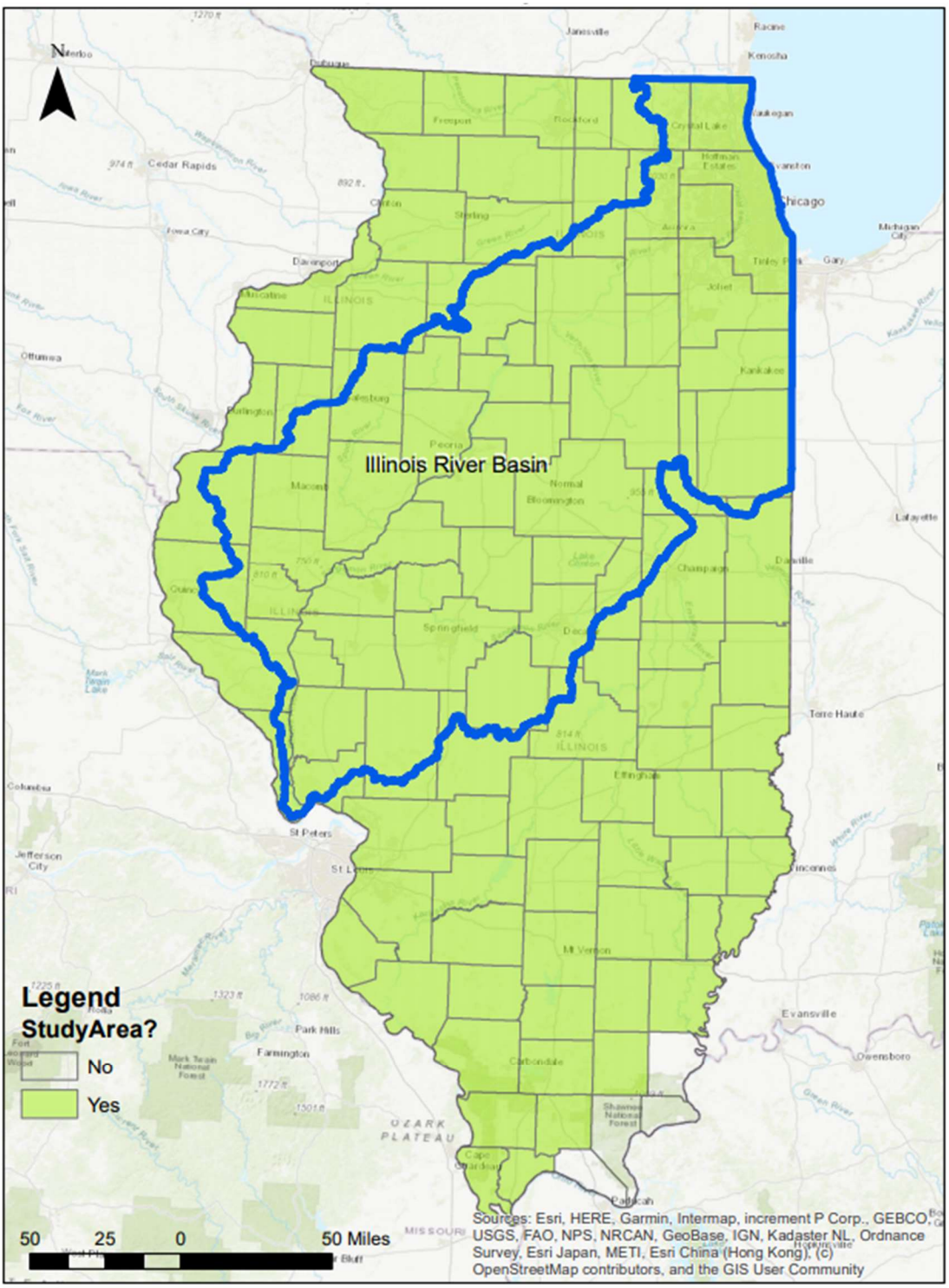

Figure 13 Study Area

Appendix A (continued)

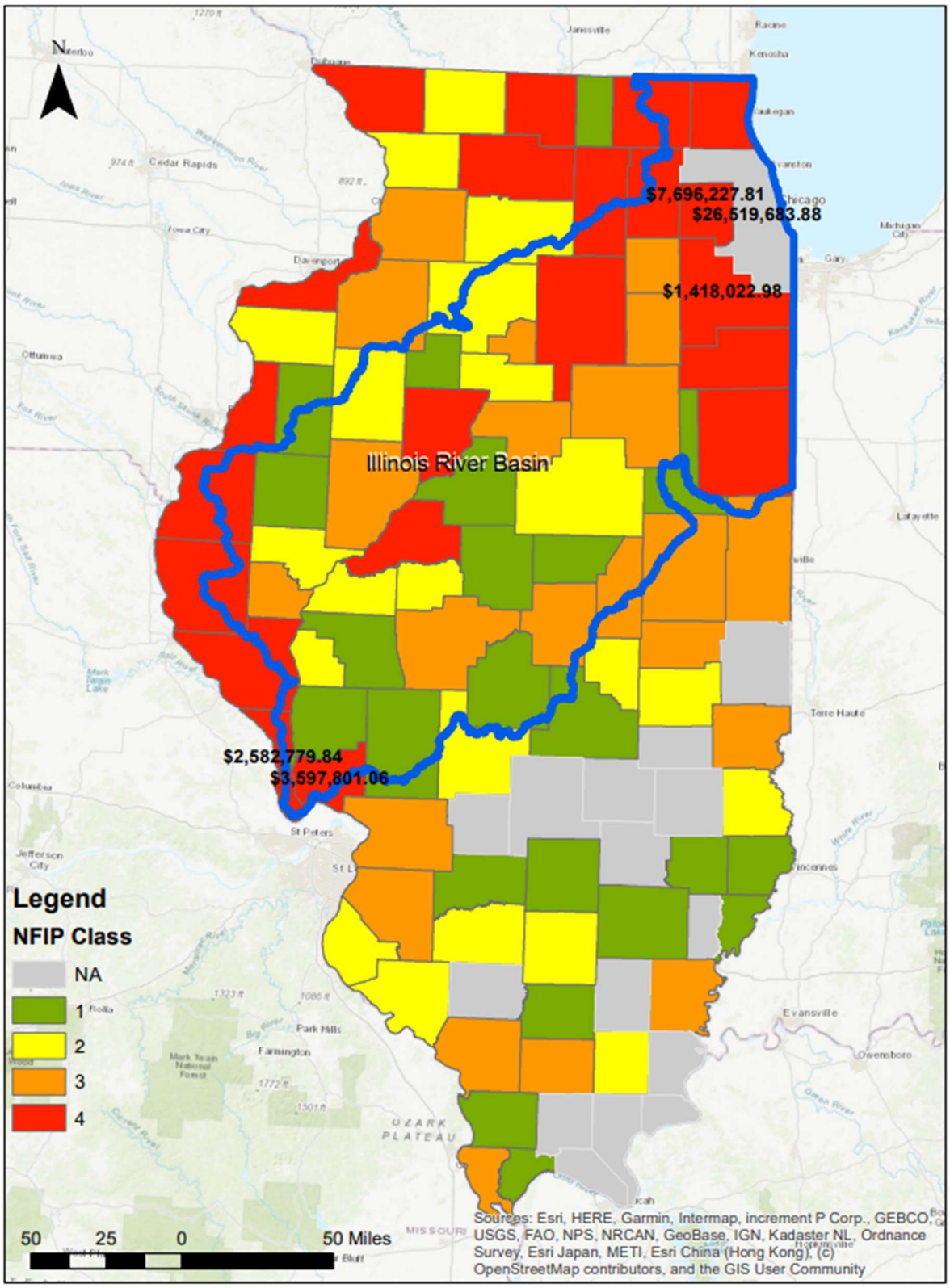

Figure 14 NFIP Claim Class and Top 5 Claims

Appendix A (continued)

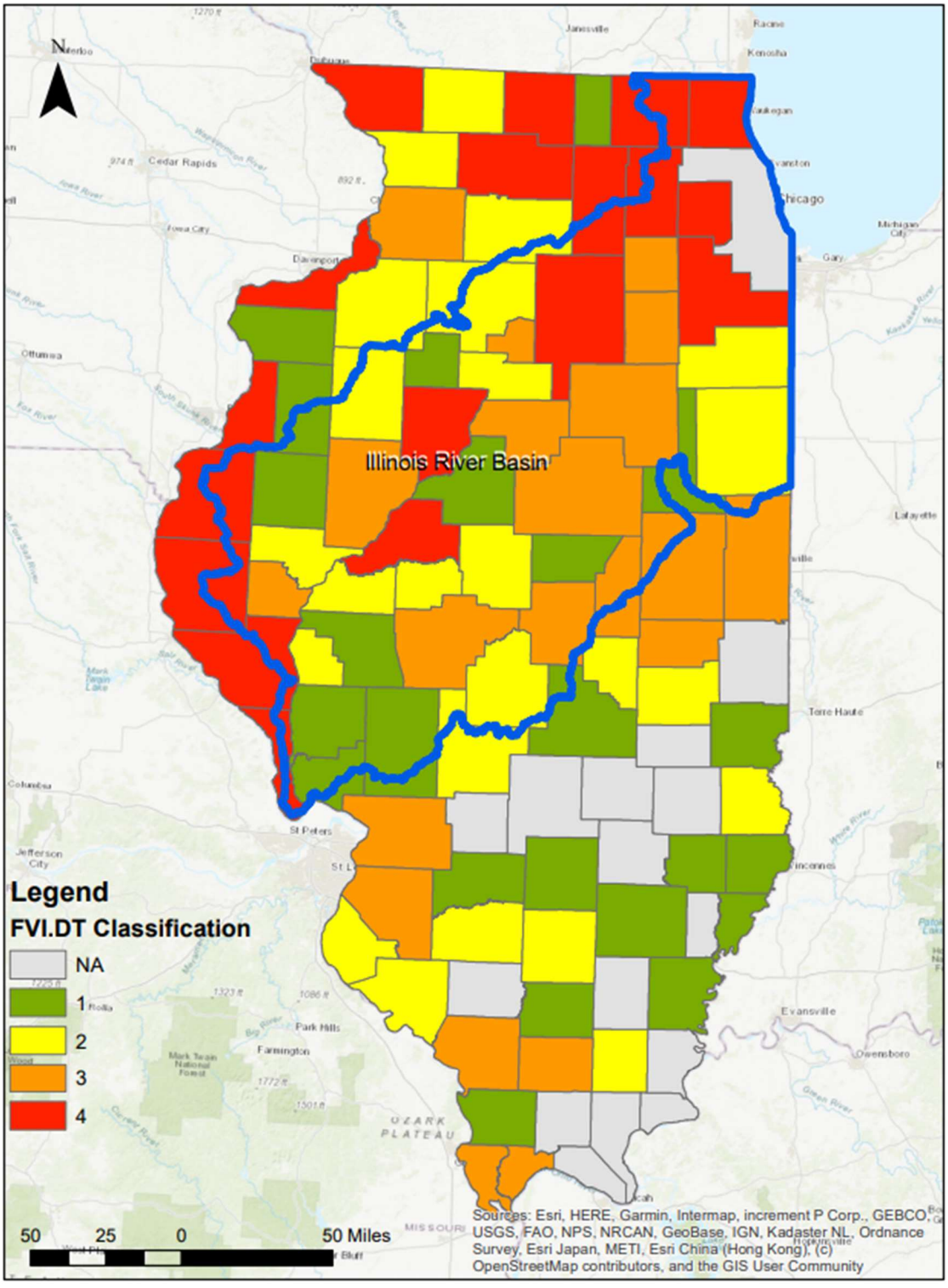

Figure 15 FVI.DT Results

Appendix A (continued)

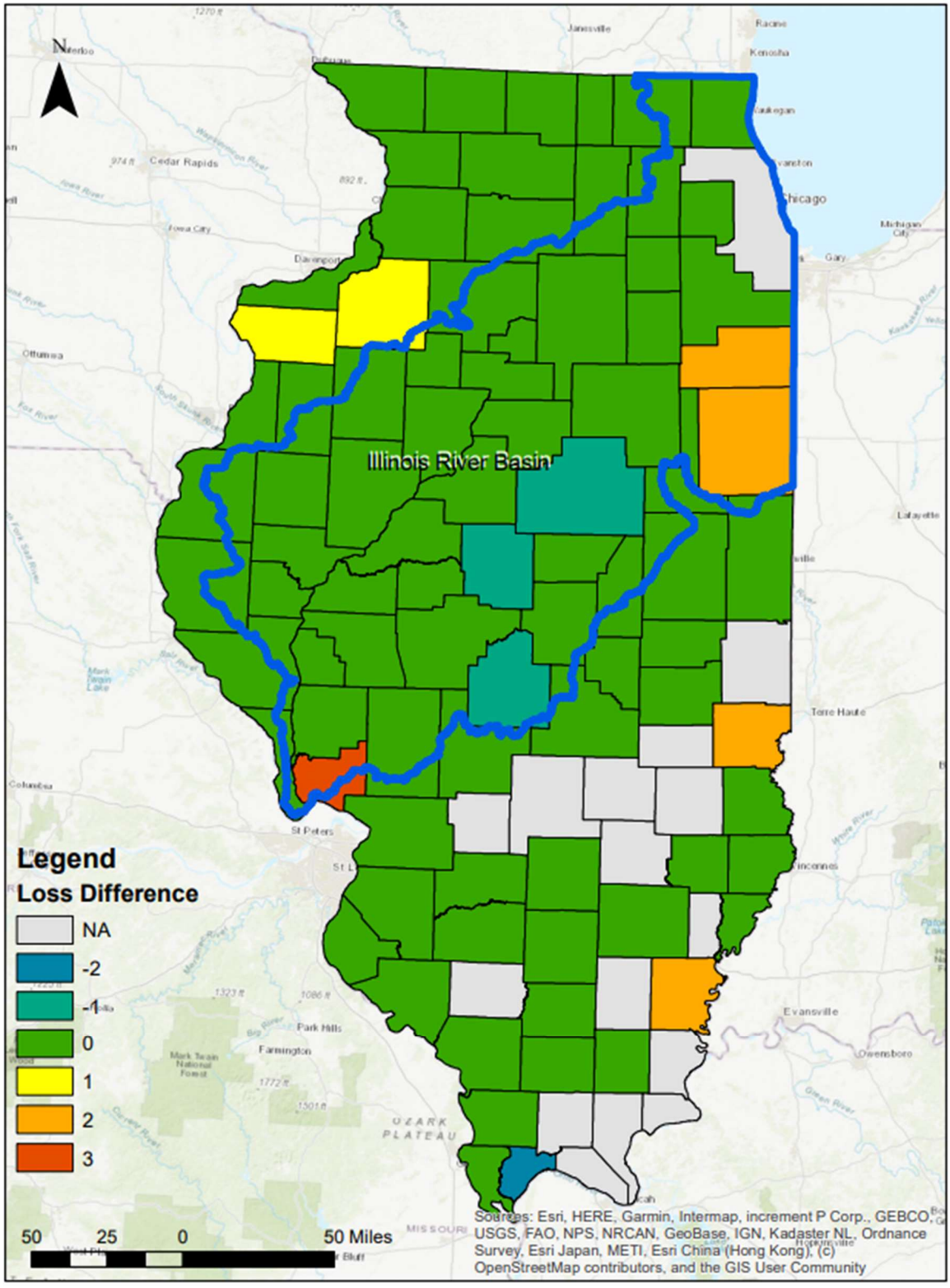

Figure 16 NFIP and FVI.DT Loss Difference

Appendix A (continued)

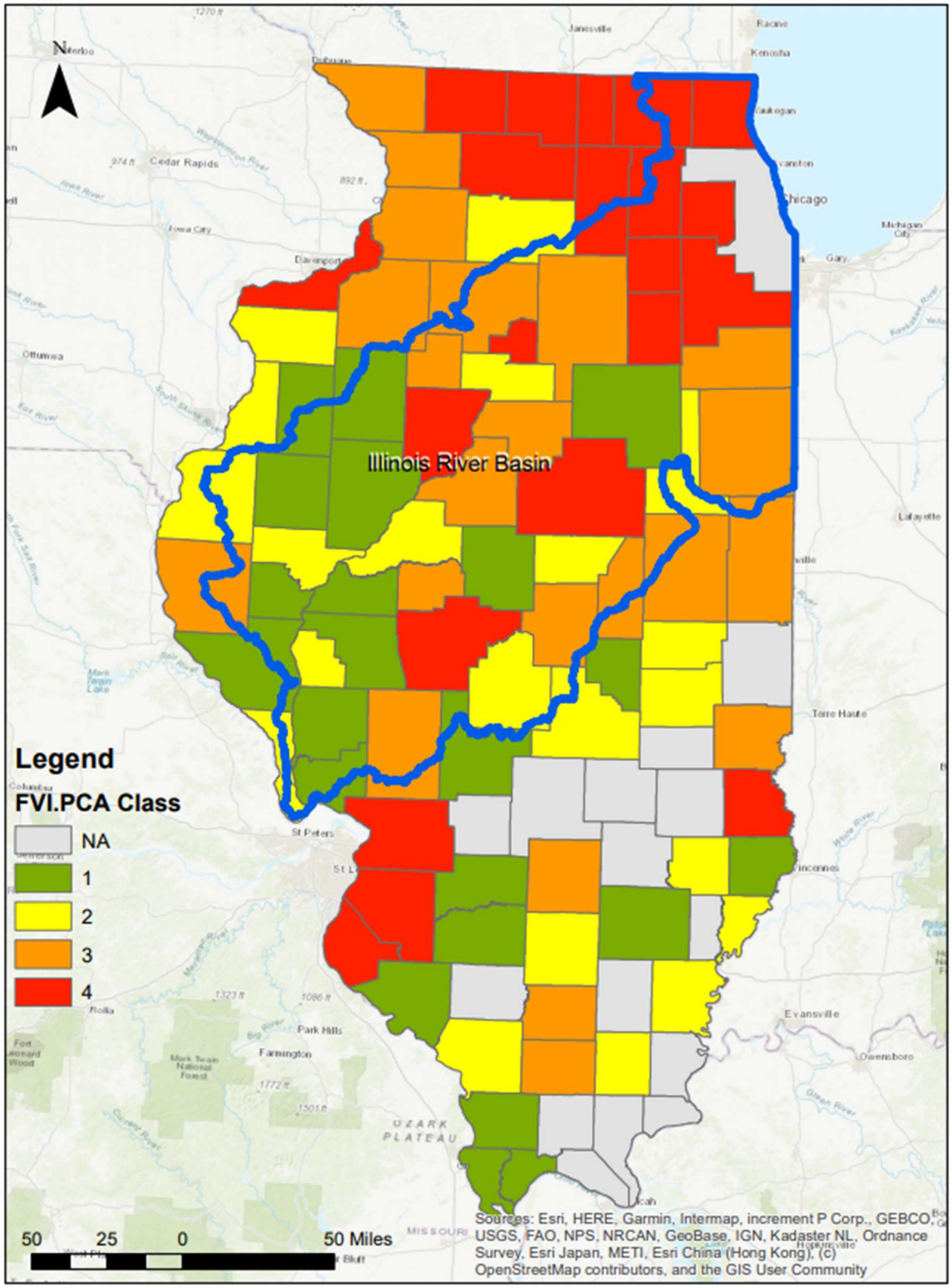

Figure 17 FVI.PCA Results

Appendix A (continued)

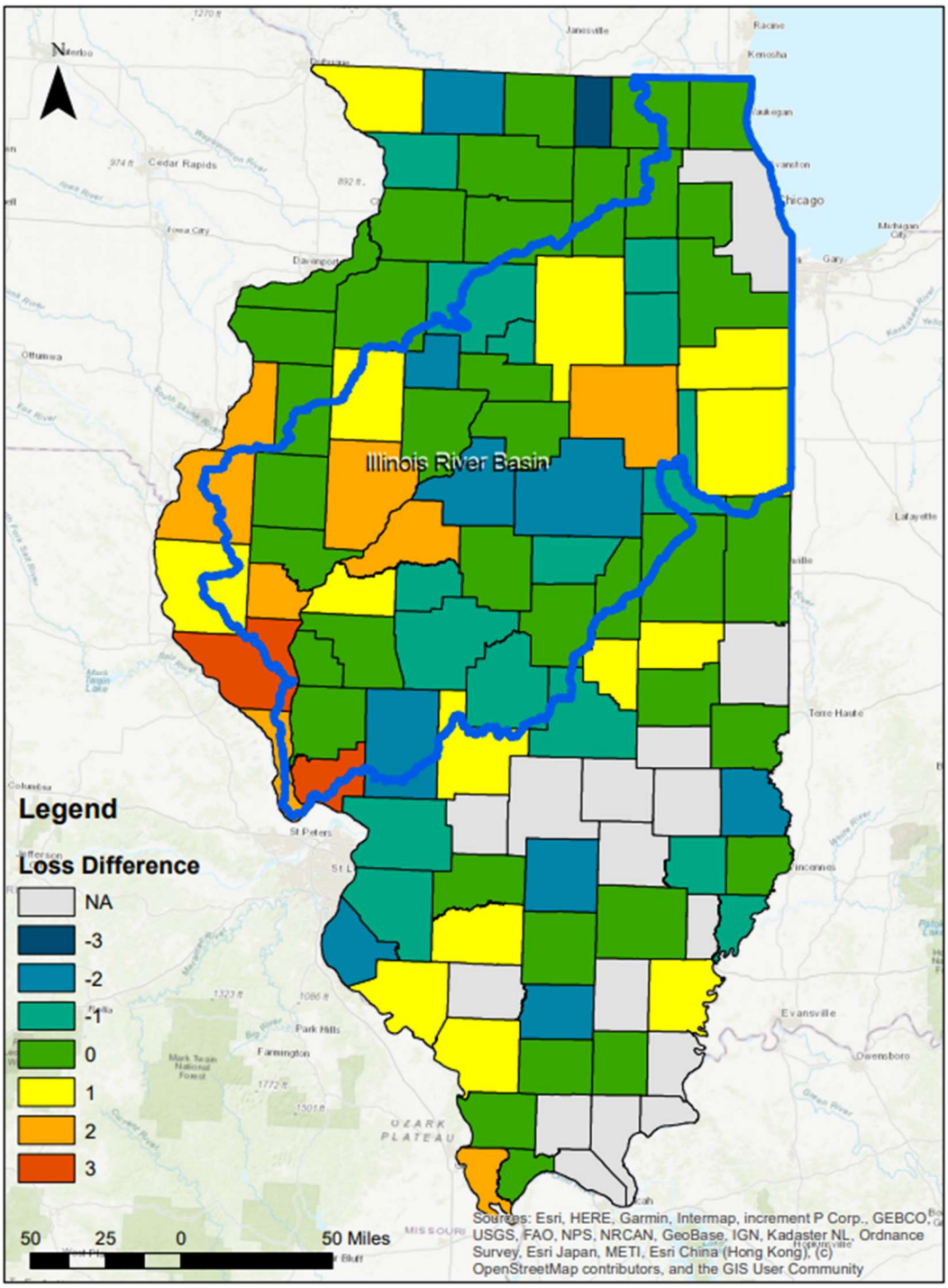

Figure 18 NFIP and FVI.PCA Loss Difference

Appendix B
Input Data

TABLE VIII: NFIP CLAIM INFORMATION (1985 – 1999)

County Name	FIPS County Code	1985 $2.20			1986 $2.16			1987 $2.08		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001	2	$ -	$ -	3	$ 10,349.25	$ 22,354.38			$ -
Alexander	17003	3	$ 17,450.06	$ 38,390.13	6	$ 22,502.13	$ 48,604.60	1	$ -	$ -
Boone	17007			$ -			$ -			$ -
Brown	17009			$ -			$ -			$ -
Bureau	17011	1	$ 1,125.28	$ 2,475.62			$ -			$ -
Calhoun	17013	19	$ 79,777.33	$ 175,510.13	39	$ 198,483.79	$ 428,724.99			$ -
Carroll	17015			$ -			$ -			$ -
Cass	17017	5	$ 21,469.39	$ 47,232.66			$ -			$ -
Champaign	17019	1	$ 353.40	$ 777.48			$ -	2	$ 12,930.09	$ 26,894.59
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -			$ -
Cook	17031	25	$ 8,225.00	$ 18,095.00	68	$1,039,941.78	$ 2,246,274.24	343	$2,782,841.80	$5,788,310.94
Crawford	17033			$ -			$ -			$ -
DeKalb	17037	1	$ 9,127.82	$ 20,081.20			$ -	1	$ 1,261.80	$ 2,624.54
DeWitt	17039			$ -			$ -			$ -
Douglas	17041	6	$ 23,385.85	$ 51,448.87			$ -			$ -
Dupage	17043	23	$ 3,764.47	$ 8,281.83	6	$ 16,346.43	$ 35,308.29	200	$1,850,850.22	$3,849,768.46
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057	27	$ 94,403.72	$ 207,688.18			$ -			$ -
Gallatin	17059			$ -			$ -			$ -
Greene	17061	3	$ 5,078.90	$ 11,173.58	2	$ 12,000.36	$ 25,920.78			$ -
Grundy	17063	13	$ 239,916.84	$ 527,817.05			$ -			$ -
Hancock	17067			$ -	1	$ 2,987.26	$ 6,452.48			$ -
Hardin	17069			$ -			$ -			$ -
Henderson	17071	1	$ 1,107.00	$ 2,435.40			$ -			$ -
Henry	17073	3	$ 2,203.88	$ 4,848.54			$ -	2	$ 144.60	$ 300.77
Iriquois	17075	1	$ -	$ -			$ -			$ -
Jackson	17077			$ -			$ -			$ -
Jefferson	17081			$ -			$ -			$ -

Appendix B (continued)

TABLE VII: NFIP CLAIM INFORMATION (1985 – 1999) (continued)

County Name	FIPS County Code	1985 $2.20			1986 $2.16			1987 $2.08		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Jersey	17083	6	$ 26,258.05	$ 57,767.71	27	$ 165,367.71	$ 357,194.25			$ -
Jo Daviess	17085			$ -	7	$ 28,833.71	$ 62,280.81			$ -
Kane	17089	3	$ 4,395.90	$ 9,670.98	2	$ 13,153.24	$ 28,411.00	1	$ 3,053.18	$ 6,350.61
Kankakee	17091	19	$ 84,978.79	$ 186,953.34	1	$ 9,393.20	$ 20,289.31	1	$ -	$ -
Kendall	17093	2	$ 15,998.00	$ 35,195.60			$ -			$ -
Knox	17095			$ -			$ -			$ -
Lake	17097	4	$ -	$ -	78	$ 539,230.47	$ 1,164,737.82	13	$ 13,274.39	$ 27,610.73
LaSalle	17099	9	$ 35,090.44	$ 77,198.97			$ -	1	$ -	$ -
Lawrence	17101			$ -			$ -			$ -
Lee	17103	8	$ 55,696.27	$ 122,531.79			$ -			$ -
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111			$ -	24	$ 98,662.72	$ 213,111.48			$ -
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -	1	$ 6,960.79	$ 15,035.31			$ -
Macoupin	17117			$ -			$ -			$ -
Madison	17119	5	$ 3,278.10	$ 7,211.82	11	$ 56,011.42	$ 120,984.67			$ -
Marion	17121			$ -	1	$ 450.00	$ 972.00			$ -
Marshall	17123	3	$ 17,907.30	$ 39,396.06	1	$ 385.10	$ 831.82			$ -
Mason	17125	12	$ 37,652.39	$ 82,835.26			$ -			$ -
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137	8	$ 19,125.24	$ 42,075.53	1	$ -	$ -			$ -
Moultrie	17139	1	$ -	$ -			$ -			$ -
Ogle	17141	1	$ 2,649.10	$ 5,828.02			$ -	1	$ -	$ -
Peoria	17143	92	$ 388,357.69	$ 854,386.92	8	$ 42,233.10	$ 91,223.50			$ -
Piatt	17147			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1985 $2.20			1986 $2.16			1987 $2.08		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Pike	17149	2	$ 2,589.44	$ 5,696.77	2	$ 10,428.93	$ 22,526.49			$ -
Pulaski	17153			$ -			$ -			$ -
Putnam	17155	1	$ 13,769.00	$ 30,291.80			$ -			$ -
Randolph	17157			$ -			$ -			$ -
Richland	17159	1	$ 765.18	$ 1,683.40	2	$ 3,742.45	$ 8,083.69			$ -
Rock Island	17161	18	$ 33,858.99	$ 74,489.78	10	$ 17,829.96	$ 38,512.71	4	$ -	$ -
St. Clair	17163			$ -			$ -	5	$ -	$ -
Saline	17165									
Sangamon	17167	1	$ 5,290.87	$ 11,639.91	6	$ 25,682.93	$ 55,475.13			$ -
Schuyler	17169	2	$ 1,622.11	$ 3,568.64			$ -			$ -
Scott	17171			$ -			$ -			$ -
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -			$ -
Tazewell	17179	9	$ 14,069.10	$ 30,952.02	1	$ -	$ -			$ -
Union	17181			$ -	1	$ 3,416.12	$ 7,378.82			$ -
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189									
Wayne	17191	1	$ 2,954.83	$ 6,500.63			$ -			$ -
White	17193	2	$ -	$ -			$ -			$ -
Whiteside	17195			$ -	4	$ 1,541.70	$ 3,330.07			$ -
Will	17197	36	$ 465,744.70	$ 1,024,638.34	2	$ 9,188.67	$ 19,847.53	1	$ -	$ -
Williamson	17199	1	$ 259.33	$ 570.53			$ -			$ -
Winnebago	17201	4	$ 627.39	$ 1,380.26	2	$ -	$ -	1	$ -	$ -
Woodford	17203	27	$ 100,519.84	$ 221,143.65			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1988 $2.00 Count	1988 $2.00 Amount	1988 $2.00 Amount in 2014 Dollars	1989 $1.91 Count	1989 $1.91 Amount	1989 $1.91 Amount in 2014 Dollars	1990 $1.81 Count	1990 $1.81 Amount	1990 $1.81 Amount in 2014 Dollars
Adams	17001			$ -			$ -			$ -
Alexander	17003			$ -			$ -			$ -
Boone	17007			$ -			$ -			$ -
Brown	17009			$ -			$ -			$ -
Bureau	17011	1	$ 1,923.30	$ 3,846.60			$ -			$ -
Calhoun	17013			$ -			$ -	8	$ 20,926.40	$ 37,876.78
Carroll	17015			$ -			$ -			$ -
Cass	17017			$ -			$ -	2	$ -	$ -
Champaign	17019			$ -			$ -	7	$ 98,401.99	$ 178,107.60
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -	1	$ -	$ -
Cook	17031	11	$ -	$ -	50	$ 38,116.12	$ 72,801.79	85	$ 173,726.00	$ 314,444.06
Crawford	17033			$ -			$ -			$ -
DeKalb	17037			$ -			$ -			$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041			$ -	1	$ -	$ -	3	$ 7,681.17	$ 13,902.92
Dupage	17043	1	$ -	$ -	10	$ 97,926.07	$ 187,038.79	14	$ 25,523.71	$ 46,197.92
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057			$ -			$ -			$ -
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -	4	$ 6,132.34	$ 11,099.54
Hancock	17067			$ -			$ -	1	$ 16,445.10	$ 29,765.63
Hardin	17069			$ -	1	$ -	$ -			$ -
Henderson	17071			$ -			$ -	2	$ 3,297.51	$ 5,968.49
Henry	17073			$ -			$ -			$ -
Iriquois	17075			$ -			$ -	1	$ 955.07	$ 1,728.68
Jackson	17077			$ -			$ -			$ -
Jefferson	17081			$ -			$ -			$ -
Jersey	17083			$ -	1	$ -	$ -	3	$ 2,127.19	$ 3,850.21

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1988 $2.00 Count	1988 $2.00 Amount	1988 $2.00 Amount in 2014 Dollars	1989 $1.91 Count	1989 $1.91 Amount	1989 $1.91 Amount in 2014 Dollars	1990 $1.81 Count	1990 $1.81 Amount	1990 $1.81 Amount in 2014 Dollars
Jo Daviess	17085			$ -			$ -			$ -
Kane	17089	8	$ 40,829.14	$ 81,658.28	1	$ 20,981.03	$ 40,073.77	2	$ 21,591.15	$ 39,079.98
Kankakee	17091			$ -			$ -	19	$ 38,416.08	$ 69,533.10
Kendall	17093			$ -			$ -			$ -
Knox	17095			$ -			$ -			$ -
Lake	17097			$ -	1	$ 1,725.22	$ 3,295.17	3	$ -	$ -
LaSalle	17099			$ -			$ -	1	$ -	$ -
Lawrence	17101			$ -			$ -			$ -
Lee	17103	2	$ 4,630.20	$ 9,260.40			$ -	1	$ 1,370.00	$ 2,479.70
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111			$ -			$ -	4	$ 7,264.00	$ 13,147.84
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -			$ -	13	$ 204,169.74	$ 369,547.23
Macoupin	17117			$ -			$ -			$ -
Madison	17119			$ -	1	$ -	$ -	2	$ 4,458.23	$ 8,069.40
Marion	17121			$ -			$ -	1	$ -	$ -
Marshall	17123			$ -			$ -			$ -
Mason	17125			$ -			$ -			$ -
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137			$ -			$ -			$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141	3	$ 6,068.46	$ 12,136.92			$ -	1	$ -	$ -
Peoria	17143	1	$ -	$ -	1	$ -	$ -	5	$ 25,097.35	$ 45,426.20
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1988 $2.00 Count	1988 $2.00 Amount	1988 $2.00 Amount in 2014 Dollars	1989 $1.91 Count	1989 $1.91 Amount	1989 $1.91 Amount in 2014 Dollars	1990 $1.81 Count	1990 $1.81 Amount	1990 $1.81 Amount in 2014 Dollars
Pulaski	17153			$ -						$ -
Putnam	17155			$ -			$ -	1	$ -	$ -
Randolph	17157			$ -			$ -	1	$ -	$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161			$ -			$ -	14	$ 22,882.56	$ 41,417.43
St. Clair	17163	1	$ -	$ -	1	$ -	$ -	3	$ 19,507.80	$ 35,309.12
Saline	17165									
Sangamon	17167			$ -			$ -	2	$ 1,485.38	$ 2,688.54
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -			$ -
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -	2	$ 603.40	$ 1,092.15
Tazewell	17179			$ -			$ -	1	$ -	$ -
Union	17181			$ -			$ -			$ -
Vermillion	17183			$ -	1	$ -	$ -	2	$ 43,785.26	$ 79,251.32
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189									
Wayne	17191			$ -			$ -			$ -
White	17193			$ -			$ -	2	$ 1,570.00	$ 2,841.70
Whiteside	17195	2	$ 20,648.18	$ 41,296.36			$ -			$ -
Will	17197			$ -	4	$ 4,748.03	$ 9,068.74	22	$ 83,037.54	$ 150,297.95
Williamson	17199			$ -	3	$ 131.98	$ 252.08	5	$ 72,637.78	$ 131,474.38
Winnebago	17201	12	$ 13,509.34	$ 27,018.68	1	$ 12,397.42	$ 23,679.07			$ -
Woodford	17203			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1991 $1.74			1992 $1.69			1993 $1.64		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -			$ -	31	$ 809,043.35	$ 1,326,831.09
Alexander	17003			$ -			$ -	7	$ 2,299.72	$ 3,771.54
Boone	17007			$ -			$ -	1	$ -	$ -
Brown	17009			$ -			$ -	2	$ 28,665.00	$ 47,010.60
Bureau	17011			$ -			$ -			$ -
Calhoun	17013			$ -			$ -	55	$ 1,077,435.83	$ 1,766,994.76
Carroll	17015			$ -			$ -			$ -
Cass	17017			$ -			$ -	2	$ 3,918.25	$ 6,425.93
Champaign	17019	7	$ 85,721.34	$ 149,155.13			$ -	3	$ 49,257.70	$ 80,782.63
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -			$ -
Cook	17031	16	$ 2,032.55	$ 3,536.64	2	$ 3,550.78	$ 6,000.82	17	$ 8,547.26	$ 14,017.51
Crawford	17033			$ -			$ -			$ -
DeKalb	17037	1	$ -	$ -			$ -	1	$ -	$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041	1	$ 532.12	$ 925.89			$ -	1	$ -	$ -
Dupage	17043			$ -			$ -	1	$ -	$ -
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057			$ -			$ -	10	$ 66,263.18	$ 108,671.62
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -	2	$ 21,670.58	$ 35,539.75
Grundy	17063			$ -			$ -			$ -
Hancock	17067			$ -			$ -	19	$ 423,666.66	$ 694,813.32
Hardin	17069	2	$ 41,117.45	$ 71,544.36			$ -			$ -
Henderson	17071			$ -			$ -	17	$ 199,132.56	$ 326,577.40
Henry	17073			$ -	1	$ -	$ -	2	$ 6,957.64	$ 11,410.53
Iriquois	17075	2	$ 1,627.50	$ 2,831.85			$ -	2	$ 191,930.23	$ 314,765.58
Jackson	17077			$ -			$ -	1	$ -	$ -
Jefferson	17081			$ -			$ -			$ -
Jersey	17083	1	$ 1,040.80	$ 1,810.99			$ -	34	$ 696,459.86	$ 1,142,194.17

Appendix B (continued)

Table 1: NFIP Claim Information (1985 – 1999) (continued)

County Name	FIPS County Code	1991 $1.74			1992 $1.69			1993 $1.64		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Jo Daviess	17085			$ -			$ -	6	$ 52,469.41	$ 86,049.83
Kane	17089			$ -			$ -	1	$ 3,822.48	$ 6,268.87
Kankakee	17091	5	$ -	$ -			$ -	1	$ -	$ -
Kendall	17093			$ -			$ -			$ -
Knox	17095			$ -			$ -	2	$ 24,200.00	$ 39,688.00
Lake	17097	3	$ 13,939.74	$ 24,255.15	1	$ -	$ -	35	$ 161,813.98	$ 265,374.93
LaSalle	17099	1	$ -	$ -			$ -			$ -
Lawrence	17101			$ -			$ -			$ -
Lee	17103			$ -	1	$ -	$ -	7	$ 15,533.67	$ 25,475.22
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111	1	$ 777.00	$ 1,351.98			$ -	22	$ 247,295.04	$ 405,563.87
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -	1	$ 10,252.43	$ 17,326.61			$ -
Macoupin	17117			$ -			$ -	1	$ 9,823.58	$ 16,110.67
Madison	17119	1	$ 795.00	$ 1,383.30			$ -	17	$ 704,446.80	$ 1,155,292.75
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -			$ -			$ -
Mason	17125			$ -			$ -	13	$ 54,816.25	$ 89,898.65
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -	22	$ 508,789.31	$ 834,414.47
Monroe	17133			$ -			$ -	26	$ 813,402.92	$ 1,333,980.79
Montgomery	17135			$ -			$ -	2	$ 16,501.24	$ 27,062.03
Morgan	17137			$ -			$ -	6	$ 27,626.65	$ 45,307.71
Moultrie	17139			$ -			$ -			$ -
Ogle	17141			$ -			$ -	1	$ 6,362.58	$ 10,434.63
Peoria	17143			$ -	1	$ -	$ -	12	$ 159,075.20	$ 260,883.33
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -			$ -	32	$ 944,121.65	$ 1,548,359.51
Pulaski	17153									
Putnam	17155			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1991 $1.74			1992 $1.69			1993 $1.64		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Randolph	17157			$ -			$ -	3	$ 9,300.00	$ 15,252.00
Richland	17159			$ -			$ -	1	$ 28,789.33	$ 47,214.50
Rock Island	17161			$ -	1	$ -	$ -	64	$ 908,442.90	$ 1,489,846.36
St. Clair	17163			$ -			$ -	10	$ 17,366.97	$ 28,481.83
Saline	17165									
Sangamon	17167	1	$ 1,196.71	$ 2,082.28			$ -	3	$ 52,366.69	$ 85,881.37
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -	3	$ 7,908.35	$ 12,969.69
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -	10	$ 79,630.24	$ 130,593.59
Tazewell	17179			$ -	1	$ 3,508.80	$ 5,929.87	5	$ 64,484.40	$ 105,754.42
Union	17181			$ -			$ -	18	$ 4,725.39	$ 7,749.64
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189									
Wayne	17191			$ -	1	$ 990.12	$ 1,673.30	1	$ 8,870.17	$ 14,547.08
White	17193			$ -			$ -	3	$ 6,360.19	$ 10,430.71
Whiteside	17195			$ -			$ -	3	$ 60,553.55	$ 99,307.82
Will	17197	3	$ 1,224.28	$ 2,130.25	1	$ -	$ -	3	$ 552.11	$ 905.46
Williamson	17199	3	$ 42,914.08	$ 74,670.50			$ -	5	$ 50,262.08	$ 82,429.81
Winnebago	17201			$ -	1	$ 2,155.02	$ 3,641.98	23	$ 68,773.82	$ 112,789.06
Woodford	17203			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1994 $1.60			1995 $1.55			1996 $1.51		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -	1	$ -	$ -	2	$ 15,357.12	$ 23,189.25
Alexander	17003			$ -			$ -			$ -
Boone	17007			$ -	1	$ -	$ -			$ -
Brown	17009			$ -	3	$ 8,397.90	$ 13,016.75			$ -
Bureau	17011			$ -			$ -			$ -
Calhoun	17013			$ -	9	$ 112,270.12	$ 174,018.69			$ -
Carroll	17015			$ -			$ -	1	$ 6,920.24	$ 10,449.56
Cass	17017	1	$ 1,703.90	$ 2,726.24			$ -	1	$ 4,160.60	$ 6,282.51
Champaign	17019	6	$ 122,557.17	$ 196,091.47	3	$ 46,930.34	$ 72,742.03	2	$ 13,150.99	$ 19,857.99
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -	1	$ -	$ -
Cook	17031	5	$ 4,156.00	$ 6,649.60	5	$ -	$ -	110	$2,202,815.32	$ 3,326,251.13
Crawford	17033			$ -			$ -			$ -
DeKalb	17037	3	$ -	$ -			$ -	9	$ 182,306.74	$ 275,283.18
DeWitt	17039	2	$ 58,610.14	$ 93,776.22	2	$ 24,686.70	$ 38,264.39	1	$ 14.50	$ 21.90
Douglas	17041	4	$ 18,765.69	$ 30,025.10			$ -	9	$ 25,396.71	$ 38,349.03
Dupage	17043			$ -	1	$ 966.74	$ 1,498.45	24	$ 176,834.75	$ 267,020.47
Ford	17053			$ -			$ -			$ -
Franklin	17055	1	$ -	$ -			$ -	3	$ 84,378.99	$ 127,412.27
Fulton	17057			$ -	7	$ 157,563.80	$ 244,223.89	3	$ 16,524.37	$ 24,951.80
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -	1	$ -	$ -
Hancock	17067			$ -			$ -	1	$ -	$ -
Hardin	17069	1	$ -	$ -	1	$ -	$ -			$ -
Henderson	17071	1	$ -	$ -			$ -			$ -
Henry	17073			$ -			$ -	2	$ 13,745.40	$ 20,755.55
Iriquois	17075	9	$ 37,654.24	$ 60,246.78			$ -			$ -
Jackson	17077	1	$ -	$ -			$ -	3	$ 28,873.64	$ 43,599.20
Jefferson	17081			$ -			$ -			$ -
Jersey	17083			$ -	14	$ 202,391.22	$ 313,706.39	12	$ 37,071.97	$ 55,978.67

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1994 $1.60			1995 $1.55			1996 $1.51		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Jo Daviess	17085			$ -			$ -			$ -
Kane	17089	4	$ 12,431.87	$ 19,890.99			$ -	23	$ 407,556.06	$ 615,409.65
Kankakee	17091	1	$ -	$ -			$ -	3	$ 43,928.09	$ 66,331.42
Kendall	17093	1	$ -	$ -			$ -	13	$ 377,956.45	$ 570,714.24
Knox	17095			$ -			$ -			$ -
Lake	17097	2	$ 5,329.83	$ 8,527.73	3	$ -	$ -	5	$ 12,775.84	$ 19,291.52
LaSalle	17099	1	$ 3,343.74	$ 5,349.98			$ -	11	$ 298,961.97	$ 451,432.57
Lawrence	17101			$ -	1	$ 3,067.37	$ 4,754.42			$ -
Lee	17103	9	$ 48,680.60	$ 77,888.96			$ -	6	$ 55,926.99	$ 84,449.75
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111	2	$ 18,425.15	$ 29,480.24			$ -			$ -
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -			$ -	2	$ 32,745.27	$ 49,445.36
Macoupin	17117			$ -			$ -			$ -
Madison	17119	1	$ 4,765.57	$ 7,624.91	9	$ 35,982.28	$ 55,772.53	3	$ 2,632.98	$ 3,975.80
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -	1	$ 15,709.29	$ 24,349.40			$ -
Mason	17125	1	$ -	$ -	12	$ 138,968.33	$ 215,400.91			$ -
Massac	17127			$ -			$ -			$ -
Menard	17129	5	$ 23,950.98	$ 38,321.57			$ -			$ -
Mercer	17131			$ -			$ -	1	$ 3,975.07	$ 6,002.36
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137			$ -	2	$ 6,477.84	$ 10,040.65			$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141	4	$ 43,875.79	$ 70,201.26			$ -	12	$ 133,086.31	$ 200,960.33
Peoria	17143			$ -	19	$ 130,502.21	$ 202,278.43	3	$ 14,100.00	$ 21,291.00
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -	3	$ 64,188.97	$ 99,492.90			$ -
Pulaski	17153									
Putnam	17155			$ -			$ -			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1994 $1.60			1995 $1.55			1996 $1.51		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Randolph	17157			$ -	1	$ -	$ -			$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161	7	$ 18,295.77	$ 29,273.23			$ -	14	$ 68,517.29	$ 103,461.11
St. Clair	17163	4	$ 13,243.89	$ 21,190.22	18	$ 106,443.21	$ 164,986.98	29	$ 173,766.24	$ 262,387.02
Saline	17165									
Sangamon	17167	5	$ 75,001.55	$ 120,002.48			$ -	3	$ 26,772.52	$ 40,426.51
Schuyler	17169	1	$ -	$ -	1	$ 74,847.29	$ 116,013.30			$ -
Scott	17171			$ -			$ -			$ -
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -	1	$ 770.75	$ 1,163.83
Tazewell	17179			$ -	1	$ 10,525.44	$ 16,314.43			$ -
Union	17181	3	$ -	$ -			$ -			$ -
Vermillion	17183	5	$ 113,800.00	$ 182,080.00			$ -	2	$ 152.00	$ 229.52
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189									
Wayne	17191			$ -			$ -			$ -
White	17193			$ -			$ -	2	$ -	$ -
Whiteside	17195	6	$ 22,618.57	$ 36,189.71			$ -	1	$ -	$ -
Will	17197	2	$ 964.63	$ 1,543.41			$ -	92	$ 872,104.95	$ 1,316,878.47
Williamson	17199			$ -			$ -	6	$ 146,992.83	$ 221,959.17
Winnebago	17201	2	$ 1,819.51	$ 2,911.22			$ -	10	$ 24,539.54	$ 37,054.71
Woodford	17203			$ -	3	$ 9,922.30	$ 15,379.57			$ -

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1997 $1.47			1998 $1.45			1999 $1.42		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -			$ -			$ -
Alexander	17003			$ -			$ -			$ -
Boone	17007			$ -			$ -	1	$ -	$ -
Brown	17009			$ -			$ -			$ -
Bureau	17011			$ -			$ -			$ -
Calhoun	17013			$ -			$ -			$ -
Carroll	17015	1	$ 2,504.35	$ 3,681.39	1	$ 2,727.22	$ 3,954.47			$ -
Cass	17017			$ -			$ -			$ -
Champaign	17019			$ -	2	$ -	$ -	2	$ 10,000.00	$ 14,200.00
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -	2	$ -	$ -
Cook	17031	124	$ 402,679.75	$ 591,939.23	14	$ 40,268.32	$ 58,389.06	29	$ 14,203.89	$ 20,169.52
Crawford	17033			$ -			$ -			$ -
DeKalb	17037	2	$ 6,298.48	$ 9,258.77			$ -	1	$ 6,576.89	$ 9,339.18
DeWitt	17039			$ -			$ -			$ -
Douglas	17041	2	$ 14,931.76	$ 21,949.69	1	$ -	$ -			$ -
Dupage	17043	8	$ 34,638.41	$ 50,918.46	3	$ 5,038.13	$ 7,305.29	3	$ 4,571.16	$ 6,491.05
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -	1	$ -	$ -			$ -
Fulton	17057			$ -			$ -			$ -
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -			$ -
Hancock	17067			$ -			$ -			$ -
Hardin	17069	1	$ -	$ -			$ -			$ -
Henderson	17071	2	$ 4,923.02	$ 7,236.84			$ -			$ -
Henry	17073	4	$ 45,232.92	$ 66,492.39			$ -	1	$ -	$ -
Iriquois	17075			$ -			$ -			$ -
Jackson	17077			$ -	2	$ 6,025.33	$ 8,736.73	1	$ -	$ -
Jefferson	17081			$ -			$ -	1	$ -	$ -
Jersey	17083	6	$ 6,553.75	$ 9,634.01	5	$ 3,393.89	$ 4,921.14	2	$ 10,761.58	$ 15,281.44

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1997 $1.47			1998 $1.45			1999 $1.42		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Jo Daviess	17085	3	$ 24,876.88	$ 36,569.01			$ -			$ -
Kane	17089	6	$ 76,523.89	$ 112,490.12	1	$ 693.98	$ 1,006.27	2	$ -	$ -
Kankakee	17091			$ -			$ -			$ -
Kendall	17093	2	$ 23,986.74	$ 35,260.51			$ -			$ -
Knox	17095			$ -			$ -			$ -
Lake	17097			$ -	1	$ -	$ -	5	$ 14,305.64	$ 20,314.01
LaSalle	17099	11	$ 188,446.30	$ 277,016.06			$ -			$ -
Lawrence	17101			$ -			$ -	1	$ 1,729.19	$ 2,455.45
Lee	17103	1	$ 5,960.62	$ 8,762.11			$ -			$ -
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -	1	$ 6,301.57	$ 9,137.28			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111			$ -			$ -	9	$ 35,571.32	$ 50,511.27
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -	1	$ -	$ -			$ -
Macoupin	17117			$ -			$ -			$ -
Madison	17119			$ -	2	$ 758.74	$ 1,100.17			$ -
Marion	17121			$ -			$ -			$ -
Marshall	17123	4	$ 17,620.66	$ 25,902.37			$ -			$ -
Mason	17125			$ -			$ -			$ -
Massac	17127	5	$ 18,838.82	$ 27,693.07			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137	1	$ 919.74	$ 1,352.02			$ -			$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141	1	$ 4,019.08	$ 5,908.05			$ -	1	$ -	$ -
Peoria	17143	28	$ 220,915.65	$ 324,746.01	4	$ 2,452.66	$ 3,556.36	4	$ 61,081.02	$ 86,735.05
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -			$ -			$ -
Pulaski	17153									

Appendix B (continued)

TABLE VIII: NFIP CLAIM INFORMATION (1985 - 1999) (continued)

County Name	FIPS County Code	1997 $1.47			1998 $1.45			1999 $1.42		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Putnam	17155	1	$ 10,551.59	$ 15,510.84			$ -			$ -
Randolph	17157			$ -			$ -			$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161	27	$ 91,917.19	$ 135,118.27	1	$ -	$ -	1	$ 894.84	$ 1,270.67
St. Clair	17163	1	$ -	$ -	10	$ 15,372.88	$ 22,290.68	3	$ 1,648.54	$ 2,340.93
Saline	17165									
Sangamon	17167			$ -			$ -			$ -
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -			$ -
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -			$ -
Tazewell	17179	2	$ 11,287.15	$ 16,592.11			$ -			$ -
Union	17181	4	$ 19,270.91	$ 28,328.24			$ -	1	$ -	$ -
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -	1	$ 4,910.00	$ 7,119.50			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189									
Wayne	17191			$ -			$ -			$ -
White	17193	1	$ 12,155.94	$ 17,869.23			$ -			$ -
Whiteside	17195	6	$ 34,306.62	$ 50,430.73			$ -			$ -
Will	17197	9	$ 31,788.66	$ 46,729.33	2	$ 5,852.96	$ 8,486.79	1	$ -	$ -
Williamson	17199	1	$ 17,199.00	$ 25,282.53	2	$ 445.34	$ 645.74	2	$ 8,642.40	$ 12,272.21
Winnebago	17201	3	$ 1,840.87	$ 2,706.08			$ -	4	$ 5,200.21	$ 7,384.30
Woodford	17203	5	$ 27,184.54	$ 39,961.27			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014)

County Name	FIPS County Code	2000 $1.37			2001 $1.34			2002 $1.32		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -	6	$ 74,555.63	$ 99,904.54			$ -
Alexander	17003			$ -	1	$ -	$ -	1	$ 947.72	$ 1,250.99
Boone	17007	1	$ -	$ -			$ -			$ -
Brown	17009			$ -			$ -	4	$ 69,086.02	$ 91,193.55
Bureau	17011			$ -			$ -			$ -
Calhoun	17013			$ -	3	$ 10,411.72	$ 13,951.70	11	$ 136,825.89	$ 180,610.17
Carroll	17015			$ -	1	$ 62,000.00	$ 83,080.00	1	$ 2,856.23	$ 3,770.22
Cass	17017			$ -			$ -	2	$ 2,274.97	$ 3,002.96
Champaign	17019			$ -	1	$ -	$ -	3	$ 73,928.83	$ 97,586.06
Christian	17021	1	$ 3,176.97	$ 4,352.45			$ -	3	$ 6,223.40	$ 8,214.89
Clark	17023			$ -			$ -			$ -
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -	1	$ 949.60	$ 1,253.47
Cook	17031	16	$ 4,759.86	$ 6,521.01	68	$ 155,563.91	$ 208,455.64	38	$ 89,182.27	$ 117,720.60
Crawford	17033			$ -			$ -			$ -
DeKalb	17037			$ -			$ -	1	$ -	$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041			$ -			$ -	9	$ 9,385.42	$ 12,388.75
Dupage	17043			$ -	26	$ 131,337.45	$ 175,992.18			$ -
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057			$ -			$ -	3	$ 5,883.01	$ 7,765.57
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063	1	$ -	$ -			$ -			$ -
Hancock	17067			$ -	9	$ 64,630.71	$ 86,605.15			$ -
Hardin	17069			$ -			$ -			$ -
Henderson	17071			$ -	10	$ 186,135.81	$ 249,421.99	1	$ 51,342.91	$ 67,772.64
Henry	17073	2	$ 1,831.52	$ 2,509.18	4	$ 35,992.95	$ 48,230.55			$ -
Iriquois	17075			$ -			$ -			$ -
Jackson	17077	1	$ 21,471.99	$ 29,416.63			$ -			$ -
Jefferson	17081			$ -			$ -			$ -
Jersey	17083	1	$ 3,506.97	$ 4,804.55	5	$ 10,269.03	$ 13,760.50	21	$ 199,784.36	$ 263,715.36
Jo Daviess	17085			$ -	9	$ 76,204.14	$ 102,113.55	3	$ 19,242.73	$ 25,400.40
Kane	17089			$ -	2	$ 10,783.98	$ 14,450.53			$ -
Kankakee	17091			$ -			$ -	1	$ 15,699.33	$ 20,723.12
Kendall	17093	1	$ 6,826.94	$ 9,352.91			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2000 $1.37			2001 $1.34			2002 $1.32		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Knox	17095			$ -			$ -			$ -
Lake	17097	7	$ 51,613.05	$ 70,709.88	8	$ 34,669.33	$ 46,456.90	4	$ 2,871.25	$ 3,790.05
LaSalle	17099			$ -			$ -	4	$ 28,534.25	$ 37,665.21
Lawrence	17101			$ -			$ -			$ -
Lee	17103	1	$ 7,904.60	$ 10,829.30	1	$ -	$ -			$ -
Livingston	17105			$ -			$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111	7	$ 52,415.35	$ 71,809.03	1	$ 5,655.33	$ 7,578.14	2	$ -	$ -
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -	1	$ -	$ -	1	$ 18,239.63	$ 24,076.31
Macoupin	17117			$ -			$ -			$ -
Madison	17119	3	$ 20,174.04	$ 27,638.43	1	$ -	$ -	11	$ 96,592.25	$ 127,501.77
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -			$ -			$ -
Mason	17125			$ -	1	$ -	$ -	8	$ 62,555.23	$ 82,572.90
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -	2	$ 23,547.84	$ 31,083.15
Mercer	17131			$ -	1	$ -	$ -			$ -
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -	1	$ 20,000.00	$ 26,400.00
Morgan	17137			$ -			$ -	2	$ 2,508.49	$ 3,311.21
Moultrie	17139			$ -			$ -			$ -
Ogle	17141	2	$ 27,827.06	$ 38,123.07			$ -	1	$ 9,168.27	$ 12,102.12
Peoria	17143			$ -	1	$ 702.64	$ 941.54	20	$ 94,944.69	$ 125,326.99
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -	1	$ -	$ -	8	$ 131,262.51	$ 173,266.51
Pulaski	17153			$ -	1	$ -	$ -	3	$ 1,921.93	$ 2,536.95
Putnam	17155			$ -			$ -			$ -
Randolph	17157			$ -			$ -	3	$ 2,722.91	$ 3,594.24
Richland	17159			$ -			$ -			$ -
Rock Island	17161	7	$ 64,746.13	$ 88,702.20	30	$ 549,358.39	$ 736,140.24	26	$ 340,287.38	$ 449,179.34
St. Clair	17163			$ -			$ -	3	$ 3,080.48	$ 4,066.23
Saline	17165			$ -			$ -			$ -
Sangamon	17167			$ -	1	$ 22,509.75	$ 30,163.07	5	$ 129,799.65	$ 171,335.54
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -	3	$ 5,681.83	$ 7,613.65	1	$ 3,301.32	$ 4,357.74
Shelby	17173			$ -			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2000 $1.37			2001 $1.34			2002 $1.32		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -			$ -
Tazewell	17179			$ -			$ -			$ -
Union	17181			$ -	1	$ -	$ -	2	$ 3,517.02	$ 4,642.47
Vermillion	17183			$ -			$ -	1	$ 20,313.87	$ 26,814.31
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189			$ -			$ -			$ -
Wayne	17191			$ -			$ -			$ -
White	17193			$ -	1	$ 2,668.77	$ 3,576.15			$ -
Whiteside	17195	2	$ 1,523.70	$ 2,087.47	7	$ 93,487.05	$ 125,272.65	2	$ 42,657.46	$ 56,307.85
Will	17197	1	$ -	$ -			$ -	5	$ 8,309.48	$ 10,968.51
Williamson	17199	1	$ -	$ -			$ -	1	$ 147.18	$ 194.28
Winnebago	17201	17	$ 158,292.30	$ 216,860.45	1	$ -	$ -	2	$ 115,814.84	$ 152,875.59
Woodford	17203			$ -			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2003 $1.29			2004 $1.25			2005 $1.21		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -			$ -			$ -
Alexander	17003			$ -			$ -			$ -
Boone	17007			$ -			$ -			$ -
Brown	17009			$ -			$ -			$ -
Bureau	17011			$ -			$ -			$ -
Calhoun	17013			$ -			$ -			$ -
Carroll	17015			$ -			$ -			$ -
Cass	17017			$ -			$ -			$ -
Champaign	17019			$ -	1	$ -	$ -			$ -
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -	3	$ 98,734.54	$ 119,468.79
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -			$ -
Cook	17031	60	$ 206,103.29	$ 265,873.24	15	$ 63,548.83	$ 79,436.04	13	$ 46,571.21	$ 56,351.16
Crawford	17033			$ -			$ -	1	$ 17,631.87	$ 21,334.56
DeKalb	17037			$ -	2	$ 14,249.71	$ 17,812.14			$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041	1	$ -	$ -			$ -	1	$ -	$ -
Dupage	17043	1	$ -	$ -			$ -			$ -
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057			$ -			$ -			$ -
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -			$ -
Hancock	17067			$ -			$ -			$ -
Hardin	17069			$ -			$ -			$ -
Henderson	17071			$ -	1	$ 3,456.66	$ 4,320.83			$ -
Henry	17073			$ -			$ -			$ -
Iriquois	17075	1	$ 626.29	$ 807.91	1	$ -	$ -	5	$ 32,294.97	$ 39,076.91
Jackson	17077			$ -			$ -	1	$ 11,304.70	$ 13,678.69
Jefferson	17081			$ -			$ -			$ -
Jersey	17083			$ -			$ -			$ -
Jo Daviess	17085	3	$ 1,663.30	$ 2,145.66	2	$ 298.12	$ 372.65			$ -
Kane	17089	1	$ -	$ -			$ -			$ -
Kankakee	17091			$ -	1	$ -	$ -	4	$ 15,362.01	$ 18,588.03

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2003 $1.29			2004 $1.25			2005 $1.21		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Kendall	17093			$ -			$ -			$ -
Knox	17095			$ -			$ -			$ -
Lake	17097	1	$ 1,729.12	$ 2,230.56	15	$ 172,991.31	$ 216,239.14	1	$ 11,641.89	$ 14,086.69
LaSalle	17099			$ -			$ -	3	$ 19,214.90	$ 23,250.03
Lawrence	17101			$ -			$ -			$ -
Lee	17103			$ -			$ -			$ -
Livingston	17105			$ -			$ -	4	$ -	$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111			$ -	7	$ 7,821.43	$ 9,776.79			$ -
McLean	17113	2	$ 6,794.63	$ 8,765.07			$ -	1	$ 1,045.78	$ 1,265.39
Macon	17115			$ -			$ -	1	$ -	$ -
Macoupin	17117			$ -			$ -			$ -
Madison	17119	1	$ 1,566.96	$ 2,021.38			$ -	5	$ 8,030.35	$ 9,716.72
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -			$ -			$ -
Mason	17125			$ -			$ -	4	$ 12,145.82	$ 14,696.44
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137			$ -			$ -	1	$ -	$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141			$ -			$ -			$ -
Peoria	17143			$ -	3	$ 1,118.90	$ 1,398.63	11	$ 38,509.69	$ 46,596.72
Piatt	17147			$ -			$ -			$ -
Pike	17149	1	$ 1,851.45	$ 2,388.37			$ -			$ -
Pulaski	17153			$ -			$ -			$ -
Putnam	17155			$ -			$ -	1	$ 5,626.40	$ 6,807.94
Randolph	17157			$ -	1	$ 2,330.94	$ 2,913.68			$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161			$ -	5	$ 31,223.40	$ 39,029.25	1	$ 45,500.00	$ 55,055.00
St. Clair	17163	3	$ 16,658.17	$ 21,489.04	2	$ -	$ -	5	$ 4,495.77	$ 5,439.88
Saline	17165			$ -			$ -			$ -
Sangamon	17167			$ -			$ -	1	$ 16,457.28	$ 19,913.31
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2003 $1.29			2004 $1.25			2005 $1.21		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -	1	$ 1,040.36	$ 1,300.45			$ -
Tazewell	17179			$ -			$ -			$ -
Union	17181			$ -			$ -			$ -
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189			$ -			$ -			$ -
Wayne	17191			$ -			$ -			$ -
White	17193			$ -			$ -			$ -
Whiteside	17195			$ -			$ -			$ -
Will	17197	2	$ 20,031.03	$ 25,840.03	2	$ 8,770.11	$ 10,962.64	3	$ 8,470.08	$ 10,248.80
Williamson	17199			$ -			$ -	3	$ 7,299.28	$ 8,832.13
Winnebago	17201	1	$ -	$ -	1	$ 2,241.07	$ 2,801.34			$ -
Woodford	17203			$ -			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2006 $1.17			2007 $1.14			2008 $1.10		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -			$ -	14	$2,544,683.24	$2,799,151.56
Alexander	17003			$ -			$ -	6	$ 109,840.14	$ 120,824.15
Boone	17007			$ -	1	$ 11,357.37	$ 12,947.40			$ -
Brown	17009			$ -			$ -			$ -
Bureau	17011			$ -			$ -	1	$ 3,315.77	$ 3,647.35
Calhoun	17013			$ -			$ -	41	$ 884,633.38	$ 973,096.72
Carroll	17015			$ -			$ -			$ -
Cass	17017			$ -			$ -			$ -
Champaign	17019	1	$ -	$ -			$ -	8	$ 110,653.92	$ 121,719.31
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -	2	$ 11,958.59	$ 13,154.45
Clinton	17027			$ -			$ -			$ -
Coles	17029			$ -			$ -	1	$ 30,899.34	$ 33,989.27
Cook	17031	146	$ 1,537,494.00	$ 1,798,867.98	92	$ 824,317.54	$939,722.00	501	$7,692,124.92	$8,461,337.41
Crawford	17033	1	$ 27,284.52	$ 31,922.89			$ -	1	$ 1,458.54	$ 1,604.39
DeKalb	17037			$ -	24	$ 443,418.27	$505,496.83	3	$ 110,287.34	$ 121,316.07
DeWitt	17039			$ -			$ -			$ -
Douglas	17041			$ -			$ -	2	$ 46,694.08	$ 51,363.49
Dupage	17043	11	$ 68,648.64	$ 80,318.91	9	$ 61,344.96	$ 69,933.25	81	$2,310,543.35	$2,541,597.69
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -	1	$ 6,503.12	$ 7,153.43
Fulton	17057			$ -			$ -	1	$ 14,427.79	$ 15,870.57
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -	8	$ 120,453.00	$ 132,498.30
Hancock	17067			$ -			$ -	29	$ 688,884.41	$ 757,772.85
Hardin	17069			$ -			$ -			$ -
Henderson	17071			$ -			$ -	27	$1,115,750.64	$1,227,325.70
Henry	17073			$ -	1	$ 1,075.93	$ 1,226.56	2	$ 2,925.75	$ 3,218.33
Iriquois	17075			$ -	1	$ -	$ -	97	$1,153,561.11	$1,268,917.22
Jackson	17077	1	$ 151.14	$ 176.83			$ -	29	$ 120,591.35	$ 132,650.49
Jefferson	17081	1	$ 17,081.00	$ 19,984.77			$ -			$ -
Jersey	17083			$ -			$ -	58	$2,553,736.42	$2,809,110.06
Jo Daviess	17085			$ -			$ -	7	$ 55,119.17	$ 60,631.09
Kane	17089			$ -	23	$435,743.01	$496,747.03	20	$ 216,515.52	$ 238,167.07
Kankakee	17091	1	$ -	$ -	2	$ 39,350.24	$ 44,859.27	30	$ 521,093.92	$ 573,203.31
Kendall	17093			$ -	2	$ 29,127.44	$ 33,205.28	3	$ 1,094.54	$ 1,203.99

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2006 $1.17			2007 $1.14			2008 $1.10		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Knox	17095			$ -			$ -			$ -
Lake	17097	6	$ 30,369.68	$ 35,532.53	34	$ 319,176.02	$363,860.66	32	$ 146,420.11	$ 161,062.12
LaSalle	17099			$ -	10	$ 131,906.79	$150,373.74	34	$ 887,120.18	$ 975,832.20
Lawrence	17101	1	$ 10,276.84	$ 12,023.90			$ -			$ -
Lee	17103			$ -	1	$ 8,286.96	$ 9,447.13	2	$ 10,898.63	$ 11,988.49
Livingston	17105			$ -			$ -	39	$ 338,642.22	$ 372,506.44
Logan	17107			$ -			$ -	1	$ 10,847.41	$ 11,932.15
McDonough	17109			$ -			$ -			$ -
McHenry	17111			$ -	28	$ 271,916.23	$309,984.50	10	$ 38,793.44	$ 42,672.78
McLean	17113			$ -			$ -	2	$ 10,619.83	$ 11,681.81
Macon	17115			$ -			$ -	8	$ 157,600.98	$ 173,361.08
Macoupin	17117			$ -			$ -			$ -
Madison	17119	1	$ 3,471.81	$ 4,062.02			$ -	12	$ 208,482.48	$ 229,330.73
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -			$ -			$ -
Mason	17125			$ -			$ -	1	$ 1,892.86	$ 2,082.15
Massac	17127			$ -			$ -	1	$ 2,467.00	$ 2,713.70
Menard	17129			$ -			$ -	1	$ 1,149.78	$ 1,264.76
Mercer	17131			$ -			$ -	3	$ 22,285.23	$ 24,513.75
Monroe	17133			$ -			$ -			$ -
Montgomery	17135			$ -			$ -	1	$ 94,600.00	$ 104,060.00
Morgan	17137			$ -			$ -			$ -
Moultrie	17139			$ -			$ -	2	$ 93,447.30	$ 102,792.03
Ogle	17141			$ -	2	$ 6,690.25	$ 7,626.89			$ -
Peoria	17143			$ -	9	$ 30,837.79	$ 35,155.08	41	$ 593,802.03	$ 653,182.23
Piatt	17147	1	$ 907.56	$ 1,061.85			$ -	2	$ 46,029.68	$ 50,632.65
Pike	17149			$ -			$ -	2	$ 104,500.00	$ 114,950.00
Pulaski	17153			$ -			$ -	1	$ 6,257.10	$ 6,882.81
Putnam	17155			$ -			$ -	2	$ 34,367.82	$ 37,804.60
Randolph	17157			$ -	1	$109,514.68	$124,846.74	2	$ -	$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161			$ -	8	$148,904.79	$169,751.46	57	$ 985,565.55	$1,084,122.11
St. Clair	17163	2	$ 4,362.78	$ 5,104.45			$ -	11	$ 64,796.91	$ 71,276.60
Saline	17165			$ -			$ -			$ -
Sangamon	17167			$ -			$ -	3	$ 57,090.67	$ 62,799.74
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2006 $1.17			2007 $1.14			2008 $1.10		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -	3	$ 7,179.30	$ 8,184.40	3	$ 8,465.01	$ 9,311.51
Tazewell	17179			$ -			$ -	1	$ -	$ -
Union	17181			$ -			$ -	3	$ 9,827.00	$ 10,809.70
Vermillion	17183			$ -			$ -	3	$ 226,663.28	$ 249,329.61
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189			$ -			$ -			$ -
Wayne	17191			$ -			$ -			$ -
White	17193			$ -			$ -	2	$ 36,079.90	$ 39,687.89
Whiteside	17195			$ -			$ -	4	$ 6,828.62	$ 7,511.48
Will	17197	6	$ 3,958.82	$ 4,631.82	13	$272,280.55	$310,399.83	26	$ 383,843.41	$ 422,227.75
Williamson	17199			$ -			$ -	11	$ 213,912.89	$ 235,304.18
Winnebago	17201	36	$ 907,609.67	$ 1,061,903.31	46	$ 791,246.00	$902,020.44	57	$1,533,439.11	$1,686,783.02
Woodford	17203			$ -			$ -	3	$ 24,882.99	$ 27,371.29

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2009 $1.10			2010 $1.09			2011 $1.05		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -			$ -			$ -
Alexander	17003			$ -			$ -	15	$ 146,005.16	$ 153,305.42
Boone	17007	1	$ 4,020.63	$ 4,422.69			$ -			$ -
Brown	17009	1	$ 12,668.41	$ 13,935.25			$ -			$ -
Bureau	17011			$ -	1	$ 3,304.84	$ 3,602.28	2	$ 3,566.20	$ 3,744.51
Calhoun	17013	4	$ 13,548.17	$ 14,902.99	7	$ 71,965.33	$ 78,442.21	7	$ 24,646.95	$ 25,879.30
Carroll	17015			$ -			$ -	1	$ 1,075.03	$ 1,128.78
Cass	17017			$ -	3	$ 6,312.18	$ 6,880.28			$ -
Champaign	17019	1	$ 6,132.21	$ 6,745.43			$ -	1	$ 995.84	$ 1,045.63
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -			$ -	1	$ 3,721.86	$ 3,907.95
Clinton	17027			$ -			$ -	1	$ 5,485.69	$ 5,759.97
Coles	17029			$ -			$ -			$ -
Cook	17031	30	$ 80,760.17	$ 88,836.19	291	$4,208,083.28	$4,586,810.78	127	$1,603,831.03	$1,684,022.58
Crawford	17033			$ -			$ -			$ -
DeKalb	17037			$ -	4	$ 69,369.26	$ 75,612.49			$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041			$ -			$ -			$ -
Dupage	17043	2	$ -	$ -	42	$ 715,806.00	$ 780,228.54	1	$ 54,064.26	$ 56,767.47
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -	1	$ 2,934.54	$ 3,081.27
Fulton	17057	4	$ 110,504.48	$ 121,554.93			$ -			$ -
Gallatin	17059			$ -			$ -	3	$ 37,510.48	$ 39,386.00
Greene	17061			$ -			$ -			$ -
Grundy	17063			$ -			$ -			$ -
Hancock	17067	2	$ 39,797.06	$ 43,776.77			$ -	1	$ -	$ -
Hardin	17069			$ -			$ -	1	$ 7,492.69	$ 7,867.32
Henderson	17071			$ -			$ -			$ -
Henry	17073	1	$ -	$ -	2	$ 303,547.01	$ 330,866.24			$ -
Iriquois	17075	2	$ -	$ -			$ -			$ -
Jackson	17077	1	$ 2,903.25	$ 3,193.58			$ -	3	$ 21,117.08	$ 22,172.93
Jefferson	17081			$ -			$ -			$ -
Jersey	17083	3	$ 1,848.74	$ 2,033.61	2	$ 5,398.00	$ 5,883.82	7	$ 5,615.57	$ 5,896.35
Jo Daviess	17085			$ -	3	$ 36,119.55	$ 39,370.31	18	$ 478,350.59	$ 502,268.12
Kane	17089	4	$ 20,803.67	$ 22,884.04	1	$ 2,481.42	$ 2,704.75			$ -
Kankakee	17091	7	$ 15,955.44	$ 17,550.98	1	$ 5,898.47	$ 6,429.33			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2009 $1.10			2010 $1.09			2011 $1.05		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Kendall	17093	1	$ 3,196.62	$ 3,516.28			$ -			$ -
Knox	17095			$ -			$ -			$ -
Lake	17097	8	$ 84,773.61	$ 93,250.97	4	$ 742.97	$ 809.84	2	$ 35,682.08	$ 37,466.18
LaSalle	17099	5	$ 21,943.71	$ 24,138.08	1	$ 3,296.29	$ 3,592.96			$ -
Lawrence	17101			$ -			$ -			$ -
Lee	17103			$ -	1	$ -	$ -	1	$ 10,164.76	$ 10,673.00
Livingston	17105			$ -	1	$ -	$ -			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -			$ -			$ -
McHenry	17111	1	$ 3,935.28	$ 4,328.81	1	$ 10,996.95	$ 11,986.68			$ -
McLean	17113			$ -	1	$ -	$ -			$ -
Macon	17115			$ -			$ -			$ -
Macoupin	17117			$ -			$ -			$ -
Madison	17119	1	$ 5,774.59	$ 6,352.05			$ -			$ -
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -	1	$ -	$ -			$ -
Mason	17125	6	$ 114,774.18	$ 126,251.60	4	$ 7,011.09	$ 7,642.09	3	$ 11,279.03	$ 11,842.98
Massac	17127			$ -			$ -	15	$ 178,612.38	$ 187,543.00
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133	1	$ 13,738.04	$ 15,111.84			$ -			$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137	3	$ 6,291.12	$ 6,920.23	1	$ 1,977.61	$ 2,155.59			$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141	1	$ 498.93	$ 548.82	16	$ 343,730.69	$ 374,666.45			$ -
Peoria	17143	48	$ 951,491.93	$1,046,641.12	1	$ 10,043.18	$ 10,947.07	2	$ 17,805.40	$ 18,695.67
Piatt	17147			$ -			$ -			$ -
Pike	17149			$ -	1	$ 1,413.83	$ 1,541.07			$ -
Pulaski	17153			$ -			$ -	1	$ 6,755.34	$ 7,093.11
Putnam	17155	1	$ -	$ -			$ -			$ -
Randolph	17157	1	$ 1,226.29	$ 1,348.92			$ -	3	$ 278.89	$ 292.83
Richland	17159			$ -			$ -			$ -
Rock Island	17161	9	$ 14,639.81	$ 16,103.79	6	$ 21,306.95	$ 23,224.58	7	$ 25,415.82	$ 26,686.61
St. Clair	17163	1	$ 17,163.00	$ 18,879.30	6	$ 26,759.10	$ 29,167.42	8	$ 77,100.16	$ 80,955.17
Saline	17165			$ -			$ -	1	$ 70,856.71	$ 74,399.55
Sangamon	17167			$ -			$ -			$ -
Schuyler	17169			$ -			$ -			$ -
Scott	17171			$ -			$ -	3	$ 19,829.25	$ 20,820.71

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2009 $1.10			2010 $1.09			2011 $1.05		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177	1	$ 3,116.98	$ 3,428.68	5	$ 36,293.47	$ 39,559.88			$ -
Tazewell	17179	1	$ 1,522.71	$ 1,674.98			$ -			$ -
Union	17181			$ -			$ -	1	$ 1,083.20	$ 1,137.36
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -			$ -			$ -
Washington	17189			$ -			$ -	2	$ 18,269.61	$ 19,183.09
Wayne	17191			$ -			$ -			$ -
White	17193			$ -			$ -	6	$ 171,892.45	$ 180,487.07
Whiteside	17195	1	$ 62,211.01	$ 68,432.11			$ -	1	$ 306.63	$ 321.96
Will	17197			$ -	6	$ 14,017.91	$ 15,279.52	3	$ 3,617.97	$ 3,798.87
Williamson	17199	3	$ 40,102.24	$ 44,112.46			$ -	1	$ -	$ -
Winnebago	17201	1	$ -	$ -	6	$ 101,151.64	$ 110,255.29			$ -
Woodford	17203	5	$ 48,084.61	$ 52,893.07			$ -	1	$ -	$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2012 $1.03			2013 $1.02			2014 $1.00		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001			$ -	4	$ 84,870.40	$ 86,567.81			$ -
Alexander	17003			$ -	1	$ 2,435.32	$ 2,484.03	1	$ -	$ -
Boone	17007			$ -			$ -			$ -
Brown	17009			$ -	2	$ 57,738.90	$ 58,893.68			$ -
Bureau	17011			$ -	3	$ 25,125.54	$ 25,628.05			$ -
Calhoun	17013			$ -	57	$1,254,708.80	$ 1,279,802.98	4	$ 16,093.77	$ 16,093.77
Carroll	17015			$ -			$ -			$ -
Cass	17017			$ -	2	$ 71,668.76	$ 73,102.14	2	$ 8,465.74	$ 8,465.74
Champaign	17019			$ -	2	$ 16,480.67	$ 16,810.28	1	$ 7,331.09	$ 7,331.09
Christian	17021			$ -			$ -			$ -
Clark	17023			$ -	2	$ 33,780.89	$ 34,456.51			$ -
Clinton	17027			$ -	1	$ 4,171.67	$ 4,255.10			$ -
Coles	17029			$ -			$ -			$ -
Cook	17031	4	$ 43,732.87	$ 45,044.86	385	$7,401,573.18	$ 7,549,604.64	89	$ 631,079.76	$ 631,079.76
Crawford	17033			$ -			$ -			$ -
DeKalb	17037			$ -	1	$ 4,269.83	$ 4,355.23			$ -
DeWitt	17039			$ -			$ -			$ -
Douglas	17041			$ -	17	$ 125,230.90	$ 127,735.52			$ -
Dupage	17043			$ -	104	$3,812,840.95	$ 3,889,097.77	9	$ 102,292.00	$ 102,292.00
Ford	17053			$ -			$ -			$ -
Franklin	17055			$ -			$ -			$ -
Fulton	17057			$ -	5	$ 88,530.62	$ 90,301.23			$ -
Gallatin	17059			$ -			$ -			$ -
Greene	17061			$ -			$ -			$ -
Grundy	17063	1	$ 1,125.87	$ 1,159.65	10	$ 266,019.92	$ 271,340.32			$ -
Hancock	17067			$ -	1	$ 13,300.00	$ 13,566.00	2	$ 10,449.30	$ 10,449.30
Hardin	17069			$ -			$ -			$ -
Henderson	17071			$ -	2	$ 28,999.16	$ 29,579.14	6	$ 87,830.49	$ 87,830.49
Henry	17073			$ -	1	$ -	$ -			$ -
Iriquois	17075			$ -			$ -			$ -
Jackson	17077			$ -			$ -	1	$ 4,451.10	$ 4,451.10
Jefferson	17081	1	$ 3,031.68	$ 3,122.63			$ -			$ -
Jersey	17083			$ -	22	$ 482,108.18	$ 491,750.34	1	$ 846.47	$ 846.47
Jo Daviess	17085			$ -	3	$ 17,280.25	$ 17,625.86	3	$ 19,384.09	$ 19,384.09
Kane	17089			$ -	21	$ 270,374.57	$ 275,782.06	3	$ 3,813.17	$ 3,813.17

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2012 $1.03			2013 $1.02			2014 $1.00		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Kankakee	17091			$ -			$ -	4	$ 83,449.27	$ 83,449.27
Kendall	17093			$ -	6	$ 149,362.87	$ 152,350.13			$ -
Knox	17095			$ -	1	$ 57,044.60	$ 58,185.49			$ -
Lake	17097			$ -	68	$1,566,483.62	$ 1,597,813.29	2	$ 376.61	$ 376.61
LaSalle	17099	1	$ -	$ -	18	$ 613,627.19	$ 625,899.73			$ -
Lawrence	17101			$ -			$ -			$ -
Lee	17103			$ -	1	$ 9,238.92	$ 9,423.70			$ -
Livingston	17105			$ -	2	$ 46,600.00	$ 47,532.00			$ -
Logan	17107			$ -			$ -			$ -
McDonough	17109			$ -	1	$ 18,145.16	$ 18,508.06			$ -
McHenry	17111			$ -	30	$ 532,959.63	$ 543,618.82			$ -
McLean	17113			$ -			$ -			$ -
Macon	17115			$ -	1	$ 8,072.51	$ 8,233.96			$ -
Macoupin	17117			$ -			$ -			$ -
Madison	17119			$ -	3	$ 11,860.57	$ 12,097.78			$ -
Marion	17121			$ -			$ -			$ -
Marshall	17123			$ -	2	$ 50,729.86	$ 51,744.46			$ -
Mason	17125			$ -	8	$ 224,231.84	$ 228,716.48			$ -
Massac	17127			$ -			$ -			$ -
Menard	17129			$ -			$ -			$ -
Mercer	17131			$ -			$ -			$ -
Monroe	17133			$ -	2	$ 54,618.88	$ 55,711.26	2	$ -	$ -
Montgomery	17135			$ -			$ -			$ -
Morgan	17137			$ -			$ -	1	$ -	$ -
Moultrie	17139			$ -			$ -			$ -
Ogle	17141			$ -	10	$ 156,861.17	$ 159,998.39			$ -
Peoria	17143			$ -	57	$1,959,186.15	$ 1,998,369.87	1	$ -	$ -
Piatt	17147			$ -			$ -	6	$ 204,791.16	$ 204,791.16
Pike	17149			$ -	5	$ 248,346.27	$ 253,313.20			$ -
Pulaski	17153			$ -			$ -			$ -
Putnam	17155			$ -	5	$ 186,517.12	$ 190,247.46			$ -
Randolph	17157			$ -			$ -			$ -
Richland	17159			$ -			$ -			$ -
Rock Island	17161			$ -	30	$ 540,516.51	$ 551,326.84	11	$ 610,859.14	$ 610,859.14
St. Clair	17163	1	$ 2,516.52	$ 2,592.02	8	$ 19,914.90	$ 20,313.20			$ -
Saline	17165			$ -			$ -	2	$ 32,446.38	$ 32,446.38
Sangamon	17167			$ -	1	$ 3,774.88	$ 3,850.38	1	$ 50,382.83	$ 50,382.83
Schuyler	17169			$ -	1	$ 29,283.02	$ 29,868.68			$ -

Appendix B (continued)

TABLE IX: NFIP CLAIM INFORMATION (2000 - 2014) (continued)

County Name	FIPS County Code	2012 $1.03			2013 $1.02			2014 $1.00		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Scott	17171			$ -			$ -			$ -
Shelby	17173			$ -			$ -			$ -
Stark	17175			$ -			$ -			$ -
Stephenson	17177			$ -			$ -			$ -
Tazewell	17179			$ -	2	$ 6,440.59	$ 6,569.40			$ -
Union	17181			$ -			$ -			$ -
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Tazewell	17179			$ -	2	$ 6,440.59	$ 6,569.40			$ -
Union	17181			$ -			$ -			$ -
Vermillion	17183			$ -			$ -			$ -
Wabash	17185			$ -			$ -			$ -
Warren	17187			$ -	1	$ 2,554.03	$ 2,605.11			$ -
Washington	17189			$ -			$ -			$ -
Wayne	17191			$ -			$ -			$ -
White	17193			$ -	1	$ 30,128.72	$ 30,731.29			$ -
Whiteside	17195			$ -	2	$ 53,005.13	$ 54,065.23			$ -
Will	17197			$ -	30	$ 591,828.64	$ 603,665.21	2	$ -	$ -
Williamson	17199			$ -			$ -			$ -
Winnebago	17201			$ -	8	$ 43,410.70	$ 44,278.91	1	$ 1,830.69	$ 1,830.69
Woodford	17203			$ -	17	$ 202,457.88	$ 206,507.04			$ -

Appendix B (continued)

TABLE X: NFIP CLAIM SUMMARY

County Name	FIPS County	1985-1999			2000-2014		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Adams	17001	39	$ 834,749.72	$ 1,372,374.73	24	$ 2,704,109.27	$ 2,985,623.92
Alexander	17003	17	$ 42,251.91	$ 90,766.27	25	$ 259,228.34	$ 277,864.59
Boone	17007	3	$ -	$ -	3	$ 15,378.00	$ 17,370.09
Brown	17009	5	$ 37,062.90	$ 60,027.35	7	$ 139,493.33	$ 164,022.48
Bureau	17011	2	$ 3,048.58	$ 6,322.22	7	$ 35,312.35	$ 36,622.18
Calhoun	17013	130	$ 1,488,893.47	$ 2,583,125.34	134	$ 2,412,834.01	$ 2,582,779.84
Carroll	17015	3	$ 12,151.81	$ 18,085.43	3	$ 65,931.26	$ 87,979.01
Cass	17017	11	$ 31,252.14	$ 62,667.33	9	$ 88,721.65	$ 91,451.11
Champaign	17019	35	$ 439,303.02	$ 738,608.92	19	$ 215,522.56	$ 251,237.80
Christian	17021	0	$ -	$ -	4	$ 9,400.37	$ 12,567.34
Clark	17023	0	$ -	$ -	8	$ 148,195.88	$ 170,987.70
Clinton	17027	0	$ -	$ -	2	$ 9,657.36	$ 10,015.08
Coles	17029	4	$ -	$ -	2	$ 31,848.94	$ 35,242.75
Cook	17031	904	$ 6,721,104.57	$ 12,466,879.55	1875	$ 24,588,726.12	$ 26,519,683.88
Crawford	17033	0	$ -	$ -	3	$ 46,374.93	$ 54,861.85
DeKalb	17037	19	$ 205,571.73	$ 316,586.87	35	$ 641,594.41	$ 724,592.76
DeWitt	17039	5	$ 83,311.34	$ 132,062.50	0	$ -	$ -
Douglas	17041	28	$ 90,693.30	$ 156,601.50	30	$ 181,310.40	$ 191,487.76
Dupage	17043	294	$ 2,216,460.09	$ 4,459,829.01	286	$ 7,256,877.61	$ 7,696,227.81
Ford	17053	0	$ -	$ -	0	$ -	$ -
Franklin	17055	5	$ 84,378.99	$ 127,412.27	2	$ 9,437.66	$ 10,234.70
Fulton	17057	47	$ 334,755.07	$ 585,535.49	13	$ 219,345.90	$ 235,492.30
Gallatin	17059	0	$ -	$ -	3	$ 37,510.48	$ 39,386.00
Greene	17061	7	$ 38,749.84	$ 72,634.11	0	$ -	$ -
Grundy	17063	18	$ 246,049.18	$ 538,916.58	20	$ 387,598.79	$ 404,998.26
Hancock	17067	22	$ 443,099.02	$ 731,031.44	44	$ 817,061.48	$ 912,170.07
Hardin	17069	6	$ 41,117.45	$ 71,544.36	1	$ 7,492.69	$ 7,867.32
Henderson	17071	23	$ 208,460.09	$ 342,218.13	47	$ 1,473,515.67	$ 1,666,250.79
Henry	17073	15	$ 68,284.44	$ 103,807.78	13	$ 345,373.16	$ 386,050.86
Iriquois	17075	15	$ 232,167.04	$ 379,572.89	107	$ 1,186,482.37	$ 1,308,802.05
Jackson	17077	8	$ 34,898.97	$ 52,335.92	37	$ 181,990.61	$ 205,740.24
Jefferson	17081	1	$ -	$ -	2	$ 20,112.68	$ 23,107.40
Jersey	17083	111	$ 1,151,426.02	$ 1,962,339.00	120	$ 3,263,113.74	$ 3,597,801.06
Jo Daviess	17085	16	$ 106,180.00	$ 184,899.66	51	$ 703,661.94	$ 769,311.72
Kane	17089	54	$ 605,031.92	$ 960,310.52	75	$ 960,515.34	$ 1,054,548.65
Kankakee	17091	50	$ 176,716.16	$ 343,107.17	51	$ 696,808.68	$ 764,803.32

Appendix B (continued)

TABLE X: NFIP CLAIM SUMMARY (continued)

County Name	FIPS County	1985-1999			2000-2014		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Kendall	17093	18	$ 417,941.19	$ 641,170.35	13	$ 189,608.41	$ 199,628.59
Knox	17095	2	$ 24,200.00	$ 39,688.00	1	$ 57,044.60	$ 58,185.49
Lake	17097	154	$ 762,395.11	$ 1,533,407.05	192	$ 2,459,540.65	$ 2,643,685.42
LaSalle	17099	35	$ 525,842.45	$ 810,997.59	76	$ 1,705,643.31	$ 1,840,751.95
Lawrence	17101	2	$ 4,796.56	$ 7,209.87	1	$ 10,276.84	$ 12,023.90
Lee	17103	35	$ 187,798.35	$ 330,847.94	8	$ 46,493.87	$ 52,361.63
Livingston	17105	0	$ -	$ -	46	$ 385,242.22	$ 420,038.44
Logan	17107	1	$ 6,301.57	$ 9,137.28	1	$ 10,847.41	$ 11,932.15
McDonough	17109	0	$ -	$ -	1	$ 18,145.16	$ 18,508.06
McHenry	17111	62	$ 407,995.23	$ 713,166.68	87	$ 924,493.64	$ 1,001,755.55
McLean	17113	0	$ -	$ -	6	$ 18,460.24	$ 21,712.28
Macon	17115	18	$ 254,128.23	$ 451,354.50	12	$ 183,913.12	$ 205,671.35
Macoupin	17117	1	$ 9,823.58	$ 16,110.67	0	$ -	$ -
Madison	17119	52	$ 813,129.12	$ 1,361,415.35	38	$ 355,953.05	$ 418,720.88
Marion	17121	2	$ 450.00	$ 972.00	0	$ -	$ -
Marshall	17123	9	$ 51,622.35	$ 90,479.65	3	$ 50,729.86	$ 51,744.46
Mason	17125	38	$ 231,436.97	$ 388,134.82	35	$ 433,890.05	$ 473,804.64
Massac	17127	5	$ 18,838.82	$ 27,693.07	16	$ 181,079.38	$ 190,256.70
Menard	17129	5	$ 23,950.98	$ 38,321.57	3	$ 24,697.62	$ 32,347.91
Mercer	17131	23	$ 512,764.38	$ 840,416.82	4	$ 22,285.23	$ 24,513.75
Monroe	17133	26	$ 813,402.92	$ 1,333,980.79	5	$ 68,356.92	$ 70,823.10
Montgomery	17135	2	$ 16,501.24	$ 27,062.03	2	$ 114,600.00	$ 130,460.00
Morgan	17137	18	$ 54,149.47	$ 98,775.90	8	$ 10,777.22	$ 12,387.03
Moultrie	17139	1	$ -	$ -	2	$ 93,447.30	$ 102,792.03
Ogle	17141	25	$ 196,061.32	$ 305,469.21	32	$ 544,776.37	$ 593,065.74
Peoria	17143	178	$ 1,043,814.88	$ 1,890,526.78	194	$ 3,698,442.40	$ 3,937,254.92
Piatt	17147	0	$ -	$ -	9	$ 251,728.40	$ 256,485.65
Pike	17149	39	$ 1,021,328.99	$ 1,676,075.67	18	$ 487,374.06	$ 545,459.15
Pulaski	17153	0	$ -	$ -	6	$ 14,934.37	$ 16,512.86
Putnam	17155	3	$ 24,320.59	$ 45,802.64	9	$ 226,511.34	$ 234,860.01
Randolph	17157	5	$ 9,300.00	$ 15,252.00	11	$ 116,073.71	$ 132,996.40
Richland	17159	4	$ 33,296.96	$ 56,981.59	0	$ -	$ -
Rock Island	17161	161	$ 1,162,639.50	$ 1,913,389.56	197	$ 3,378,323.87	$ 3,850,180.56
St. Clair	17163	85	$ 347,349.53	$ 536,986.77	50	$ 236,847.79	$ 259,283.31
Saline	17165	0	$ -	$ -	3	$ 103,303.09	$ 106,845.93
Sangamon	17167	21	$ 187,796.65	$ 318,196.21	12	$ 280,015.06	$ 338,444.86

Appendix B (continued)

TABLE X: NFIP CLAIM SUMMARY (continued)

County Name	FIPS County	1985-1999			2000-2014		
		Count	Amount	Amount in 2014 Dollars	Count	Amount	Amount in 2014 Dollars
Schuyler	17169	4	$ 76,469.40	$ 119,581.94	1	$ 29,283.02	$ 29,868.68
Scott	17171	3	$ 7,908.35	$ 12,969.69	7	$ 28,812.40	$ 32,792.11
Shelby	17173	0	$ -	$ -	0	$ -	$ -
Stark	17175	0	$ -	$ -	0	$ -	$ -
Stephenson	17177	13	$ 81,004.39	$ 132,849.58	13	$ 56,095.12	$ 61,784.92
Tazewell	17179	20	$ 103,874.89	$ 175,542.85	4	$ 7,963.30	$ 8,244.38
Union	17181	27	$ 27,412.42	$ 43,456.70	7	$ 14,427.22	$ 16,589.53
Vermillion	17183	10	$ 157,737.26	$ 261,560.84	4	$ 246,977.15	$ 276,143.92
Wabash	17185	1	$ 4,910.00	$ 7,119.50	0	$ -	$ -
Warren	17187	0	$ -	$ -	1	$ 2,554.03	$ 2,605.11
Washington	17189	0	$ -	$ -	2	$ 18,269.61	$ 19,183.09
Wayne	17191	3	$ 12,815.12	$ 22,721.01	0	$ -	$ -
White	17193	10	$ 20,086.13	$ 31,141.64	10	$ 240,769.84	$ 254,482.41
Whiteside	17195	22	$ 139,668.62	$ 230,554.70	19	$ 260,019.60	$ 313,998.75
Will	17197	178	$ 1,475,206.53	$ 2,580,526.26	99	$ 1,315,128.00	$ 1,418,022.98
Williamson	17199	28	$ 339,484.82	$ 549,556.95	20	$ 261,461.59	$ 288,443.05
Winnebago	17201	63	$ 130,863.12	$ 218,565.36	177	$ 3,655,036.02	$ 4,179,609.04
Woodford	17203	35	$ 137,626.68	$ 276,484.49	26	$ 275,425.48	$ 286,771.40
Total	--	3344	$ 27,855,613.44	$ 49,101,256.22	4553	$ 72,276,616.92	$ 78,751,216.78

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS

COUNTY_NAM	OBJECTID	COUNTY_SQMI	TOTAL_COUNT
ADAMS	14	855.2	2256267600
ALEXANDER	62	235.51	655892100
BOND	92	380.28	991532700
BOONE	2	280.72	730480500
BROWN	40	305.61	795716100
BUREAU	6	869.03	2263814100
CALHOUN	45	253.83	734938200
CARROLL	27	444.81	1208259000
CASS	43	375.82	993624300
CHAMPAIGN	15	996.27	2585616300
CHRISTIAN	82	709.38	1852641000
CLARK	89	501.42	1307560500
CLAY	46	468.32	1215509400
CLINTON	50	474.09	1303382700
COLES	85	508.29	1321947000
COOK	30	945.33	2479723200
CRAWFORD	90	443.63	1154688300
CUMBERLAND	44	346.02	897985800
DEKALB	29	631.31	1643625900
DEWITT	37	397.51	1048911300
DOUGLAS	41	416.67	1080875700
DUPAGE	63	327.5	871248600
EDGAR	80	623.37	1615452300
EDWARDS	52	222.42	576743400
EFFINGHAM	48	478.78	1243578600
FAYETTE	94	716.48	1879163100
FORD	34	485.62	1259688600
FRANKLIN	57	408.89	1117971900
FULTON	13	865.6	2286394200
GALLATIN	70	323.07	849783600
GREENE	49	543.02	1416716100
GRUNDY	8	418.04	1115113500

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	OBJECTID	COUNTY_SQMI	TOTAL_COUNT
HAMILTON	73	434.67	1128901500
HANCOCK	39	793.73	2108605500
HARDIN	74	177.53	469637100
HENDERSON	22	378.87	1025435700
HENRY	7	822.99	2136538800
IROQUOIS	24	1117.32	2899134900
JACKSON	58	584.08	1567748700
JASPER	91	494.51	1290660300
JEFFERSON	98	571.17	1512084600
JERSEY	47	369.27	977818500
JO DAVIESS	66	601.09	1601366400
JOHNSON	72	343092	902768400
KANE	28	520.06	1357353900
KANKAKEE	33	676.56	1764252900
KENDALL	32	320.34	834815700
KNOX	19	716.4	1863458100
LAKE	69	443.67	1219389300
LASALLE	5	1135.12	2973677400
LAWRENCE	99	372.18	968668200
LEE	65	724.9	1887008400
LIVINGSTON	21	1044.29	2709133200
LOGAN	16	618.06	1602852300
MACON	78	580.69	1517494500
MACOUPIN	88	862.91	2246540400
MADISON	93	715.58	1916992800

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	LIGHT_DEV_ COUNT	LIGHT_DEV_ PROP	LIGHT_DEV_ AREA
ADAMS	122499900	0.054293161	46.43151126
ALEXANDER	33947100	0.051757141	12.18932431
BOND	61063200	0.061584656	23.41941289
BOONE	67957200	0.09303082	26.11561183
BROWN	29123100	0.036599863	11.18528404
BUREAU	122677200	0.054190492	47.09316331
CALHOUN	26910900	0.036616548	9.294378421
CARROLL	60383700	0.049975792	22.22973187
CASS	36970200	0.037207423	13.98329385
CHAMPAIGN	226770300	0.087704545	87.37740661
CHRISTIAN	106869600	0.057685002	40.9205868
CLARK	76818600	0.058749557	29.45820282
CLAY	64703700	0.053231756	24.92949605
CLINTON	79744500	0.061182721	29.00611617
COLES	95791500	0.072462436	36.83193164
COOK	1042128900	0.420260173	397.284549
CRAWFORD	68769900	0.059557112	26.42132144
CUMBERLAND	52548300	0.058517963	20.24838563
DEKALB	110180700	0.067035145	42.31995719
DEWITT	55783800	0.053182571	21.14060392
DOUGLAS	65653200	0.060740749	25.30884804
DUPAGE	487594800	0.559650598	183.2855708
EDGAR	82198800	0.050882839	31.71883562
EDWARDS	31576500	0.054749651	12.17741743
EFFINGHAM	95805900	0.077040486	36.88544399
FAYETTE	106548300	0.056699868	40.62432153
FORD	68189400	0.05413195	26.28755744
FRANKLIN	97104600	0.086857818	35.51529327
FULTON	107636400	0.047076921	40.74978315
GALLATIN	37257300	0.04384328	14.16444835
GREENE	59905800	0.042284972	22.96158526
GRUNDY	75003300	0.067260687	28.11765756

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	LIGHT_DEV_COUNT	LIGHT_DEV_PROP	LIGHT_DEV_AREA
HAMILTON	54386100	0.048176125	20.94071634
HANCOCK	102823200	0.048763602	38.70513405
HARDIN	21097800	0.044923623	7.975290781
HENDERSON	41060700	0.040042199	15.1707878
HENRY	123163200	0.057646133	47.44219107
IROQUOIS	156033000	0.053820538	60.1347635
JACKSON	112512600	0.071766987	41.91766155
JASPER	64436400	0.049925143	24.68848245
JEFFERSON	108433800	0.071711464	40.95943676
JERSEY	53742600	0.054961734	20.2957194
JO DAVIESS	80208900	0.050087788	30.10726821
JOHNSON	49735800	0.055092535	18901.80814
KANE	314523900	0.231718419	120.5074811
KANKAKEE	139642200	0.079150897	53.55033104
KENDALL	77521500	0.092860616	29.74696967
KNOX	115425900	0.061941774	44.37508671
LAKE	479648700	0.393351574	174.5182927
LASALLE	208466100	0.070103805	79.57623091
LAWRENCE	69894000	0.072154738	26.85455032
LEE	103583700	0.054893078	39.79199252
LIVINGSTON	143514000	0.052974139	55.32036411
LOGAN	88303500	0.055091477	34.04983804
MACON	164884500	0.108655748	63.09530631
MACOUPIN	133660800	0.059496281	51.33993625
MADISON	301366800	0.157208102	112.4949738

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	HEAVY_DEV_ COUNT	HEAVY_DEV _PROP	HEAVY_DEV_ TOTAL	TOTAL_DEV _COUNT	TOTAL_PROP_ DEV	DEV_AREA
ADAMS	40943700	0.018146651	15.51901567	163443600	0.072439812	61.95052693
ALEXANDER	3345300	0.005100382	1.201190871	37292400	0.056857523	13.39051518
BOND	3125700	0.003152392	1.198791725	64188900	0.064737048	24.61820462
BOONE	12708000	0.017396768	4.883620795	80665200	0.110427588	30.99923262
BROWN	3965400	0.004983436	1.522987777	33088500	0.041583298	12.70827181
BUREAU	13930200	0.00615342	5.347506982	136607400	0.060343913	52.44067029
CALHOUN	714600	0.000972327	0.246805674	27625500	0.037588875	9.541184095
CARROLL	5290200	0.004378366	1.947540935	65673900	0.054354158	24.1772728
CASS	7979400	0.008030601	3.018060355	44949600	0.045238024	17.00135421
CHAMPAIGN	41963400	0.016229554	16.16901801	268733700	0.103934099	103.5464246
CHRISTIAN	8456400	0.004564511	3.237972728	115326000	0.062249513	44.15855953
CLARK	4040100	0.0030898	1.54928735	80858700	0.061839357	31.00749017
CLAY	2769300	0.002278304	1.066975357	67473000	0.05551006	25.99647141
CLINTON	12146400	0.009319136	4.418108953	91890900	0.070501856	33.42422512
COLES	13451400	0.010175446	5.172077327	109242900	0.082637882	42.00400897
COOK	980362800	0.395351707	373.7378292	2022491700	0.81561188	771.0223781
CRAWFORD	4157100	0.003600192	1.597153338	72927000	0.063157304	28.01847478
CUMBERLAND	1611000	0.001794015	0.620765072	54159300	0.060311978	20.8691507
DEKALB	25693200	0.015632024	9.868653257	135873900	0.082667169	52.18861044
DEWITT	7227000	0.006890001	2.738844333	63010800	0.060072572	23.87944825
DOUGLAS	7800300	0.007216649	3.006960931	73453500	0.067957398	28.31580897
DUPAGE	217007100	0.249075981	81.57238388	704601900	0.808726579	264.8579547
EDGAR	3855600	0.0023867	1.487797177	86054400	0.053269539	33.2066328
EDWARDS	1278900	0.002217451	0.493205363	32855400	0.056967102	12.67062279
EFFINGHAM	10402200	0.008364731	4.004865729	106208100	0.085405217	40.89030972
FAYETTE	5238900	0.00278789	1.997467422	111787200	0.059487758	42.62178895
FORD	5607000	0.0044511	2.16154321	73796400	0.05858305	28.44910065
FRANKLIN	8222400	0.007354747	3.007282326	105327000	0.094212565	38.52257559
FULTON	12940200	0.005659654	4.898996472	120576600	0.052736575	45.64877962
GALLATIN	1473300	0.001733736	0.56011793	38730600	0.045577015	14.72456628
GREENE	3571200	0.002520759	1.368822606	63477000	0.044805731	24.33040786
GRUNDY	15721200	0.014098296	5.893651586	90724500	0.081358983	34.01130914
HAMILTON	1366200	0.001210203	0.526038945	55752300	0.049386328	21.46675528

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	HEAVY_DEV_ COUNT	HEAVY_DEV _PROP	HEAVY_DEV_ TOTAL	TOTAL_DEV _COUNT	TOTAL_PROP_ DEV	DEV_AREA
HANCOCK	17206200	0.00815999	6.47682894	120029400	0.056923592	45.18196299
HARDIN	1015200	0.002161669	0.383761113	22113000	0.047085292	8.359051893
HENDERSON	5166900	0.005038736	1.909025991	46227600	0.045080935	17.07981379
HENRY	19556100	0.009153169	7.532966281	142719300	0.066799302	54.97515735
IROQUOIS	10865700	0.003747911	4.18761608	166898700	0.057568449	64.32237958
JACKSON	8781300	0.005601217	3.271558576	121293900	0.077368203	45.18922013
JASPER	2594700	0.002010366	0.99414625	67031100	0.051935509	25.6826287
JEFFERSON	11603700	0.007673975	4.38314452	120037500	0.079385439	45.34258128
JERSEY	4559400	0.004662829	1.721842692	58302000	0.059624562	22.01756209
JO DAVIESS	4194900	0.002619575	1.574600567	84403800	0.052707363	31.68186877
JOHNSON	1663200	0.001842333	632.0897081	51399000	0.056934868	19533.89785
KANE	97683300	0.071965977	37.42662617	412207200	0.303684397	157.9341073
KANKAKEE	25584300	0.014501492	9.81112969	165226500	0.09365239	63.36146073
KENDALL	15116400	0.01810747	5.800546846	92637900	0.110968086	35.54751652
KNOX	22920300	0.012299874	8.811629797	138346200	0.074241648	53.1867165
LAKE	143942400	0.118044664	52.372876	623591100	0.511396237	226.8911687
LASALLE	39172500	0.013173083	14.95303028	247638600	0.083276888	94.52926119
LAWRENCE	3060900	0.003159906	1.176053639	72954900	0.075314643	28.03060396
LEE	15314400	0.008115703	5.883073207	118898100	0.063008782	45.67506572
LIVINGSTON	18000000	0.006644192	6.938462826	161514000	0.059618331	62.25882694
LOGAN	10528200	0.006568416	4.059674926	98831700	0.061659892	38.10951296
MACON	41603400	0.027415849	15.92010933	206487900	0.136071597	79.01541564
MACOUPIN	13459500	0.005991212	5.169876823	147120300	0.065487494	56.50981308
MADISON	82420200	0.042994528	30.76602412	383787000	0.20020263	143.2609979

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	VALUE_21	VALUE_22	VALUE_23	VALUE_24
ADAMS	46222200	76277700	34441200	6502500
ALEXANDER	24219900	9727200	2689200	656100
BOND	40518900	20544300	2594700	531000
BOONE	31462200	36495000	9501300	3206700
BROWN	12255300	16867800	3546000	419400
BUREAU	76134600	46542600	11110500	2819700
CALHOUN	20782800	6128100	590400	124200
CARROLL	36942300	23441400	4085100	1205100
CASS	15474600	21495600	6681600	1297800
CHAMPAIGN	100359900	126410400	31703400	10260000
CHRISTIAN	63127800	43741800	6337800	2118600
CLARK	52383600	24435000	3309300	730800
CLAY	50374800	14328900	2103300	666000
CLINTON	41196600	38547900	10147500	1998900
COLES	49187700	46603800	10430100	3021300
COOK	209503800	832625100	639520200	340842600
CRAWFORD	50885100	17884800	3041100	1116000
CUMBERLAND	39038400	13509900	1349100	261900
DEKALB	45877500	64303200	19584900	6108300
DEWITT	29697300	26086500	5797800	1429200
DOUGLAS	32348700	33304500	5793300	2007000
DUPAGE	129438900	358155900	151731900	65275200
EDGAR	54698400	27500400	2921400	934200
EDWARDS	23050800	8525700	961200	317700
EFFINGHAM	68018400	27787500	7169400	3232800
FAYETTE	82628100	23920200	4188600	1050300
FORD	33876900	34312500	4243500	1363500
FRANKLIN	56172600	40932000	7021800	1200600
FULTON	47515500	60120900	11189700	1750500
GALLATIN	25484400	11772900	1178100	295200
GREENE	37221300	22684500	2971800	599400
GRUNDY	35740800	39262500	10742400	4978800
HAMILTON	37418400	16967700	1143900	222300

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	VALUE_21	VALUE_22	VALUE_23	VALUE_24
HANCOCK	44915400	57907800	15661800	1544400
HARDIN	17502300	3595500	688500	326700
HENDERSON	18126900	22933800	4683600	483300
HENRY	64218600	58944600	15325200	4230900
IROQUOIS	91549800	64483200	8973000	1892700
JACKSON	63267300	49245300	7578900	1202400
JASPER	51351300	13085100	2013300	581400
JEFFERSON	68522400	39911400	8783100	2820600
JERSEY	35208000	18534600	3420000	1139400
JO DAVIESS	57240000	22968900	3439800	755100
JOHNSON	29278800	20457000	1485000	178200
KANE	100278900	214245000	74070000	23613300
KANKAKEE	51582600	88059600	18959400	6624900
KENDALL	32550300	44971200	11252700	3863700
KNOX	55377900	60048000	17320500	5599800
LAKE	195180300	284468400	104913000	39029400
LASALLE	92442600	116023500	29141100	10031400
LAWRENCE	52470900	17423100	2621700	439200
LEE	58275000	45308700	11994300	3320100
LIVINGSTON	68211900	75302100	14659200	3340800
LOGAN	44647200	43656300	8481600	2046600
MACON	72892800	91991700	27864000	13739400
MACOUPIN	79425000	54235800	10836900	2622600
MADISON	144942300	156424500	56482200	25938000

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	OBJECTID	COUNTY_SQMI	TOTAL_COUNT
MARION	100	572.36	1491682500
MARSHALL	20	386.79	1033157700
MASON	36	539.24	1459076400
MASSAC	75	237.22	625962600
MCDONOUGH	76	589.41	1528088400
MCHENRY	1	603.17	1581994800
MCLEAN	11	1183.38	3072485700
MENARD	35	314.44	816608700
MERCER	9	561.2	1469909700
MONROE	97	385.01	1030193100
MONTGOMERY	87	703.69	1838026800
MORGAN	81	568.79	1483821900
MOULTRIE	83	335.94	891152100
OGLE	3	758.57	1977178500
PEORIA	25	619.21	1631750400
PERRY	56	441.76	1157852700
PIATT	17	439.2	1137796200
PIKE	42	831.38	2192574600
POPE	102	368.77	969269400
PULASKI	61	199.19	526304700
PUTNAM	10	160.16	445882500
RANDOLPH	55	575.5	1541014200
RICHLAND	54	359.99	937457100
ROCK ISLAND	31	427.64	1169292600
SALINE	59	379.82	1002240900
SANGAMON	79	868.3	2270951100
SCHUYLER	38	437.27	1142905500
SCOTT	84	250.91	654718500
SHELBY	86	758.52	1989931500
ST. CLAIR	95	657.76	1745477100
STARK	18	288.08	747117000
STEPHENSON	67	564.52	1461653100
TAZEWELL	12	648.97	1704348000

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	OBJECTID	COUNTY_SQMI	TOTAL_COUNT
UNION	101	413.46	1093309200
VERMILION	77	898.37	2334028500
WABASH	51	223.25	589215600
WARREN	23	542.41	1408287600
WASHINGTON	53	562.57	1460427300
WAYNE	96	713.81	1853073900
WHITE	60	494.77	1299716100
WHITESIDE	64	684.25	1806750900
WILL	4	836.91	2198998800
WILLIAMSON	71	420.15	1150257600
WINNEBAGO	68	513.36	1344637800
WOODFORD	26	527.8	1405771200

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	LIGHT_DEV_ COUNT	LIGHT_DEV_ PROP	LIGHT_DEV_ AREA
MARION	110962800	0.07438768	42.57653234
MARSHALL	53968500	0.052236459	20.20454004
MASON	63377100	0.043436451	23.42267163
MASSAC	39566700	0.063209367	14.99452615
MCDONOUGH	77091300	0.050449503	29.73544144
MCHENRY	250061400	0.158067144	95.3413593
MCLEAN	218665800	0.071169021	84.21999634
MENARD	42832800	0.05245205	16.49302246
MERCER	63761400	0.043377767	24.34360266
MONROE	62767800	0.060928189	23.45796208
MONTGOMERY	114738300	0.062424715	43.92764802
MORGAN	78066900	0.052612042	29.92520332
MOULTRIE	48103200	0.053978664	18.13359247
OGLE	114937200	0.058131929	44.09713731
PEORIA	155498400	0.095295457	59.0078999
PERRY	67767300	0.058528429	25.85551897
PIATT	63363600	0.055689762	24.45894363
PIKE	94905900	0.043285141	35.98640025
POPE	28220400	0.029115125	10.73678475
PULASKI	31094100	0.059080035	11.76815214
PUTNAM	24178500	0.054226169	8.684863299
RANDOLPH	90459900	0.058701536	33.78273377
RICHLAND	62464500	0.066631849	23.98679935
ROCK ISLAND	125877600	0.107652781	46.0366352
SALINE	73710900	0.073546091	27.93427612
SANGAMON	210002400	0.092473325	80.29458843
SCHUYLER	44749800	0.039154418	17.12105248
SCOTT	27479700	0.041971779	10.531139
SHELBY	101898900	0.05120724	38.84171572
ST. CLAIR	271196100	0.155370758	102.1966697
STARK	32497200	0.043496802	12.53055864
STEPHENSON	90173700	0.061692956	34.82690737

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	LIGHT_DEV_ COUNT	LIGHT_DEV_ PROP	LIGHT_DEV_ AREA
TAZEWELL	158436900	0.092960417	60.32852152
UNION	59759100	0.05465892	22.59927703
VERMILION	168221700	0.072073542	64.74870749
WABASH	35371800	0.060032015	13.40214745
WARREN	66268800	0.047056297	25.52380622
WASHINGTON	73453500	0.050295896	28.29496237
WAYNE	95144400	0.051344094	36.64992754
WHITE	77750100	0.059820833	29.59755363
WHITESIDE	105281100	0.058270955	39.87190081
WILL	414353700	0.188428343	157.6975645
WILLIAMSON	119638800	0.104010441	43.6999867
WINNEBAGO	239351400	0.178004367	91.38032168
WOODFORD	90090000	0.06408582	33.82449576

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	HEAVY_DEV_ COUNT	HEAVY_DEV _PROP	HEAVY_DEV_ TOTAL	TOTAL_DEV _COUNT	TOTAL_PROP_ DEV	DEV_AREA
MARION	11056500	0.0074121	4.24238961	122019300	0.08179978	46.81892195
MARSHALL	5102100	0.004938355	1.91010652	59070600	0.057174815	22.11464656
MASON	5796000	0.003972376	2.142064007	69173100	0.047408827	25.56473564
MASSAC	3775500	0.006031511	1.430794923	43342200	0.069240878	16.42532107
MCDONOUGH	13227300	0.008656109	5.101997301	90318600	0.059105612	34.83743874
MCHENRY	47407500	0.029966913	18.07514271	297468900	0.188034057	113.416502
MCLEAN	59699700	0.019430424	22.9935752	278365500	0.090599445	107.2135715
MENARD	3734100	0.004572692	1.437837246	46566900	0.057024741	17.93085971
MERCER	3978900	0.002706901	1.519112827	67740300	0.046084668	25.86271549
MONROE	13383900	0.012991642	5.001912107	76151700	0.073919831	28.45987419
MONTGOMERY	9708300	0.005281914	3.716830259	124446600	0.06770663	47.64447828
MORGAN	21229200	0.014307108	8.137739892	99296100	0.06691915	38.06294321
MOULTRIE	4393800	0.004930471	1.656342584	52497000	0.058909136	19.78993505
OGLE	16333200	0.008260863	6.266442572	131270400	0.066392792	50.36357988
PEORIA	66446100	0.04072075	25.21469557	221944500	0.136016207	84.22259547
PERRY	5111100	0.004414292	1.950057668	72878400	0.062942721	27.80557664
PIATT	5753700	0.005056881	2.220982141	69117300	0.060746643	26.67992577
PIKE	12995100	0.005926868	4.927479429	107901000	0.049212009	40.91387968
POPE	466200	0.000480981	0.1773713	28686600	0.029596106	10.91415605
PULASKI	1799100	0.003418362	0.680903532	32893200	0.062498397	12.44905567
PUTNAM	2275200	0.00510269	0.817246768	26453700	0.059328859	9.502110067
RANDOLPH	8344800	0.005415135	3.116410219	98804700	0.064116671	36.89914399
RICHLAND	3060900	0.003265109	1.175406737	65525400	0.069896958	25.16220608
ROCK ISLAND	63404100	0.054224323	23.18848963	189281700	0.161877104	69.22512482
SALINE	5830200	0.005817164	2.209475351	79541100	0.079363255	30.14375147
SANGAMON	77859000	0.034284754	29.76945197	287861400	0.126758079	110.0640404
SCHUYLER	5948100	0.005204367	2.275713685	50697900	0.044358786	19.39676617
SCOTT	5328900	0.008139223	2.042212491	32808600	0.050111002	12.57335149
SHELBY	5013000	0.002519182	1.910850077	106911900	0.053726422	40.7525658
ST. CLAIR	78436800	0.044937169	29.5578725	349632900	0.200307927	131.7545422
STARK	1392300	0.001863564	0.536855384	33889500	0.045360365	13.06741402
STEPHENSON	11428200	0.007818681	4.41380206	101601900	0.069511637	39.24070943
TAZEWELL	42880500	0.025159474	16.32774415	201317400	0.118119891	76.65626567

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	HEAVY_DEV_ COUNT	HEAVY_DEV _PROP	HEAVY_DEV_ TOTAL	TOTAL_DEV _COUNT	TOTAL_PROP_ DEV	DEV_AREA
UNION	2331000	0.002132059	0.88152122	62090100	0.056790979	23.48079825
VERMILION	15831900	0.006783079	6.093714795	184053600	0.078856621	70.84242229
WABASH	2364300	0.004012623	0.895818059	37736100	0.064044638	14.29796551
WARREN	9689400	0.006880271	3.731927664	75958200	0.053936568	29.25573389
WASHINGTON	7198200	0.004928831	2.772812706	80651700	0.055224728	31.06777507
WAYNE	3208500	0.001731447	1.235924474	98352900	0.053075541	37.88585202
WHITE	3320100	0.002554481	1.263880533	81070200	0.062375314	30.86143417
WHITESIDE	22459500	0.012430878	8.505828266	127740600	0.070701833	48.37772908
WILL	153528300	0.069817364	58.43085024	567882000	0.258245707	216.1284147
WILLIAMSON	16110900	0.014006341	5.884764104	135749700	0.118016782	49.5847508
WINNEBAGO	83246400	0.061909906	31.78206942	322597800	0.239914273	123.1623911
WOODFORD	12007800	0.008541788	4.508355869	102097800	0.072627608	38.33285163

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	VALUE_21	VALUE_22	VALUE_23	VALUE_24
MARION	73023300	37939500	8071200	2985300
MARSHALL	28343700	25624800	4072500	1029600
MASON	32637600	30739500	4774500	1021500
MASSAC	27607500	11959200	2649600	1125900
MCDONOUGH	37639800	39451500	10827000	2400300
MCHENRY	90062100	159999300	35665200	11742300
MCLEAN	101269800	117396000	46165500	13534200
MENARD	23443200	19389600	3154500	579600
MERCER	33868800	29892600	3181500	797400
MONROE	24904800	37863000	11838600	1545300
MONTGOMERY	66957300	47781000	7959600	1748700
MORGAN	31730400	46336500	18114300	3114900
MOULTRIE	24372000	23731200	3420900	972900
OGLE	62218800	52718400	12107700	4225500
PEORIA	62551800	92946600	51097500	15348600
PERRY	39025800	28741500	4461300	649800
PIATT	35969400	27394200	4820400	933300
PIKE	47682900	47223000	11985300	1009800
POPE	23879700	4340700	369000	97200
PULASKI	18774900	12319200	1668600	130500
PUTNAM	11031300	13147200	1493100	782100
RANDOLPH	45990000	44469900	7157700	1187100
RICHLAND	47999700	14464800	2214900	846000
ROCK ISLAND	50391000	75486600	42896700	20507400
SALINE	49109400	24601500	4642200	1188000
SANGAMON	84581100	125421300	62496000	15363000
SCHUYLER	19527300	25222500	5499000	449100
SCOTT	10576800	16902900	4969800	359100
SHELBY	74842200	27056700	3882600	1130400
ST. CLAIR	114256800	156939300	57801600	20635200
STARK	23465700	9031500	1010700	381600
STEPHENSON	53505000	36668700	8565300	2862900
TAZEWELL	64741500	93695400	30972600	11907900

Appendix B (continued)

TABLE XI: NATIONAL LAND COVER DATABASE DEVELOPMENT CALCULATIONS (continued)

COUNTY_NAM	VALUE_21	VALUE_22	VALUE_23	VALUE_24
UNION	41530500	18228600	2035800	295200
VERMILION	91612800	76608900	10382400	5449500
WABASH	24693300	10678500	1934100	430200
WARREN	31780800	34488000	8270100	1419300
WASHINGTON	48249000	25204500	5779800	1418400
WAYNE	68387400	26757000	2542500	666000
WHITE	56905200	20844900	2593800	726300
WHITESIDE	56186100	49095000	16443900	6015600
WILL	120649500	293704200	115831800	37696500
WILLIAMSON	66384900	53253900	13494600	2616300
WINNEBAGO	96219000	143132400	59845500	23400900
WOODFORD	37508400	52581600	9867600	2140200

Appendix B (continued)

TABLE XII: NATIONAL LAND COVER DATABASE VARIABLE DESCRIPTIONS

TOTAL_COUNT	Sum of the counts in the county area
LIGHT_DEV_COUNT	Count of "lightly developed" areas, found by adding value 21 and value 22
LIGHT_DEV_PROP	Proportion of "lightly developed" areas, calculated by dividing Light_Dev_Count by Total_Count
LIGHT_DEV_AREA	Area of lightly developed areas in square miles, found by multiplying Light_Dev_Prop by County_SqMi
HEAVY_DEV_COUNT	Count of "highly developed" areas, found by adding value 23 and value 24
HEAVY_DEV_PROP	Proportion of "highly developed" areas, calculated by dividing high_Dev_Count by Total_Count
HEAVY_DEV_TOTAL	Area of highly developed areas in square miles, found by multiplying high_Dev_Prop by County_SqMi
TOTAL_DEV_COUNT	Count of all developed areas, found by adding values 21, 22, 23, and 24
TOTAL_PROP_DEV	Proportion of all developed areas, calculated by dividing Light_Dev_Count by Total_Count
DEV_AREA	Area of lightly developed areas in square miles, found by multiplying Total_Dev_Prop by County_SqMi
VALUE_21	Developed, Open Space- areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
VALUE_22	Developed, Low Intensity- areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.
VALUE_23	Developed, Medium Intensity -areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.
VALUE_24	Developed High Intensity-highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.

Source: https://www.mrlc.gov/data/legends/national-land-cover-database-2016-nlcd2016-legend

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS

CO_FIPS	OBJECTID	County_FIPS	County_Name	COUNT	AREA	MIN	MAX	RANGE
1	1	17001	Adams	2512802	2261521800	446	861	415
3	2	17003	Alexander	728941	656046900	282	843	561
5	3	17005	Bond	1101977	991779300	439	674	235
7	4	17007	Boone	811445	730300500	723	1052	329
9	5	17009	Brown	885681	797112900	423	810	387
11	6	17011	Bureau	2516046	2264441400	439	958	519
13	7	17013	Calhoun	817921	736128900	394	821	427
15	8	17015	Carroll	1343440	1209096000	560	1067	507
17	9	17017	Cass	1105244	994719600	417	680	263
19	10	17019	Champaign	2871271	2584143900	620	857	237
21	11	17021	Christian	2058803	1852922700	531	802	271
23	12	17023	Clark	1451835	1306651500	407	778	371
25	13	17025	Clay	1350071	1215063900	400	646	246
27	14	17027	Clinton	1448516	1303664400	382	595	213
29	15	17029	Coles	1468003	1321202700	546	794	248
31	16	17031	Cook	2753266	2477939400	421	951	530
33	17	17033	Crawford	1282028	1153825200	400	646	246
35	18	17035	Cumberland	997252	897526800	494	709	215
37	19	17037	DeKalb	1825787	1643208300	634	991	357
39	20	17039	DeWitt	1165316	1048784400	603	811	208
41	21	17041	Douglas	1200375	1080337500	578	745	167
43	22	17043	DuPage	967418	870676200	475	974	499
45	23	17045	Edgar	1793413	1614071700	502	838	336
47	24	17047	Edwards	640453	576407700	351	591	240
49	25	17049	Effingham	1381248	1243123200	454	680	226
51	26	17051	Fayette	2087935	1879141500	445	714	269
53	27	17053	Ford	1398914	1259022600	639	870	231
55	28	17055	Franklin	1242085	1117876500	348	605	257
57	29	17057	Fulton	2543032	2288728800	411	783	372
59	30	17059	Gallatin	943747	849372300	318	925	607
61	31	17061	Greene	1576150	1418535000	393	708	315
63	32	17063	Grundy	1238389	1114550100	484	704	220
65	33	17065	Hamilton	1253849	1128464100	348	631	283
67	34	17067	Hancock	2348186	2113367400	438	763	325
69	35	17069	Hardin	521579	469421100	308	879	571

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	OBJECTID	County_FIPS	County_Name	COUNT	AREA	MIN	MAX	RANGE
71	36	17071	Henderson	1141526	1027373400	486	801	315
73	37	17073	Henry	2376058	2138452200	546	880	334
75	38	17075	Iroquois	3219052	2897146800	602	817	215
77	39	17077	Jackson	1742371	1568133900	320	858	538
79	40	17079	Jasper	1433288	1289959200	436	626	190
81	41	17081	Jefferson	1679840	1511856000	396	642	246
83	42	17083	Jersey	1087854	979068600	392	904	512
85	43	17085	Jo Daviess	1781072	1602964800	571	1235	664
87	44	17087	Johnson	1002928	902635200	288	860	572
89	45	17089	Kane	1507450	1356705000	593	1064	471
91	46	17091	Kankakee	1958854	1762968600	543	752	209
93	47	17093	Kendall	927102	834391800	539	813	274
95	48	17095	Lmpx	2072545	1865290500	508	877	369
97	49	17097	Lake	1353978	1218580200	584	957	373
99	50	17099	LaSalle	3303471	2973123900	356	920	564
101	51	17101	Lawrence	1075540	967986000	387	640	253
103	52	17103	Lee	2096875	1887187500	635	1000	365

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	OBJECTID	County_FIPS	County_Name	COUNT	AREA	MIN	MAX	RANGE
105	53	17105	Livingston	3009057	2708151300	561	837	276
107	54	17107	Logan	1781247	1603122300	505	771	266
109	55	17109	McDonough	1700629	1530566100	477	800	323
111	56	17111	McHenry	1757017	1581315300	720	1183	463
113	57	17113	McLean	3413077	3071769300	600	957	357
115	58	17115	Macon	1685838	1517254200	560	755	195
117	59	17117	Macoupin	2498034	2248230600	468	766	298
119	60	17119	Madison	2131596	1918436400	205	679	474
121	61	17121	Marion	1657113	1491401700	422	656	234
123	62	17123	Marshall	1148218	1033396200	440	906	466
125	63	17125	Mason	1622311	1460079900	413	733	320
127	64	17127	Massac	695354	625818600	274	593	319
129	65	17129	Menard	907901	817110900	460	661	201
131	66	17131	Mercer	1635856	1472270400	513	825	312
133	67	17133	Monroe	1145890	1031301000	347	833	486
135	68	17135	Montgomery	2042840	1838556000	510	781	271
137	69	17137	Morgan	1650382	1485343800	420	727	307
139	70	17139	Moultrie	989827	890844300	596	773	177
141	71	17141	Ogle	2197163	1977446700	648	1024	376
143	72	17143	Peoria	1813951	1632555900	402	833	431
145	73	17145	Perry	1286820	1158138000	352	601	249
147	74	17147	Piatt	1263706	1137335400	616	810	194
149	75	17149	Pike	2440894	2196804600	414	884	470
151	76	17151	Pope	1076528	968875200	302	1070	768
153	77	17153	Pulaski	584799	526319100	285	522	237
155	78	17155	Putnam	495486	445937400	430	863	433
157	79	17157	Randolph	1713413	1542071700	324	745	421
159	80	17159	Richland	1041095	936985500	394	604	210
161	81	17161	Rock Island	1301017	1170915300	427	829	402
163	82	17163	St Clair	1940946	1746851400	352	703	351
165	83	17165	Saline	1113145	1001830500	318	1001	683
167	84	17167	Sangamon	2524467	2272020300	491	716	225
169	85	17169	Schuyler	1271815	1144633500	423	750	327
171	86	17171	Scott	728493	655643700	416	712	296

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	OBJECTID	County_FIPS	County_Name	COUNT	AREA	MIN	MAX	RANGE
173	87	17173	Shelby	2210545	1989490500	499	819	320
175	88	17175	Stark	830591	747531900	579	876	297
177	89	17177	Stephenson	1624712	1462240800	688	1162	474
179	90	17179	Tazewell	1894299	1704869100	420	851	431
181	91	17181	Union	1214996	1093496400	308	1030	722
183	92	17183	Vermillion	2591485	2332336500	481	863	382
185	93	17185	Wabash	654239	588815100	338	594	256
187	94	17187	Warren	1567065	1410358500	559	810	251
189	95	17189	Washington	1623149	1460834100	379	601	222
191	96	17191	Wayne	2057976	1852178400	365	601	236
193	97	17193	White	1443334	1299000600	292	584	292
195	98	17195	Whiteside	2008801	1807920900	537	880	343
197	99	17197	Will	2441930	2197737000	403	836	433
199	100	17199	Williamson	1277892	1150102800	348	725	377
201	101	17201	Winnebago	1494043	1344638700	668	996	328
203	102	17203	Woodford	1561989	1405790100	401	858	457

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN
1	653.43	87.53003	1641940336	416	475	446	679
3	386.2695	97.98274	281567670	492	320	733	338
5	537.4996	40.70804	592312181	230	550	674	541
7	862.8684	68.76083	700170258	330	840	723	851
9	624.6338	85.29046	553226295	385	430	804	636
11	702.4754	87.40653	1767460394	518	630	954	696
13	552.1328	111.4531	451600980	428	420	820	534
15	768.2129	101.5097	1032047922	498	583	560	779
17	536.9953	78.92806	593510785	264	440	680	567
19	710.6556	32.50188	2040484828	237	725	853	707
21	619.6375	27.9304	1275711444	266	610	791	616
23	587.9262	59.80344	853571791	302	591	777	594
25	487.1456	38.11005	657681151	246	522	643	488
27	454.482	27.1029	658324434	214	445	592	455
29	680.1973	33.84946	998531723	245	669	787	678
31	660.403	71.35211	1818265117	531	600	447	637
33	505.2018	42.04424	647682833	216	531	405	505
35	605.419	35.20118	603755295	215	591	496	605
37	830.1946	66.76131	1515758417	358	880	634	850
39	722.9319	37.08338	842444154	209	740	603	727
41	661.9283	19.08503	794562165	157	640	578	659
43	728.5208	38.41813	704784098	434	750	475	730
45	669.8715	37.99784	1201356290	286	659	572	669
47	441.4296	37.27546	282714920	240	410	585	439
49	578.6607	36.12001	799273961	227	591	678	582
51	553.9339	50.02216	1156578033	270	581	714	562
53	747.9096	48.09679	1046261178	229	655	867	758
55	434.0977	37.00209	539186181	257	405	605	431
57	600.5735	78.09922	1527277676	372	430	411	615
59	386.9526	62.21188	365185341	374	350	586	372
61	543.1979	70.23742	856161431	302	420	393	554
63	583.3716	44.2313	722440992	221	610	704	586
65	437.7352	51.36064	548853894	283	375	629	430
67	638.5077	55.97327	1499334741	301	670	438	653

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN
69	477.6791	88.93361	249147408	174	459	866	472
71	640.1868	82.02228	730789829	310	520	486	654
73	709.8445	76.1989	1686631604	335	610	880	719
75	666.8563	31.47781	2146645172	204	659	817	661
77	453.1117	95.00381	789488658	523	360	809	419
79	528.7565	38.62707	757860321	191	552	626	531
81	490.7443	45.61993	824371902	247	490	642	490
83	578.5839	80.82876	629414817	509	420	392	588
85	835.8365	125.7503	1488685051	658	591	572	850
87	500.3229	116.2716	501787891	459	351	288	488
89	812.5992	89.14108	1224952606	472	910	601	810
91	647.5655	30.98752	1268486214	208	625	549	644
93	654.1112	47.61208	606427819	275	650	812	652
95	717.1761	71.03631	1486379836	370	780	876	727
97	738.5178	61.62211	999936819	369	732	932	740
99	654.7386	61.29528	2162909851	550	630	356	660
101	454.7465	37.57703	489098069	206	430	640	443
103	790.5571	83.20535	1657699399	366	770	999	787

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued)

CO_FIPS	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN
105	683.0391	44.083	2055303480	260	650	834	679
107	599.3074	36.59553	1067514458	253	600	743	596
109	666.0061	55.03435	1132629334	324	660	477	662
111	872.4442	67.21937	1532899317	457	890	728	873
113	767.7745	54.02852	2620473615	358	790	957	765
115	668.3173	38.39978	1126674763	196	685	755	679
117	626.6615	39.67034	1565421673	246	660	468	634
119	515.3627	56.78103	1098545130	341	540	205	525
121	535	36.47027	886555435	235	510	424	533
123	660.5657	90.84023	758473392	423	440	842	679
125	503.7389	45.89285	817221167	317	495	715	497
127	387.372	58.91663	269360664	309	340	274	370
129	574.8607	44.8695	521916590	202	600	659	592
131	680.7288	80.21563	1113574373	313	530	513	689
133	514.5086	114.0668	589570245	474	400	806	500
135	638.8041	31.96215	1304974521	272	640	781	640
137	616.2705	57.78993	1017081804	307	610	420	623
139	666.8166	24.36834	660033026	175	674	596	669
141	813.725	64.1663	1787886443	377	790	1019	811
143	650.1061	87.8211	1179260673	432	620	833	664
145	462.4969	42.17158	595150309	250	450	601	460
147	696.0733	25.67238	879632065	195	674	809	693
149	600.5758	112.3061	1465941747	467	446	414	619
151	505.8178	124.6487	544527017	442	341	602	495
153	362.6192	38.745	212059370	214	340	487	348
155	601.5347	93.68871	298052044	356	440	749	640
157	466.8151	67.48393	799846979	416	380	731	468
159	476.5747	35.68483	496159508	211	490	394	476
161	662.4117	78.04171	861808818	348	570	430	673
163	470.7113	64.19671	913625302	347	420	358	453
165	416.5233	67.25576	463650832	358	367	557	400
167	600.091	31.58874	1514909951	226	600	716	600
169	582.4787	74.10698	740805205	328	430	746	595
171	536.5738	77.64573	390890228	293	430	416	551
173	639.3659	41.97826	1413347136	321	600	796	639

Appendix B (continued)

TABLE XIII: ILLINOIS DIGITAL ELEVATION MODEL TABULATED ZONAL STATISTICS (continued))

CO_FIPS	MEAN	STD	SUM	VARIETY	MAJORITY	MINORITY	MEDIAN
175	721.482	47.24912	599256456	267	748	580	722
177	870.638	68.11124	1414536064	470	760	1132	868
179	617.4081	97.64652	1169555480	430	440	851	633
181	498.625	119.1742	605827339	614	340	313	497
183	681.245	39.37003	1765436195	325	670	802	679
185	434.5663	36.01213	284310197	153	413	338	430
187	716.9121	48.68552	1123447927	252	770	559	723
189	484.5796	40.61849	786544860	223	510	598	483
191	435.5599	39.09401	896371859	236	380	598	434
193	405.5417	35.87647	585332117	256	380	299	397
195	656.2429	57.43639	1318261491	324	580	537	643
197	662.0791	68.5369	1616750842	414	710	408	667
199	465.0587	56.04566	594294764	320	404	615	456
201	801.2731	57.41733	1197136404	323	730	668	799
203	709.9016	77.70721	1108858436	457	719	858	731

Appendix C
Model Outputs

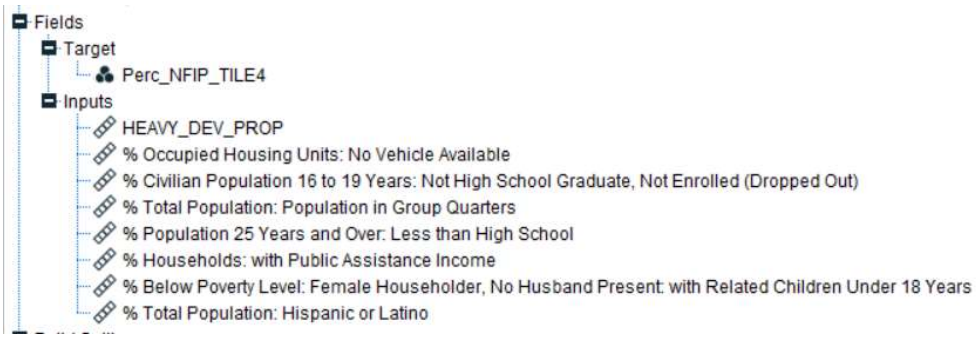

Figure 19 FVI.DT Variables

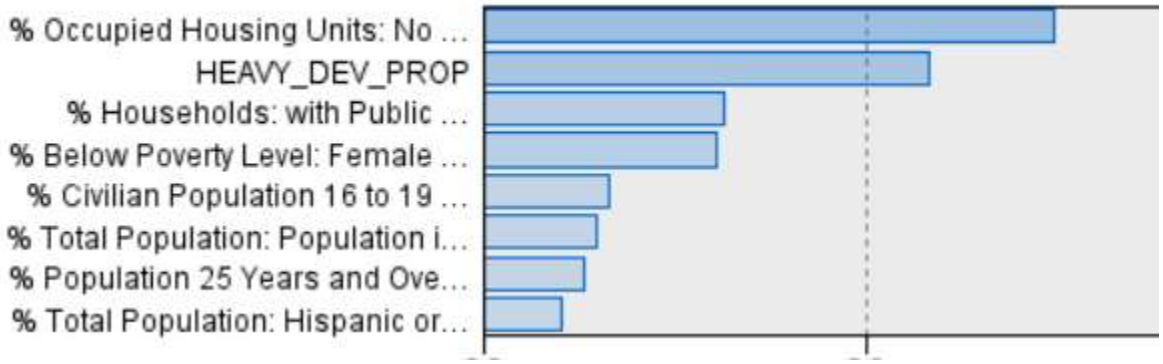

Figure 20 FVI.DT Relative Significance

Appendix C (continued)

TABLE XIV: FVI.PCA: 16 VARIABLES, 5 PRINCIPAL COMPONENTS WITHOUT COOK COUNTY, COMMUNALITIES

	Initial	Extraction
HEAVY_DEV_PROP	1.000	.576
% Total Population: Black or African American Alone	1.000	.838
% Total Population: Population in Group Quarters	1.000	.879
% Population 25 Years and Over: Less than High School	1.000	.865
% Civilian Population 16 to 19 Years: Not High School Graduate, Not Enrolled (Dropped Out)	1.000	.807
% Civilian Population in Labor Force 16 Years and Over: Unemployed	1.000	.769
% Households: with Social Security Income	1.000	.848
% Households: with Public Assistance Income	1.000	.471
Per Capita Income 2014	1.000	.892
% Married Couple Family: with Related Child Living Bellow Poverty Level	1.000	.802
% Below Poverty Level Female Householder, No Husband Present	1.000	.918
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	1.000	.892
% Occupied Housing Units: No Vehicle Available	1.000	.757
% Total Population: Hispanic or Latino	1.000	.828
%Age.75+	1.000	.835
MEAN_EI	1.000	.410

Extraction Method: Principal Component Analysis.

Appendix C (continued)

TABLE XV: FVI.PCA: 16 VARIABLES, 5 PRINCIPAL COMPONENTS WITHOUT COOK COUNTY, TOTAL VARIANCE EXPLAINED

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.533	34.579	34.579	5.533	34.579	34.579
2	3.220	20.125	54.704	3.220	20.125	54.704
3	1.360	8.500	63.204	1.360	8.500	63.204
4	1.194	7.466	70.669	1.194	7.466	70.669
5	1.081	6.758	77.427	1.081	6.758	77.427
6	.842	5.260	82.687			
7	.690	4.313	87.000			
8	.529	3.304	90.304			
9	.483	3.019	93.324			
10	.326	2.036	95.359			
11	.311	1.945	97.304			
12	.189	1.180	98.485			
13	.090	.564	99.048			
14	.086	.540	99.589			
15	.055	.343	99.932			
16	.011	.068	100.000			

Extraction Method: Principal Component Analysis.

Appendix C (continued)

TABLE XVI: FVI.PCA: 16 VARIABLE, 5 PRINCIPAL COMPONENTS WITHOUT COOK COUNTY, COMPONENT MATRIX

	Component				
	1	2	3	4	5
HEAVY_DEV_PROP	-.389	.590	.157	.227	-.038
% Total Population: Black or African American Alone	.564	.643	-.287	.123	-.097
% Total Population: Population in Group Quarters	.333	.109	-.623	-.295	.531
% Population 25 Years and Over: Less than High School	.728	-.004	.104	.248	.513
% Civilian Population 16 to 19 Years: Not High School Graduate, Not Enrolled (Dropped Out)	.392	-.080	.396	.643	.277
% Civilian Population in Labor Force 16 Years and Over: Unemployed	.422	.544	.428	-.324	-.081
% Households: with Social Security Income	.573	-.703	.140	.060	-.054
% Households: with Public Assistance Income	.627	.229	.078	-.139	-.002
Per Capita Income 2014	-.843	.272	.099	.230	-.210
% Married Couple Family: with Related Child Living Bellow Poverty Level	.281	-.050	.606	-.572	.164
% Below Poverty Level Female Householder, No Husband Present	.858	.351	-.105	.029	-.219
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	.824	.346	-.021	.012	-.306
% Occupied Housing Units: No Vehicle Available	.752	.360	-.008	.138	-.206
% Total Population: Hispanic or Latino	-.388	.671	.279	.047	.384
%Age.75+	.395	-.792	.140	.016	-.178
MEAN_EI	-.541	.271	.054	-.190	-.072

Extraction Method: Principal Component Analysis.

Appendix C (continued)

TABLE XVII: FVI.PCA: 14 VARIABLES, 4 PRINCIPAL COMPONENTS WITHOUT COOK COUNTIES, COMMUNALITIES

	Initial	Extraction
HEAVY_DEV_PROP	1.000	.565
% Total Population: Black or African American Alone	1.000	.832
% Total Population: Population in Group Quarters	1.000	.849
% Population 25 Years and Over: Less than High School	1.000	.592
% Civilian Population in Labor Force 16 Years and Over: Unemployed	1.000	.735
% Households: with Social Security Income	1.000	.854
% Households: with Public Assistance Income	1.000	.472
Per Capita Income 2014	1.000	.896
% Married Couple Family: with Related Child Living Bellow Poverty Level	1.000	.795
% Below Poverty Level Female Householder, No Husband Present	1.000	.916
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	1.000	.888
% Occupied Housing Units: No Vehicle Available	1.000	.755
% Total Population: Hispanic or Latino	1.000	.720
%Age.75+	1.000	.867

Extraction Method: Principal Component Analysis.

Appendix C (continued)

TABLE XVIII: FVI.PCA: 14 VARIABLES, 4 PRINCIPAL COMPONENTS WITHOUT COOK COUNTY, TOTAL VARIANCE EXPLAINED

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.164	36.889	36.889	5.164	36.889	36.889
2	3.149	22.496	59.385	3.149	22.496	59.385
3	1.320	9.429	68.815	1.320	9.429	68.815
4	1.101	7.867	76.681	1.101	7.867	76.681
5	.814	5.816	82.498			
6	.678	4.846	87.344			
7	.523	3.739	91.083			
8	.396	2.826	93.908			
9	.313	2.237	96.145			
10	.232	1.661	97.806			
11	.141	1.009	98.815			
12	.100	.713	99.528			
13	.055	.393	99.921			
14	.011	.079	100.000			

Extraction Method: Principal Component Analysis.

Appendix C (continued)

TABLE XIX: FVI.PCA: 14 VARIABLES, 4 PRINCIPAL COMPONENTS WITHOUT COOK COUNTY, COMPONENT MATRIX

	Component			
	1	2	3	4
HEAVY_DEV_PROP	-.364	.631	.099	-.156
% Total Population: Black or African American Alone	.604	.609	-.288	-.115
% Total Population: Population in Group Quarters	.362	.073	-.524	.662
% Population 25 Years and Over: Less than High School	.700	-.041	-.031	.315
% Civilian Population in Labor Force 16 Years and Over: Unemployed	.478	.495	.511	.032
% Households: with Social Security Income	.524	-.745	.111	-.109
% Households: with Public Assistance Income	.646	.183	.136	.044
Per Capita Income 2014	-.833	.339	.036	-.292
% Married Couple Family: with Related Child Living Bellow Poverty Level	.276	-.068	.767	.355
% Below Poverty Level Female Householder, No Husband Present	.886	.286	-.092	-.203
% Below Poverty Level: Female Householder, No Husband Present: with Related Children Under 18 Years	.856	.279	-.005	-.280
% Occupied Housing Units: No Vehicle Available	.774	.305	-.049	-.245
% Total Population: Hispanic or Latino	-.340	.692	.208	.288
%Age.75+	.351	-.830	.128	-.196

Extraction Method: Principal Component Analysis.

Appendix C (continued)

NFIP Claim Loss				
NFIP Claim Loss	1	2	3	4
1	11	8	3	0
2	8	8	5	0
3	3	3	8	8
4	0	2	6	13

Overall Performance Rate:	46.51%
Underestimation Error:	25.58%
Overestimation Error:	27.91%
Classification Failure:	0.00%

Figure 21 Performance Threshold Matrix

FVI.DT Classification (without Cook County)				
NFIP Claim Loss	1	2	3	4
1	19	2	1	0
2	1	19	1	0
3	2	1	19	0
4	1	2	0	18

Overall Performance Rate:	87.21%
Underestimation Error:	8.14%
Overestimation Error:	4.65%
Classification Failure:	1.16%

Figure 22 Predictive Performance Matrix for FVI.DT without Cook County

FVI.PCA Classification (without Cook County)				
NFIP Claim Loss	1	2	3	4
1	9	4	6	3
2	3	9	5	4
3	6	2	7	7
4	4	6	4	7

Overall Performance Rate:	37.21%
Underestimation Error:	29.07%
Overestimation Error:	33.72%
Classification Failure:	4.65%

Figure 23 Predictive Performance Matrix for 16 Variable FVI.PCA without Cook County

Appendix C (continued)

NFIP Claim Loss	FVI.PCA Classification (without Cook County)			
	1	2	3	4
1	10	6	5	1
2	6	8	3	4
3	4	3	9	6
4	2	4	5	10

Overall Performance Rate:	43.02%
Underestimation Error:	27.91%
Overestimation Error:	29.07%
Classification Failure:	2.33%

Figure 24 Predictive Performance Matrix for 14 Variable FVI.PCA without Cook County

FVI

NFIP Claim Loss	Remo 2013			
	1	2	3	4
1	4	7	9	2
2	8	5	7	1
3	6	8	5	3
4	5	8	3	5

Overall Performance Rate:	22.09%
Underestimation Error:	44.19%
Overestimation Error:	33.72%
Classification Failure:	5.81%

Figure 25 Predictive Performance Matrix for 2013 Illinois Flood Vulnerability Assessment Flood Vulnerability Index

NFIP Claim Loss	NFIP Claim Loss		
	1	2	3
1	19	9	1
2	9	13	7
3	1	7	20

Overall Performance Rate:	60.47%
Underestimation Error:	19.77%
Overestimation Error:	19.77%
Classification Failure:	1.16%

Figure 26 Performance Threshold Matrix for 3 Output Classes

Appendix C (continued)

NFIP Claim Loss	FEMA NRI		
	1	2	3
1	15	12	2
2	6	15	8
3	7	15	6

Overall Performance Rate:	41.86%
Underestimation Error:	32.56%
Overestimation Error:	25.58%
Classification Failure:	8.14%

Figure 27 Predictive Performance Matrix for the Federal Emergency Management Agency National Risk Index

NFIP Claim Loss	IL HMP		
	1	2	3
1	11	14	4
2	12	12	5
3	2	23	3

Overall Performance Rate:	30.23%
Underestimation Error:	43.02%
Overestimation Error:	26.74%
Classification Failure:	2.33%

Figure 28 Predictive Performance Matrix for the 20108 Illinois Hazard Mitigation Plan Flood Vulnerability Index

NFIP Claim Loss	FVI.DT		
	1	2	3
1	28	1	0
2	2	26	1
3	8	0	20

Overall Performance Rate:	86.05%
Underestimation Error:	11.63%
Overestimation Error:	2.33%
Classification Failure:	9.30%

Figure 29 Predictive Performance Matrix for FVI.DT with 3 Output Classes

Appendix C (continued)

NFIP Claim Loss	FVI.PCA		
	1	2	3
1	14	12	3
2	11	8	10
3	4	9	15

Overall Performance Rate:	43.02%
Underestimation Error:	27.91%
Overestimation Error:	29.07%
Classification Failure:	4.65%

Figure 30 Predictive Performance Matrix for FVI.PCA with 3 Output Classes

NFIP Claim Loss	FVI.DT Classification (with Cook County)				
	1	2	3	4	
1	19	2	1	0	
2	2	18	2	0	
3	1	3	18	0	
4	2	2	0	17	

Overall Performance Rate:	82.76%
Underestimation Error:	11.49%
Overestimation Error:	5.75%
Classification Failure:	2.30%

Figure 31 Predictive Performance Matrix for FVI.DT with Cook County

NFIP Claim Loss	FVI.PCA Classification (with Cook County)				
	1	2	3	4	
1	9	6	5	2	
2	8	5	8	1	
3	4	6	5	7	
4	1	5	4	11	

Overall Performance Rate:	34.48%
Underestimation Error:	32.18%
Overestimation Error:	33.33%
Classification Failure:	1.15%

Figure 32 Predictive Performance Matrix for FVI.PCA with Cook County

VITA

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