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A CLASSIFICATION TREE APPROACH TO THE AUTOMATION OF LANDTYPE ASSOCIATION MAPPING IN MICHIGAN

By

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ABSTRACT

A CLASSIFICATION TREE APPROACH TO THE AUTOMATION
OF LANDTYPE ASSOCIATION DELINEATION

By

Catherine J. DeLain

The U.S. Forest Service has developed a national ecological classification hierarchy which includes Landtype Associations (LTAs) with sizes of tens to thousands of acres based on landforms, natural overstory communities, and soil associations. LTAs in Michigan's northern Lower Peninsula were delineated by ecologists utilizing a manual map overlay technique. This study presents a less labor-intensive and consistent method to perform LTA mapping. A classification tree analysis was run to predict the distribution of LTAs and identify their hierarchical relationships with predictor variables. The analysis was carried out using co-registered raster GIS data layers for four counties. The classification tree analysis predicted LTAs with an average of 60% accuracy when all four counties were modeled together. The percentage correctly classified increased to 64 to 80% when the counties were modeled separately. The most important variables were surficial geology, pre-European settlement vegetation, soil drainage class, soil texture class, and elevation.

To my husband, Tom.

Thank you for your patience and understanding through the years of separation.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1

INTRODUCTION

Land managers are moving towards the concept of "ecosystem management," which involves managing entire landscapes and the interacting biotic and abiotic factors which drive their functioning. Abiotic factors, such as climate, geology, soil, topography, and hydrography, place constraints on the biotic pocesses and patterns on a landscape. A better understanding of landscape patterns is needed to improve ecosystem management practices.

Landtype Associations (LTAs), an ecological land unit defined by the U.S. Forest Service (USFS) in their national hierarchy scheme, are generally delineated by a manual mapping technique. In this study, a classification tree analysis was performed in an effort to predict LTAs in a more consistent and less labor-intensive way. This first chapter includes a brief introduction into ecological classifications and their history, the current status of ecoregional mapping in the state of Michigan, the rationale behind this study, and the research questions that were investigated.

Ecological Classifications

Classifications are artificial groupings of places or things based on expressed logical criteria to meet a certain need. When applied to places, they can be site specific or have broad application and can be based on single or multiple factors (Allen n.d.). Ecological classifications use natural biological and physical components and their relationships to identify spatial units, typically to aid land management.

The premise behind mapping ecological units, or ecoregions, is "that relatively homogeneous areas exist and that these areas can be perceived by simultaneously analyzing a combination of causal and integrative factors" (Omernik 1987, 123). Ecoregions are areas of land that have unique combinations of biotic and abiotic factors and which differ from other areas in their ability to produce vegetation and respond to disturbance (Avers and Schlatterer 1991). Maps of ecological units represent hypotheses about ecosystem structure and function (Rowe and Sheard 1981).

The ecoregion concept is hierarchical and multifactorial. Ecoregions are defined by the factors appropriate to a particular spatial scale. For example, large ecoregions defined by a relatively uniform macroclimate and physiography may be subdivided into smaller ecoregions based on finer differences in physiography, soil, and vegetation (Yaffee et al. 1996).

Ecoregion maps give a geographic framework for summarizing an area's characteristics, organizing and integrating resource management, planning a survey, monitoring resource response, biodiversity conservation, and comparing species composition and productivity among ecosystems (Townshend 1981; Barnes et al. 1982; Spies and Barnes 1985; Avers and Schlatterer 1991; Brenner and Jordan 1991; Hart et al. 1991; Probst and Crow 1991; Jimerson and Jones 1993; Albert 1995). A survey completed in the summer of 1995 by the University of Michigan's School of Natural Resources and Environment identified 619 projects using an ecosystem approach to resource management in the United States. These projects are addressing environmental stresses across numerous ecosystem types, with a mix of landownership patterns and managing agencies (Yaffee et al. 1996).

History of the Ecoregion Concept

The idea of ecological regions is not new. The Greeks recognized the concept of land as abiotic and biotic elements interacting to form a system. Baron Alexander von Humbolt outlined the latitudinal and high-altitude zonality of plants and animals to climate in the eighteenth century (Bailey 1996). Ernest Haeckel used the term *ecology* in 1866 to describe Darwin's proposed faunal species-environment associations. In Russia, Gutorovich applied the concept of ecological regions in 1894 when he recognized that areas named for local topographic features had different forest compositions. He then used this information to help estimate timber production (Jordan et al. 1996). In 1899, Dokuchaev theorized that natural conditions within a zone have many features in common, and these change noticeably when passing from one zone to another (Bailey 1996).

The incorporation of spatial patterns of several factors into ecoregional units has been an evolving process. A. J. Herbertson used the distribution of various characteristics to delineate "major natural regions" on a global scale in 1905 (Omernik 1987). His work was later modified by Passarge in 1929 and Bisasutti in 1962 (Bailey 1996).

A nested hierarchiacal, multiple ecological factor approach to forest classification was developed in the 1920s in the German state of Baden-Wurttemberg. The system had three spatial scales: Growth Areas, Growth Districts, and Site Units. Growth Areas, the broadest scale, coincided with units previously identified by geographers based on macroclimate and geology. Growth Districts were based on mesoclimate, and patterns of physiography, soils, and vegetation. Site Units were based on functional interrelationships between physiography, soil, and ground-flora at the local level (Barnes 1984).

The term *landscape* was introduced into American geography by Carl Sauer (1925). Veatch (1930) mapped the "natural geographic divisions" and "natural land types" of Michigan based on soil, vegetation, drainage, and topography. The term *ecosystem* was first used by Tansley (1935) to describe the concept of abiotic and biotic elements interacting to form a system (Bailey 1996).

Australia conducted regional surveys in the late 1940s to describe, classify, and map *land systems*, defined as assemblies "of land units which are geographically and genetically related in terms of recurring patterns of topography, soils, and vegetation" (Jordan et al. 1996, 29). System boundaries were mapped through aerial photograph interpretation where pattern changes were observed. Cross sectional diagrams were used to describe the composition of each land system. These maps were to be used to assess land use, identify potential for development, and describe technical problems.

A nested hierarchical framework of land types, consisting of Forest Site Regions, Landscapes, Landtypes, and Sites, was established in Canada in the 1940s and 1950s. Site Regions, the coarsest scale units, were based mainly on climate. Landtypes were based on broad areas of uniform geological materials (Jordan et al. 1996).

A method of Land System Inventory described by Wertz and Arnold (1972) for the

Intermountain Region of the U.S. identified landtypes as the basic units for land use study and planning. Their system was the first to match specific objectives and information needs with integrated ecological units at a variety of hierarchical levels.

Crowley coined the term *ecoregion* in 1967 while studying Canadian forests (Bailey 1996). Bailey (1976, 1995) popularized the term ecoregion when he applied Crowley's classification to a map of the United States. He used climate, soils, land surface form, and potential natural vegetation data to delineate his ecoregions for managing water quality at the continental scale. Each of Bailey's hierarchical levels is based mainly on information from a particular source map. For example, Sections are based on Küchler's (1964) map of potential natural vegetation. Divisions are based on Köppen's (1931) system of ecological climate zones as modified by Trewartha (1968).

Omernik mapped ecoregions of the conterminous U.S. in 1987. He found that maps of land use, land-surface form, potential natural vegetation, and soils were the most useful when analyzed together to sketch out areas that were relatively homogeneous at the interregional scale. The sizes of the ecoregions (15,000 km^2 to 333,000 km^2) were determined by their usefulness in watershed management (Omernik 1987).

U.S. Forest Service Hierarchy of Ecological Units

In the United States, a systematic, interdisciplinary approach to land planning and management was required by the 1974 Forest and Rangeland Resources Planning Act and the 1976 National Forest Management Act. These acts also required detailed inventories of all National Forest lands (Avers and Schlatterer 1991). To comply, the U.S. Forest Service (USFS) has developed a policy concerning ecosystem classification and inventory designed to increase efficiency, eliminate duplicate data collection, standardize resource terminology, and identify areas that have similar ecological potential so that the probable effects of management actions can be predicted (Allen n.d.; Jordan et al. 1996).

The USFS defined an ecological unit as any land or water area homogenous enough to have similar capacities for response to disturbance, including management (ECOMAP 1993). Vegetation, soils, hydrology, geology, climate, and topography were identified as the ecosystem components appropriate for use in classifying and mapping ecological units. A nested hierarchical framework was adopted because ecosystems exist at multiple scales. From largest to smallest, their ecological units are: the Domain, Divisions, Provinces, Sections, Subsections, Landtype Associations (LTAs), Ecological Land Types (ELTs), and Ecological Land Type Phases (ELTPs) (Table 1). Each level in the framework is defined based on the dominant factors influencing ecological components and processes at each given spatial scale (Cleland et al. 1993). The macroscale units are based on climate and physiography, the mesoscale on geology and topography, and the microscale on local climate and edaphic factors (Bailey 1996).

The broad-scale levels of the hierarchy are delineated by a top-down approach known as regionalization. Areas are divided and subdivided based on the dominant ecological factors and their known effects on the distribution of vegetation (Rowe 1980). Regionalization can be a cost-effective method of ecological mapping when maps of the dominant factors are available (Jordan et al. 1996).

Table 1 - National Hierarchy of Ecological Units

Ecological Unit	Ecological Factors	Map Scale/Polygon Size	Planning Level
Division	Macroclimate	1:30,000,000 - 1:7,500,000 100,000's of sq. mi.	International - National
Province	Geomorphology, climate	1:15,000,000 - 1:5,000,000 10,000's of sq. mi.	National - Regional
Section	Geomorphology, climate, vegetation	1:7,500,000 - 1:3,500,000 1000's of square miles	Regional-Subregion
Subsection	Landforms, natural overstory communities, soil associations	1:3,500,000 to 1:250,000 10's to 100's of sq. mi.	Multi-Forest, State
Landtype Association (LTA)	Landforms, natural vegetative communities, soil associations	1:250,000 to 1:60,000 10's to 1000's of acres	Forest, Watershed
Ecological Landtype (ELT)	Landforms, natural vegetative communities, soil	1:60,000 to 1:24,000 10's to 100's of acres	Ranger District, Management or Opportunity Area
Ecological Landtype Phase (ELTP)	Soil, landscape position, natural vegetative community	1:24,000 or larger 1 to 10's of acres	Project

(ECOMAP 1993, Avers et al. 1993)

Ecoregion Mapping in Michigan

Michigan is located in Bailey's (1995) Humid Temperate Domain. Northern Michigan is in the Humid Warm-Summer Continental Division and Laurentian Mixed Forest Province. Southern Michigan is in the Humid Hot-Summer Continental Division and Eastern Broadleaf Forest Province. The entire state was classified and mapped down to the Section, Subsection, and Sub-subsection level (a level not recognized by the USFS, but falling between Subsections and LTAs) (Figure 1) (Albert et al. 1986; Albert 1995). Long-term climatic records were the primary component used to distinguish Sections and Subsections. Because of its significant influence on the climatic regime, physiography was used in conjunction with climatic data to refine the boundaries. At the Sub-subsection level, differences in physiography and soil conditions were used to delineate boundaries. Existing vegetation was used wherever possible to validate boundaries that were based upon climate and geomorphology.

Michigan's National Forests have been classified and inventoried down to the ELTP level. Jordan (1982) initiated an ecological classification and inventory of the Ottawa National Forest in the 1970s. Emphasis was placed on local ecosystems by integrating field data on ground flora, soils, substrata, and local physiography. These ELTPs were then grouped into ELTs. LTAs were delineated by stratifying mesoclimatic zones by major glacial landforms, bedrock control and outcrop, and post-glacial erosional features as interpreted from 1:60,000 aerial photographs. A similar approach was followed in the Huron-Manistee National Forest (Cleland et al. 1993).

Landtype Associations

With their relatively homogeneous macroclimate, the Subsection and Sub-subsection units provide the framework for further subdivision into LTAs. LTAs represent the landscape scale of the USFS's hierarchy. An LTA has been defined as an ecological unit tens to thousands of acres in size based on landforms, natural overstory communities, and soil associations for use in forest-level planning (Cleland et al. 1993). Differences in biotic distributions, hydrologic function, natural disturbance regimes, and general land use patterns are apparent at this level. Applications of LTAs within the USFS include management plan updates, landscape level

Figure 1 - Regional Landscape Ecosystems of Michigan

analyses that identify context for project level planning, coordinated management efforts, stratification for research and management studies, education, and regional assessments (Jordan et al. 1996, iv). LTAs are most useful when viewed within the hierarchy of ecological units (Albert et al. 1996).

LTAs are subdivisions of Subsections and groupings of ELTs (Avers et al. 1993). Depending on which ecological factor(s) dominate(s) at a given location, LTAs may be delineated on the basis of surficial geology, native plant communities, hydrology, local climate, geologic rock types, hydrography, general topography, geomorphic process, local landforms, soil complexes, or disturbance processes (ECOMAP 1993). Glacial landforms, with their characteristic topography and soil complexes, are the environmental features most often correlated with patterns of vegetation and succession at the LTA level in the Lake States Region (Michigan, Wisconsin, Minnesota). For example, northern hardwood forests are most often found on glacial moraines, mixed pine or oak forests are associated with ice-contact features, and jack pine forests commonly occur on outwash plains (Albert et al. 1986; Rowe 1971, 1992). Because of the strong association between glacial landforms and ecological factors in the Lake States, they are often the primary criteria in delineating LTAs. Names of LTA units are often derived from geomorphic history and plant communities (Avers et al. 1993).

Rationale for the Study

While the concept of ecosystems controlled by factors operating at multiple scales and existing in nested spatial hierarchies has been well documented, procedures for developing ecological classifications have not (Host et al. 1996). The USFS is a decentralized organization without strong central control. They have provided a national framework for ecosystem classification and mapping, but not the details. Regional foresters and station directors are responsible for providing specific direction for the classification, inventory, description, and evaluation of ecological units. Because of this, each USFS region has developed slightly different approaches to ecological type classification and ecological unit mapping (Avers and Schlatterer 1991).

In the Lake States Region, the methods used in LTA mapping have not been described in detail nor standardized among the national forests. This has led to inconsistent mapping and problems in interpreting LTA units. LTA maps produced at scales between 1:60,000 and 1:250,000 are common. LTAs are usually mapped by regionalization, or subdividing larger units, because maps of the dominant factors are often available at this scale; however, aggregation of finer-scaled ELTP and ELT units has also been used to delineate LTAs in some places. The development of a consistent method for delineating LTAs is necessary in order to "provide a basis for predicting ranges of potential vegetative composition and productivity" across a range of ecosystems (Jordan et al. 1996, 18).

Persons involved in the mapping and description of LTAs in the Michigan, Minnesota, and Wisconsin met in 1994 and agreed that it would be desirable for LTAs to be mapped consistently across the Lake States. A coordinating committee was established in 1995 with representatives from the USFS and each of the three states. A review document has been distributed for comments. This draft paper states that national forests commonly display LTA maps at a scale of 1:126,720 (1 in. = 2 mi.), but does not state that this will be a mapping standard. Mapping units between 4,047 and 70,822 ha (10,000 to 175,000 acres) in size are proposed, with units from 1214 to 121,410 ha (3,000 to 300,000 acres) allowed in some local circumstances. The issue of LTA naming conventions was not resolved (Jordan et al. 1996).

Also in 1994, the Michigan Department of Natural Resources (MDNR) and the Huron-Manistee National Forest (HMNF) initiated the Northern Lower Michigan Ecosystem Management Project (Mang and Ruswick 1995). The project is a joint effort between MDNR, HMNF, the U.S. Department of Interior, Bureau of Land Management, and various state and local agencies and organizations. Combined, the MDNR and HMNF manages approximately 1.2 million ha of public land in northern Lower Michigan, accounting for 16% of the total area. Their goal in ecosystem management was to focus on ecosystem integrity and sustainability. The unit of management chosen was the LTA from the USFS national hierarchy, creating the need for an LTA map of the region.

Work is currently underway by the Michigan Natural Features Inventory[1] (MNFI) to delineate and describe the LTAs for the thirty-three counties in the northern Lower Peninsula of Michigan. Topography, surficial geology, soil, and pre-European settlement vegetation maps are consulted in the delineation of LTA units. Where possible, the component maps are plotted at the same scale to accommodate comparisons.

MNFI's approach to LTA delineation was designed so that the defining characteristics of an LTA unit would be immediately understandable and interpretable and that the relationships between adjacent units would be easily shown (Albert et al. 1996). A four digit code was developed to describe LTAs (Table 2). The first digit represents the major landform. The second digit stands for a landform modifier or minor landform. The third and fourth digits are the soil drainage class and soil texture class, respectively.

LTAs in Northern Lower Michigan are being mapped at a scale of 1:63,360 (1 in. = 1 mi.) with the minimum mapping unit arbitrarily set at 4 sq. mi. (10.4 sq. km). LTA boundaries are drawn on mylar sheets overlaying the presettlement vegetation and geology maps. A first approximation of LTA boundaries is interpreted from the Natural Resource Conservation Service (NRCS; formerly the Soil Conservation Service) soils maps and Farrand and Bell's (1982) Quaternary geology map to identify landform features, as well as slope and drainage classes. The geology map is more generalized than the soil survey maps. The soil maps allow broadly mapped glacial features to be divided into individual land units (Albert et al. 1996). MNFI's pre-European settlement vegetation maps, reclassed into major forest communities, are then used to check the first approximation LTA boundaries, assuming that the differences in adjacent LTAs are reflected in changes in the dominant vegetation (Comer et al. 1995). If there is not good agreement between the LTA boundaries and the presettlement vegetation, photo-based soils maps and U.S. Geological Service 7.5 min. topographic maps are used to refine boundaries.

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[1]The Michigan Natural Features Inventory (MNFI)is the Nature Conservancy's Heritage Program in Michigan, designed to identify priority species, communities, and sites for biological conservation. They maintain a statewide database of the occurrences and status of rare species and exemplary natural communities which is used by federal, state, and local agencies and private organizations to guide land management, development, and conservation decisions. MNFI staff work closely with the MDNR and are housed in the Wildlife Division of MDNR.

Table 2 - Four Digit Code Descriptions of Landtype Associations

X--- = Major landform
-X-- = Landform modifier
--X- = Soil drainage class
---X = Soil textural class

Major landform:
1--- Moraine ridges, steep or irregularly sloped
Landform modifiers:
-1-- Steep, broken topography; few kettle lakes
-2-- Steep, broken topography; many kettle lakes

Major landform:
2--- Moraines or till plains, flat or broad ridges
Landform modifiers:
-1-- Flat plain
-2-- Large, broad ridges; few or no lakes
-3-- Large, broad ridges; many lakes

Major landform:
3--- Ice contact
Landform modifiers:
-3-- Small, steep, irregular ridges; few kettle lakes
-4-- Small, steep, irregular ridges; many kettle lakes
-5-- Broad ridges (not irregular or steep)

Major landform:
5--- Outwash plain
Landform modifiers:
-1-- Broad, flat plain; no or few kettle lakes or wetlands
-2-- Pitted outwash (many kettle depressions, lakes, or wetlands)
-5-- Narrow channel / floodplain

Major landform:
6--- Lake plain
Landform modifiers:
-1-- Flat plain
-3-- Dune and swale complex (coastal)

Soil drainage class modifier:
--1- Excessively to somewhat excessively drained
--2- Well to moderately well drained
--3- Somewhat poorly to poorly drained
--4- Very poorly drained

Soil texture class modifiers:
---1 Sand or loamy sand
---2 Sandy loam
---3 Loam
---4 Silt loam, clay loam, or clay
---6 Two storied soils: 12 in. or less of sand or loamy sand over silt loam, clay loam, or clay
---9 Peat or muck

(Modified from Albert et al., 1996)

Statement of the problem

The team assigned to coordinate LTA mapping in the Lake States region is about to recommend, and the MNFI is employing, a manual map overlay technique in their LTA mapping effort. This is a very labor intensive process yielding results that are not easily reproduced. The aim of this study is to determine whether the mapping process can be automated and made more consistent given the available digital data. Modeling based on decision trees was used in an effort to produce an accurate classifier and provide insight into the predictive structure of the data used for into LTA mapping.

The study compares LTA maps prepared by MNFI's ecologists to input variables, all stored in a geographic information system (GIS), in an attempt to understand the logical relationships between LTAs and the input variables used to delineate them. Besides accurate prediction of LTAs, the goal was to acquire a better understanding of the relative importance of variables in determining LTA classes. After formalizing the classification process into a hierarchical set of rules using a classification tree approach, the results of the empirically derived rules were compared with the subjectively defined units. This analysis was intended to provide insight into how generalizable the process is, how consistent the mappers were, and what information is needed to automate LTA mapping.

Research questions

1) Can digital data co-registered in a GIS be used as inputs to a hierarchical decision tree to delineate LTAs in a way that is repeatable and that mimics the logic used by humans in a manual interpretation?

2) Which are the most important data layers in delineating LTAs? Aside from soil, surficial geology, presettlement vegetation, and topography, is additional information needed to automate the process of LTA delineation?

3) To what degree do the LTA units exhibit fuzzy boundaries; i.e., is the ability to classify land to an LTA affected by the fact that the site is near or not near to the LTA boundary?

4) Can LTA delineation be automated in the future? Can a classification tree model be developed as the basis for extending LTA classification throughout the state?

Chapter 2

RESEARCH PROCEDURES

This chapter contains three main sections. In the first section, studies that have used statistical classification methods to delineate ecological units are reviewed. Decision tree classifiers, and specifically classification trees, are introduced and explained, and studies that have used tree-based models are summarized. The second section describes the spatial variables used in this study and how the data were prepared. The final section explains how the data were analyzed in order to address the research questions.

BACKGROUND

Statistical Methods used in Ecoregion Mapping

Designing an ecoregion classification at the landscape or land-type levels requires a large amount of effort in data collection and analysis. Expert knowledge is necessary to derive classes based on data from multiple sources. Because of this, efforts have been directed to improve the efficiency of ecoregion mapping using computer-based digital analysis techniques (Gong et al. 1996). Many statistical, ordination, and clustering methods have been applied to ecological classification. Recent projects have utilized remotely sensed imagery, digital elevation models, spatial statistics, and GIS to develop and validate ecological units more objectively, more reliably, and with better documentation (Rowe and Sheard 1981; Davis and Dozier 1990; McNulty et al. 1994; Jordan et al. 1996). When biological and physical relationships are accurately quantified in mathematical models, GIS can be used to quickly apply the models over large areas (McNab and McCorquodale 1993). Raster GIS packages are especially well-suited to applying biological models (Congalton and Green 1992).

Davis and Dozier (1990) developed an ecological land classification for a complex region in southern California using mutual information analysis. The method is hierarchical, divisive, and predictive; samples that share a set of attributes are grouped based on the association of those attributes with a dependent variable. Terrain was classified based on the spatial correspondence between digital maps of natural vegetation and other environmental variables including geology, elevation, slope, azimuth, seasonal insolation, and position in a drainage basin. Mutual information analysis presumes that land surfaces are spatially ordered due to ecological interdependence among terrain variables. One draw-back is that the method only works with categorical variables. Nineteen land classes were identified accounting for 18.5 percent of the information in the vegetation data. Geology, insolation, and elevation were found to be the most important variables.

In a case study conducted by the USFS Southeastern Forest Experiment Station, a GIS was used to predict ecological types (ELTPs) within an LTA prior to an intensive field examination (McNab and McCorquodale 1993). Pre-classification was tested in a 10,000 acre tract of the Nantahala National Forest in western North Carolina. The study area was stratified into 0.25 acre sample plots. Vegetation, topographic, and soils variables were measured. The vegetation data were grouped into areas based on similar species composition and dominance. Ordination analysis identified five ecological types having unique combinations of vegetation (predominant overstory and understory), elevation, landform, aspect, gradient, and solum (thickness of the soil profile). Discriminant functions were developed for each of the five ecological types and then the models were applied to the study area using a raster-based GIS. The predicted ELTPs were not field validated to determine their accuracy or area of applicability.

Host et al. (1996) combined a GIS and multivariate statistical analyses to integrate climatic data with Pleistocene geology and soil association maps to produce a landscape level ecosystem map of northwestern Wisconsin. Climatic and physiographic classifications were integrated through overlay operations. When climatic and physiographic boundaries were within 2-3 km, they were shifted to coincide. Climatic boundaries were used to separate regions where physiographic boundaries diverged. Independently classified Landsat imagery was used to validate the classification. Forest composition was shown to differ between the regional ecosystems.

An existing land-systems classification map prepared through aerial photograph interpretation and field studies at Duck Mountain, Manitoba, Canada was used to train and test an artificial neural network (Gong et al. 1996). A back-propagation, feed-forward neural network algorithm was applied to land-systems mapping using elevation, slope, aspect, dominant forest species, and cover type. Numerous neural network structures, data encoding methods, and sampling strategies were attempted. The best overall classification accuracy achieved was 52%. The elevation data were the biggest contributors to the discrimination of the 27 land-systems classes.

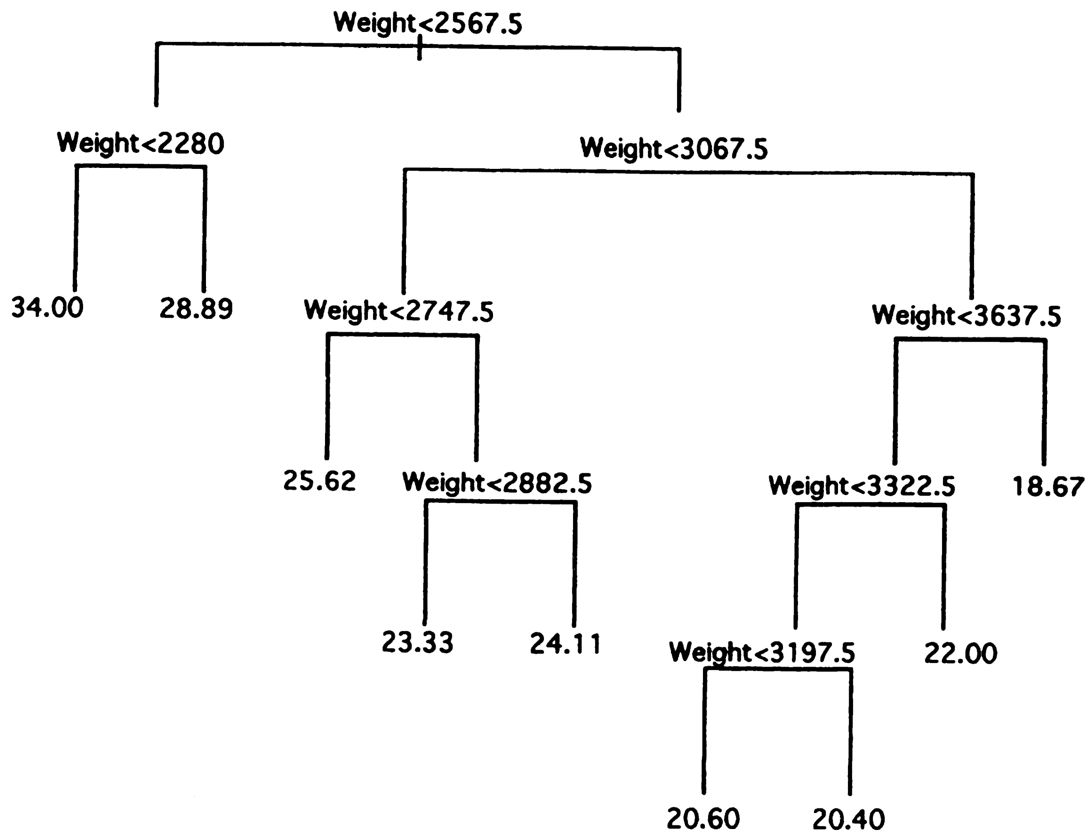
Decision Tree Classifiers

Decision tree analyses are relatively new, flexible, computer-intensive statistical techniques (Efron and Tibshirani 1991; Michaelsen et al. 1994). They are nonparametric statistical methods useful for looking at data in classification or regression problems. In these problems, there is a single response variable and a set of predictor variables. The "difference between classification and regression trees is the nature of the response variable. Classification trees predict class membership probabilities for categorical response variables, while regression trees predict average values for interval or ratio scale response variables" (Michaelsen et al. 1994, 676). Predictor variables may be any combination of numeric or factor types. Tree-based modelling is also an exploratory technique for uncovering structure in data as complex hierarchical relationships are identified and estimated (Breiman et. al 1984; Michaelsen et al. 1994).

A tree-based model is fit by a process of recursive partitioning. In growing a tree, a binary partition algorithm chooses the "best" set of splits that partition a dataset of predictor variables into increasingly homogeneous subsets, or nodes, until it is not feasible to proceed. Binary splits are made so that the data in each of the descendant subsets are "purer" than the data in the parent subset. Node impurity is largest at the beginning when all classes are mixed together. Subsets which are not split are called terminal nodes and given a class label. The final model is a collection of classification rules displayed in the form of a binary tree (Statistical Sciences 1993; Sankar and Mammone 1991; Breiman et al. 1984).

For example, Figure 2 shows a tree-based model relating the response variable, gasoline mileage, to the predictor variable, automobile weight (Statistical Sciences 1993). In growing the tree, the binary partitioning algorithm successively partitioned the data into homogeneous subsets shown with the decision rule labeling each split. To predict mileage from weight you follow the path from the top node of the tree, called the root (Node 1), to a terminal node, called a leaf, according to the rules for creating new branches, called splits, at the interior nodes. Automobiles are first split depending on whether they weigh less than 2567.5 lbs. If they do, follow the path to the left (Node 2); if they do not, follow the path to the right (Node 3). In this example, nine weight classes (terminal nodes) are formed. Consistent with intuition, the lightest automobiles (less than 2280 lbs.) have the best predicted gas mileage (34 mpg).

A Tree-Based Model for Mileage versus Weight



(Statistical Sciences 1993)

Figure 2 - A Typical Tree-Based Model

A learning sample of classified observations, assumed to be an independent random sample, is used to construct, or grow, a classification tree. S-plus, a statistical software package (Statistical Sciences, Inc., Seattle, Washington) capable of growing tree-based models, uses a one-step look ahead method when growing a tree; i.e., the next split is chosen based on the maximum reduction in deviance (likelihood ratio statistic) over all allowed splits of all nodes, with no attempt being made to optimize the performance of the whole tree. The tree continues to grow until the number of observations in each node is small (less than five) or the node is homogeneous enough (its deviance is less that one percent of the deviance of the root node). Each observation in the training sample is then assigned to a node (Venables and Ripley 1994; Clark and Pregibon 1992).

A classification tree may be viewed as a probability model. In real classification problems, such as predicting LTAs, the distributions of the classes over the set of predictor variables overlap. So at each node of a classification tree there is a probability distribution over all the classes, and the Bayes decision rule is used to choose the class with the highest probability (Breiman et al. 1984).

Selecting the optimum size tree can be difficult because the flexibility of the procedure makes overfitting very difficult to avoid (Michaelsen et al. 1994). It is possible to grow a tree so large that it has only one observation in each terminal node. The misclassification error rate would be zero, but the model would probably be a poor predictor of new observations. In other words, the tree would not generalize well. This is because the tree is geared too much to the data used to construct the tree, that is, it is "overfit" (Efron and Tibshirani 1991). Overfitting is a more serious problem with data sets of 300 or fewer observations (Michaelsen et al. 1994).

When growing a tree, pruning a "too large" tree upward has been shown to give better results than searching for the correct stopping rule. Pruning reduces the number of nodes on a tree. The cost-complexity measure is used to recursively snip off the least important splits, leaving a subtree of the original tree. Generally, "as a tree is pruned upward, the estimated misclassification rate first decreases slowly, reaches a gradual minimum, and then increases rapidly as the number of terminal nodes becomes small" (Breiman et al. 1984, 62).

Two methods of estimation may be used to find the best size tree: an independent test sample or cross-validation. The test sample method is preferred given a large enough sample size because it "gives relatively unbiased estimates of the node misclassification costs" (Breiman et al. 1984, 72). The maximum size tree is grown and pruned using only the learning sample. Then an independent test sample is run through the various pruned trees where a predicted classification is assigned to each data point. Since the true class of each case is known, the misclassification cost of each tree can be calculated by computing the misclassification cost of every case in the test sample and then taking the average. The right sized tree is the one with the smallest misclassification cost.

If sample size is small, cross-validation can be used to reduce the chances of overfitting. This procedure involves dividing the full dataset into subsets, developing the model on part of the data, and testing the model with the excluded cases. Cross-validation ensures that a model is not overly complex for the sample size (Michaelsen et al. 1994).

Tree-based modeling is a flexible alternative to generalized linear and additive logistic models, such as multiple regression, multi-way analysis of variance, logistic regression, and linear discriminant analysis for classification problems (Michaelsen et al. 1994). As such, trees have many advantages. Unlike many statistical techniques, they effectively handle large data sets with many variables and complex data sets with high dimensionality, combinations of continuous and classed data types, nonstandard data structure, and nonhomogeneous populations (Breiman et al. 1994). Rule-based instead of parametric, there are no assumptions about the frequency distribution of the variable (Moore et al. 1991). Missing values are permitted in the set of predictor variables used to construct trees or to predict the response variable class of any sample run through the constructed tree (Statistical Sciences 1993). Trees are "extremely robust with respect to outliers and misclassified points" as a single data point has a weight of one among *N* data points (Breiman et al. 1984, 57).

With nonhomogeneous data, relationships between variables can differ over the measurement space. Most of the common multivariate methods contain a dimensionality reduction process, such as stepwise variable selection and variable subset selection in regression and discriminant analysis. But with decision trees, the model construction may be viewed as a type of variable selection. Problems of interaction between variables and the form in which predictor variables appear in a model formula are handled automatically by searching for the most significant split at each node (Breiman et al. 1984; Clark and Pregibon 1992; Venables and Ripley 1994).

Tree-based models can identify and express non-linear and non-additive relationships in relatively simple form. According to Michaelsen et al. (1994, 675), "this is particularly appealing in situations where hierarchical interactions are present, and relationships between the response variable and some predictor variables are conditional on the values of other predictors." In linear models, ordered relationships between predictors are difficult to capture. Interactions between variables must be pre-specified and be of a certain multiplicative form. But in a tree-based model, this kind of interaction is captured "by splitting the data into subsets based on the first predictor and then identifying entirely different relationships with other predictors in the two resulting subsets" (Michaelsen et al. 1994, 675).

Classification tree models are well suited to representing the complexity of interactions between diverse factors that determine their environment. When applied to data with strongly regionalized relationships between variables, different splitting rules are automatically produced to account for the distribution of classes in each region. Unlike parametric techniques, tree models attempt to identify the precise conditions associated with boundaries of the response variable. With spatial data, variables operating at coarse scales are used to split the data early in the model and variables influencing the response variable locally are used as splitting criteria near the terminal nodes (Moore et al. 1991).

The output from a decision tree include the classification itself and an estimation of the misclassification probability for each object. Information about the predictive structure of the data can be easily understood and interpreted from the results. The form of the final classification algorithm is easy to store and to use in the classification of new data (Breiman et al. 1984).

Studies using Tree-Based Modeling

The automated construction of decision trees, particularly in statistics for the social sciences, is due to the work of Morgan, Sonquist, and Messenger during the 1960s and 1970s. Breiman et al. (1984) proposed new algorithms and developed many of the key concepts which now form the basis of tree-based modeling. They are responsible for bringing the method to the attention of statisticians with their basic reference, *Classification and Regression Trees*. During the same time period, Quinlan was beginning to use decision tree induction in the field of machine learning. The recent introduction of decision tree modeling into the S statistical language has made the method available to more users (Venables and Ripley 1994; Michaelsen et al. 1994).

Tree-based models have been utilized in recent ecological studies. Borchert et al. (1989) used a classification tree analysis to help develop a model to predict acorn germination probabilities using micro-environmental factors in the central Coast Ranges of California. The use of decision trees in mapping thirty vegetation communities using a GIS of environmental parameters was explored by Moore et al. (1991). Community membership was determined by field data collected from 1257 sample sites in the forested coastal range near Kioloa in southeastern Australia. Geology and ten topographic variables derived from elevation data were submitted as predictor variables. Groups of geomorphological formations supporting similar suites of communities were split out first. Then erosional and depositional environments within each parent material type were separated on the basis of the variable steepness. Subsequent splits were made on angle to the northern horizon, aspect, and slope. Forest communities were correctly classified 87% of the time.

Using the GIS database established by Moore et al. (1991), Lees and Ritman (1991) integrated remote sensing and GIS data in a decision tree analysis to predict the vegetation in disturbed and hilly environments. Field data from 52 cleared sites were added to the previous learning sample. They attempted to predict seven broad forest types and one category of cleared land; cross-validation showed that there was a satisfactory level of prediction for only the dry sclerophyll forest and the cleared land. The authors attributed this to excessive pruning of the tree which was done to make the landcover map easier to interpret (i.e., more generalized). Even though prediction accuracies were low, vegetation was classified according to conventional forest typing with standard data, not according a technique-determined scheme. The map had no topographic shadowing problems, contained significant floristic and structural information, and successfully delineated cleared areas.

Baker et al. (1993) grew a classification tree based on soil variables to predict slash and loblolly pine mortality caused by annosus root disease in the southeastern region of the U.S. Percent silt and pH of the A horizon were the only two variables needed to correctly predict the hazard category for 85% of the sample cases.

Michaelsen et al. (1994) used a regression tree analysis to derive an ecological classification of a tall grass prairie landscape in Kansas in order to design and allocate ground sampling efforts. The response variable used in the study was multi-temporal greenness vegetation index (GVI) imagery derived from Landsat Thematic Mapper. The predictor variables were co-registered maps of woody vegetation, prairie burning, and several topographic variables. Vegetation type had the most direct relationship with GVI on all dates; burning treatment and elevation were also important predictors.

Cialella et al. (1997) used a classification tree analysis to predict soil drainage class in a mixed conifer forest in Maine. A remotely sensed optical image and a digital elevation model were used to create a model with 78% accuracy.

DATA PREPARATION

Study Area

Four counties in the Lower Peninsula of Michigan were selected for this study: Grand Traverse, Alcona, Newaygo, and Midland (Figure 3). These counties were chosen based on good geographic separation throughout northern Lower Michigan, availability of digital soils data, and the inclusion of large areas of each of the major glacial landforms (end moraine, ground moraine, ice-contact, outwash, and lacustrine), as mapped by Farrand and Bell (1982). These landforms correspond to the first number of MNFI's four digit LTA code.

This area of Michigan has a humid, cold-winter, warm-summer climate that is somewhat

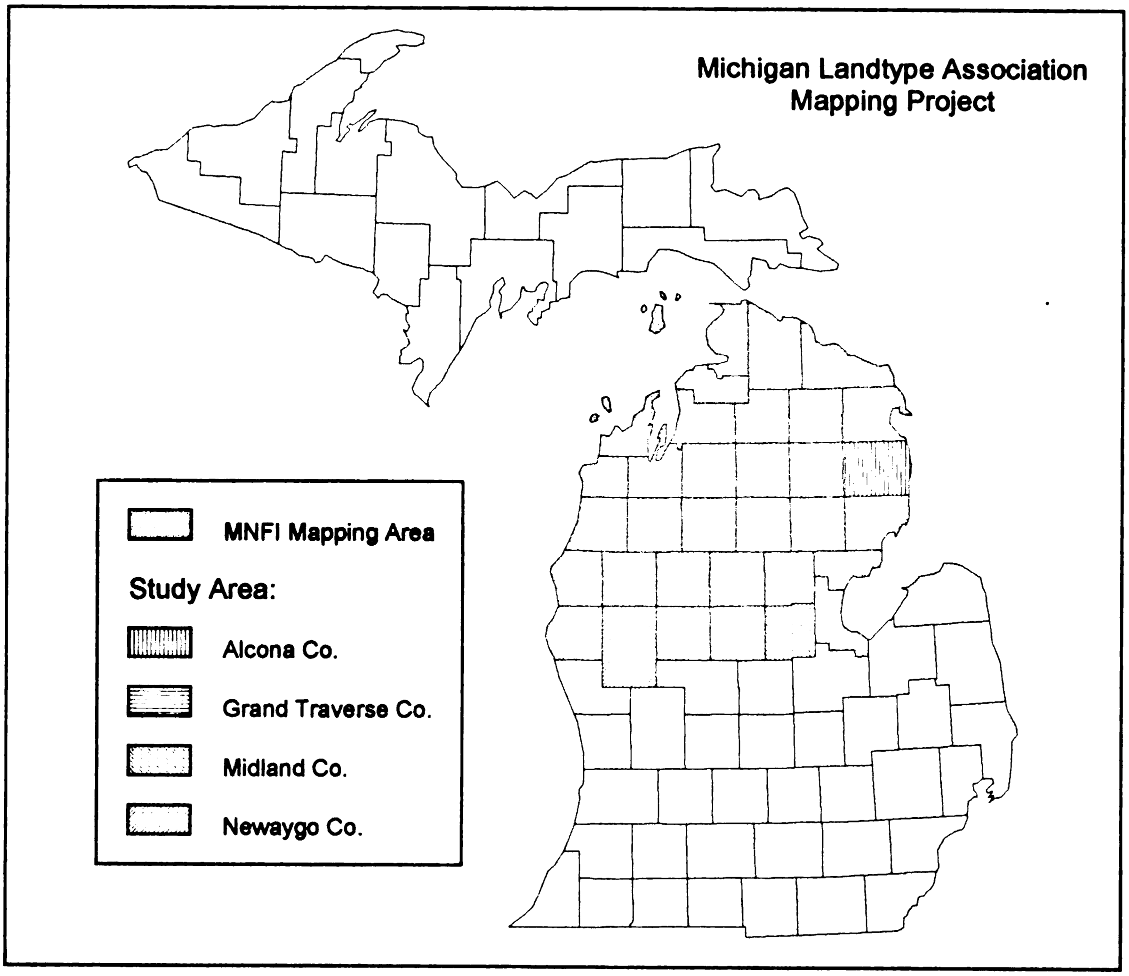


Figure 3 - Map of Study Area

moderated by the Great Lakes. Average annual precipitation is between 71 and 86 cm (28 to 34 in.). Annual temperatures are typical of a mid-latitude continental location. Mean daily temperatures range from -9 to -4 deg. C (16 to 24 deg. F) in the winter to 18 to 21 deg. C (65 to 70 deg. F) in the summer (Eichenlaub et al. 1990). The physiography and soils are the result of erosion and soil formation processes acting on late Wisconsin-age glacial deposits lying over Paleozoic sedimentary bedrock. Several different landforms cover the area, each with characteristic slope, substrate, soils, and drainage conditions. Vegetation consists of northern hardwood forests, jack pine barrens, white pine/red pine forests, conifer swamps, and bogs. Logging, agriculture, drainage, fire, and fire suppression have seriously altered plant cover and composition (Albert 1995).

Data

The response variable for this study is the landtype association (LTA) classification as mapped by MNFI's ecologists. Eleven predictor variables were collected to formalize the LTA mapping process: Quaternary geology, vegetation prior to widespread European settlement, soil drainage class, soil texture class, depth to high water table, slope class (from soil maps), elevation, slope aspect, slope angle (calculated from the DEM), distance from inland lakes, and distance from streams. Climate variables were not used by the ecologists in their original LTA classification nor in this study because climate is assumed to be homogenous across the region. Climate is an important ecological factor influencing ecoregions at the Section level and above in the national hierarchy (Table 1).

Landtype Associations

MNFI's ecologists drew their LTA boundaries on mylar which was overlaid on presettlement vegetation maps plotted at a scale of 1:63,360, and backlighted. The boundary lines were digitized with a horizontal accuracy of +/- approximately 32 m and labels were added. Check plots of LTA boundaries and labels were manually compared to the original mylar source sheets and topological vector polygons were built. The vector polygons were converted to raster (grid) format with a cell size of 0.4047 ha (1 acre). Lakes large enough for the ecologists to code as separate LTAs were not included in this study; therefore, forty-three different LTAs were included the four county study area (Figure 4). The LTA codes are described in Table 2.

Grand Traverse County has fifteen different landtype associations. Polygons range in size from 4 to 17,667 ha (10 to 43,657 acres). The largest LTA class is pitted outwash plain with excessively to somewhat excessively drained sand or loamy sand soils (LTA 5-2-1-1), covering almost 17% of the county. Other major LTAs, at 11-14% each, are steep moraine ridges with well to moderately well drained sandy loam soils (LTA 1-1-2-2), large, broad moraine or till plain ridges with few or no lakes and well to moderately well drained sand or loamy sand soils (LTA 2-2-2-1), large, broad moraine or till plain ridges with few or no lakes and well to moderately well drained sandy loam soils (LTA 2-2-2-2), and broad, flat outwash plain with no or few kettle lakes or wetlands and excessively to somewhat excessively drained sand or loamy sand soils (LTA

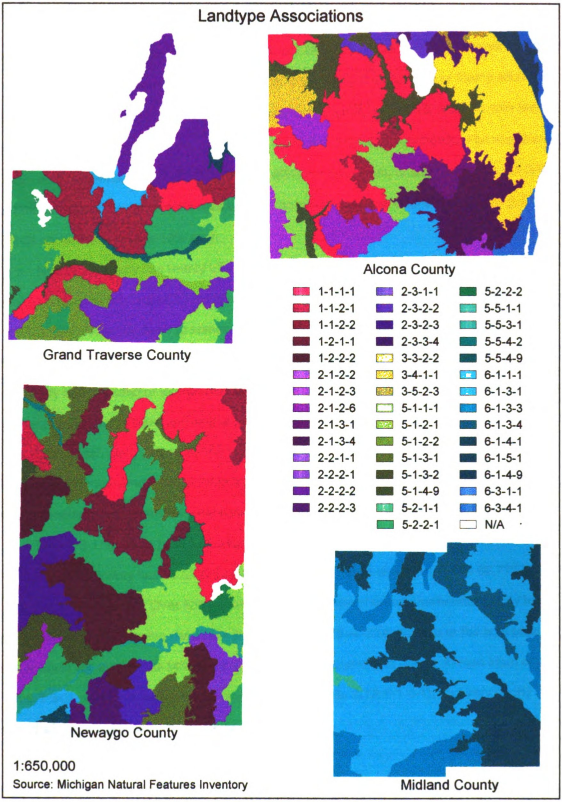


Figure 4 - Maps of Landtype Associations

5-1-1-1).

Alcona County has eighteen different landtype associations. The polygons range in size from 193 to 30,796 ha (477 to 76,100 acres). Almost 24% of the county is steep moraine ridges with few kettle lakes and excessively to somewhat excessively drained sand or loamy sand soils (LTA 1-1-1-1). Just over 17% is small, steep, irregular ridges of ice contact outwash with few kettle lakes and well to moderately well drained sandy loam soils (LTA 3-3-2-2). Flat moraine or till plain with somewhat poorly to poorly drained silt loam, clay loam, or clay soils (LTA 2-1-3-4) and broad ridges of ice contact outwash with well to moderately well drained loam soils (LTA 3-5-2-3) account for another 10% each.

Newaygo County has twenty LTA classes. They range from 7 to 31,105 ha (17 to 76,862 acres) in size. The two largest LTAs cover approximately 17% of the county each, pitted outwash plain with excessively to somewhat excessively drained sand or loamy sand soils (LTA 5-2-1-1) and steep moraine ridges with few kettle lakes and excessively to somewhat excessively drained sand or loamy sand soils (LTA 1-1-1-1). Another three LTAs, steep moraine ridges with many kettle lakes and well to moderately well drained sandy loam soils (LTA 1-2-2-2), broad, flat outwash plain with no or few kettle lakes or wetlands and excessively to somewhat excessively drained sand or loamy sand soils (LTA 5-1-1-1), and broad, flat outwash plain with no or few kettle lakes or wetlands and somewhat poorly to poorly drained sand or loamy sand soils (LTA 5-1-3-1) account for 11-12% each.

Midland County has six LTA classes. Polygons range in size from 726 to 68,773 ha (1,794 to 169,943 acres). Over 53% of the county is flat lake plain with somewhat poorly to poorly drained sand or loamy sand soils (LTA 6-1-3-1). Three more classes of flat lake plain each account for another 10-14% of the county: somewhat poorly to poorly drained loam soils (LTA 6-1-3-3), very poorly drained sand or loamy sand soils (LTA 6-1-4-1), and very poorly drained silt loam, clay loam, or clay soils (LTA 6-1-4-4).

Quaternary Geology

Farrand and Bell's (1982) Quaternary Geology map of Michigan has been digitized by MNFI and organized by State Plane zone. The original map was published at a scale of

1:500,000 with no estimation of its accuracy with respect to ground truth. The main sources consulted by Farrand and Bell (1982) in the mapping process were Martin's (1955) map of surface formations and USDA soil surveys of individual counties. The digital map has an effective resolution of approximately 250 m. Data for the four counties in the study area were clipped out of the statewide files. The files were cleaned and built and the vector polygons were converted to 0.4047 ha (1 acre) grid cells. The maps were then reclassified into eight geology types to reflect the way the ecologists were using the geology map in their delineation of LTAs; different textures within the same type landform were grouped together. This process resulted in a map with the following classes: end moraine, glacial till, ice-contact outwash, glacial outwash, lacustrine, lake, dune sand, and peat and muck (Figure 5).

Almost half of Grand Traverse County is outwash sand and gravel and postglacial alluvium. The outwash flanks end moraines of coarse-textured till.

The center of Alcona County has a large area of medium-textured glacial till. The southwest corner of the county is end moraine "occurring in narrow linear belts of hummocky relief marking former stillstands of ice-sheet margin" (Farrand and Bell 1982). Both the till and moraines are dissected by glacial outwash sand and gravel and postglacial alluvium occurring along present drainageways. The northwest corner and a large area just inland from Lake Huron are ice-contact sand and gravel.

Newaygo County is mostly a complex of glacial outwash sand and gravel and postglacial alluvium and end moraines of coarse-textured till. The outwash corresponds well to the present-day stream pattern.

Eighty-five percent of Midland County is composed of lacustrine deposits dotted with areas of dune sand.

Presettlement Vegetation

Deputy Surveyors of the General Land Office (GLO) surveyed what was then Michigan Territory between 1816 and 1856, prior to widespread European settlement. While not undertaken as a scientific sample of vegetation, their transcribed field notes and township plat maps provide a detailed record of the state's presettlement vegetation. Plant ecologists from the

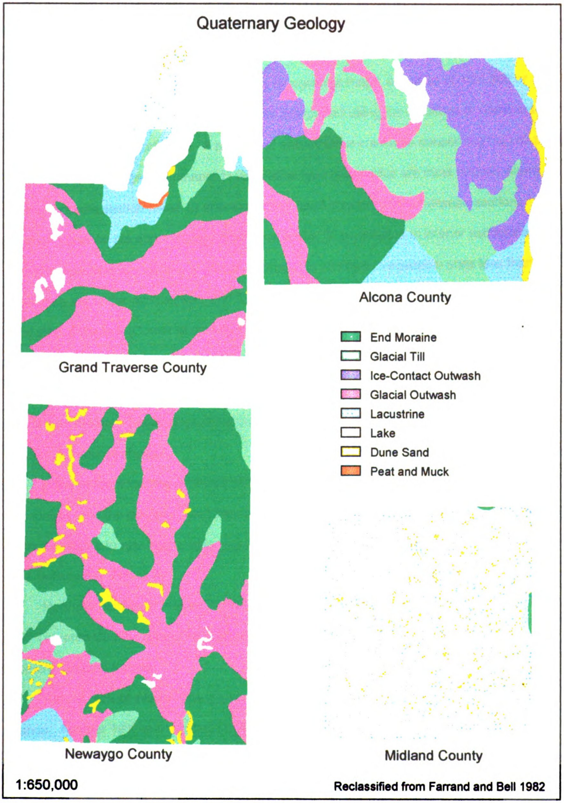


Figure 5 - Maps of Quaternary Geology

MNFI have used these records to draw a presettlement vegetation map. A vegetation type code was developed to capture the complexity of plant communities that were distinguishable in the survey notes. Information from the GLO notes was written onto mylar sheets overlaying the most recent U.S. Geological Survey 7.5 minute topographic maps, at scales of 1:24,000 or 1:25,000. Vegetation type boundaries were then interpreted using the locations of dominant tree species and associated landforms. A number of assumptions are made concerning the reliability of the presettlement vegetation maps: 1) vegetation type boundaries are most reliable where they intersect with section lines; 2) errors in interpolated boundary lines between sections depend on variation not apparent on topographic maps; 3) boundaries in interior sections are most accurate where topography is abrupt; 4) wetlands and other vegetation units less than 50 acres in size are under-represented; and 5) the accuracy of areal coverage increases with the natural size of the unit (Comer et al. 1995).

Once vegetation type boundaries were drawn and assigned codes, the maps were proofed and digitized. The digitized maps have a horizontal accuracy of approximately plus or minus fifteen meters. Check plots of the boundaries and labels were manually compared to the original mylar source sheets.

Polygon topology was established for the digital presettlement vegetation maps for the four counties and the polygons were converted to 0.4047 ha (1 acre) grid cells. The maps were then reclassified into nine major cover types (Table 3) to simulate the ecologist's use of the data in LTA delineation (Figure 6).

Northern hardwood forests of beech, sugar maple, and yellow birch covered 60% of Grand Traverse County. There were also large areas of lowland conifers and inland lakes, and red pine/white pine forests.

Almost 30% of Alcona County was covered by wetlands, water, or sparsely vegetated lowlands. Another 19% was covered by white pine/red pine/oak forests. Other large forested tracts included red pine/jack pine, northern hardwoods, and beech/hemlock.

The major vegetation cover types in Newaygo County were white pine/beech/red maple forest, white pine/white oak/red pine forest, northern hardwood forests of beech, sugar maple,

Table 3. Pre-European Settlement Vegetation Cover Types

1	Upland Savanna and Jack Pine
2	Red Pine and Red Pine/Jack Pine
3	Aspen/Paper Birch
4	White Pine, White Pine/Red Pine, White Pine/White Oak, and Red Pine/Oak
5	Other Upland Conifers (White Spruce, Hemlock, Cedar, Fir)
6	Northern Hardwoods (Beech, Sugar Maple, Yellow Birch, Red Maple)
7	Beech / Hemlock
8	White Pine / Beech / Red Maple
9	Forested and Shrub-dominated Wetlands, Lowlands, Streams, and Lakes

yellow birch, and basswood, wetlands, and beech/hemlock forests.

Half of Midland County was covered with upland conifer forests of hemlock and white pine. There were also many forested wetlands, some conifer-dominated and some hardwood-dominated, and beech/hemlock forests.

Soil

Digital copies of the NRCS soil surveys were obtained for each of the four study counties (USDA 1997a, 1997b, 1997c, 1997d). They are stored by 7.5 minute quadrangles and include a detailed, field verified inventory of soils and nonsoil areas large enough to be cartographically shown at a scale of 1:24,000. The soil map units are linked to attributes in the relational database Map Unit Interpretations Record. Attribute accuracy was tested by manual comparison of the source with hard copy plots and also tested against a master set of valid attributes. In adherence to National Cooperative Soil Survey standards and procedures, statistical analysis of field observations and transect data were used to determine the actual composition and interpretive purity of the map unit delineations. Horizontal positional accuracy on the ground varies with the transition between map units. The difference in accuracy between the soil boundaries and their digitized map locations is unknown, but lines were generally digitized within 0.01 in. of their locations on the digitizing source.

The quads for each county were joined together and polygon topology was established.

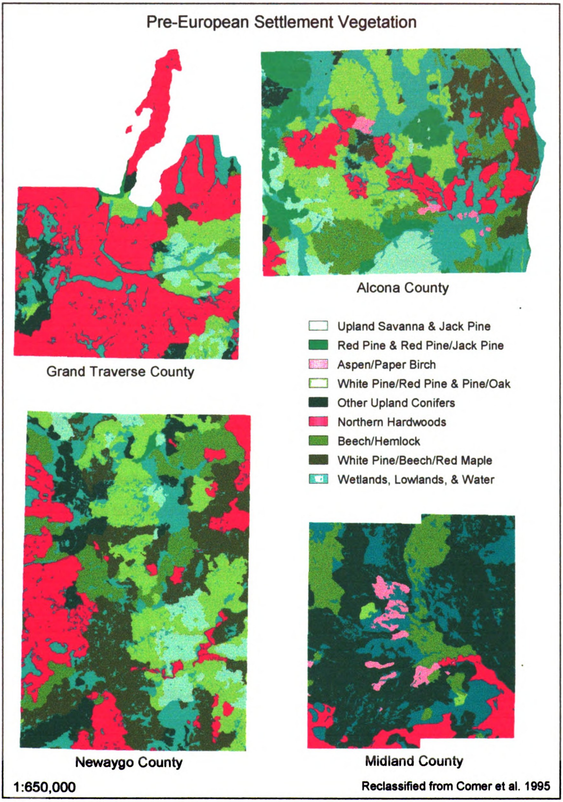


Figure 6 - Maps of Pre-European Settlement Vegetation

The soils data were reclassified to form polygons representing homogeneous areas of different attributes: drainage class, texture class, depth to the high water table, and slope. Each of the soils maps was then converted to a raster format for processing.

Maps of soil drainage classes were made from the NRCS maps by recoding the polygons based on the soil survey data (Figure 7). The NRCS uses seven natural soil drainage classes: excessive, somewhat excessive, well, moderately well, somewhat poorly, poorly, and very poorly. An eighth class covers any area not falling into one of the above classes, such as urban land, pits, and water.

Almost one-third of Grand Traverse County has excessively drained soils; most of the remaining soils are classed as either well or somewhat excessively drained. Over 42% of the soils in Alcona County are either well or moderately well drained; however, there are large areas of both very poorly and excessively drained soils. The soils of Newaygo County cover the range of drainage classes. The majority are excessively drained, but there are large amounts of well, somewhat poorly, and very poorly drained soils. Eighty percent of Midland County's soils are poorly or somewhat poorly drained. Approximately 12% are classified as moderately well drained.

Maps of soil texture were made by recoding the soils maps into ten texture classes (Figure 8). The soil texture class attempts to provide general information about the average textural condition of the soil solum (A, E, and B horizons) and the C horizon. Emphasis was placed on the likely relationship between this textural class and potential natural vegetation (Albert et al. 1996). The first eight classes grade from the most coarse to the most fine soil particles (Table 4). The ninth class represents soils too variable to be put into one of the first eight. The last class has all of the other areas.

Grand Traverse County consists of mainly sands and loamy sands, with some sandy loams. One-third of Alcona County is covered with loamy sands and another quarter with sands. Muck and peat account of 13% of the county's soils. Newaygo County is almost one-half sands and another quarter is loamy sands. Midland County is mostly covered with loamy sands and sands, but also has significant amounts of silty and/or clay loams and loam.

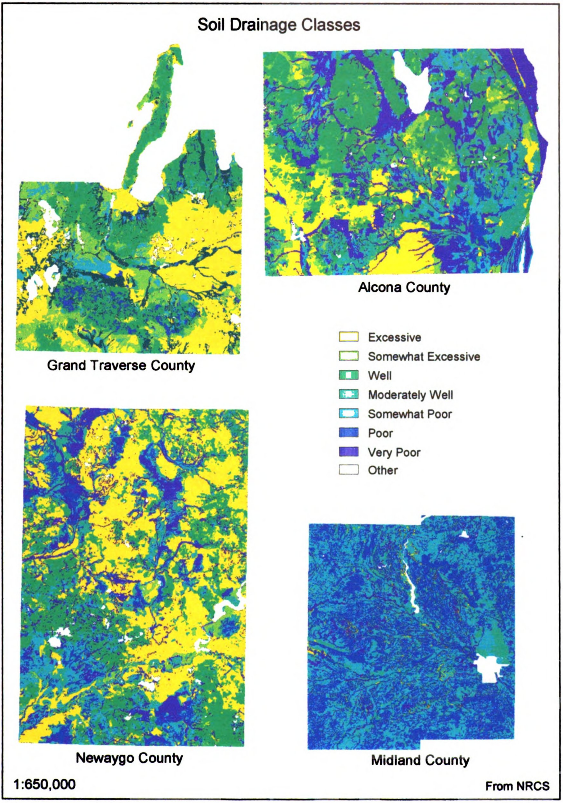


Figure 7 - Maps of Soil Drainage Classes

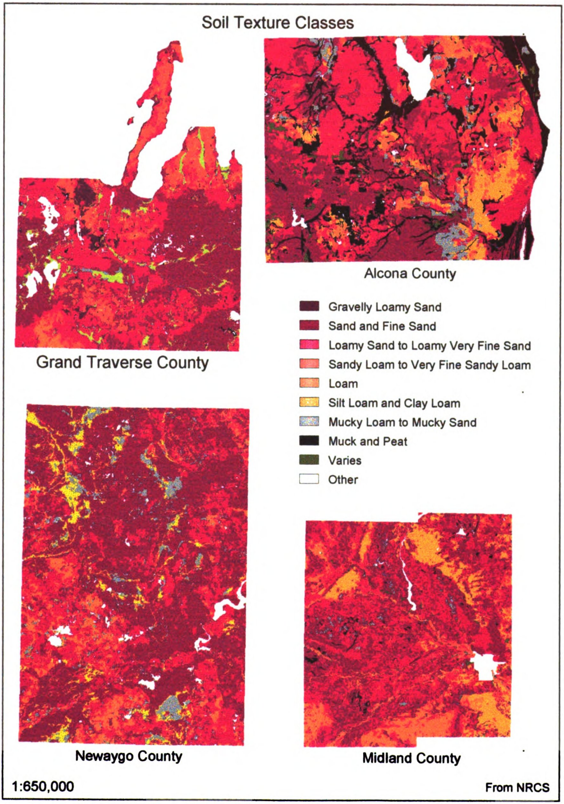


Figure 8 - Maps of Soil Texture Classes

Table 4 - Soil Texture Classes

1	Gravelly loamy sands
2	Sand and fine sand
3	Loamy sand, loamy fine sand, and loamy very fine sand
4	Sandy loam, fine sandy loam, and very fine sandy loam
5	Loam
6	Silty loam, clay loam, and silty clay loam
7	Mucky sand, mucky sandy loam, and mucky loamy sand
8	Muck and peat
9	Varies
10	Other (gullied land, gravel pits, pits, urban land, water, and wind eroded land)

The soils maps were recoded to create maps indicating depth to high water table (Figure 9). Five classes were created: -1 to 1 ft. (-0.30 m to 0.30 m), 1 to 3 ft. (0.30 to 0.91 m), 3 to 6 ft. (0.91 to 1.83 m), > 6 ft. (> 1.83 m), and non-applicable. In Grand Traverse County, the depth to high water table is greater than six feet over 80% of the county. The water table is at or near the surface in approximately 10 % of the county. The high water table is greater than six feet deep throughout most of Alcona County; however, there are large areas where the water table is at or is very near the surface. In over half of Newaygo County the high water table is at least six feet deep. Twenty percent is at a depth of one to three feet and another eighteen percent is ponded or very near the surface. The high water table is within three feet of the surface over almost all of Midland County.

The soil maps were recoded a fourth time, this time based on slope class (Figure 10). The maps were recoded into a non-applicable class, for sites where slope was not measured, and 6 slope classes: 0-2%, 2-6%, 6-12%, 12-18%, 18-25%, and >25%.

Almost three-quarters of the land in Grand Traverse County falls into the three least steep slope classes. Alcona County is quite flat, with a third of its area in the 0-2% slope class and another 28% in the 2-6% class. The 6-12% and 12-18% slope classes each account for 12-14% of the total area in the county. Approximately three-fourths of Newaygo County is classified

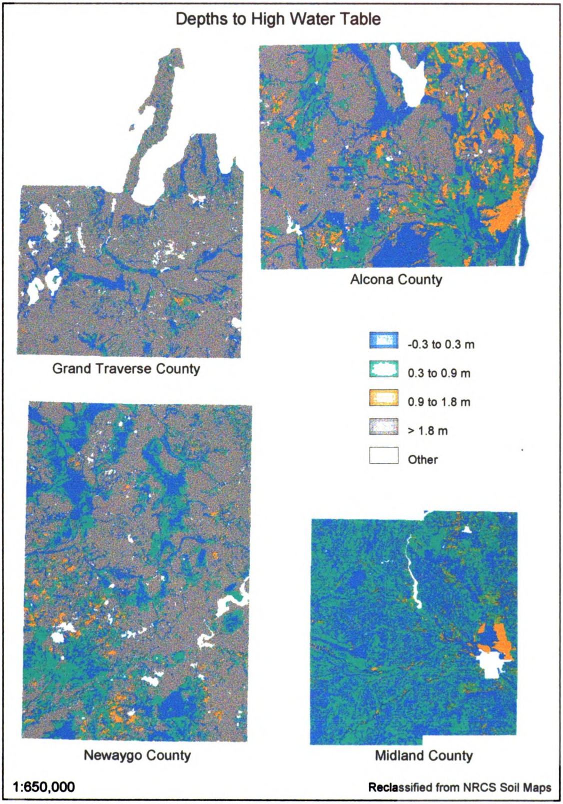


Figure 9 - Maps of Depth to High Water Table

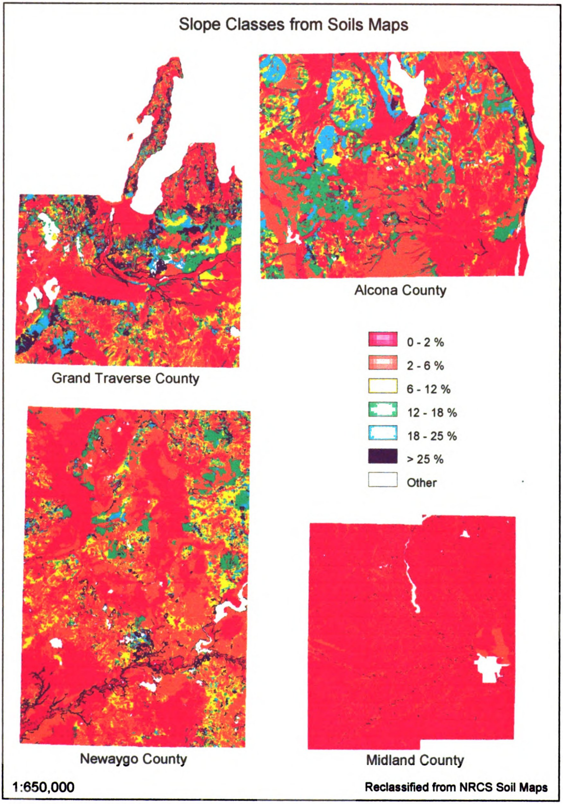


Figure 10 - Maps of Slope Classes from Soils Maps

as 0-2% or 2-6%. Another 16% of the county has slopes of 6-12%. Midland County is the flattest county in the study area with 84% classed as 0-2% and no land mapped steeper than 6%.

Digital Elevation Model

One-degree digital elevation models (DEMs), produced by or for the Defense Mapping Agency, were downloaded off the Internet from the U.S. Geological Survey (n.d.) in DEM data record format. The DEMs consists of an array of elevations sampled from cartographic and photographic sources for ground positions spaced at 3- by 3-arc second intervals. Elevations are measured in meters relative to the National Geodetic Vertical Datum of 1929 and mean sea level. The accuracy and information content of a 1-degree DEM is roughly equivalent to that which could be derived from contour lines printed on a 1:250,000 scale map. Accuracy of any DEM is dependent on the quality of the source data, horizontal grid spacing of the data profiles, collection and processing procedures, and digitizing systems. The broad production objective was to satisfy an absolute horizontal accuracy of 130 m (circular error at 90% probability) and an absolute vertical accuracy of +/- 30 m (linear error at 90% probability).

The DEMs were reprojected into State Plane coordinates and resampled to 0.4047 ha (1 acre). The counties were clipped out of the 1-degree blocks so the DEMs would overlay with the other images. Table 5 shows a summary of the elevations in the study area. Elevation was brought into the model as a continuous variable (Figure 11).

The elevation data were used to calculate slope and aspect layers. The slopes calculated from the DEM were kept as a continuous variable (Figure 12). Slopes ranged from 0-19% in Grand Traverse County, 0-78% in Alcona County, 0-20% in Newaygo County, and 0-11%

Table 5 - Elevation of Study Area

County:	Grand Traverse	Alcona	Newaygo	Midland
Low El., m:	176	176	184	182
High El., m:	365	381	411	237
Relief, m:	189	205	227	55

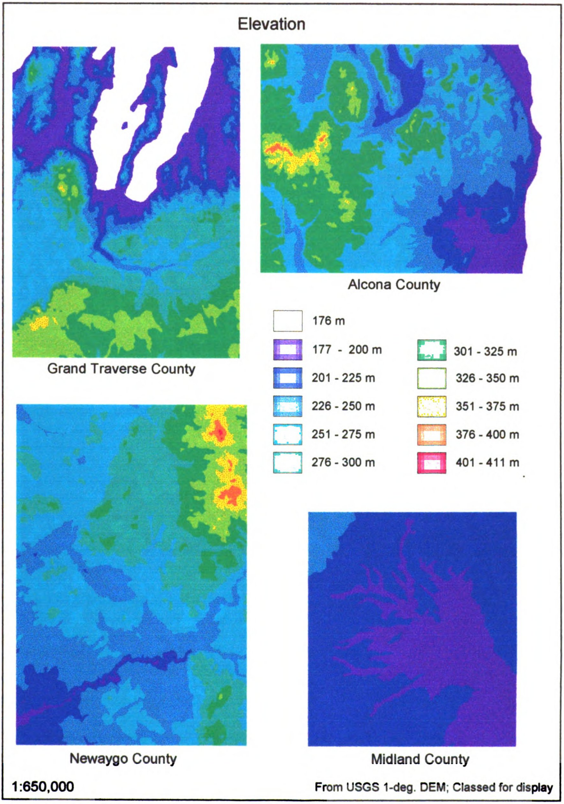


Figure 11 - Maps of Elevation

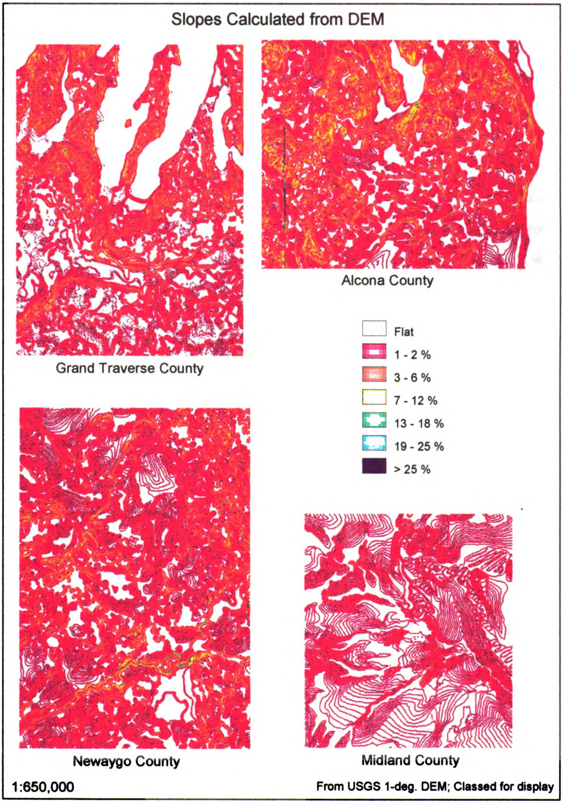


Figure 12 - Maps of Slope Calculated from DEM

in Midland County. Aspects were recoded into a no slope class and the eight major compass headings: north, northeast, east, southeast, south, southwest, west, and northwest (Figure 13).

The generation and plotting of graphics from a DEM, such as slope contours, at a scale larger than 1:250,000 reduces the reliability of the results. Most terrain features are generalized by being reduced to grid nodes spaced at regular intervals in the horizonal plane. Generalizing reduces the ability to recover positions of features less than the grid spacing, resulting in a smoothing of the surface. This is apparent when you compare the slope from soil maps with the slope calculated from DEM maps (Figures 10 and 12). Even though a (probably more reliable) slope variable was already obtained from the soil maps, digital soil maps are not available for the entire Lower Peninsula of Michigan and one goal of the study is to produce a classifier that is generalizable. The coarser scaled 1-degree DEMs are available for the entire area. Classification trees are not adversely affected by multiple variables measuring the same thing, so both slope variables were submitted in the modeling process to see which, if either, is shown to be an important variable in LTA mapping.

Distance from Inland Lakes and Streams

The LTA classification system distinguishes between sites with few versus many kettle lakes for four of the major landform categories (the first digit of the LTA code). Another LTA category (5-5-*x*-*x*) is described as a narrow channel (floodplain). The MNFI ecologists were making these determinations subjectively by looking at the 7.5 minute topographic maps. As a surrogate for this information in the automated classification, the distances from lakes and streams were calculated and mapped (Figures 14 and 15). The lake and stream layers were copied from the digital county base maps available from MIRIS. The lake files were processed as polygons. It was felt that the presence of very large lakes would skew the results of a distance calculation away from the desired intention of determining if there were a lot of lakes in an LTA or not. Therefore, any lake with an area greater than 250 ha was deleted. The stream files were imported as lines instead of polygons and distances from them were calculated.

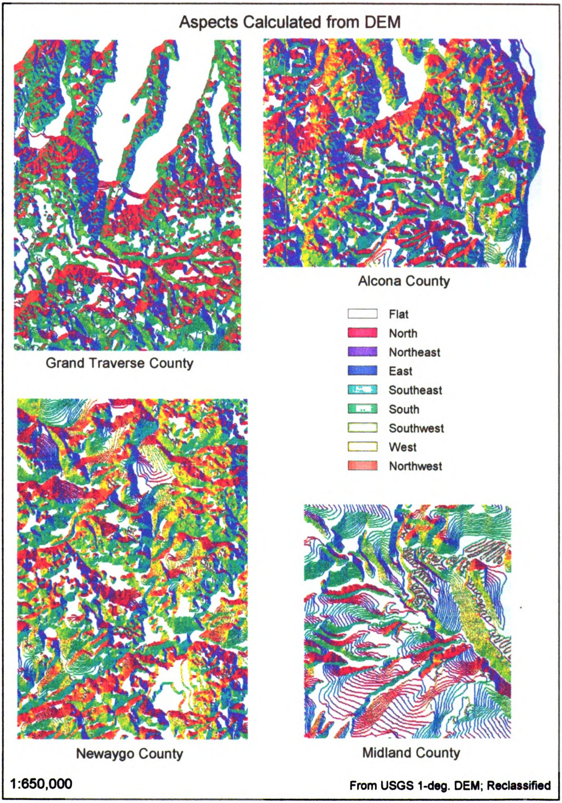


Figure 13 - Maps of Aspect Calculated from DEM

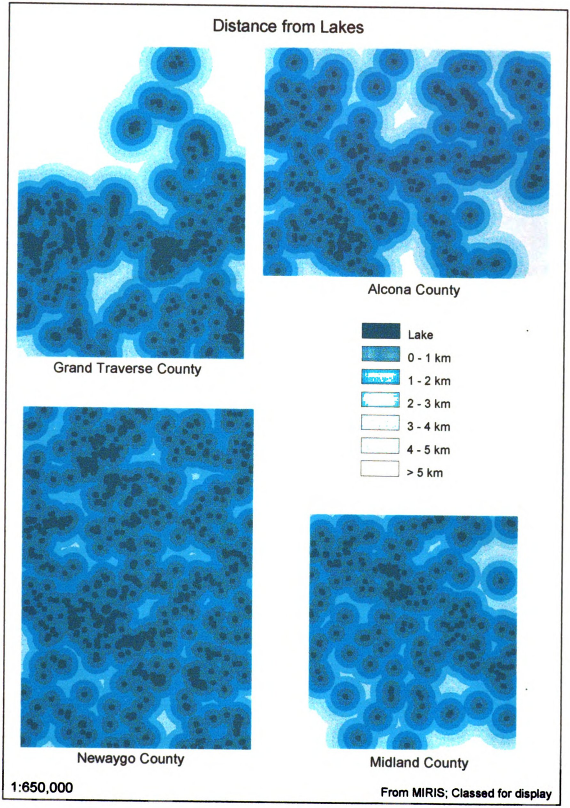


Figure 14 - Maps of Distance from Lakes

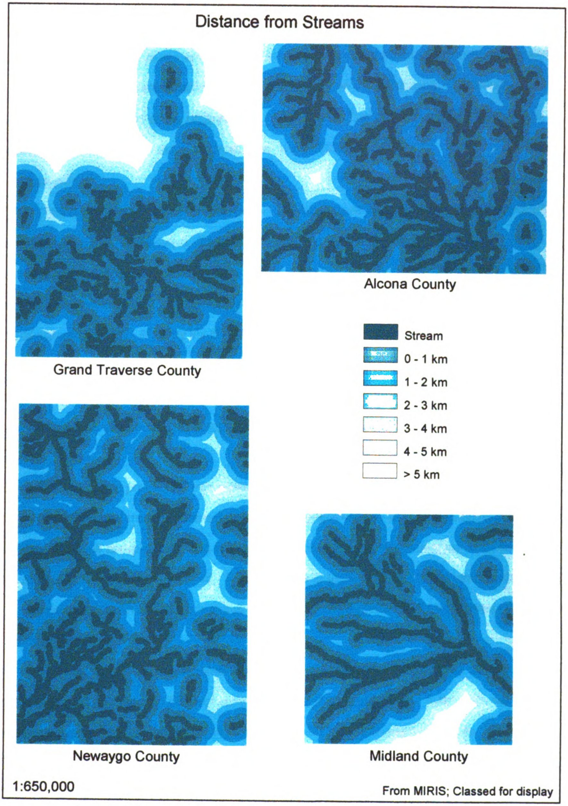


Figure 15 - Maps of Distance from Streams

Distance from an LTA Boundary

The last set of input maps constructed were distances from the LTA boundaries. These data were used as buffer zones around LTA lines to examine the effect of mapping errors and problems caused by naturally occurring fuzzy boundaries on the landscape. The county lines were deleted from a copy of the original vector LTA maps. The remaining LTA linework was rasterized as lines and the distances from them were calculated.

Data Sampling

The data points used in the tree-based modeling were systematically sampled from the co-registered raster digital maps. The goal in sampling was to decrease the spatial autocorrelation as much as possible while not allowing the number of sample points in any LTA class to drop below thirty. Statistical tests of between-variable correlation can be biased by high spatial autocorrelation. A six by six pixel thinning was used to obtain a learning sample with 52,988 observations. Pixel thinning generalizes an image by reducing the number of rows and columns while simultaneously increasing cell resolution. Every sixth cell on every sixth line was retained in a new sample file. In sampling, both spatial autocorrelation and sample size were reduced (Brown

1994). The sampling procedure was repeated for all the predictor variables. The thinned grids lake) were eliminated from the dataset, leaving a learning sample with 45,245 observations. In addition to the full sample, a second learning sample was made, with observations closer than 250 m of an LTA boundary removed. This was done to lessen the variability which exists when boundaries were drawn based on features that occur along a gradient. The buffered sample had 41,443 observations.

The raster grids were sampled a second time to obtain an independent sample which was used to test the model. The test sample was acquired from the full raster data set through a twelve by twelve pixel thinning, but offset by three cells from the original sample. The test sample was approximately one-quarter the size of the learning sample (10,268 observations) (Table 6).

Table 6 - Sample Sizes

County:	Learning Sample: As first sampled	Learning Sample: Without LTAs = 0	Learning Sample: Without pts. <250 m from a boundary	Test Sample: As first sampled	Test Sample: Without LTAs = 0	Test Sample: Without pts <250 m from a boundary
Grand Traverse	14,280	8,542	7,900	3,450	2,113	1,962
Alcona	13,184	12,074	10,954	3,213	2,974	2,680
Newaygo	15,988	15,245	13,921	3,876	3,797	3,463
Midland	9,765	9,380	8,668	2,392	2,323	2,163
Totals:	52,988	45,245	41,443	12,931	11,207	10,268

ANALYSIS

Growing and Displaying Classification Trees

The sample tables were read into S-plus, a statistical software package capable of growing tree-based models. Classification trees were grown using the full learning sample and the 250 m buffered learning sample. The buffered learning sample tree was pruned five times to create a nested sequence of subtrees by recursively snipping off the least important splits. Independent data were then used to guide the selection of the right size tree. For comparison, classification trees were also grown for the individual counties using the buffered learning sample obtained from each of the counties. The expectation is that the trees fit on county data will be more accurate for predicting LTAs within the county than the full tree. This is because of less variability within an individual county as compared to the variability measured over the entire study area.

The fitted trees were displayed in a tabular form to show the details of the fitting procedure. A record of how each tree was created, the residual mean deviance, and the misclassification error rate were obtained. Residual mean deviance describes the fit of the classification to the data. Higher levels of deviance indicate a poorer fit. It is calculated by summing, over all the observations, the residual terms based on the multinomial distribution and then dividing by the degrees of freedom (the number of observations minus the number of terminal nodes) (see Chambers and Hastie 1992). The misclassification error rate is the percentage of observations that were wrongly classified by the tree, obtained by counting the number of misclassified observations and dividing by the number of observations.

The trees were then plotted twice, once with uniform node spacing to enable the trees to be labeled and studied, and once with nonuniform node spacing. Nonuniform spacing was used to gain insight into the relative importance of the splits. The more important the split, the further the descendent node pairs are spaced from its parent node.

Because the size of a tree is not limited in the growing process, a tree may be more complex than necessary to describe the data (Statistical Sciences 1993). The predictive capability of a tree may be reduced if it is "too large", even though the misclassification error rate increases as the number of nodes decreases. The tree grown with the buffered sample was selectively pruned upwards five times; i.e., the number of nodes on the tree was reduced by consecutively snipping off the least important splits. The importance of a subtree is measured by a cost-complexity measure, with *k* being the cost-complexity parameter. The larger the *k*, the fewer nodes there will be. This produced a sequence of trees with decreasing complexity. Each of these trees was tested with an independent sample and the tree with the highest percentage correctly classified was selected as the best model for this study.

Comparing LTA Maps

The "best" fitted trees were used to predict the LTA class of observations given the set of predictor variables in both the buffered learning and test samples. The prediction function directs each observation point through a tree and assigns the *y value* from the deepest node reached. The predicted LTAs and residuals were then brought back into IDRISI to create raster maps showing the results from the fitted trees.

The analyses used in this study were very dependent on visual comparisons of the original LTAs (i.e., the LTAs as mapped by the MNFI ecologists) and the predicted LTAs. Crosstabulation maps showing the occurrence of all combinations of LTA classes on any two images were created to help identify differences in location, shape, and area of specific LTAs. Where the patterns differed, maps of the input variables and the classification trees were consulted to try to explain the reasons for misclassification. The crosstabulation also reported a Chi Square statistic that judges the likelihood of association between the classes any two images, the degrees of freedom, and Cramer's "V" statistic that measures the degree of association (Eastman 1995).

Answering the Research Questions

1) *Can data in a GIS be used as inputs to a classification tree to delineate LTAs in a repeatable way that mimics human logic in a manual interpretation?* Comparisons between the original LTAs and the predicted LTAs were used to determine whether classification trees are able to delineate LTAs in a repeatable fashion in a way similar to the ecologists' manual mapping process. Visual inspection of the classification trees and the mapped results, crosstabulation information, and discussions with the MNFI ecologists was utilized.

2) *Which are the most important data layers in delineating LTAs?* The predictor variables actually used in tree construction and the relative importance of splits made using a particular variable were used to determine which data layers are the most important in delineating LTAs. This information was obtained using S-plus's summary and plotting (with nonuniform spacing) functions. Possible missing variables were identified by examining which LTA units were consistently misclassified.

3) *To what degree do the LTA units exhibit fuzzy boundaries?* The degree to which the ability to classify land into LTA units is affected by the fact that the site is near or not near to the LTA boundary was examined by a comparison of the residual mean deviances and misclassification error rates of the trees grown with the full and 250 m buffered learning samples. A planned third learning sample with a 1 km buffer zone was not usable because smaller LTA units either disappeared or had too few sample points.

4) *Can LTA delineation be automated in the future? Can a classification tree model be developed to extend LTA delineation throughout the rest of the state?* Whether a classification tree model can or should be developed to automate LTA delineation for the rest of Michigan depends heavily on answers to questions one and two above. To use the model for extending LTAs, even as a rough first approximation, the necessary predictor variables would have to be

available in digital format. Also, new LTA codes cannot be identified. In other words, only the forty-three LTA codes used by the ecologists in the four county study area could be assigned to new LTA units.

Chapter 3

RESULTS

This chapter is organized into three sections. The first section describes the output from the LTA classification trees and how they are interpreted. The various trees are summarized and displayed, with the focus being placed on the most important splits. The second and third sections show how the LTA classes predicted from the learning sample and the independent test sample compare to the ecologists' original LTA units, respectively. In both of these latter sections, the main errors assessed were in the first two digits of the LTA code; i.e., the major landform and landform modifier.

Landtype Association Classification Trees

A Landtype Association (LTA) classification tree was grown using all eleven of the predictor variables in the learning sample (Appendix A). S-plus returned a tabular representation of the classification tree (Appendix B) with the following information for each node:

- Node number
- Split
- Number of observations
- Deviance (measure of node heterogeneity used in the tree-growing algorithm)
- Fitted value (LTA class with the highest probability)
- Estimated probabilities of observations in that node being the same as the fitted value
- Whether a node is terminal or not

A portion of the classification tree table, called "learn.tree," showing all the details of the fitting procedure tree is reproduced in Table 7. The first number of each record of the output is the node number. For a full binary tree, the nodes at depth *d* are integers n, $2^d \leq n < 2^{d+1}$. However, this tree, like most, is not full, but the nodes are numbered the same as if it were a full tree. The nodes are ordered according to a depth-first transversal of the tree (Statistical Sciences 1993).

Following the node number is the split. For example, node 2 was split on geology (V2).

Table 7 - Partial Classification Tree Print-Out

```
> learn.tree
node), split, n, deviance, yval, (yprob)
    * denotes terminal node

 1) root 45245 290400.0 1-1-1-1 ( 0.1280000 0.008598 0.0381900 0.0232500 0.041550 0.0058790 0.0206400
0.0024310 0.0054150 2.646e-02 0.0083550 0.027270 0.0252200 0.0074260 0.0049510 0.0072720 0.0162400
0.0044870 0.0467000 0.0074040 0.0011050 0.0865700 0.0110300 0.0129700 0.0359600 0.0099240 0.0269600
0.0907300 0.0072270 0.0080010 0.0010390 5.901e-03 0.0008620 0.0029620 0.0219000 0.1104000 0.005990
0.0274100 0.012820 0.0302100 0.020860 0.0056140 5.039e-03 2.696e-03 )
  2) V2:dunesand,icec_out,lacustri,peatmuck 14741  71400.0 6-1-3-1 ( 0.0086150 0.000000 0.0112600 0.0005427
0.003053 0.0000000 0.0029170 0.0000000 0.0028490 1.072e-02 0.0000000 0.000000 0.0187900 0.0007462
0.0060380 0.0000000 0.0008141 0.0110600 0.1337000 0.0192700 0.0024420 0.0024420 0.0000000 0.0000000
0.0103800 0.0011530 0.0099040 0.0094290 0.0000000 0.0000000 0.0031880 3.799e-03 0.0002035 0.0004070
0.0561700 0.3359000 0.018380 0.0820200 0.039350 0.0918500 0.064040 0.0152000 1.526e-02 8.141e-03 )
    4) V2:icec_out 2951   8062.0 3-3-2-2 ( 0.0413400 0.000000 0.0000000 0.0000000 0.000000 0.0000000
0.0013550 0.0000000 0.0142300 2.270e-02 0.0000000 0.000000 0.0000000 0.0000000 0.0301600 0.0000000
0.0000000 0.0552400 0.6533000 0.0962400 0.0122000 0.0023720 0.0000000 0.0000000 0.0000000 0.0000000
0.0494700 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0169400 4.405e-03 0.000e+00 )
      8) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o 1350   5302.0 3-3-2-2 ( 0.0903700 0.000000
0.0000000 0.0000000 0.000000 0.0000000 0.0029630 0.0000000 0.0251900 3.778e-02 0.0000000 0.000000
0.0000000 0.0000000 0.0659300 0.0000000 0.0000000 0.1126000 0.3044000 0.2104000 0.0014810 0.0051850
0.0000000 0.0000000 0.0000000 0.0000000 0.1067000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00
0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0370400
0.000e+00 0.000e+00 )
       16) V3:othupcon,rp_r/jp, shrub_jp 392    930.1 3-4-1-1 ( 0.3036000 0.000000 0.0000000 0.0000000
0.000000 0.0000000 0.0102000 0.0000000 0.0000000 2.551e-03 0.0000000 0.000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0102000 0.0153100 0.5459000 0.0000000 0.0178600 0.0000000 0.0000000
0.0000000 0.0000000 0.0867300 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0076530 0.000e+00 0.000e+00 ) *
```

The observations in node 1 (root) with geology of dune sand, ice-contact, lacustrine, or peat and muck were put into node 2. The number 14,741 is the number of observations in node 2. Next, 71,400 is the *deviance*, the measure of node heterogeneity used in the tree-growing algorithm. The fitted value, *yval*, of node 2 is 6-1-3-1. If node 2 was a terminal node, this is the class that would be assigned to an observation with one of the previously mentioned geology types. Finally, the numbers in parentheses, *yprob*, are the estimated probabilities of the observations in that node being each of the possible LTA codes. Therefore, the observations that have geology of dune sand, ice-contact, lacustrine, or peat and muck have a 33.6% chance of being LTA 6-1-3-1, andlower probabilities for all other LTA classes, under this tree model.

The group of observations at node 2 is then partitioned into nodes 4 and 5 depending on whether the geology is ice-contact or not. Node 4, with 2,951 individuals and a deviance of

8,062, is divided into nodes 8 and 9 based on presettlement vegetation (V3). Node 8 has 1,350 observations and deviance improved to 5,302. The group at node 8 is subdivided into nodes 16 and 17 based on vegetation again. The asterisk at node 16 signifies a terminal node; i.e., a group that is not subdivided. Node 16 has 392 individuals and a deviance of 930.1. The probability of an observation on ice-contact outwash and with presettlement vegetation of red pine/jack pine, other upland conifer, or shrubland/jack pine being an LTA 3-4-1-1 (small, steep, irregular ice-contact ridges with many kettle lakes and excessively to somewhat excessively drained sand or loamy sand soils) is 54.6%.

Eight of the eleven submitted predictor variables were actually used in the full tree construction. Depth to high water table, slope calculated from the DEM, and aspect were not used. The mean residual deviance was 2.63 and the misclassification error rate was 0.430.

A second classification tree was constructed using the learning sample where all the observations within 250 m of an LTA boundary had been excluded (Appendix C). Table 8 compares the summaries of the two trees. The variables used in tree construction are ordered by when they entered the model, which is roughly comparable to how important they are in the classification. Again, depth to high water table, aspect, and one of the slope variables were not used to grow the tree. The residual mean deviance dropped slightly and the misclassification error rate improved to 0.408.

Table 8 - Summary of LTA Classification Trees

	Tree Grown with Full Learning Sample	**Tree Grown with Learning Sample with 250 m Buffer**
Variables used in tree construction:	Surficial geology Presettlement vegetation Distance from lakes Soil drainage class Elevation Soil texture class Distance from streams Slope class (from soil data)	Surficial geology Presettlement vegetation Elevation Soil drainage class Soil texture class Distance from streams Distance from lakes Slope (calculated from DEM)
Number of terminal nodes:	77	77
Residual mean deviance:	118,800/45,170 = 2.63	102,800/41,370 = 2.46
Misclassification error rate:	19,464/45,245 = 0.430	16,903/41,443 = 0.408

The classification tree grown with the buffered learning sample is shown in Figure 16. The first split was on surficial geology. The 41,443 observations were partitioned into two subsets, represented by nodes 2 and 3. Node 2 had 13,584 observations with geology of dune sand, ice contact sand and gravel, lacustrine, and peat and muck. The remaining 27,859 sample points with geology types of end moraine, glacial outwash, glacial till, large lakes, or NA (missing data) went into node 3.

The group at node 2 was then partitioned into groups of 2,720 and 10,864 individuals (nodes 4 and 5) depending on whether the geology was ice contact sand and gravel or not. The group at node 3 was also split on geology again. Node 6 had 16,291 sample points that are either end moraine or glacial till. Node 7 had 11,567 individuals of glacial outwash, large lakes, or NA.

The third tier of splits were made on presettlement vegetation and soil drainage. This level was where the first terminal node occurred. LTA class 3-3-2-2 (ice-contact outwash with small, steep, irregular ridges and well to moderately well drained sandy loam soils) was assigned to 1,532 observations with geology of ice-contact sand and gravel and presettlement vegetation of beech/hemlock, northern hardwood, or white pine/beech/maple. The probability of an observation with those characteristics being correctly classified as LTA 3-3-2-2 is 0.953.

The procedure continued through 12 tiers of splits, yielding 77 terminal nodes. Of the forty-three LTA codes in the response variable, only twenty-eight were assigned to terminal nodes. The other fifteen LTA classes were not unique enough to be separated out by the model; i.e., they never had the highest estimated probability at any of the terminal nodes. A display of the tree with uniform spacing, such as shown in Figure 16, is useful in order to label and study the tree. However, looking at the same tree with nonuniform spacing helps you to gain insight into the relative importance of the splits (Figure 17). The first splits, made on surficial geology, presettlement vegetation, elevation, soil drainage class, and soil texture class, are clearly more important than the lower splits.

The five pruned trees are summarized in Table 9. By comparing this to the summaries of the full trees (Table 8) we see that reducing the number of nodes simplifies the model, but at

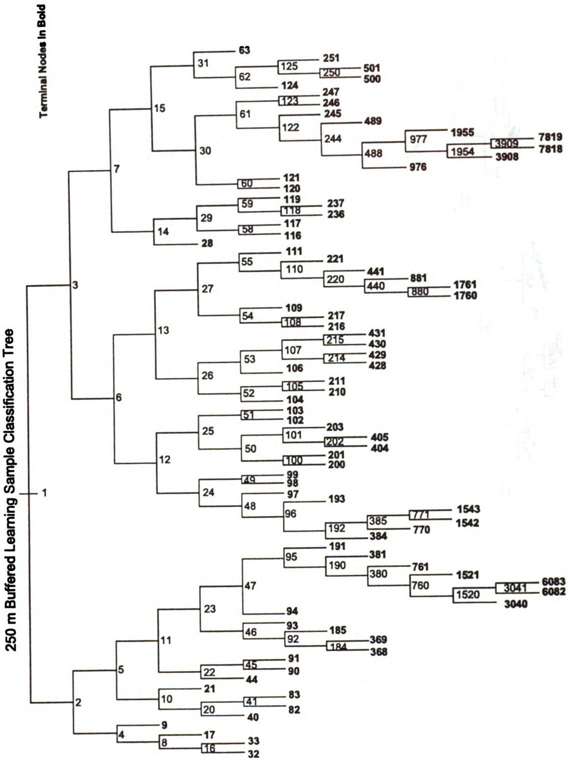


Figure 16 - Tree Grown with 250 m Buffered Learning Sample (uniform spacing)

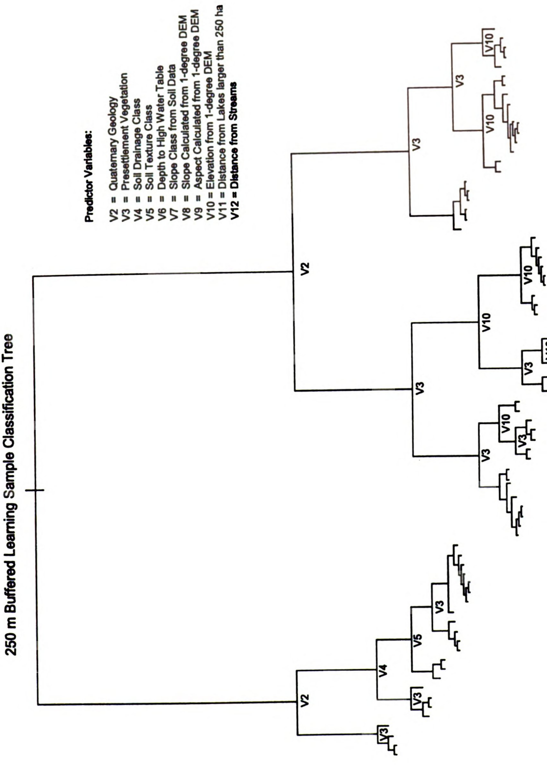


Figure 17 - Tree Grown with 250 m Buffered Learning Sample (nonuniform spacing)

Table 9 - Summary of Cost-Complexity Pruning LTA Classification Trees

	k = 300	*k* = 500	*k* = 650	*k* = 1000	*k* = 1500
Nodes snipped off:	440, 250, 58, 192, 214, 488, 215, 59, 380	58, 192, 214, 215, 59, 49, 92, 244, 125, 110, 123, 16, 54, 190	192, 214, 215, 49, 92, 244, 125, 110, 123, 16, 54, 190, 51, 41, 202, 29, 100, 45	123, 54, 51, 29, 100, 45, 107, 55, 105, 60, 101, 122, 62, 47, 8, 20, 46, 24	51, 100, 107, 60, 101, 62, 47, 20, 46, 24, 14, 22, 61, 52, 27, 4
Variables used in tree construction:	Surf. geology Presettle. Veg. Elevation Soil Drainage Soil Texture Stream dist. Lake distance	Surf. geology Presettle. Veg. Elevation Soil Drainage Soil Texture Stream dist. Lake distance	Surf. geology Presettle. Veg. Elevation Soil Drainage Soil Texture Stream dist.	Surf. geology Presettle. Veg. Soil Drainage Soil Texture Elevation	Surf. geology Soil Drainage Presettle. Veg. Soil Texture Elevation
Number of terminal nodes:	58	46	40	25	19
Residual mean deviance:	106700/41380 = 2.58	111700/41400 = 2.70	115200/41400 = 2.78	127500/41420 = 3.08	135400/41420 = 3.27
Misclassification error rate:	17459/41443 = 0.421	17976/41443 = 0.434	18266/41443 = 0.441	19643/41443 = 0.474	20828/41443 = 0.503

the cost of increased misclassification. To choose the right size tree, a separate independent sample was used to predict LTAs and the percentages of LTAs correctly classified were calculated. The percentage correctly classified decreased from 64.3% for the full tree with 77 terminal nodes to 55.3% for the most simplified tree with 19 terminal nodes. The trees with 58 and 46 terminal nodes both had percentages correctly classified of 64.1%. Based on the goals of this study (looking for the most accurate classifier), the full tree was used; however, the simplicity of the 46 node tree is attractive and could have been used without a great loss of accuracy.

Classification trees were also grown for the individual counties that made up the study area using 250 m buffered learning samples (Appendices D, E, F, and G). All of the predictor variables, with the exception of slope class from the soils data, were used in at least one of the county LTA classification trees (Table 10). The first split was made on surficial geology in every county except Midland. Whereas only 59.2% of the LTA codes were correctly classified in the

Table 10 - Summary of County LTA Classification Trees

	Grand Traverse	Alcona	Newaygo	Midland
Variables used in tree construction:	Surficial Geology Presettle. Veg. Elevation Dis. from streams Dis. from Lakes Soil Drainage Soil Texture Aspect Depth to H^2O Tbl. Slope (from DEM)	Surficial Geology Presettle. Veg. Elevation Dis. from Lakes Soil Texture Dis. from streams Soil Drainage	Surficial Geology Elevation Presettle. Veg. Dis. from streams Soil Drainage Soil Texture Dis. from Lakes Aspect Depth to H^2O Tbl.	Soil Texture Elevation Presettle. Veg. Dis. from Lakes Dis. from streams Soil Drainage Aspect Surficial Geology Depth to H^2O Tbl.
Number of terminal nodes:	59	53	71	78
Residual mean deviance:	10,090/7,841 = 1.29	13,840/10,900 = 1.27	27,150/13,850 = 1.96	9,683/8,590 = 1.13
Misclassifica-tion error rate:	1,820/7,900 = 0.230	2,506/10,954 = 0.229	5,084/13,921 = 0.365	1,752/8,668 = 0.202

full model, 63.5% to 79.8% were correct in the county models.

The Grand Traverse County classification tree used all of the predictor variables except slope class from the soils data. Twelve of the fifteen LTA codes in the county were assigned to at least one of the 59 terminal nodes (Figure 18). The first split was made on surficial geology. Of the 7900 sample points, 3899 observations of glacial outwash and lakes went to node 2 and the remaining 4001 observations went to node 3. Node 2 was then spit on presettlement vegetation, while node 3 split on elevation. The first four terminal nodes (24, 25, 26, and 31) came in the fourth level of splits and are summarized in Table 11. The tree continued on through eight tiers of splits. The most important splits were made on geology, elevation, vegetation, soil texture class, distance from lakes, and distance from streams (Figure 19).

The classification tree grown with the buffered learning sample from Alcona County used the fewest number of predictor variables of any of the trees constructed. LTA 3-5-2-3 (broad ridged ice-contact outwash with well to moderately well drained loam soils) was the only one of the 18 LTA types in the county not assigned to one of the 53 terminal nodes. There were only 39 observations of LTA 3-5-2-3, the fewest number of any class in the county, and most of them were classified as LTA 3-3-2-2 (small, steep, irregular ridged ice-contact outwash with well to

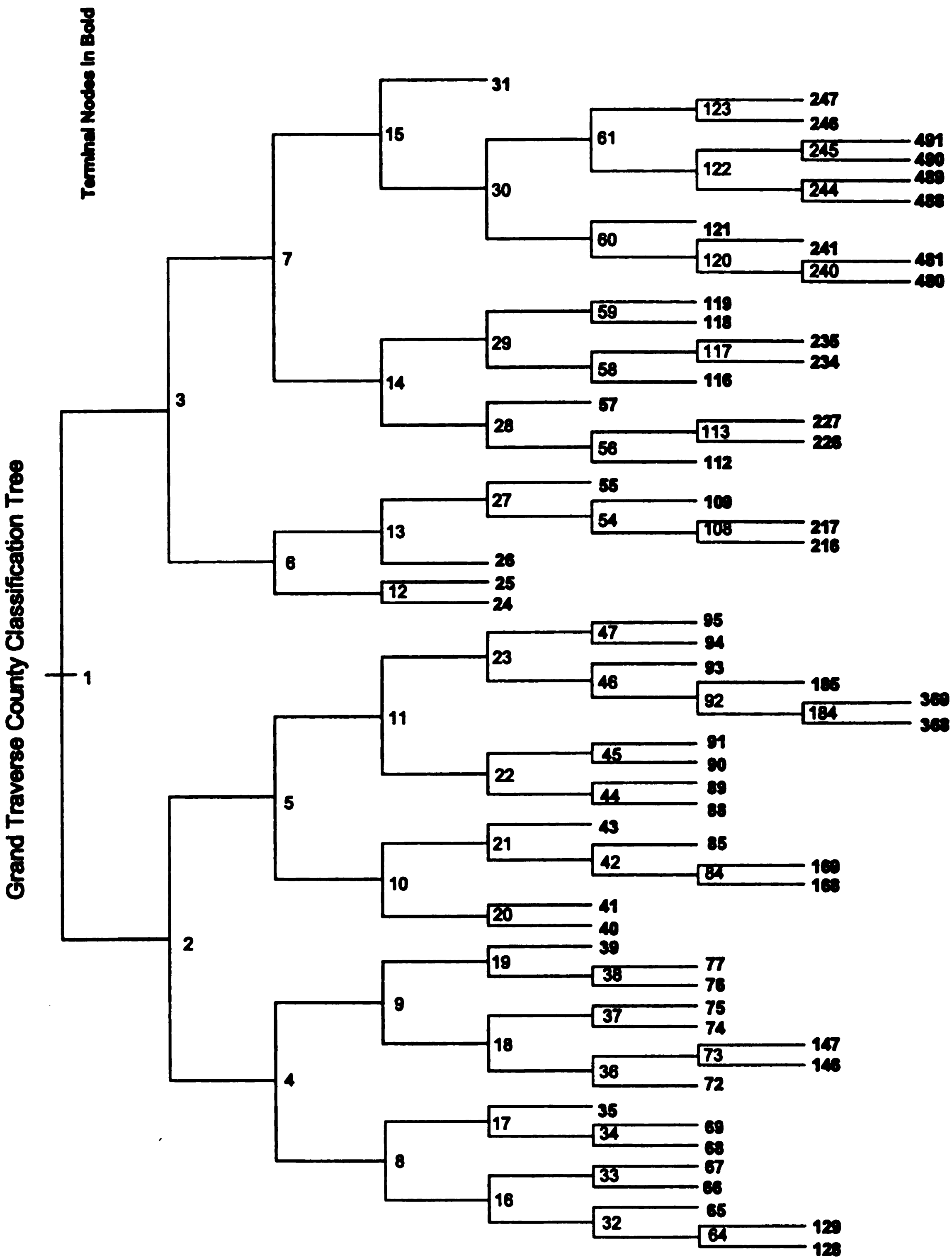


Figure 18 - Tree Grown with Grand Traverse Co. Buffered Sample (uniform spacing)

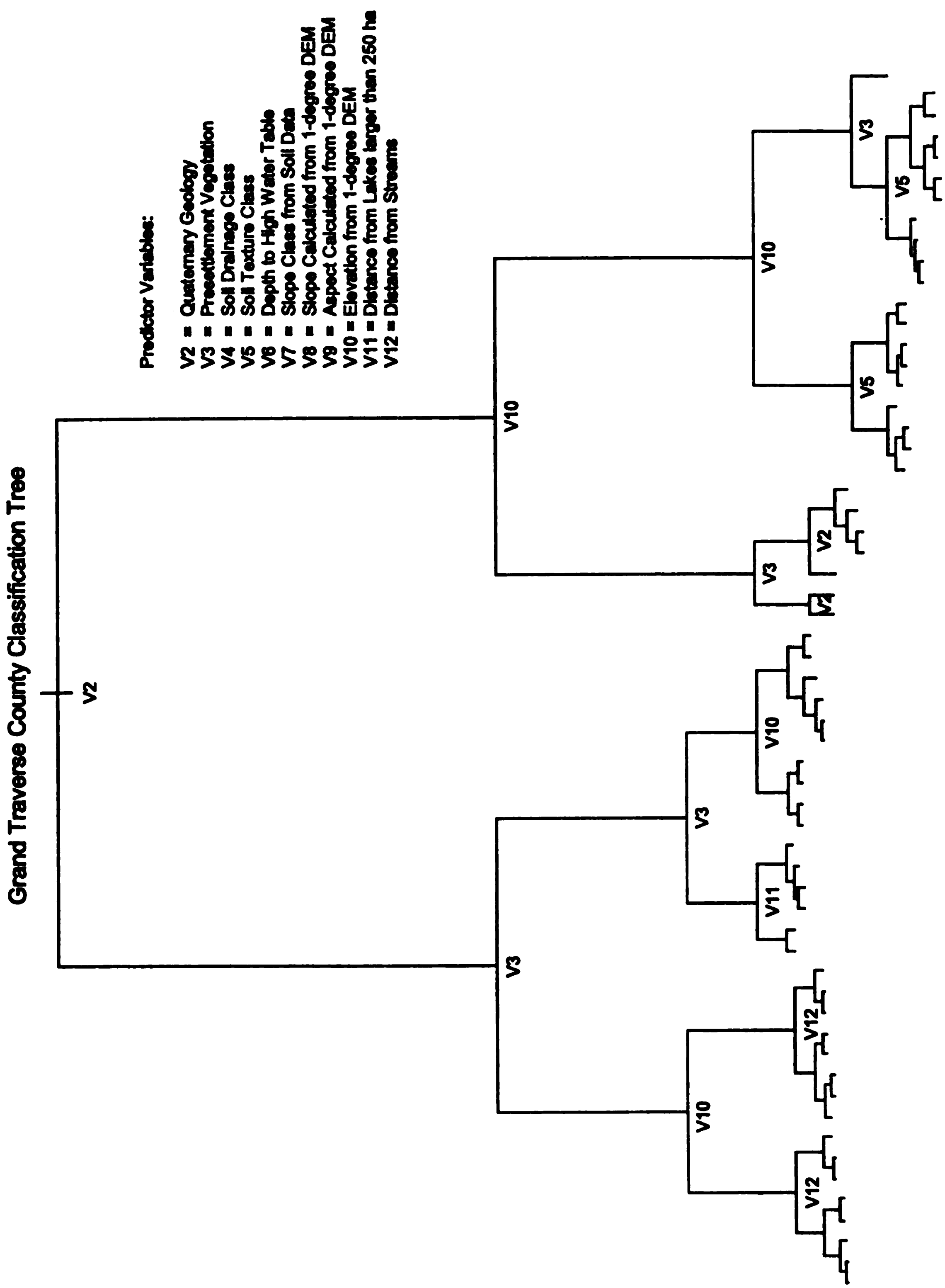


Figure 19 - Tree Grown with Grand Traverse Co. Buffered Sample (nonuniform spacing)

Table 11 - Terminal Nodes 24, 25, 26, and 31 of the Grand Traverse County Tree

LTA Code: (probability)	**6-1-1-1** (0.85)	**2-2-2-2** (0.71)	**2-2-2-2** (0.99)	**1-1-1-1** (0.60)
Geology:	lacustrine peat or muck	dune sand end moraine glacial till	dune sand glacial till peat or muck	dune sand end moraine glacial till lacustrine peat or muck
Elevation:	< 245.5 m	< 245.5 m	< 245.5 m	> 303.5 m
Vegetation:	other upland conifer wht, red pine/oak red pine/jack pine wetlands, water	other upland conifer wht, red pine/oak red pine/jack pine wetlands, water	beech/hemlock N'rn hardwood w pine/ beech/maple	other upland conifer wht, red pine/oak w pine/beech/maple

moderately well drained sandy loam soils). The tree has ten tiers of splits (Figure 20). The 10,954 data points were first split on surficial geology, with 7226 observations of end moraine, glacial outwash, or glacial till going into node 2 and the remaining 3728 observations going into node 3. Node 2 was then split on presettlement vegetation, while node 3 split on geology again. The first terminal node appeared in the third tier of splits at node 15 and it was fitted with the value of 6-1-1-1 (flat lake plain with excessively to somewhat excessively drained sand or loamy sand soils). The probability of an observation in Alcona County with a geology of either dune sand or lacustrine and an elevation above 223.5 m being correctly classified as a 6-1-1-1 was 98%. Geology, vegetation, elevation, and distance from streams were used to make the most important splits (Figure 21).

Newaygo County is the most complicated county in the study area. The classification tree grown with the county buffered learning sample found fifteen of the twenty LTA codes as it split into 10 tiers with 71 terminal nodes (Figure 22). The five codes missed by the model had the fewest number of observations (30 to 181), accounting for only 3.27% of the total sample. The misclassification error rate was relatively high at 36.5%. Again, the first split was made on geology. Of the 13,921 sample points in the county, 6,997, those with end moraine or glacial till, went into node 2. The remaining 6,924 points went to node 3. Nodes 2 and 3 were then split on elevation (nodes 4 and 5) and vegetation (node 6 and 7) respectively. The first terminal node

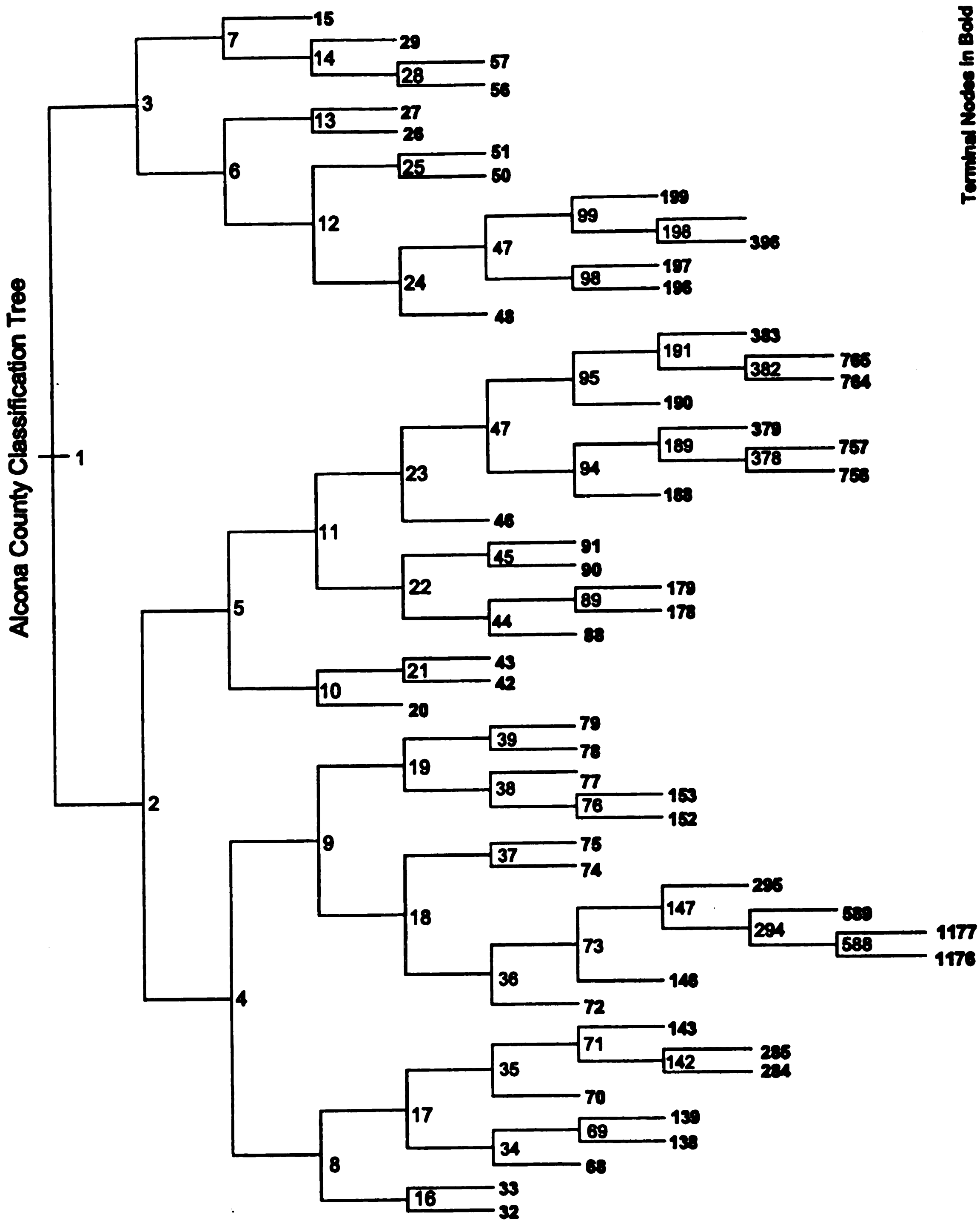


Figure 20 - Tree Grown with Alcona Co. Buffered Learning Sample (uniform spacing)

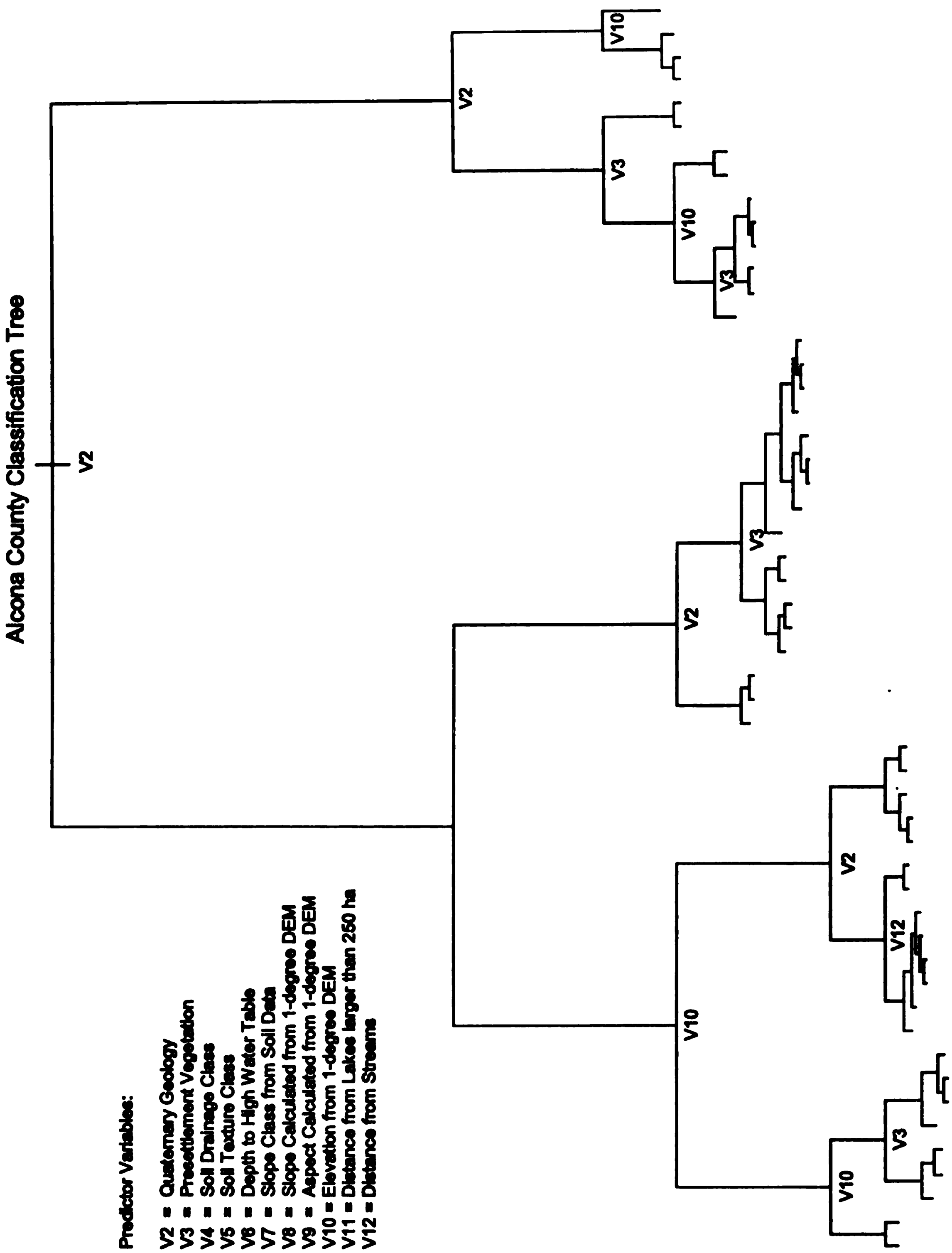


Figure 21 - Tree Grown with Alcona Co. Buffered Learning Sample (nonuniform spacing)

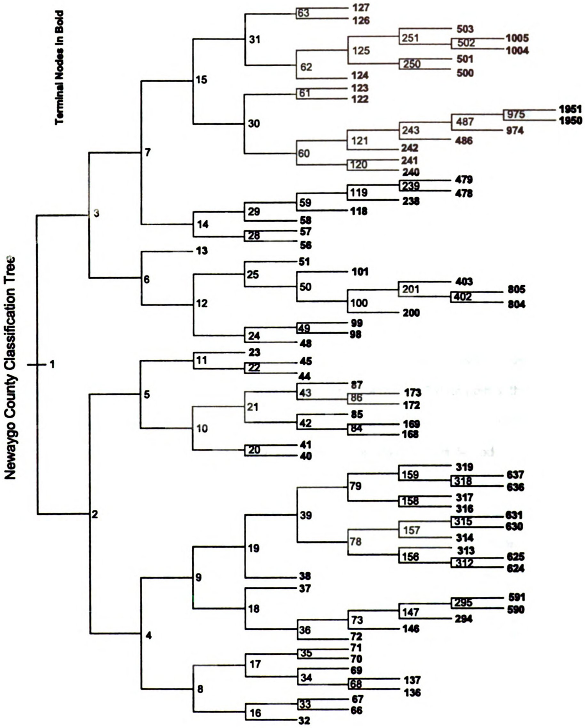


Figure 22 - Tree Grown with Newaygo Co. Buffered Learning Sample (uniform spacing)

appeared after the third tier of splits at node 13. An LTA code of 5-1-1-1 (broad, flat outwash plain with no or few kettle lakes or wetlands and excessively to somewhat excessively drained sand or loamy sand) was assigned to 910 observations with geology of dune sand, glacial outwash, lacustrine, lake, or NA and presettlement vegetation of red pine/jack pine or shrubland/jack pine. The probability of a point with those characteristics being correctly classified as 5-1-1-1 is 91%. Although nine predictor variables were used to construct the Newaygo County tree, the most important splits were made on geology, elevation, vegetation, and depth to high water table (Figure 23).

Midland County had the fewest number of LTA codes at six. Five of those with lake plain as the major landform were assigned to terminal nodes in the tree grown from the county buffered learning sample. Only the narrow channeled outwash plain was not found (LTA 5-5-1-1). The Midland County tree had 15 levels of splits and 78 terminal nodes (Figure 24). Only 20.2% of the sample points were misclassified. All of the predictor variables except the two slope variables were used in tree construction. Unlike the previous trees that split on geology first, the Midland County tree split first on soil texture class. Of the 8688 data points, the 2058 observations of loam or silty loam/clay loam/silty clay loam went into node 2. The remaining 6610 observations went into node 3. Node 2 was then split on elevation, while node 3 split on presettlement vegetation. The first terminal node appeared after the third level of splits. Node 9 was assigned an LTA class of 6-1-4-4 (flat lake plain with very poorly drained silt loam, clay loam, or clay soils). There was a 96% chance of an observation with loam or silty loam/clay loam/silty clay loam soils, an elevation of < 197.5 m, and presettlement vegetation of Northern hardwood or wetlands/water being correctly classified as LTA 6-1-4-4. The most important splits were made on soil texture class, presettlement vegetation, elevation, distance from inland lakes, and distance from streams (Figure 25).

Predicted LTAs from Learning Sample

The predicted LTAs from the full and county classification trees were mapped and cross-tabulated with the LTA units drawn by the ecologists. Table 12 lists the Cramer's "V" correlation coefficients obtained in the crosstabulations; 0.0 means no correlation and 1.0 means perfect

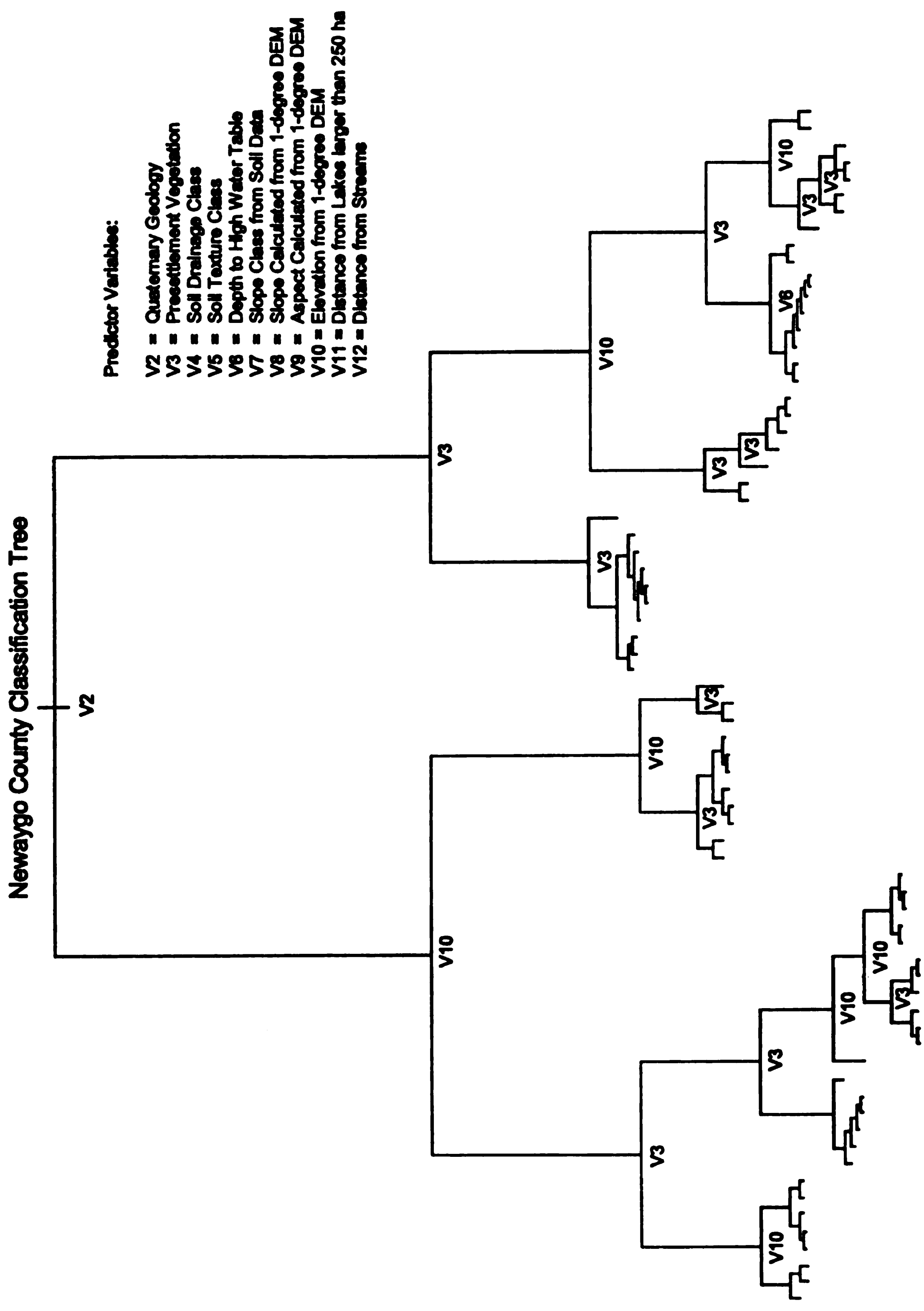


Figure 23 - Tree Grown with Newaygo Co. Buffered Sample (nonuniform spacing)

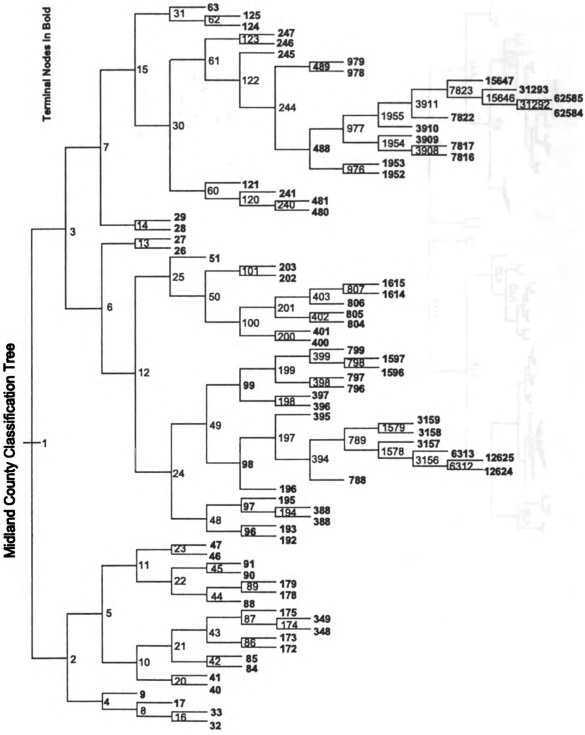


Figure 24 - Tree Grown with Midland Co. Buffered Learning Sample (uniform spacing)

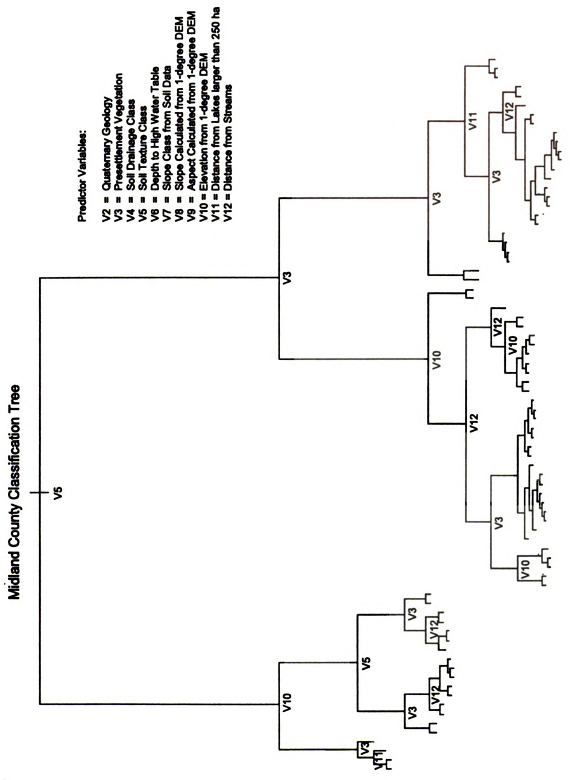


Figure 25 - Tree Grown with Midland Co. Buffered Learning Sample (nonuniform spacing)

Table 12 - Cramer's "V":Original LTAs vs. LTAs Predicted from Learning Sample

	Grand Traverse	Alcona	Newaygo	Midland
Full Model:	0.602	0.588	0.498	0.578
County Model:	0.814	0.694	0.632	0.723

correlation. As expected, the models grown on the individual counties performed better than the full model where data from all counties were used. The deviance of the root node of the models measures this variability. The deviance of the full model was 264,000, while the county models ranged from 10,954 to 68,450.

When comparing the LTA units as mapped by the ecologists to those mapped by the model it is not always apparent whether the model is wrong or whether the ecologists were incorrect or inconsistent in their delineation and coding. For example, if the first digit of an LTA code is different and the model corresponds to the Farrand and Bell (1982) geology map, that does not necessarily mean that the ecologists were wrong because LTAs are not nested within the geology map, only influenced by it. The tree-based model is consistent, but can assign codes based solely on what it learned from the ecologists' map and the predictor variables. In the discussion to follow, an attempt was made to point out and, if possible, explain the classification differences.

Figure 26 shows the LTAs as mapped by the MNFI ecologists and those predicted by running the Grand Traverse County learning sample through both the full model and the county model. The white areas on the map were the locations excluded from analysis because they were in large lakes or within 250 m of a boundary. The largest area of disagreement found when comparing the original map to the results from the full model is on Old Mission Peninsula. The model found 242 acres of flat lake plain (LTA 6-1-1-1) that the ecologists mapped as broad ridged till plain (LTA 2-2-2-2). A look back at the Quaternary geology map (Figure 5) confirms that Farrand and Bell (1982) had mapped this area as lacustrine plain. In this case the model correctly coded this area based on information learned from other places in the study area. In the southern part of the county the ecologists mapped another large unit of broad moraine or glacial

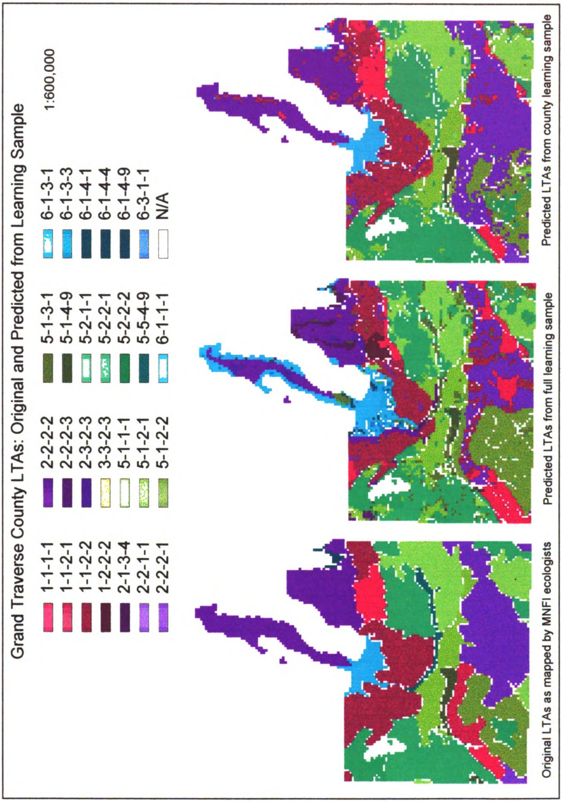


Figure 26 - Grand Traverse Co. Original and Predicted LTAs from Learning Sample

till (LTA 2-2-2-1). The full model coded the western part of this unit as a flat outwash plain (LTA 5-1-2-2), extending the adjacent polygon farther to the east. Again, the model's boundary follows the geology map. The model also found areas of steep moraine (LTA 1-1-1-1) within this polygon. In the east and southeast parts of the county there are two large polygons of outwash plain with few kettle lakes (LTA 5-1-1-1). The model mapped numerous smaller polygons of pitted outwash within these polygons.

The model trained on the Grand Traverse County data shows three major of areas of difference when compared to the original map. In the northeast, the county model shifted the border between the end moraine (LTA 1-1-1-1) and the glacial till (LTA 2-2-2-2) farther to the north. In the center of the county, the model was unable to find the narrow outwash channel (LTA 5-5-4-9); it was coded as pitted outwash (LTA 5-2-1-1), the same as the unit to its north. Also in the center, a small, triangular-shaped area of outwash plain (LTA 5-1-2-1) was mapped by the model where the ecologists' map had steep moraine (LTA 1-1-2-2). Finally, in the southwest, the model mapped a unit of broad ridged till with many lakes (LTA 2-2-2-1) where the ecologists had steep moraine (LTA 1-1-1-1) or outwash plain (LTA 5-1-2-2) mapped. Farrand and Bell (1982) (Figure 5) had mapped this area as end moraine. When the tree made its first split on geology the end moraine and glacial till both went into node 3. Following down the tree from that point it is possible to get to a terminal node classified as LTA 2-2-2-1 without ever splitting on geology again. That is what happened in this case and, based on other characteristics, this polygon was more like the other till plains in the county than like end moraine, according to the model.

Figure 27 shows the original and predicted LTAs from Alcona County. In the northwest the model coded the steep moraine (LTA 1-1-1-1) as either small, steep, irregular ice-contact ridges (LTA 3-4-1-1) or flat outwash plain (LTA 5-1-1-1). In this case, the model follows the surficial geology map closer than the ecologists did. In the west part of the county, the model did not find the flat till plain (LTA 2-1-2-3), but coded it as end moraine (LTA 1-1-2-2 or 1-1-1-1). The center of the county is a very complicated area. Parts of the flat outwash plain (LTA 5-1-1-1) was coded as steep moraine (LTA 1-1-1-1) and visa versa. In the southwest, the model

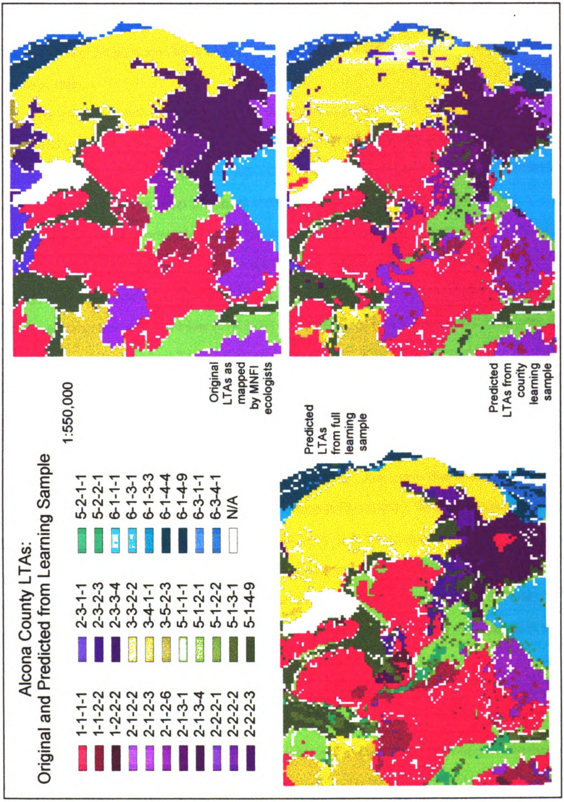
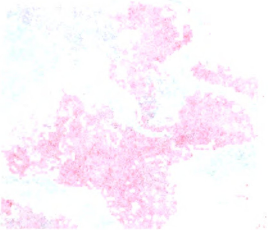


Figure 27 - Alcona Co. Original and Predicted LTAs from Learning Sample



coded the flat till (LTA 2-1-2-2) as steep moraine (LTA 1-1-1-1, 1-1-2-2, and 1-2-2-2). In the north, the model coded the area east of Hubbard Lake as small, steep ice-contact ridges (LTA 3-3-2-2) instead of broad ridged till (LTA 2-3-1-1 and 2-3-3-4) or outwash (LTA 3-5-2-3), following the geology map.

The tree grown with the Alcona County data performed quite well. In the northwest, the model coded most of the flat outwash polygon (LTA 5-1-1-1) as steep moraine (LTA 1-1-1-1). And, in the southwest, the flat till plain (LTA 2-1-2-2) was coded as loam (LTA 2-1-2-3) instead of sandy loam. The soil texture map (Figure 8) shows the soils in this area are highly varied.

The predicted and original LTAs for Newaygo County are shown in Figure 28. From the full model, the largest misclassified polygon was the end moraine with many kettle lakes and excessively drained sand soils (LTA 1-2-1-1) in the center of the county. The model coded it mostly as end moraine with few lakes (LTA 1-1-1-1), end moraine with many kettle lakes and well drained sandy loam soils (LTA 1-2-2-2), or pitted outwash (LTA 5-2-1-1), more closely following the geology map. Throughout the county there are numerous areas where pitted and non-pitted outwash plains were interchanged (LTAs 5-2-x-x and 5-1-x-x). In the west, the unit of steep moraine with many lakes (LTA 1-2-2-2) was coded as steep moraine with few lakes, flat till plain, or broad-ridged till (LTAs 1-1-2-2, 2-1-2-3, and 2-3-2-3). Just below that area, large areas of till plain (LTA 2-3-2-3) were classified as end moraine (LTA 1-1-2-2). The model found a large polygon of steep moraine with few kettle lakes (LTA 1-1-1-1) in the southeast that the ecologists coded as steep moraine with many lakes, pitted outwash, and till plain with few lakes (LTAs 1-2-2-2, 5-2-1-1, and 2-2-1-1). The map of the predicted LTAs follows the shape of the end moraine as shown on the geology map (Figure 5). In the south, the large, broad ridged till (LTA 2-3-2-2) was coded by the model as steep, broken moraine (LTA 1-2-2-2).

In the model created from the Newaygo County data, the most common misclassification problem is between outwash plain with few lakes and wetlands and those with many kettle depressions (LTAs 5-1-x-x and 5-2-x-x). Similarly, the model coded the end moraine with many kettle lakes (LTA 1-2-1-1) in the center of the county as having few lakes (LTA 1-1-1-1). The "distance from lakes" variable was not very important in the construction of the Newaygo County

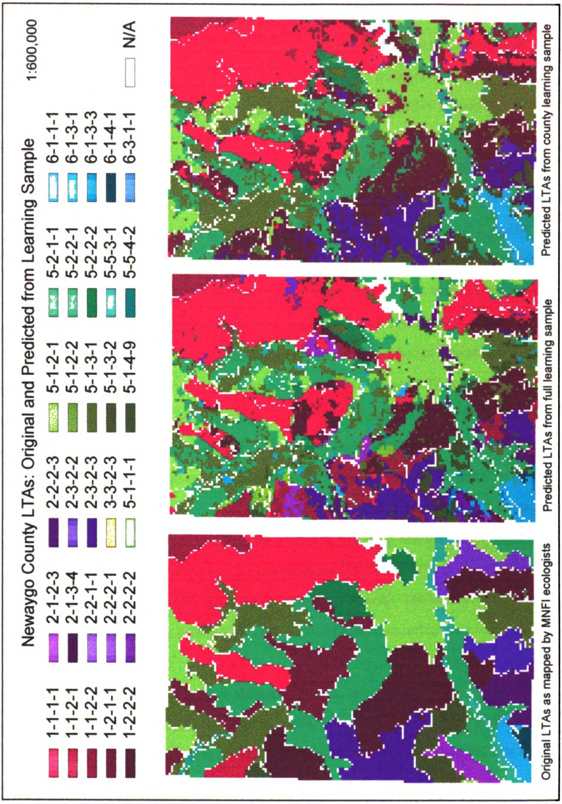


Figure 28 - Newaygo Co. Original and Predicted LTAs from Learning Sample

tree; these areas were being classified based upon other information. In the south, the broad-ridged ground moraine (LTA 2-3-2-2) was mostly classified as steeply sloped moraine ridges (LTA 1-2-2-2). In the southeast corner of the county, the model did not find the broad moraine (LTA 2-2-1-1). It coded it mainly as steep moraine (LTA 1-1-1-1). Some of the adjacent end moraine with many kettle lakes (LTA 1-2-2-2) and pitted outwash (LTA 5-2-1-1) were also coded as LTA 1-1-1-1.

Except for a narrow channel of outwash plain (LTA 5-5-1-1) in the west, Midland County was mapped entirely as lake plain by the ecologists (Figure 29). The full model did not find that outwash, but did map a small section of broad, flat outwash (LTA 5-1-3-1) in the east which corresponds to the shape of an end moraine unit on the geology map (Figure 5). This is possible because end moraine and glacial till are together in node 6 and the 5-1-3-1 is then classified by the model based on presettlement vegetation and elevation without ever splitting on geology again. In the center of the county, the model mapped large areas of the flat lake plain with very poorly drained soils (LTA 6-1-4-1) as somewhat poorly to poorly drained (LTA 6-1-3-1). It appears that the model is more consistent with the soil drainage class map (Figure 7). In the northeast, the very poorly drained clay soils (LTA 6-1-4-4) were classified somewhat poorly to poorly drained (LTAs 6-1-3-1, 6-1-3-3, or 6-1-3-4). In a later version of the Midland County LTA map, the ecologists eliminated this 6-1-4-1 polygon, recoding it mostly as 6-1-3-1 with some 6-1-3-3. In the southeast the model miscoded some of the flat lake plain with very poorly drained clay soils (LTA 6-1-4-4). Most of the errors occurred in the soil class modifiers (third and fourth digits) because soil was the primary discriminator in Midland County. The model did include some dune and swale complex (LTA 6-3-1-1) that had only been mapped by the ecologists in Alcona County.

The county model mapped all or Midland County as flat lake plain. The deviations from the original map are in the soil properties; for example, very poorly drained soils coded as somewhat poorly to poorly drained, loam coded as sand or loamy sand, or silt loam, clay loam, or clay coded as sand or loamy sand.

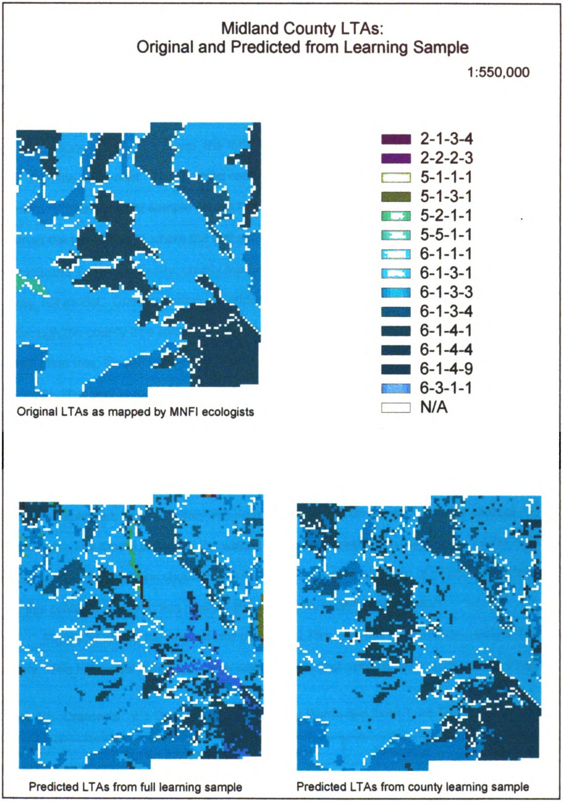


Figure 29 - Midland Co. Original and Predicted LTAs from Learning Sample

Predicted LTAs from Test Sample

An independent test sample taken from each of the four counties in the study area was classified using the full and corresponding county classification trees. As with the learning sample, the predicted LTAs from the test sample were mapped and cross-tabulated with the LTA units drawn by the ecologists. Cramer's "V" correlation coefficients were calculated in the crosstabulations (Table 13). Again, the models grown on the individual counties performed better than the full model. The learning sample results (Table 12) should produce a higher Cramer's "V" than the test sample results because these were the observations actually used to construct the tree. Places where the test sample did not perform as well as the learning sample are: 1) Grand Traverse County, county model; 2) Newaygo County, full model; and 3) Midland County, full model. One interesting exception was in noted in Newaygo County; the test sample run through the county tree actually out-performed the learning sample used to construct the classification tree, though not by much.

Another way to look at the model results is to compare the percentage of LTA codes correctly classified from the learning and independent test samples (Table 14). When run through the full model, the LTA codes assigned to the test sample points were incorrect 80% of the time in Newaygo County and 95% of the time in Midland County. At this point, these results cannot be explained; however, they can be reproduced and do not appear to be random miscodings. The model predicted the value of some observations based on the *yval* of terminal nodes that the observations should never have reached given their set of predictor variables. Until this problem is solved this method should only be applied with caution.

Figure 30 shows the original and predicted LTAs from the test sample in Grand Traverse County. The full model mapped a large unit of ice-contact outwash with small, steep, irregular

Table 13 - Cramer's "V": Original LTAs vs. LTAs Predicted from Test Sample

	Grand Traverse	Alcona	Newaygo	Midland
Full Model:	0.594	0.578	0.419	0.475
County Model:	0.731	0.687	0.638	0.710

Table 14 - LTA Codes: Percentage Correctly Classified

	Grand Traverse	Alcona	Newaygo	Midland
Full Model, Learning Sample:	56.7%	64.0%	50.9%	68.9%
Full Model, Test Sample:	53.3%	64.0%	20.4%	5.2%
County Model, Learning Sample:	77.3%	77.1%	63.5%	79.8%
County Model, Test Sample:	72.6%	76.3%	63.2%	78.6%

ridges and few kettle lakes (LTA 3-3-2-2) at the base of Old Mission Peninsula and extending up the peninsula shoreline. The shape of this polygon matches what Farrand and Bell (1982) mapped as lacustrine on their geology map (Figure 5). I am unable to explain how the model classified this area as ice-contact. The first split of the model was made on geology with ice-contact and lacustrine (LTAs 3-x-x-x and 6-x-x-x) going into node 2 and end and ground moraine (LTAs 1-x-x-x and 2-x-x-x) going to node 3. Node 2 was then split on geology again, with ice-contact going into node 4 and lacustrine going to node 5. All of the observations currently mapped as ice-contact should have gone into nodes 3 or 5, not node 4. In the southwest, the ecologists' map has a large polygon of non-pitted outwash (LTA 5-1-2-2) with an island of pitted outwash within it (LTA 5-2-2-1). The model coded it all as non-pitted outwash, including part of the end moraine (LTA 1-1-2-1) to the north and the ground moraine (LTA 2-2-2-1) to the east. The model also mapped some steep moraine (LTA 1-1-1-1 and 1-1-2-2) within the ground moraine polygon. With the exception of the lake plain miscoded as ice-contact, the predicted LTA maps for the learning (Figure 26) and test samples are very similar.

When the test sample was run through the county tree the only large area of misclassification was in the southwest corner. Parts of the steep end moraine and flat outwash plain (LTA 1-1-2-1 and 5-1-2-2) were coded as ground moraine with broad ridges (LTA 2-2-2-1). The learning and test samples maps were very similar.

In the northwest corner of Alcona County, the steep moraine was coded as either steep ice-contact or flat outwash (LTAs 3-4-1-1 and 5-1-1-1) (Figure 31). Farther south, the flat ground

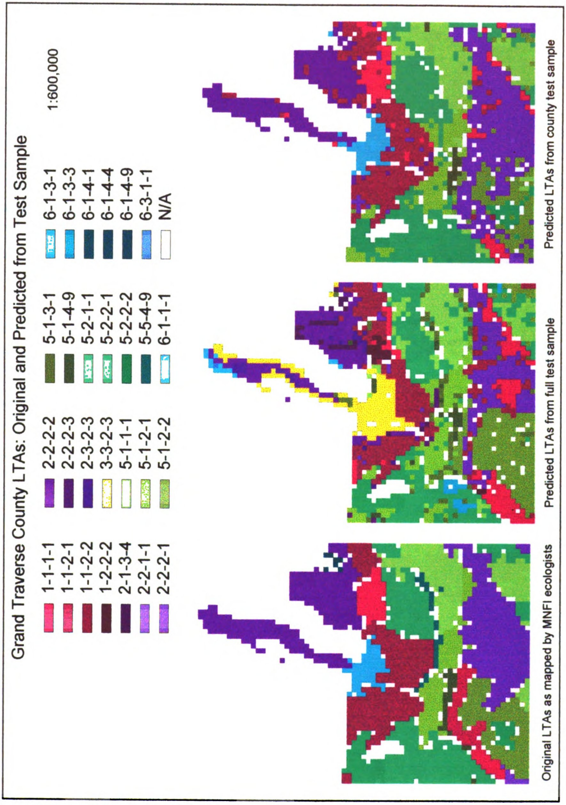


Figure 30 - Grand Traverse Co. Original and Predicted LTAs from Test Sample

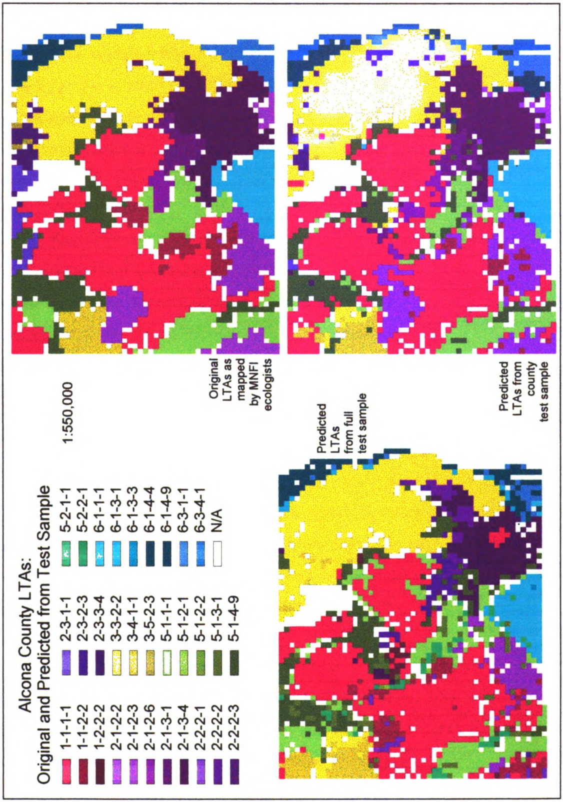
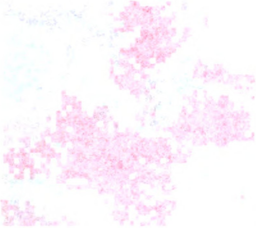


Figure 31 - Alcona Co. Original and Predicted LTAs from Test Sample



moraine unit (LTA 2-1-2-3) was coded as steep end moraine or broad ridged ground moraine (LTAs 1-1-1-1, 1-1-2-2, and 2-2-2-1). In the southwest corner of the county there are two areas where the model coded the test sample as end moraine (LTA 1-1-x-x) instead of as ground moraine (LTA 1-2-x-x). When the test sample was run through the Alcona county tree small areas of flat outwash plain (LTA 5-1-1-1) in the northwest and center of the county were classified as steep moraine (LTA 1-1-1-1). Both from the full model and the county model, the pattern of predicted LTAs based on the learning sample (Figure 27) and the test sample appear to be the same.

In Newaygo County, the independent sample run through the full model was correct only 20.4% of the time. Some of the difference between the original and predicted maps was in the soil class modifier only (Figure 32). For example, LTA 1-1-1-1 coded as 1-1-2-2 and LTA 5-1-3-1 coded as 5-1-1-1. There are numerous areas of outwash plain with few lakes (LTA 5-1-x-x) that were classed as pitted outwash (LTA 5-2-x-x) and visa versa. In the west, a large polygon of broad-ridged till (LTA 2-3-2-3) was coded as a flat till plain (LTAs 2-1-2-3 and 2-1-3-4). In the southwest, two units of end moraine (LTA 1-2-2-2) were miscoded mainly as flat outwash plain (LTA 5-1-3-1). Again, I am unable to explain how the model came up with its classification. Node 3 was split on geology, with end moraine going into node 6 and glacial outwash going to node 7. It is interesting, and perplexing, to note that the lake plain (LTA 6-1-3-1) in the southwest corner of the county was misclassified as ice-contact (LTA 3-3-2-2), just as in Grand Traverse County. Comparing the predicted LTAs from the test sample to those of the learning sample (Figure 28) you can see numerous areas that differ, a condition that did not exist in either Grand Traverse or Alcona Counties.

The same test sample in the county model was classified correctly 63.2% of the time, almost identical to the result of the learning sample (Table 14). The learning and test sample maps for the county model appear to be the same. Just west of center, pitted outwash (LTA 5-2-1-1) was mapped as having few lakes or wetlands (LTA 5-1-3-1). In the center of the county, some moraines with many kettle lakes (LTA 1-2-1-1) were also coded as having few lakes (LTA 1-1-1-1). In the south and southeast, areas of large, broad-ridged moraine (LTAs 2-3-2-2 and

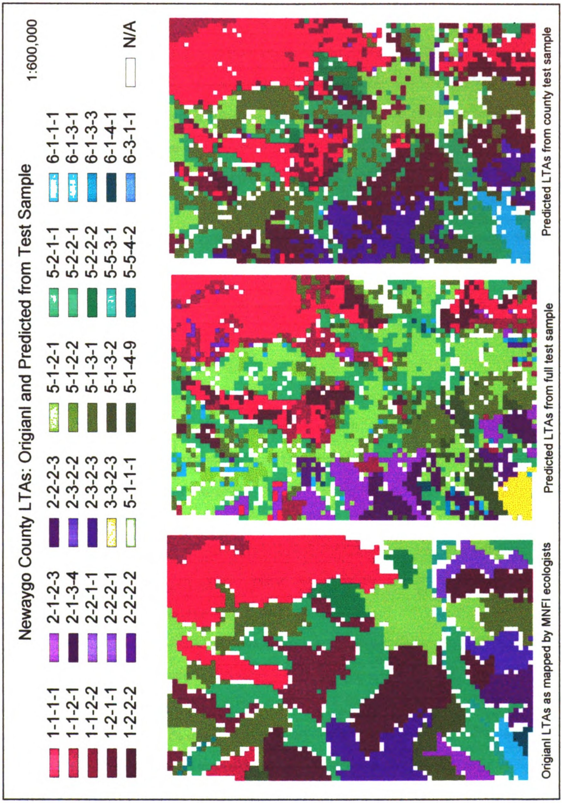


Figure 32 - Newaygo Co. Original and Predicted LTAs from Test Sample

2-2-1-1) were coded as steep moraine (LTAs 1-2-2-2 and 1-1-1-1).

The test sample for Midland County was correctly classified only 5.2% of the time when run through the full model (Figure 33). Generally, the lake plain was classified as outwash plain. The large areas of lake plain with somewhat poorly to poorly drained sand soils (LTA 6-1-3-1) were mostly coded as pitted outwash with excessively to somewhat excessively drained sand soils (LTA 5-2-1-1), though some were coded as outwash with few kettle lakes or wetlands (LTA 5-1-1-1). Most of the county is covered with moderately well to poorly drained soils (Figure 7). Lake plain with loam soils (LTA 6-1-3-3) in the northwest and clay soils (LTA 6-1-3-4) in the north were also coded as pitted outwash. In the northwest and center of the county, the lake plain with very poorly drained soils (LTA 6-1-4-1) was coded as outwash with few lakes or wetlands. In the south, the model mapped the lake plain as till plain with large, broad ridges (LTA 2-2-2-3). The only way for points to be classified as LTA 2-2-2-3 is if they have a geology of glacial outwash, lake, or NA, presettlement vegetation of northern hardwood, and an elevation of <253.5 m. The pattern of the till plain matches that of the northern hardwood on the presettlement vegetation map (Figure 6); however, the submitted test sample all has geology of lacustrine. The predicted LTAs should not have been coded as outwash or till plains. At the first split, sample points of lacustrine plain should have gone into node 2; till and outwash should have gone to node 3. I have tried to find the cause of this problem, but have been unsuccessful. The error is occurring at the point of the sample being run through the model. The same (full) model correctly classified 68.9% of the learning sample in Midland County and the same (test) sample was correctly classified 78.6% of the time in the county model.

The maps of the predicted LTAs from the county model are the same for the test sample as they were for the learning sample. The errors that did occur were with the soil class modifiers; LTAs 6-1-3-3, 6-1-3-4, 6-1-4-1, and 6-1-4-4 were usually coded as LTA 6-1-3-1, which the ecologists mapped over 53% of the county. Some very poorly drained soils were classed as somewhat poorly to poorly drained and some loams and silt loams, clay loams, or clays were classed as sands or loamy sands. These were the only types of errors that could occur because the county is essentially all flat lake plain.

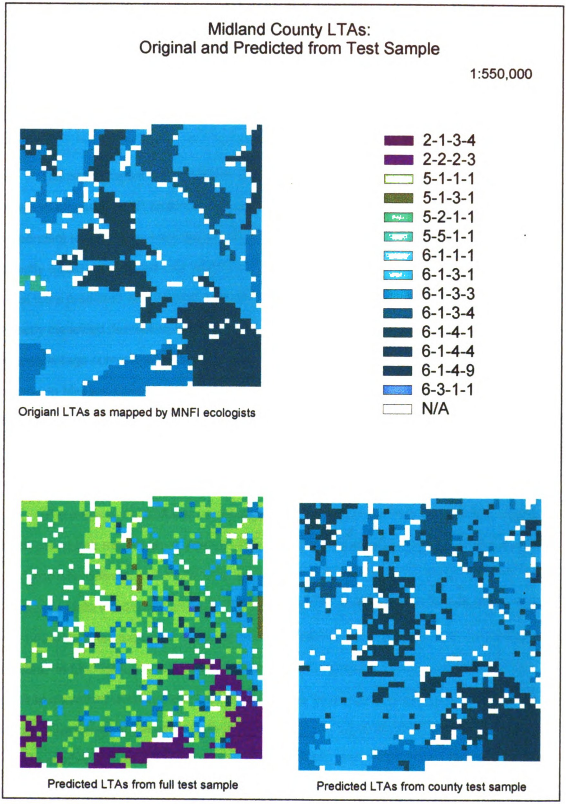


Figure 33 - Midland Co. Original and Predicted LTAs from Learning Sample

Chapter 4

DISCUSSION AND CONCLUSIONS

The percentage of LTA codes of the learning sample that were correctly classified in the full model ranged from 51 to 69%, and from 64 to 80% in the various county models. When the independent test samples were submitted to their respective county models, the percentage correctly classified declined only slightly, by an average of 2%. The test samples in the full model were predicted with varying success. In Grand Traverse County, the percentage of LTAs correctly classified decreased slightly, from 57 to 53%; Alcona County remained steady at 64%. The percentage correctly classified decreased significantly in Newaygo County, from 51% down to 20%. In Midland County, only 5% of the test sample was correctly classified, where 69% of the learning sample had been correctly classified. Of the explainable errors, over half of the misclassifications involved only one or two digits of the four digit LTA code.

Ecologists' Comments

The maps of the LTAs as predicted by running the independent test samples through the classification tree models were shown to Dennis Albert and Richard Corner. They are the MNFI ecologists who delineated the LTA units used to train the models. Their comments are incorporated into the discussion below. Overall, the ecologists thought the models did much better than they had expected. They did question the frequent use of elevation as a splitter variable. In hindsight, a measure of relative elevation should have been used instead of absolute elevation. Relative elevation in one county does not necessarily translate to another county. The terrain of the counties in the study area all have a gradual rise in elevation (from north to south in Grand Traverse, east to west in Alcona, southwest to northeast in Newaygo, and southeast to northwest in Midland; Figure 11) which may overwhelm any local variations in topography. This overall elevation trend could have been removed from the surface to leave only the local variations (Cialella et al. 1997). The use of absolute elevation limits the generality of the models. Often its use differentiated the latter three digits of the LTA code. Where it was used to determine the major landform, the elevation of: 1) till plains were lower than end moraines; 2) till plains were lower than outwash plains; 3) outwash plains were lower than end moraines; and 4) lake plains were lower than outwash plains.

Grand Traverse County

The full model applied to the learning and test samples identified a unit of lake plain on the tip of Old Mission Peninsula (Figure 30). The information the model used to assign LTA 6-1-1-1 (node 21) to this area was dune sand geology (Figure 5), excessively to well drained soils (Figure 7), and presettlement vegetation of northern hardwoods (Figure 6). In this case the model was correct, but the ecologists did not map this unit because it was too small. The ability of the model to delineate this unit was "learned" from the lake plain found in other places in the study area.

As mentioned previously, it is not known why the model classified the polygon along the peninsula shoreline and base as ice-contact (LTA 3-3-2-3) instead of lake plain, as these geology types go in different directions when node 2 is split. The shape of the ice-contact polygon matches that of the lake plain polygon on the geology map. The only place the ecologists mapped LTA 3-3-2-2 was in eastern Alcona County. There are two ways the model should classify an observation as LTA 3-3-2-2: 1) geology of ice-contact and presettlement vegetation of beech/hemlock, northern hardwood, or white pine/beech/maple (node 9); or 2) geology of ice-contact, any other vegetation type, and an elevation < 276.5 m (nodes 32 and 33). The Alcona County maps of these variables (Figures 5, 6, and 11) clearly show how the rules were learned for the characteristics of LTA 3-3-2-2, but I do not know why the test sample with lake plain geology in Grand Traverse County was classified as such.

The overall shape of the outwash plain mapped by the model more closely corresponds to glacial outwash as mapped by Farrand and Bell (1982) (Figure 5) than does the ecologists' map. The model did have some problems differentiating between the non-pitted and pitted outwash (LTAs 5-1-x-x and 5-2-x-x). According to the ecologists (Albert and Comer 1997), these boundaries are not sharp, but occur along a gradient. Some of the pitted outwash is very "lake rich"; others have few lakes, but do have numerous small depressions and kettle wetlands. The total area of these lakes and wetlands may not be very different from the total area of lakes and wetlands in adjacent sandy moraines, but they are very different systems biologically. There are six nodes with a fitted value of LTA 5-1-1-1, glacial outwash with few kettle lakes or wetlands. The "distance from lakes" variable was used to get to four of those nodes. Given the proper geology and vegetation, observations > 0.85 km of a lake could be classified as LTA 5-1-1-1 (or < 0.85 km if the elevation was < 261.5 m). Only two of seven nodes with a fitted value of LTA 5-2-1-1 used the "distance from lakes" variable. In both cases, an observation had to be < 0.73 or 0.85 km from a lake to be classed as pitted outwash. Elevation and soil drainage class were also used to class a sample point as pitted outwash.

The model was unable to differentiate the narrow channel outwash/floodplain (LTA 5-5-x-x) from the surrounding broad, flat outwash anywhere in the four county study area. The narrow-channel outwash does not always have a river running through it and there was relatively little LTA 5-5-x-x in the learning sample. The ecologists debated about whether or not to map LTAs 5-5-x-x as separate units, and decided they were important in some areas. A measure of terrain shape may have helped the model correctly classify these areas; however, there are places where these polygons are several miles across.

In the south, the model coded some areas as steep moraine (LTA 1-1-x-x) in the moraine with large, broad ridges (LTAs 2-2-x-x), especially along the polygon boundaries. Often the broad ridges have very steep slopes going down to the adjacent outwash plains (Albert and Corner 1997).

Alcona County

The full model correctly classified the lake plain (LTAs 6-1-x-x and 6-3-x-x) in Alcona County (Figure 31). In places, the model did not differentiate well between the steep and broad-ridged moraine. The shape of the ice-contact polygons (LTAs 3-3-2-3 and 3-4-1-1) predicted by the full model are the same as shapes found on the geology map (Figure 5). Differences between the original and predicted ice-contact outwash occurs in the northwest and north, just to the north and east of Hubbard Lake (the large polygon of NA in the north part of the county). In a closer examination of the areas west and north of Hubbard Lake (mapped by the ecologists as moraine), the soils are well drained loamy sand, slopes are fairly steep, and presettlement vegetation is pine/oak or white pine/red pine forest (Figures 6, 7, 8, and 10). According to the GLO survey notes, this area was heavily influenced by Native American land management practices; i.e., the vegetation is influenced more by fire than by geology (Albert and Comer 1997). The area west of the lake is glacial till and the area to the north is ice-contact outwash. The very first split of the model was made on geology with ice-contact and moraine going in opposite directions.

Alcona County has the only units of LTA 3-3-x-x and 3-4-x-x in the study area. Both of these are small, steep, irregular ridges of ice-contact. The difference between them is in the number of kettle lakes. The variables that the model used to classify these units were geology, presettlement vegetation, and elevation, with elevation being the deciding factor between the two. The model worked in Alcona County because the 3-3-x-x polygon is in the east and the 3-4-x-x polygon is in the west and the elevation rises as you move west, away from Lake Huron. However, this points out a potential problem in the generalizability of the model as discussed above.

Newaygo County

Newaygo County was the first county mapped by the MNFI in the LTA project. As such, the ecologists spent a lot of time there developing their technique of LTA delineation and coding. If it were being mapped today, after a year on the project, it may not look exactly the same way (Albert and Comer 1997). Changes in the placement of the LTA boundaries or in the LTA code assigned to a unit demonstrates a problem in the consistency and generalizability of the manual method. Overall, the county model performed quite well, but the test sample run through the full model had numerous problems (Figure 32). As in Grand Traverse County, the lake plain (LTA 6-1-1-1) was coded as ice-contact (LTA 3-3-2-2) and is shaped the same way as the lacustrine polygon on the geology map (Figure 5).

The geology of Newaygo County is very complicated (Figure 5). Overall, the pattern of moraine/till (LTAs 1-x-x-x and 2-x-x-x) and outwash (LTA 5-x-x-x) as mapped by Farrand and Bell (1982) is more closely preserved by the full model than in the ecologists' LTA map. This is because splits made on geology separate end moraine and glacial till from glacial outwash (nodes 6 and 7) before each group is split on presettlement vegetation. The model finds the patterns of steep vs. broad moraine and pitted vs. non-pitted outwash to be more variable, though much of the "salt and pepper" look would be eliminated if the model results were clustered into polygons equal in size to the minimum mapping unit (10 km^2) used by the ecologists.

Just to the south and west of center there is a large polygon of steep moraine ridges with many kettle lakes and well to moderately well drained sandy loam soils (LTA 1-2-2-2) that the model coded mainly as broad, flat outwash plain with few lakes or wetlands and excessively to somewhat excessively well drained sand or loamy sand soils (LTA 5-1-3-1). A check of the predictor variable maps (Figures 5, 7, 8, and 14) shows this area to be end moraine with an inclusion of glacial outwash, have numerous small lakes, and contain mostly well drained sandy loam or loam soils. Manually following the predictor variables through the classification tree it appears this area should have been coded as 1-2-2-2 at node 405 based on geology of end moraine or glacial till, vegetation of white pine/beech/maple, and elevation of < 294.5 m.

Midland County

The lake plain counties west of Saginaw Bay were very difficult to map (Albert and Corner 1997). Placement of LTA boundaries was heavily influenced by soil texture. In addition to the usual natural resource maps, the ecologists referred to land use maps to help place boundaries in Midland County. One of the problems in mapping LTAs on lake plain is that species variation occurs as a resolution smaller than an LTA unit. Farrand and Bell (1982) differentiated between sand and clay lake plain on their Quaternary geology map, but these types were lumped together in this study. These geology types are very different biologically, and in hindsight, they probably should have been kept as separate classes. Although Midland County is almost all flat lake plain (LTA 6-1-x-x), the test sample in the full model was coded mostly as outwash (LTAs 5-1-1-1 and 5-2-1-1) and till plain (LTA 2-2-2-3). Studying the model I can see no way that observations with lacustrine or dune sand geology could be coded as either LTA 5-1-1-1 or 2-2-2-3 and the only way they could be coded as LTA 5-2-1-1 is if observations had also had soil drainage class of excessive, somewhat excessive, well, or very poor, presettlement of vegetation of aspen/birch, beech/hemlock, other upland conifer, wetlands/water, or white pine/beech/maple, and elevation > 223.5 m. Very little of Midland County meets all of those criteria. The pattern mapped by the full model is very similar to the pattern of presettlement vegetation (Figure 6). The model's till plain matches the pattern of northern hardwoods, the outwash plain with few lakes or wetlands matches wetlands/water, aspen/birch, and pine/oak forests, and the pitted outwash matches the beech/hemlock and other upland conifer forests.

It is interesting to note that the county model, which performed very well, made its first split on soil texture class, the variable that the ecologists felt was most important in delineating LTAs on lake plain. After soil texture, vegetation and elevation were used to make the most important splits.

Answers to the Research Questions

1) *Can digital data co-registered in a GIS be used as inputs to a hierarchical decision tree to delineate LTAs in a way that is repeatable and that mimics the logic used by humans in a manual interpretation?* The GIS and classification tree modeling technique has proven to be useful for delineating LTAs in a repeatable fashion using readily available spatial databases. The fact that the classification tree model correctly classified only sixty percent of the LTAs in the learning sample is neither surprising nor discouraging. Human interpretation of the component maps used in LTA delineation is a complex abstraction, selection, and generalization process. Computing techniques, such as classification trees, are unable to achieve the same level of complexity of intelligent inference (Gong et al. 1996). They are bounded by data and poorer generalization capabilities, thereby producing results that are more fragmented than the ecologists' maps (Figures 26-33). Some of the disagreement between the original and predicted maps is caused by the models' lack of generalization.

In other places it appears that some of the differences between the original and predicted LTAs are due to the ecologists' inconsistencies. A systematic study of specific LTA units located across the study area was beyond the scope of this study. The areas of misclassification certainly serve as flags for the ecologists to go back and review their work. Long, linearly shaped units of differences identified in the crosstabulation process indicate that some boundaries should be shifted slightly.

The spatial patterning of LTAs in the study area reflects complex variations in geology, vegetation, soil, topography, and hydrography. The maps of the predictor variables used in the sampling are generalizations themselves, and therefore, an imperfect representation of factors important to LTA delineation, especially where they merge into one another along environmental gradients. Map errors can not be distinguished from model errors. The ecologists are also able to make use of ancillary data, such as years of field work, to fill in data gaps. In spite of these limitations, the classification trees were sensible based on the ecologists' mapping of the region and showed reasonable predictive ability.

2) *Which are the most important data layers in delineating LTAs? Is additional information needed to automate the process of LTA delineation?* The classification trees were useful for identifying and estimating hierarchical relationships in the multivariate data set. The most important data layer was surficial geology. In the Lake States area, surficial geology is the dominant abiotic feature correlated with vegetation composition and productivity at the scale of LTAs (Curtis 1959; Peet and Loucks 1977; Barnes et al. 1982; Spies and Barnes 1985; Albert et al. 1986; Host et al. 1987; Host et al 1988; Host and Pregitzer 1992). Because of this strong association, glacial formations have often been the primary criteria in LTA delineation (Jordan et al. 1996). Much of the predictive ability of the classification tree models was due to the strong influence exerted by surficial geology. Where the geology is dune sand, lacustrine, or peat and muck, soil drainage and texture classes are the most important predictor variables. Presettlement vegetation and elevation are the most important predictor variables where the geology is end moraine, glacial outwash, glacial till, or ice-contact. If I were to repeat this study, I would eliminate the slope, aspect, and depth to water table variables, use a measure of relative elevation instead of absolute elevation, and retain the textural information from Farrand and

Bell's (1982) Quaternary geology map.

Narrow outwash channels (LTAs 5-5-x-x) were consistently misclassified by the classification tree models. A variable that measures terrain shape may be helpful to correctly predict these LTAs; however, using a fixed fraction (i.e., stratified) sample instead of a systematic sample may do more to correct this problem (Cialella et al. 1997). With the current sampling technique, the number of sample points for any LTA class is roughly proportional to the percentage of land mapped as that landtype. In all cases but one, misclassified LTAs tended to be the smallest units, and therefore, they accounted for the fewest number of observations in the learning sample.

3) *To what degree do the LTA units exhibit fuzzy boundaries?* The classification tree model created from the learning sample where all data points within 250 m of an LTA boundary were eliminated produced a more accurate estimate than did the tree created from the full learning sample by 2.23%. This suggests that at least some of the LTA boundaries occur along environmental gradients. A third learning sample with all points within 1 km of an LTA boundary eliminated could not be tested because numerous smaller LTA units were either eliminated from the sample or had too few data points. In future work I recommend using a fixed fraction sample, and where there is enough data available, I would not use data points within 1 km of the LTA boundaries. This should produce the most accurate classifier and the model could then place the boundaries based on rules learned where the ecologists are most certain of the correct classification. The modeler then has a stronger case when suggesting that some boundaries should be adjusted.

4) *Can LTA delineation be automated in the future? Can a classification tree model be developed as the basis for extending LTA classification throughout Michigan?* The usefulness of the LTA classification models developed from the study area depend on both cartographic and ecological factors, as well as interactions between the two (Davis and Dozier 1990). The cartographic considerations include the resolution, accuracy, and bias of the component maps. The ecological considerations include the LTA classification scheme itself and the precision at which the units were delineated. Different results may have been obtained with a different

classification scheme or had different predictor variables been used.

There are numerous potential problems with extending the classification tree model to LTA delineation in the rest of the state. The problem of the miscoded points when some of the test samples were run through the full model needs to be solved. The full model worked as expected with the original learning sample and the test sample worked as expected in the county models. An unidentified processing error is the only explanation at this point.

Another current problem is the lack of digital soil survey data for most of the state. Soil properties were found to be important factors where the surficial geology is dune sand, lacustrine, and muck and peat. The STATSGO soil database, consisting of generalized soil map units linked to a relational database of soil attributes, could be investigated as a substitute for the detailed soil survey data. Based on the dominant surficial geology of a given county, using one of the four county models may yield better results than using the full model to delineate LTA boundaries in a new county.

The largest limitation in generalizing the current models would be in the LTA coding itself. The MNFI four digit coding scheme incorporates much information (major landform, landform modifier, soil drainage class, and soil texture class) and new combinations of the four digits in the code have continually been added throughout the LTA mapping project. After eliminating the "lake" LTAs, the four county study areas had 43 different LTA classes. As the ecologists continue mapping the remaining 29 counties of Northern Lower Michigan, the number of LTA classes has grown to approximately 100. Classification tree models cannot create "new" response variables. Any attempt to predict LTAs in new areas would be limited to the 28 LTAs classes that were assigned to the terminal nodes of the full model. The number of LTA codes identified by a classification tree model may increase by using a fixed fraction sample to construct a new tree, but it will always be limited to the LTA classes found in the learning sample. For the most part, the large increase in the number of LTA classes of Northern Lower Michigan is not due to the inconsistency of the ecologists, but to the actual natural variability of the landscape. For this reason, these classification tree models will not work well for extending LTA delineation to new areas.

Even though a generalizable model was not developed, this analysis was of value to the ecologists who mapped the LTA units. The method provided insight into the physical factors that exerted the strongest influence over LTA delineation and numerous potential boundary problems were discovered. Future research into why some classes were more likely to be misclassified would provide insight into the operational use of classification trees and to the consistency of the LTA units across a wide area. It is possible that with a learning sample obtained from areas identified by the ecologists to include all possible LTA classes, a classification tree model may be used to produce a continuous map of LTAs for the entire state.

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APPENDICES

APPENDIX A

Variables used in Classification Tree Construction

Table 15 - Response Variable: V1 = Landtype Association (LTA)

Code:	Description:
1-1-1-1	moraine ridges; steep, broken topography, few kettle lakes; excessively to somewhat excessively drained; sand or loamy sand
1-1-2-1	moraine ridges; steep, broken topography, few kettle lakes; well to moderately well drained; sand or loamy sand
1-1-2-2	moraine ridges; steep, broken topography, few kettle lakes; well to moderately well drained; sandy loam
1-2-1-1	moraine ridges; steep, broken topography, many kettle lakes; excessively to somewhat excessively drained; sand or loamy sand
1-2-2-2	moraine ridges; steep, broken topography, many kettle lakes; well to moderately well drained; sandy loam
2-1-2-2	moraines or till plains; flat; well to moderately well drained; sandy loam
2-1-2-3	moraines or till plains; flat; well to moderately well drained; loam
2-1-2-6	moraines or till plains; flat; well to moderately well drained; two storied soils: 12 in. or less of sand or loamy sand over silt loam, clay loam, or clay
2-1-3-1	moraines or till plains; flat; somewhat poorly to poorly drained; sand or loamy sand
2-1-3-4	moraines or till plains; flat; somewhat poorly to poorly drained; silt loam, clay loam, or clay
2-2-1-1	moraines or till plains; large, broad ridges, few or no lakes; excessively to somewhat excessively drained; sand or loamy sand
2-2-2-1	moraines or till plains; large, broad ridges, few or no lakes; well to moderately well drained; sand or loamy sand
2-2-2-2	moraines or till plains; large, broad ridges, few or no lakes; well to moderately well drained; sandy loam
2-2-2-3	moraines or till plains; large, broad ridges, few or no lakes; well to moderately well drained; loam
2-3-1-1	moraines or till plains; large, broad ridges, many lakes; excessively to somewhat excessively drained; sand or loamy sand
2-3-2-2	moraines or till plains; large, broad ridges, many lakes; well to moderately well drained; sandy loam
2-3-2-2	moraines or till plains; large, broad ridges, many lakes; well to moderately well drained; loam
2-3-3-4	moraines or till plains; large, broad ridges, many lakes; somewhat poorly to poorly drained; silt loam, clay loam, or clay

Table 15 (cont'd).

3-3-2-2	ice contact; small, steep, irregular ridges, few kettle lakes; well to moderately well drained; sandy loam
3-4-1-1	ice contact; small, steep, irregular ridges, many kettle lakes; excessively to somewhat excessively drained; sand or loamy sand
3-5-2-3	ice contact; broad ridges; well to moderately well drained; loam
5-1-1-1	outwash plain; broad, flat, no or few kettle lakes or wetlands; excessively to somewhat excessively drained; sand or loamy sand
5-1-2-1	outwash plain; broad, flat, no or few kettle lakes or wetlands; well to moderately well drained; sand or loamy sand
5-1-2-2	outwash plain; broad, flat, no or few kettle lakes or wetlands; well to moderately well drained; sandy loam
5-1-3-1	outwash plain; broad, flat, no or few kettle lakes or wetlands; somewhat poorly to poorly drained; sand or loamy sand
5-1-3-2	outwash plain; broad, flat, no or few kettle lakes or wetlands; somewhat poorly to poorly drained; sandy loam
5-1-4-9	outwash plain; broad, flat, few kettle lakes or wetlands; very poorly drained; peat or muck
5-2-1-1	outwash plain; pitted; excessively to somewhat excessively drained; sand or loamy sand
5-2-2-1	outwash plain; pitted; well to moderately well drained; sand or loamy sand
5-2-2-2	outwash plain; pitted; well to moderately well drained; sandy loam
5-5-1-1	outwash plain; narrow channel; excessively to somewhat excessively drained; sand or loamy sand
5-5-3-1	outwash plain; narrow channel; somewhat poorly to poorly drained; sand or loamy sand
5-5-4-2	outwash plain; narrow channel; very poorly drained; sandy loam
5-5-4-9	outwash plain; narrow channel; very poorly drained; peat or muck
6-1-1-1	lake plain; flat; excessively to somewhat excessively drained; sand or loamy sand
6-1-3-1	lake plain; flat; somewhat poorly to poorly drained; sand or loamy sand
6-1-3-1 /A	(treated the same as 6-1-3-1)
6-1-3-3	lake plain; flat; somewhat poorly to poorly drained; loam
6-1-3-4	lake plain; flat; somewhat poorly to poorly drained; silt loam, clay loam, or clay
6-1-4-1	lake plain; flat; very poorly drained; sand or loamy sand
6-1-4-4	lake plain; flat; very poorly drained; silt loam, clay loam, or clay
6-1-4-9	lake plain; flat; very poorly drained; peat or muck
6-3-1-1	lake plain; dune and swale complex; excessively to somewhat excessively drained; sand or loamy sand
6-3-4-1	lake plain; dune and swale complex; very poorly drained; sand or loamy sand

Predictor Variables:

Table 16 - V2 = Quaternary Geology

Code:	Description:
endmorai	end moraine
glcltill	glacial till
icec_out	ice-contact outwash sand and gravel
glcl_out	glacial outwash sand, gravel, and postglacial alluvium
lacustri	lacustrine deposits
lake	lakes
dunesand	dune sand
peatmuck	peat and muck
NA	not available

Table 17 - V3 = Presettlement Vegetation

Code:	Description:
shrub_jp	upland savanna and jack pine
rp_r/jp	red pine and red pine/jack pine
sap/wbir	aspen/white birch
p/o_w/rp	white pine/white oak, red pine/oak, white pine, and white pine/red pine
othupcon	other upland conifer (white spruce, hemlock, cedar, fir)
n_hardw	northern hardwoods (beech, sugar maple, yellow birch, red maple)
bee/heml	beech/hemlock
wp/be/ma	white pine/beech/red maple
wetl_h2o	forested and shrub-dominated wetlands, lowlands, streams, and lakes
NA	not available

Table 18 - V4 = Soil Drainage Class

Code:	Description:
excessiv	excessive
someexce	somewhat excessive
well	well
modwell	moderately well
somepoor	somewhat poor
poor	poor
verypoor	very poor
NA	not applicable (gullied land, gravel pits, pits, urban land, water, and wind eroded land)

Table 19 - V5 = Soil Texture Class

Code:	Description:
grloasan	gravelly loamy sands
san_fsan	sand and fine sand
loamysan	loamy sand, loamy fine sand, and loamy very fine sand
sandyloa	sand loam, fine sandy loam, and very fine sand loam
loam	loam
siclloam	silty loam, clay loam, and silty clay loam
musaloam	mucky sand, mucky sandy loam, and mucky loamy sand
muckpeat	muck and peat
varies	varies
NA	not available or applicable (gullied land, gravel pits, pits, urban land, water, and wind eroded land)

V6 = Depth to High Water Table, ft.

V7 = Slope Class from Soil Data, %

V8 = Slope Calculated from 1-degree DEM, %

V9 = Aspect Calculated from 1- degree DEM, major compass heading

V10 = Elevation from 1-degree DEM, m

V12 = Distance from Lakes larger than 250 ha, ft.

V13 = Distance from Streams, ft.

APPENDIX B

Learning Sample Classification Tree

```
> learn.tree
node), split, n, deviance, yval, (yprob)
      * denotes terminal node

 1) root 45245 290400.0 1-1-1-1 ( 0.1280000 0.008598 0.0381900 0.0232500 0.041550 0.0058790 0.0206400
0.0024310 0.0054150 2.646e-02 0.0083550 0.027270 0.0252200 0.0074260 0.0049510 0.0072720 0.0162400
0.0044870 0.0467000 0.0074040 0.0011050 0.0865700 0.0110300 0.0129700 0.0359600 0.0099240 0.0269600
0.0907300 0.0072270 0.0080010 0.0010390 5.901e-03 0.0008620 0.0029620 0.0219000 0.1104000 0.005990
0.0274100 0.012820 0.0302100 0.020860 0.0056140 5.039e-03 2.696e-03 )
   2) V2:dunesand,icec_out,lacustri,peatmuck 14741  71400.0 6-1-3-1 ( 0.0086150 0.000000 0.0112600 0.0005427
0.003053 0.0000000 0.0029170 0.0000000 0.0028490 1.072e-02 0.0000000 0.000000 0.0187900 0.0007462
0.0060380 0.0000000 0.0008141 0.0110600 0.1337000 0.0192700 0.0024420 0.0024420 0.0000000 0.0000000
0.0103800 0.0011530 0.0099040 0.0094290 0.0000000 0.0000000 0.0031880 3.799e-03 0.0002035 0.0004070
0.0561700 0.3359000 0.018380 0.0820200 0.039350 0.0918500 0.064040 0.0152000 1.526e-02 8.141e-03 )
     4) V2:icec_out 2951   8062.0 3-3-2-2 ( 0.0413400 0.000000 0.0000000 0.0000000 0.000000 0.0000000
0.0013550 0.0000000 0.0142300 2.270e-02 0.0000000 0.000000 0.0000000 0.0000000 0.0301600 0.0000000
0.0000000 0.0552400 0.6533000 0.0962400 0.0122000 0.0023720 0.0000000 0.0000000 0.0000000 0.0000000
0.0494700 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0169400 4.405e-03 0.000e+00 )
       8) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o 1350   5302.0 3-3-2-2 ( 0.0903700 0.000000
0.0000000 0.0000000 0.000000 0.0000000 0.0029630 0.0000000 0.0251900 3.778e-02 0.0000000 0.000000
0.0000000 0.0000000 0.0659300 0.0000000 0.0000000 0.1126000 0.3044000 0.2104000 0.0014810 0.0051850
0.0000000 0.0000000 0.0000000 0.0000000 0.1067000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00
0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0370400
0.000e+00 0.000e+00 )
        16) V3:othupcon,rp_r/jp,shrub_jp 392    930.1 3-4-1-1 ( 0.3036000 0.000000 0.0000000 0.0000000 0.000000
0.0000000 0.0102000 0.0000000 0.0000000 2.551e-03 0.0000000 0.000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0102000 0.0153100 0.5459000 0.0000000 0.0178600 0.0000000 0.0000000 0.0000000
0.0000000 0.0867300 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0076530 0.000e+00 0.000e+00 ) *
        17) V3:asp/wbir,p/o_w/rp,wetl_h2o 958   3381.0 3-3-2-2 ( 0.0031320 0.000000 0.0000000 0.0000000
0.000000 0.0000000 0.0000000 0.0000000 0.0354900 5.219e-02 0.0000000 0.000000 0.0000000 0.0000000
0.0929000 0.0000000 0.0000000 0.1545000 0.4228000 0.0730700 0.0020880 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.1148000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0490600 0.000e+00 0.000e+00 )
          34) V12<9095 750   2307.0 3-3-2-2 ( 0.0026670 0.000000 0.0000000 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.0346700 2.933e-02 0.0000000 0.000000 0.0000000 0.0000000 0.0053330 0.0000000
0.0000000 0.1200000 0.5067000 0.0933300 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.1453000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0626700 0.000e+00 0.000e+00 ) *
          35) V12>9095 208    610.6 2-3-1-1 ( 0.0048080 0.000000 0.0000000 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.0384600 1.346e-01 0.0000000 0.000000 0.0000000 0.0000000 0.4087000 0.0000000
0.0000000 0.2788000 0.1202000 0.0000000 0.0096150 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0048080 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00 ) *
       9) V3:bee/heml,n_hardw,wp/be/ma 1601    919.1 3-3-2-2 ( 0.0000000 0.000000 0.0000000 0.0000000
0.000000 0.0000000 0.0000000 0.0000000 0.0049970 9.994e-03 0.0000000 0.000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0068710 0.9475000 0.0000000 0.0212400 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0012490 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 8.120e-03 0.000e+00 ) *
```

5) V2:dunesand,lacustri,peatmuck 11790 49650.0 6-1-3-1 (0.0004241 0.000000 0.0140800 0.0006785 0.003817 0.0000000 0.0033080 0.0000000 0.0000000 7.718e-03 0.0000000 0.000000 0.0234900 0.0009330 0.0000000 0.0000000 0.0010180 0.0000000 0.0036470 0.0000000 0.0000000 0.0024600 0.0000000 0.0000000 0.0129800 0.0014420 0.0000000 0.0117900 0.0000000 0.0000000 0.0039860 4.750e-03 0.0002545 0.0005089 0.0702300 0.4199000 0.022990 0.1025000 0.049190 0.1148000 0.080070 0.0147600 1.798e-02 1.018e-02)

10) V4:excessiv,someexce,verypoor,well 2330 11290.0 6-1-1-1 (0.0008584 0.000000 0.0519300 0.0025750 0.013730 0.0000000 0.0081550 0.0000000 0.0000000 2.918e-02 0.0000000 0.000000 0.1073000 0.0012880 0.0000000 0.0000000 0.0038630 0.0000000 0.0094420 0.0000000 0.0000000 0.0090130 0.0000000 0.0000000 0.0240300 0.0008584 0.0000000 0.0309000 0.0000000 0.0000000 0.0090130 7.296e-03 0.0008584 0.0004292 0.3223000 0.1223000 0.007725 0.0085840 0.005579 0.0545100 0.011160 0.0639500 4.206e-02 5.107e-02)

20) V3:asp/wbir,bee/heml,othupcon,wetl_h2o,wp/be/ma 1319 6686.0 6-1-3-1 (0.0015160 0.000000 0.0007582 0.0045490 0.008340 0.0000000 0.0090980 0.0000000 0.0000000 5.080e-02 0.0000000 0.000000 0.0113700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0166800 0.0000000 0.0000000 0.0053070 0.0000000 0.0000000 0.0417000 0.0000000 0.0000000 0.0477600 0.0000000 0.0000000 0.0159200 1.289e-02 0.0015160 0.0007582 0.1509000 0.2092000 0.013650 0.0144000 0.009856 0.0924900 0.015920 0.1130000 6.141e-02
9.022e-02)

40) V10<191.5 462 1676.0 6-1-4-9 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 9.091e-02 0.0000000 0.000000 0.0129900 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0303000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0259700 0.0974000 0.000000 0.0000000 0.000000 0.0043290 0.019480 0.2879000 1.732e-01 2.576e-01) *

41) V10>191.5 857 3937.0 6-1-3-1 (0.0023340 0.000000 0.0011670 0.0070010 0.012840 0.0000000 0.0140000 0.0000000 0.0000000 2.917e-02 0.0000000 0.000000 0.0105000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0093350 0.0000000 0.0000000 0.0081680 0.0000000 0.0000000 0.0641800 0.0000000 0.0000000 0.0735100 0.0000000 0.0000000 0.0245000 1.984e-02 0.0023340 0.0011670 0.2182000 0.2695000 0.021000 0.0221700 0.015170 0.1400000 0.014000 0.0186700 1.167e-03 0.000e+00)

82) V10<228.5 680 2687.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0161800 0.0000000 0.0000000 3.382e-02 0.0000000 0.000000 0.0073530 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0117600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0161800 0.0000000 0.0000000 0.0308800 2.500e-02 0.0000000 0.0000000 0.2324000 0.3397000 0.025000 0.0250000 0.019120 0.1750000 0.017650 0.0235300 1.471e-03 0.000e+00) *

83) V10>228.5 177 661.6 5-1-3-1 (0.0113000 0.000000 0.0056500 0.0339000 0.062150 0.0000000 0.0056500 0.0000000 0.0000000 1.130e-02 0.0000000 0.000000 0.0226000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0395500 0.0000000 0.0000000 0.3107000 0.0000000 0.0000000 0.2938000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0113000 0.0056500 0.1638000 0.0000000 0.005650 0.0113000 0.000000 0.0056500 0.000000 0.0000000 0.000e+00 0.000e+00) *

21) V3:n_hardw,p/o_w/rp,rp_r/jp,shrub_jp,NA 1011 2819.0 6-1-1-1 (0.0000000 0.000000 0.1187000 0.0000000 0.020770 0.0000000 0.0069240 0.0000000 0.0000000 9.891e-04 0.0000000 0.000000 0.2324000 0.0029670 0.0000000 0.0000000 0.0089020 0.0000000 0.0000000 0.0000000 0.0000000 0.0138500 0.0000000 0.0000000 0.0009891 0.0019780 0.0000000 0.0089020 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.5460000 0.0089020 0.000000 0.0009891 0.000000 0.0049460 0.004946 0.0000000 1.682e-02 0.000e+00) *

11) V4:modwell,poor,somepoor,NA 9460 32590.0 6-1-3-1 (0.0003171 0.000000 0.0047570 0.0002114 0.001374 0.0000000 0.0021140 0.0000000 0.0000000 2.431e-03 0.0000000 0.000000 0.0028540 0.0008457 0.0000000 0.0000000 0.0003171 0.0000000 0.0022200 0.0000000 0.0000000 0.0008457 0.0000000 0.0000000 0.0102500 0.0015860 0.0000000 0.0070820 0.0000000 0.0000000 0.0027480 4.123e-03 0.0001057 0.0005285 0.0081400 0.4932000 0.026740 0.1257000 0.059940 0.1297000 0.097040 0.0026430 1.205e-02 1.057e-04)

22) V3:bee/heml,othupcon 5792 14640.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0001727 0.000000 0.0000000 0.0013810 0.0000000 0.0000000 3.453e-04 0.0000000 0.000000 0.0005180 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0005180 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0081150 0.0000000 0.0000000 0.0044890 0.0000000 0.0000000 0.0034530 2.762e-03 0.0001727 0.0000000 0.0034530 0.6568000 0.042130 0.1051000 0.094100 0.0297000 0.045410 0.0013810 0.000e+00 0.000e+00)

44) V5:loam,siclloam 1146 3388.0 6-1-3-4 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0008726 0.0000000 0.0000000 1.745e-03 0.0000000 0.000000 0.0017450 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0008726 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.2286000 0.029670 0.3002000 0.328100 0.0104700 0.097730 0.0000000 0.000e+00 0.000e+00)

88) V5:loam 412 1148.0 6-1-3-3 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0024270 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0048540 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0024270 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.3058000 0.058250 0.4587000 0.036410 0.0267000 0.104400 0.0000000 0.000e+00 0.000e+00) *

89) V5:siclloam 734 1902.0 6-1-3-4 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 2.725e-03 0.0000000 0.000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.1853000 0.013620 0.2112000 0.491800 0.0013620 0.094010 0.0000000 0.000e+00 0.000e+00) *

45) V5:loamysan,musaloam,san_fsan,sandyloa,NA 4646 9572.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0002152 0.000000 0.0000000 0.0015070 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0002152 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0006457 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0099010 0.0000000 0.0000000 0.0055960 0.0000000 0.0000000 0.0043050 3.444e-03 0.0002152 0.0000000 0.0043050 0.7624000 0.045200 0.0570400 0.036380 0.0344400 0.032500 0.0017220 0.000e+00 0.000e+00)

90) V10<221.5 4366 7460.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0013740 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0002290 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0006871 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0002290 0.0000000 0.0000000 0.0045810 3.665e-03 0.0000000 0.0000000 0.0016030 0.8058000 0.035040 0.0462700 0.038480 0.0256500 0.034590 0.0018320 0.000e+00 0.000e+00)

180) V13<7462.5 3515 5015.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0017070 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0008535 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0002845 0.0000000 0.0000000 0.0056900 4.552e-03 0.0000000 0.0000000 0.0019910 0.8489000 0.040680 0.0335700 0.024470 0.0204800 0.015080 0.0017070 0.000e+00 0.000e+00)

360) V3:bee/heml 504 1329.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0119000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0059520 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0019840 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.6071000 0.107100 0.0277800 0.129000 0.0515900 0.057540 0.0000000 0.000e+00 0.000e+00) *

361) V3:othupcon 3011 3307.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0066420 5.314e-03 0.0000000 0.0000000 0.0023250 0.8894000 0.029560 0.0345400 0.006974 0.0152800 0.007971 0.0019930 0.000e+00 0.000e+00)

722) V13<4424.5 2100 2279.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0095240 7.619e-03 0.0000000 0.0000000 0.0033330 0.8900000 0.040000 0.0281000 0.003810 0.0076190 0.008095 0.0019050 0.000e+00 0.000e+00) *

723) V13>4424.5 911 922.8 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.8880000 0.005488 0.0494000 0.014270 0.0329300 0.007684 0.0021950 0.000e+00 0.000e+00) *

181) V13>7462.5 851 2065.0 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0011750 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.6275000 0.011750 0.0987100 0.096360 0.0470000 0.115200 0.0023500 0.000e+00 0.000e+00) *

91) V10>221.5 280 1068.0 6-1-3-3 (0.0000000 0.000000 0.0000000 0.0035710 0.000000 0.0000000 0.0035710 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1643000 0.0000000 0.0000000 0.0892900 0.0000000 0.0000000 0.0000000 0.000e+00 0.0035710 0.0000000 0.0464300 0.0857100 0.203600 0.2250000 0.003571 0.1714000 0.000000 0.0000000 0.000e+00 0.000e+00) *

23) V3:asp/wbir,n_hardw,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma,NA 3668 14290.0 6-1-4-1 (0.0008179 0.000000 0.0122700 0.0002726 0.003544 0.0000000 0.0032720 0.0000000 0.0000000 5.725e-03 0.0000000 0.000000 0.0065430 0.0021810 0.0000000 0.0000000 0.0008179 0.0000000 0.0049070 0.0000000 0.0000000 0.0021810 0.0000000 0.0000000 0.0136300 0.0040890 0.0000000 0.0111800 0.0000000 0.0000000 0.0016360 6.270e-03 0.0000000 0.0013630 0.0155400 0.2350000 0.002454 0.1581000 0.005998 0.2876000 0.178600 0.0046350 3.108e-02 2.726e-04)

46) V3:asp/wbir,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma 2787 9993.0 6-1-4-1 (0.0010760 0.000000 0.0007176 0.0003588 0.004306 0.0000000 0.0003588 0.0000000 0.0000000 7.535e-03 0.0000000 0.000000 0.0003588 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0064590 0.0000000 0.0000000 0.0028700 0.0000000 0.0000000 0.0172200 0.0028700 0.0000000 0.0125600 0.0000000 0.0000000 0.0021530 8.253e-03 0.0000000 0.0017940 0.0168600 0.2921000 0.003229 0.0696100 0.007894 0.3753000 0.118800 0.0061000 4.090e-02 3.588e-04)

92) V10<190.5 251 878.2 6-3-1-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 7.171e-02 0.0000000 0.000000 0.0039840 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0557800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0079680 0.0000000 0.0000000 0.0000000 1.195e-02 0.0000000 0.0000000 0.0278900 0.1873000 0.000000 0.0000000 0.000000 0.0438200 0.079680 0.0517900 4.542e-01 3.984e-03) *

93) V10>190.5 2536 8187.0 6-1-4-1 (0.0011830 0.000000 0.0007886 0.0003943 0.004732 0.0000000 0.0003943 0.0000000 0.0000000 1.183e-03 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0015770 0.0000000 0.0000000 0.0031550 0.0000000 0.0000000 0.0189300 0.0031550 0.0000000 0.0130100 0.0000000 0.0000000 0.0023660 7.886e-03 0.0000000 0.0019720 0.0157700 0.3024000 0.003549 0.0765000 0.008675 0.4081000 0.122600 0.0015770 0.000e+00 0.000e+00)

186) V10<239.5 2426 7020.0 6-1-4-1 (0.0000000 0.000000 0.0008244 0.0000000 0.000000 0.0000000 0.0004122 0.0000000 0.0000000 1.237e-03 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0016490 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0032980 0.0000000 0.0024730 0.0000000 0.0000000 0.0024730 8.244e-03 0.0000000 0.0012370 0.0127800 0.3162000 0.003710 0.0799700 0.009068 0.4266000 0.128200 0.0016490 0.000e+00 0.000e+00)

372) V5:loam,siclloam 398 1128.0 6-1-4-4 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 7.538e-03 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0025130 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0100500 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0075380 0.0804000 0.000000 0.3090000 0.017590 0.1457000 0.419600 0.0000000 0.000e+00 0.000e+00) *

373) V5:grloasan,loamysan,musaloam,san_fsan,sandyloa,NA 2028 5187.0 6-1-4-1 (0.0000000 0.000000 0.0009862 0.0000000 0.000000 0.0000000 0.0004931 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0014790 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0019720 0.0000000 0.0029590 0.0000000 0.0000000 0.0029590 9.862e-03 0.0000000 0.0014790 0.0138100 0.3624000 0.004438 0.0350100 0.007396 0.4818000 0.071010 0.0019720 0.000e+00 0.000e+00)

746) V12<10248 1819 4333.0 6-1-4-1 (0.0000000 0.000000 0.0011000 0.0000000 0.000000 0.0000000 0.0005498 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0016490 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0021990 0.0000000 0.0032990 0.0000000 0.0000000 0.0032990 1.100e-02 0.0000000 0.0016490 0.0137400 0.3540000 0.004948 0.0313400 0.008246 0.5272000 0.035730 0.0000000 0.000e+00 0.000e+00)

1492) V5:loamysan,musaloam,san_fsan 1616 3462.0 6-1-4-1 (0.0000000 0.000000 0.0012380 0.0000000 0.000000 0.0000000 0.0006188 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0018560 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0024750 0.0000000 0.0030940 0.0000000 0.0000000 0.0006188 3.094e-03 0.0000000 0.0000000 0.0086630 0.3385000 0.001238 0.0272300 0.008663 0.5687000 0.034030 0.0000000 0.000e+00 0.000e+00)

2984) V13<11268.5 1469 2988.0 6-1-4-1 (0.0000000 0.000000 0.0013610 0.0000000 0.000000 0.0000000 0.0006807 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0020420 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0027230 0.0000000 0.0034040 0.0000000 0.0000000 0.0006807 3.404e-03 0.0000000 0.0000000 0.0095300 0.3696000 0.001361 0.0170200 0.009530 0.5609000 0.017700 0.0000000 0.000e+00 0.000e+00)

5968) V3:wetl_h2o 1126 2349.0 6-1-4-1 (0.0000000 0.000000 0.0008881 0.0000000 0.000000 0.0000000 0.0008881 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0035520 0.0000000 0.0000000 0.0000000 0.0000000 0.0008881 1.776e-03 0.0000000 0.0000000 0.0097690 0.4236000 0.001776 0.0222000 0.012430 0.4991000 0.023090 0.0000000 0.000e+00 0.000e+00) *

5969) V3:asp/wbir,p/o_w/rp,wp/be/ma 343 498.0 6-1-4-1 (0.0000000 0.000000 0.0029150 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0087460 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0145800 0.0000000 0.0000000 0.0000000 8.746e-03 0.0000000 0.0000000 0.0087460 0.1924000 0.000000 0.0000000 0.000000 0.7638000 0.000000 0.0000000 0.000e+00 0.000e+00) *

2985) V13>11268.5 147 283.7 6-1-4-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0272100 0.000000 0.1293000 0.000000 0.6463000 0.197300 0.0000000 0.000e+00 0.000e+00) *

1493) V5:grloasan,sandyloa,NA 203 677.9 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0049260 0.0000000 0.0000000 0.0246300 7.389e-02 0.0000000 0.0147800 0.0541900 0.4778000 0.034480 0.0640400 0.004926 0.1970000 0.049260 0.0000000 0.000e+00 0.000e+00) *

747) V12>10248 209 526.1 6-1-3-1 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0143500 0.4354000 0.000000 0.0669900 0.000000 0.0861200 0.378000 0.0191400 0.000e+00 0.000e+00) *

187) V10>239.5 110 342.7 5-1-3-1 (0.0272700 0.000000 0.0000000 0.0090910 0.109100 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0727300 0.0000000 0.0000000 0.4364000 0.0000000 0.0000000 0.2455000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0181800 0.0818200 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

47) V3:n_hardw,NA 881 2535.0 6-1-3-3 (0.0000000 0.000000 0.0488100 0.0000000 0.001135 0.0000000 0.0124900 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0261100 0.0090810 0.0000000 0.0000000 0.0034050 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0022700 0.0079460 0.0000000 0.0068100 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0113500 0.0544800 0.000000 0.4381000 0.000000 0.0102200 0.367800 0.0000000 0.000e+00 0.000e+00) *

3) V2:endmorai,glcl_out,glcltill,lake,NA 30504 175700.0 1-1-1-1 (0.1857000 0.012750 0.0512100 0.0342300 0.060160 0.0087200 0.0292100 0.0036060 0.0066550 3.406e-02 0.0123900 0.040450 0.0283200 0.0106500 0.0044260 0.0107900 0.0237000 0.0013110 0.0046550 0.0016720 0.0004590 0.1272000 0.0163600 0.0192400 0.0483200 0.0141600 0.0352100 0.1300000 0.0107200 0.0118700 0.0000000 6.917e-03 0.0011800 0.0041960 0.0053440 0.0015080 0.000000 0.0010160 0.000000 0.0004262 0.000000 0.0009835 9.835e-05 6.557e-05)

6) V2:endmorai,glcltill 17687 95490.0 1-1-1-1 (0.3024000 0.012040 0.0780800 0.0373200 0.082550 0.0144200 0.0471000 0.0059370 0.0110800 5.722e-02 0.0199000 0.055460 0.0486800 0.0127800 0.0067280 0.0171900 0.0391800 0.0021480 0.0080280 0.0024880 0.0007915 0.0387900 0.0033920 0.0081420 0.0146400 0.0098380 0.0209200 0.0255600 0.0003392 0.0063890 0.0000000 5.654e-05 0.0000000 0.0010740 0.0055410 0.0004523 0.000000 0.0015270 0.000000 0.0000000 0.000000 0.0016960 1.696e-04 0.000e+00)

12) V10<261.5 6416 35610.0 2-1-3-4 (0.0946100 0.000000 0.0472300 0.0084160 0.114100 0.0118500 0.0268100 0.0034290 0.0305500 1.576e-01 0.0003117 0.000000 0.1342000 0.0347600 0.0070140 0.0464500 0.0760600 0.0059230 0.0221300 0.0014030 0.0014030 0.0314800 0.0018700 0.0000000 0.0255600 0.0271200 0.0461300 0.0171400 0.0000000 0.0000000 0.0000000 1.559e-04 0.0000000 0.0029610 0.0127800 0.0012470 0.000000 0.0042080 0.000000 0.0000000 0.000000 0.0046760 4.676e-04 0.000e+00)

24) V3:asp/wbir,bee/heml,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma 3970 20460.0 2-1-3-4 (0.1388000 0.000000 0.0022670 0.0136000 0.145300 0.0191400 0.0317400 0.0020150 0.0173800 2.350e-01 0.0005038 0.000000 0.0259400 0.0017630 0.0113400 0.0735500 0.0042820 0.0095720 0.0148600 0.0022670 0.0022670 0.0483600 0.0005038 0.0000000 0.0413100 0.0191400 0.0730500 0.0239300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0047860 0.0206500 0.0020150 0.000000 0.0068010 0.000000 0.0000000 0.000000 0.0070530 7.557e-04 0.000e+00)

48) V2:endmorai 1586 6872.0 1-2-2-2 (0.0718800 0.000000 0.0044140 0.0340500 0.354400 0.0000000 0.0498100 0.0000000 0.0000000 2.333e-02 0.0012610 0.000000 0.0227000 0.0018920 0.0000000 0.1557000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0800800 0.0012610 0.0000000 0.0851200 0.0044140 0.0000000 0.0599000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0119800 0.0100900 0.0050440 0.000000 0.0170200 0.000000 0.0000000 0.000000 0.0056750 0.000e+00 0.000e+00)

96) V3:othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o 768 3787.0 5-1-3-1 (0.1263000 0.000000 0.0091150 0.0638000 0.153600 0.0000000 0.0182300 0.0000000 0.0000000 1.823e-02 0.0026040 0.000000 0.0468800 0.0039060 0.0000000 0.0768200 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1445000 0.0026040 0.0000000 0.1719000 0.0065100 0.0000000 0.0520800 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0247400 0.0208300 0.0104200 0.000000 0.0351600 0.000000 0.0000000 0.000000 0.0117200 0.000e+00 0.000e+00)

192) V3:p/o_w/rp,rp_r/jp,shrub_jp 291 936.9 5-1-1-1 (0.2715000 0.000000 0.0137500 0.1340000 0.158100 0.0000000 0.0000000 0.0000000 0.0000000 6.873e-03 0.0068730 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.3540000 0.0000000 0.0000000 0.0068730 0.0000000 0.0000000 0.0068730 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0412400 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

193) V3:othupcon,wetl_h2o 477 2264.0 5-1-3-1 (0.0377400 0.000000 0.0062890 0.0209600 0.150900 0.0000000 0.0293500 0.0000000 0.0000000 2.516e-02 0.0000000 0.000000 0.0754700 0.0062890 0.0000000 0.1237000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0167700 0.0041930 0.0000000 0.2725000 0.0104800 0.0000000 0.0796600 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0398300 0.0083860 0.0167700 0.000000 0.0566000 0.000000 0.0000000 0.000000 0.0188700 0.000e+00 0.000e+00) *

97) V3:bee/heml,wp/be/ma 818 2252.0 1-2-2-2 (0.0207800 0.000000 0.0000000 0.0061120 0.542800 0.0000000 0.0794600 0.0000000 0.0000000 2.812e-02 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.2298000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0195600 0.0000000 0.0000000 0.0036670 0.0024450 0.0000000 0.0672400 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

49) V2:glcltill 2384 10390.0 2-1-3-4 (0.1833000 0.000000 0.0008389 0.0000000 0.006292 0.0318800 0.0197100 0.0033560 0.0289400 3.758e-01 0.0000000 0.000000 0.0281000 0.0016780 0.0188800 0.0188800 0.0071310 0.0159400 0.0247500 0.0037750 0.0037750 0.0272700 0.0000000 0.0000000 0.0121600 0.0289400 0.1216000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0276800 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0079700 1.258e-03 0.000e+00)

98) V10<221.5 859 1650.0 2-1-3-4 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0780000 0.0337600 0.0000000 0.0069850 7.590e-01 0.0000000 0.000000 0.0663600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0256100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0046570 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0221200 3.492e-03 0.000e+00) *

99) V10>221.5 1525 6992.0 1-1-1-1 (0.2866000 0.000000 0.0013110 0.0000000 0.009836 0.0059020 0.0118000 0.0052460 0.0413100 1.600e-01 0.0000000 0.000000 0.0065570 0.0026230 0.0295100 0.0295100 0.0111500 0.0249200 0.0242600 0.0059020 0.0059020 0.0426200 0.0000000 0.0000000 0.0190200 0.0452500 0.1902000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0406600 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

198) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp 636 1849.0 1-1-1-1 (0.6132000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0078620 0.0283000 3.616e-02 0.0000000 0.000000 0.0062890 0.0000000 0.0597500 0.0000000 0.0000000 0.0015720 0.0141500 0.0125800 0.0000000 0.0990600 0.0000000 0.0000000 0.0110100 0.0000000 0.0173000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0927700 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

199) V3:bee/heml,wetl_h2o,wp/be/ma 889 3884.0 5-1-4-9 (0.0528700 0.000000 0.0022500 0.0000000 0.016870 0.0101200 0.0202500 0.0033750 0.0506200 2.486e-01 0.0000000 0.000000 0.0067490 0.0044990 0.0078740 0.0506200 0.0191200 0.0416200 0.0315000 0.0011250 0.0101200 0.0022500 0.0000000 0.0000000 0.0247500 0.0776200 0.3138000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0033750 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

398) V3:wetl_h2o 682 2635.0 5-1-4-9 (0.0439900 0.000000 0.0029330 0.0000000 0.004399 0.0000000 0.0029330 0.0043990 0.0557200 2.141e-01 0.0000000 0.000000 0.0073310 0.0058650 0.0087980 0.0102600 0.0190600 0.0542500 0.0161300 0.0014660 0.0014660 0.0029330 0.0000000 0.0000000 0.0322600 0.0997100 0.4076000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0043990 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

399) V3:bee/heml,wp/be/ma 207 831.5 2-1-3-4 (0.0821300 0.000000 0.0000000 0.0000000 0.057970 0.0434800 0.0772900 0.0000000 0.0338200 3.623e-01 0.0000000 0.000000 0.0048310 0.0000000 0.0048310 0.1836000 0.0193200 0.0000000 0.0821300 0.0000000 0.0386500 0.0000000 0.0000000 0.0000000 0.0000000 0.0048310 0.0048310 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

25) V3:n_hardw,NA 2446 10450.0 2-2-2-2 (0.0228900 0.000000 0.1202000 0.0000000 0.063370 0.0000000 0.0188100 0.0057240 0.0519200 3.189e-02 0.0000000 0.000000 0.3099000 0.0883100 0.0000000 0.0024530 0.1926000 0.0000000 0.0339300 0.0000000 0.0000000 0.0040880 0.0040880 0.0000000 0.0000000 0.0400700 0.0024530 0.0061320 0.0000000 0.0000000 0.0000000 4.088e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0008177 0.000e+00 0.000e+00)

50) V10<228.5 997 2700.0 2-2-2-2 (0.0010030 0.000000 0.0802400 0.0000000 0.002006 0.0000000 0.0381100 0.0000000 0.0310900 7.222e-02 0.0000000 0.000000 0.6520000 0.0090270 0.0000000 0.0000000 0.0150500 0.0000000 0.0641900 0.0000000 0.0000000 0.0040120 0.0040120 0.0000000 0.0000000 0.0250800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0020060 0.000e+00 0.000e+00) *

51) V10>228.5 1449 6103.0 2-3-2-3 (0.0379600 0.000000 0.1477000 0.0000000 0.105600 0.0000000 0.0055210 0.0096620 0.0662500 4.141e-03 0.0000000 0.000000 0.0745300 0.1429000 0.0000000 0.0041410 0.3147000 0.0000000 0.0131100 0.0000000 0.0000000 0.0041410 0.0041410 0.0000000 0.0000000 0.0503800 0.0041410 0.0103500 0.0000000 0.0000000 0.0000000 6.901e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

102) V2:endmorai 769 2713.0 2-3-2-3 (0.0507200 0.000000 0.2575000 0.0000000 0.195100 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0585200 0.1157000 0.0000000 0.0065020 0.2848000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0078020 0.0000000 0.0000000 0.0026010 0.0000000 0.0195100 0.0000000 0.0000000 0.0000000 1.300e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

103) V2:glcltill 680 2681.0 2-3-2-3 (0.0235300 0.000000 0.0235300 0.0000000 0.004412 0.0000000 0.0117600 0.0205900 0.1412000 8.824e-03 0.0000000 0.000000 0.0926500 0.1735000 0.0000000 0.0014710 0.3485000 0.0000000 0.0279400 0.0000000 0.0000000 0.0088240 0.0000000 0.0000000 0.0000000 0.1044000 0.0088240 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

13) V10>261.5 11271 49000.0 1-1-1-1 (0.4206000 0.018900 0.0956400 0.0537700 0.064590 0.0158800 0.0586500 0.0073640 0.0000000 8.872e-05 0.0310500 0.087040 0.0000000 0.0002662 0.0065660 0.0005323 0.0181900 0.0000000 0.0000000 0.0031050 0.0004436 0.0429400 0.0042590 0.0127800 0.0084290 0.0000000 0.0065660 0.0303400 0.0005323 0.0100300 0.0000000 0.000e+00 0.0000000 0.0000000 0.0014200 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

26) V3:bee/heml,n_hardw,wetl_h2o 5545 26280.0 1-1-1-1 (0.2069000 0.038410 0.1812000 0.0209200 0.065640 0.0256100 0.1145000 0.0137100 0.0000000 0.000e+00 0.0124400 0.173900 0.0000000 0.0005410 0.0012620 0.0000000 0.0369700 0.0000000 0.0000000 0.0005410 0.0009017 0.0131700 0.0086560 0.0259700 0.0129800 0.0000000 0.0126200 0.0218200 0.0010820 0.0095580 0.0000000 0.000e+00 0.0000000 0.0000000 0.0007214 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

52) V10<295.5 2355 11520.0 1-1-2-2 (0.0896000 0.036940 0.2369000 0.0416100 0.137200 0.0318500 0.1389000 0.0322700 0.0000000 0.000e+00 0.0004246 0.026330 0.0000000 0.0012740 0.0029720 0.0000000 0.0870500 0.0000000 0.0000000 0.0012740 0.0021230 0.0233500 0.0123100 0.0000000 0.0084930 0.0000000 0.0250500 0.0386400 0.0021230 0.0216600 0.0000000 0.000e+00 0.0000000 0.0000000 0.0016990 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

104) V3:n_hardw 1367 5819.0 1-1-2-2 (0.0833900 0.054130 0.3475000 0.0102400 0.140500 0.0336500 0.0219500 0.0424300 0.0000000 0.000e+00 0.0007315 0.043890 0.0000000 0.0021950 0.0000000 0.0000000 0.1492000 0.0000000 0.0000000 0.0014630 0.0000000 0.0036580 0.0153600 0.0000000 0.0007315 0.0000000 0.0036580 0.0182900 0.0036580 0.0234100 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

208) V13<4721.5 829 3367.0 1-1-2-2 (0.0796100 0.026540 0.4246000 0.0060310 0.061520 0.0518700 0.0361900 0.0675500 0.0000000 0.000e+00 0.0012060 0.072380 0.0000000 0.0036190 0.0000000 0.0000000 0.1025000 0.0000000 0.0000000 0.0024130 0.0000000 0.0036190 0.0253300 0.0000000 0.0000000 0.0000000 0.0024130 0.0012060 0.0000000 0.0313600 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

416) V2:endmorai 680 2654.0 1-1-2-2 (0.0573500 0.032350 0.4397000 0.0073530 0.070590 0.0632400 0.0441200 0.0000000 0.0000000 0.000e+00 0.0014710 0.088240 0.0000000 0.0044120 0.0000000 0.0000000 0.1132000 0.0000000 0.0000000 0.0029410 0.0000000 0.0029410 0.0308800 0.0000000 0.0000000 0.0000000 0.0014710 0.0014710 0.0000000 0.0382400 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

417) V2:glcltill 149 401.6 2-1-2-6 (0.1812000 0.000000 0.3557000 0.0000000 0.020130 0.0000000 0.0000000 0.3758000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0536900 0.0000000 0.0000000 0.0000000 0.0000000 0.0067110 0.0000000 0.0000000 0.0000000 0.0000000 0.0067110 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

209) V13>4721.5 538 2018.0 1-2-2-2 (0.0892200 0.096650 0.2286000 0.0167300 0.262100 0.0055760 0.0000000 0.0037170 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.2212000 0.0000000 0.0000000 0.0000000 0.0000000 0.0037170 0.0000000 0.0000000 0.0018590 0.0000000 0.0055760 0.0446100 0.0092940 0.0111500 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

105) V3:bee/heml,wetl_h2o 988 4546.0 2-1-2-3 (0.0981800 0.013160 0.0840100 0.0850200 0.132600 0.0293500 0.3006000 0.0182200 0.0000000 0.000e+00 0.0000000 0.002024 0.0000000 0.0000000 0.0070850 0.0000000 0.0010120 0.0000000 0.0000000 0.0010120 0.0050610 0.0506100 0.0080970 0.0000000 0.0192300 0.0000000 0.0546600 0.0668000 0.0000000 0.0192300 0.0000000 0.000e+00 0.0000000 0.0000000 0.0040490 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

210) V2:endmorai 797 3279.0 2-1-2-3 (0.0401500 0.016310 0.0941000 0.1054000 0.148100 0.0363900 0.3726000 0.0000000 0.0000000 0.000e+00 0.0000000 0.002509 0.0000000 0.0000000 0.0000000 0.0000000 0.0012550 0.0000000 0.0000000 0.0000000 0.0000000 0.0225800 0.0100400 0.0000000 0.0238400 0.0000000 0.0175700 0.0828100 0.0000000 0.0213300 0.0000000 0.000e+00 0.0000000 0.0000000 0.0050190 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

420) V3:bee/heml 512 1668.0 2-1-2-3 (0.0019530 0.000000 0.0996100 0.0996100 0.128900 0.0390600 0.4941000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0156200 0.0000000 0.0000000 0.0117200 0.0000000 0.0000000 0.0918000 0.0000000 0.0117200 0.0000000 0.000e+00 0.0000000 0.0000000 0.0058590 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

421) V3:wetl_h2o 285 1388.0 1-2-2-2 (0.1088000 0.045610 0.0842100 0.1158000 0.182500 0.0315800 0.1544000 0.0000000 0.0000000 0.000e+00 0.0000000 0.007018 0.0000000 0.0000000 0.0000000 0.0000000 0.0035090 0.0000000 0.0000000 0.0000000 0.0000000 0.0350900 0.0280700 0.0000000 0.0456100 0.0000000 0.0491200 0.0666700 0.0000000 0.0386000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0035090 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

211) V2:glcltill 191 696.7 1-1-1-1 (0.3403000 0.000000 0.0418800 0.0000000 0.068060 0.0000000 0.0000000 0.0942400 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0366500 0.0000000 0.0000000 0.0000000 0.0000000 0.0052360 0.0261800 0.1675000 0.0000000 0.0000000 0.0000000 0.0000000 0.2094000 0.0000000 0.0000000 0.0104700 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

53) V10>295.5 3190 12320.0 1-1-1-1 (0.2934000 0.039500 0.1401000 0.0056430 0.012850 0.0210000 0.0965500 0.0000000 0.0000000 0.000e+00 0.0213200 0.282800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0056430 0.0059560 0.0451400 0.0163000 0.0000000 0.0034480 0.0094040 0.0003135 0.0006270 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

106) V3:n_hardw 2225 8163.0 2-2-2-1 (0.1762000 0.056180 0.1676000 0.0008989 0.016180 0.0220200 0.0678700 0.0000000 0.0000000 0.000e+00 0.0305600 0.386100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0067420 0.0049440 0.0611200 0.0004494 0.0000000 0.0000000 0.0026970 0.0004494 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

212) V13<6641.5 1553 5092.0 2-2-2-1 (0.0882200 0.080490 0.2073000 0.0000000 0.007727 0.0302600 0.0611700 0.0000000 0.0000000 0.000e+00 0.0006439 0.459800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0025760 0.0064390 0.0528000 0.0006439 0.0000000 0.0000000 0.0019320 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

424) V2:endmorai 1378 4450.0 2-2-2-1 (0.0791000 0.090710 0.1328000 0.0000000 0.008708 0.0341100 0.0689400 0.0000000 0.0000000 0.000e+00 0.0007257 0.512300 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0029030 0.0072570 0.0595100 0.0007257 0.0000000 0.0000000 0.0021770 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

848) V5:grloasan,muckpeat,sandyloa,siclloam,varies 288 978.2 1-1-2-2 (0.0208300 0.065970
0.3368000 0.0000000 0.000000 0.0833300 0.2569000 0.0000000 0.0000000 0.000e+00 0.0000000 0.156200
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0069440 0.0729200 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00
0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000
0.000e+00 0.000e+00) *

849) V5:loam,loamysan,musaloam,san_fsan,NA 1090 3068.0 2-2-2-1 (0.0945000 0.097250 0.0789000
0.0000000 0.011010 0.0211000 0.0192700 0.0000000 0.0000000 0.000e+00 0.0009174 0.606400 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0036700 0.0073390
0.0559600 0.0009174 0.0000000 0.0000000 0.0027520 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000
0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00
0.000e+00)

1698) V10<340.5 975 2472.0 2-2-2-1 (0.0748700 0.091280 0.0584600 0.0000000 0.012310
0.0235900 0.0112800 0.0000000 0.0000000 0.000e+00 0.0010260 0.668700 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0041030 0.0082050 0.0420500 0.0010260
0.0000000 0.0000000 0.0030770 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1699) V10>340.5 115 390.2 1-1-1-1 (0.2609000 0.147800 0.2522000 0.0000000 0.000000
0.0000000 0.0869600 0.0000000 0.0000000 0.000e+00 0.0000000 0.078260 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1739000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

425) V2:glcltill 175 216.0 1-1-2-2 (0.1600000 0.000000 0.7943000 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.045710 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

213) V13>6641.5 672 2417.0 1-1-1-1 (0.3795000 0.000000 0.0758900 0.0029760 0.035710 0.0029760
0.0833300 0.0000000 0.0000000 0.000e+00 0.0997000 0.215800 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0163700 0.0014880 0.0803600 0.0000000 0.0000000
0.0000000 0.0044640 0.0014880 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

107) V3:bee/heml,wetl_h2o 965 2971.0 1-1-1-1 (0.5637000 0.001036 0.0766800 0.0165800 0.005181
0.0186500 0.1627000 0.0000000 0.0000000 0.000e+00 0.0000000 0.044560 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0031090 0.0082900 0.0082900 0.0528500
0.0000000 0.0114000 0.0248700 0.0000000 0.0020730 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

214) V10<318.5 455 1802.0 2-1-2-3 (0.2835000 0.002198 0.0791200 0.0351600 0.010990 0.0373600
0.2857000 0.0000000 0.0000000 0.000e+00 0.0000000 0.065930 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0065930 0.0175800 0.0000000 0.1077000 0.0000000
0.0175800 0.0461500 0.0000000 0.0043960 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

215) V10>318.5 510 785.3 1-1-1-1 (0.8137000 0.000000 0.0745100 0.0000000 0.000000 0.0019610
0.0529400 0.0000000 0.0000000 0.000e+00 0.0000000 0.025490 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0156900 0.0039220 0.0000000
0.0058820 0.0058820 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

27) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wp/be/ma,NA 5726 16680.0 1-1-1-1 (0.6277000
0.000000 0.0127500 0.0855700 0.063570 0.0064620 0.0045410 0.0012220 0.0000000 1.746e-04 0.0490700
0.002969 0.0000000 0.0000000 0.0117000 0.0010480 0.0000000 0.0000000 0.0000000 0.0055890 0.0000000
0.0717800 0.0000000 0.0000000 0.0040170 0.0000000 0.0006986 0.0386000 0.0000000 0.0104800 0.0000000
0.000e+00 0.0000000 0.0000000 0.0020960 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000
0.0000000 0.000e+00 0.000e+00)

54) V10<305.5 3856 13080.0 1-1-1-1 (0.5070000 0.000000 0.0085580 0.1268000 0.094400 0.0080390
0.0025930 0.0018150 0.0000000 2.593e-04 0.0619800 0.000778 0.0000000 0.0000000 0.0173800 0.0015560
0.0000000 0.0000000 0.0000000 0.0033710 0.0000000 0.0907700 0.0000000 0.0000000 0.0044090 0.0000000
0.0007780 0.0510900 0.0000000 0.0153000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0031120 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

108) V3:asp/wbir,p/o_w/rp,rp_r/jp,shrub_jp 2852 8397.0 1-1-1-1 (0.5863000 0.000000 0.0094670 0.0957200 0.028750 0.0049090 0.0035060 0.0024540 0.0000000 3.506e-04 0.0718800 0.000000 0.0000000 0.0000000 0.0220900 0.0000000 0.0000000 0.0000000 0.0000000 0.0045580 0.0000000 0.1206000 0.0000000 0.0000000 0.0007013 0.0000000 0.0010520 0.0434800 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0042080 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

216) V2:endmorai 1987 6395.0 1-1-1-1 (0.4937000 0.000000 0.0130900 0.1263000 0.041270 0.0070460 0.0050330 0.0000000 0.0000000 5.033e-04 0.1032000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0060390 0.0000000 0.1344000 0.0000000 0.0000000 0.0010070 0.0000000 0.0000000 0.0624100 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0060390 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

432) V3:p/o_w/rp 1609 4861.0 1-1-1-1 (0.5308000 0.000000 0.0161600 0.1560000 0.045990 0.0062150 0.0012430 0.0000000 0.0000000 0.000e+00 0.1019000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0074580 0.0000000 0.0559400 0.0000000 0.0000000 0.0012430 0.0000000 0.0000000 0.0770700 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

864) V10<291.5 979 3234.0 1-1-1-1 (0.4229000 0.000000 0.0163400 0.2339000 0.064350 0.0071500 0.0020430 0.0000000 0.0000000 0.000e+00 0.1113000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0122600 0.0000000 0.0766100 0.0000000 0.0000000 0.0010210 0.0000000 0.0000000 0.0520900 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

1728) V13<4124 255 845.6 1-1-1-1 (0.4314000 0.000000 0.0392200 0.1294000 0.011760 0.0156900 0.0078430 0.0000000 0.0000000 0.000e+00 0.1020000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0392200 0.0000000 0.2118000 0.0000000 0.0000000 0.0039220 0.0000000 0.0000000 0.0078430 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1729) V13>4124 724 2225.0 1-1-1-1 (0.4199000 0.000000 0.0082870 0.2707000 0.082870 0.0041440 0.0000000 0.0000000 0.0000000 0.000e+00 0.1146000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0027620 0.0000000 0.0290100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0676800 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

865) V10>291.5 630 1375.0 1-1-1-1 (0.6984000 0.000000 0.0158700 0.0349200 0.017460 0.0047620 0.0000000 0.0000000 0.0000000 0.000e+00 0.0873000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0238100 0.0000000 0.0000000 0.0015870 0.0000000 0.0000000 0.1159000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

433) V3:rp_r/jp,shrub_jp 378 982.2 5-1-1-1 (0.3360000 0.000000 0.0000000 0.0000000 0.021160 0.0105800 0.0211600 0.0000000 0.0000000 2.646e-03 0.1085000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.4683000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0317500 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

217) V2:glcltill 865 1303.0 1-1-1-1 (0.7988000 0.000000 0.0011560 0.0254300 0.000000 0.0000000 0.0000000 0.0080920 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0728300 0.0000000 0.0000000 0.0000000 0.0000000 0.0011560 0.0000000 0.0890200 0.0000000 0.0000000 0.0000000 0.0000000 0.0034680 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

109) V3:othupcon,wp/be/ma 1004 3572.0 1-1-1-1 (0.2819000 0.000000 0.0059760 0.2151000 0.280900 0.0169300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0338600 0.002988 0.0000000 0.0000000 0.0039840 0.0059760 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0059760 0.0000000 0.0000000 0.0149400 0.0000000 0.0000000 0.0727100 0.0000000 0.0587600 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

218) V5:musaloam,san_fsan,siclloam,varies 485 1619.0 1-2-1-1 (0.3072000 0.000000 0.0000000 0.3423000 0.063920 0.0309300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.004124 0.0000000 0.0000000 0.0020620 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0103100 0.0000000 0.0000000 0.0288700 0.0000000 0.0000000 0.1196000 0.0000000 0.0907200 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

219) V5:loam,loamysan,muckpeat,sandyloa,NA 519 1557.0 1-2-2-2 (0.2582000 0.000000 0.0115600 0.0963400 0.483600 0.0038540 0.0000000 0.0000000 0.0000000 0.000e+00 0.0655100 0.001927 0.0000000 0.0000000 0.0057800 0.0115600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0019270 0.0000000 0.0000000 0.0019270 0.0000000 0.0000000 0.0289000 0.0000000 0.0289000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

55) V10>305.5 1870 2332.0 1-1-1-1 (0.8765000 0.000000 0.0213900 0.0005348 0.000000 0.0032090 0.0085560 0.0000000 0.0000000 0.000e+00 0.0224600 0.007487 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0101600 0.0000000 0.0326200 0.0000000 0.0000000 0.0032090 0.0000000 0.0005348 0.0128300 0.0000000 0.0005348 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

7) V2:glcl_out,lake,NA 12817 61060.0 5-2-1-1 (0.0247300 0.013730 0.0141200 0.0299600 0.029260 0.0008582 0.0045250 0.0003901 0.0005461 2.107e-03 0.0020290 0.019740 0.0002341 0.0077240 0.0012480 0.0019510 0.0023410 0.0001560 0.0000000 0.0005461 0.0000000 0.2493000 0.0342500 0.0345600 0.0948000 0.0201300 0.0549300 0.2742000 0.0250400 0.0194300 0.0000000 1.638e-02 0.0028090 0.0085040 0.0050710 0.0029650 0.000000 0.0003121 0.000000 0.0010140 0.000000 0.0000000 0.000e+00 1.560e-04)

14) V3:asp/wbir,bee/heml,p/o_w/rp,rp_r/jp,shrub_jp,wp/be/ma 6196 19010.0 5-1-1-1 (0.0382500 0.001453 0.0001614 0.0474500 0.033570 0.0011300 0.0067790 0.0001614 0.0000000 3.712e-03 0.0030660 0.001937 0.0000000 0.0008070 0.0024210 0.0004842 0.0000000 0.0000000 0.0000000 0.0009684 0.0000000 0.4600000 0.0001614 0.0000000 0.0182400 0.0085540 0.0037120 0.3268000 0.0000000 0.0276000 0.0000000 1.194e-02 0.0000000 0.0004842 0.0000000 0.0000000 0.000000 0.0001614 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

28) V3:asp/wbir,p/o_w/rp,rp_r/jp,shrub_jp 3991 9089.0 5-1-1-1 (0.0496100 0.000000 0.0002506 0.0418400 0.014280 0.0012530 0.0000000 0.0002506 0.0000000 1.754e-03 0.0045100 0.003007 0.0000000 0.0000000 0.0032570 0.0005011 0.0000000 0.0000000 0.0000000 0.0015030 0.0000000 0.6572000 0.0002506 0.0000000 0.0085190 0.0000000 0.0057630 0.2017000 0.0000000 0.0002506 0.0000000 3.508e-03 0.0000000 0.0007517 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

56) V3:p/o_w/rp 2185 6251.0 5-1-1-1 (0.0741400 0.000000 0.0004577 0.0755100 0.024710 0.0000000 0.0000000 0.0004577 0.0000000 3.204e-03 0.0077800 0.005492 0.0000000 0.0000000 0.0059500 0.0009153 0.0000000 0.0000000 0.0000000 0.0013730 0.0000000 0.5098000 0.0004577 0.0000000 0.0100700 0.0000000 0.0077800 0.2668000 0.0000000 0.0004577 0.0000000 4.119e-03 0.0000000 0.0004577 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

112) V12<2716.5 899 2723.0 5-2-1-1 (0.0656300 0.000000 0.0000000 0.0923200 0.046720 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0100100 0.008899 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0033370 0.0000000 0.3248000 0.0000000 0.0000000 0.0166900 0.0000000 0.0100100 0.4182000 0.0000000 0.0000000 0.0000000 2.225e-03 0.0000000 0.0011120 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

113) V12>2716.5 1286 3206.0 5-1-1-1 (0.0800900 0.000000 0.0007776 0.0637600 0.009331 0.0000000 0.0000000 0.0007776 0.0000000 5.443e-03 0.0062210 0.003110 0.0000000 0.0000000 0.0101100 0.0015550 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.6392000 0.0007776 0.0000000 0.0054430 0.0000000 0.0062210 0.1610000 0.0000000 0.0007776 0.0000000 5.443e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

226) V4:modwell,poor,someexce,somepoor,verypoor,well 363 1081.0 5-1-1-1 (0.1322000 0.000000 0.0000000 0.0247900 0.005510 0.0000000 0.0000000 0.0027550 0.0000000 1.928e-02 0.0027550 0.000000 0.0000000 0.0000000 0.0358100 0.0027550 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.5592000 0.0000000 0.0000000 0.0165300 0.0000000 0.0220400 0.1543000 0.0000000 0.0027550 0.0000000 1.928e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

227) V4:excessiv,NA 923 1979.0 5-1-1-1 (0.0595900 0.000000 0.0010830 0.0790900 0.010830 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0075840 0.004334 0.0000000 0.0000000 0.0000000 0.0010830 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.6706000 0.0010830 0.0000000 0.0010830 0.0000000 0.0000000 0.1636000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

57) V3:asp/wbir,rp_r/jp,shrub_jp 1806 2208.0 5-1-1-1 (0.0199300 0.000000 0.0000000 0.0011070 0.001661 0.0027690 0.0000000 0.0000000 0.0000000 0.000e+00 0.0005537 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0016610 0.0000000 0.8355000 0.0000000 0.0000000 0.0066450 0.0000000 0.0033220 0.1229000 0.0000000 0.0000000 0.0000000 2.769e-03 0.0000000 0.0011070 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

29) V3:bee/heml,wp/be/ma 2205 7303.0 5-2-1-1 (0.0176900 0.004082 0.0000000 0.0576000 0.068480 0.0009070 0.0190500 0.0000000 0.0000000 7.256e-03 0.0004535 0.000000 0.0000000 0.0022680 0.0009070 0.0004535 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1029000 0.0000000 0.0000000 0.0358300 0.0240400 0.0000000 0.5533000 0.0000000 0.0771000 0.0000000 2.721e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0004535 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

58) V10<279.5 1844 5232.0 5-2-1-1 (0.0000000 0.004881 0.0000000 0.0390500 0.081890 0.0010850 0.0227800 0.0000000 0.0000000 8.677e-03 0.0000000 0.000000 0.0000000 0.0027110 0.0010850 0.0005423 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0553100 0.0000000 0.0000000 0.0303700 0.0287400 0.0000000 0.6475000 0.0000000 0.0423000 0.0000000 3.254e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0005423 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

116) V10<240.5 634 1171.0 5-2-1-1 (0.0000000 0.000000 0.0000000 0.0000000 0.083600 0.0000000 0.0662500 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0015770 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0015770 0.0000000 0.0000000 0.0000000 0.0820200 0.0000000 0.7429000 0.0000000 0.0000000 0.0000000 2.050e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0015770 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

117) V10>240.5 1210 3569.0 5-2-1-1 (0.0000000 0.007438 0.0000000 0.0595000 0.080990 0.0016530 0.0000000 0.0000000 0.0000000 1.322e-02 0.0000000 0.000000 0.0000000 0.0041320 0.0016530 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0834700 0.0000000 0.0000000 0.0462800 0.0008264 0.0000000 0.5975000 0.0000000 0.0644600 0.0000000 3.884e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

234) V3:bee/heml 521 966.4 5-2-1-1 (0.0000000 0.017270 0.0000000 0.0748600 0.021110 0.0038390 0.0000000 0.0000000 0.0000000 3.071e-02 0.0000000 0.000000 0.0000000 0.0000000 0.0038390 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0403100 0.0000000 0.0000000 0.0307100 0.0000000 0.0000000 0.7774000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

235) V3:wp/be/ma 689 2279.0 5-2-1-1 (0.0000000 0.000000 0.0000000 0.0479000 0.126300 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0072570 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1161000 0.0000000 0.0000000 0.0580600 0.0014510 0.0000000 0.4615000 0.0000000 0.1132000 0.0000000 6.821e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

59) V10>279.5 361 1172.0 5-1-1-1 (0.1080000 0.000000 0.0000000 0.1524000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0027700 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.3463000 0.0000000 0.0000000 0.0637100 0.0000000 0.0000000 0.0720200 0.0000000 0.2548000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

15) V3:n_hardw,othupcon,wetl_h2o,NA 6621 34790.0 5-2-1-1 (0.0120800 0.025220 0.0271900 0.0135900 0.025220 0.0006041 0.0024170 0.0006041 0.0010570 6.041e-04 0.0010570 0.036400 0.0004531 0.0142000 0.0001510 0.0033230 0.0045310 0.0003021 0.0000000 0.0001510 0.0000000 0.0521100 0.0661500 0.0669100 0.1664000 0.0309600 0.1029000 0.2249000 0.0484800 0.0117800 0.0000000 2.054e-02 0.0054370 0.0160100 0.0098170 0.0057390 0.000000 0.0004531 0.000000 0.0019630 0.000000 0.0000000 0.000e+00 3.021e-04)

30) V3:othupcon,wetl_h2o 4150 17820.0 5-2-1-1 (0.0168700 0.002169 0.0053010 0.0204800 0.012770 0.0004819 0.0000000 0.0000000 0.0002410 0.000e+00 0.0000000 0.002892 0.0002410 0.0024100 0.0002410 0.0053010 0.0002410 0.0004819 0.0000000 0.0002410 0.0000000 0.0588000 0.0134900 0.0101200 0.2578000 0.0371100 0.1617000 0.2913000 0.0086750 0.0144600 0.0000000 1.301e-02 0.0086750 0.0253000 0.0156600 0.0091570 0.000000 0.0007229 0.000000 0.0031330 0.000000 0.0000000 0.000e+00 4.819e-04)

60) V10<240.5 735 2982.0 5-1-4-9 (0.0000000 0.000000 0.0000000 0.0000000 0.013610 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0013610 0.0081630 0.0000000 0.0176900 0.0013610 0.0027210 0.0000000 0.0000000 0.0000000 0.0231300 0.0000000 0.0000000 0.0000000 0.2068000 0.3048000 0.1728000 0.0000000 0.0054420 0.0000000 6.395e-02 0.0000000 0.0176900 0.0843500 0.0517000 0.000000 0.0040820 0.000000 0.0176900 0.000000 0.0000000 0.000e+00 2.721e-03)

120) V12<6016.5 363 1609.0 5-2-1-1 (0.0000000 0.000000 0.0000000 0.0000000 0.027550 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0165300 0.0000000 0.0358100 0.0000000 0.0027550 0.0000000 0.0000000 0.0000000 0.0468300 0.0000000 0.0000000 0.0000000 0.0854000 0.0606100 0.2810000 0.0000000 0.0110200 0.0000000 1.074e-01 0.0000000 0.0082640 0.1708000 0.1047000 0.000000 0.0082640 0.000000 0.0275500 0.000000 0.0000000 0.000e+00 5.510e-03) *

121) V12>6016.5 372 851.7 5-1-4-9 (0.0000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0026880 0.0000000 0.0000000 0.0000000 0.0026880 0.0026880 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.3253000 0.5430000 0.0672000 0.0000000 0.0000000 0.0000000 2.151e-02 0.0000000 0.0268800 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0080650 0.000000 0.0000000 0.000e+00 0.000e+00) *

61) V10>240.5 3415 13040.0 5-2-1-1 (0.0205000 0.002635 0.0064420 0.0248900 0.012590 0.0005857 0.0000000 0.0000000 0.0002928 0.000e+00 0.0000000 0.003514 0.0000000 0.0011710 0.0002928 0.0026350 0.0000000 0.0000000 0.0000000 0.0002928 0.0000000 0.0664700 0.0164000 0.0123000 0.3133000 0.0005857 0.1309000 0.3168000 0.0105400 0.0164000 0.0000000 2.050e-03 0.0105400 0.0269400 0.0008785 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

122) V4:modwell,poor,someexce,somepoor,verypoor,well 2452 9140.0 5-1-3-1 (0.0155000 0.003263 0.0020390 0.0191700 0.009788 0.0004078 0.0000000 0.0000000 0.0004078 0.000e+00 0.0000000 0.004078 0.0000000 0.0004078 0.0004078 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0697400 0.0167200 0.0163100 0.4021000 0.0008157 0.1615000 0.2011000 0.0110100 0.0224300 0.0000000 4.078e-04 0.0122300 0.0293600 0.0008157 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

244) V10<304.5 2333 8324.0 5-1-3-1 (0.0150000 0.003429 0.0021430 0.0201500 0.010290 0.0004286 0.0000000 0.0000000 0.0004286 0.000e+00 0.0000000 0.000000 0.0000000 0.0004286 0.0004286 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0677200 0.0167200 0.0004286 0.4196000 0.0008573 0.1646000 0.1989000 0.0098590 0.0235700 0.0000000 4.286e-04 0.0128600 0.0308600 0.0008573 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

488) V7:0-2%,18-25% 1905 6458.0 5-1-3-1 (0.0141700 0.004199 0.0026250 0.0189000 0.010500 0.0000000 0.0000000 0.0000000 0.0005249 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0005249 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0698200 0.0189000 0.0005249 0.4719000 0.0010500 0.1081000 0.2115000 0.0083990 0.0267700 0.0000000 5.249e-04 0.0089240 0.0215200 0.0005249 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

976) V5:musaloam,san_fsan 969 2660.0 5-1-3-1 (0.0123800 0.005160 0.0010320 0.0082560 0.006192 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0010320 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0278600 0.0082560 0.0000000 0.6078000 0.0010320 0.0866900 0.1754000 0.0030960 0.0299300 0.0000000 1.032e-03 0.0175400 0.0061920 0.0010320 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

977) V5:loam,loamysan,muckpeat,sandyloa,siclloam,varies 936 3552.0 5-1-3-1 (0.0160300 0.003205 0.0042740 0.0299100 0.014960 0.0000000 0.0000000 0.0000000 0.0010680 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1132000 0.0299100 0.0010680 0.3312000 0.0010680 0.1303000 0.2489000 0.0138900 0.0235000 0.0000000 0.000e+00 0.0000000 0.0373900 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

1954) V12<1922 247 866.4 5-2-1-1 (0.0242900 0.000000 0.0000000 0.0364400 0.040490 0.0000000 0.0000000 0.0000000 0.0040490 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1174000 0.0242900 0.0000000 0.1215000 0.0000000 0.0404900 0.4939000 0.0364400 0.0080970 0.0000000 0.000e+00 0.0000000 0.0526300 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1955) V12>1922 689 2496.0 5-1-3-1 (0.0130600 0.004354 0.0058060 0.0275800 0.005806 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1118000 0.0319300 0.0014510 0.4064000 0.0014510 0.1626000 0.1611000 0.0058060 0.0290300 0.0000000 0.000e+00 0.0000000 0.0319300 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

489) V7:12-18%,2-6%,6-12% 428 1557.0 5-1-4-9 (0.0186900 0.000000 0.0000000 0.0257000 0.009346 0.0023360 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0023360 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0584100 0.0070090 0.0000000 0.1869000 0.0000000 0.4159000 0.1425000 0.0163600 0.0093460 0.0000000 0.000e+00 0.0303700 0.0724300 0.0023360 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

245) V10>304.5 119 436.3 5-1-2-2 (0.0252100 0.000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.084030 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1092000 0.0168100 0.3277000 0.0588200 0.0000000 0.1008000 0.2437000 0.0336100 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

123) V4:excessiv,NA 963 3080.0 5-2-1-1 (0.0332300 0.001038 0.0176500 0.0394600 0.019730 0.0010380 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.002077 0.0000000 0.0031150 0.0000000 0.0093460

0.0000000 0.0000000 0.0000000 0.0010380 0.0000000 0.0581500 0.0155800 0.0020770 0.0872300 0.0000000
0.0529600 0.6116000 0.0093460 0.0010380 0.0000000 6.231e-03 0.0062310 0.0207700 0.0010380 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

246) V3:othupcon 416 923.5 5-2-1-1 (0.0625000 0.000000 0.0000000 0.0865400 0.000000 0.0000000
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.000000 0.0000000 0.0072120 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0456700 0.0048080 0.0000000 0.1034000 0.0000000
0.0024040 0.6851000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0024040 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

247) V3:wetl_h2o 547 1912.0 5-2-1-1 (0.0109700 0.001828 0.0310800 0.0036560 0.034730 0.0018280
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.003656 0.0000000 0.0000000 0.0000000 0.0164500
0.0000000 0.0000000 0.0000000 0.0018280 0.0000000 0.0676400 0.0237700 0.0036560 0.0749500 0.0000000
0.0914100 0.5558000 0.0164500 0.0018280 0.0000000 1.097e-02 0.0109700 0.0365600 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

31) V3:n_hardw,NA 2471 12520.0 5-1-2-2 (0.0040470 0.063940 0.0639400 0.0020230 0.046140 0.0008094
0.0064750 0.0016190 0.0024280 1.619e-03 0.0028330 0.092680 0.0008094 0.0339900 0.0000000 0.0000000
0.0117400 0.0000000 0.0000000 0.0000000 0.0000000 0.0408700 0.1546000 0.1623000 0.0129500 0.0206400
0.0040470 0.1133000 0.1153000 0.0072850 0.0000000 3.318e-02 0.0000000 0.0004047 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

62) V10<302.5 1606 7792.0 5-1-2-1 (0.0031130 0.040470 0.0946500 0.0031130 0.068490 0.0012450
0.0099630 0.0024910 0.0037360 2.491e-03 0.0043590 0.013080 0.0012450 0.0523000 0.0000000 0.0000000
0.0180600 0.0000000 0.0000000 0.0000000 0.0000000 0.0342500 0.2379000 0.0000000 0.0199300 0.0317600
0.0043590 0.1638000 0.1264000 0.0112100 0.0000000 5.106e-02 0.0000000 0.0006227 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

124) V10<253.5 388 1805.0 2-2-2-3 (0.0000000 0.000000 0.0515500 0.0000000 0.030930 0.0000000
0.0386600 0.0025770 0.0154600 1.031e-02 0.0000000 0.000000 0.0051550 0.2113000 0.0000000 0.0000000
0.0438100 0.0000000 0.0000000 0.0000000 0.0000000 0.0644300 0.0103100 0.0000000 0.0000000 0.1314000
0.0000000 0.1366000 0.0309300 0.0412400 0.0000000 1.727e-01 0.0000000 0.0025770 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

125) V10>253.5 1218 5042.0 5-1-2-1 (0.0041050 0.053370 0.1084000 0.0041050 0.080460 0.0016420
0.0008210 0.0024630 0.0000000 0.000e+00 0.0057470 0.017240 0.0000000 0.0016420 0.0000000 0.0000000
0.0098520 0.0000000 0.0000000 0.0000000 0.0000000 0.0246300 0.3103000 0.0000000 0.0262700 0.0000000
0.0057470 0.1724000 0.1568000 0.0016420 0.0000000 1.232e-02 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

250) V13<4725 827 3230.0 5-1-2-1 (0.0024180 0.059250 0.0979400 0.0060460 0.065300 0.0024180
0.0012090 0.0036280 0.0000000 0.000e+00 0.0024180 0.025390 0.0000000 0.0024180 0.0000000 0.0000000
0.0108800 0.0000000 0.0000000 0.0000000 0.0000000 0.0278100 0.4510000 0.0000000 0.0290200 0.0000000
0.0084640 0.1197000 0.0640900 0.0024180 0.0000000 1.814e-02 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

500) V10<274.5 491 2050.0 5-1-2-1 (0.0000000 0.057030 0.1202000 0.0081470 0.073320 0.0000000
0.0020370 0.0061100 0.0000000 0.000e+00 0.0040730 0.008147 0.0000000 0.0040730 0.0000000 0.0000000
0.0183300 0.0000000 0.0000000 0.0000000 0.0000000 0.0407300 0.3116000 0.0000000 0.0448100 0.0000000
0.0000000 0.1996000 0.0814700 0.0000000 0.0000000 2.037e-02 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

501) V10>274.5 336 943.9 5-1-2-1 (0.0059520 0.062500 0.0654800 0.0029760 0.053570 0.0059520
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.050600 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0089290 0.6548000 0.0000000 0.0059520 0.0000000
0.0208300 0.0029760 0.0386900 0.0059520 0.0000000 1.488e-02 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

251) V13>4725 391 1333.0 5-2-2-1 (0.0076730 0.040920 0.1304000 0.0000000 0.112500 0.0000000
0.0000000 0.0000000 0.0000000 0.000e+00 0.0127900 0.000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0076730 0.0000000 0.0000000 0.0000000 0.0000000 0.0179000 0.0127900 0.0000000 0.0204600 0.0000000
0.0000000 0.2839000 0.3529000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

63) V10>302.5 865 2602.0 5-1-2-2 (0.0057800 0.107500 0.0069360 0.0000000 0.004624 0.0000000
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.240500 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0531800 0.0000000 0.4636000 0.0000000 0.0000000
0.0034680 0.0196500 0.0948000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

APPENDIX C

Buffered Learning Sample Classification Tree

```
> l250.tree
node), split, n, deviance, yval, (yprob)
      * denotes terminal node

  1) root 41443 264500.00 1-1-1-1 ( 0.1311000 0.0086140 0.0385600 0.0227300 0.0420300 0.0058630 0.0206500
0.0022440 0.0051640 0.0266400 0.0081080 0.0280900 0.0269300 0.0076490 0.0047290 0.0069980 0.0166700
4.006e-03 0.0479700 0.0074560 0.0009411 0.0861700 0.010710 0.0132700 0.0345800 0.0097720 0.0234300
0.0905800 0.0071420 0.0079870 0.0008445 4.802e-03 0.0007239 0.0023410 0.0218900 0.1135000 0.005960
0.0273900 0.012570 0.0293200 0.020990 0.0055020 4.947e-03 2.437e-03 )
    2) V2:dunesand,icec_out,lacustri,peatmuck 13584  64830.00 6-1-3-1 ( 0.0087600 0.0000000 0.0102300
0.0005153 0.0025770 0.0000000 0.0027240 0.0000000 0.0022080 0.0097170 0.0000000 0.0000000 0.0201700
0.0008098 0.0058890 0.0000000 0.0008834 9.791e-03 0.1381000 0.0198800 0.0022080 0.0022820 0.000000
0.0000000 0.0103100 0.0010310 0.0077300 0.0093490 0.0000000 0.0000000 0.0025770 3.092e-03 0.0001472
0.0002945 0.0574900 0.3431000 0.018180 0.0814900 0.038350 0.0886300 0.064050 0.0150900 1.502e-02
7.288e-03 )
      4) V2:icec_out 2720   6959.00 3-3-2-2 ( 0.0430100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0003676 0.0000000 0.0110300 0.0183800 0.0000000 0.0000000 0.0000000 0.0000000 0.0294100 0.0000000
0.0000000 4.890e-02 0.6787000 0.0992600 0.0110300 0.0018380 0.000000 0.0000000 0.0000000 0.0000000
0.0386000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0150700 4.412e-03 0.000e+00 )
        8) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o 1188   4501.00 3-3-2-2 ( 0.0984800 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0008418 0.0000000 0.0185200 0.0311400 0.0000000 0.0000000
0.0000000 0.0000000 0.0673400 0.0000000 0.0000000 1.035e-01 0.3249000 0.2273000 0.0008418 0.0042090
0.000000 0.0000000 0.0000000 0.0000000 0.0883800 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00
0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0345100
0.000e+00 0.000e+00 )
         16) V10<276.5 816   2803.00 3-3-2-2 ( 0.0036760 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0269600 0.0453400 0.0000000 0.0000000 0.0000000 0.0000000 0.0808800 0.0000000
0.0000000 1.495e-01 0.4559000 0.0674000 0.0012250 0.0049020 0.000000 0.0000000 0.0000000 0.0000000
0.1140000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0502500 0.000e+00 0.000e+00 )
           32) V3:p/o_w/rp,rp_r/jp 190    478.90 3-3-2-2 ( 0.0157900 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.3421000
0.0000000 0.0000000 5.263e-03 0.3526000 0.2632000 0.0000000 0.0210500 0.000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00 ) *
           33) V3:asp/wbir,othupcon,wetl_h2o 626   1845.00 3-3-2-2 ( 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0351400 0.0591100 0.0000000 0.0000000 0.0000000 0.0000000
0.0015970 0.0000000 0.0000000 1.933e-01 0.4872000 0.0079870 0.0015970 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.1486000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0655000 0.000e+00 0.000e+00 ) *
         17) V10>276.5 372    807.00 3-4-1-1 ( 0.3065000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0026880 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0376300 0.0000000
0.0000000 2.688e-03 0.0376300 0.5780000 0.0000000 0.0026880 0.000000 0.0000000 0.0000000 0.0000000
0.0322600 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00 ) *
        9) V3:bee/heml,n_hardw,wp/be/ma 1532    795.80 3-3-2-2 ( 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0052220 0.0084860 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 6.527e-03 0.9530000 0.0000000 0.0189300 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 7.833e-03 0.000e+00 ) *
```

5) V2:dunesand,lacustri,peatmuck 10864 45100.00 6-1-3-1 (0.0001841 0.0000000 0.0127900 0.0006443 0.0032220 0.0000000 0.0033140 0.0000000 0.0000000 0.0075480 0.0000000 0.0000000 0.0252200 0.0010130 0.0000000 0.0000000 0.0011050 0.000e+00 0.0027610 0.0000000 0.0000000 0.0023930 0.000000 0.0000000 0.0128900 0.0012890 0.0000000 0.0116900 0.0000000 0.0000000 0.0032220 3.866e-03 0.0001841 0.0003682 0.0718900 0.4290000 0.022740 0.1019000 0.047960 0.1108000 0.080080 0.0151000 1.767e-02 9.113e-03)

10) V4:excessiv,someexce,verypoor,well 2152 10260.00 6-1-1-1 (0.0009294 0.0000000 0.0474000 0.0027880 0.0130100 0.0000000 0.0079000 0.0000000 0.0000000 0.0274200 0.0000000 0.0000000 0.1148000 0.0013940 0.0000000 0.0000000 0.0041820 0.000e+00 0.0079000 0.0000000 0.0000000 0.0083640 0.000000 0.0000000 0.0237000 0.0004647 0.0000000 0.0306700 0.0000000 0.0000000 0.0083640 4.647e-03 0.0009294 0.0004647 0.3309000 0.1245000 0.007900 0.0074350 0.005576 0.0511200 0.011150 0.0659900 4.461e-02 4.554e-02)

20) V3:asp/wbir,bee/heml,othupcon,wetl_h2o,wp/be/ma 1186 5972.00 6-1-3-1 (0.0016860 0.0000000 0.0008432 0.0050590 0.0075890 0.0000000 0.0092750 0.0000000 0.0000000 0.0497500 0.0000000 0.0000000 0.0118000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0143300 0.0000000 0.0000000 0.0050590 0.000000 0.0000000 0.0421600 0.0000000 0.0000000 0.0497500 0.0000000 0.0000000 0.0151800 8.432e-03 0.0016860 0.0008432 0.1442000 0.2192000 0.014330 0.0134900 0.010120 0.0902200 0.016020 0.1197000 6.661e-02 8.263e-02)

40) V10<191.5 423 1538.00 6-1-4-9 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0922000 0.0000000 0.0000000 0.0118200 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0283700 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0283700 0.1017000 0.000000 0.0000000 0.000000 0.0047280 0.018910 0.2979000 1.844e-01 2.317e-01) *

41) V10>191.5 763 3479.00 6-1-3-1 (0.0026210 0.0000000 0.0013110 0.0078640 0.0118000 0.0000000 0.0144200 0.0000000 0.0000000 0.0262100 0.0000000 0.0000000 0.0118000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0065530 0.0000000 0.0000000 0.0078640 0.000000 0.0000000 0.0655300 0.0000000 0.0000000 0.0773300 0.0000000 0.0000000 0.0235900 1.311e-02 0.0026210 0.0013110 0.2084000 0.2844000 0.022280 0.0209700 0.015730 0.1376000 0.014420 0.0209700 1.311e-03 0.000e+00)

82) V10<223.5 587 2244.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0170400 0.0000000 0.0000000 0.0306600 0.0000000 0.0000000 0.0085180 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0085180 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0051110 0.0000000 0.0000000 0.0306600 1.704e-02 0.0000000 0.0000000 0.2300000 0.3680000 0.027260 0.0221500 0.020440 0.1670000 0.018740 0.0272600 1.704e-03 0.000e+00) *

83) V10>223.5 176 689.60 5-2-1-1 (0.0113600 0.0000000 0.0056820 0.0340900 0.0511400 0.0000000 0.0056820 0.0000000 0.0000000 0.0113600 0.0000000 0.0000000 0.0227300 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0340900 0.000000 0.0000000 0.2841000 0.0000000 0.0000000 0.3182000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0113600 0.0056820 0.1364000 0.0056820 0.005682 0.0170500 0.000000 0.0397700 0.000000 0.0000000 0.000e+00 0.000e+00) *

21) V3:n_hardw,p/o_w/rp,rp_r/jp,shrub_jp,NA 966 2578.00 6-1-1-1 (0.0000000 0.0000000 0.1046000 0.0000000 0.0196700 0.0000000 0.0062110 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.2412000 0.0031060 0.0000000 0.0000000 0.0093170 0.000e+00 0.0000000 0.0000000 0.0000000 0.0124200 0.000000 0.0000000 0.0010350 0.0010350 0.0000000 0.0072460 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.5600000 0.0082820 0.000000 0.0000000 0.000000 0.0031060 0.005176 0.0000000 1.760e-02 0.000e+00) *

11) V4:modwell,poor,somepoor,NA 8712 29400.00 6-1-3-1 (0.0000000 0.0000000 0.0042470 0.0001148 0.0008035 0.0000000 0.0021810 0.0000000 0.0000000 0.0026400 0.0000000 0.0000000 0.0030990 0.0009183 0.0000000 0.0000000 0.0003444 0.000e+00 0.0014920 0.0000000 0.0000000 0.0009183 0.000000 0.0000000 0.0102200 0.0014920 0.0000000 0.0070020 0.0000000 0.0000000 0.0019510 3.673e-03 0.0000000 0.0003444 0.0079200 0.5042000 0.026400 0.1252000 0.058430 0.1256000 0.097110 0.0025250 1.102e-02 1.148e-04)

22) V5:grloasan,loam,siclloam 2017 6561.00 6-1-3-3 (0.0000000 0.0000000 0.0029750 0.0000000 0.0024790 0.0000000 0.0029750 0.0000000 0.0000000 0.0039660 0.0000000 0.0000000 0.0069410 0.0009916 0.0000000 0.0000000 0.0000000 0.000e+00 0.0014870 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0014870 0.0014870 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0004958 0.0019830 0.1284000 0.014870 0.3778000 0.176000 0.0302400 0.241900 0.0034710 0.000e+00 0.000e+00)

44) V10<197.5 508 1025.00 6-1-4-4 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0157500 0.0000000 0.0000000 0.0137800 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0059060 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0078740 0.1398000 0.000000 0.0157500 0.043310 0.0118100 0.732300 0.0137800 0.000e+00 0.000e+00) *

45) V10>197.5 1509 4411.00 6-1-3-3 (0.0000000 0.0000000 0.0039760 0.0000000 0.0033130 0.0000000 0.0039760 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0046390 0.0013250 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0019880 0.0019880 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0006627 0.0000000 0.1246000 0.019880 0.4997000 0.220700 0.0364500 0.076870 0.0000000 0.000e+00 0.000e+00)

90) V5:grloasan,loam 868 2096.00 6-1-3-3 (0.0000000 0.0000000 0.0069120 0.0000000 0.0057600 0.0000000 0.0069120 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0080650 0.0023040 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0034560 0.0034560 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0011520 0.0000000 0.1325000 0.024190 0.6740000 0.011520 0.0460800 0.073730 0.0000000 0.000e+00 0.000e+00) *

91) V5:siclloam 641 1661.00 6-1-3-4 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.1139000 0.014040 0.2637000 0.503900 0.0234000 0.081120 0.0000000 0.000e+00 0.000e+00) *

23) V5:loamysan,musaloam,san_fsan,sandyloa,NA 6695 19400.00 6-1-3-1 (0.0000000 0.0000000 0.0046300 0.0001494 0.0002987 0.0000000 0.0019420 0.0000000 0.0000000 0.0022400 0.0000000 0.0000000 0.0019420 0.0008962 0.0000000 0.0000000 0.0004481 0.000e+00 0.0014940 0.0000000 0.0000000 0.0011950 0.000000 0.0000000 0.0128500 0.0014940 0.0000000 0.0091110 0.0000000 0.0000000 0.0025390 4.780e-03 0.0000000 0.0002987 0.0097090 0.6175000 0.029870 0.0491400 0.023000 0.1543000 0.053470 0.0022400 1.434e-02 1.494e-04)

46) V3:bee/heml,othupcon 4309 8430.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0002321 0.0000000 0.0000000 0.0016250 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0002321 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0002321 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0102100 0.0000000 0.0000000 0.0055700 0.0000000 0.0000000 0.0032490 3.481e-03 0.0000000 0.0000000 0.0044090 0.7784000 0.044790 0.0496600 0.033420 0.0334200 0.029710 0.0013920 0.000e+00 0.000e+00)

92) V10<221.5 4060 6513.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0014780 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0002463 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0002463 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0002463 0.0000000 0.0000000 0.0034480 3.695e-03 0.0000000 0.0000000 0.0014780 0.8209000 0.034730 0.0406400 0.035470 0.0243800 0.031530 0.0014780 0.000e+00 0.000e+00)

184) V13<6970.5 3180 4155.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0018870 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0003145 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0003145 0.0000000 0.0000000 0.0044030 4.717e-03 0.0000000 0.0000000 0.0018870 0.8642000 0.041190 0.0267300 0.022960 0.0179200 0.012260 0.0012580 0.000e+00 0.000e+00)

368) V3:bee/heml 446 1176.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0134500 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0022420 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0022420 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.6009000 0.116600 0.0291500 0.132300 0.0515700 0.051570 0.0000000 0.000e+00 0.000e+00) *

369) V3:othupcon 2734 2607.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0051210 5.486e-03 0.0000000 0.0000000 0.0021950 0.9071000 0.028900 0.0263400 0.005121 0.0124400 0.005852 0.0014630 0.000e+00 0.000e+00) *

185) V13>6970.5 880 2010.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0011360 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.6648000 0.011360 0.0909100 0.080680 0.0477300 0.101100 0.0022730 0.000e+00 0.000e+00) *

93) V10>221.5 249 941.00 6-1-3-1/A (0.0000000 0.0000000 0.0000000 0.0040160 0.0000000 0.0000000 0.0040160 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.1767000 0.0000000 0.0000000 0.0923700 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0522100 0.0843400 0.208800 0.1968000 0.000000 0.1807000 0.000000 0.0000000 0.000e+00 0.000e+00) *

47) V3:asp/wbir,n_hardw,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma,NA 2386 8506.00 6-1-4-1 (
0.0000000 0.0000000 0.0129900 0.0000000 0.0008382 0.0000000 0.0025150 0.0000000 0.0000000 0.0062870
0.0000000 0.0000000 0.0050290 0.0025150 0.0000000 0.0000000 0.0012570 0.000e+00 0.0037720 0.0000000
0.0000000 0.0033530 0.000000 0.0000000 0.0176000 0.0041910 0.0000000 0.0155100 0.0000000 0.0000000
0.0012570 7.125e-03 0.0000000 0.0008382 0.0192800 0.3269000 0.002934 0.0482000 0.004191 0.3726000
0.096400 0.0037720 4.023e-02 4.191e-04)
94) V10<190.5 298 1012.00 6-3-1-1 (0.0000000 0.0000000 0.0167800 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0503400 0.0000000 0.0000000 0.0201300 0.0000000 0.0000000 0.0000000
0.0000000 0.000e+00 0.0201300 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0033560 0.0000000 0.0000000 0.0000000 3.356e-03 0.0000000 0.0000000 0.0167800 0.2315000
0.000000 0.0000000 0.000000 0.0134200 0.278500 0.0201300 3.221e-01 3.356e-03) *
95) V10>190.5 2088 6631.00 6-1-4-1 (0.0000000 0.0000000 0.0124500 0.0000000 0.0009579 0.0000000
0.0028740 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0028740 0.0028740 0.0000000 0.0000000
0.0014370 0.000e+00 0.0014370 0.0000000 0.0000000 0.0038310 0.000000 0.0000000 0.0201100 0.0047890
0.0000000 0.0172400 0.0000000 0.0000000 0.0014370 7.663e-03 0.0000000 0.0009579 0.0196400 0.3405000
0.003352 0.0550800 0.004789 0.4239000 0.070400 0.0014370 0.000e+00 0.000e+00)
190) V10<237 1981 5540.00 6-1-4-1 (0.0000000 0.0000000 0.0101000 0.0000000 0.0000000 0.0000000
0.0030290 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0025240 0.0010100 0.0000000 0.0000000
0.0000000 0.000e+00 0.0015140 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0050480
0.0000000 0.0020190 0.0000000 0.0000000 0.0015140 8.077e-03 0.0000000 0.0005048 0.0166600 0.3589000
0.003534 0.0580500 0.005048 0.4467000 0.074200 0.0015140 0.000e+00 0.000e+00)
380) V3:asp/wbir,p/o_w/rp,wetl_h2o 1822 4364.00 6-1-4-1 (0.0000000 0.0000000 0.0010980
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000
0.0000000 0.0000000 0.0021950 0.0000000 0.0000000 0.0000000 0.0000000 0.0016470 6.037e-03 0.0000000
0.0005488 0.0142700 0.3836000 0.003842 0.0312800 0.005488 0.4808000 0.067510 0.0016470 0.000e+00
0.000e+00)
760) V12<10248 1635 3603.00 6-1-4-1 (0.0000000 0.0000000 0.0012230 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000
0.0024460 0.0000000 0.0000000 0.0000000 0.0000000 0.0018350 6.728e-03 0.0000000 0.0006116 0.0140700
0.3743000 0.004281 0.0269100 0.006116 0.5284000 0.033030 0.0000000 0.000e+00 0.000e+00)
1520) V13<11283.5 1503 3186.00 6-1-4-1 (0.0000000 0.0000000 0.0013310 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000
0.0026610 0.0000000 0.0000000 0.0000000 0.0000000 0.0019960 7.319e-03 0.0000000 0.0006653 0.0153000
0.4039000 0.004657 0.0192900 0.006653 0.5170000 0.019290 0.0000000 0.000e+00 0.000e+00)
3040) V3:asp/wbir,p/o_w/rp 323 370.10 6-1-4-1 (0.0000000 0.0000000 0.0030960 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000
0.0092880 0.2012000 0.000000 0.0000000 0.000000 0.7864000 0.000000 0.0000000 0.000e+00 0.000e+00) *
3041) V3:wetl_h2o 1180 2667.00 6-1-3-1 (0.0000000 0.0000000 0.0008475 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000
0.0033900 0.0000000 0.0000000 0.0000000 0.0000000 0.0025420 9.322e-03 0.0000000 0.0008475 0.0169500
0.4593000 0.005932 0.0245800 0.008475 0.4432000 0.024580 0.0000000 0.000e+00 0.000e+00)
6082) V10<221.5 1089 2421.00 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0027550 1.010e-02 0.0000000 0.0000000 0.0174500
0.4968000 0.005510 0.0266300 0.009183 0.4050000 0.026630 0.0000000 0.000e+00 0.000e+00) *
6083) V10>221.5 91 87.18 6-1-4-1 (0.0000000 0.0000000 0.0109900 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000
0.0439600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0109900 0.0109900
0.0109900 0.010990 0.0000000 0.000000 0.9011000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1521) V13>11283.5 132 253.70 6-1-4-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0378800 0.000000 0.1136000 0.000000 0.6591000 0.189400 0.0000000 0.000e+00 0.000e+00) *

761) V12>10248 187 455.60 6-1-3-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0160400 0.4652000 0.000000 0.0695200 0.000000 0.0641700 0.369000 0.0160400 0.000e+00 0.000e+00) *

381) V3:n_hardw,wp/be/ma,NA 159 662.20 6-1-3-3 (0.0000000 0.0000000 0.1132000 0.0000000 0.0000000 0.0000000 0.0377400 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0314500 0.0125800 0.0000000 0.0000000 0.0000000 0.000e+00 0.0188700 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0377400 0.0000000 0.0251600 0.0000000 0.0000000 0.0000000 3.145e-02 0.0000000 0.0000000 0.0440300 0.0754700 0.000000 0.3648000 0.000000 0.0566000 0.150900 0.0000000 0.000e+00 0.000e+00) *

191) V10>237 107 355.70 5-1-3-1 (0.0000000 0.0000000 0.0560700 0.0000000 0.0186900 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0093460 0.0373800 0.0000000 0.0000000 0.0280400 0.000e+00 0.0000000 0.0000000 0.0000000 0.0747700 0.000000 0.0000000 0.3925000 0.0000000 0.0000000 0.2991000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0093460 0.0747700 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

3) V2:endmorai,glcl_out,glcltill,lake,NA 27859 159300.00 1-1-1-1 (0.1907000 0.0128100 0.0523700 0.0335600 0.0612700 0.0087220 0.0294000 0.0033380 0.0066050 0.0348900 0.0120600 0.0417800 0.0302200 0.0109800 0.0041640 0.0104100 0.0243700 1.185e-03 0.0040200 0.0014000 0.0003231 0.1271000 0.015940 0.0197400 0.0464100 0.0140300 0.0310900 0.1302000 0.0106200 0.0118800 0.0000000 5.636e-03 0.0010050 0.0033380 0.0045230 0.0015790 0.000000 0.0010050 0.000000 0.0003948 0.000000 0.0008256 3.590e-05 7.179e-05)

6) V2:endmorai,glcltill 16292 86670.00 1-1-1-1 (0.3102000 0.0124600 0.0794300 0.0376900 0.0840900 0.0145500 0.0475100 0.0055240 0.0110500 0.0584300 0.0194000 0.0582500 0.0515000 0.0131400 0.0064450 0.0166300 0.0402000 1.964e-03 0.0068750 0.0020260 0.0005524 0.0339400 0.003315 0.0080410 0.0128300 0.0093910 0.0168800 0.0225300 0.0001228 0.0061380 0.0000000 6.138e-05 0.0000000 0.0008593 0.0044810 0.0004910 0.000000 0.0015960 0.000000 0.0000000 0.000000 0.0014120 6.138e-05 0.000e+00)

12) V3:bee/heml,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wp/be/ma 8349 31950.00 1-1-1-1 (0.5111000 0.0000000 0.0185700 0.0674300 0.1058000 0.0154500 0.0571300 0.0008384 0.0005989 0.0192800 0.0309000 0.0015570 0.0027550 0.0000000 0.0115000 0.0258700 0.0004791 1.198e-04 0.0039530 0.0039530 0.0009582 0.0588100 0.000000 0.0000000 0.0068270 0.0001198 0.0010780 0.0355700 0.0000000 0.0070670 0.0000000 0.000e+00 0.0000000 0.0000000 0.0083840 0.0005989 0.000000 0.0029940 0.000000 0.0000000 0.000000 0.0002395 1.198e-04 0.000e+00)

24) V3:p/o_w/rp,rp_r/jp,shrub_jp 4419 12390.00 1-1-1-1 (0.6465000 0.0000000 0.0122200 0.0681100 0.0255700 0.0027160 0.0049790 0.0015840 0.0000000 0.0097310 0.0493300 0.0022630 0.0000000 0.0000000 0.0174200 0.0000000 0.0000000 0.000e+00 0.0013580 0.0074680 0.0000000 0.1070000 0.000000 0.0000000 0.0002263 0.0000000 0.0018100 0.0258000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0156100 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 2.263e-04 0.000e+00)

48) V3:p/o_w/rp 3322 8555.00 1-1-1-1 (0.6782000 0.0000000 0.0162600 0.0906100 0.0316100 0.0024080 0.0000000 0.0009031 0.0000000 0.0111400 0.0532800 0.0030100 0.0000000 0.0000000 0.0231800 0.0000000 0.0000000 0.000e+00 0.0018060 0.0030100 0.0000000 0.0496700 0.000000 0.0000000 0.0003010 0.0000000 0.0003010 0.0343200 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

96) V2:endmorai 2389 6386.00 1-1-1-1 (0.6258000 0.0000000 0.0226000 0.1168000 0.0439500 0.0033490 0.0000000 0.0000000 0.0000000 0.0000000 0.0740900 0.0041860 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0041860 0.0000000 0.0569300 0.000000 0.0000000 0.0004186 0.0000000 0.0000000 0.0477200 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

192) V10<294.5 1231 4007.00 1-1-1-1 (0.4346000 0.0000000 0.0154300 0.2193000 0.0836700 0.0048740 0.0000000 0.0000000 0.0000000 0.0000000 0.0885500 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0081230 0.0000000 0.0909800 0.000000 0.0000000 0.0008123 0.0000000 0.0000000 0.0536100 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

384) V13<2977 216 696.60 5-1-1-1 (0.3287000 0.0000000 0.0601900 0.1111000 0.0370400 0.0138900 0.0000000 0.0000000 0.0000000 0.0000000 0.0555600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0185200 0.0000000 0.3657000 0.000000 0.0000000 0.0046300 0.0000000 0.0000000 0.0046300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

385) V13>2977 1015 3071.00 1-1-1-1 (0.4571000 0.0000000 0.0059110 0.2424000 0.0936000 0.0029560 0.0000000 0.0000000 0.0000000 0.0000000 0.0955700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0059110 0.0000000 0.0325100 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0640400 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

770) V10<249.5 31 14.83 1-2-2-2 (0.0000000 0.0000000 0.0000000 0.0000000 0.9355000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0645200 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

771) V10>249.5 984 2911.00 1-1-1-1 (0.4715000 0.0000000 0.0060980 0.2500000 0.0670700 0.0030490 0.0000000 0.0000000 0.0000000 0.0000000 0.0985800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0060980 0.0000000 0.0315000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0660600 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

1542) V4:someexce,well 304 1058.00 1-1-1-1 (0.3586000 0.0000000 0.0164500 0.1974000 0.1480000 0.0098680 0.0000000 0.0000000 0.0000000 0.0000000 0.1480000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0164500 0.0000000 0.0394700 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0657900 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1543) V4:excessiv,modwell,poor,somepoor,verypoor,NA 680 1764.00 1-1-1-1 (0.5221000 0.0000000 0.0014710 0.2735000 0.0308800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0764700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0014710 0.0000000 0.0279400 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0661800 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

193) V10>294.5 1158 1716.00 1-1-1-1 (0.8290000 0.0000000 0.0302200 0.0077720 0.0017270 0.0017270 0.0000000 0.0000000 0.0000000 0.0000000 0.0587200 0.0086360 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0207300 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0414500 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

97) V2:glcltill 933 1413.00 1-1-1-1 (0.8124000 0.0000000 0.0000000 0.0235800 0.0000000 0.0000000 0.0000000 0.0032150 0.0000000 0.0396600 0.0000000 0.0000000 0.0000000 0.0000000 0.0825300 0.0000000 0.0000000 0.000e+00 0.0064310 0.0000000 0.0000000 0.0310800 0.000000 0.0000000 0.0000000 0.0000000 0.0010720 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

49) V3:rp_r/jp,shrub_jp 1097 2820.00 1-1-1-1 (0.5506000 0.0000000 0.0000000 0.0000000 0.0072930 0.0036460 0.0200500 0.0036460 0.0000000 0.0054690 0.0373700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0209700 0.0000000 0.2808000 0.000000 0.0000000 0.0000000 0.0000000 0.0063810 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0629000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 9.116e-04 0.000e+00)

98) V10<273.5 408 1064.00 5-1-1-1 (0.3284000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0098040 0.0000000 0.0147100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0220600 0.0000000 0.4363000 0.000000 0.0000000 0.0000000 0.0000000 0.0171600 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.1691000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 2.451e-03 0.000e+00) *

99) V10>273.5 689 1398.00 1-1-1-1 (0.6821000 0.0000000 0.0000000 0.0000000 0.0116100 0.0058060 0.0319300 0.0000000 0.0000000 0.0000000 0.0595100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0203200 0.0000000 0.1887000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

25) V3:bee/heml,othupcon,wp/be/ma 3930 16470.00 1-1-1-1 (0.3588000 0.0000000 0.0257000 0.0666700 0.1959000 0.0297700 0.1158000 0.0000000 0.0012720 0.0300300 0.0101800 0.0007634 0.0058520 0.0000000 0.0048350 0.0549600 0.0010180 2.545e-04 0.0068700 0.0000000 0.0020360 0.0045800 0.000000 0.0000000 0.0142500 0.0002545 0.0002545 0.0465600 0.0000000 0.0150100 0.0000000 0.000e+00 0.0000000 0.0000000 0.0002545 0.0012720 0.000000 0.0063610 0.000000 0.0000000 0.000000 0.0005089 0.000e+00 0.000e+00)

50) V10<294.5 2377 10880.00 1-2-2-2 (0.0950800 0.0000000 0.0197700 0.0811900 0.3143000 0.0391200 0.1422000 0.0000000 0.0021030 0.0496400 0.0029450 0.0000000 0.0096760 0.0000000 0.0079930 0.0908700 0.0016830 4.207e-04 0.0113600 0.0000000 0.0033660 0.0067310 0.000000 0.0000000 0.0189300 0.0004207 0.0004207 0.0643700 0.0000000 0.0235600 0.0000000 0.000e+00 0.0000000 0.0000000 0.0004207 0.0021030 0.000000 0.0105200 0.000000 0.0000000 0.000000 0.0008414 0.000e+00 0.000e+00)

100) V3:bee/heml 846 3380.00 2-1-2-3 (0.0248200 0.0000000 0.0484600 0.0425500 0.1182000 0.0969300 0.3889000 0.0000000 0.0059100 0.1395000 0.0000000 0.0000000 0.0047280 0.0000000 0.0011820 0.0000000 0.0000000 0.000e+00 0.0271900 0.0000000 0.0094560 0.0130000 0.000000 0.0000000 0.0059100 0.0000000 0.0000000 0.0685600 0.0000000 0.0035460 0.0000000 0.000e+00 0.0000000 0.0000000 0.0011820 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

200) V2:endmorai 586 1893.00 2-1-2-3 (0.0000000 0.0000000 0.0699700 0.0614300 0.1706000 0.0324200 0.4983000 0.0000000 0.0000000 0.0341300 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0187700 0.000000 0.0000000 0.0085320 0.0000000 0.0000000 0.0989800 0.0000000 0.0051190 0.0000000 0.000e+00 0.0000000 0.0000000 0.0017060 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

201) V2:glcltill 260 871.10 2-1-3-4 (0.0807700 0.0000000 0.0000000 0.0000000 0.0000000 0.2423000 0.1423000 0.0000000 0.0192300 0.3769000 0.0000000 0.0000000 0.0153800 0.0000000 0.0038460 0.0000000 0.0000000 0.000e+00 0.0884600 0.0000000 0.0307700 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

101) V3:othupcon,wp/be/ma 1531 5832.00 1-2-2-2 (0.1339000 0.0000000 0.0039190 0.1025000 0.4226000 0.0071850 0.0058790 0.0000000 0.0000000 0.0000000 0.0045720 0.0000000 0.0124100 0.0000000 0.0117600 0.1411000 0.0026130 6.532e-04 0.0026130 0.0000000 0.0000000 0.0032660 0.000000 0.0000000 0.0261300 0.0006532 0.0006532 0.0620500 0.0000000 0.0346200 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0032660 0.000000 0.0163300 0.000000 0.0000000 0.000000 0.0013060 0.000e+00 0.000e+00)

202) V10<268.5 922 3042.00 1-2-2-2 (0.0629100 0.0000000 0.0000000 0.0108500 0.4892000 0.0000000 0.0097610 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0206100 0.0000000 0.0195200 0.2343000 0.0043380 1.085e-03 0.0043380 0.0000000 0.0000000 0.0054230 0.000000 0.0000000 0.0368800 0.0010850 0.0010850 0.0639900 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0054230 0.000000 0.0271100 0.000000 0.0000000 0.000000 0.0021690 0.000e+00 0.000e+00)

404) V3:othupcon 167 701.70 5-1-3-1 (0.1677000 0.0000000 0.0000000 0.0059880 0.0778400 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1138000 0.0000000 0.1078000 0.0000000 0.0000000 5.988e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.1976000 0.0000000 0.0059880 0.1257000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0299400 0.000000 0.1497000 0.000000 0.0000000 0.000000 0.0119800 0.000e+00 0.000e+00) *

405) V3:wp/be/ma 755 1758.00 1-2-2-2 (0.0397400 0.0000000 0.0000000 0.0119200 0.5801000 0.0000000 0.0119200 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.2861000 0.0052980 0.000e+00 0.0052980 0.0000000 0.0000000 0.0066230 0.000000 0.0000000 0.0013250 0.0013250 0.0000000 0.0503300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

203) V10>268.5 609 2004.00 1-2-2-2 (0.2414000 0.0000000 0.0098520 0.2414000 0.3218000 0.0180600 0.0000000 0.0000000 0.0000000 0.0000000 0.0114900 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0098520 0.0000000 0.0000000 0.0591100 0.0000000 0.0870300 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

51) V10>294.5 1553 3135.00 1-1-1-1 (0.7624000 0.0000000 0.0347700 0.0444300 0.0148100 0.0154500 0.0753400 0.0000000 0.0000000 0.0000000 0.0212500 0.0019320 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0012880 0.000000 0.0000000 0.0070830 0.0000000 0.0000000 0.0193200 0.0000000 0.0019320 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

102) V10<313.5 526 1863.00 1-1-1-1 (0.4392000 0.0000000 0.0494300 0.1312000 0.0437300 0.0342200 0.1768000 0.0000000 0.0000000 0.0000000 0.0570300 0.0057030 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0038020 0.000000 0.0000000 0.0209100 0.0000000 0.0000000 0.0323200 0.0000000 0.0057030 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

103) V10>313.5 1027 734.90 1-1-1-1 (0.9279000 0.0000000 0.0272600 0.0000000 0.0000000 0.0058420 0.0233700 0.0000000 0.0000000 0.0000000 0.0029210 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0126600 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

13) V3:asp/wbir,n_hardw,wetl_h2o,NA 7943 44370.00 1-1-2-2 (0.0989600 0.0255600 0.1434000 0.0064210 0.0613100 0.0136000 0.0373900 0.0104500 0.0220300 0.0995800 0.0073020 0.1178000 0.1027000 0.0269400 0.0011330 0.0069240 0.0819600 3.903e-03 0.0099460 0.0000000 0.0001259 0.0078060 0.006798 0.0164900 0.0191400 0.0191400 0.0334900 0.0088130 0.0002518 0.0051620 0.0000000 1.259e-04 0.0000000 0.0017630 0.0003777 0.0003777 0.000000 0.0001259 0.000000 0.0000000 0.000000 0.0026440 0.000e+00 0.000e+00)

26) V10<271.5 4201 20980.00 2-2-2-2 (0.0302300 0.0002380 0.0823600 0.0014280 0.0716500 0.0004761 0.0135700 0.0099980 0.0416600 0.1883000 0.0000000 0.0000000 0.1942000 0.0509400 0.0014280 0.0130900 0.1285000 7.379e-03 0.0188100 0.0000000 0.0002380 0.0035710 0.004047 0.0000000 0.0257100 0.0361800 0.0583200 0.0073790 0.0000000 0.0000000 0.0000000 2.380e-04 0.0000000 0.0033330 0.0007141 0.0007141 0.000000 0.0002380 0.000000 0.0000000 0.000000 0.0049990 0.000e+00 0.000e+00)

52) V3:asp/wbir,wetl_h2o 1648 6974.00 2-1-3-4 (0.0443000 0.0000000 0.0030340 0.0036410 0.0527900 0.0012140 0.0084950 0.0054610 0.0333700 0.4363000 0.0000000 0.0000000 0.0473300 0.0042480 0.0036410 0.0321600 0.0072820 1.881e-02 0.0042480 0.0000000 0.0006068 0.0048540 0.001214 0.0000000 0.0655300 0.0382300 0.1456000 0.0127400 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0084950 0.0018200 0.0018200 0.000000 0.0006068 0.000000 0.0000000 0.000000 0.0121400 0.000e+00 0.000e+00)

104) V10<221.5 686 937.00 2-1-3-4 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0029150 0.0058310 0.0000000 0.0072890 0.8294000 0.0000000 0.0000000 0.1035000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0029150 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0131200 0.0000000 0.0043730 0.000000 0.0014580 0.000000 0.0000000 0.000000 0.0291500 0.000e+00 0.000e+00) *

105) V10>221.5 962 4659.00 5-1-4-9 (0.0758800 0.0000000 0.0051980 0.0062370 0.0904400 0.0000000 0.0104000 0.0093560 0.0519800 0.1559000 0.0000000 0.0000000 0.0072770 0.0072770 0.0062370 0.0550900 0.0124700 3.222e-02 0.0051980 0.0000000 0.0010400 0.0083160 0.002079 0.0000000 0.1123000 0.0654900 0.2495000 0.0218300 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0051980 0.0031190 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

210) V2:endmorai 303 1255.00 5-1-3-1 (0.0627100 0.0000000 0.0165000 0.0198000 0.2508000 0.0000000 0.0297000 0.0000000 0.0000000 0.0297000 0.0000000 0.0000000 0.0066010 0.0099010 0.0000000 0.1551000 0.0033000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0231000 0.006601 0.0000000 0.2838000 0.0099010 0.0000000 0.0693100 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0165000 0.0066010 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

211) V2:glcltill 659 2635.00 5-1-4-9 (0.0819400 0.0000000 0.0000000 0.0000000 0.0166900 0.0000000 0.0015170 0.0136600 0.0758700 0.2140000 0.0000000 0.0000000 0.0075870 0.0060700 0.0091050 0.0091050 0.0166900 4.704e-02 0.0075870 0.0000000 0.0015170 0.0015170 0.000000 0.0000000 0.0333800 0.0910500 0.3642000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0015170 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

53) V3:n_hardw,NA 2553 10870.00 2-2-2-2 (0.0211500 0.0003917 0.1336000 0.0000000 0.0838200 0.0000000 0.0168400 0.0129300 0.0470000 0.0282000 0.0000000 0.0000000 0.2891000 0.0810800 0.0000000 0.0007834 0.2068000 0.000e+00 0.0282000 0.0000000 0.0000000 0.0027420 0.005875 0.0000000 0.0000000 0.0348600 0.0019580 0.0039170 0.0000000 0.0000000 0.0000000 3.917e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0003917 0.000e+00 0.000e+00)

106) V10<228.5 954 2504.00 2-2-2-2 (0.0010480 0.0000000 0.0775700 0.0000000 0.0020960 0.0000000 0.0387800 0.0000000 0.0304000 0.0702300 0.0000000 0.0000000 0.6667000 0.0094340 0.0000000 0.0000000 0.0115300 0.000e+00 0.0587000 0.0000000 0.0000000 0.0041930 0.004193 0.0000000 0.0000000 0.0241100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0010480 0.000e+00 0.000e+00) *

107) V10>228.5 1599 6563.00 2-3-2-3 (0.0331500 0.0006254 0.1670000 0.0000000 0.1326000 0.0000000 0.0037520 0.0206400 0.0569100 0.0031270 0.0000000 0.0000000 0.0637900 0.1238000 0.0000000 0.0012510 0.3233000 0.000e+00 0.0100100 0.0000000 0.0000000 0.0018760 0.006879 0.0000000 0.0000000 0.0412800 0.0031270 0.0062540 0.0000000 0.0000000 0.0000000 6.254e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

214) V2:endmorai 885 2974.00 2-3-2-3 (0.0440700 0.0011300 0.2768000 0.0000000 0.2113000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0452000 0.0949200 0.0000000 0.0022600 0.2994000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.012430 0.0000000 0.0000000 0.0000000 0.0000000 0.0113000 0.0000000 0.0000000 0.0000000 1.130e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

428) V13<3823 642 2216.00 1-1-2-2 (0.0607500 0.0000000 0.3676000 0.0000000 0.1340000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0576300 0.1246000 0.0000000 0.0031150 0.2181000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.017130 0.0000000 0.0000000 0.0000000 0.0000000 0.0155800 0.0000000 0.0000000 0.0000000 1.558e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

429) V13>3823 243 473.10 2-3-2-3 (0.0000000 0.0041150 0.0370400 0.0000000 0.4156000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0123500 0.0164600 0.0000000 0.0000000 0.5144000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

215) V2:glcltill 714 2880.00 2-3-2-3 (0.0196100 0.0000000 0.0308100 0.0000000 0.0350100 0.0000000 0.0084030 0.0462200 0.1275000 0.0070030 0.0000000 0.0000000 0.0868300 0.1597000 0.0000000 0.0000000 0.3529000 0.000e+00 0.0224100 0.0000000 0.0000000 0.0042020 0.000000 0.0000000 0.0000000 0.0924400 0.0070030 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

430) V10<258.5 562 2069.00 2-3-2-3 (0.0160100 0.0000000 0.0142300 0.0000000 0.0000000 0.0000000 0.0106800 0.0017790 0.1548000 0.0088970 0.0000000 0.0000000 0.1068000 0.1922000 0.0000000 0.0000000 0.3399000 0.000e+00 0.0284700 0.0000000 0.0000000 0.0035590 0.000000 0.0000000 0.0000000 0.1174000 0.0053380 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

431) V10>258.5 152 514.90 2-3-2-3 (0.0328900 0.0000000 0.0921100 0.0000000 0.1645000 0.0000000 0.0000000 0.2105000 0.0263200 0.0000000 0.0000000 0.0000000 0.0131600 0.0394700 0.0000000 0.0000000 0.4013000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0065790 0.000000 0.0000000 0.0000000 0.0000000 0.0131600 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

27) V10>271.5 3742 16790.00 2-2-2-1 (0.1761000 0.0539800 0.2119000 0.0120300 0.0497100 0.0283300 0.0641400 0.0109600 0.0000000 0.0000000 0.0155000 0.2501000 0.0000000 0.0000000 0.0008017 0.0000000 0.0296600 0.000e+00 0.0000000 0.0000000 0.0000000 0.0125600 0.009888 0.0350100 0.0117600 0.0000000 0.0056120 0.0104200 0.0005345 0.0109600 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

54) V10<296.5 1371 6346.00 1-1-2-2 (0.1320000 0.0627300 0.3115000 0.0291800 0.1109000 0.0401200 0.0488700 0.0299100 0.0000000 0.0000000 0.0000000 0.0437600 0.0000000 0.0000000 0.0021880 0.0000000 0.0809600 0.000e+00 0.0000000 0.0000000 0.0000000 0.0233400 0.015320 0.0000000 0.0051060 0.0000000 0.0138600 0.0189600 0.0014590 0.0299100 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

108) V2:endmorai 1134 5033.00 1-1-2-2 (0.0820100 0.0758400 0.3333000 0.0335100 0.1252000 0.0485000 0.0590800 0.0000000 0.0000000 0.0000000 0.0000000 0.0529100 0.0000000 0.0000000 0.0000000 0.0000000 0.0908300 0.000e+00 0.0000000 0.0000000 0.0000000 0.0061730 0.018520 0.0000000 0.0061730 0.0000000 0.0079370 0.0229300 0.0017640 0.0352700 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

216) V13<3745.5 509 2108.00 1-1-2-2 (0.0471500 0.0451900 0.3792000 0.0039290 0.0334000 0.0923400 0.1179000 0.0000000 0.0000000 0.0000000 0.0000000 0.1179000 0.0000000 0.0000000 0.0000000 0.0000000 0.0432200 0.000e+00 0.0000000 0.0000000 0.0000000 0.0058940 0.041260 0.0000000 0.0078590 0.0000000 0.0098230 0.0058940 0.0000000 0.0491200 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

217) V13>3745.5 625 2515.00 1-1-2-2 (0.1104000 0.1008000 0.2960000 0.0576000 0.2000000 0.0128000 0.0112000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.1296000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0064000 0.000000 0.0000000 0.0048000 0.0000000 0.0064000 0.0368000 0.0032000 0.0240000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

109) V2:glcltill 237 822.30 1-1-1-1 (0.3713000 0.0000000 0.2068000 0.0084390 0.0421900 0.0000000 0.0000000 0.1730000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0126600 0.0000000 0.0337600 0.000e+00 0.0000000 0.0000000 0.0000000 0.1055000 0.000000 0.0000000 0.0000000 0.0000000 0.0421900 0.0000000 0.0000000 0.0042190 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

55) V10>296.5 2371 8963.00 2-2-2-1 (0.2016000 0.0489200 0.1544000 0.0021090 0.0143400 0.0215100 0.0729600 0.0000000 0.0000000 0.0000000 0.0244600 0.3695000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0063260 0.006748 0.0552500 0.0156100 0.0000000 0.0008435 0.0054830 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

110) V13<6552 1643 5733.00 2-2-2-1 (0.0992100 0.0706000 0.1923000 0.0012170 0.0073040 0.0298200 0.0687800 0.0000000 0.0000000 0.0000000 0.0000000 0.4437000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0030430 0.009130 0.0480800 0.0225200 0.0000000 0.0012170 0.0030430 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

220) V2:endmorai 1465 5058.00 2-2-2-1 (0.0894200 0.0791800 0.1215000 0.0013650 0.0081910 0.0334500 0.0771300 0.0000000 0.0000000 0.0000000 0.0000000 0.4922000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0034130 0.010240 0.0539200 0.0252600 0.0000000 0.0013650 0.0034130 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

440) V5:loam,loamysan,san_fsan 1067 3124.00 2-2-2-1 (0.0993400 0.0899700 0.0702900 0.0000000 0.0103100 0.0224900 0.0187400 0.0000000 0.0000000 0.0000000 0.0000000 0.5989000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0028120 0.010310 0.0506100 0.0243700 0.0000000 0.0000000 0.0018740 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

880) V3:n_hardw 1009 2729.00 2-2-2-1 (0.0951400 0.0951400 0.0723500 0.0000000 0.0109000 0.0227900 0.0178400 0.0000000 0.0000000 0.0000000 0.0000000 0.6224000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0019820 0.007929 0.0525300 0.0000000 0.0000000 0.0000000 0.0009911 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

1760) V10<341.5 914 2222.00 2-2-2-1 (0.0744000 0.0897200 0.0579900 0.0000000 0.0120400 0.0251600 0.0098470 0.0000000 0.0000000 0.0000000 0.0000000 0.6805000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0021880 0.008753 0.0382900 0.0000000 0.0000000 0.0000000 0.0010940 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

1761) V10>341.5 95 319.80 1-1-1-1 (0.2947000 0.1474000 0.2105000 0.0000000 0.0000000 0.0000000 0.0947400 0.0000000 0.0000000 0.0000000 0.0000000 0.0631600 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.1895000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

881) V3:wetl_h2o 58 190.60 5-1-3-1 (0.1724000 0.0000000 0.0344800 0.0000000 0.0000000 0.0172400 0.0344800 0.0000000 0.0000000 0.0000000 0.0000000 0.1897000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0172400 0.051720 0.0172400 0.4483000 0.0000000 0.0000000 0.0172400 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

441) V5:grloasan,muckpeat,musaloam,sandyloa,siclloam,varies,NA 398 1563.00 1-1-2-2 (0.0628100 0.0502500 0.2588000 0.0050250 0.0025130 0.0628100 0.2337000 0.0000000 0.0000000 0.0000000 0.0000000 0.2060000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0050250 0.010050 0.0628100 0.0276400 0.0000000 0.0050250 0.0075380 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

221) V2:glcltill 178 229.70 1-1-2-2 (0.1798000 0.0000000 0.7753000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0449400 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

111) V13>6552 728 2515.00 1-1-1-1 (0.4327000 0.0000000 0.0686800 0.0041210 0.0302200 0.0027470 0.0824200 0.0000000 0.0000000 0.0000000 0.0796700 0.2019000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0137400 0.001374 0.0714300 0.0000000 0.0000000 0.0000000 0.0109900 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

7) V2:glcl_out,lake,NA 11567 53970.00 5-2-1-1 (0.0224800 0.0133100 0.0142600 0.0277500 0.0291300 0.0005187 0.0038900 0.0002594 0.0003458 0.0017290 0.0017290 0.0185900 0.0002594 0.0079540 0.0009510 0.0016430 0.0020750 8.645e-05 0.0000000 0.0005187 0.0000000 0.2582000 0.033720 0.0362200 0.0937100 0.0205800 0.0510900 0.2818000 0.0254200 0.0199700 0.0000000 1.349e-02 0.0024210 0.0068300 0.0045820 0.0031120 0.000000 0.0001729 0.000000 0.0009510 0.000000 0.0000000 0.000e+00 1.729e-04)

14) V3:asp/wbir,bee/heml,p/o_w/rp,rp_r/jp,shrub_jp 4464 10780.00 5-1-1-1 (0.0371900 0.0017920 0.0002240 0.0416700 0.0127700 0.0008961 0.0078410 0.0000000 0.0000000 0.0038080 0.0033600 0.0011200 0.0000000 0.0000000 0.0022400 0.0000000 0.0000000 0.000e+00 0.0000000 0.0011200 0.0000000 0.5889000 0.000000 0.0000000 0.0129900 0.0038080 0.0035840 0.2760000 0.0000000 0.0000000 0.0000000 6.720e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

28) V3:bee/heml 774 1997.00 5-2-1-1 (0.0051680 0.0103400 0.0000000 0.0516800 0.0103400 0.0000000 0.0452200 0.0000000 0.0000000 0.0155000 0.0000000 0.0000000 0.0000000 0.0000000 0.0025840 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.1641000 0.000000 0.0000000 0.0387600 0.0219600 0.0000000 0.6344000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

29) V3:asp/wbir,p/o_w/rp,rp_r/jp,shrub_jp 3690 7725.00 5-1-1-1 (0.0439000 0.0000000 0.0002710 0.0395700 0.0132800 0.0010840 0.0000000 0.0000000 0.0000000 0.0013550 0.0040650 0.0013550 0.0000000 0.0000000 0.0021680 0.0000000 0.0000000 0.000e+00 0.0000000 0.0013550 0.0000000 0.6780000 0.000000 0.0000000 0.0075880 0.0000000 0.0043360 0.2008000 0.0000000 0.0000000 0.0000000 8.130e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

58) V12<2804 1286 3355.00 5-1-1-1 (0.0388800 0.0000000 0.0000000 0.0575400 0.0334400 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0054430 0.0038880 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0038880 0.0000000 0.4533000 0.000000 0.0000000 0.0147700 0.0000000 0.0069980 0.3810000 0.0000000 0.0000000 0.0000000 7.776e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

116) V10<261.5 404 998.50 5-1-1-1 (0.0321800 0.0000000 0.0000000 0.0396000 0.0866300 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0099010 0.0000000 0.6361000 0.000000 0.0000000 0.0148500 0.0000000 0.0222800 0.1559000 0.0000000 0.0000000 0.0000000 2.475e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

117) V10>261.5 882 2137.00 5-2-1-1 (0.0419500 0.0000000 0.0000000 0.0657600 0.0090700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0079370 0.0056690 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0011340 0.0000000 0.3696000 0.000000 0.0000000 0.0147400 0.0000000 0.0000000 0.4841000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

59) V12>2804 2404 3785.00 5-1-1-1 (0.0465900 0.0000000 0.0004160 0.0299500 0.0024960 0.0016640 0.0000000 0.0000000 0.0000000 0.0020800 0.0033280 0.0000000 0.0000000 0.0000000 0.0033280 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.7983000 0.000000 0.0000000 0.0037440 0.0000000 0.0029120 0.1044000 0.0000000 0.0000000 0.0000000 8.319e-04 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

118) V3:p/o_w/rp,rp_r/jp 1389 2872.00 5-1-1-1 (0.0806300 0.0000000 0.0007199 0.0518400 0.0043200 0.0000000 0.0000000 0.0000000 0.0000000 0.0036000 0.0050400 0.0000000 0.0000000 0.0000000 0.0057600 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.7099000 0.000000 0.0000000 0.0064790 0.0000000 0.0050400 0.1253000 0.0000000 0.0000000 0.0000000 1.440e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

236) V12<5806.5 840 1802.00 5-1-1-1 (0.0523800 0.0000000 0.0000000 0.0738100 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0035710 0.0083330 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.6643000 0.000000 0.0000000 0.0071430 0.0000000 0.0071430 0.1810000 0.0000000 0.0000000 0.0000000 2.381e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

237) V12>5806.5 549 919.60 5-1-1-1 (0.1239000 0.0000000 0.0018210 0.0182100 0.0109300 0.0000000 0.0000000 0.0000000 0.0000000 0.0036430 0.0000000 0.0000000 0.0000000 0.0000000 0.0145700 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.7796000 0.000000 0.0000000 0.0054640 0.0000000 0.0018210 0.0400700 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

119) V3:asp/wbir,shrub_jp 1015 612.50 5-1-1-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0039410 0.0000000 0.0000000 0.0000000 0.0000000 0.0009852 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.9192000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0758600 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

15) V3:n_hardw,othupcon,wetl_h2o,wp/be/ma,NA 7103 36340.00 5-2-1-1 (0.0132300 0.0205500 0.0230900 0.0190100 0.0394200 0.0002816 0.0014080 0.0004224 0.0005631 0.0004224 0.0007039 0.0295600 0.0004224 0.0129500 0.0001408 0.0026750 0.0033790 1.408e-04 0.0000000 0.0001408 0.0000000 0.0504000 0.054910 0.0589900 0.1444000 0.0311100 0.0809500 0.2855000 0.0413900 0.0325200 0.0000000 2.154e-02 0.0039420 0.0111200 0.0074620 0.0050680 0.000000 0.0002816 0.000000 0.0015490 0.000000 0.0000000 0.000e+00 2.816e-04)

30) V3:othupcon,wetl_h2o,wp/be/ma 4900 20830.00 5-2-1-1 (0.0171400 0.0014290 0.0036730 0.0265300 0.0365300 0.0000000 0.0000000 0.0000000 0.0002041 0.0000000 0.0002041 0.0022450 0.0002041 0.0028570 0.0002041 0.0038780 0.0000000 2.041e-04 0.0000000 0.0002041 0.0000000 0.0563300 0.008163 0.0081630 0.2043000 0.0359200 0.1173000 0.3633000 0.0069390 0.0436700 0.0000000 1.735e-02 0.0057140 0.0161200 0.0108200 0.0073470 0.000000 0.0004082 0.000000 0.0022450 0.000000 0.0000000 0.000e+00 4.082e-04)

60) V10<240.5 1076 3823.00 5-2-1-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0529700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0009294 0.0046470 0.0000000 0.0111500 0.0000000 9.294e-04 0.0000000 0.0000000 0.0000000 0.0158000 0.000000 0.0000000 0.0000000 0.1617000 0.1980000 0.4164000 0.0000000 0.0009294 0.0000000 3.439e-02 0.0000000 0.0074350 0.0474000 0.0334600 0.000000 0.0018590 0.000000 0.0102200 0.000000 0.0000000 0.000e+00 1.859e-03)

120) V3:wetl_h2o 502 1728.00 5-1-4-9 (0.0000000 0.0000000 0.0000000 0.0000000 0.0199200 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0019920 0.0000000 0.0219100 0.0000000 1.992e-03 0.0000000 0.0000000 0.0000000 0.0338600 0.000000 0.0000000 0.0000000 0.2610000 0.4243000 0.1076000 0.0000000 0.0019920 0.0000000 4.582e-02 0.0000000 0.0159400 0.0059760 0.0318700 0.000000 0.0000000 0.000000 0.0219100 0.000000 0.0000000 0.000e+00 3.984e-03) *

121) V3:othupcon,wp/be/ma 574 1319.00 5-2-1-1 (0.0000000 0.0000000 0.0000000 0.0000000 0.0818800 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0017420 0.0069690 0.0000000 0.0017420 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0749100 0.0000000 0.6864000 0.0000000 0.0000000 0.0000000 2.439e-02 0.0000000 0.0000000 0.0836200 0.0348400 0.000000 0.0034840 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

61) V10>240.5 3824 15230.00 5-2-1-1 (0.0219700 0.0018310 0.0047070 0.0340000 0.0319000 0.0000000 0.0000000 0.0000000 0.0002615 0.0000000 0.0002615 0.0028770 0.0000000 0.0023540 0.0002615 0.0018310 0.0000000 0.000e+00 0.0000000 0.0002615 0.0000000 0.0677300 0.010460 0.0104600 0.2618000 0.0005230 0.0946700 0.3483000 0.0088910 0.0557000 0.0000000 1.255e-02 0.0073220 0.0185700 0.0005230 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

122) V3:othupcon,wetl_h2o 3019 11180.00 5-2-1-1 (0.0182200 0.0023190 0.0059620 0.0205400 0.0122600 0.0000000 0.0000000 0.0000000 0.0003312 0.0000000 0.0000000 0.0036440 0.0000000 0.0013250 0.0003312 0.0023190 0.0000000 0.000e+00 0.0000000 0.0003312 0.0000000 0.0649200 0.013250 0.0132500 0.3196000 0.0003312 0.1199000 0.3372000 0.0112600 0.0175600 0.0000000 1.656e-03 0.0092750 0.0235200 0.0006625 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

244) V4:modwell,poor,someexce,somepoor,verypoor,well 2145 7760.00 5-1-3-1 (0.0135200 0.0027970 0.0013990 0.0144500 0.0093240 0.0000000 0.0000000 0.0000000 0.0004662 0.0000000 0.0000000 0.0046620 0.0000000 0.0004662 0.0004662 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0676000 0.012590 0.0177200 0.4172000 0.0004662 0.1515000 0.2117000 0.0116600 0.0247100 0.0000000 4.662e-04 0.0107200 0.0256400 0.0004662 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)

488) V10<304.5 2044 7040.00 5-1-3-1 (0.0132100 0.0029350 0.0014680 0.0151700 0.0097850
0.0000000 0.0000000 0.0000000 0.0004892 0.0000000 0.0000000 0.0000000 0.0000000 0.0004892 0.0004892
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0655600 0.012720 0.0004892 0.4354000
0.0004892 0.1566000 0.2094000 0.0102700 0.0259300 0.0000000 4.892e-04 0.0112500 0.0269100 0.0004892
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
976) V13<794 637 2204.00 5-1-3-1 (0.0000000 0.0047100 0.0031400 0.0000000 0.0031400
0.0000000 0.0000000 0.0000000 0.0015700 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.1413000 0.025120 0.0015700 0.3532000
0.0000000 0.1507000 0.2214000 0.0000000 0.0015700 0.0000000 0.000e+00 0.0361100 0.0565100 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
977) V13>794 1407 4550.00 5-1-3-1 (0.0191900 0.0021320 0.0007107 0.0220300 0.0127900
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0007107 0.0007107
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0312700 0.007107 0.0000000 0.4726000
0.0007107 0.1592000 0.2040000 0.0149300 0.0369600 0.0000000 7.107e-04 0.0000000 0.0135000 0.0007107
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
1954) V8<2.5 1268 3924.00 5-1-3-1 (0.0181400 0.0023660 0.0007886 0.0220800 0.0118300
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0007886 0.0007886
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0331200 0.007098 0.0000000 0.5134000
0.0007886 0.1104000 0.2145000 0.0110400 0.0402200 0.0000000 7.886e-04 0.0000000 0.0118300 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
3908) V12<2407 295 1055.00 5-2-1-1 (0.0474600 0.0000000 0.0000000 0.0372900 0.0372900
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0033900 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0305100 0.003390 0.0000000 0.2780000
0.0000000 0.0983100 0.3797000 0.0339000 0.0237300 0.0000000 0.000e+00 0.0000000 0.0271200 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
3909) V12>2407 973 2711.00 5-1-3-1 (0.0092500 0.0030830 0.0010280 0.0174700 0.0041110
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0010280
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0339200 0.008222 0.0000000 0.5848000
0.0010280 0.1141000 0.1644000 0.0041110 0.0452200 0.0000000 1.028e-03 0.0000000 0.0071940 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
7818) V12<11078.5 898 2465.00 5-1-3-1 (0.0100200 0.0033410 0.0011140 0.0189300 0.0044540
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0367500 0.008909 0.0000000 0.5980000
0.0011140 0.0768400 0.1782000 0.0044540 0.0490000 0.0000000 1.114e-03 0.0000000 0.0077950 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
7819) V12>11078.5 75 111.90 5-1-4-9 (0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0133300
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.4267000
0.0000000 0.5600000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
1955) V8>2.5 139 406.90 5-1-4-9 (0.0287800 0.0000000 0.0000000 0.0215800 0.0215800
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0143900 0.007194 0.0000000 0.1007000
0.0000000 0.6043000 0.1079000 0.0503600 0.0071940 0.0000000 0.000e+00 0.0000000 0.0287800 0.0071940
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
489) V10>304.5 101 350.80 5-1-2-2 (0.0198000 0.0000000 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0990100 0.0000000 0.0000000 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.1089000 0.009901 0.3663000 0.0495000
0.0000000 0.0495000 0.2574000 0.0396000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
245) V4:excessiv,NA 874 2612.00 5-2-1-1 (0.0297500 0.0011440 0.0171600 0.0354700 0.0194500
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0011440 0.0000000 0.0034320 0.0000000
0.0080090 0.0000000 0.000e+00 0.0000000 0.0011440 0.0000000 0.0583500 0.014870 0.0022880 0.0800900
0.0000000 0.0423300 0.6453000 0.0103000 0.0000000 0.0000000 4.577e-03 0.0057210 0.0183100 0.0011440
0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
123) V3:wp/be/ma 805 2894.00 5-2-1-1 (0.0360200 0.0000000 0.0000000 0.0844700 0.1056000
0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0012420 0.0000000 0.0000000 0.0062110 0.0000000
0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0782600 0.000000 0.0000000 0.0447200
0.0012420 0.0000000 0.3901000 0.0000000 0.1988000 0.0000000 5.342e-02 0.0000000 0.0000000 0.0000000

0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
246) V10<280.5 633 2040.00 5-2-1-1 (0.0000000 0.0000000 0.0000000 0.0347600 0.1343000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0078990 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0995300 0.000000 0.0000000 0.0568700 0.0015800 0.0000000 0.4818000 0.0000000 0.1153000 0.0000000 6.793e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
247) V10>280.5 172 406.60 5-2-2-2 (0.1686000 0.0000000 0.0000000 0.2674000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0058140 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0523300 0.0000000 0.5058000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
31) V3:n_hardw,NA 2203 10950.00 5-1-2-2 (0.0045390 0.0631000 0.0662700 0.0022700 0.0458500 0.0009079 0.0045390 0.0013620 0.0013620 0.0013620 0.0018160 0.0903300 0.0009079 0.0354100 0.0000000 0.0000000 0.0108900 0.000e+00 0.0000000 0.0000000 0.0000000 0.0372200 0.158900 0.1720000 0.0113500 0.0204300 0.0000000 0.1126000 0.1180000 0.0077170 0.0000000 3.087e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
62) V10<302.5 1408 6631.00 5-1-2-1 (0.0035510 0.0376400 0.1001000 0.0035510 0.0688900 0.0014200 0.0071020 0.0021310 0.0021310 0.0021310 0.0028410 0.0078120 0.0014200 0.0554000 0.0000000 0.0000000 0.0170500 0.000e+00 0.0000000 0.0000000 0.0000000 0.0305400 0.248600 0.0000000 0.0177600 0.0319600 0.0000000 0.1648000 0.1328000 0.0120700 0.0000000 4.830e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
124) V10<253.5 333 1503.00 2-2-2-3 (0.0000000 0.0000000 0.0540500 0.0000000 0.0270300 0.0000000 0.0300300 0.0000000 0.0090090 0.0090090 0.0000000 0.0000000 0.0060060 0.2282000 0.0000000 0.0000000 0.0450500 0.000e+00 0.0000000 0.0000000 0.0000000 0.0600600 0.006006 0.0000000 0.0000000 0.1351000 0.0000000 0.1351000 0.0360400 0.0450500 0.0000000 1.742e-01 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
125) V10>253.5 1075 4276.00 5-1-2-1 (0.0046510 0.0493000 0.1144000 0.0046510 0.0818600 0.0018600 0.0000000 0.0027910 0.0000000 0.0000000 0.0037210 0.0102300 0.0000000 0.0018600 0.0000000 0.0000000 0.0083720 0.000e+00 0.0000000 0.0000000 0.0000000 0.0214000 0.323700 0.0000000 0.0232600 0.0000000 0.0000000 0.1740000 0.1628000 0.0018600 0.0000000 9.302e-03 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
250) V13<4725 722 2654.00 5-1-2-1 (0.0027700 0.0540200 0.1066000 0.0069250 0.0651000 0.0027700 0.0000000 0.0041550 0.0000000 0.0000000 0.0000000 0.0152400 0.0000000 0.0027700 0.0000000 0.0000000 0.0083100 0.000e+00 0.0000000 0.0000000 0.0000000 0.0263200 0.475100 0.0000000 0.0263200 0.0000000 0.0000000 0.1233000 0.0637100 0.0027700 0.0000000 1.385e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00)
500) V12<4834 395 1602.00 5-1-2-1 (0.0050630 0.0405100 0.1190000 0.0101300 0.1038000 0.0025320 0.0000000 0.0050630 0.0000000 0.0000000 0.0000000 0.0202500 0.0000000 0.0050630 0.0000000 0.0000000 0.0025320 0.000e+00 0.0000000 0.0000000 0.0000000 0.0253200 0.306300 0.0000000 0.0075950 0.0000000 0.0000000 0.2177000 0.0987300 0.0050630 0.0000000 2.532e-02 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
501) V12>4834 327 833.20 5-1-2-1 (0.0000000 0.0703400 0.0917400 0.0030580 0.0183500 0.0030580 0.0000000 0.0030580 0.0000000 0.0000000 0.0000000 0.0091740 0.0000000 0.0000000 0.0000000 0.0000000 0.0152900 0.000e+00 0.0000000 0.0000000 0.0000000 0.0275200 0.678900 0.0000000 0.0489300 0.0000000 0.0000000 0.0091740 0.0214100 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
251) V13>4725 353 1186.00 5-2-2-1 (0.0084990 0.0396600 0.1303000 0.0000000 0.1161000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0113300 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0084990 0.000e+00 0.0000000 0.0000000 0.0000000 0.0113300 0.014160 0.0000000 0.0170000 0.0000000 0.0000000 0.2776000 0.3654000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *
63) V10>302.5 795 2339.00 5-1-2-2 (0.0062890 0.1082000 0.0062890 0.0000000 0.0050310 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.2365000 0.0000000 0.0000000 0.0000000 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0490600 0.000000 0.4767000 0.0000000 0.0000000 0.0000000 0.0201300 0.0918200 0.0000000 0.0000000 0.000e+00 0.0000000 0.0000000 0.0000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.0000000 0.000e+00 0.000e+00) *

APPENDIX D

Grand Traverse County Classification Tree

> g250l.tree
node), split, n, deviance, yval, (yprob)
* denotes terminal node

1) root 7900 36770.000 5-2-1-1 (0.038100 0.026960 0.139500 0.00557 0.147300 0.1413000 0.110300 0.056200 0.069620 0.011770 0.172300 0.0374700 0.0122800 0.027590 0.0037970)

2) V2:glcl_out,lake 3899 15110.000 5-2-1-1 (0.004360 0.024880 0.040520 0.00000 0.055140 0.0002565 0.217500 0.100000 0.107500 0.023850 0.330300 0.0754000 0.0202600 0.000000 0.0000000)

4) V3:n_hardw 1675 6504.000 5-1-2-2 (0.000000 0.057910 0.084780 0.00000 0.118800 0.0005970 0.030450 0.209000 0.226300 0.000000 0.117000 0.1552000 0.0000000 0.000000 0.0000000)

8) V10<302.5 889 2633.000 5-1-2-1 (0.000000 0.012370 0.154100 0.00000 0.012370 0.0011250 0.013500 0.393700 0.000000 0.000000 0.202500 0.2103000 0.0000000 0.000000 0.0000000)

16) V13<4725 600 1554.000 5-1-2-1 (0.000000 0.018330 0.151700 0.00000 0.018330 0.0000000 0.015000 0.575000 0.000000 0.000000 0.136700 0.0850000 0.0000000 0.000000 0.0000000)

32) V12<4145 273 816.400 5-1-2-1 (0.000000 0.003663 0.150200 0.00000 0.018320 0.0000000 0.029300 0.348000 0.000000 0.000000 0.300400 0.1502000 0.0000000 0.000000 0.0000000)

64) V4:poor,someexce,somepoor,well 172 473.800 5-1-2-1 (0.000000 0.005814 0.203500 0.00000 0.005814 0.0000000 0.011630 0.441900 0.000000 0.000000 0.116300 0.2151000 0.0000000 0.000000 0.0000000)

128) V13<1945 62 148.700 5-1-2-1 (0.000000 0.016130 0.177400 0.00000 0.016130 0.0000000 0.016130 0.612900 0.000000 0.000000 0.112900 0.0483900 0.0000000 0.000000 0.0000000) *

129) V13>1945 110 298.600 5-1-2-1 (0.000000 0.000000 0.218200 0.00000 0.000000 0.0000000 0.009091 0.345500 0.000000 0.000000 0.118200 0.3091000 0.0000000 0.000000 0.0000000) *

65) V4:excessiv,modwell,verypoor,NA 101 243.400 5-2-1-1 (0.000000 0.000000 0.059410 0.00000 0.039600 0.0000000 0.059410 0.188100 0.000000 0.000000 0.613900 0.0396000 0.0000000 0.000000 0.0000000)*

33) V12>4145 327 521.100 5-1-2-1 (0.000000 0.030580 0.152900 0.00000 0.018350 0.0000000 0.003058 0.764500 0.000000 0.000000 0.000000 0.0305800 0.0000000 0.000000 0.0000000)

66) V10<286.5 292 354.200 5-1-2-1 (0.000000 0.000000 0.161000 0.00000 0.003425 0.0000000 0.000000 0.801400 0.000000 0.000000 0.000000 0.0342500 0.0000000 0.000000 0.0000000) *

67) V10>286.5 35 91.410 5-1-2-1 (0.000000 0.285700 0.085710 0.00000 0.142900 0.0000000 0.028570 0.457100 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

17) V13>4725 289 665.400 5-2-2-1 (0.000000 0.000000 0.159200 0.00000 0.000000 0.0034600 0.010380 0.017300 0.000000 0.000000 0.339100 0.4706000 0.0000000 0.000000 0.0000000)

34) V4:someexce,somepoor,verypoor,well 213 435.300 5-2-2-1 (0.000000 0.000000 0.183100 0.00000 0.000000 0.0000000 0.014080 0.014080 0.000000 0.000000 0.164300 0.6244000 0.0000000 0.000000 0.0000000)

68) V10<275.5 152 302.500 5-2-2-1 (0.000000 0.000000 0.118400 0.00000 0.000000 0.0000000 0.019740 0.006579 0.000000 0.000000 0.230300 0.6250000 0.0000000 0.000000 0.0000000) *

69) V10>275.5 61 94.430 5-2-2-1 (0.000000 0.000000 0.344300 0.00000 0.000000 0.0000000 0.000000 0.032790 0.000000 0.000000 0.000000 0.6230000 0.0000000 0.000000 0.0000000) *

35) V4:excessiv,modwell,NA 76 99.630 5-2-1-1 (0.000000 0.000000 0.092110 0.00000 0.000000 0.0131600 0.000000 0.026320 0.000000 0.000000 0.828900 0.0394700 0.0000000 0.000000 0.0000000) *

9) V10>302.5 786 2228.000 5-1-2-2 (0.000000 0.109400 0.006361 0.00000 0.239200 0.0000000 0.049620 0.000000 0.482200 0.000000 0.020360 0.0928800 0.0000000 0.000000 0.0000000)

18) V13<3745 488 1376.000 2-2-2-1 (0.000000 0.172100 0.002049 0.00000 0.362700 0.0000000 0.061480 0.000000 0.350400 0.000000 0.028690 0.0225400 0.0000000 0.000000 0.0000000)

36) V4:excessiv,modwell,someexce,somepoor,verypoor 275 800.100 5-1-2-2 (0.000000 0.072730 0.003636 0.00000 0.290900 0.0000000 0.109100 0.000000 0.432700 0.000000 0.050910 0.0400000 0.0000000 0.000000 0.0000000)

72) V5:muckpeat,san_fsan,varies 86 234.100 2-2-2-1 (0.000000 0.046510 0.011630 0.00000 0.500000 0.0000000 0.197700 0.000000 0.081400 0.000000 0.162800 0.0000000 0.0000000 0.000000 0.0000000) *

73) V5:grloasan,loam,loamysan,sandyloa,NA 189 449.100 5-1-2-2 (0.000000 0.084660 0.000000 0.00000 0.195800 0.0000000 0.068780 0.000000 0.592600 0.000000 0.000000 0.0582000 0.0000000 0.000000 0.0000000)

146) V10<332.5 121 308.700 5-1-2-2 (0.000000 0.132200 0.000000 0.00000 0.281000 0.0000000 0.099170 0.000000 0.471100 0.000000 0.000000 0.0165300 0.0000000 0.000000 0.0000000) *

147) V10>332.5 68 86.900 5-1-2-2 (0.000000 0.000000 0.000000 0.00000 0.044120 0.0000000 0.014710 0.000000 0.808800 0.000000 0.000000 0.1324000 0.0000000 0.000000 0.0000000) *

37) V4:poor,well,NA 213 453.200 2-2-2-1 (0.000000 0.300500 0.000000 0.00000 0.455400 0.0000000 0.000000 0.000000 0.244100 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000)

74) V13<2255 137 269.100 2-2-2-1 (0.000000 0.430700 0.000000 0.00000 0.445300 0.0000000 0.000000 0.000000 0.124100 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

75) V13>2255 76 135.300 2-2-2-1 (0.000000 0.065790 0.000000 0.00000 0.473700 0.0000000 0.000000 0.000000 0.460500 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

19) V13>3745 298 554.300 5-1-2-2 (0.000000 0.006711 0.013420 0.00000 0.036910 0.0000000 0.030200 0.000000 0.698000 0.000000 0.006711 0.2081000 0.0000000 0.000000 0.0000000)

38) V12<4930 157 379.100 5-1-2-2 (0.000000 0.012740 0.025480 0.00000 0.057320 0.0000000 0.044590 0.000000 0.465000 0.000000 0.006369 0.3885000 0.0000000 0.000000 0.0000000)

76) V5:loamysan 96 201.000 5-2-2-1 (0.000000 0.010420 0.020830 0.00000 0.020830 0.0000000 0.052080 0.000000 0.322900 0.000000 0.000000 0.5729000 0.0000000 0.000000 0.0000000) *

77) V5:grloasan,loam,muckpeat,san_fsan,sandyloa 61 133.300 5-1-2-2 (0.000000 0.016390 0.032790 0.00000 0.114800 0.0000000 0.032790 0.000000 0.688500 0.000000 0.016390 0.0983600 0.0000000 0.000000 0.0000000) *

39) V12>4930 141 65.580 5-1-2-2 (0.000000 0.000000 0.000000 0.00000 0.014180 0.0000000 0.014180 0.000000 0.957400 0.000000 0.007092 0.0070920 0.0000000 0.000000 0.0000000) *

5) V3:asp/wbir,bee/heml,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma 2224 5716.000 5-2-1-1 (0.007644 0.000000 0.007194 0.00000 0.007194 0.0000000 0.358400 0.017990 0.017990 0.041820 0.491000 0.0152900 0.0355200 0.000000 0.0000000)

10) V3:asp/wbir,bee/heml,p/o_w/rp,rp_r/jp,shrub_jp 1146 1591.000 5-1-1-1 (0.001745 0.000000 0.000000 0.00000 0.004363 0.0000000 0.629100 0.000000 0.000000 0.000000 0.364700 0.0000000 0.0000000 0.000000 0.0000000)

20) V12<2715 448 583.300 5-2-1-1 (0.002232 0.000000 0.000000 0.00000 0.008929 0.0000000 0.274600 0.000000 0.000000 0.000000 0.714300 0.0000000 0.0000000 0.000000 0.0000000)

40) V10<290.5 335 268.000 5-2-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.137300 0.000000 0.000000 0.000000 0.862700 0.0000000 0.0000000 0.000000 0.0000000) *

41) V10>290.5 113 175.400 5-1-1-1 (0.008850 0.000000 0.000000 0.00000 0.035400 0.0000000 0.681400 0.000000 0.000000 0.000000 0.274300 0.0000000 0.0000000 0.000000 0.0000000) *

21) V12>2715 698 595.900 5-1-1-1 (0.001433 0.000000 0.000000 0.00000 0.001433 0.0000000 0.856700 0.000000 0.000000 0.000000 0.140400 0.0000000 0.0000000 0.000000 0.0000000)

42) V12<5795 396 469.900 5-1-1-1 (0.002525 0.000000 0.000000 0.00000 0.002525 0.0000000 0.747500 0.000000 0.000000 0.000000 0.247500 0.0000000 0.0000000 0.000000 0.0000000)

84) V13<11150 365 377.800 5-1-1-1 (0.002740 0.000000 0.000000 0.00000 0.002740 0.0000000 0.808200 0.000000 0.000000 0.000000 0.186300 0.0000000 0.0000000 0.000000 0.0000000)

168) V10<271.5 25 0.000 5-2-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.000000 1.000000 0.0000000 0.0000000 0.000000 0.0000000) *

169) V10>271.5 340 284.900 5-1-1-1 (0.002941 0.000000 0.000000 0.00000 0.002941 0.0000000 0.867600 0.000000 0.000000 0.000000 0.126500 0.0000000 0.0000000 0.000000 0.0000000) *

85) V13>11150 31 8.835 5-2-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.032260 0.000000 0.000000 0.000000 0.967700 0.0000000 0.0000000 0.000000 0.0000000) *

43) V12>5795 302 0.000 5-1-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 1.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

11) V3:othupcon,wetl_h2o,wp/be/ma 1078 3031.000 5-2-1-1 (0.013910 0.000000 0.014840 0.00000 0.010200 0.0000000 0.070500 0.037110 0.037110 0.086270 0.625200 0.0315400 0.0732800 0.000000 0.0000000)

22) V10<274.5 678 1094.000 5-2-1-1 (0.004425 0.000000 0.022120 0.00000 0.000000 0.0000000 0.013270 0.010320 0.000000 0.020650 0.800900 0.0324500 0.0958700 0.000000 0.0000000)

44) V13<1370 203 440.200 5-2-1-1 (0.000000 0.000000 0.004926 0.00000 0.000000 0.0000000 0.019700 0.009852 0.000000 0.059110 0.581300 0.0246300 0.3005000 0.000000 0.0000000)

88) V3:wetl_h2o 153 343.400 5-2-1-1 (0.000000 0.000000 0.006536 0.00000 0.000000 0.0000000 0.000000 0.013070 0.000000 0.078430 0.470600 0.0326800 0.3987000 0.000000 0.0000000) *

89) V3:othupcon,wp/be/ma 50 27.880 5-2-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.080000 0.000000 0.000000 0.000000 0.920000 0.0000000 0.0000000 0.000000 0.0000000) *

45) V13>1370 475 488.000 5-2-1-1 (0.006316 0.000000 0.029470 0.00000 0.000000 0.0000000 0.010530 0.010530 0.000000 0.004211 0.894700 0.0357900 0.0084210 0.000000 0.0000000)

90) V10<263.5 314 143.500 5-2-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.006369 0.952200 0.0350300 0.0063690 0.000000 0.0000000) *

91) V10>263.5 161 280.500 5-2-1-1 (0.018630 0.000000 0.086960 0.00000 0.000000 0.0000000 0.031060 0.031060 0.000000 0.000000 0.782600 0.0372700 0.0124200 0.000000 0.0000000) *

23) V10>274.5 400 1490.000 5-2-1-1 (0.030000 0.000000 0.002500 0.00000 0.027500 0.0000000 0.167500 0.082500 0.100000 0.197500 0.327500 0.0300000 0.0350000 0.000000 0.0000000)

46) V10<304.5 227 754.700 5-1-4-9 (0.013220 0.000000 0.004405 0.00000 0.000000 0.0000000 0.229100 0.141000 0.004405 0.339200 0.180600 0.0264300 0.0616700 0.000000 0.0000000)

92) V12<9415 166 570.500 5-1-1-1 (0.018070 0.000000 0.006024 0.00000 0.000000 0.0000000 0.313300 0.186700 0.006024 0.102400 0.247000 0.0361400 0.0843400 0.000000 0.0000000)

184) V13<2475 123 381.400 5-1-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.398400 0.252000 0.008130 0.130100 0.081300 0.0243900 0.1057000 0.000000 0.0000000)

368) V9:N,NE,NW,SE 63 207.300 5-1-2-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.206300 0.238100 0.000000 0.238100 0.158700 0.0158700 0.1429000 0.000000 0.0000000) *

369) V9:E,S,SW,NA 60 130.700 5-1-1-1 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.600000 0.266700 0.016670 0.016670 0.000000 0.0333300 0.0666700 0.000000 0.0000000) *

185) V13>2475 43 90.780 5-2-1-1 (0.069770 0.000000 0.023260 0.00000 0.000000 0.0000000 0.069770 0.000000 0.000000 0.023260 0.720900 0.0697700 0.0232600 0.000000 0.0000000) *

93) V12>9415 61 10.210 5-1-4-9 (0.000000 0.000000 0.000000 0.00000 0.000000 0.0000000 0.000000 0.016390 0.000000 0.983600 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

47) V10>304.5 173 489.500 5-2-1-1 (0.052020 0.000000 0.000000 0.00000 0.063580 0.0000000 0.086710 0.005780 0.225400 0.011560 0.520200 0.0346800 0.0000000 0.000000 0.0000000)

94) V5:loam,loamysan,muckpeat,musaloam,sandyloa 85 252.800 5-1-2-2 (0.000000 0.000000 0.000000 0.00000 0.105900 0.0000000 0.129400 0.000000 0.423500 0.023530 0.247100 0.0705900 0.0000000 0.000000 0.0000000) *

95) V5:san_fsan,varies,NA 88 143.700 5-2-1-1 (0.102300 0.000000 0.000000 0.00000 0.022730 0.0000000 0.045450 0.011360 0.034090 0.000000 0.784100 0.0000000 0.0000000 0.000000 0.0000000) *

3) V2:dunesand,endmorai,glcltill,lacustri,peatmuck,NA 4001 15000.000 2-2-2-2 (0.070980 0.028990 0.235900 0.01100 0.237200 0.2787000 0.005749 0.013500 0.032740 0.000000 0.018250 0.0004999 0.0044990 0.054490 0.0074980)

6) V10<245.5 1635 3264.000 2-2-2-2 (0.005505 0.000000 0.162100 0.00000 0.000000 0.6679000 0.000000 0.003058 0.000000 0.000000 0.000000 0.0000000 0.0097860 0.133300 0.0183500)

12) V3:othupcon,p/o_w/rp,rp_r/jp,wetl_h2o 378 861.100 6-1-1-1 (0.000000 0.000000 0.034390 0.00000 0.000000 0.3016000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0423300 0.545000 0.0767200)

24) V2:lacustri,peatmuck 240 277.300 6-1-1-1 (0.000000 0.000000 0.037500 0.00000 0.000000 0.0666700 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0083330 0.858300 0.0291700) *

25) V2:dunesand,endmorai,glcltill,NA 138 240.300 2-2-2-2 (0.000000 0.000000 0.028990 0.00000 0.000000 0.7101000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.1014000 0.000000 0.1594000) *

13) V3:bee/heml,n_hardw,wp/be/ma,NA 1257 1571.000 2-2-2-2 (0.007160 0.000000 0.200500 0.00000 0.000000 0.7780000 0.000000 0.003978 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.009547 0.0007955)

26) V2:dunesand,glcltill,peatmuck 553 47.400 2-2-2-2 (0.007233 0.000000 0.000000 0.00000 0.000000 0.9928000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

27) V2:endmorai,lacustri,NA 704 1153.000 2-2-2-2 (0.007102 0.000000 0.358000 0.00000 0.000000 0.6094000 0.000000 0.007102 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.017050 0.0014200)

54) V13<3525 532 947.400 2-2-2-2 (0.009398 0.000000 0.469900 0.00000 0.000000 0.4868000 0.000000 0.009398 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.022560 0.0018800)

108) V10<223.5 335 517.600 2-2-2-2 (0.000000 0.000000 0.301500 0.00000 0.000000 0.6597000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.035820 0.0029850)

216) V5:loam,san_fsan,sandyloa 164 113.500 2-2-2-2 (0.000000 0.000000 0.109800 0.00000 0.000000 0.8902000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

217) V5:grloasan,loamysan,muckpeat,musaloam,varies 171 317.700 1-1-2-2 (0.000000 0.000000 0.485400 0.00000 0.000000 0.4386000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.070180 0.0058480) *

109) V10>223.5 197 281.800 1-1-2-2 (0.025380 0.000000 0.756300 0.00000 0.000000 0.1929000 0.000000 0.025380 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

55) V13>3525 172 21.790 2-2-2-2 (0.000000 0.000000 0.011630 0.00000 0.000000 0.9884000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

7) V10>245.5 2366 7792.000 2-2-2-1 (0.116200 0.049030 0.287000 0.01860 0.401100 0.0097210 0.009721 0.020710 0.055370 0.000000 0.030850 0.0008453 0.0008453 0.000000 0.0000000)

14) V10<303.5 989 2499.000 1-1-2-2 (0.205300 0.000000 0.576300 0.00000 0.109200 0.0232600 0.001011 0.037410 0.000000 0.000000 0.043480 0.0020220 0.0020220 0.000000 0.0000000)

28) V5:musaloam,san_fsan 313 778.500 1-1-1-1 (0.562300 0.000000 0.131000 0.00000 0.178900 0.0031950 0.003195 0.019170 0.000000 0.000000 0.102200 0.0000000 0.0000000 0.000000 0.0000000)

56) V13<8660 280 595.800 1-1-1-1 (0.614300 0.000000 0.142900 0.00000 0.200000 0.0000000 0.000000 0.021430 0.000000 0.000000 0.021430 0.0000000 0.0000000 0.000000 0.0000000)

112) V4:someexce,verypoor 42 47.410 2-2-2-1 (0.071430 0.000000 0.095240 0.00000 0.833300 0.0000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

113) V4:excessiv,poor,NA 238 442.000 1-1-1-1 (0.710100 0.000000 0.151300 0.00000 0.088240 0.0000000 0.000000 0.025210 0.000000 0.000000 0.025210 0.0000000 0.0000000 0.000000 0.0000000)

226) V3:n_hardw,wetl_h2o 150 344.800 1-1-1-1 (0.560000 0.000000 0.240000 0.00000 0.140000 0.0000000 0.000000 0.040000 0.000000 0.000000 0.020000 0.0000000 0.0000000 0.000000 0.0000000) *

227) V3:othupcon,p/o_w/rp,wp/be/ma 88 26.170 1-1-1-1 (0.965900 0.000000 0.000000 0.00000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.000000 0.034090 0.0000000 0.0000000 0.000000 0.0000000)*

57) V13>8660 33 50.260 5-2-1-1 (0.121200 0.000000 0.030300 0.00000 0.000000 0.0303000 0.030300 0.000000 0.000000 0.000000 0.787900 0.0000000 0.0000000 0.000000 0.0000000) *

29) V5:grloasan,loam,loamysan,muckpeat,sandyloa,varies,NA 676 1179.000 1-1-2-2 (0.039940 0.000000 0.782500 0.00000 0.076920 0.0325400 0.000000 0.045860 0.000000 0.000000 0.016270 0.0029590 0.0029590 0.000000 0.0000000)

58) V10<275.5 319 521.900 1-1-2-2 (0.078370 0.000000 0.768000 0.00000 0.000000 0.0689700 0.000000 0.078370 0.000000 0.000000 0.000000 0.0000000 0.0062700 0.000000 0.0000000)

116) V2:glcltill 15 20.190 1-1-1-1 (0.600000 0.000000 0.000000 0.00000 0.000000 0.4000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

117) V2:endmorai,lacustri 304 439.200 1-1-2-2 (0.052630 0.000000 0.805900 0.00000 0.000000 0.0526300 0.000000 0.082240 0.000000 0.000000 0.000000 0.0000000 0.0065790 0.000000 0.0000000)

234) V3:n_hardw,p/o_w/rp 276 296.700 1-1-2-2 (0.021740 0.000000 0.862300 0.00000 0.000000 0.0434800 0.000000 0.072460 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

235) V3:othupcon,rp_r/jp,wetl_h2o,wp/be/ma 28 83.350 1-1-1-1 (0.357100 0.000000 0.250000 0.00000 0.000000 0.1429000 0.000000 0.178600 0.000000 0.000000 0.000000 0.0000000 0.0714300 0.000000 0.0000000)*

59) V10>275.5 357 497.400 1-1-2-2 (0.005602 0.000000 0.795500 0.00000 0.145700 0.0000000 0.000000 0.016810 0.000000 0.000000 0.030810 0.0056020 0.0000000 0.000000 0.0000000)

118) V6:-1-1',1-3',3-6' 44 87.480 2-2-2-1 (0.022730 0.000000 0.227300 0.00000 0.613600 0.0000000 0.000000 0.136400 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

119) V6:>6' 313 304.700 1-1-2-2 (0.003195 0.000000 0.875400 0.00000 0.079870 0.0000000 0.000000 0.000000 0.000000 0.000000 0.035140 0.0063900 0.0000000 0.000000 0.0000000) *

15) V10>303.5 1377 3826.000 2-2-2-1 (0.052290 0.084240 0.079160 0.03195 0.610700 0.0000000 0.015980 0.008715 0.095130 0.000000 0.021790 0.0000000 0.0000000 0.000000 0.0000000)

30) V3:n_hardw,wetl_h2o 1266 3049.000 2-2-2-1 (0.003949 0.091630 0.086100 0.03476 0.654000 0.0000000 0.010270 0.009479 0.103500 0.000000 0.006319 0.0000000 0.0000000 0.000000 0.0000000)

60) V5:grloasan,loam,sandyloa,varies 229 602.700 1-1-2-2 (0.000000 0.096070 0.379900 0.00000 0.275100 0.0000000 0.000000 0.000000 0.244500 0.000000 0.004367 0.0000000 0.0000000 0.000000 0.0000000)

120) V10<341.5 187 471.200 1-1-2-2 (0.000000 0.101600 0.422500 0.00000 0.336900 0.0000000 0.000000 0.000000 0.133700 0.000000 0.005348 0.0000000 0.0000000 0.000000 0.0000000)

240) V5:loam,sandyloa 147 376.500 2-2-2-1 (0.000000 0.129300 0.299300 0.00000 0.415000 0.0000000 0.000000 0.000000 0.156500 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000)

480) V8<2.5 130 331.500 2-2-2-1 (0.000000 0.146200 0.215400 0.00000 0.461500 0.0000000 0.000000 0.000000 0.176900 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

481) V8>2.5 17 7.606 1-1-2-2 (0.000000 0.000000 0.941200 0.00000 0.058820 0.0000000 0.000000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

241) V5:grloasan,varies 40 40.690 1-1-2-2 (0.000000 0.000000 0.875000 0.00000 0.050000 0.0000000 0.000000 0.000000 0.050000 0.000000 0.025000 0.0000000 0.0000000 0.000000 0.0000000) *

121) V10>341.5 42 61.190 5-1-2-2 (0.000000 0.071430 0.190500 0.00000 0.000000 0.0000000 0.000000 0.000000 0.738100 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

61) V5:loamysan,muckpeat,musaloam,san_fsan,NA 1037 2103.000 2-2-2-1 (0.004822 0.090650 0.021220 0.04243 0.737700 0.0000000 0.012540 0.011570 0.072320 0.000000 0.006750 0.0000000 0.0000000 0.000000 0.0000000)

122) V13<7130 856 1449.000 2-2-2-1 (0.004673 0.109800 0.022200 0.00000 0.769900 0.0000000 0.003505 0.014020 0.071260 0.000000 0.004673 0.0000000 0.0000000 0.000000 0.0000000)

244) V4:excessiv,modwell,someexce,somepoor,verypoor 482 676.600 2-2-2-1 (0.008299 0.012450 0.026970 0.00000 0.836100 0.0000000 0.006224 0.024900 0.076760 0.000000 0.008299 0.0000000 0.0000000 0.000000 0.0000000)

488) V12<6335 321 321.200 2-2-2-1 (0.012460 0.015580 0.018690 0.00000 0.897200 0.0000000 0.000000 0.037380 0.006231 0.000000 0.012460 0.0000000 0.0000000 0.000000 0.0000000) *

489) V12>6335 161 262.200 2-2-2-1 (0.000000 0.006211 0.043480 0.00000 0.714300 0.0000000 0.018630 0.000000 0.217400 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

245) V4:poor,well,NA 374 630.200 2-2-2-1 (0.000000 0.235300 0.016040 0.00000 0.684500 0.0000000 0.000000 0.000000 0.064170 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000)

490) V13<3265 189 333.000 2-2-2-1 (0.000000 0.396800 0.005291 0.00000 0.545000 0.0000000 0.000000 0.000000 0.052910 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

491) V13>3265 185 235.500 2-2-2-1 (0.000000 0.070270 0.027030 0.00000 0.827000 0.0000000 0.000000 0.000000 0.075680 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

123) V13>7130 181 427.100 2-2-2-1 (0.005525 0.000000 0.016570 0.24310 0.585600 0.0000000 0.055250 0.000000 0.077350 0.000000 0.016570 0.0000000 0.0000000 0.000000 0.0000000)

246) V12<8665 134 220.500 2-2-2-1 (0.000000 0.000000 0.022390 0.01493 0.783600 0.0000000 0.074630 0.000000 0.082090 0.000000 0.022390 0.0000000 0.0000000 0.000000 0.0000000) *

247) V12>8665 47 41.360 2-2-1-1 (0.021280 0.000000 0.000000 0.89360 0.021280 0.0000000 0.000000 0.000000 0.063830 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.0000000) *

31) V3:othupcon,p/o_w/rp,wp/be/ma 111 239.800 1-1-1-1 (0.603600 0.000000 0.000000 0.00000 0.117100 0.0000000 0.081080 0.000000 0.000000 0.000000 0.198200 0.0000000 0.0000000 0.000000 0.0000000) *

APPENDIX E

Alcona County Classification Tree

> a250l.tree
node), split, n, deviance, yval, (yprob)
*** denotes terminal node**

1) root 10954 51920.00 1-1-1-1 (0.248300 0.027200 0.022180 0.0616200 0.0084900 0.019540 0.100800 0.017890 0.0151500 0.181500 0.0282100 0.003560 0.096680 0.076410 0.0464700 0.01808 0.0187100 0.009220)

2) V2:endmorai,glcl_out,glcltill 7226 28970.00 1-1-1-1 (0.360200 0.041240 0.033630 0.0930000 0.0128700 0.025460 0.134500 0.016050 0.0044280 0.015500 0.0053970 0.001246 0.144900 0.101300 0.0101000 0.00000 0.0001384 0.000000)

4) V3:asp/wbir,bee/heml,n_hardw,wetl_h2o 3739 15650.00 2-1-3-4 (0.118200 0.066600 0.054560 0.1738000 0.0230000 0.049210 0.247100 0.003209 0.0082910 0.027280 0.0002675 0.002407 0.037440 0.187500 0.0010700 0.00000 0.0000000 0.000000)

8) V10<258.5 1961 5816.00 2-1-3-4 (0.018360 0.005609 0.033150 0.0045890 0.0005099 0.091790 0.466100 0.001530 0.0158100 0.052010 0.0000000 0.002550 0.012750 0.294700 0.0005099 0.00000 0.0000000 0.000000)

16) V10<221.5 757 798.60 2-1-3-4 (0.000000 0.000000 0.075300 0.0000000 0.0000000 0.017170 0.863900 0.000000 0.0000000 0.043590 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000)

32) V3:bee/heml 96 190.90 2-1-2-2 (0.000000 0.000000 0.572900 0.0000000 0.0000000 0.010420 0.281200 0.000000 0.0000000 0.135400 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

33) V3:asp/wbir,n_hardw,wetl_h2o 661 325.60 2-1-3-4 (0.000000 0.000000 0.003026 0.0000000 0.0000000 0.018150 0.948600 0.000000 0.0000000 0.030260 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

17) V10>221.5 1204 3764.00 5-1-4-9 (0.029900 0.009136 0.006645 0.0074750 0.0008306 0.138700 0.215900 0.002492 0.0257500 0.057310 0.0000000 0.004153 0.020760 0.480100 0.0008306 0.00000 0.0000000 0.000000)

34) V3:asp/wbir,bee/heml,n_hardw 394 1321.00 2-1-3-1 (0.058380 0.027920 0.020300 0.0152300 0.0025380 0.335000 0.324900 0.007614 0.0000000 0.162400 0.0000000 0.012690 0.022840 0.010150 0.0000000 0.00000 0.0000000 0.000000)

68) V3:bee/heml 135 299.60 2-1-3-4 (0.000000 0.000000 0.059260 0.0444400 0.0000000 0.029630 0.718500 0.022220 0.0000000 0.074070 0.0000000 0.037040 0.014810 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

69) V3:asp/wbir,n_hardw 259 757.30 2-1-3-1 (0.088800 0.042470 0.000000 0.0000000 0.0038610 0.494200 0.119700 0.000000 0.0000000 0.208500 0.0000000 0.000000 0.027030 0.015440 0.0000000 0.00000 0.0000000 0.000000)

138) V12<8084 177 362.50 2-1-3-1 (0.118600 0.005650 0.000000 0.0000000 0.0056500 0.694900 0.113000 0.000000 0.0000000 0.022600 0.0000000 0.000000 0.039550 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

139) V12>8084 82 202.70 3-3-2-2 (0.024390 0.122000 0.000000 0.0000000 0.0000000 0.060980 0.134100 0.000000 0.0000000 0.609800 0.0000000 0.000000 0.000000 0.048780 0.0000000 0.00000 0.0000000 0.000000) *

35) V3:wetl_h2o 810 1627.00 5-1-4-9 (0.016050 0.000000 0.000000 0.0037040 0.0000000 0.043210 0.163000 0.000000 0.0382700 0.006173 0.0000000 0.000000 0.019750 0.708600 0.0012350 0.00000 0.0000000 0.000000)

70) V2:glcl_out 382 146.70 5-1-4-9 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.002618 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.041880 0.955500 0.0000000 0.00000 0.0000000 0.000000) *

71) V2:endmorai,glcltill 428 1122.00 5-1-4-9 (0.030370 0.000000 0.000000 0.0070090 0.0000000 0.079440 0.308400 0.000000 0.0724300 0.011680 0.0000000 0.000000 0.000000 0.488300 0.0023360 0.00000 0.0000000 0.000000)

142) V5:loamysan,muckpeat,musaloam,san_fsan 287 612.00 5-1-4-9 (0.041810 0.000000 0.000000 0.0034840 0.0000000 0.101000 0.170700 0.000000 0.0174200 0.006969 0.0000000 0.000000 0.000000 0.658500 0.0000000 0.00000 0.0000000 0.000000)

284) V10<229.5 102 204.80 5-1-4-9 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.058820 0.431400 0.000000 0.0196100 0.009804 0.0000000 0.000000 0.000000 0.480400 0.0000000 0.00000 0.0000000 0.000000) *

285) V10>229.5 185 321.30 5-1-4-9 (0.064860 0.000000 0.000000 0.0054050 0.0000000 0.124300 0.027030 0.000000 0.0162200 0.005405 0.0000000 0.000000 0.000000 0.756800 0.0000000 0.00000 0.0000000 0.000000) *

143) V5:loam,sandyloa,siclloam,varies 141 347.30 2-1-3-4 (0.007092 0.000000 0.000000 0.0141800 0.0000000 0.035460 0.588700 0.000000 0.1844000 0.021280 0.0000000 0.000000 0.000000 0.141800 0.0070920 0.00000 0.0000000 0.000000) *

9) V10>258.5 1778 6326.00 2-1-2-3 (0.228300 0.133900 0.078180 0.3605000 0.0478100 0.002250 0.005624 0.005062 0.0000000 0.000000 0.0005624 0.002250 0.064680 0.069180 0.0016870 0.00000 0.0000000 0.000000)

18) V2:endmorai 1172 3086.00 2-1-2-3 (0.152700 0.145100 0.116900 0.5469000 0.0000000 0.000000 0.008532 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.021330 0.005973 0.0025600 0.00000 0.0000000 0.000000)

36) V13<5436.5 865 2062.00 2-1-2-3 (0.024280 0.166500 0.154900 0.6035000 0.0000000 0.000000 0.011560 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.027750 0.008092 0.0034680 0.00000 0.0000000 0.000000)

72) V10<273.5 161 238.60 2-1-2-3 (0.012420 0.012420 0.000000 0.8075000 0.0000000 0.000000 0.062110 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.086960 0.000000 0.0186300 0.00000 0.0000000 0.000000) *

73) V10>273.5 704 1645.00 2-1-2-3 (0.026990 0.201700 0.190300 0.5568000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.014200 0.009943 0.0000000 0.00000 0.0000000 0.000000)

146) V5:loam,musaloam,sandyloa,siclloam 231 304.10 2-1-2-3 (0.008658 0.043290 0.160200 0.7879000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

147) V5:loamysan,muckpeat,san_fsan,varies,NA 473 1235.00 2-1-2-3 (0.035940 0.279100 0.205100 0.4440000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.021140 0.014800 0.0000000 0.00000 0.0000000 0.000000)

294) V12<3745.5 302 684.90 2-1-2-3 (0.009934 0.364200 0.125800 0.4702000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.029800 0.000000 0.0000000 0.00000 0.0000000 0.000000)

588) V4:excessiv,someexce,verypoor,well 228 549.40 1-1-2-2 (0.013160 0.416700 0.153500 0.3772000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.039470 0.000000 0.0000000 0.00000 0.0000000 0.000000)

1176) V12<2474 155 347.00 1-1-2-2 (0.019350 0.483900 0.077420 0.3806000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.038710 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

1177) V12>2474 73 177.80 2-1-2-3 (0.000000 0.274000 0.315100 0.3699000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.041100 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

589) V4:modwell,somepoor,NA 74 98.33 2-1-2-3 (0.000000 0.202700 0.040540 0.7568000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

295) V12>3745.5 171 466.30 2-1-2-3 (0.081870 0.128700 0.345000 0.3977000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.005848 0.040940 0.0000000 0.00000 0.0000000 0.000000) *

37) V13>5436.5 307 603.10 1-1-1-1 (0.514700 0.084690 0.009772 0.3876000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.003257 0.000000 0.0000000 0.00000 0.0000000 0.000000)

74) V13<9189.5 205 406.90 2-1-2-3 (0.341500 0.126800 0.000000 0.5268000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.004878 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

75) V13>9189.5 102 96.14 1-1-1-1 (0.862700 0.000000 0.029410 0.1078000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

19) V2:glcl_out,glcltill 606 1996.00 1-1-1-1 (0.374600 0.112200 0.003300 0.0000000 0.1403000 0.006601 0.000000 0.014850 0.0000000 0.000000 0.0016500 0.006601 0.148500 0.191400 0.0000000 0.00000 0.0000000 0.000000)

38) V3:asp/wbir,bee/heml,n_hardw 316 818.00 1-1-1-1 (0.515800 0.193000 0.006329 0.0000000 0.2089000 0.012660 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.009494 0.047470 0.006329 0.0000000 0.00000 0.0000000 0.000000)

76) V13<4706.5 200 576.90 2-1-2-6 (0.265000 0.300000 0.010000 0.0000000 0.3200000 0.020000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.075000 0.010000 0.0000000 0.00000 0.0000000 0.000000)

152) V10<276.5 141 391.40 2-1-2-6 (0.148900 0.248200 0.000000 0.0000000 0.4539000 0.028370 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.106400 0.014180 0.0000000 0.00000 0.0000000 0.000000) *

153) V10>276.5 59 95.63 1-1-1-1 (0.542400 0.423700 0.033900 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

77) V13>4706.5 116 59.36 1-1-1-1 (0.948300 0.008621 0.000000 0.0000000 0.0172400 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.025860 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

39) V3:wetl_h2o 290 850.00 5-1-4-9 (0.220700 0.024140 0.000000 0.0000000 0.0655200 0.000000 0.000000 0.031030 0.0000000 0.000000 0.0034480 0.003448 0.258600 0.393100 0.0000000 0.00000 0.0000000 0.000000)

78) V2:glcl_out 155 290.20 5-1-4-9 (0.064520 0.012900 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0064520 0.000000 0.316100 0.600000 0.0000000 0.00000 0.0000000 0.000000) *

79) V2:glcltill 135 428.80 1-1-1-1 (0.400000 0.037040 0.000000 0.0000000 0.1407000 0.000000 0.000000 0.066670 0.0000000 0.000000 0.0000000 0.007407 0.192600 0.155600 0.0000000 0.00000 0.0000000 0.000000) *

5) V3:othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wp/be/ma 3487 8058.00 1-1-1-1 (0.619700 0.014050 0.011180 0.0063090 0.0020070 0.000000 0.013770 0.029830 0.0002868 0.002868 0.0109000 0.000000 0.260100 0.008890 0.0197900 0.00000 0.0002868 0.000000)

10) V2:glcl_out 723 984.20 5-1-1-1 (0.121700 0.000000 0.005533 0.0000000 0.0000000 0.000000 0.006916 0.012450 0.0000000 0.000000 0.0069160 0.000000 0.816000 0.030430 0.0000000 0.00000 0.0000000 0.000000)

20) V4:excessiv 403 84.00 5-1-1-1 (0.009926 0.000000 0.004963 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.982600 0.002481 0.0000000 0.00000 0.0000000 0.000000) *

21) V4:modwell,someexce,somepoor,verypoor,well,NA 320 701.00 5-1-1-1 (0.262500 0.000000 0.006250 0.0000000 0.0000000 0.000000 0.015620 0.028130 0.0000000 0.000000 0.0156200 0.000000 0.606200 0.065630 0.0000000 0.00000 0.0000000 0.000000)

42) V10<279.5 243 496.30 5-1-1-1 (0.139900 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.020580 0.037040 0.0000000 0.000000 0.0205800 0.000000 0.695500 0.086420 0.0000000 0.00000 0.0000000 0.000000) *

43) V10>279.5 77 114.00 1-1-1-1 (0.649400 0.000000 0.025970 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.324700 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

11) V2:endmorai,glcltill 2764 5610.00 1-1-1-1 (0.750000 0.017730 0.012660 0.0079590 0.0025330 0.000000 0.015560 0.034370 0.0003618 0.003618 0.0119400 0.000000 0.114700 0.003256 0.0249600 0.00000 0.0003618 0.000000)

22) V3:rp_r/jp,shrub_jp 958 2144.00 1-1-1-1 (0.625300 0.000000 0.004175 0.0229600 0.0041750 0.000000 0.006263 0.000000 0.0000000 0.000000 0.0240100 0.000000 0.232800 0.007307 0.0720300 0.00000 0.0010440 0.000000)

44) V10<269.5 331 916.60 5-1-1-1 (0.338400 0.000000 0.000000 0.0000000 0.0120800 0.000000 0.018130 0.000000 0.0000000 0.000000 0.0271900 0.000000 0.371600 0.021150 0.2085000 0.00000 0.0030210 0.000000)

88) V10<238.5 48 53.94 6-1-1-1 (0.062500 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.062500 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.8542000 0.00000 0.0208300 0.000000) *

89) V10>238.5 283 717.70 5-1-1-1 (0.385200 0.000000 0.000000 0.0000000 0.0141300 0.000000 0.010600 0.000000 0.0000000 0.000000 0.0318000 0.000000 0.434600 0.024730 0.0989400 0.00000 0.0000000 0.000000)

178) V2:endmorai 64 94.21 5-1-1-1 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.031250 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.671900 0.000000 0.2969000 0.00000 0.0000000 0.000000) *

179) V2:glcltill 219 519.10 1-1-1-1 (0.497700 0.000000 0.000000 0.0000000 0.0182600 0.000000 0.004566 0.000000 0.0000000 0.000000 0.0411000 0.000000 0.365300 0.031960 0.0411000 0.00000 0.0000000 0.000000) *

45) V10>269.5 627 907.60 1-1-1-1 (0.776700 0.000000 0.006380 0.0350900 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0223300 0.000000 0.159500 0.000000 0.0000000 0.00000 0.0000000 0.000000)

90) V4:excessiv,someexce 315 378.70 1-1-1-1 (0.711100 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.288900 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

91) V4:modwell,somepoor,verypoor,well 312 392.10 1-1-1-1 (0.842900 0.000000 0.012820 0.0705100 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0448700 0.000000 0.028850 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

23) V3:othupcon,p/o_w/rp,wp/be/ma 1806 2896.00 1-1-1-1 (0.816200 0.027130 0.017170 0.0000000 0.0016610 0.000000 0.020490 0.052600 0.0005537 0.005537 0.0055370 0.000000 0.052050 0.001107 0.0000000 0.00000 0.0000000 0.000000)

46) V10<220 37 0.00 2-1-3-4 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 1.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

47) V10>220 1769 2535.00 1-1-1-1 (0.833200 0.027700 0.017520 0.0000000 0.0016960 0.000000 0.000000 0.053700 0.0005653 0.005653 0.0056530 0.000000 0.053140 0.001131 0.0000000 0.00000 0.0000000 0.000000)

94) V2:endmorai 784 1129.00 1-1-1-1 (0.809900 0.054850 0.039540 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0127600 0.000000 0.082910 0.000000 0.0000000 0.00000 0.0000000 0.000000)

188) V3:othupcon 23 0.00 2-1-2-2 (0.000000 0.000000 1.000000 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

189) V3:p/o_w/rp 761 956.40 1-1-1-1 (0.834400 0.056500 0.010510 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0131400 0.000000 0.085410 0.000000 0.0000000 0.00000 0.0000000 0.000000)

378) V13<8584 364 692.90 1-1-1-1 (0.684100 0.098900 0.013740 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0274700 0.000000 0.175800 0.000000 0.0000000 0.00000 0.0000000 0.000000)

756) V13<2438.5 70 152.40 5-1-1-1 (0.400000 0.028570 0.042860 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0428600 0.000000 0.485700 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

757) V13>2438.5 294 482.10 1-1-1-1 (0.751700 0.115600 0.006803 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0238100 0.000000 0.102000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

379) V13>8584 397 119.50 1-1-1-1 (0.972300 0.017630 0.007557 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.002519 0.000000 0.0000000 0.00000 0.0000000 .000000) *

95) V2:glcltill 985 1144.00 1-1-1-1 (0.851800 0.006091 0.000000 0.0000000 0.0030460 0.000000 0.000000 0.096450 0.0010150 0.010150 0.0000000 0.000000 0.029440 0.002030 0.0000000 0.00000 0.0000000 0.000000)

190) V12<5400 371 397.20 1-1-1-1 (0.867900 0.013480 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.032350 0.0000000 0.002695 0.0000000 0.000000 0.078170 0.005391 0.0000000 0.00000 0.0000000 0.000000) *

191) V12>5400 614 643.60 1-1-1-1 (0.842000 0.001629 0.000000 0.0000000 0.0048860 0.000000 0.000000 0.135200 0.0016290 0.014660 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000)

382) V10<294.5 418 555.30 1-1-1-1 (0.772700 0.002392 0.000000 0.0000000 0.0071770 0.000000 0.000000 0.193800 0.0023920 0.021530 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000)

764) V3:othupcon 19 24.06 2-3-1-1 (0.157900 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.789500 0.0526300 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

765) V3:p/o_w/rp,wp/be/ma 399 488.30 1-1-1-1 (0.802000 0.002506 0.000000 0.0000000 0.0075190 0.000000 0.000000 0.165400 0.0000000 0.022560 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

383) V10>294.5 196 22.32 1-1-1-1 (0.989800 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.010200 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

3) V2:dunesand,icec_out,lacustri,lake,NA 3728 13650.00 3-3-2-2 (0.031380 0.000000 0.000000 0.0008047 0.0000000 0.008047 0.035410 0.021460 0.0359400 0.503200 0.0724200 0.008047 0.003219 0.028170 0.1170000 0.05311 0.0547200 0.027090)

6) V2:icec_out,lake 2721 6965.00 3-3-2-2 (0.043000 0.000000 0.000000 0.0003675 0.0000000 0.011030 0.018380 0.029400 0.0492500 0.678400 0.0992300 0.011030 0.001838 0.038590 0.0000000 0.01507 0.0044100 0.000000)

12) V3:asp/wbir,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o 1189 4505.00 3-3-2-2 (0.098400 0.000000 0.000000 0.0008410 0.0000000 0.018500 0.031120 0.067280 0.1043000 0.324600 0.2271000 0.000841 0.004205 0.088310 0.0000000 0.03448 0.0000000 0.000000)

24) V10<276.5 817 2807.00 3-3-2-2 (0.003672 0.000000 0.000000 0.0000000 0.0000000 0.026930 0.045290 0.080780 0.1506000 0.455300 0.0673200 0.001224 0.004896 0.113800 0.0000000 0.05018 0.0000000 0.000000)

48) V3:p/o_w/rp,rp_r/jp 190 478.90 3-3-2-2 (0.015790 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.342100 0.0052630 0.352600 0.2632000 0.000000 0.021050 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

49) V3:asp/wbir,othupcon,wetl_h2o 627 1848.00 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.035090 0.059010 0.001595 0.1946000 0.486400 0.0079740 0.001595 0.000000 0.148300 0.0000000 0.06539 0.0000000 0.000000)

98) V10<241.5 223 680.40 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.089690 0.165900 0.000000 0.2197000 0.340800 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.18390 0.0000000 0.000000)

196) V10<213.5 88 172.70 6-1-4-9 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.125000 0.000000 0.0000000 0.409100 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.46590 0.0000000 0.000000) *

197) V10>213.5 135 358.70 2-3-3-4 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.148100 0.192600 0.000000 0.3630000 0.296300 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

99) V10>241.5 404 872.20 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.004950 0.000000 0.002475 0.1807000 0.566800 0.0123800 0.002475 0.000000 0.230200 0.0000000 0.00000 0.0000000 0.000000)

198) V13<3253.5 253 580.20 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.007905 0.000000 0.000000 0.1621000 0.454500 0.0158100 0.003953 0.000000 0.355700 0.0000000 0.00000 0.0000000 0.000000)

396) V10<271.5 226 497.40 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.008850 0.000000 0.000000 0.1770000 0.508800 0.0044250 0.004425 0.000000 0.296500 0.0000000 0.00000 0.0000000 0.000000) *

397) V10>271.5 27 27.15 5-1-4-9 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0370400 0.000000 0.1111000 0.000000 0.000000 0.851900 0.0000000 0.00000 0.0000000 0.000000) *

199) V13>3253.5 151 207.00 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.006623 0.2119000 0.755000 0.0066230 0.000000 0.000000 0.019870 0.0000000 0.00000 0.0000000 0.000000) *

25) V10>276.5 372 807.00 3-4-1-1 (0.306500 0.000000 0.000000 0.0026880 0.0000000 0.000000 0.000000 0.037630 0.0026880 0.037630 0.5780000 0.000000 0.002688 0.032260 0.0000000 0.00000 0.0000000 0.000000)

50) V12<6395.5 268 380.60 3-4-1-1 (0.119400 0.000000 0.000000 0.0037310 0.0000000 0.000000 0.000000 0.000000 0.0037310 0.052240 0.8022000 0.000000 0.003731 0.014930 0.0000000 0.00000 0.0000000 0.000000) *

51) V12>6395.5 104 136.20 1-1-1-1 (0.788500 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.134600 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.076920 0.0000000 0.00000 0.0000000 0.000000) *

13) V3:bee/heml,n_hardw,wp/be/ma 1532 795.80 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.005222 0.008486 0.000000 0.0065270 0.953000 0.0000000 0.018930 0.000000 0.000000 0.0000000 0.00000 0.0078330 0.000000)

26) V3:bee/heml 348 302.00 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.002874 0.000000 0.0287400 0.885100 0.0000000 0.083330 0.000000 0.000000 0.0000000 0.00000 0.0000000 0.000000) *

27) V3:n_hardw,wp/be/ma 1184 363.50 3-3-2-2 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.006757 0.010140 0.000000 0.0000000 0.973000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.00000 0.0101400 0.000000) *

7) V2:dunesand,lacustri,NA 1007 3131.00 6-1-1-1 (0.000000 0.000000 0.000000 0.0019860 0.0000000 0.000000 0.081430 0.000000 0.0000000 0.029790 0.0000000 0.000000 0.006951 0.000000 0.4330000 0.15590 0.1907000 0.100300)

14) V10<223 560 1643.00 6-3-1-1 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.142900 0.000000 0.0000000 0.053570 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.28040 0.3429000 0.180400)

28) V2:lacustri 358 826.30 6-3-1-1 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.223500 0.000000 0.0000000 0.002793 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.35750 0.3994000 0.016760)

56) V13<3319.5 218 445.50 6-1-4-9 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.279800 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.55050 0.1606000 0.009174) *

57) V13>3319.5 140 216.10 6-3-1-1 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.135700 0.000000 0.0000000 0.007143 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.05714 0.7714000 0.028570) *

29) V2:dunesand,NA 202 507.30 6-3-4-1 (0.000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.143600 0.0000000 0.000000 0.000000 0.000000 0.0000000 0.14360 0.2426000 0.470300) *

15) V10>223 447 123.20 6-1-1-1 (0.000000 0.000000 0.000000 0.0044740 0.0000000 0.000000 0.004474 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.015660 0.000000 0.9754000 0.00000 0.0000000 0.000000) *

APPENDIX F

Newaygo County Classification Tree

> n250l.tree
node), split, n, deviance, yval, (yprob)
* denotes terminal node

1) root 13921 68450.00 1-1-1-1 (0.173200 0.010340 0.01422 0.067670 0.125100 0.013000 0.020980 0.0227700 0.020830 0.0496400 0.117900 0.102900 0.0290900 0.0029450 0.171900 0.023780 0.0142900 0.002155 0.0129300 0.004310)
2) V2:endmorai,glcltill 6997 30570.00 1-1-1-1 (0.325000 0.012430 0.02830 0.087750 0.195800 0.014580 0.038870 0.0305800 0.038730 0.0936100 0.022870 0.029870 0.0218700 0.0032870 0.042020 0.014290 0.0001429 0.000000 0.0000000 0.000000)
4) V10<289.5 3952 17950.00 1-2-2-2 (0.058960 0.018220 0.00000 0.088060 0.307700 0.025810 0.023790 0.0541500 0.068570 0.1655000 0.034670 0.038970 0.0387100 0.0058200 0.049090 0.021760 0.0002530 0.000000 0.0000000 0.000000)
8) V3:n_hardw 1396 4419.00 2-3-2-3 (0.000000 0.043700 0.00000 0.007880 0.214900 0.030800 0.000000 0.1483000 0.001433 0.4570000 0.003582 0.000000 0.0637500 0.0007163 0.007163 0.020060 0.0007163 0.000000 0.0000000 0.000000)
16) V10<257.5 659 1958.00 2-3-2-3 (0.000000 0.000000 0.00000 0.000000 0.074360 0.065250 0.000000 0.2792000 0.003035 0.4203000 0.007587 0.000000 0.1351000 0.0000000 0.013660 0.000000 0.0015170 0.000000 0.0000000 0.000000)
32) V2:endmorai 211 549.60 2-3-2-3 (0.000000 0.000000 0.00000 0.000000 0.232200 0.004739 0.000000 0.3318000 0.009479 0.3744000 0.000000 0.000000 0.0000000 0.0000000 0.042650 0.000000 0.0047390 0.000000 0.0000000 0.000000) *
33) V2:glcltill 448 1167.00 2-3-2-3 (0.000000 0.000000 0.00000 0.000000 0.000000 0.093750 0.000000 0.2545000 0.000000 0.4420000 0.011160 0.000000 0.1987000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000)
66) V10<239.5 225 643.70 5-1-3-2 (0.000000 0.000000 0.00000 0.000000 0.000000 0.186700 0.000000 0.2044000 0.000000 0.2356000 0.022220 0.000000 0.3511000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *
67) V10>239.5 223 348.40 2-3-2-3 (0.000000 0.000000 0.00000 0.000000 0.000000 0.000000 0.000000 0.3049000 0.000000 0.6502000 0.000000 0.000000 0.0448400 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *
17) V10>257.5 737 1822.00 2-3-2-3 (0.000000 0.082770 0.00000 0.014930 0.340600 0.000000 0.000000 0.0312100 0.000000 0.4898000 0.000000 0.000000 0.0000000 0.0013570 0.001357 0.037990 0.0000000 0.000000 0.0000000 0.000000)
34) V10<271.5 441 767.60 2-3-2-3 (0.000000 0.002268 0.00000 0.000000 0.374100 0.000000 0.000000 0.0521500 0.000000 0.5692000 0.000000 0.000000 0.0000000 0.0000000 0.002268 0.000000 0.0000000 0.000000 0.0000000 0.000000)
68) V13<7482 403 694.50 2-3-2-3 (0.000000 0.002481 0.00000 0.000000 0.330000 0.000000 0.000000 0.0570700 0.000000 0.6079000 0.000000 0.000000 0.0000000 0.0000000 0.002481 0.000000 0.0000000 0.000000 0.0000000 0.000000)
136) V4:excessiv,modwell,poor,somepoor 115 228.50 1-2-2-2 (0.000000 0.008696 0.00000 0.000000 0.504300 0.000000 0.000000 0.0782600 0.000000 0.4000000 0.000000 0.000000 0.0000000 0.0000000 0.008696 0.000000 0.0000000 0.000000 0.0000000 0.000000) *
137) V4:verypoor,well,NA 288 433.60 2-3-2-3 (0.000000 0.000000 0.00000 0.000000 0.260400 0.000000 0.000000 0.0486100 0.000000 0.6910000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *
69) V13>7482 38 33.15 1-2-2-2 (0.000000 0.000000 0.00000 0.000000 0.842100 0.000000 0.000000 0.0000000 0.000000 0.1579000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *
35) V10>271.5 296 837.80 2-3-2-3 (0.000000 0.202700 0.00000 0.037160 0.290500 0.000000 0.000000 0.0000000 0.000000 0.3716000 0.000000 0.000000 0.0000000 0.0033780 0.000000 0.094590 0.0000000 0.000000 0.0000000 0.000000)

70) V5:loam,loamysan,muckpeat,musaloam,sandyloa 197 493.00 2-3-2-3 (0.000000 0.106600 0.00000
0.035530 0.233500 0.000000 0.000000 0.0000000 0.000000 0.5431000 0.000000 0.000000 0.0000000 0.0050760
0.000000 0.076140 0.0000000 0.000000 0.0000000 0.000000) *

71) V5:san_fsan,NA 99 244.60 1-2-2-2 (0.000000 0.393900 0.00000 0.040400 0.404000 0.000000
0.000000 0.0000000 0.000000 0.0303000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.131300 0.0000000
0.000000 0.0000000 0.000000) *

9) V3:bee/heml,othupcon,p/o_w/rp,rp_r/jp,shrub_jp,wetl_h2o,wp/be/ma 2556 10740.00 1-2-2-2 (0.091160
0.004304 0.00000 0.131800 0.358400 0.023080 0.036780 0.0027390 0.105200 0.0062600 0.051640 0.060250
0.0250400 0.0086070 0.071990 0.022690 0.0000000 0.000000 0.0000000 0.000000)

18) V3:p/o_w/rp,rp_r/jp,shrub_jp 736 2397.00 1-2-1-1 (0.267700 0.000000 0.00000 0.294800 0.111400
0.000000 0.127700 0.0000000 0.000000 0.0000000 0.169800 0.001359 0.0000000 0.0000000 0.027170 0.000000
0.0000000 0.000000 0.0000000 0.000000)

36) V3:p/o_w/rp 629 1952.00 1-2-1-1 (0.310000 0.000000 0.00000 0.345000 0.124000 0.000000 0.103300
0.0000000 0.000000 0.0000000 0.084260 0.001590 0.0000000 0.0000000 0.031800 0.000000 0.0000000 0.000000
0.0000000 0.000000)

72) V10<249.5 46 56.53 1-2-2-2 (0.000000 0.000000 0.00000 0.000000 0.695700 0.000000 0.000000
0.0000000 0.000000 0.0000000 0.304300 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

73) V10>249.5 583 1733.00 1-2-1-1 (0.334500 0.000000 0.00000 0.372200 0.078900 0.000000 0.111500
0.0000000 0.000000 0.0000000 0.066900 0.001715 0.0000000 0.0000000 0.034310 0.000000 0.0000000 0.000000
0.0000000 0.000000)

146) V13<4106 150 471.90 1-2-1-1 (0.226700 0.000000 0.00000 0.306700 0.053330 0.000000 0.146700
0.0000000 0.000000 0.0000000 0.246700 0.006667 0.0000000 0.0000000 0.013330 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

147) V13>4106 433 1156.00 1-2-1-1 (0.371800 0.000000 0.00000 0.394900 0.087760 0.000000 0.099310
0.0000000 0.000000 0.0000000 0.004619 0.000000 0.0000000 0.0000000 0.041570 0.000000 0.0000000 0.000000
0.0000000 0.000000)

294) V12<1907 113 239.90 1-2-1-1 (0.185800 0.000000 0.00000 0.646000 0.053100 0.000000
0.008850 0.0000000 0.000000 0.0000000 0.008850 0.000000 0.0000000 0.0000000 0.097350 0.000000 0.0000000
0.000000 0.0000000 0.000000) *

295) V12>1907 320 846.40 1-1-1-1 (0.437500 0.000000 0.00000 0.306300 0.100000 0.000000
0.131300 0.0000000 0.000000 0.0000000 0.003125 0.000000 0.0000000 0.0000000 0.021870 0.000000 0.0000000
0.000000 0.0000000 0.000000)

590) V9:N,NE,NW 51 119.40 2-2-1-1 (0.274500 0.000000 0.00000 0.078430 0.137300 0.000000
0.509800 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000
0.000000 0.0000000 0.000000) *

591) V9:E,S,SE,SW,W,NA 269 660.20 1-1-1-1 (0.468400 0.000000 0.00000 0.349400 0.092940
0.000000 0.059480 0.0000000 0.000000 0.0000000 0.003717 0.000000 0.0000000 0.0000000 0.026020 0.000000
0.0000000 0.000000 0.0000000 0.000000) *

37) V3:rp_r/jp,shrub_jp 107 175.00 5-1-1-1 (0.018690 0.000000 0.00000 0.000000 0.037380 0.000000
0.271000 0.0000000 0.000000 0.0000000 0.672900 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000
0.000000 0.0000000 0.000000) *

19) V3:bee/heml,othupcon,wetl_h2o,wp/be/ma 1820 6659.00 1-2-2-2 (0.019780 0.006044 0.00000 0.065930
0.458200 0.032420 0.000000 0.0038460 0.147800 0.0087910 0.003846 0.084070 0.0351600 0.0120900 0.090110
0.031870 0.0000000 0.000000 0.0000000 0.000000)

38) V10<238.5 187 557.20 5-1-3-2 (0.000000 0.000000 0.00000 0.000000 0.187200 0.315500 0.000000
0.0160400 0.000000 0.0427800 0.000000 0.000000 0.3262000 0.0000000 0.112300 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

39) V10>238.5 1633 5369.00 1-2-2-2 (0.022050 0.006736 0.00000 0.073480 0.489300 0.000000 0.000000
0.0024490 0.164700 0.0048990 0.004287 0.093690 0.0018370 0.0134700 0.087570 0.035520 0.0000000 0.000000
0.0000000 0.000000)

78) V10<263.5 1015 2903.00 1-2-2-2 (0.021670 0.000000 0.00000 0.012810 0.473900 0.000000 0.000000
0.0039410 0.264000 0.0068970 0.005911 0.137900 0.0029560 0.0068970 0.063050 0.000000 0.0000000 0.000000
0.0000000 0.000000)

156) V3:othupcon,wetl_h2o 323 1072.00 5-1-3-1 (0.040250 0.000000 0.00000 0.018580 0.207400
0.000000 0.000000 0.0123800 0.164100 0.0216700 0.003096 0.430300 0.0092880 0.0216700 0.071210 0.000000
0.0000000 0.000000 0.0000000 0.000000)

312) V10<258.5 241 717.40 5-1-3-1 (0.041490 0.000000 0.00000 0.020750 0.091290 0.000000 0.000000 0.0166000 0.182600 0.0290500 0.000000 0.535300 0.0124500 0.0000000 0.070540 0.000000 0.0000000 0.000000 0.0000000 0.000000)

624) V12<4130 96 331.10 5-1-3-1 (0.000000 0.000000 0.00000 0.052080 0.218800 0.000000 0.000000 0.0312500 0.187500 0.0520800 0.000000 0.333300 0.0104200 0.0000000 0.114600 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

625) V12>4130 145 313.20 5-1-3-1 (0.068970 0.000000 0.00000 0.000000 0.006897 0.000000 0.000000 0.0068970 0.179300 0.0137900 0.000000 0.669000 0.0137900 0.0000000 0.041380 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

313) V10>258.5 82 239.20 1-2-2-2 (0.036590 0.000000 0.00000 0.012200 0.548800 0.000000 0.000000 0.0000000 0.109800 0.0000000 0.012200 0.122000 0.0000000 0.0853700 0.073170 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

157) V3:bee/heml,wp/be/ma 692 1365.00 1-2-2-2 (0.013010 0.000000 0.00000 0.010120 0.598300 0.000000 0.000000 0.0000000 0.310700 0.0000000 0.007225 0.001445 0.0000000 0.0000000 0.059250 0.000000 0.0000000 0.000000 0.0000000 0.000000)

314) V5:musaloam,san_fsan 171 475.70 1-2-2-2 (0.029240 0.000000 0.00000 0.029240 0.415200 0.000000 0.000000 0.0000000 0.274900 0.0000000 0.029240 0.005848 0.0000000 0.0000000 0.216400 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

315) V5:loam,loamysan,muckpeat,sandyloa,NA 521 767.20 1-2-2-2 (0.007678 0.000000 0.00000 0.003839 0.658300 0.000000 0.000000 0.0000000 0.322500 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.007678 0.000000 0.0000000 0.000000 0.0000000 0.000000)

630) V2:endmorai 477 676.20 1-2-2-2 (0.008386 0.000000 0.00000 0.004193 0.700200 0.000000 0.000000 0.0000000 0.278800 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.008386 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

631) V2:glcltill 44 44.58 2-3-2-2 (0.000000 0.000000 0.00000 0.000000 0.204500 0.000000 0.000000 0.0000000 0.795500 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

79) V10>263.5 618 1843.00 1-2-2-2 (0.022650 0.017800 0.00000 0.173100 0.514600 0.000000 0.000000 0.0000000 0.001618 0.0016180 0.001618 0.021040 0.0000000 0.0242700 0.127800 0.093850 0.0000000 0.000000 0.0000000 0.000000)

158) V5:loam,loamysan,muckpeat,sandyloa 359 823.00 1-2-2-2 (0.027860 0.011140 0.00000 0.108600 0.699200 0.000000 0.000000 0.0000000 0.002786 0.0027860 0.000000 0.013930 0.0000000 0.0390000 0.036210 0.058500 0.0000000 0.000000 0.0000000 0.000000)

316) V10<278.5 264 448.80 1-2-2-2 (0.018940 0.007576 0.00000 0.060610 0.803000 0.000000 0.000000 0.0000000 0.003788 0.0037880 0.000000 0.007576 0.0000000 0.0530300 0.030300 0.011360 0.0000000 0.000000 0.0000000 0.000000) *

317) V10>278.5 95 289.60 1-2-2-2 (0.052630 0.021050 0.00000 0.242100 0.410500 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.031580 0.0000000 0.0000000 0.052630 0.189500 0.0000000 0.000000 0.0000000 0.000000) *

159) V5:musaloam,san_fsan,NA 259 849.30 1-2-1-1 (0.015440 0.027030 0.00000 0.262500 0.258700 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.003861 0.030890 0.0000000 0.0038610 0.254800 0.142900 0.0000000 0.000000 0.0000000 0.000000)

318) V13<8274 212 687.00 5-2-1-1 (0.018870 0.014150 0.00000 0.150900 0.287700 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.004717 0.037740 0.0000000 0.0047170 0.306600 0.174500 0.0000000 0.000000 0.0000000 0.000000)

636) V10<280.5 131 348.40 1-2-2-2 (0.007634 0.000000 0.00000 0.122100 0.404600 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.007634 0.022900 0.0000000 0.0076340 0.381700 0.045800 0.0000000 0.000000 0.0000000 0.000000) *

637) V10>280.5 81 266.50 5-2-2-2 (0.037040 0.037040 0.00000 0.197500 0.098770 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.061730 0.0000000 0.0000000 0.185200 0.382700 0.0000000 0.000000 0.0000000 0.000000) *

319) V13>8274 47 71.31 1-2-1-1 (0.000000 0.085110 0.00000 0.766000 0.127700 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.021280 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

5) V10>289.5 3045 7618.00 1-1-1-1 (0.670300 0.004926 0.06502 0.087360 0.050570 0.000000 0.058460 0.0000000 0.000000 0.0003284 0.007553 0.018060 0.0000000 0.0000000 0.032840 0.004598 0.0000000 0.000000 0.0000000 0.000000)

10) V10<313.5 1512 4753.00 1-1-1-1 (0.487400 0.009921 0.00000 0.175900 0.099210 0.000000 0.101200
0.0000000 0.000000 0.0006614 0.015210 0.035050 0.0000000 0.0000000 0.066140 0.009259 0.0000000 0.000000
0.0000000 0.000000)

20) V3:n_hardw,othupcon,rp_r/jp,shrub_jp,wetl_h2o 297 1132.00 1-1-1-1 (0.269400 0.050510 0.00000
0.107700 0.232300 0.000000 0.067340 0.0000000 0.000000 0.0033670 0.047140 0.175100 0.0000000 0.0000000
0.033670 0.013470 0.0000000 0.000000 0.0000000 0.000000)

40) V3:n_hardw,rp_r/jp,shrub_jp 128 385.80 1-2-2-2 (0.093750 0.101600 0.00000 0.031250 0.500000
0.000000 0.156200 0.0000000 0.000000 0.0078120 0.101600 0.000000 0.0000000 0.0000000 0.000000 0.007812
0.0000000 0.000000 0.0000000 0.000000) *

41) V3:othupcon,wetl_h2o 169 491.00 1-1-1-1 (0.402400 0.011830 0.00000 0.165700 0.029590 0.000000
0.000000 0.0000000 0.000000 0.0000000 0.005917 0.307700 0.0000000 0.0000000 0.059170 0.017750 0.0000000
0.000000 0.0000000 0.000000) *

21) V3:bee/heml,p/o_w/rp,wp/be/ma 1215 3273.00 1-1-1-1 (0.540700 0.000000 0.00000 0.192600 0.066670
0.000000 0.109500 0.0000000 0.000000 0.0000000 0.007407 0.000823 0.0000000 0.0000000 0.074070 0.008230
0.0000000 0.000000 0.0000000 0.000000)

42) V5:musaloam,san_fsan,sandyloa 732 1655.00 1-1-1-1 (0.595600 0.000000 0.00000 0.243200 0.008197
0.000000 0.046450 0.0000000 0.000000 0.0000000 0.002732 0.001366 0.0000000 0.0000000 0.090160 0.012300
0.0000000 0.000000 0.0000000 0.000000)

84) V3:bee/heml,p/o_w/rp 558 1151.00 1-1-1-1 (0.675600 0.000000 0.00000 0.138000 0.007168 0.000000
0.060930 0.0000000 0.000000 0.0000000 0.003584 0.001792 0.0000000 0.0000000 0.111100 0.001792 0.0000000
0.000000 0.0000000 0.000000)

168) V13<9407 364 565.30 1-1-1-1 (0.802200 0.000000 0.00000 0.065930 0.010990 0.000000 0.032970
0.0000000 0.000000 0.0000000 0.005495 0.002747 0.0000000 0.0000000 0.076920 0.002747 0.0000000 0.000000
0.0000000 0.000000) *

169) V13>9407 194 492.00 1-1-1-1 (0.438100 0.000000 0.00000 0.273200 0.000000 0.000000 0.113400
0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.175300 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

85) V3:wp/be/ma 174 334.80 1-2-1-1 (0.339100 0.000000 0.00000 0.580500 0.011490 0.000000
0.000000 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.022990 0.045980 0.0000000
0.000000 0.0000000 0.000000) *

43) V5:loam,loamysan,muckpeat,NA 483 1396.00 1-1-1-1 (0.457600 0.000000 0.00000 0.115900 0.155300
0.000000 0.205000 0.0000000 0.000000 0.0000000 0.014490 0.000000 0.0000000 0.0000000 0.049690 0.002070
0.0000000 0.000000 0.0000000 0.000000)

86) V10<296.5 236 764.00 1-1-1-1 (0.343200 0.000000 0.00000 0.178000 0.216100 0.000000 0.148300
0.0000000 0.000000 0.0000000 0.029660 0.000000 0.0000000 0.0000000 0.080510 0.004237 0.0000000 0.000000
0.0000000 0.000000)

172) V13<11763 202 674.20 1-1-1-1 (0.272300 0.000000 0.00000 0.188100 0.252500 0.000000
0.153500 0.0000000 0.000000 0.0000000 0.034650 0.000000 0.0000000 0.0000000 0.094060 0.004950 0.0000000
0.000000 0.0000000 0.000000) *

173) V13>11763 34 48.19 1-1-1-1 (0.764700 0.000000 0.00000 0.117600 0.000000 0.000000 0.117600
0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

87) V10>296.5 247 563.10 1-1-1-1 (0.566800 0.000000 0.00000 0.056680 0.097170 0.000000 0.259100
0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.020240 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

11) V10>313.5 1533 1512.00 1-1-1-1 (0.850600 0.000000 0.12920 0.000000 0.002609 0.000000 0.016310
0.0000000 0.000000 0.0000000 0.000000 0.001305 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000
0.0000000 0.000000)

22) V3:n_hardw,wetl_h2o 455 744.30 1-1-1-1 (0.538500 0.000000 0.43520 0.000000 0.008791 0.000000
0.013190 0.0000000 0.000000 0.0000000 0.000000 0.004396 0.0000000 0.0000000 0.000000 0.000000 0.0000000
0.000000 0.0000000 0.000000)

44) V2:endmorai 301 420.40 1-1-1-1 (0.760800 0.000000 0.19930 0.000000 0.013290 0.000000 0.019930
0.0000000 0.000000 0.0000000 0.000000 0.006645 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

45) V2:glcltill 154 102.70 1-1-2-2 (0.103900 0.000000 0.89610 0.000000 0.000000 0.000000 0.000000
0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

23) V3:bee/heml,othupcon,p/o_w/rp,wp/be/ma,NA 1078 191.10 1-1-1-1 (0.982400 0.000000 0.00000 0.000000 0.000000 0.000000 0.017630 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

3) V2:dunesand,glcl_out,lacustri,lake,NA 6924 29100.00 5-2-1-1 (0.019790 0.008232 0.00000 0.047370 0.053730 0.011410 0.002889 0.0148800 0.002744 0.0051990 0.213900 0.176800 0.0364000 0.0026000 0.303100 0.033360 0.0286000 0.004333 0.0260000 0.008666)

6) V3:p/o_w/rp,rp_r/jp,shrub_jp 1949 4453.00 5-1-1-1 (0.043100 0.000000 0.00000 0.074910 0.033350 0.000000 0.007696 0.0000000 0.000000 0.0000000 0.647500 0.015390 0.0000000 0.0000000 0.176500 0.000000 0.0015390 0.000000 0.0000000 0.000000)

12) V3:p/o_w/rp 1039 3137.00 5-1-1-1 (0.079880 0.000000 0.00000 0.140500 0.059670 0.000000 0.013470 0.0000000 0.000000 0.0000000 0.416700 0.019250 0.0000000 0.0000000 0.268500 0.000000 0.0019250 0.000000 0.0000000 0.000000)

24) V10<259.5 420 925.40 5-1-1-1 (0.028570 0.000000 0.00000 0.040480 0.114300 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.633300 0.000000 0.0000000 0.0000000 0.178600 0.000000 0.0047620 0.000000 0.0000000 0.000000)

48) V4:well 41 79.15 1-2-2-2 (0.219500 0.000000 0.00000 0.000000 0.585400 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.195100 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

49) V4:excessiv,modwell,poor,someexce,somepoor,verypoor,NA 379 729.50 5-1-1-1 (0.007916 0.000000 0.00000 0.044850 0.063320 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.680700 0.000000 0.0000000 0.0000000 0.197900 0.000000 0.0052770 0.000000 0.0000000 0.000000)

98) V10<231.5 101 53.15 5-1-1-1 (0.000000 0.000000 0.00000 0.000000 0.039600 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.940600 0.000000 0.0000000 0.0000000 0.000000 0.000000 0.0198000 0.000000 0.0000000 0.000000) *

99) V10>231.5 278 598.00 5-1-1-1 (0.010790 0.000000 0.00000 0.061150 0.071940 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.586300 0.000000 0.0000000 0.0000000 0.269800 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

25) V10>259.5 619 1952.00 5-2-1-1 (0.114700 0.000000 0.00000 0.208400 0.022620 0.000000 0.022620 0.0000000 0.000000 0.0000000 0.269800 0.032310 0.0000000 0.0000000 0.329600 0.000000 0.0000000 0.000000 0.0000000 0.000000)

50) V10<289.5 467 1424.00 5-1-1-1 (0.036400 0.000000 0.00000 0.244100 0.029980 0.000000 0.025700 0.0000000 0.000000 0.0000000 0.323300 0.042830 0.0000000 0.0000000 0.297600 0.000000 0.0000000 0.000000 0.0000000 0.000000)

100) V4:excessiv,well 352 1036.00 5-1-1-1 (0.036930 0.000000 0.00000 0.306800 0.034090 0.000000 0.034090 0.0000000 0.000000 0.0000000 0.312500 0.008523 0.0000000 0.0000000 0.267000 0.000000 0.0000000 0.000000 0.0000000 0.000000)

200) V10<266.5 51 112.20 1-2-1-1 (0.000000 0.000000 0.00000 0.607800 0.137300 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.137300 0.000000 0.0000000 0.0000000 0.117600 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

201) V10>266.5 301 875.00 5-1-1-1 (0.043190 0.000000 0.00000 0.255800 0.016610 0.000000 0.039870 0.0000000 0.000000 0.0000000 0.342200 0.009967 0.0000000 0.0000000 0.292400 0.000000 0.0000000 0.000000 0.0000000 0.000000)

402) V12<4854.5 246 729.30 5-2-1-1 (0.052850 0.000000 0.00000 0.272400 0.016260 0.000000 0.048780 0.0000000 0.000000 0.0000000 0.268300 0.008130 0.0000000 0.0000000 0.333300 0.000000 0.0000000 0.000000 0.0000000 0.000000)

804) V13<3800 124 342.10 5-2-1-1 (0.016130 0.000000 0.00000 0.177400 0.000000 0.000000 0.088710 0.0000000 0.000000 0.0000000 0.290300 0.016130 0.0000000 0.0000000 0.411300 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

805) V13>3800 122 348.80 1-2-1-1 (0.090160 0.000000 0.00000 0.368900 0.032790 0.000000 0.008197 0.0000000 0.000000 0.0000000 0.245900 0.000000 0.0000000 0.0000000 0.254100 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

403) V12>4854.5 55 106.00 5-1-1-1 (0.000000 0.000000 0.00000 0.181800 0.018180 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.672700 0.018180 0.0000000 0.0000000 0.109100 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

101) V4:modwell,poor,someexce,somepoor,verypoor,NA 115 312.50 5-2-1-1 (0.034780 0.000000 0.00000 0.052170 0.017390 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.356500 0.147800 0.0000000 0.0000000 0.391300 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

51) V10>289.5 152 381.00 5-2-1-1 (0.355300 0.000000 0.00000 0.098680 0.000000 0.000000 0.013160
0.0000000 0.000000 0.0000000 0.105300 0.000000 0.0000000 0.0000000 0.427600 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

13) V3:rp_r/jp,shrub_jp 910 663.00 5-1-1-1 (0.001099 0.000000 0.00000 0.000000 0.003297 0.000000
0.001099 0.0000000 0.000000 0.0000000 0.911000 0.010990 0.0000000 0.0000000 0.071430 0.000000 0.0010990
0.000000 0.0000000 0.000000) *

7) V3:bee/heml,n_hardw,othupcon,wetl_h2o,wp/be/ma,NA 4975 20850.00 5-2-1-1 (0.010650 0.011460 0.00000
0.036580 0.061710 0.015880 0.001005 0.0207000 0.003819 0.0072360 0.044020 0.240000 0.0506500 0.0036180
0.352800 0.046430 0.0392000 0.006030 0.0361800 0.012060)

14) V10<240.5 1476 5473.00 5-2-1-1 (0.000000 0.000000 0.00000 0.000000 0.045390 0.053520 0.000000
0.0413300 0.008130 0.0033880 0.021000 0.000000 0.1687000 0.0000000 0.407900 0.004743 0.0846900 0.000000
0.1206000 0.040650)

28) V3:bee/heml,wp/be/ma 624 1177.00 5-2-1-1 (0.000000 0.000000 0.00000 0.000000 0.075320 0.083330
0.000000 0.0000000 0.001603 0.0000000 0.000000 0.000000 0.0737200 0.0000000 0.738800 0.000000 0.0192300
0.000000 0.0000000 0.008013)

56) V3:bee/heml 184 320.50 5-2-1-1 (0.000000 0.000000 0.00000 0.000000 0.000000 0.282600 0.000000
0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0923900 0.0000000 0.625000 0.000000 0.0000000 0.000000
0.0000000 0.000000) *

57) V3:wp/be/ma 440 677.70 5-2-1-1 (0.000000 0.000000 0.00000 0.000000 0.106800 0.000000 0.000000
0.0000000 0.002273 0.0000000 0.000000 0.000000 0.0659100 0.0000000 0.786400 0.000000 0.0272700 0.000000
0.0000000 0.011360) *

29) V3:n_hardw,othupcon,wetl_h2o,NA 852 3483.00 5-1-3-2 (0.000000 0.000000 0.00000 0.000000
0.023470 0.031690 0.000000 0.0716000 0.012910 0.0058690 0.036380 0.000000 0.2383000 0.0000000 0.165500
0.008216 0.1326000 0.000000 0.2089000 0.064550)

58) V3:othupcon 280 596.50 6-1-1-1 (0.000000 0.000000 0.00000 0.000000 0.000000 0.000000 0.000000
0.0142900 0.000000 0.0000000 0.000000 0.000000 0.0500000 0.0000000 0.207100 0.000000 0.1036000 0.000000
0.6250000 0.000000) *

59) V3:n_hardw,wetl_h2o,NA 572 2289.00 5-1-3-2 (0.000000 0.000000 0.00000 0.000000 0.034970
0.047200 0.000000 0.0996500 0.019230 0.0087410 0.054200 0.000000 0.3304000 0.0000000 0.145100 0.012240
0.1469000 0.000000 0.0052450 0.096150)

118) V10<225.5 140 406.50 5-5-3-1 (0.000000 0.000000 0.00000 0.000000 0.000000 0.085710 0.000000
0.0142900 0.000000 0.0000000 0.007143 0.000000 0.0428600 0.0000000 0.150000 0.000000 0.4071000 0:000000
0.0000000 0.292900) *

119) V10>225.5 432 1624.00 5-1-3-2 (0.000000 0.000000 0.00000 0.000000 0.046300 0.034720 0.000000
0.1273000 0.025460 0.0115700 0.069440 0.000000 0.4236000 0.0000000 0.143500 0.016200 0.0625000 0.000000
0.0069440 0.032410)

238) V3:wetl_h2o 233 666.20 5-1-3-2 (0.000000 0.000000 0.00000 0.000000 0.042920 0.000000
0.000000 0.0042920 0.047210 0.0000000 0.068670 0.000000 0.5794000 0.0000000 0.158800 0.004292 0.0257500
0.000000 0.0128800 0.055790) *

239) V3:n_hardw,NA 199 776.70 2-2-2-3 (0.000000 0.000000 0.00000 0.000000 0.050250 0.075380
0.000000 0.2714000 0.000000 0.0251300 0.070350 0.000000 0.2412000 0.0000000 0.125600 0.030150 0.1055000
0.000000 0.0000000 0.005025)

478) V4:poor,somepoor,well 125 406.80 2-2-2-3 (0.000000 0.000000 0.00000 0.000000 0.064000
0.112000 0.000000 0.3840000 0.000000 0.0160000 0.000000 0.000000 0.2960000 0.0000000 0.056000 0.016000
0.0480000 0.000000 0.0000000 0.008000) *

479) V4:excessiv,modwell,someexce,verypoor,NA 74 283.10 5-2-1-1 (0.000000 0.000000 0.00000
0.000000 0.027030 0.013510 0.000000 0.0810800 0.000000 0.0405400 0.189200 0.000000 0.1486000 0.0000000
0.243200 0.054050 0.2027000 0.000000 0.0000000 0.000000) *

15) V10>240.5 3499 12650.00 5-1-3-1 (0.015150 0.016290 0.00000 0.052010 0.068590 0.000000 0.001429
0.0120000 0.002001 0.0088600 0.053730 0.341200 0.0008574 0.0051440 0.329500 0.064020 0.0200100 0.008574
0.0005716 0.000000)

30) V3:othupcon,wetl_h2o 1859 4915.00 5-1-3-1 (0.009683 0.003765 0.00000 0.037120 0.020440 0.000000
0.000000 0.0021520 0.003765 0.0000000 0.038730 0.588000 0.0005379 0.0096830 0.237800 0.028510 0.0026900
0.016140 0.0010760 0.000000)

60) V6:-1-1',1-3' 1508 3264.00 5-1-3-1 (0.001989 0.003979 0.00000 0.011940 0.013260 0.000000 0.000000
0.0006631 0.000000 0.0000000 0.021220 0.667100 0.0006631 0.0112700 0.214900 0.035150 0.0006631 0.016580
0.0006631 0.000000)

120) V13<643 367 812.40 5-1-3-1 (0.000000 0.008174 0.00000 0.000000 0.002725 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.046320 0.574900 0.0000000 0.0109000 0.288800 0.000000 0.0000000 0.068120 0.0000000 0.000000)

240) V10<274.5 254 572.50 5-1-3-1 (0.000000 0.000000 0.00000 0.000000 0.003937 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.023620 0.464600 0.0000000 0.0157500 0.393700 0.000000 0.0000000 0.098430 0.0000000 0.000000) *

241) V10>274.5 113 144.50 5-1-3-1 (0.000000 0.026550 0.00000 0.000000 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.097350 0.823000 0.0000000 0.0000000 0.053100 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

121) V13>643 1141 2300.00 5-1-3-1 (0.002629 0.002629 0.00000 0.015780 0.016650 0.000000 0.000000 0.0008764 0.000000 0.0000000 0.013150 0.696800 0.0008764 0.0113900 0.191100 0.046450 0.0008764 0.000000 0.0008764 0.000000)

242) V10<255.5 309 595.40 5-1-3-1 (0.000000 0.000000 0.00000 0.003236 0.016180 0.000000 0.000000 0.0032360 0.000000 0.0000000 0.006472 0.589000 0.0032360 0.0000000 0.343000 0.032360 0.0000000 0.000000 0.0032360 0.000000) *

243) V10>255.5 832 1622.00 5-1-3-1 (0.003606 0.003606 0.00000 0.020430 0.016830 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.015620 0.736800 0.0000000 0.0156200 0.134600 0.051680 0.0012020 0.000000 0.0000000 0.000000)

486) V12<2164 140 381.50 5-1-3-1 (0.014290 0.000000 0.00000 0.035710 0.064290 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.014290 0.500000 0.0000000 0.0357100 0.300000 0.035710 0.0000000 0.000000 0.0000000 0.000000) *

487) V12>2164 692 1173.00 5-1-3-1 (0.001445 0.004335 0.00000 0.017340 0.007225 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.015900 0.784700 0.0000000 0.0115600 0.101200 0.054910 0.0014450 0.000000 0.0000000 0.000000)

974) V3:othupcon 204 204.60 5-1-3-1 (0.004902 0.000000 0.00000 0.039220 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.009804 0.882400 0.0000000 0.0000000 0.058820 0.004902 0.0000000 0.000000 0.0000000 0.000000) *

975) V3:wetl_h2o 488 917.60 5-1-3-1 (0.000000 0.006148 0.00000 0.008197 0.010250 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.018440 0.743900 0.0000000 0.0163900 0.118900 0.075820 0.0020490 0.000000 0.0000000 0.000000)

1950) V10<281.5 309 608.70 5-1-3-1 (0.000000 0.009709 0.00000 0.009709 0.016180 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.029130 0.734600 0.0000000 0.0258900 0.139200 0.032360 0.0032360 0.000000 0.0000000 0.000000) *

1951) V10>281.5 179 261.60 5-1-3-1 (0.000000 0.000000 0.00000 0.005587 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.000000 0.759800 0.0000000 0.0000000 0.083800 0.150800 0.0000000 0.000000 0.0000000 0.000000) *

61) V6:3-6',>6',NA 351 1269.00 5-2-1-1 (0.042740 0.002849 0.00000 0.145300 0.051280 0.000000 0.000000 0.0085470 0.019940 0.0000000 0.114000 0.247900 0.0000000 0.0028490 0.336200 0.000000 0.0114000 0.014250 0.0028490 0.000000)

122) V10<267.5 173 588.80 5-2-1-1 (0.017340 0.000000 0.00000 0.057800 0.104000 0.000000 0.000000 0.0173400 0.040460 0.0000000 0.098270 0.086710 0.0000000 0.0057800 0.514500 0.000000 0.0231200 0.028900 0.0057800 0.000000) *

123) V10>267.5 178 525.20 5-1-3-1 (0.067420 0.005618 0.00000 0.230300 0.000000 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.129200 0.404500 0.0000000 0.0000000 0.162900 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

31) V3:bee/heml,n_hardw,wp/be/ma,NA 1640 6245.00 5-2-1-1 (0.021340 0.030490 0.00000 0.068900 0.123200 0.000000 0.003049 0.0231700 0.000000 0.0189000 0.070730 0.061590 0.0012200 0.0000000 0.433500 0.104300 0.0396300 0.000000 0.0000000 0.000000)

62) V10<282.5 1361 4600.00 5-2-1-1 (0.000000 0.036000 0.00000 0.044820 0.129300 0.000000 0.000000 0.0279200 0.000000 0.0220400 0.043350 0.064660 0.0014700 0.0000000 0.519500 0.063190 0.0477600 0.000000 0.0000000 0.000000)

124) V3:bee/heml 478 590.00 5-2-1-1 (0.000000 0.016740 0.00000 0.071130 0.016740 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.006276 0.037660 0.0000000 0.0000000 0.851500 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

125) V3:n_hardw,wp/be/ma,NA 883 3515.00 5-2-1-1 (0.000000 0.046430 0.00000 0.030580 0.190300 0.000000 0.000000 0.0430400 0.000000 0.0339800 0.063420 0.079280 0.0022650 0.0000000 0.339800 0.097400 0.0736100 0.000000 0.0000000 0.000000)

250) V3:n_hardw 269 1087.00 1-2-2-2 (0.000000 0.152400 0.00000 0.014870 0.263900 0.000000 0.000000 0.1227000 0.000000 0.1115000 0.000000 0.100400 0.0037170 0.0000000 0.126400 0.040890 0.0632000 0.000000 0.0000000 0.000000)

500) V10<257.5 101 334.10 2-2-2-3 (0.000000 0.000000 0.00000 0.000000 0.009901 0.000000 0.000000 0.3168000 0.000000 0.1881000 0.000000 0.019800 0.0099010 0.0000000 0.257400 0.089110 0.1089000 0.000000 0.0000000 0.000000) *

501) V10>257.5 168 540.00 1-2-2-2 (0.000000 0.244000 0.00000 0.023810 0.416700 0.000000 0.000000 0.0059520 0.000000 0.0654800 0.000000 0.148800 0.0000000 0.0000000 0.047620 0.011900 0.0357100 0.000000 0.0000000 0.000000) *

251) V3:wp/be/ma,NA 614 2072.00 5-2-1-1 (0.000000 0.000000 0.00000 0.037460 0.158000 0.000000 0.000000 0.0081430 0.000000 0.0000000 0.091210 0.070030 0.0016290 0.0000000 0.433200 0.122100 0.0781800 0.000000 0.0000000 0.000000)

502) V5:muckpeat,musaloam,san_fsan 414 1151.00 5-2-1-1 (0.000000 0.000000 0.00000 0.028990 0.050720 0.000000 0.000000 0.0072460 0.000000 0.0000000 0.091790 0.103900 0.0000000 0.0000000 0.596600 0.070050 0.0507200 0.000000 0.0000000 0.000000)

1004) V10<259.5 232 665.10 5-2-1-1 (0.000000 0.000000 0.00000 0.000000 0.064660 0.000000 0.000000 0.0129300 0.000000 0.0000000 0.051720 0.172400 0.0000000 0.0000000 0.534500 0.073280 0.0905200 0.000000 0.0000000 0.000000) *

1005) V10>259.5 182 393.70 5-2-1-1 (0.000000 0.000000 0.00000 0.065930 0.032970 0.000000 0.000000 0.0000000 0.000000 0.0000000 0.142900 0.016480 0.0000000 0.0000000 0.675800 0.065930 0.0000000 0.000000 0.0000000 0.000000) *

503) V5:loam,loamysan,sandyloa,NA 200 659.40 1-2-2-2 (0.000000 0.000000 0.00000 0.055000 0.380000 0.000000 0.000000 0.0100000 0.000000 0.0000000 0.090000 0.000000 0.0050000 0.0000000 0.095000 0.230000 0.1350000 0.000000 0.0000000 0.000000) *

63) V10>282.5 279 1003.00 5-2-2-2 (0.125400 0.003584 0.00000 0.186400 0.093190 0.000000 0.017920 0.0000000 0.000000 0.0035840 0.204300 0.046590 0.0000000 0.0000000 0.014340 0.304700 0.0000000 0.000000 0.0000000 0.000000)

126) V3:bee/heml,n_hardw 114 333.40 5-1-1-1 (0.035090 0.008772 0.00000 0.061400 0.228100 0.000000 0.035090 0.0000000 0.000000 0.0087720 0.500000 0.114000 0.0000000 0.0000000 0.008772 0.000000 0.0000000 0.000000 0.0000000 0.000000) *

127) V3:wp/be/ma 165 367.60 5-2-2-2 (0.187900 0.000000 0.00000 0.272700 0.000000 0.000000 0.006061 0.0000000 0.000000 0.0000000 0.000000 0.000000 0.0000000 0.0000000 0.018180 0.515200 0.0000000 0.000000 0.0000000 0.000000) *

APPENDIX G

Midland County Classification Tree

> m250l.tree
node), split, n, deviance, yval, (yprob)
*** denotes terminal node**

1) root 8668 24090.000 6-1-3-1 (0.004038 0.54280 0.0285000 0.130900 0.060110 0.1332000 0.100400)
2) V5:loam,siclloam 2058 6204.000 6-1-3-3 (0.001458 0.14630 0.0204100 0.380000 0.173000 0.0374100 0.241500)
4) V10<197.5 510 832.300 6-1-4-4 (0.000000 0.17060 0.0000000 0.017650 0.043140 0.0235300 0.745100)
8) V3:asp/wbir,bee/heml,othupcon 197 476.800 6-1-3-1 (0.000000 0.42130 0.0000000 0.030460 0.101500 0.0456900 0.401000)
16) V12<6981.5 118 245.800 6-1-3-1 (0.000000 0.68640 0.0000000 0.050850 0.118600 0.0678000 0.076270)
32) V13<5870 92 116.200 6-1-3-1 (0.000000 0.82610 0.0000000 0.065220 0.000000 0.0869600 0.021740) *
33) V13>5870 26 52.190 6-1-3-4 (0.000000 0.19230 0.0000000 0.000000 0.538500 0.0000000 0.269200) *
17) V12>6981.5 79 71.310 6-1-4-4 (0.000000 0.02532 0.0000000 0.000000 0.075950 0.0126600 0.886100) *
9) V3:n_hardw,wetl_h2o 313 134.400 6-1-4-4 (0.000000 0.01278 0.0000000 0.009585 0.006390 0.0095850 0.961700) *
5) V10>197.5 1548 4302.000 6-1-3-3 (0.001938 0.13820 0.0271300 0.499400 0.215800 0.0419900 0.075580)
10) V5:loam 900 1990.000 6-1-3-3 (0.003333 0.15560 0.0366700 0.664400 0.012220 0.0555600 0.072220)
20) V3:bee/heml,n_hardw 450 396.700 6-1-3-3 (0.000000 0.01778 0.0533300 0.897800 0.002222 0.0288900 0.000000)
40) V3:bee/heml 125 236.900 6-1-3-3 (0.000000 0.02400 0.1920000 0.672000 0.008000 0.1040000 0.000000) *
41) V3:n_hardw 325 51.670 6-1-3-3 (0.000000 0.01538 0.0000000 0.984600 0.000000 0.0000000 0.000000) *
21) V3:asp/wbir,othupcon,wetl_h2o 450 1263.000 6-1-3-3 (0.006667 0.29330 0.0200000 0.431100 0.022220 0.0822200 0.144400)
42) V13<2760.5 106 244.700 6-1-3-1 (0.028300 0.67920 0.0754700 0.084910 0.009434 0.0660400 0.056600)
84) V12<7782.5 70 153.900 6-1-3-1 (0.042860 0.65710 0.1143000 0.000000 0.000000 0.1000000 0.085710) *
85) V12>7782.5 36 49.040 6-1-3-1 (0.000000 0.72220 0.0000000 0.250000 0.027780 0.0000000 0.000000) *
43) V13>2760.5 344 870.700 6-1-3-3 (0.000000 0.17440 0.0029070 0.537800 0.026160 0.0872100 0.171500)
86) V13<10678 204 445.800 6-1-3-3 (0.000000 0.27940 0.0049020 0.588200 0.034310 0.0343100 0.058820)
172) V12<8075 101 240.500 6-1-3-1 (0.000000 0.41580 0.0099010 0.405900 0.000000 0.0693100 0.099010) *
173) V12>8075 103 153.100 6-1-3-3 (0.000000 0.14560 0.0000000 0.767000 0.067960 0.0000000 0.019420) *
87) V13>10678 140 325.500 6-1-3-3 (0.000000 0.02143 0.0000000 0.464300 0.014290 0.1643000 0.335700)
174) V10<205.5 109 245.900 6-1-4-4 (0.000000 0.00000 0.0000000 0.357800 0.018350 0.2018000 0.422000)
348) V10<204.5 91 181.500 6-1-4-4 (0.000000 0.00000 0.0000000 0.417600 0.021980 0.0769200 0.483500) *
349) V10>204.5 18 20.040 6-1-4-1 (0.000000 0.00000 0.0000000 0.055560 0.000000 0.8333000 0.111100) *

175) V10>205.5 31 36.890 6-1-3-3 (0.000000 0.09677 0.0000000 0.838700 0.000000 0.0322600 0.032260) *

11) V5:siclloam 648 1681.000 6-1-3-4 (0.000000 0.11420 0.0138900 0.270100 0.498500 0.0231500 0.080250)

22) V3:bee/heml,othupcon 548 1134.000 6-1-3-4 (0.000000 0.11680 0.0164200 0.273700 0.583900 0.0018250 0.007299)

44) V13<6902 253 547.200 6-1-3-3 (0.000000 0.11860 0.0355700 0.509900 0.336000 0.0000000 0.000000)

88) V3:bee/heml 109 169.500 6-1-3-4 (0.000000 0.02752 0.0091740 0.302800 0.660600 0.0000000 0.000000) *

89) V3:othupcon 144 277.000 6-1-3-3 (0.000000 0.18750 0.0555600 0.666700 0.090280 0.0000000 0.000000)

178) V12<8832.5 127 201.000 6-1-3-3 (0.000000 0.15750 0.0629900 0.748000 0.031500 0.0000000 0.000000) *

179) V12>8832.5 17 29.540 6-1-3-4 (0.000000 0.41180 0.0000000 0.058820 0.529400 0.0000000 0.000000) *

45) V13>6902 295 410.600 6-1-3-4 (0.000000 0.11530 0.0000000 0.071190 0.796600 0.0033900 0.013560)

90) V12<4627 92 170.200 6-1-3-4 (0.000000 0.11960 0.0000000 0.228300 0.641300 0.0108700 0.000000)*

91) V12>4627 203 181.800 6-1-3-4 (0.000000 0.11330 0.0000000 0.000000 0.867000 0.0000000 0.019700) *

23) V3:asp/wbir,wetl_h2o 100 261.900 6-1-4-4 (0.000000 0.10000 0.0000000 0.250000 0.030000 0.1400000 0.480000)

46) V10<207.5 79 181.600 6-1-4-4 (0.000000 0.10130 0.0000000 0.088610 0.025320 0.1772000 0.607600)*

47) V10>207.5 21 21.040 6-1-3-3 (0.000000 0.09524 0.0000000 0.857100 0.047620 0.0000000 0.000000) *

3) V5:loamysan,muckpeat,musaloam,san_fsan,sandyloa,varies,NA 6610 14680.000 6-1-3-1 (0.004841 0.66630 0.0310100 0.053400 0.024960 0.1631000 0.056430)

6) V3:bee/heml,othupcon 4412 7472.000 6-1-3-1 (0.006120 0.79620 0.0448800 0.053260 0.035130 0.0340000 0.030370)

12) V10<223.5 4260 6559.000 6-1-3-1 (0.006338 0.82180 0.0354500 0.043430 0.036380 0.0251200 0.031460)

24) V13<6970.5 3328 4080.000 6-1-3-1 (0.008113 0.86750 0.0405600 0.029150 0.022840 0.0189300 0.012920)

48) V3:bee/heml 455 1151.000 6-1-3-1 (0.000000 0.60220 0.1143000 0.032970 0.136300 0.0593400 0.054950)

96) V10<201.5 290 343.800 6-1-3-1 (0.000000 0.84140 0.0000000 0.000000 0.024140 0.0482800 0.086210)

192) V10<184.5 62 74.700 6-1-3-1 (0.000000 0.70970 0.0000000 0.000000 0.000000 0.0000000 0.290300) *

193) V10>184.5 228 228.100 6-1-3-1 (0.000000 0.87720 0.0000000 0.000000 0.030700 0.0614000 0.030700) *

97) V10>201.5 165 481.200 6-1-3-4 (0.000000 0.18180 0.3152000 0.090910 0.333300 0.0787900 0.000000)

194) V10<216.5 152 397.600 6-1-3-4 (0.000000 0.19740 0.3421000 0.092110 0.361800 0.0065790 0.000000)

388) V13<3293 96 222.500 6-1-3-1/A (0.000000 0.14580 0.4688000 0.031250 0.343800 0.0104200 0.000000) *

389) V13>3293 56 146.100 6-1-3-4 (0.000000 0.28570 0.1250000 0.196400 0.392900 0.0000000 0.000000) *

195) V10>216.5 13 7.051 6-1-4-1 (0.000000 0.00000 0.0000000 0.076920 0.000000 0.9231000 0.000000) *

49) V3:othupcon 2873 2566.000 6-1-3-1 (0.009398 0.90950 0.0288900 0.028540 0.004873 0.0125300 0.006265)

98) V13<3213 1639 1494.000 6-1-3-1 (0.016470 0.90360 0.0433200 0.022570 0.003661 0.0048810 0.005491)

196) V10<197.5 350 136.700 6-1-3-1 (0.000000 0.96000 0.0000000 0.022860 0.000000 0.0000000 0.017140) *
197) V10>197.5 1289 1294.000 6-1-3-1 (0.020950 0.88830 0.0550800 0.022500 0.004655 0.0062060 0.002327)
394) V4:modwell,poor,somepoor 1225 1115.000 6-1-3-1 (0.011430 0.89960 0.0538800 0.023670 0.003265 0.0057140 0.002449)
788) V9:NW,SW,W 106 159.200 6-1-3-1 (0.018870 0.75470 0.1698000 0.000000 0.000000 0.0566000 0.000000) *
789) V9:E,N,NE,S,SE,NA 1119 903.000 6-1-3-1 (0.010720 0.91330 0.0429000 0.025920 0.003575 0.0008937 0.002681)
1578) V10<201.5 444 436.900 6-1-3-1 (0.006757 0.87160 0.0720700 0.049550 0.000000 0.0000000 0.000000)

3156) V12<5578.5 255 294.700 6-1-3-1 (0.000000 0.82750 0.0980400 0.074510 0.000000 0.0000000 0.000000)
6312) V2:endmorai,lacustri 210 275.800 6-1-3-1 (0.000000 0.79050 0.1190000 0.090480 0.000000 0.0000000 0.000000)
12624) V6:-1-1' 76 49.620 6-1-3-1 (0.000000 0.92110 0.0263200 0.052630 0.000000 0.0000000 0.000000) *
12625) V6:1-3',3-6' 134 210.800 6-1-3-1 (0.000000 0.71640 0.1716000 0.111900 0.000000 0.0000000 0.000000) *
6313) V2:dunesand,lake 45 0.000 6-1-3-1 (0.000000 1.00000 0.0000000 0.000000 0.000000 0.0000000 0.000000) *
3157) V12>5578.5 189 120.900 6-1-3-1 (0.015870 0.93120 0.0370400 0.015870 0.000000 0.0000000 0.000000) *
1579) V10>201.5 675 425.600 6-1-3-1 (0.013330 0.94070 0.0237000 0.010370 0.005926 0.0014810 0.004444)
3158) V5:loamysan 285 176.100 6-1-3-1 (0.000000 0.93330 0.0386000 0.017540 0.000000 0.0000000 0.010530) *
3159) V5:san_fsan,sandyloa 390 221.900 6-1-3-1 (0.023080 0.94620 0.0128200 0.005128 0.010260 0.0025640 0.000000) *
395) V4:excessiv,verypoor,NA 64 123.300 6-1-3-1 (0.203100 0.67190 0.0781200 0.000000 0.031250 0.0156200 0.000000) *
99) V13>3213 1234 985.700 6-1-3-1 (0.000000 0.91730 0.0097240 0.036470 0.006483 0.0226900 0.007293)
198) V10<198.5 281 272.100 6-1-3-1 (0.000000 0.88610 0.0000000 0.014230 0.010680 0.0640600 0.024910)
396) V10<196.5 153 94.480 6-1-3-1 (0.000000 0.93460 0.0000000 0.019610 0.013070 0.0000000 0.032680) *
397) V10>196.5 128 146.600 6-1-3-1 (0.000000 0.82810 0.0000000 0.007812 0.007812 0.1406000 0.015620) *
199) V10>198.5 953 666.000 6-1-3-1 (0.000000 0.92650 0.0125900 0.043020 0.005247 0.0104900 0.002099)
398) V10<205.5 378 262.200 6-1-3-1 (0.000000 0.90480 0.0052910 0.087300 0.002646 0.0000000 0.000000)
796) V2:endmorai 5 0.000 6-1-3-3 (0.000000 0.00000 0.0000000 1.000000 0.000000 0.0000000 0.000000) *
797) V2:dunesand,lacustri,lake 373 237.100 6-1-3-1 (0.000000 0.91690 0.0053620 0.075070 0.002681 0.0000000 0.000000) *
399) V10>205.5 575 358.800 6-1-3-1 (0.000000 0.94090 0.0173900 0.013910 0.006957 0.0173900 0.003478)
798) V12<7134.5 364 261.100 6-1-3-1 (0.000000 0.92580 0.0274700 0.019230 0.000000 0.0219800 0.005495)
1596) V12<4137.5 191 99.050 6-1-3-1 (0.000000 0.94760 0.0000000 0.026180 0.000000 0.0157100 0.010470) *
1597) V12>4137.5 173 142.600 6-1-3-1 (0.000000 0.90170 0.0578000 0.011560 0.000000 0.0289000 0.000000) *
799) V12>7134.5 211 74.830 6-1-3-1 (0.000000 0.96680 0.0000000 0.004739 0.018960 0.0094790 0.000000) *

25) V13>6970.5 932 2140.000 6-1-3-1 (0.000000 0.65880 0.0171700 0.094420 0.084760 0.0472100 0.097640)

50) V13<15767.5 876 1838.000 6-1-3-1 (0.000000 0.70090 0.0182600 0.077630 0.090180 0.0296800 0.083330)

100) V10<210.5 691 1350.000 6-1-3-1 (0.000000 0.69320 0.0000000 0.081040 0.112900 0.0072360 0.105600)

200) V10<199.5 170 302.500 6-1-3-1 (0.000000 0.66470 0.0000000 0.000000 0.070590 0.0235300 0.241200)

400) V12<9728.5 135 194.100 6-1-3-1 (0.000000 0.79260 0.0000000 0.000000 0.088890 0.0296300 0.088890) *

401) V12>9728.5 35 32.070 6-1-4-4 (0.000000 0.17140 0.0000000 0.000000 0.000000 0.0000000 0.828600) *

201) V10>199.5 521 972.100 6-1-3-1 (0.000000 0.70250 0.0000000 0.107500 0.126700 0.0019190 0.061420)

402) V2:dunesand 180 277.700 6-1-3-1 (0.000000 0.77220 0.0000000 0.066670 0.027780 0.0055560 0.127800)

804) V12<6925.5 72 92.520 6-1-3-1 (0.000000 0.79170 0.0000000 0.166700 0.013890 0.0000000 0.027780) *

805) V12>6925.5 108 149.700 6-1-3-1 (0.000000 0.75930 0.0000000 0.000000 0.037040 0.0092590 0.194400) *

403) V2:endmorai,lacustri 341 640.300 6-1-3-1 (0.000000 0.66570 0.0000000 0.129000 0.178900 0.0000000 0.026390)

806) V6:-1-1',3-6' 158 188.700 6-1-3-1 (0.000000 0.83540 0.0000000 0.075950 0.075950 0.0000000 0.012660) *

807) V6:1-3',>6',NA 183 411.000 6-1-3-1 (0.000000 0.51910 0.0000000 0.174900 0.267800 0.0000000 0.038250)

1614) V5:san_fsan 118 181.000 6-1-3-1 (0.000000 0.70340 0.0000000 0.042370 0.245800 0.0000000 0.008475) *

1615) V5:loamysan,NA 65 163.700 6-1-3-3 (0.000000 0.18460 0.0000000 0.415400 0.307700 0.0000000 0.092310) *

101) V10>210.5 185 330.900 6-1-3-1 (0.000000 0.72970 0.0864900 0.064860 0.005405 0.1135000 0.000000)

202) V3:bee/heml 40 94.890 6-1-3-1 (0.000000 0.35000 0.3250000 0.300000 0.025000 0.0000000 0.000000) *

203) V3:othupcon 145 148.200 6-1-3-1 (0.000000 0.83450 0.0206900 0.000000 0.000000 0.1448000 0.000000) *

51) V13>15767.5 56 122.900 6-1-3-3 (0.000000 0.00000 0.0000000 0.357100 0.000000 0.3214000 0.321400) *

13) V10>223.5 152 391.000 6-1-3-3 (0.000000 0.07895 0.3092000 0.328900 0.000000 0.2829000 0.000000)

26) V13<7368.5 83 184.400 6-1-4-1 (0.000000 0.13250 0.0361400 0.361400 0.000000 0.4699000 0.000000)*

27) V13>7368.5 69 120.400 6-1-3-1/A (0.000000 0.01449 0.6377000 0.289900 0.000000 0.0579700 0.000000) *

7) V3:asp/wbir,n_hardw,p/o_w/rp,wetl_h2o 2198 5209.000 6-1-4-1 (0.002275 0.40540 0.0031850 0.053690 0.004550 0.4222000 0.108700)

14) V3:n_hardw 211 462.600 6-1-4-4 (0.000000 0.21800 0.0000000 0.274900 0.000000 0.0142200 0.492900)

28) V10<196.5 140 179.400 6-1-4-4 (0.000000 0.25710 0.0000000 0.000000 0.000000 0.0142900 0.728600)*

29) V10>196.5 71 85.460 6-1-3-3 0.000000 0.14080 0.0000000 0.816900 0.000000 0.0140800 0.028170)*

15) V3:asp/wbir,p/o_w/rp,wetl_h2o 1987 4250.000 6-1-4-1 (0.002516 0.42530 0.0035230 0.030200 0.005033 0.4655000 0.067940)

30) V12<10248 1797 3535.000 6-1-4-1 (0.002782 0.41790 0.0038950 0.026150 0.005565 0.5103000 0.033390)

60) V3:asp/wbir,p/o_w/rp 362 360.200 6-1-4-1 (0.000000 0.18510 0.0000000 0.000000 0.000000 0.8122000 0.002762)

120) V13<7564.5 319 327.900 6-1-4-1 (0.000000 0.21000 0.0000000 0.000000 0.000000 0.7900000 0.000000)

240) V4:poor,somepoor 232 267.300 6-1-4-1 (0.000000 0.26290 0.0000000 0.000000 0.000000 0.7371000 0.000000)

480) V10<199.5 171 164.900 6-1-4-1 (0.000000 0.18710 0.0000000 0.000000 0.000000 0.8129000 0.000000) *

481) V10>199.5 61 84.420 6-1-4-1 (0.000000 0.47540 0.0000000 0.000000 0.000000 0.5246000 0.000000) *

241) V4:excessiv,modwell,verypoor,NA 87 43.670 6-1-4-1 (0.000000 0.06897 0.0000000 0.000000 0.000000 0.9310000 0.000000) *

121) V13>7564.5 43 9.499 6-1-4-1 (0.000000 0.00000 0.0000000 0.000000 0.000000 0.9767000 0.023260) *

61) V3:wetl_h2o 1435 2982.000 6-1-3-1 (0.003484 0.47670 0.0048780 0.032750 0.006969 0.4341000 0.041110)

122) V13<11559 1314 2568.000 6-1-3-1 (0.003805 0.51670 0.0053270 0.024350 0.007610 0.4163000 0.025880)

244) V10<225.5 1247 2437.000 6-1-3-1 (0.004010 0.54450 0.0048120 0.025660 0.008019 0.3857000 0.027270)

488) V5:loamysan,muckpeat,musaloam,san_fsan 1083 2019.000 6-1-3-1 (0.002770 0.52170 0.0009234 0.019390 0.008310 0.4229000 0.024010)

976) V10<196.5 212 298.000 6-1-3-1 (0.000000 0.74060 0.0000000 0.000000 0.004717 0.2170000 0.037740)

1952) V13<5894 157 155.000 6-1-3-1 (0.000000 0.83440 0.0000000 0.000000 0.000000 0.1529000 0.012740) *

1953) V13>5894 55 113.900 6-1-3-1 (0.000000 0.47270 0.0000000 0.000000 0.018180 0.4000000 0.109100) *

977) V10>196.5 871 1654.000 6-1-4-1 (0.003444 0.46840 0.0011480 0.024110 0.009185 0.4730000 0.020670)

1954) V10<199.5 296 420.800 6-1-4-1 (0.000000 0.23990 0.0000000 0.010140 0.006757 0.7297000 0.013510)

3908) V12<6436.5 237 337.600 6-1-4-1 (0.000000 0.29110 0.0000000 0.012660 0.008439 0.6878000 0.000000)

7816) V10<197.5 49 87.970 6-1-3-1 (0.000000 0.57140 0.0000000 0.020410 0.040820 0.3673000 0.000000) *

7817) V10>197.5 188 218.400 6-1-4-1 (0.000000 0.21810 0.0000000 0.010640 0.000000 0.7713000 0.000000) *

3909) V12>6436.5 59 46.440 6-1-4-1 (0.000000 0.03390 0.0000000 0.000000 0.000000 0.8983000 0.067800) *

1955) V10>199.5 575 1110.000 6-1-3-1 (0.005217 0.58610 0.0017390 0.031300 0.010430 0.3409000 0.024350)

3910) V2:dunesand,endmorai 123 160.400 6-1-3-1 (0.000000 0.82930 0.0000000 0.024390 0.008130 0.0569100 0.081300) *

3911) V2:lacustri 452 864.400 6-1-3-1 (0.006637 0.51990 0.0022120 0.033190 0.011060 0.4181000 0.008850)

7822) V13<1497.5 60 142.300 6-1-3-1 (0.050000 0.60000 0.0166700 0.066670 0.000000 0.2167000 0.050000) *

7823) V13>1497.5 392 685.900 6-1-3-1 (0.000000 0.50770 0.0000000 0.028060 0.012760 0.4490000 0.002551)

15646) V4:poor,somepoor 290 500.800 6-1-3-1 (0.000000 0.57590 0.0000000 0.031030 0.017240 0.3759000 0.000000)

31292) V10<205.5 151 254.800 6-1-3-1 (0.000000 0.59600 0.0000000 0.059600 0.000000 0.3444000 0.000000)

62584) V10<201.5 85 103.000 6-1-3-1 (0.000000 0.70590 0.0000000 0.000000 0.000000 0.2941000 0.000000) *

62585) V10>201.5 66 131.400 6-1-3-1 (0.000000 0.45450 0.0000000 0.136400 0.000000 0.4091000 0.000000) *

31293) V10>205.5 139 225.800 6-1-3-1 (0.000000 0.55400 0.0000000 0.000000 0.035970 0.4101000 0.000000) *

15647) V4:modwell,verypoor 102 155.500 6-1-4-1 (0.000000 0.31370 0.0000000 0.019610 0.000000 0.6569000 0.009804) *

489) V5:sandyloa,varies,NA 164 343.800 6-1-3-1 (0.012200 0.69510 0.0304900 0.067070 0.006098 0.1402000 0.048780)
978) V4:poor,verypoor 84 224.700 6-1-3-1 (0.011900 0.52380 0.0595200 0.131000 0.000000 0.2024000 0.071430) *
979) V4:NA 80 82.060 6-1-3-1 (0.012500 0.87500 0.0000000 0.000000 0.012500 0.0750000 0.025000)*
245) V10>225.5 67 10.390 6-1-4-1 (0.000000 0.00000 0.0149300 0.000000 0.000000 0.9851000 0.000000) *
123) V13>11559 121 244.000 6-1-4-1 (0.000000 0.04132 0.0000000 0.124000 0.000000 0.6281000 0.206600)
246) V10<197.5 20 13.000 6-1-4-4 (0.000000 0.00000 0.0000000 0.000000 0.000000 0.1000000 0.900000) *
247) V10>197.5 101 170.700 6-1-4-1 (0.000000 0.04950 0.0000000 0.148500 0.000000 0.7327000 0.069310) *
31) V12>10248 190 392.100 6-1-3-1 (0.000000 0.49470 0.0000000 0.068420 0.000000 0.0421100 0.394700)
62) V10<205.5 150 269.300 6-1-4-4 (0.000000 0.44000 0.0000000 0.006667 0.000000 0.0533300 0.500000)
124) V10<198.5 25 0.000 6-1-4-4 (0.000000 0.00000 0.0000000 0.000000 0.000000 0.0000000 1.000000)*
125) V10>198.5 125 229.600 6-1-3-1 (0.000000 0.52800 0.0000000 0.008000 0.000000 0.0640000 0.400000) *
63) V10>205.5 40 48.870 6-1-3-1 (0.000000 0.70000 0.0000000 0.300000 0.000000 0.0000000 0.000000) *