

Title: Geospatial Modernization Within USDA Conservation Programs
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Abstract

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) received a sharp increase in funding for the Environmental Quality Incentives Program (EQIP) due to passage of the 2002 Farm Bill. Kansas NRCS was compelled to migrate from hardcopy to a digital data capture, analysis, and reporting through a geographic information system. This presentation will examine the transition to and automation of the ranking process for Kansas EQIP applications. Natural resource geospatial data was processed and distributed to 104 county field offices. Each application was evaluated using application evaluation criteria set fourth in program policy. Following evaluation of all applications, data was transferred to a centralized location and merged into a statewide dataset to further manage and analyze EQIP. The transition to a digital automated process of evaluating EQIP application saved more than 11,000 hours and increased county and statewide consistency.

Introduction

NRCS conservation programs focus on addressing specific resource concerns while sustaining or improving agricultural productivity. A major component of most conservation programs is collecting natural resource information on tracts of land as producers submit applications for conservation programs. Natural resource information is used to determine if resource concerns exist on individual tracts of land and provides planners with the information they need to do conservation planning. In the past, most of the natural resource information was either collected onsite or from hard copy materials such as soil surveys and hard copy photography. USDA and the State of Kansas have invested heavily in geospatial technology and data development since the early 1990's, but it was not until 2000 that the NRCS was able to realize the full potential of the geospatial data. In the mid 1990's NRCS was considered to be "data rich and information poor" the problem was two fold, computers that were able to manipulate the data into information were cost prohibitive and the number of people with the expertise to run the GIS software and get information out of the data were few. Fortunately, advances in computer technology and software has allowed the NRCS to place GIS software and geospatial data in the hands of virtually every employee that has a need for it. This paper will focus on the EQIP program and the effect that geospatial technology had in the 2004 program application process.

Resource concerns and evaluating criteria for EQIP

The EQIP conservation program is a competitive program requiring producers to submit an application that competes for funding against other applications within a specific resource concern. A set of high priority resource concerns were identified for the Kansas EQIP program based on national program policy and recommendations from the Kansas State Technical committee (KTC). The KTC is a local committee of interested parties, primarily made up of state resource agencies and local agriculture interest groups. Each resource concern was given a set of criteria to be used in evaluating individual applications for the EQIP program. The evaluating criteria are used in determining eligibility for the EQIP program and ranking each application. Geospatial data was used in as many of the evaluating criteria as possible to

decrease the amount of workload required to evaluate applications. Geospatial data also allowed for a greater consistency in evaluating applications than was possible in the past.

Evaluating EQIP applications in the past

In the past, EQIP applications were evaluated using hard copy materials. Hard copy maps were at multiple scales making it difficult to collect resource information. Tabular data requiring look up tables consumed a considerable amount of time in the resource collection process. The resource information collected was hand written on a ranking worksheet, all of the ranking worksheets were then entered into a database that ranked all EQIP applications. This method of evaluating and ranking EQIP applications was time consuming, had little consistency, and did not allow employees to conduct a thorough resource inventory. The picture below illustrates some of the materials and the planimeter used by field office employees to collect resource information in past EQIP application periods.



The EQIP application process today

The 2004 EQIP application process took advantage of geospatial technology to determine eligibility and rank each EQIP application. An automated process was developed using Arcview 3.3 software and the avenue programming language. The software application named AV- EQIP allowed NRCS field office staff to maximize the amount of resource information available while minimizing the amount of input required. The following is a list of the resource concerns, evaluating criteria and geospatial data used in the 2004 EQIP sign up.

- **Soil Erosion – Wind**

Evaluating Criteria: Unit of concern within an at risk species habitat area.

Geospatial Data: Threatened and Endangered Species data.

Data Source: Kansas Department of Wildlife and Parks

Evaluating Criteria: Weighted Wind Erosion Index for unit of concern.

Geospatial Data: SSURGO soils data.

Data Source: USDA Natural Resources Conservation Service.

- **Sedimentation of Federal Reservoirs**

(Soil Erosion – Stream bank; Water Quality - Suspended Sediment)

Evaluating Criteria: Unit of concern within an at risk species habitat area.

Geospatial Data: Threatened and Endangered Species data.

Data Source: Kansas Department of Wildlife and Parks

Evaluating Criteria: Distance to Federal Reservoir from unit of concern

Geospatial Data: 1:24000 hydrography

Data Source: United States Geological Survey / Natural Resources Conservation Service

- **Grazing Lands Health**

(Plant Condition – Productivity, Health, Vigor; Plant Condition – Noxious, Invasive Weeds)

Evaluating Criteria: Unit of concern within an at risk species habitat area.

Geospatial Data: Threatened and Endangered Species data.

Data Source: Kansas Department of Wildlife and Parks

- **Water Quality Excessive Organics in Ground and Surface Water**

(Concentrated, Non-Confined Animal Waste)

Evaluating Criteria: Unit of concern within a high priority Total Maximum Daily Load (TMDL) area.

Geospatial Data: TMDL Areas.

Data Source: Kansas Department of Health and Environment.

Evaluating Criteria: Unit of concern within a sensitive ground water area.

Geospatial Data: Sensitive Grand Water Areas

Data Source: Kansas Geological Survey

Evaluating Criteria: Unit of concern within 180ft or 300ft of a receiving water body

Geospatial Data: 1:24000 hydrography buffered at 180ft and 300ft

Data Source: United States Geological Survey / Natural Resources

Conservation Service

Evaluating Criteria: Unit of concern within an at risk species habitat area.

Geospatial Data: Threatened and Endangered Species data.

Data Source: Kansas Department of Wildlife and Parks.

- **Water Quality Excessive Organics in Ground and Surface Water (Confined Animal Waste)**

Evaluating Criteria: Unit of concern within a high priority Total Maximum Daily Load (TMDL) area.

Geospatial Data: TMDL Areas.

Data Source: Kansas Department of Health and Environment.

Evaluating Criteria: Unit of concern within a sensitive ground water area.

Geospatial Data: Sensitive Grand Water Areas

Data Source: Kansas Geological Survey

Evaluating Criteria: Unit of concern within an at risk species habitat area.

Geospatial Data: Threatened and Endangered Species data.

Data Source: Kansas Department of Wildlife and Parks

- **Water Quality Nutrients and /or Pesticides in Ground and Surface Water; Excessive Suspended Sediment and Turbidity in Surface Water.**

Evaluating Criteria: Unit of concern within a high priority Total Maximum Daily Load (TMDL) area.

Geospatial Data: TMDL Areas.

Data Source: Kansas Department of Health and Environment.

Evaluating Criteria: Unit of concern within a sensitive ground water area.

Geospatial Data: Sensitive Grand Water Areas

Data Source: Kansas Geological Survey

Evaluating Criteria: Unit of concern within an area of high flooding frequency.

Geospatial Data: SSURGO soils data.

Data Source: Natural Resources Conservation Service.

Evaluating Criteria: Percent of unit of concern with high soil loss potential.

Geospatial Data: SSURGO soils data

Data Source: Natural Resources Conservation Service

Evaluating Criteria: Percent of unit of concern with high leaching potential.

Geospatial Data: SSURGO soils data

Data Source: Natural Resources Conservation Service

Evaluating Criteria: Unit of concern within 180ft or 300ft of a receiving

water body
Geospatial Data: 1:24000 hydrography buffered at 180ft and 300ft
Data Source: United States Geological Survey / Natural Resources Conservation Service

Evaluating Criteria: Unit of concern within an at risk species habitat area.
Geospatial Data: Threatened and Endangered Species data.
Data Source: Kansas Department of Wildlife and Parks

- **Water Quantity – Inefficient Water Use on Irrigated Land; Aquifer Overdraft.**

Evaluating Criteria: Unit of concern within an at risk species habitat area
Geospatial Data: Threatened and Endangered Species data.
Data Source: Kansas Department of Wildlife and Parks

Evaluating Criteria: Unit of concern within declining aquifer priority areas.
Geospatial Data: Declining Aquifer Priority Areas.
Data Source: Kansas water office

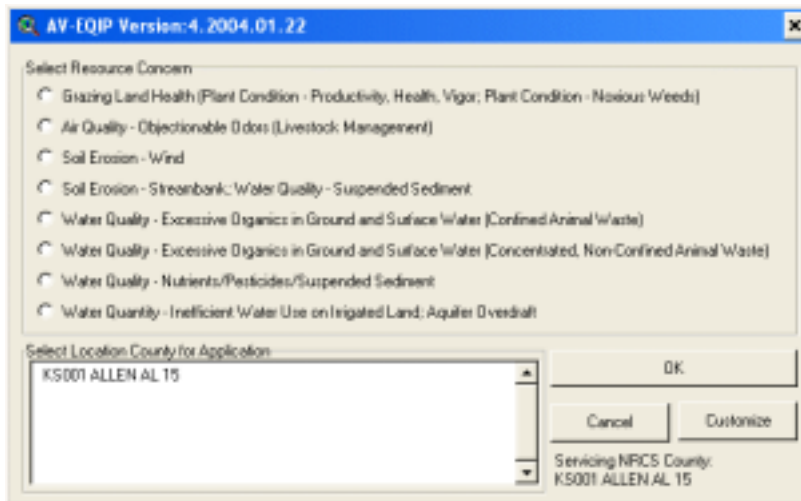
Evaluating Criteria: Unit of concern within a high priority Total Maximum Daily Load (TMDL) area.
Geospatial Data: TMDL Areas.
Data Source: Kansas Department of Health and Environment.

Evaluating Criteria: Unit of concern within a sensitive ground water area.
Geospatial Data: Sensitive Grand Water Areas
Data Source: Kansas Geological Survey

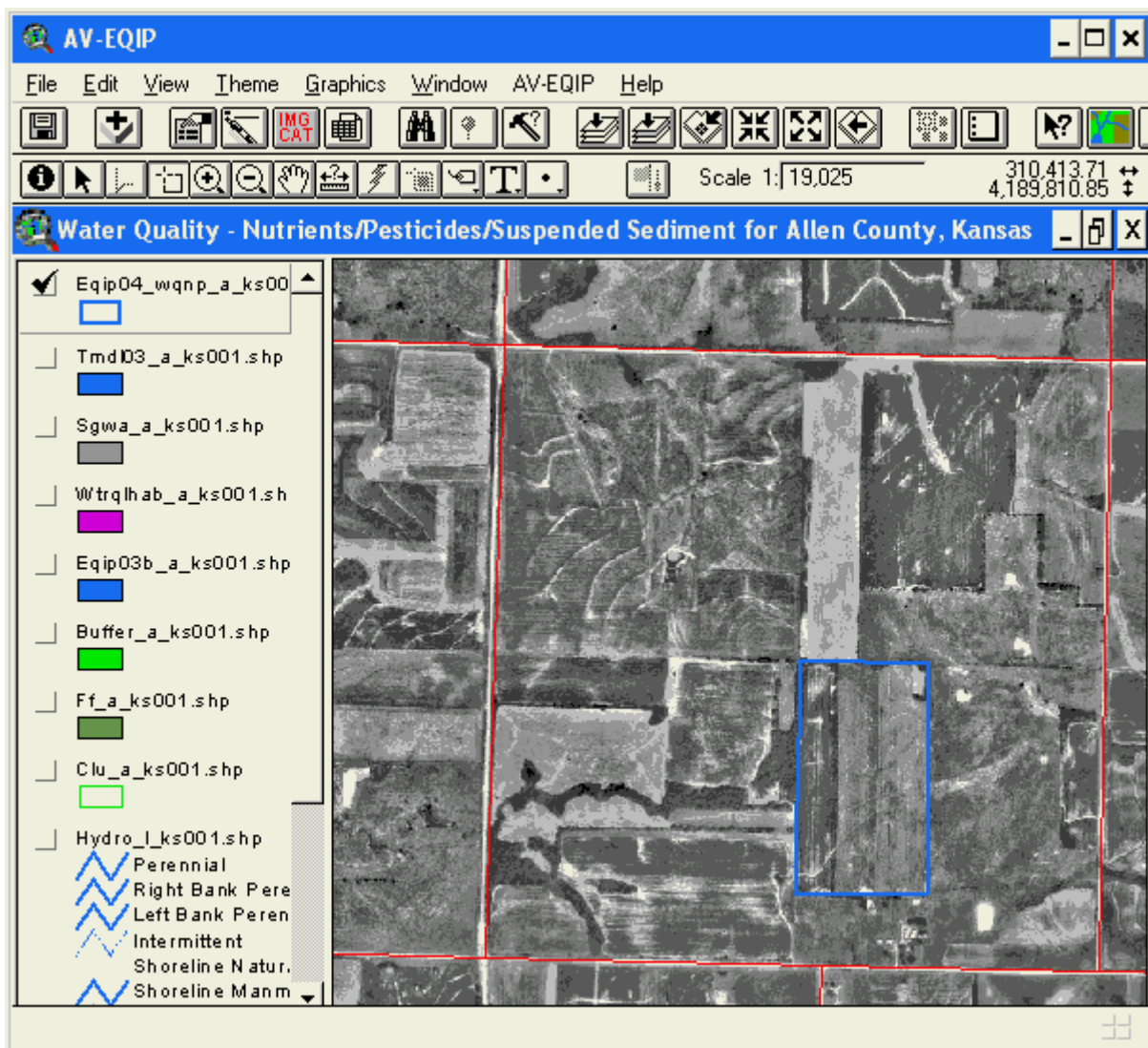
The automated procedure

The AV- EQIP tool uses geospatial data in shapefile format to extract resource information. The resource information that comes from the AV-EQIP tool is stored in a shapefile .dbf file and is used to automatically populate the EQIP ranking database. The following images illustrate the process used by field office personnel to evaluate a EQIP application using the AV-EQIP tool.

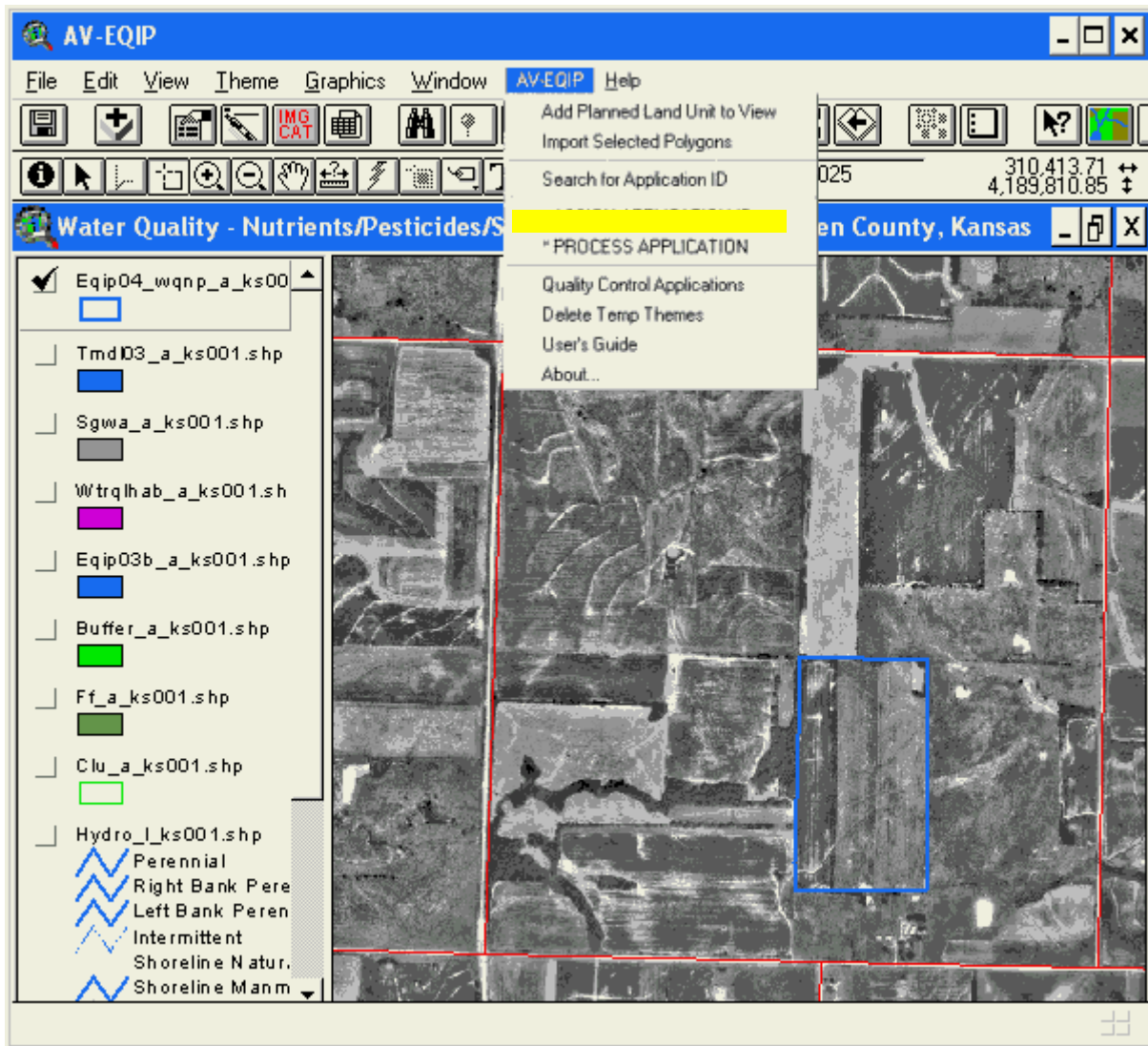
The first step in the process is to select the resource concern to be analyzed and the county the unit of concern is located in.



The landowners unit of concern is digitized using the standard arcview digitizing tools.



An application ID is assigned to the unit of concern.



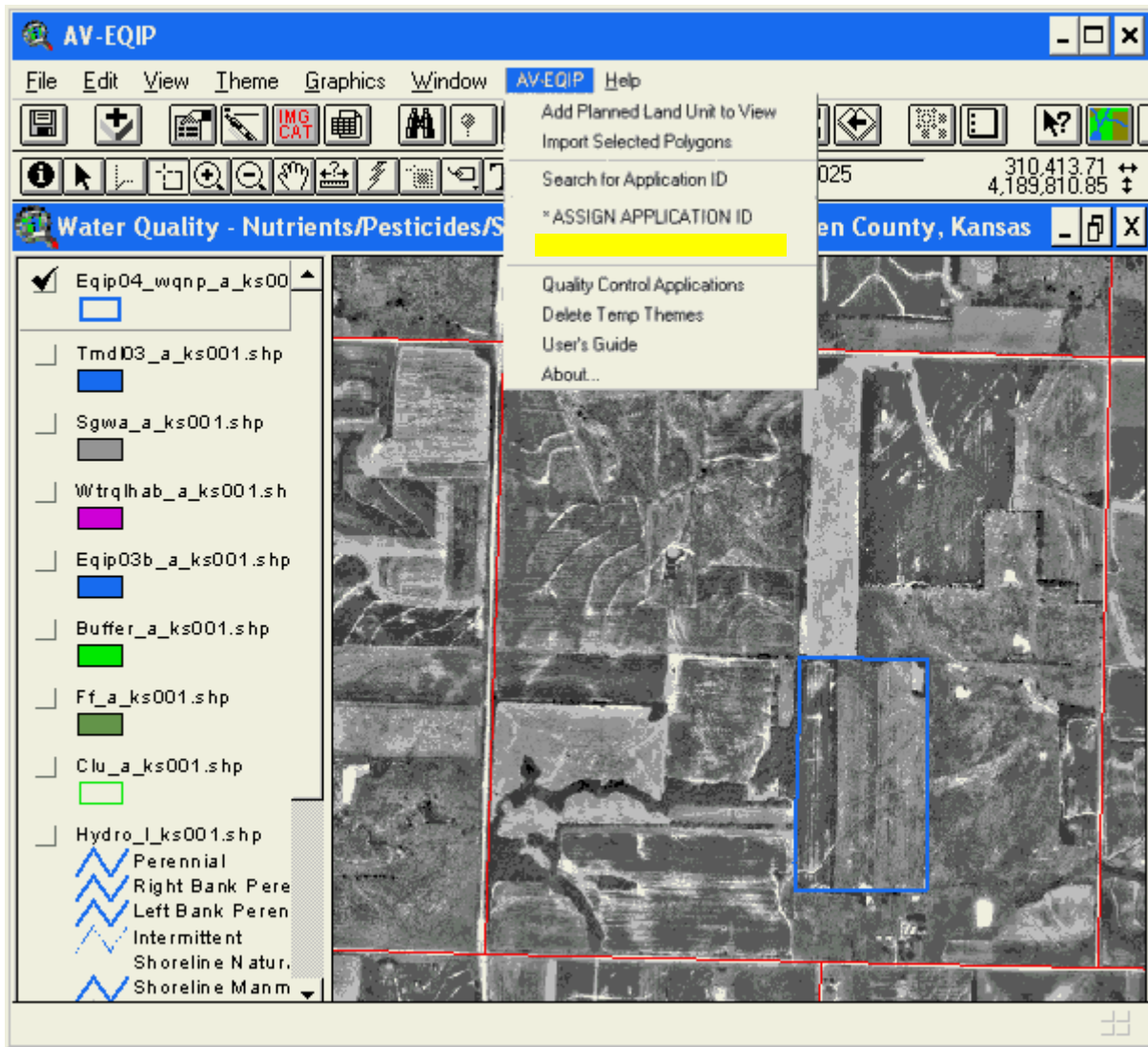
The following menu allows users to assign a unique application id for each EQIP application.

The "Application Information" dialog box is shown, titled "AV-EQIP Version: 4.2004.01.22". It contains two sections: "Application ID" and "Other Information".

Field	Value
State FIPS (20):	20
County FIPS (155):	001
Fiscal Year (2004):	2004
Application (0001):	0001
Program Code:	E
2000120040001E	
Date:	20040618
Editor:	Travis Rome
Notes:	Limit 255 Characters None

Buttons: OK, Cancel

The EQIP application is then processed. The processing procedure clips themes by the unit of concern and calculates acres of and distances to natural resource features such as soils and streams.



The following resource inventory report and map are automatically generated for the unit of concern at the end of the process application procedure. The report and map are printed for hardcopy documentation.

Application Number: 20-001-2004-0001-E Location: Allen County, Kansas

Number of Fields/Polygons Processed: 1 Total Report Acres: 52.1

Report Generated: June 18 2004 by Travis Rome

Notes: None

At-Risk Species Habitat Areas

No Concerns Identified

Arkansas Darter	0.00 Acres	0.0 %
Neosho Madton	0.00 Acres	0.0 %
Topeka Shiner	0.00 Acres	0.0 %
Neosho Mucket	0.00 Acres	0.0 %

Kansas Geological Survey Sensitive Ground Water Concern - Formation

No Concerns Identified

Kansas Department of Health and Environment TMDL Concern

Dissolved Oxygen	39.0 Acres	74.8 %
Eutrophication	0.0 Acres	0.0 %
Nutrients	39.0 Acres	74.8 %
Pesticides	0.0 Acres	0.0 %

Receiving Water Body Buffer Zone

0 - 180 ft	0.9 Acres	1.8 %
180 - 300 ft	2.6 Acres	5.0 %
Exceeds 300 ft	48.6 Acres	93.2 %

Distance to Selected Receiving Water Body

Distance is calculated using the shortest distance between the application boundary and the receiving water body selected by the user
Distance: 434.25 Ft. Water Type: Intermittent

Soils Flooding Frequency

Very Frequent	0.0 Acres	0.0 %
Frequent	0.0 Acres	0.0 %
Occasional	0.0 Acres	0.0 %
Rare	0.0 Acres	0.0 %
Very Rare	0.0 Acres	0.0 %
None	52.1 Acres	100.0 %
Not Rated	0.0 Acres	0.0 %

Water Erosion - Potential Soil Loss Index (PSLI)

High	20.5 Acres	39.4 %
Medium	31.6 Acres	60.6 %
Low	0.0 Acres	0.0 %
Not Rated	0.0 Acres	0.0 %

Potential Tons Soil Loss Per Year = 481.6

Weighted Potential Soil Loss Index = 9.25

Leaching Potential

High	0.0 Acres	0.0 %
Medium	20.3 Acres	39.0 %
Low	31.8 Acres	61.0 %
Not Rated	0.0 Acres	0.0 %

Application Number: 20-001-2004-0001-E

Primary Legal Descriptions (S-T-R): 31-25-21

Total Report Acres: 52.1



The tracking and ranking data base is used to import the information from AV-EQIP and rank each application according to the EQIP evaluating criteria.



Conclusions

There were five major advantages to implementing an automated EQIP evaluation process.

- **Significant time savings.**
There were 4279 applications taken for the Kansas EQIP program in 2004, it was estimated that 11,000 hours were saved by automating the process of evaluating EQIP applications.
- **More resource information was used to evaluate EQIP applications with the automated process.**
Because GIS technology has the ability to analyze data with such efficiency it was possible to collect more resource information than was previously possible in the manual resource collection process.
- **Optimizes the environmental benefits of the EQIP program.**
The ability to use more and better quality resource information creates better funding decisions that in turn increase the environmental benefits of the EQIP program.
- **Reduced the risk of error**

The automated process greatly reduces the chance for human error. In the manual process there were many opportunities to introduce error in the evaluation process.

- **Statewide consistency in evaluation**

Having statewide data and an automated process insured consistent EQIP application evaluation and ranking.

A number of factors came together and culminated into the automated EQIP evaluation process we have today. Statewide coverage of critical geospatial datasets became available. USDA purchased an ESRI software site license allowing employees access to GIS software. Computer technology improved as computer prices dropped making it possible and affordable to use GIS technology. Field office personnel had received arcview 3.x software and training prior to the development of an automated EQIP process making training requirements minimal for implementation. The automated EQIP application process used in 2003 and 2004 was a great success, other conservation programs are now be automated to take advantage of geospatial technology. The NRCS in Kansas is now starting to realize the full potential of geospatial technologies after many years of data development.

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