

DELAWARE COUNTY SOIL AND WATER CONSERVATION DISTRICT

SOIL AND WATER RESOURCE CONSERVATION PLAN

MAY 1991

DELAWARE COUNTY
SOIL AND WATER RESOURCE CONSERVATION PLAN

TABLE OF CONTENTS

- I. Introduction
- II. Purpose
- III. Preface and Credits
- IV. Organization and Authority
- V. General Description - Delaware Conservation District
- VI. Inventory of Soil, Water and Related Natural Resources
 - 1. Soil Resources
 - A. Cropland
 - B. Pasture and Hayland
 - C. Woodland
 - D. Gully Erosion
 - E. Streambank Erosion
 - F. Urban Erosion
 - 2. Water Resources
 - A. Water Quantity
 - B. Water Quality
 - 3. Recreation and Wildlife
 - 4. Mining and Mineral Resources
- VII. Land Management in the Delaware SWCD
 - 1. Factors Limiting Conservation Practices
 - 2. Action Needed to Overcome Limiting Factors
- VIII. Delaware SWCD Policies
- IX. Delaware SWCD Objectives, Goals & Priorities
- X. Statement of Adoption
- XI. Statement of Approval
- XII. Appendix

I. INTRODUCTION

Delaware County's Soil and Water Resource Conservation Plan is a comprehensive long-range assessment of soil and water resources within the Conservation District, and is a plan of action consistent with recent changes in Iowa law. The plan was developed by the Delaware Soil and Water Conservation District (SWCD) Commissioners, with technical assistance provided by the USDA Soil Conservation Service (SCS), the Iowa Department of Agriculture and Land Stewardship (IDALS) Division of Soil Conservation, and various other local, state and federal agencies. Local public input was used to finalize the plan.

The systematic planning process we have used, was designed to insure the highest probability of desired accomplishments, with the fewest undesirable side effects.

The plan you are holding: 1.) provides a basic inventory of soil, water and related natural resources within Delaware County; 2.) discusses the condition of these resources; 3.) explains some key factors which limit conservation practices, and explains how each might be addressed; 4.) identifies Delaware SWCD objectives, goals and priorities; and, 5.) sets out a course of action to achieve the desired results.

The Delaware SWCD Commissioners have been designated to carry out a vital conservation policy established by the State Legislature. This policy is "to integrate the conservation of soil and water resources into production of agricultural commodities to insure the long-term protection of the soil and water resources of the State of Iowa...". In addition, the Delaware SWCD has signed a Basic Memorandum of Understanding with the United States Department of Agriculture, and with the USDA Soil Conservation Service. Both of these memorandums require the Delaware SWCD to have a Long Range Plan to provide guidance and program direction for USDA and Soil Conservation Service employees.

Delaware County's Soil and Water Resource Conservation Plan is aimed at successfully achieving these important state and federal obligations, and securing a future of strong agricultural production and environmental protection.

II. PURPOSE

The major purpose of the Delaware Soil and Water Resource Conservation Plan is to assure proper direction and guidance for the future efforts of the Delaware SWCD program. Secondly, completion of the planning process, and finalization of our plan, also allows the Delaware SWCD Commissioners to apply for Resource Enhancement And Protection (REAP) grants and other sources of funding. With this plan, we also meet requirements and guidelines of various federal and state agencies as they apply to Soil and Water Conservation Districts.

A third purpose of our plan is to meet requirements of the Iowa Code, which pertain to the operation of Soil and Water Conservation Districts. Fourthly, the Delaware SWCD plan focuses on long-range conservation priorities and provides the basis for future budgeting and staffing decisions.

This plan is to be periodically updated and/or amended to match changing natural resource conditions; and the changing needs and priorities of local citizens.

III. PREFACE AND CREDITS

Planning for the long-term conservation of Delaware County's soil, water, and related natural resources is not a simple task; but it is a necessary process when orderly development and utilization of these precious resources is expected.

This long-range plan reflects our current objectives and priorities as we set out to meet the future land and water needs of local citizens. We SWCD Commissioners recognize that with constant economic and environmental change, the operating strategies for our overall SWCD program need to be regularly re-evaluated and periodically revised.

The present planning process is being provided by the Commissioners of the Delaware Soil and Water Conservation District for all local individuals, groups, and units of government. It is an organized effort to develop and protect our soil and water resources for the benefit of all. Every governmental agency; civic, environmental, or community group; and each citizen can and is encouraged to make a meaningful contribution toward implementing this conservation program. Only with the cooperation of everyone, can we hope to complete this most important task before some of our natural resources are irretrievably destroyed.

The Delaware Soil and Water Conservation District Commissioners appreciate the inter-agency cooperation needed to develop this long-range plan. First the Commissioners would like to thank the staff of the U.S. Soil Conservation Service, U. S. Agricultural Stabilization and Conservation Service, Iowa Department of Natural Resources, Iowa Department of Agriculture and Land Stewardship-Division of Soil Conservation, Iowa State University Cooperative Extension Service, Delaware County Board of Supervisors, Iowa Department of Transportation, U.S. Geological Survey, and the Iowa Department of Economic Development.

Secondly, credit should go to those who contributed the public input which produced the objectives, goals, and priorities of our plan. These in Delaware County include: the Delaware County Board of Supervisors, the county ASCS, Iowa DNR, Delaware County Conservation Board, Ryan Coop, Lake Delhi Recreation Association, and private individuals.

IV. ORGANIZATION AND AUTHORITY

The Delaware Soil and Water Conservation District was organized at the request of local people interested in soil and water conservation. A charter was issued under the provisions of the Soil Conservation Districts' Law, Code of Iowa, Chapter 467A, on September 29, 1944. The boundaries of the District and the county are the same.

The District is a subdivision of state government governed by five locally elected Commissioners, who are elected on the general ballot and serve six year terms. The Commissioners can appoint as many Assistant Commissioners as they deem necessary. SWCD Commissioners are charged by the Iowa General Assembly with the restoration and conservation of the soil, water, and the related natural resources of the county. The District receives support services from the Division of Soil Conservation, within the Iowa Department of Agriculture and Land Stewardship.

Additional authorities have been given the Soil and Water Conservation District since it was founded. Some of these additional authorities are:

1. Sub-districts (Chapter 467A, Sec. 13-41) of a soil and water conservation district may be formed for the purpose of carrying out watershed protection and flood prevention programs with the sub-district, but may not be formed solely for the purpose of establishing or taking over the operation an existing drainage district.

2. The Commissioners of the Soil and Water Conservation District shall adopt reasonable regulations (Chapter 467A, Sec. 42-53) to establish a soil loss limit or limits for the District and provide for the implementation of the limit or limits, and may subsequently amend or repeal their regulations as they deem necessary. Chapter 467A also provides for mandatory erosion control after due process.

3. The Soil and Water Conservation District (Chapter 467B) advises and consults with counties and sub-districts upon the request of any of them or any affected landowners, and is authorized to cooperate with other state subdivisions, or instrumentalities and affected landowners, as well as with the federal government or any department or agency thereof, to construct, operate, and maintain suitable projects for flood or soil erosion.

4. Under Chapter 467C, the County Board of Supervisors can establish districts having for their purpose soil conservation and the control of flood waters. The establishment of these districts requires the approval of the Soil and Water Conservation District along with the Department of Natural Resources. This section includes the role of the District in representing the rural as well as urban interests in the administration of the Erosion Control Law and other programs in which the District is involved. The basic urban concern is to help urban areas with erosion control. Consultive assistance is provided to both the cities and the county upon request. Also, these authorities are within the Code of Iowa, Chapter 467E - Agricultural Energy Management and Chapter 467F - Water Protection Projects and Practices. However, the ultimate responsibility for soil erosion control rests with the District.

The District is authorized to request assistance from, and enter into Memorandums of Understanding between themselves and other federal, state, and local entities to carry out their assignments and unique leadership role in the implementation of this long-range plan.

Active Memorandums of Understanding have been signed with:

- U.S. Department of Agriculture 1945, Rev.4-11-63
- U.S. Soil Conservation Service 1945, Rev.7-7-88
- Iowa Conservation Commission 1947, Rev.10-16-67
- U.S. Army Corp. of Engineers 3-10-76
- Iowa Cooperative Extension Service 1944, Rev.5-8-63
- Delaware County ASCS 1976, Rev.9-6-89
- Area VIII Regional Planning Commission 1-15-75

The SWCD Commissioners also provide sponsorship and direction to programs administered by other agencies which directly affect the operations, objectives and priorities of the District. There are a number of such agencies which have programs available that can assist the Delaware SWCD in carrying out this Soil and Water Resource Conservation Plan.

V. GENERAL DESCRIPTION - DELAWARE SWCD DISTRICT

The total area within the District is approximately 573 square miles or 366,720 acres. The Delaware SWCD and the county have the same boundaries, and these include 16 townships. The county is 24 miles from north to south and 24 miles east to west. Roughly 99 percent of the total acres is land, and the remaining 1 percent is in water.

The major business in the county is agriculture, including several associated agri-business facilities and services which support agricultural production. The major industrial and manufacturing businesses of the county include: Swiss Valley Farms Inc., Farm Tek, Chapmman Logging and Sawmilling, and Sno-Go in Hopkinton; Kendrick Logging and Sawmilling, Inc. in Edgewood; Imperial Tool and Die in Colesburg; American Trencher Inc., and Hankins Triple H Trailers Corp. in Delhi; Eastern Iowa Pork Manuf. Inc. in Earlville; and Baumgartner Gate Factory, Collins Air Transport Div. of Rockwell International, Exide Corp., Hawkeye Castings, Henderson Manuf., Lewisystems, Tredegar Industries Inc. and Kann Fabrication Inc. all in Manchester.

The population of Delaware County was approximately 18,035 according to the 1990 census. The population trend has been a gradual decrease, with a loss of 898 or 5% over the past 10 years. There are 10 incorporated towns within the Delaware SWCD. Everyone lives in a rural setting where the quality of life is considered quite high. The population by gender is approximately 52% female and 48% male. Approximately 89% of the District's farms are owned and/or operated by males and 11% by females. According to census data provided by Iowa State University, white Caucasians make up 99.5% of the local population, 0.2% are black, and 0.3% fall into the "other" category. Of the operating units within the District, 99.9% are owned and/or operated by white Caucasians, and 0.1% by Asians.

The average income, or per capita income (in 1982 dollars) for Delaware County rose gradually from \$7,485 in 1970, to \$9,374 in 1984, and is projected to be \$9,522 in 1990. Compared to per capita income for the entire State, Delaware County was 21% lower in 1970, and 19% lower in 1984. This 1987 data is the most current provided by Iowa State University.

The trend over the past several years has shown a decrease in the number of farm units, and a corresponding increase in farm size to an average of 244 acres according to the 1987 Census of Agriculture. There has been an increase in the number of crop acres resulting primarily from bringing previous pasture and woodland into crop production. Livestock numbers have decreased in the past ten years. However, Delaware County ranks first in the

state in hog production. Dairy cow numbers have dropped by 8% since 1980 according to the Iowa Agricultural Statistics Report. If the present trend in the livestock mix continues, even greater pressure will be placed on soil and water resources for grain production and less forage will be produced. Large amounts of the grain and hay now produced in the county are used locally to support the livestock industry.

There are 292,000 cropland acres within the Delaware District and based on 1989 data, 75% of these acres are being used for row crops. Woodland covers an additional 26,000 acres. In total, 127,604 cropland acres are designated as Highly Erodible Land (HEL) under guidelines of the Food Security Act of 1985.

The increase over the past few years in acreage being used for the two major rowcrops (corn and soybeans) has been significant. This translates into a greater potential threat to the sustainable use of our precious soil and water. The urgency for preventing soil erosion, sedimentation damage, and contamination of surface and groundwater, is therefore INCREASING not decreasing with time.

The major streams and rivers within the District include: the Maquoketa River, North Fork of the Maquoketa River, Plum Creek, Little Turkey River, Buffalo Creek, and several high quality, coldwater trout streams. Many of these are important for their fishing and recreational uses. There is a high potential for degrading these rivers and streams if contamination from sediment, pesticides, animal waste, and fertilizers are allowed to continue at recent levels. Groundwater contamination is a serious concern. Underground aquifers provide ALL of the drinking water for Delaware county residents and visitors.

Approximately 60 small ponds are found within the Delaware District. Nearly all were constructed using technical assistance provided through the SWCD office.

The owner vs operator status of farms within our District fall into two categories. Approximately 65% of the local farms are managed by the landowner. The remaining 35% of the farms are managed by a renter or leasee.

VI. INVENTORY OF SOIL, WATER AND RELATED NATURAL RESOURCES

1. SOIL RESOURCES

There are 292,000 acres of agricultural land in Delaware County. Soil losses exceed acceptable levels on 208,400 acres, or 71% of the total. Non-agricultural areas also have soil erosion levels which cause various problems.

Seven major soil associations are found in Delaware county. The Fayette-Nordness and Fayette-Chelsea associations have the most excessive erosion rates. When these soils are unprotected, the estimated average soil loss is 22 tons per acre per year based on a CCCOMM rotation. For continuous corn, the Downs-Fayette association also has an estimated average annual soil loss of 18 tons/acre on unprotected acres. All remaining soil types have an estimated loss of 10 tons/acre/year with continuous corn. If left unchecked, these excessive soil losses will limit both crop production and economic returns in the future.

Soil resources, and their management is mentioned repeatedly throughout the various other sections of this plan.

Additional, more detailed soils data, appears in the Delaware County Soil Survey Report which is available along with much more conservation information in the Delaware County Soil and Water Conservation District Office.

A. CROPLAND

Row crops are grown on 75% (or 219,200 acres) of the county's 292,000 acres of cropland. Oats and hay are produced on another 23% of this land. Increased reliance on corn and soybeans has resulted in greater total soil erosion across Delaware county. Not only are corn and soybean fields more widespread today, but these erosion causing crops are being grown on increasingly more marginal land having steeper and longer slopes.

Listed below are the acres of the major crops produced in Delaware County. The data is from the Iowa Agricultural Statistics Report and the Delaware County SWCD Resource Inventory.

	<u>ACRES IN PRODUCTION</u>		
	<u>1965</u>	<u>1978</u>	<u>1989</u>
Corn	117,207	178,000	190,000
Soybeans	15,327	26,100	29,200
Oats	39,768	38,600	26,900
Hay	45,522	46,600	46,600
Pasture	75,051	25,000	17,730

The increase in corn acres has been the result of converting pasture, wetlands and some woodlands. The largest amount of this landuse conversion occurred during the 1970's.

The Food Security Act of 1985 designated 127,604 acres, or 44% of all cropland as HEL. At present 125,218 HEL acres have an approved conservation plan.

Cropland enrolled in the Conservation Reserve Program (CRP), totals 12,343 acres or 4% of all cropland. This represents all or part of 238 farms out of a total of 1,688 farms in the county.

Sheet and rill erosion continues to be a major problem throughout the cropland of Delaware County. The switch to row crop production during the past 25 years has put excessive demand on the finite soil resources in the county. About 65% of the HEL farms have soil loss requirements planned under the alternative system to reach soil loss limits of the Food Security Act. Using this alternative conservation system on "D" and "E" slopes make it possible to achieve these soil loss limits. This alternative system allows soil losses of 2 to 3.5 times the acceptable limits. A large amount of conservation work remains to be completed in Delaware County.

The following table shows acres treated, and additional conservation needed, by land class, on the cropland in Delaware County:

<u>LAND CLASS</u>	<u>CROP ACRES</u>	<u>TREATED</u>	<u>TREATMENT NEEDED</u>
I	4,904	3,923	980
IIe	100,831	25,208	75,624
IIw	74,656	18,664	55,992
IIs	10,424	2,606	7,818
IIIe	46,791	6,000	40,791
IVe	13,144	2,450	10,694
IVs	24,160	4,800	19,360
Vw	2,200	1,100	1,100
VIe	5,000	474	4,526
VIIs	6,500	1,310	5,190
VIIe	1,070	70	1,000
VIIIs	1,180	80	1,100
TOTAL	290,860	66,685	224,175

Original topsoil depths measured approximately 12-16 inches on the class IIe soils, which was formed under prairie conditions. Today these same gently sloping soils have only 7 to 8 inches of topsoil remaining. Present estimated losses on IIe soils average 10 tons per acre per year. At this rate of erosion, IIe soils will lose 3.5 inches of topsoil in just the next 60 years. TOTAL depletion will occur in 1.5 average lifetimes, or 120 years. This important class IIe cropland in Delaware County needs appropriate conservation practices to control erosion and to maintain productivity for as long as possible.

Most of the class IIIe and IVe soils were developed under forest vegetation. These gently to strongly sloping soils have only approximately 7 inches of topsoil remaining today, because about one-half of this precious heritage has been lost through erosion. At present, soil losses average 22 tons per acre per year for continuous corn or CCCOMM rotations on steeper class IIIe and IVe cropland. At today's excessive erosion rates, TOTAL topsoil depletion

will occur on these two soil classes in approximately 50 years. Or, perhaps to put this in clearer perspective, ALL topsoil on class IIIe and IVe soils will be gone before babies born in 1990 reach middle age - - unless conservation practices are applied quickly.

Any loss of topsoil will relate directly to lost productivity as more and more subsoil is continuously brought up into the plow layer. Increased fertilizer inputs can only make subsoil moderately more productive. Improving subsoil tilth is a more difficult problem. Adding chemical inputs on cropland acres may cause or increase problems with both groundwater and surface water quality across Delaware County. Current FSA regulations fail to completely address the soil erosion and water quality problems on the 84,095 acres of class III and IV lands needing treatment in the Delaware SWCD.

Class VI land obviously has severe limitations for crop production. Fortunately these soils are very rarely used for crops. Pasture development or management is a logical alternative for this land.

B. PASTURE AND HAYLAND

There are currently 17,730 acres of permanent pasture in the Delaware SWCD. Of this, 8,865 acres have soil losses above acceptable levels due to rill and gully erosion. Diversion, grassed waterways, grade stabilization structures, ponds, pasture and hayland renovation, and critical area seedings are needed to stabilize these problem areas. Improvements are therefore needed on approximately 8,865 acres of pasture.

Hayland management in Delaware County is quite variable but appears to be slowly improving. About 86% of the District's 46,600 acres of hayland plantings are pure alfalfa, with the remainder being a combination of alfalfa and cool season grasses. Yields range from 2.0 to 5.0 tons/acre/year with an average yield of about 2.4 tons. Improvements in fertilization and lime applications would have the greatest impact for improving hayland production. Timely harvesting and better pest management are other important potential improvements.

C. WOODLANDS

There are currently about 26,000 acres of woodland in the Delaware SWCD. For the most part, these woodlots are made up of mixed hardwoods. Some 6,000 of these acres have soil losses above acceptable levels due to rill and gully erosion which results primarily from livestock grazing. Fewer than 10,000 acres are managed for forest products.

Delaware County currently has 6,000 acres enrolled in the Iowa Forest Reserve program.

The total acres of woodland have decreased over the past 10-20 years. This situation has developed because of the perceived lack of economic return from woodland versus other land uses. Most of the loss has been through conversion to cropland. There is a growing concern that the loss of both quantity and quality of our woodlands is reaching a point where timber is not a sustained yield resource. Loss of local woodlands is also beginning to affect the aesthetic quality of the District as well as reducing the "edge" condition which is very important for wildlife habitat.

There is a strong need for greater woodland management to increase production and economic return on private land within the Delaware SWCD. The elimination of grazing in woodland and fencing livestock out of timber would mean better timber production. Additional landowner education is needed to inform decision-makers about: obtaining bids and timber harvests, state and federal tax incentives, timber management methods, and marketing raw wood products. Tree planting and timberstand improvement practices are needed in many areas. Grade stabilization structures, ponds and tile outlet diversions are needed on the 6,000 wooded acres having erosion problems. Sound woodland management is needed on the 10,000 acres of grazed woodland within the District.

Tree planting is needed on approximately 10,000 acres which should be converted from poor quality cropland, and pastureland to permanent woodland. Hopefully, the Iowa Resource Enhancement and Protection (REAP) program will raise public awareness sufficiently to get many landowners actively managing their valuable timber acres for maximum economic benefit and long-term resource protection.

D. GULLY EROSION

Gully erosion is a definite problem in the Delaware SWCD. It is currently estimated that ephemeral gully erosion rates on average D slopes in a typical corn-hay rotation are 7 tons/acre/year. On average E slopes the soil loss increases to 10 tons/acre/year. Soil loss from gully erosion often reaches 10-12 tons/acre/year in the Delaware SWCD.

While the majority of ephemeral gullies can be addressed through management practices such as grassed waterways, structural practices will be required on major gullies. According to the District's inventories about 1,000 grade stabilization structures will be required to effectively address this problem. To date, 90 structures have been established, leaving approximately 910 yet to be

installed. In addition, 2,150 more water and sediment control structures need to be built; to date, 132 of these type of structures are in place. The District also believes that 15,000 acres of grassed waterways need to be installed to control gully erosion.

E. STREAMBANK EROSION

According to the 1977 National Resource Inventory conducted by the U.S. Soil Conservation Service there are 210.4 miles of streambanks in the District. Approximately 80% of these streambanks are eroding excessively. Land loss adjacent to larger streams and rivers can be extensive during flooding and other high water events. These losses include not only the actual voiding away of valuable lands, but the depreciation of adjacent areas as well.

Sedimentation damage is also an unfortunate negative result of streambank erosion. Sediment damage includes: loss of channel capacity, direct detrimental impacts on both vertebrate and invertebrate animal species (including hunted and fished species), loss of habitat for both fish and wildlife, and deposition of infertile materials over previously productive farmland.

The Delaware District has a strong interest in improving management of streambanks, preventing excessive loss of farmland from streambank erosion, preventing contamination of all water bodies by sediment, and protecting recreational resources used by tourists and local residents.

F. URBAN EROSION

Urban expansion has been minimal in recent years due to declining population and a poor economy. It is likely that there will not be a heavy workload with this type of resource degradation. Rather, the SWCD will probably receive only an occasional request for technical assistance to protect natural resources on urban sites.

2. WATER RESOURCES

A. WATER QUANTITY

Water resources within the Delaware Soil and Water Conservation District have contributed largely to the development of the District and its conservation program. In the past, small streams served as generators of power for grain mills and electricity. Today these streams are very important for livestock water, fish and wildlife habitat, and recreational uses throughout the county.

There are 105.26 miles of perennial rivers and streams in the Delaware District. The major bodies of flowing water include the Maquoketa River, Plum Creek, Little Turkey River, Buffalo Creek, and several high quality coldwater trout streams. Specific data about the rivers, streams, and other bodies of water are shown in the table below.

The key for the table of Iowa Department of Natural Resources water quality standards and designated uses is as follows:

A= Primary human contact, ie. swimming & water skiing
 B(W)= Secondary human contact, ie. warmwater fish & fishing
 B(C)= Secondary human contact, ie. coldwater fish & fishing
 C= Domestic water supply
 HQ= Water of exceptional quality
 HQR= Water of substantial recreational significance
 L= Lake
 W= Wetland
 R= Reservoir

<u>WATER BODY</u>			<u>MILES</u>	<u>WQSNO</u>
Bloody Run Cr.	B(C)	HQR	1.76	103
Steeles Br.	B(C)	HQR	2.04	108
Elk Cr.	B(W)		0.79	107
Twin Springs Cr.	B(C)	HQR	1.32	111
Fenchel Cr.	B(C)	HQ	1.23	57
Maquoketa R.	B(C)	HQ	1.17	38
Little Turkey R.	B(C)	HQ	2.09	101
Elk Cr.	B(W)		1.46	107
Fountain Spring Cr.	B(C)	HQ	1.21	112
Fountain Spring Cr.	B(C)	HQ	1.51	112
Elk Cr.	B(W)		0.74	107
Maquoketa R.	B(C)	HQ	1.33	38
Backbone Lake	A	B(W)	0.62	37
Schectman Br.	B(C)	HQR	1.45	114
South Br. Fountain Spring Cr.	B(C)	HQR	1.95	113
South Fk.				
Maquoketa R.	B(W)		3.28	56
Honey Cr.	B(W)		2.67	54
Lindsey Cr.	B(W)		5.36	55
Maquoketa R.	B(W)		6.76	36
Quaker Mill Pond	A	B(W)	1.34	35
Honey Cr.	B(W)		4.25	54
Maquoketa R.	A	B(W)	0.32	34
Maquoketa R.	A	B(W)	0.43	34
Coffins Cr.	B(W)		5.52	53
Spring Br.	B(C)	HQR	3.86	52
Maquoketa R.	A	B(W)	5.25	34
Maquoketa R.	A	B(W)	5.27	34
North Fk.				
Maquoketa R.	B(W)		5.84	60
Plum Cr.	B(W)		12.55	51

Maquoketa R.	A	B(W)	4.21	34
Maquoketa R.	A	B(W) HQR	0.96	33
Buck Cr.	B(W)		7.19	50
North Fk.				
Maquoketa R.	B(W)		0.32	60
Maquoketa R.	A	B(W)	4.75	33
Buffalo Cr.	B(W)	HQR	4.46	19

Refer to Designated Rivers of Delaware County, page one of appendix, for WQSNO river locations.

The land classified by the SWCD as priority watersheds and special areas for water quality related conservation practices, contain approximately 43,920 acres. These priority areas represent about 12% of the area within the Conservation District. Coldwater streams in need of special protection and management involve 36,230 of these acres.

All drinking water within the Delaware SWCD comes from underground aquifers. Groundwater supplies in the District appear to be abundant. There are currently 25 active public water supplying wells in Delaware County. Municipal wells are located in the Jordan sandstone formation. Most private wells are located either in the Jordan aquifer or in shallow water bearing formations.

The quantity of available water for human use does not appear to be a concern at this time. There are, however, major concerns about the quality of the groundwater and to a lesser extent, surface water. Water quality will be covered in a later section of this plan.

Wetlands have been treated in Delaware County much as they have been in other counties in Iowa and the nation. They have almost been eliminated through drainage and changes in land use. The wetlands still occurring within the SWCD will be protected to the fullest extent possible through the Food Security Act legislation. This will be accomplished by advising landowners of their opportunities and responsibilities to protect wetland areas for groundwater recharge, wildlife habitat, aesthetics, recreation, and other appropriate land uses.

The majority of wetlands in the Delaware SWCD are located on flood plains and in small upland drainage areas. A detailed program has been prepared for identifying all wetlands on privately owned land and for assisting landowners with managing these wetland areas.

B. WATER QUALITY

Karst topography of fractured limestone bedrock and shallow soils cover approximately 88,000 acres in Delaware County. This topography and intensive row-crop farming set

the stage for potential long-term water quality and public health problems, since all drinking water comes from underground aquifers.

Research conducted by the Iowa DNR and University of Iowa Health Center (from March 1988 to June 1989) under the Iowa Groundwater Protection Act of 1987, identified nitrates and pesticides as contaminants in randomly selected wells. A Statewide Rural Well-Water Survey exposed additional facts. The percentage of contaminated wells in the Delaware County sampling is as follows: nitrates 11.6%, pesticides 11.3%, and bacteria 34.3%.

Over 200 sinkholes have been located in the county. These visible openings provide a direct route for contaminated water to collect on the surface and flow directly into shallow underground aquifers. Soil infiltration is another source of groundwater contamination. This type of contamination is just as serious but less obvious. Water infiltrating through the many acres of shallow soils covering fractured bedrock in Delaware County also reaches the drinking water used by local residents. When this infiltration water contains chemicals which are not healthy for humans, problems may result.

Current rates of groundwater contamination need to be reduced before a large portion of local drinking water supplies are unsafe for people or livestock. Although present rates of water contamination are usually below toxic levels, there are uncertainties involved with unimagined combinations of the many pesticides which have been on the market. Nitrate concentrations are most often mentioned in relation to infants and methemoglobinemia. However, recent research suggests that drinking water with high nitrate levels may contribute to other long-term health problems as well.

3. RECREATION AND WILDLIFE RESOURCES

The Delaware County Conservation Board has designated 1,540 acres of land to recreation and wildlife uses. The Parks Division, Iowa DNR, administers Backbone State Park which contains 1,750 acres, for the same types of public use. The Fisheries Division, Iowa DNR, has an active trout stocking program in the coldwater streams of the District. Fishing for trout and other fish species is an important recreational attraction within Delaware County.

Even with the land holdings of county and state agencies, the vast majority of wildlife habitat and property used for recreation within the SWCD remains in private ownership. Some land having better soil types is still being converted from primarily wildlife habitat to cropland. However, at present this seems to be more than offset by conversion of marginal cropland back to idle land in the

Conservation Reserve Program (CRP). CRP acres can directly benefit wildlife populations and the people who enjoy outdoor recreation.

Populations of white-tailed deer, turkey, ring-necked pheasant, gray partridge, cotton-tail rabbit, bobwhite and some non-game species appear to have increased, at least in part due to the more favorable and abundant habitat provided through the Conservation Reserve Program. Recreational opportunities have likewise increased for hunters and non-consumptive users of wildlife alike.

4. MINING AND MINERAL RESOURCES

Mineral resources within Delaware County consist primarily of limestone with some sand and gravel.

Limestone occurs near the surface in several areas in the county. It is crushed in quarries and used commercially for roadbuilding and agricultural lime. There are approximately 20 active limestone quarries located within Delaware County.

A few sand and gravel pits have been opened in some of the county's river valleys. The commercial value of this resource is quite limited at this time.

VII. LAND MANAGEMENT IN THE DELAWARE SWCD

Conservation of the land and the water, which helps make it productive, is the primary concern of the Delaware SWCD. A great deal of important conservation work remains to be accomplished in our District. Quantities of some of the more important soil and water management practices needed in the Delaware SWCD are shown in the following matrix.

<u>CONSERVATION PRACTICES</u>	<u>TOTAL NEEDED</u>	<u>ACCOMPLISHED TO DATE</u>	<u>PRACTICES NEEDED</u>
Conservation Tillage (Ac.)	250,000	66,000	184,000
Contour System Farming (Ac.)	130,900	12,063	118,837
Contour Strip- cropping (Ac.)	38,800	7,594	31,206
Terraces (Ft.)	11,670,000	260,815	11,409,000
Grassed Waterways (Ac.)	15,342	2,153	13,189
Grade Stab. Structures (No.)	1,000	90	910
Field Border (Ft.)	8,000,000	463,050	7,536,950
Water & Sediment Structures (No.)	2,150	132	2,018
Subsurface Drainage (Ft.)	80,000,000	50,526,940	29,473,060
Waste Mgmt. Systems (No.)	930	320	610
Nutrient Mgmt. (Farms)	1,600	400	1,200
Pesticides Mgmt. (Farms)	1,600	800	800

In addition to our vital soil conservation workload, a significant portion of our needed water quality protection practices relate directly to livestock waste management and overall plant nutrient management.

Delaware County has a large number of hogs, dairy cattle, and other livestock. The District is continually receiving requests from landowners for both technical and financial assistance in developing animal waste systems.

Delaware County contains several high quality coldwater trout streams which are some of the most heavily used streams in Iowa. Many livestock operations are adjacent to these streams. Animal waste management structures would allow landowners to properly apply and manage waste from their livestock, and protect these important streams from this runoff.

High nitrate levels are also a problem in the groundwater of Delaware County. Animal waste structures would be the first step toward assisting landowners with a good manure application plan and nutrient management practices.

1. FACTORS LIMITING CONSERVATION PRACTICES

A number of factors are limiting the amount of soil and water conservation practices being applied within Delaware County. We wish to see the following factors eliminated, or greatly reduced. When considered in various combinations, the following factors have a significant negative impact on vital resources in our county.

A. Inadequate financial incentives - -

This is fast becoming a major hindrance to structural practices such as terraces, grade stabilization structures, grassed waterways, water and sediment control basins, and waste management facilities.

B. Inadequate staffing - -

This limits the amount of all structural practices which can be designed and the amount of strip cropping, contouring, etc. which can be laid out; and technical assistance which can be provided.

C. Landowner acceptance of management practices - -

This factor, taken alone, limits the application of conservation tillage, pasture management, woodland management, and nutrient/pesticide management. In conjunction with other limiting factors it has an even greater negative impact.

- D. Inadequately trained staff - -
This limiting factor hinders assistance to land-users who need help with nutrient, pesticide, pasture, and woodland management and the development of waste management systems.
- E. Inability of landowners to pay for conservation - -
Expensive practices such as terraces and waste management structures are not constructed when the farmer has limited financial resources.
- F. Length of construction season - -
Completion of structural practices is limited to early spring and late fall due to crop production and frozen soil.
- G. Availability of contractors - -
This affects our ability to complete structural practices on a timely basis, especially in poor weather during the short construction season.
- H. Obligations other than conservation practices - -
Fewer conservation practices are applied when field office staff are pulled away from traditional duties to take care of assignments not directly related to erosion control. The increased work load has made it more difficult to meet the requests for application.
- I. Lack of landowner knowledge - -
Landowners need a better understanding of soil erosion, its effects, and the practices which will adequately treat the various problems.

2. ACTION NEEDED TO OVERCOME LIMITING FACTORS

- A. Inadequate financial incentives - -
If state and federal incentives for conservation are not increased, the necessary funds will have to be sought through competitive grant proposals for new funding sources.
- B. Inadequate staffing - -
If staffing levels are not increased, existing staff will have to become more highly motivated, more efficient, and better trained in order to achieve additional conservation objectives. Landowners and contractors will have to assist in layout and checkout.
- C. Landowner acceptance of management practices - -
New and innovative information and education efforts are needed to convince landowners and operators of the value of various resource management systems and conservation practices.
- D. Inadequate training of staff - -
Mechanisms will have to be put in place to insure improved staff training without reducing production levels of existing staff.
- E. Inability of landowners to pay for conservation - -
Improved agricultural profitability, increased state and federal incentives, SWCD grant proposals for new funding sources, or some combination of these may be needed to change this limiting factor.
- F. Length of construction season - -
Additional incentives could be used to increase the amount of summer terrace construction, thereby lengthening the construction season.
- G. Availability of contractors - -
Anticipated workload can be discussed with contractors to encourage them to make their management decisions according to this workload.
- H. Obligations other than conservation practices - -
To "get more conservation on the land" any time-consuming task which takes staff away from soil and water conservation practices will need to be either reduced or eliminated.
- I. Increased information programs - -
These will better inform landowners about erosion problems that exist on local properties and how individuals can benefit by applying conservation practices.

VIII. DELAWARE SWCD POLICIES

The Delaware SWCD is administered by five Commissioners who are elected on the general ballot by the eligible voters of this county. Commissioners are elected to six year terms and not more than two Commissioners are elected in any one year. Commissioners can appoint as many Assistant Commissioners as they deem necessary. The District's annual organizational meeting is held in conjunction with the regular SWCD meeting in January of each year.

It is the policy of the Delaware Soil and Water Conservation District:

1. To hold Commissioner meetings on a monthly basis to transact any business necessary to carry out the District's Long Range Plan and Annual Work Plan. The SWCD District keeps minutes of all meetings and records are maintained for all funds the District receives and spends.

2. To place high priority on field office staff providing technical assistance in planning, design, layout, adherence to specifications, and the maintenance of soil and water conservation practices.

3. To encourage and promote the conservation and wise development of soil, water, and related natural resources which improve the total environment of the county.

4. To work cooperatively with all federal, state, and local agencies, organizations, and individuals to advance natural resource conservation within Delaware County, and to avoid duplication of effort wherever possible.

5. To enter into agreements with units of government, organizations, and individual landowner/operators, who request help in developing Inventories and Evaluations, and Resource Conservations Plans.

6. To determine the kind, amount, and priority of the work to be performed by the field office staff.

7. To carry out an effective information and education program designed to improve public understanding of the District and its conservation program. Emphasis will be placed on informing citizens about the Food Security Act and on providing schools with information to be used in classrooms.

8. To work with other Soil and Water Conservation Districts and planning organizations for the coordination of programs involving soil and water resource use.

9. To provide all technical assistance and services without regard to race, color, sex, age, handicap, religion, or national heritage. Applicants for employment will not be discriminated against in any way, nor will any individual be denied their rights on any discriminatory basis.

10. To use the following list of priorities for technical assistance and cost-share, should funds become limiting:

a. Provide technical assistance and cost-share to cooperators in the Fayette-Nordness-Rock Outcrop soil association. Priority practices are terraces, erosion control structures, and management practices such as no-till, contouring, contour stripcropping, and grassed waterways.

b. Provide technical assistance and cost-share to cooperators in the Downs-Fayette soil association with terracing, grade stabilization structures, and management practices and grassed waterways.

c. Provide assistance and cost-share to cooperators in the Fayette-Chelsea and Nordness-Backbone-Bassett soil associations. Priority practices are terraces, grade stabilization structures, management practices and grassed waterways.

d. Technical assistance and cost-share on the remainder of the soil associations will be provided considering soil loss reduction and public benefit.

e. Woodland, pasture and wildlife management practices will be given special consideration for funding from the state Resource Enhancement and Protection (REAP) program.

IX. DELAWARE SWCD OBJECTIVES, GOALS & PRIORITIES

The Delaware SWCD Commissioners intend to pursue actions under all of the following major objectives simultaneously throughout the work-year.

OBJECTIVE 1. Help landowners implement their conservation plans on 127,000 acres of HEL cropland by January 1, 1995, in accordance with the National Food Security Act.

Goal A. Provide technical assistance and cost sharing to install 217,000 feet of terraces by Jan. 1, 1995.

Goal B. Conduct an intensive information and education program to educate landowners to convert 97,000 acres of row crops to conservation tillage by Jan. 1, 1995.

Goal C. Help landowners establish 60,000 acres of new contouring and contour stripcropping by Jan. 1, 1995.

OBJECTIVE 2. Improve the quality of both groundwater and surface water by actively participating in new water quality projects and programs, and by assisting landowners with planning and implementing practices which protect water quality.

Goal A. Identify potential new water quality project watersheds and other areas, the applicable sources of funding for each, and assist with proposals for funds.

Goal B. Provide planning and implementation assistance to help landowners comply with state water quality legislation and local water quality health standards.

Goal C. Encourage proper use of animal wastes, fertilizers, and farm chemicals by providing information/education and technical assistance.

Goal D. Provide individuals, organizations and agencies with soils interpretations, water quality information, and technical assistance related to: sinkholes, landuse near abandoned wells, landfill sites, streambank erosion, livestock access to streams, and wetland identification and management.

Goal E. Encourage application of Best Management Practices (BMP) such as crop rotations, grassed buffer strips, nutrient management, streambank protection, animal waste management, grassed waterways and others to improve water quality.

OBJECTIVE 3. Assist landowners in planning for and adequately treating 5,000 acres of pastureland by Jan. 1, 1995.

Goal A. Provide technical assistance to landowners for establishing or renovating 3,000 acres of pasture by Jan. 1, 1995.

Goal B. Work closely with Cooperative Extension Service specialists to initiate an intensive information and education program on pasture management systems, especially as they relate to conservation compliance.

Goal C. Emphasize sustainable pastureland management when conservation plans are developed or reviewed with district cooperators.

Goal D. Encourage the use of conservation tillage equipment for pasture renovation when the soils are subject to erosion in excess of T value.

Goal E. Assist landusers with implementing grade stabilization structures and waterways to protect pastureland from gully erosion and to provide a source of livestock water.

OBJECTIVE 4. Assist landowners with planning and adequately managing 17,000 acres of woodland and wildlife land by Jan. 1, 1995.

Goal A. Promote the Conservation Reserve Program as a method for protecting soil and water quality and for achieving woodland and wildlife benefits throughout the district.

Goal B. Work with the DNR District Forester and the Cooperative Extension Service on information and education programs which explain the benefits of managing private lands for wildlife and woodland resources.

Goal C. Become actively involved in the REAP program to expand and improve the acreage available as wildlife habitat and woodland within the district.

Goal D. Encourage landowners to develop and implement woodland management plans for their woodlots by requesting technical assistance from their District Forester and other specialists within the DNR Division of Forestry.

Goal E. Provide assistance in planning and establishing 50 farmstead windbreaks by Jan. 1, 1995.

Goal F. Cooperate with the Delaware County Conservation Board, in planning, development, and management of stream corridor areas and other public and private properties for wildlife and woodland.

Goal G. Assist all interested agencies, organizations, and individuals who wish to establish or improve wildlife habitat within the district.

Goal H. Use the Food Security Act to effectively communicate to landowners the value of protecting and managing all wetland areas within the district.

Goal I. Work to protect fragile and unique areas which would be better managed and preserved under alternative landuses, such as for wildlife or woodland.

OBJECTIVE 5. Assist landowners in treating 120,000 acres of non-HEL cropland to reduce soil losses to acceptable levels.

Goal A. Provide field checks of crop residues and other forms of technical assistance to expand the use of conservation tillage on NHEL cropland.

Goal B. Focus intensive information and education programs on promoting additional conservation practices on NHEL acres.

Goal C. Provide assistance to landowners in establishing contours, grass waterways, contour strip cropping, and field borders on NHEL acres.

Goal D. Provide technical assistance on no-till and ridge-till farming operations wherever requested within the district.

OBJECTIVE 6. Encourage proper landuse and management throughout the SWCD.

Goal A. Inform landusers on proper management of fragile soil types within the county and provide technical assistance for alternative land uses to protect the district's resources.

Goal B. Identify and maintain prime farmland acres for maximum cropland potential.

Goal C. Encourage and assist county supervisors with proper land use programs such as county zoning and county ordinances for the protection of county resources.

Goal D. Support the county conservation board in identifying and protecting critical resource areas in the county.

X. STATEMENT OF ADOPTION

We, the Commissioners of Delaware Soil and Water
Conservation District, adopt this program on the
8th day of May, 1991.

Maurin Calender

Chairman

Daniel Eibey

Larry E. Kipper

Arnold Lucken

Joe McGraw

Commissioners

XI. STATEMENT OF APPROVAL

This plan of the Delaware Soil and Water Conservation District was reviewed and approved by the Iowa Department of Agriculture and Land Stewardship, Division of Soil Conservation on June 25, 1991.

J. B. Chelf

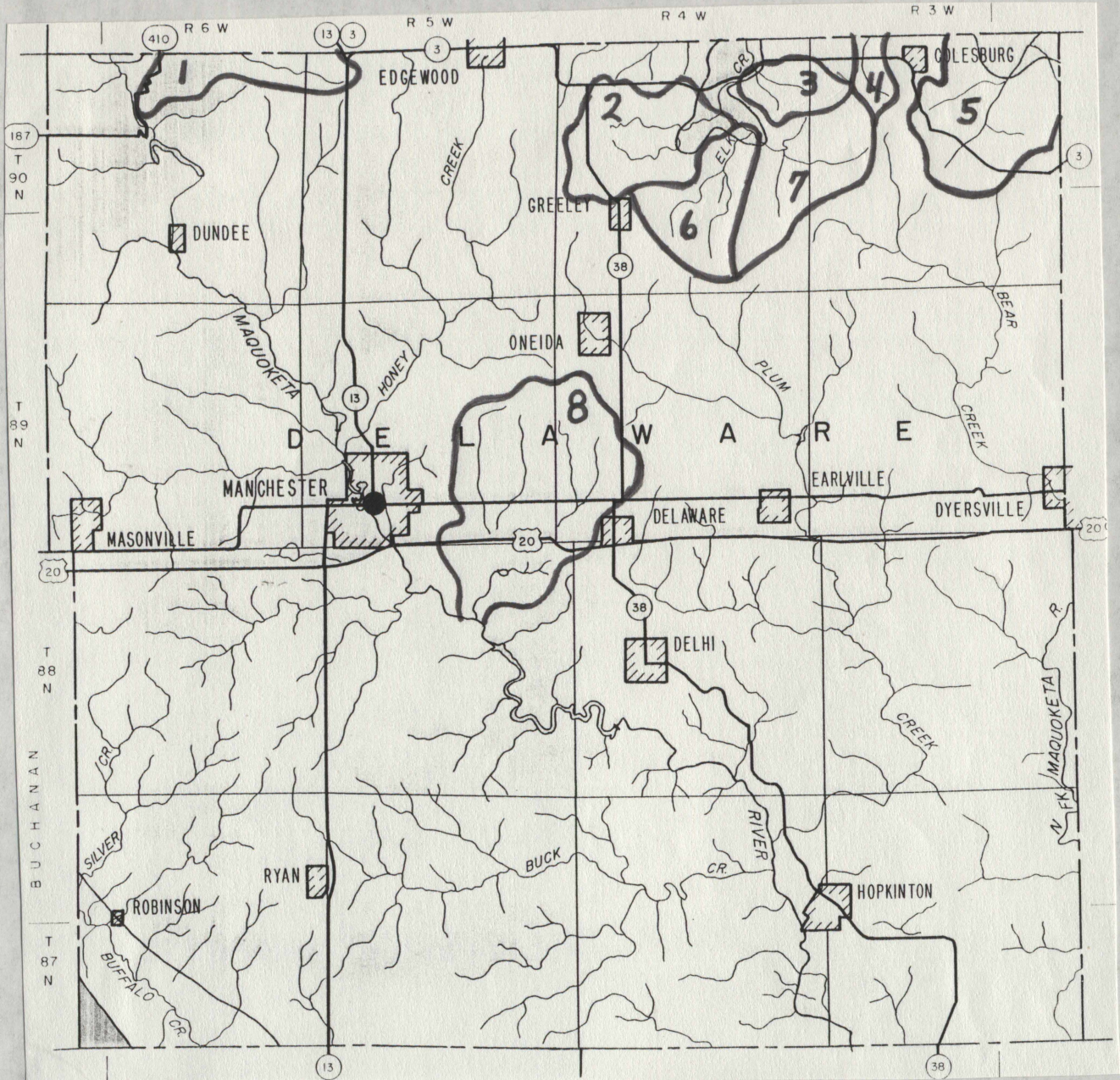
Director

Division of Soil Conservation,
Iowa Department of Agriculture
and Land Stewardship

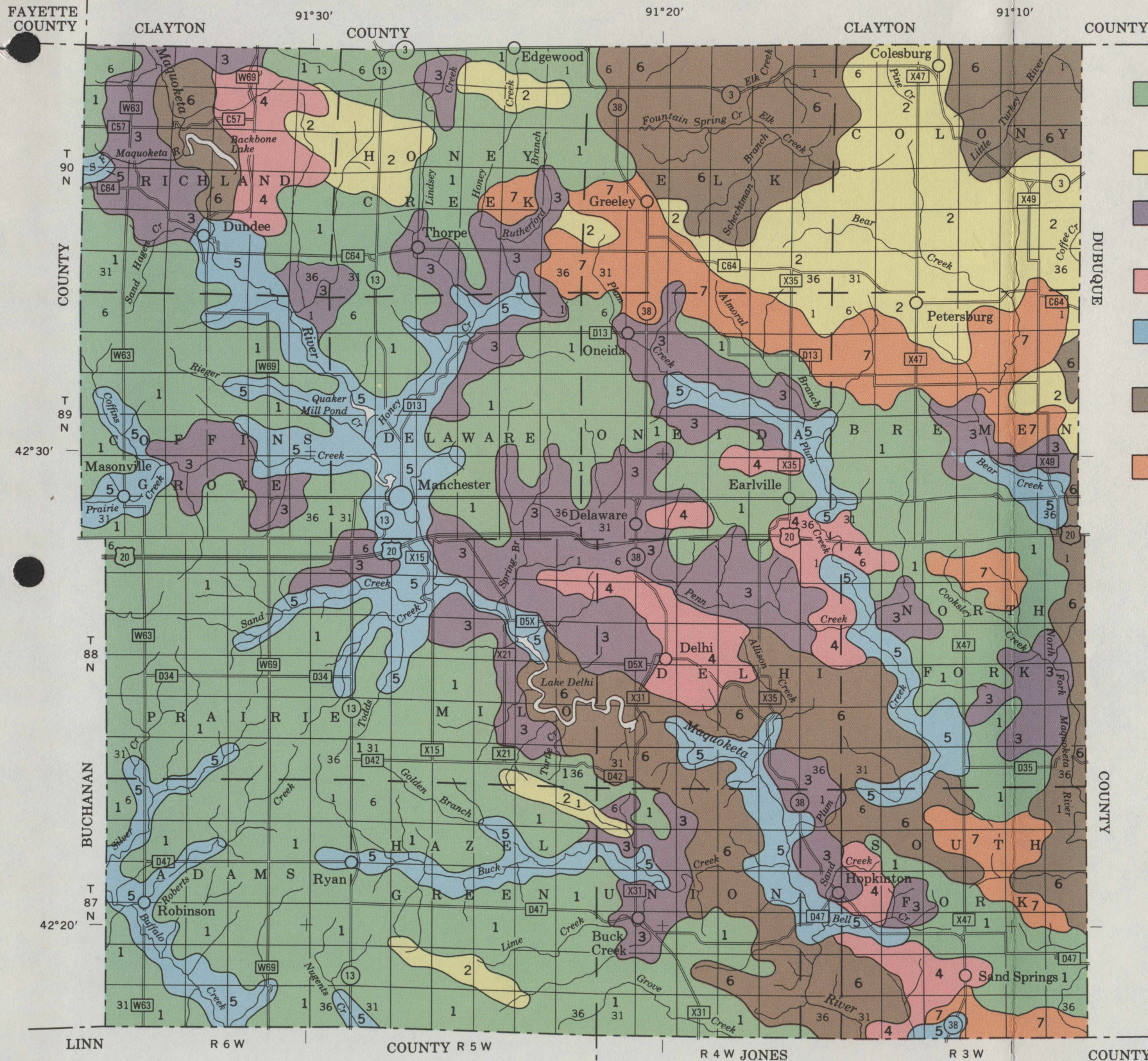
XII. APPENDIX

The map shows the Klamath River watershed, with the river flowing from the top left towards the bottom right. The river is labeled with numbers 1 through 56, indicating specific locations or points of interest. Key tributaries include the Klamath River, the Rogue River, and the Rogue River. The map is oriented with North at the top.

DELAWARE COUNTY PRIORITY WATERSHEDS



1. Fenchel Creek - Class B (Coldwater)
2. Fountain Springs Creek - Class B (Coldwater)
Designated Priority Watershed Project (REAP Funds)
3. Spring Falls - Class B (Coldwater)
4. Brownfield Creek
5. Little Turkey River - Class B (Coldwater)
ACP-LTA Water Quality Special Project Watershed
6. Schechtman Branch - Class B (Coldwater)
7. Elk Creek - Class B (Warmwater)
8. Spring Branch - Class B (Coldwater)



LEGEND

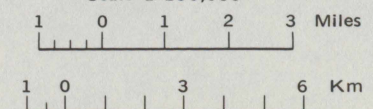
- 1 KENYON-CLYDE-FLOYD association: Nearly level to moderately sloping, moderately well drained to poorly drained soil formed in loamy sediments and in the underlying glacial till; on uplands
- 2 DOWNS-FAYETTE association: Gently sloping to moderately steep, well drained soils formed in loess; on uplands
- 3 NORDNESS-BACKBONE-BASSETT association: Gently sloping to steep, well drained and moderately well drained soils formed in loess or loamy sediments and in the underlying glacial till or limestone residuum; on uplands
- 4 FAYETTE-CHELSEA association: Gently sloping to steep, well drained and excessively drained soils formed in loess and eolian sand; on uplands and alluvial terraces
- 5 SPILLVILLE-SAUDE-MARSHAN association: Nearly level to gently sloping, well drained to poorly drained soils formed in loamy alluvium or in loamy material underlain by sand and gravel; on bottom land and alluvial terraces
- 6 FAYETTE-NORDNESS-ROCK OUTCROP association: Rock outcrop and moderately sloping to very steep, well drained soils formed in loess or in loess and the underlying limestone residuum; on uplands
- 7 DINSDALE-SAWMILL-TAMA association: Very gently sloping to moderately sloping, well drained and poorly drained soils formed in loess, in loess and the underlying glacial till, or in silty alluvium; on uplands

Compiled 1984

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
COOPERATIVE EXTENSION SERVICE, IOWA STATE UNIVERSITY
DEPARTMENT OF SOIL CONSERVATION, STATE OF IOWA

GENERAL SOIL MAP DELAWARE COUNTY, IOWA

Scale 1:190,080



SECTIONALIZED TOWNSHIP											
6	5	4	3	2	1						
7	8	9	10	11	12						
18	17	16	15	14	13						
19	20	21	22	23	24						
30	29	28	27	26	25						
31	32	33	34	35	36						

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

Do-2

NOTICE OF FILING OF
SOIL AND WATER RESOURCE CONSERVATION PLAN

Delaware Soil and Water Conservation District
Soil and Water Resource Conservation Plan

DELAWARE COUNTY SOIL AND WATER CONSERVATION DISTRICT

SOIL AND WATER RESOURCE CONSERVATION PLAN

MAY 1991

YOU ARE HEREBY NOTIFIED that the Delaware Soil and Water Conservation District has adopted a soil and water resource conservation plan which was approved by the State Soil Conservation Committee and signed by the director of the division of Soil Conservation on June 25, 1991. The plan is available for your inspection during normal business hours, Monday - Friday, 8:00 a.m. - 4:00 p.m., at the district office located at 909 W. Main in Manchester, Iowa. This notice is given pursuant to the requirements of Iowa Code section 467A.7(20)(b)(1991), and House File 2112, 74th G.A., 2nd Sess., Section 1 (Iowa 1992), or as subsequently amended.

STATE OF IOWA

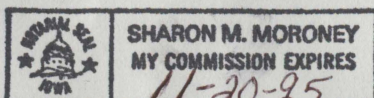
}SS

COUNTY OF DELAWARE

Marvin C. Calonder
Marvin C Calonder

On this 29th day of October, 1993, before me, a Notary Public for the State of Iowa, personally appeared Marvin Calonder, to me personally know, who being by me duly sworn did say that he is the chairperson of the Delaware Soil and Water Conservation District (District), that no seal has been procured by the District, that said instrument was signed on behalf of the District, and Marvin Calonder acknowledged execution of said instrument to be the voluntary act and deed of said District, by it voluntarily executed.

IN WITNESS WHEREOF, I have hereunto signed my name and affixed my Nortarial Seal, the day and year above written.



Sharon M. Moroney
NOTARY PUBLIC in and for the State of Iowa

FILE No. 329-1322

RECORDING FEE \$ 6.00

TRANSFER FEE \$ _____

FILED FOR RECORD THE 29 DAY OF Oct, 1993 AT 11:57
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STATE OF IOWA, DELAWARE COUNTY
Deborah L. Peyton, Recorder
Misc.

329-1322
DELAWARE COUNTY IOWA
FILED

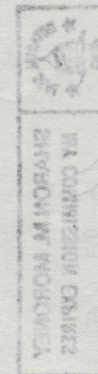
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RECORDER
\$6.00

Delaware Soil & Water
Conservation District

To

Public of Delaware County



8347

09/06/93

Manly C. Gentry
Manly C. Gentry



Soil & Water Conservation District
909 W Main
Manchester, IA 52057