The Iowa River - Lower Rapid Watershed Assessment (RWA) provides initial estimates of where conservation investments would best address the resource concerns of landowners, conservation districts, and other community organizations and stakeholders. These assessments help landowners and local leaders set priorities and determine the best actions to achieve their goals to conserve and improve soil and water resources.

The Iowa River - Lower 8-Digit Hydrologic Unit Code (HUC) watershed contains 1,078,335 acres (1). 23.1 percent of the watershed is in Johnson County, 21.6 percent in Iowa County, 18.6 percent in Louisa County, 17.3 percent in Washington County, 11.0 percent in Poweshiek County, 5.7 percent in Keokuk County, 1.4 percent in Des Moines County, 1.2 percent in Muscatine County and less than one percent is split between Mahaska and Henry counties (1). Ninety-three percent of the watershed is privately owned agricultural land, 3 percent in municipal areas, 3 percent in rural road R.O.W.s, and the remaining 1.0 percent is split between public areas and unincorporated areas (2).

Fifty-five percent of the watershed is in row crop production, 26.2 percent is pasture or hay land, 9.2 percent is developed urban land use, 8.4 percent is woodland or natural areas, and 1.2 percent is split between water and wetlands (3). Elevations range from 513 feet to 1015 feet (4). The average watershed slope is 4.6 percent (5). The primary Land Capability Class in the watershed is class 2. The Land Capability Class (LCC) breakdown for the watershed is: 8.7 percent in class 1; 38.8 percent in class 2; 31.6 percent in class 3; 10.6 percent in class 4; 1.4 percent in class 5; 5.2 percent in class 6; and the remaining 3.7 percent is split between class 7, class 8, and miscellaneous soils (6). Rainfall ranges from 35 to 37 inches per year (7). The HUC includes two interstate highways (80 and 380), five US highways (6, 61, 63, 218, 151), and ten state highways (1, 21, 22, 27, 70, 78, 85, 92, 146, 149) (8).

Conservation assistance is provided by ten Soil and Water Conservation Districts (SWCD) and Natural Resources Conservation Service (NRCS) field offices located in Burlington, Mt. Pleasant, Williamsburg, Iowa City, Sigourney, Wapello, Oskaloosa, Muscatine, Malcom, and Washington. An office locator is found at http://offices.sc.egov.usda.gov/locator/app

The Iowa River - Lower HUC includes 77 NRCS conservation easements totaling 10,537.2 acres. The easements include the Emergency Watershed Protection (EWP) program, Wetlands Reserve Program (WRP), and the Emergency Wetlands Reserve Program (EWRP). Sixty six percent of the easements are in Louisa County, 12 percent in Johnson County, 9 percent in Iowa County, 9 percent in Washington County, and the remaining 4 percent in Des Moines, Keokuk and Muscatine Counties (9).

The United States Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA’s TARGET Center at 202-720-2600 (voice and TDD). To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-9410 or call 202-720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.
Physical Description

Iowa Rapid Watershed Assessment
Iowa River, Lower Watershed - Location Map

Data Source: Project Area based on USDA-NRCS
Watershed Boundary Dataset, 2000

Total Area in Watershed: 1,078,335 Acres

<table>
<thead>
<tr>
<th>County</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Des Moines</td>
<td>15,131</td>
<td>1.4%</td>
</tr>
<tr>
<td>Henry</td>
<td>15</td>
<td>0.0%</td>
</tr>
<tr>
<td>Iowa</td>
<td>232,586</td>
<td>24.0%</td>
</tr>
<tr>
<td>Johnson</td>
<td>249,046</td>
<td>23.1%</td>
</tr>
<tr>
<td>Keokuk</td>
<td>61,140</td>
<td>5.7%</td>
</tr>
<tr>
<td>Louisa</td>
<td>200,271</td>
<td>18.6%</td>
</tr>
<tr>
<td>Mahaska</td>
<td>1,138</td>
<td>0.1%</td>
</tr>
<tr>
<td>Muscatine</td>
<td>15,476</td>
<td>1.4%</td>
</tr>
<tr>
<td>Poweshiek</td>
<td>116,391</td>
<td>10.8%</td>
</tr>
<tr>
<td>Washington</td>
<td>186,254</td>
<td>17.3%</td>
</tr>
</tbody>
</table>

Legend
ESRI Highway Iowa

- Interstate
- State
- City/Town in Iowa
- Iowa River, Lower Basin

USDA-NRCS GIS Staff
Des Moines, IA May 2010
Physical Description (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower Watershed - Percent Slope

Legend

- Iowa River, Lower Drain
- State Boundary
- County Boundary
- Major Rivers/Streams

<table>
<thead>
<tr>
<th>County</th>
<th>Mean Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Des Moines</td>
<td>2.9%</td>
</tr>
<tr>
<td>Henry</td>
<td>6.3%</td>
</tr>
<tr>
<td>Iowa</td>
<td>5.3%</td>
</tr>
<tr>
<td>Johnson</td>
<td>4.7%</td>
</tr>
<tr>
<td>Keokuk</td>
<td>4.0%</td>
</tr>
<tr>
<td>Louisa</td>
<td>4.4%</td>
</tr>
<tr>
<td>Mahaska</td>
<td>3.8%</td>
</tr>
<tr>
<td>Muscatine</td>
<td>3.3%</td>
</tr>
<tr>
<td>Poweshiek</td>
<td>5.6%</td>
</tr>
<tr>
<td>Washington</td>
<td>4.0%</td>
</tr>
</tbody>
</table>

Data Source: USGS Digital Elevation Model (30M DEM)
Average Watershed Slope: 4.5%
Slope Calculations Done Using ArcMap Spatial Analyst Tools
Physical Description (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower - Annual Precipitation

Legend:
- State Boundary
- County Boundary
- Major Rivers/Streams

Precipitation (In. per year)
RANGE
- 35
- 37
- Iowa River, Lower Basin

Data Source: National Climatic Data Center (NCDC)
Average Rainfall (Inches) from 1951 - 2000

0 5 10 15 20 25 30 Miles

Physical Description (continued)

Iowa River, Lower – 07080209
8-Digit Hydrologic Unit Profile

Iowa

September 2011
Iowa River, Lower – 07080209
8-Digit Hydrologic Unit Profile

Physical Description (continued)

Iowa Rapid Watershed Assessment
Lower Iowa River - Alluvial Landform/Floodplain Map

This coverage maps alluvial deposits throughout Iowa. This generally would include areas of alluvial soils associated with modern streams that are identified on 1:100,000 scale county topographic maps. However, it also includes areas associated with glacial outwash streams from Wisconsin-age glaciers. Both loess-covered and non-loess-covered stream erases and benches are included as alluvial deposits. In general, these deposits would outline alluvial aquifers, although in some areas the sand and gravel may be thin or unsaturated. Mapping was done on 1:100,000 county maps using the modern county soil survey. In some instances, 1:24,000 topographic maps were used where the interpreter felt it useful. The Des Moines Lobe area was all mapped with the aid of 1:24,000 maps.

Data Source: Digital data set was developed by the Iowa Department of Natural Resources. Data created by Bernard Hoyer, 2/01/1991.

Legend
- State Boundary
- County Boundary
- Alluvial Landform Data Set
- Cities/Towns - Lower Iowa
- Lower Iowa River Basin

COUNTY | Acres
---------|--------
Des Moines | 340
Iowa | 30,094
Johnson | 74,978
Keokuk | 10,258
Louisa | 87,128
Mahaska | 210
Muscatine | 9,044
Poweshiek | 10,864
Washington | 40,518
Total | 263,432

0 5 10 20 30 40 Miles
Physical Description (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower - Percent Hydric Components

Data Source: Iowa USDA-NRCS Soil Survey
Des Moines, Iowa, March 2010, Summarized data from individual County SSURGO data sets.

<table>
<thead>
<tr>
<th>% Hydric Components</th>
<th>Acres</th>
<th>% of Watershed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>574,190</td>
<td>53.2%</td>
</tr>
<tr>
<td>1 - 10%</td>
<td>257,280</td>
<td>23.5%</td>
</tr>
<tr>
<td>11 - 35%</td>
<td>9,097</td>
<td>0.8%</td>
</tr>
<tr>
<td>36 - 46%</td>
<td>8,097</td>
<td>0.8%</td>
</tr>
<tr>
<td>47 - 60%</td>
<td>58,033</td>
<td>5.4%</td>
</tr>
<tr>
<td>61 - 90%</td>
<td>26,077</td>
<td>2.5%</td>
</tr>
<tr>
<td>91 - 100%</td>
<td>144,215</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

Legend

- State Boundary
- County Boundary
- Iowa River Boundary
- Iowa River, Lower, Basin
- 0%
- 1 - 10%
- 11 - 35%
- 36 - 40%
- 41 - 60%
- 61 - 90%
- 91 - 100%

USDA-NRCS GIS Staff
Des Moines, IA, June 2010
Physical Description (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower - Drainage Districts

Data Source: Iowa Geologic Survey Bureau - IDNR.
Data from county based drainage maps, February, 2005.

Legend

<table>
<thead>
<tr>
<th>County</th>
<th>No. of Sections</th>
<th>Total Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louisa</td>
<td>46</td>
<td>234,406</td>
</tr>
<tr>
<td>Washington</td>
<td>15</td>
<td>45,813</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>County</th>
<th>No. of Districts</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louisa</td>
<td>6</td>
<td>1,928.9</td>
</tr>
<tr>
<td>Washington</td>
<td>3</td>
<td>117</td>
</tr>
</tbody>
</table>

G:\geo\data\project_data\nrce\Rapid_Watershed_Assessment\Iowa\Mar08\RWA_District_Map-Iowa.mxd
Physical Description (continued)

Common Resource Areas
The Iowa River - Lower HUC includes portions of three National Common Resource Areas (CRA): 108C.2, 108C.1, and 115C.1. Seventy nine percent of the watershed is in CRA 108C.2, 13.0 percent in 108C.1, and 8.0 percent in 115C.1 (12).

The CRAs delineated below for the Iowa River - Lower HUC are described on the next page (for additional information, see http://soils.usda.gov/survey/geography/cra.html). A CRA is defined as a geographical area where resource concerns, problems, or treatment needs are similar. It is considered a subdivision of an existing Major Land Resource Area (MLRA) map delineation or polygon. Landscape conditions, soil, climate, human considerations, and other natural resource information are used to determine the geographic boundaries of a CRA (12) (General Manual Title 450, Subpart C, §401.21).
Physical Description (continued)

Common Resource Area Descriptions (12)

The National Coordinated CRA Geographic Database provides:

- A consistent CRA geographic database;
- CRA geographic data compatible with other GIS data digitized from 1:250,000 scale maps, such as land use/land cover, political boundaries, Digital General Soil Map of the U.S. (updated STATSGO), and ecoregion boundaries;
- A consistent (correlated) geographic index for Conservation Management Guide Sheet information and the eFOTG;
- A geographic linkage with the national MLRA framework.

108C.2 - Iowa River Loess and Till

This area consists of silty soils on ridge tops and highly dissected side slopes with drainage ways and streams. Glacial till soils dominate the steeper side slopes. Native vegetation was prairie on the ride tops with thin bands of timber in the valleys and ravines. Common crops are corn and soybeans with some hay. Swine and poultry operations are numerous. Resource concerns are soil erosion, soil quality, nutrient management, water quality, and wildlife habitat.

108C.1 – Iowa River Loess and Till

This area consists of silty soils on ridge tops and highly dissected side slopes with drainage ways and streams. Glacial till soils dominate the steeper side slopes. Native vegetation was prairie on the ride tops with thin bands of timber in the valleys and ravines. Common crops are corn and soybeans with some hay. Swine and poultry operations are numerous. Resource concerns are soil erosion, soil quality, nutrient management, water quality, and wildlife habitat.

115C.1 – Central Mississippi Valley Wooded Slopes

Mississippi and lower Iowa River valleys and adjacent slopes. Low areas consist of the nearly level flood plains and terraces. The Corps of Engineers maintains a levee along the Mississippi River. Adjacent uplands consist of loess hills with moderately steep to very steep side slopes and narrow to moderately wide gently sloping to moderately sloping ridgetops. Low areas are composed of poorly drained to well drained silty, clayey and loamy alluvial and outwash deposits. Corn and soybeans are the major crops. Upland areas consist of well drained to somewhat poorly drained light colored soils. Hardwood forest dominates the upland side slopes. Livestock and grain farming are dominant in the less sloping upland areas. Urban growth is evident in the area around the Quad Cities.
Physical Description (continued)

Geology, Geomorphology & Soils

This drainage area consists of the southern (lower) portion of the Iowa River watershed. The English River is a major tributary, draining roughly one third of the RWA area from the west. Other large tributaries, also from the west and southwest, include Old Mans Creek, Clear Creek, and Long Creek. Soils and landforms of the watershed formed in deposits laid down by ice and water over the last two million years during the Pleistocene and Holocene Epochs. The thickness of these unconsolidated deposits above the Paleozoic bedrock ranges from less than 25 feet in southeastern portions of the watershed to more than 300 feet in the northwest. Surface elevations from the head to the mouth of the watershed range from about 1,010 to 530 feet above sea level.

The bedrock consists predominantly of Late Devonian shale, siltstone, and dolomite. Areas of older Devonian dolomite and limestone occur along the eastern edge of the watershed area. Younger dolomite and limestone of Mississippian age, and small outliers of Pennsylvanian shale and sandstone, occur along the southern edge of the watershed area. Several sinkholes are known to exist in the carbonate rocks in Louisa County. Bedrock exposures in the watershed are uncommon, however, and quarries are limited to a few in Johnson and Louisa counties.

The landscape of the Iowa River – Lower RWA area falls into two of Iowa’s seven physiographic provinces (landform regions). Most of the watershed, including the entire western half, is in the Southern Iowa Drift Plain. Here, windblown silty loess several feet thick blankets an old glacial surface composed of thick, dense Pre-Illinioan till deposited beneath a few thousand feet of ice at least a half million years ago. The landscape is steeply rolling and highly dissected by a well-established, dendritic drainage network. Channels carved deeply into the land surface have since been partially filled by Holocene alluvial sediments of the DeForest Formation. Between valleys, tabular upland divides represent the highest and oldest areas of land, remnants that have experienced little erosion since the till was deposited.

In the lower half of the drainage area, the alluvial valley of the Iowa River is the dominant physiographic feature. The bottomland ranges from two to four miles in width and is nearly level. In Louisa County, the river valley is bordered on both sides by gently undulating upland plains. The western plain is underlain by loess over Pre-Illinoian till. The eastern plain is partially covered by sand dunes and terminates in high steep bluffs that border the wide alluvial valley of the Mississippi River.

Soils on the uplands are moderately drained to well-drained and consist mainly of silt loam and silty clay loam soils formed in loess (Tama, Downs, Ladoga, etc.) or thin loess over till (Dinsdale, Kenyon). Loam and clay loam soils that developed in glacial till are found on strongly sloping hillsides (Shelby, Gara). Loess-derived silt loam and silty clay loam soils (Colo, Nodaway, Lawson, etc.) dominate in the Iowa River valley, and range from poorly drained to well-drained. Very well-drained Sparta and Chelsea soils occur on stream terraces and wind-deposited sands on uplands in the eastern part of the watershed area. (30)
Physical Description (continued)

Soil Loss

Water erosion (sheet and rill) from cropland accounts for nearly 90 percent of Iowa’s soil erosion. In Iowa, there has been a steady decline in sheet and rill erosion from 1982 to 1997, but on average soil erosion remains above the sustainable levels. In order to maintain sustainable levels of soil stability, soil erosion should not exceed the soil “T” value. The “T” value ranges from 1 ton/acre/year to 5 tons/acre/year.

National Resource Inventory (NRI) estimates for sheet and rill erosion by water (USLE) on cropland and pastureland decreased by approximately 4,050,700 tons (48 percent) of soil loss between 1982 and 1997. NRCS estimates indicate wind erosion rates (WEQ) decreased by 188,900 tons (98.9 percent) between 1982 and 1997. The standard error for the USLE estimate is 367,945 tons for 1997 (USLE) and 654,996 tons for 1982 (USLE). The standard error for the WEQ estimate is 1,229 tons for 1997 (WEQ) and 47,315 tons for 1982 (WEQ). The margin of error at the 95% confidence limit is obtained by multiplying the standard error by 1.96 (18).
Water Quality

Under Section 303(d) of the Clean Water Act, states are required from "time to time" to submit a list of waters for which effluent limits will not be sufficient to meet all state water quality standards. EPA has defined "time to time" to mean April 1 of even numbered years. The failure to meet water quality standards might be due to an individual pollutant, multiple pollutants, "pollution," or an unknown cause of impairment. The 303(d) listing process includes waters impaired by point sources and nonpoint sources of pollutants. States must also establish a priority ranking for the listed waters, taking into account the severity of pollution and uses. The EPA regulations that govern 303(d) listing can be found in the Code of Federal Regulations 40 CFR 130.7.

The Iowa Department of Natural Resources compiles this impaired water list, or 303(d) listing. The 303(d) listing is composed of those lakes, wetlands, streams, rivers, and portions of rivers that do not meet all state water quality standards. These are considered "impaired water bodies" and states are required to calculate total maximum daily loads (TMDLs) for pollutants causing impairments (19).

Bacteria, nutrients, and biological pollutants and their affects are the major pollutants impacting surface waters of the Iowa River – Lower Watershed. Surface waters, especially lakes and ponds, have a repeated history of algal blooms. A variety of human activities contribute directly to pollutant loads in the water bodies, including intensive row crop agriculture; urban storm runoff; failing septic systems; and Confined Animal Feeding Operations (CAFOs). The change in hydrology due to stream channel straightening, subsurface drainage systems, wetland destruction, and lack of perennial groundcover has resulted in flashy stream flows, thus contributing to stream down cutting and increased stream bank instability.

Conservation practices that can be used to address these water quality issues include erosion control structures, residue management, nutrient management, riparian buffers, drainage control structures, wetland restoration, urban Best Management Practices (BMPs), and improved septic systems.

For more information on water quality and the Iowa Department of Natural Resources (IDNR) Water Quality Index, go to the following website (20):
http://www.igsb.uiowa.edu/wqm/Data/WQI/WQI.htm

For more information on water quality and IDNR’s Regional Watershed Assessment Tool go to the following website: http://programs.iowadnr.gov/iowawaterweb/rwa.aspx

This assessment tool should be beneficial to watershed stakeholders who are interested in improving water resources at the watershed scale. The first DNR regional watershed assessment covers nutrients. Assessments of other issue areas will follow as they are developed. Note that the text for each HUC-8 assessment is the same, but the data, charts, and maps provided are specific to the individual watershed. For locating the watershed on the website type the watershed name in the “For” box and click on Go. This website is a work in progress so not all watersheds and issue areas are completed yet.
### Water Quality (continued)

#### Water Quality Concerns Data Graph/Table (19)

<table>
<thead>
<tr>
<th>Impaired Water Bodies</th>
<th>Fish Kill</th>
<th>pH</th>
<th>Biological</th>
<th>Bacteria</th>
<th>Nutrients</th>
<th>Turbidity</th>
<th>Sewage</th>
<th>Priority Organics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Creek (IA 02-IOW-0161_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>English River (IA 02-IOW-0100_1)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honey Creek (IA 02-IOW-0093_0)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa Lake (IA 02-IOW-01150-L_0)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muddy Creek (IA 02-IOW-0162_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Iowa River (IA 02-IOW-0030_1)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa River (IA 02-IOW-0020_1)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa River (IA 02-IOW-0020_2)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iowa River (IA 02-IOW-0010_3)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Impaired Water Bodies</td>
<td>Fish Kill</td>
<td>pH</td>
<td>Biological</td>
<td>Bacteria</td>
<td>Nutrients</td>
<td>Turbidity</td>
<td>Sewage</td>
<td>Priority Organics</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-----------</td>
<td>----</td>
<td>------------</td>
<td>----------</td>
<td>-----------</td>
<td>-----------</td>
<td>--------</td>
<td>-------------------</td>
</tr>
<tr>
<td>Kent Park Lake (IA 02-IOW-01630-L_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Mans Creek (IA 02-IOW-0150_1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old Mans Creek (IA 02-IOW-0150_2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Otter Creek (IA 02-IOW-0086_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ralston Creek (IA 02-IOW-0155_1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Creek (IA 02-IOW-0450_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnamed tributary to Clear Creek (IA 02-IOW-01615_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unnamed Tributary to Short Creek (IA 02-IOW-0451_0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The schedule for TMDL development can be found at: [http://www.iowadnr.gov/Environment/WaterQuality/WatershedImprovement/WatershedResearchData/WaterImprovementPlans/PlanSchedule.aspx](http://www.iowadnr.gov/Environment/WaterQuality/WatershedImprovement/WatershedResearchData/WaterImprovementPlans/PlanSchedule.aspx)
## Water Quality (continued)

<table>
<thead>
<tr>
<th>Watershed Projects, Plans, Studies, and Assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Iowa Watershed Improvement Review Board (WIRB) Projects (31)</strong></td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td><em><em>Water Quality Improvement Projects</em> (33)</em>*</td>
</tr>
<tr>
<td>Chinkapin Bluffs Water Quality Improvement and Flood Reduction</td>
</tr>
<tr>
<td>Louisa County (Active)</td>
</tr>
<tr>
<td><strong>Bonus for Trees Project</strong></td>
</tr>
<tr>
<td>Des Moines County (Completed)</td>
</tr>
<tr>
<td><strong>Johnson County Urban Water Quality Project</strong></td>
</tr>
<tr>
<td>Johnson County (Completed)</td>
</tr>
<tr>
<td><strong>Johnson County Urban Conservationist Project</strong></td>
</tr>
<tr>
<td>Johnson County (Active)</td>
</tr>
<tr>
<td><strong>Iowa Lake Water Quality Project</strong></td>
</tr>
<tr>
<td>Iowa County (Completed)</td>
</tr>
<tr>
<td><strong>Kent Park Lake Renovation &amp; Water Quality Project</strong></td>
</tr>
<tr>
<td>Johnson County (Completed)</td>
</tr>
<tr>
<td><strong>Deer Creek and North Branch Sub-sheds of Clear Creek</strong></td>
</tr>
<tr>
<td>Johnson County (Active)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

* Listing includes past efforts in the watershed, and ongoing studies and assessments. Projects funded through the following programs: Water Quality Protection Fund, Watershed Protection Fund, and IDNR 319 Program
Water Quality (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower - 100' Stream Buffer Landuse

Data Sources: National Ag Statistics 2008
Total Buffeted Area: 56,046 Ac.

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developed - Urban</td>
<td>3,793</td>
<td>6.8%</td>
</tr>
<tr>
<td>Hayland</td>
<td>147</td>
<td>0.3%</td>
</tr>
<tr>
<td>Pastureland</td>
<td>18,252</td>
<td>32.6%</td>
</tr>
<tr>
<td>Row Crop</td>
<td>18,702</td>
<td>33.4%</td>
</tr>
<tr>
<td>Water</td>
<td>1,909</td>
<td>3.5%</td>
</tr>
<tr>
<td>Wetland</td>
<td>342</td>
<td>0.6%</td>
</tr>
<tr>
<td>Woodland - Natural Areas</td>
<td>12,924</td>
<td>22.8%</td>
</tr>
</tbody>
</table>

Legend
- State Boundary
- County Boundary
- Iowa River, Lower, Basin
- 100' Buffer Landuse
- Developed - Urban
- Hayland
- Pastureland
- Row Crop
- Water
- Wetland
- Woodland - Natural Areas
### Threatened and Endangered Species *(17,34)*

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>State</th>
<th>Federal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henslow's Sparrow <em>(Ammodramus henslowii)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Arogos Skipper <em>(Atrytone arogos)</em></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Wood Turtle <em>(Clemmys insculpta)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Blanding's Turtle <em>(Emydoidea blandingii)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Grass Pickerel <em>(Esox americanus)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Orangethroat Darter <em>(Etheostoma spectabile)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Baltimore Checkerspot <em>(Euphydryas phaeton)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Bald Eagle <em>(Haliaeetus leucocephalus)</em></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Yellow Sandshell <em>(Lampsilis teres)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Smooth Green Snake <em>(Liochlorophis vernalis)</em></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Indiana Bat <em>(Myotis sodalis)</em></td>
<td>E</td>
<td>E</td>
</tr>
<tr>
<td>Copperbelly Water Snake <em>(Nerodia erythrogaster neglecta)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Freckled Madtom <em>(Notorus nocturnus)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Sheepnose <em>(Plethobasus cyphyus)</em></td>
<td>E</td>
<td>C</td>
</tr>
<tr>
<td>Round Pigtoe <em>(Pleurobema sintroxia)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Fat Pocketbook <em>(Potamilus capax)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Massasauga Rattlesnake <em>(Sistrurus catenatus)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Regal Fritillary <em>(Speyeria idalia)</em></td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Spotted Skunk <em>(Spilogale putorius)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Common Musk Turtle <em>(Sternotherus odoratus)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Creeper <em>(Strophitus undulatus)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Ornate Box Turtle <em>(Terrapene ornata)</em></td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Pistolgrip <em>(Tritogonia verrucosa)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Barn Owl <em>(Tyto alba)</em></td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>SPECIES</td>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td><strong>Plants</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pearly Everlasting (Anaphalis margaritacea)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Broom Sedge (Andropogon virginicus)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Limestone Rockcress (Arabis divaricarpa)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Flat Top White Aster (Aster pubentior)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Sweet Indian Plantain (Cacalia suaveolens)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Low Bindweed (Calystegia spithamaea)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Missouri Lambsquarters (Chenopodium missouriensis)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Hill's Thistle (Cirsium hillii)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Slender Dayflower (Commelina erecta)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Fineberry Hawthorn (Crataegus chrysocarpa)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Slim-leaved Panic Grass (Dichanthelium linearfolium)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Tall Cotton Grass (Eriophorum angustifolium)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Spring Avens (Geum vernum)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Limestone Oak Fern (Gymnocarpium robertianum)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>False Loosestrife (Ludwigia peploides)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Crowfoot Clubmoss (Lycopodium digitatum)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Yellow Monkey Flower (Mimulus glabrus)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Pinesap (Monotropa hypopithys)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Northern Adder's-tongue (Ophioglossum pusillum)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Philadelphia Panic Grass (Panicum philadelphicum)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Pale Green Orchid (Platanthera flava)</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Eastern Prairie Fringed Orchid (Platanthera leucophaea)</td>
<td>E  T</td>
<td></td>
</tr>
<tr>
<td>Chapman Bluegrass (Poa chapmaniana)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Pink Milkwort (Polygala incarnata)</td>
<td>T</td>
<td></td>
</tr>
<tr>
<td>Vasey Pondweed (Potamogeton vaseyi)</td>
<td>S</td>
<td></td>
</tr>
<tr>
<td>Plants</td>
<td>SPECIES</td>
<td>Status</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>Hortulan Plum (Prunus hortulana)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Sand Cherry (Prunus pumila)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Toothcup (Rotala ramosior)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Sage Willow (Salix candida)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Slender Ladies'-tresses (Spiranthes lacera)</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Great Plains Ladies'-tresses (Spiranthes magnicamporum)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Hedge Nettle (Stachys aspera)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Earleaf Foxglove (Tomanthera auriculata)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Virginia Spiderwort (Tradescantia virginiana)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>False Hellebore (Veratrum woodii)</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Cream Violet (Viola striata)</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Frost Grape (Vitis vulpina)</td>
<td></td>
<td>S</td>
</tr>
</tbody>
</table>

E = Endangered Species  
T = Threatened Species  
C = Candidate Species  
S = Special Concern Species
Threatened and Endangered Species

Iowa Natural Areas Inventory Threatened, Endangered, and Special Concern Species
Records by PLSS Section for Lower Iowa HUC 8 07080209
Census and Social Data

There are 4,786 total farm operators in the watershed. Of these, 3,558 are male and 1,228 are female. Eighty-one percent of the farm operators in the watershed are full time farmers (24).

There are 3,251 farms in the Iowa River - Lower Watershed with farm size ranging from one acre to over 1,000 acres. Size of farms: eight percent are 1-10 acres; 20 percent are 10-50 acres; 31 percent are 50-179 acres; 24 percent are 180-499 acres; 11 percent are 500-999 acres; and 6 percent are over 1,000 acres. The Census of Agriculture is authorized under Public Law (PL) 105-113 and uses the definition of a farm as any place from which $1,000 or more of agricultural products are produced and sold, or normally would have been sold, during the census year (24).
### Total Farms By Size Per County

**Iowa River, Lower Watershed**

<table>
<thead>
<tr>
<th>COUNTY</th>
<th>Acres</th>
<th>% of Watershed</th>
<th>1 - 10 Ac</th>
<th>10 - 50 Ac</th>
<th>50 - 179 Ac</th>
<th>180 - 499 Ac</th>
<th>560 - 999 Ac</th>
<th>&gt; 1000 Ac</th>
</tr>
</thead>
<tbody>
<tr>
<td>DES MOINES</td>
<td>15,131</td>
<td>1.4%</td>
<td>3</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>HENRY</td>
<td>19</td>
<td>0.0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>IOWA</td>
<td>232,580</td>
<td>21.6%</td>
<td>59</td>
<td>127</td>
<td>212</td>
<td>201</td>
<td>68</td>
<td>40</td>
</tr>
<tr>
<td>JOHNSON</td>
<td>249,040</td>
<td>23.1%</td>
<td>41</td>
<td>198</td>
<td>295</td>
<td>158</td>
<td>78</td>
<td>39</td>
</tr>
<tr>
<td>KEOKUK</td>
<td>61,440</td>
<td>5.7%</td>
<td>12</td>
<td>33</td>
<td>68</td>
<td>46</td>
<td>24</td>
<td>9</td>
</tr>
<tr>
<td>LOUISA</td>
<td>200,271</td>
<td>18.6%</td>
<td>51</td>
<td>101</td>
<td>156</td>
<td>124</td>
<td>63</td>
<td>31</td>
</tr>
<tr>
<td>MAHASKA</td>
<td>1,138</td>
<td>0.1%</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MUSCATINE</td>
<td>13,470</td>
<td>1.2%</td>
<td>3</td>
<td>9</td>
<td>12</td>
<td>9</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>POWESHEIK</td>
<td>118,991</td>
<td>11.0%</td>
<td>29</td>
<td>61</td>
<td>78</td>
<td>68</td>
<td>36</td>
<td>26</td>
</tr>
<tr>
<td>WASHINGTON</td>
<td>186,254</td>
<td>17.3%</td>
<td>58</td>
<td>118</td>
<td>183</td>
<td>172</td>
<td>85</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,078,334</strong></td>
<td><strong>101.0%</strong></td>
<td><strong>256</strong></td>
<td><strong>656</strong></td>
<td><strong>1,015</strong></td>
<td><strong>787</strong></td>
<td><strong>362</strong></td>
<td><strong>175</strong></td>
</tr>
</tbody>
</table>

Data Source: 2007 National Ag Statistics

County numbers obtained by correlating the percent county which lies within the watershed to determine an estimated number (shown in table).
### NASS Farm Operators Per County
**Iowa River, Lower Watershed**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington</td>
<td>186,254</td>
<td>17.30%</td>
<td>953</td>
<td>223</td>
<td>730</td>
<td>1,043</td>
<td>747</td>
<td>296</td>
</tr>
<tr>
<td>Poweshiek</td>
<td>118,991</td>
<td>11.00%</td>
<td>441</td>
<td>120</td>
<td>322</td>
<td>482</td>
<td>352</td>
<td>129</td>
</tr>
<tr>
<td>Muscatine</td>
<td>13,470</td>
<td>1.20%</td>
<td>58</td>
<td>13</td>
<td>45</td>
<td>63</td>
<td>47</td>
<td>17</td>
</tr>
<tr>
<td>Mahaska</td>
<td>1,138</td>
<td>0.10%</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Louisa</td>
<td>200,271</td>
<td>18.60%</td>
<td>759</td>
<td>202</td>
<td>557</td>
<td>853</td>
<td>622</td>
<td>231</td>
</tr>
<tr>
<td>Keokuk</td>
<td>61,440</td>
<td>5.70%</td>
<td>282</td>
<td>73</td>
<td>209</td>
<td>308</td>
<td>224</td>
<td>85</td>
</tr>
<tr>
<td>Johnson</td>
<td>249,040</td>
<td>23.10%</td>
<td>1,195</td>
<td>306</td>
<td>889</td>
<td>1,319</td>
<td>969</td>
<td>351</td>
</tr>
<tr>
<td>Iowa</td>
<td>232,580</td>
<td>21.60%</td>
<td>1,041</td>
<td>277</td>
<td>763</td>
<td>1,152</td>
<td>846</td>
<td>306</td>
</tr>
<tr>
<td>Henry</td>
<td>19</td>
<td>0.00%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Des Moines</td>
<td>15,131</td>
<td>1.40%</td>
<td>53</td>
<td>13</td>
<td>40</td>
<td>59</td>
<td>43</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1,078,335</td>
<td>100.00%</td>
<td>4,786</td>
<td>1,228</td>
<td>3,558</td>
<td>5,284</td>
<td>3,854</td>
<td>1,431</td>
</tr>
</tbody>
</table>

*Full Time Operators - On Farm Operators > 200 days per year*

**Data Source:** 2007 National Ag Statistics

County numbers obtained by correlating the percent county which lies within the watershed to determine an estimated number (shown in table).

**USDA-NASS Quickstats Query**
- Weblink: http://quickstats.nass.usda.gov/
- Sector: Demographics
- Community: Operators
- Data Item: Operators (All), Operators - Female
- Domain: Total
- Locale: County | State: Iowa | Counties: Select All Year: 2007
**Resource Concerns**

**Resource Concerns by Land Use**

**Pasture (14)**

Typical vegetation consists of introduced cool season species. Predominant grass species are Tall Fescue, Orchard grass, Smooth Brome grass, and possibly Kentucky Bluegrass. Legumes present include White and Red Clover, Birdsfoot Trefoil or Alfalfa. Management regimes are diverse and range from continuous overgrazing to ultra-high density intensively managed grazing systems. Classic gully erosion may be present on abusively grazed areas and are generally follow areas that receive excess surface runoff. Stream bank erosion may be significant where livestock have access to streams and particularly where endophyte infected fescue is the predominant forage causing livestock to spend excessive time cooling in water bodies. In time, undesirable species such as locust and other trees, thistles and other native and non-natives may invade pastures and decrease the productivity of the forage. Soil compaction and disturbance on cattle paths and around water sources can increase soil erosion and create a niche for undesirable plant species. Lack of watering systems is the primary barrier to developing rotational grazing systems.

**Cropland (16, 32)**

Cropland is intensively used, primarily for corn and soybeans production, with a very small amount of oats and meadow as part of a rotation. Corn acres increased in recent years, compared to soybean acres, due to increased grain prices and ethanol plant development. The average slope is 4.6 percent. Predominant resource concerns on cropland include soil erosion (sheet and rill, gully, and wind); soil compaction; soil eutrophication; weed infestation; and decrease in soil carbon. Over-application of nutrients (commercial and manure-based) and pesticides typically does not meet Iowa NRCS standards. In recent years, no-till systems on soybean acres have increased, although no-till on corn acres has decreased.

**Natural Areas/Forestland (35)**

Natural areas in the Iowa River, Lower Watershed consist of a mix of native trees and shrubs. Oaks and hickories dominate dry upland sites and occupy 48% of the forestland. Sugar maple-basswood, is increasing on upland sites due to individual tree selection timber harvesting techniques. Silver maple-cottonwood-American elm-green ash dominates the bottomland/floodplain forest sites. Overall, the health of forests is in relatively good condition, with minimal annual losses to oak wilt, Dutch elm disease and other pathogens. But forests are stressed from severe weather, livestock grazing, invasive species and poor logging practices. Severe weather has been the biggest impact on the health of Iowa’s existing forests from ice storms, early wet heavy snow storms, strong winds/tornadoes and flooding over the last decade that break, blow down, uproot or kill trees. Predominant resource concerns include invasive species, classic gully erosion, habitat fragmentation, increasing homogeneity, and land use conversion to cropland.
Resource Concern Trends

Focus of Past 7 Years of Progress

Efforts in the past seven years have included: promotion of conservation tillage and no-till; promotion of Conservation Reserve Program (CRP) and contract extensions to protect sensitive lands; application of comprehensive nutrient management plans; pest management plans; and water monitoring through IOWATER (Iowa's volunteer water monitoring program).

Urban erosion has created increased natural resource concerns related to soil erosion and water quality. Focus on these issues, especially in areas of substantial development, has resulted in increased technical assistance in the urban arena.

On a statewide basis, increase in ethanol plant manufacturing utilizes crop residues which adversely affects soil quality and increases soil erosion. This creates more of a need for increased conservation efforts.

Resource Concerns that Require Ongoing Attention

Technical assistance and attention will continue regarding soil erosion by water, especially on cropland. Recent increases in grain prices have caused fewer CRP contracts to be renewed, and existing pasture and forestland to be brought into crop production. The loss of pastureland and forestland on highly erodible lands is a trend that has resulted in significant increases in soil erosion, sedimentation, and run off requiring technical assistance (32). Ongoing efforts are needed to increase utilization of conservation tillage, no-till, and contoured buffer strips. Educational activities are needed to promote extension of expiring CRP contracts.

In the Iowa River - Lower Watershed, urban natural resource concerns will be an ongoing issue. Urban Best Management Practices (BMPs) will be implemented and increased education of developers, cities, and urban residents will continue (21).

A resource concern that will draw increasing attention and need for technical assistance in the future is the topic of renewable energy and biomass systems, now a highlight of the current Farm Bill.

In addition, there is increased interest and productivity in agricultural diversification and market support for alternative crops, including specialty and organic crop production, direct and local marketing opportunities, and non-traditional needs for technical assistance. The region has the soils, climate and resources to produce and add value to a wide variety of alternative agriculture crops and products.

Underground storage tanks create resource issues due to storage of substances, primarily petroleum products (25).
Other concerns that will be addressed in the future include the preservation, protection, and enhancement of natural areas, including rare plant and animal species. This will require species inventories and an educational campaign (34).

In the state of Iowa, as of October 2009, there were approximately 57 biofuel plants that are in operation or under construction. At this time, there is one bio diesel plant that is in operation in the Iowa River - Lower Watershed, located in the City of Washington, in Washington County. It is reported that 2 - 4 gallons of water is required for every gallon of biofuel produced, creating a concern about water quantity (26).

Water quality concerns are increased by manure from livestock that is commonly spread on cropland as fertilizer. Using manure as a fertilizer creates potential water quality challenges from bacteria and nutrients delivered through runoff and subsurface drainage. Steam bank erosion in the region has been related to livestock overgrazing of the stream and river banks (15).

The primary natural resource concerns with animal feeding operations are water and air pollution. Manure contains the nutrients nitrogen and phosphorus, which, when not managed properly on agricultural land, can pollute nearby streams, lakes, and other waters. EPA’s regulation of Animal Feeding Operations (AFOs) and Confined Animal Feeding Operations (CAFOs) provide pollution prevention and environmental protection, while maintaining the country’s economic and agricultural competitiveness (27). There are 247 Confined Animal Feeding Operations (CAFO) in the watershed, with a total of 229,033 animal units. Eighty-three percent of the CAFOs are swine and the remaining 17 percent are split between swine-cattle operations, poultry, and cattle (28). There are 32 Animal Feeding Operations (AFO) in the watershed, with a total number of 5,513 animal units. Fifty-six percent of the AFOs are cattle, 13 percent swine, and 31 percent are split between a mixture of poultry, horse, swine, and cattle operations (29).
Iowa Rapid Watershed Assessment
Iowa River, Lower - Confined Animal Feeding Operations

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of Facilities</th>
<th>Total Registered AU*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>3</td>
<td>1,000</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Poultry</td>
<td>7</td>
<td>7,914.7</td>
</tr>
<tr>
<td>Swine</td>
<td>205</td>
<td>218,944.2</td>
</tr>
<tr>
<td>Swine &amp; Cattle</td>
<td>1</td>
<td>172</td>
</tr>
<tr>
<td>Swine &amp; Poultry</td>
<td>2</td>
<td>82.6</td>
</tr>
</tbody>
</table>

*Animal Units (AU): A unit of measure developed to compare differences in the amount of manure produced by a species. One animal unit is standardized as the amount of manure produced on a regular basis by a slaughter steer/heifer (1000 lb).

Legend
- State Boundary
- County Boundary
- Iowa River, Lower, Basin

Confined Operations
- Type
  - Poultry
  - Swine
  - Swine & Cattle
  - Swine & Poultry

Data Source: Iowa Geological and Water Survey, DNR.
February 09, 2010. This file contains locations of confinement feeding operations that are known by the Iowa DNR, Iowa City, IA.
Resource Concerns (continued)

Iowa Rapid Watershed Assessment
Iowa River, Lower - Open Lot Animal Feeding Operations

<table>
<thead>
<tr>
<th>Type</th>
<th>No. of Facilities</th>
<th>Total Registered AUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>18</td>
<td>3,611.4</td>
</tr>
<tr>
<td>Cattle &amp; Horses</td>
<td>1</td>
<td>90</td>
</tr>
<tr>
<td>Not Recorded</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Swine</td>
<td>4</td>
<td>317</td>
</tr>
<tr>
<td>Swine &amp; Horses</td>
<td>1</td>
<td>150</td>
</tr>
<tr>
<td>Swine, Cattle &amp; Poultry</td>
<td>1</td>
<td>75.8</td>
</tr>
<tr>
<td>Swine, Cattle, Poultry, Horses</td>
<td>1</td>
<td>77.4</td>
</tr>
</tbody>
</table>

*Animal Units (AU); A unit of measure developed to compare differences in the amount of manure produced by a species. One animal unit is standardized as the amount of manure produced on a regular basis by a slaughter steer/heifer (1000 lb).

Data Source: Iowa Geological and Water Survey, DNR. February 09, 2010. This file contains locations of open lot feeding operations that are known by the Iowa DNR, Iowa City, IA.

Legend
- State Boundary
- County Boundary
- Iowa River, Lower, Basin
- Major River/Streams
- Open Lot Operations Type
  - Cattle
  - Cattle & Horses
  - Swine
  - Swine & Horses
  - Swine, Cattle & Poultry
  - Swine, Cattle, Poultry, Horses
- No AUs Recorded

NRCS 50/50 Staff
Des Moines, IA May 2010
**Resource Concerns Table**

The table below lists the resource concerns and priorities of stakeholders and landowners in the watershed. The concerns were summarized from the Environmental Quality Incentive Program (EQIP) resource concerns developed in each county (22).

<table>
<thead>
<tr>
<th>SWAPA *</th>
<th>Specific Resource Concerns/Issues</th>
<th>Cropland</th>
<th>Pasture</th>
<th>Natural Areas</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Soil Erosion</strong></td>
<td>Sheet and Rill</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ephemeral Gully</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Classic Gully</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Stream Bank</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water Quality, Surface</strong></td>
<td>Excessive Nutrients &amp; Organics</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Excessive Suspended Sediment &amp; Turbidity</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Water Quality, Ground</strong></td>
<td>Excessive Nutrients &amp; Organics</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Soil Condition</strong></td>
<td>Animal Waste &amp; Other Organics (N,P,K)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Organic Matter Depletion</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Plant Condition</strong></td>
<td>Productivity, Health, and Vigor</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forage Quality and Palatability</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noxious and Invasive Species</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Domestic Animals</strong></td>
<td>Inadequate Quantity &amp; Quality Feed &amp; Forage</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate Stock Water</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Excessive Green House Gas (CO2)</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Wildlife</strong></td>
<td>Inadequate Cover &amp; Shelter</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>T &amp; E Species</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate Food</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* SWAPA: - Soil, Water, Air, Plants, and Animals
Special Considerations

With over nine percent of the watershed included in an urban land use, unique resource concerns exist. Resource concerns in urban and developing areas include ephemeral gully erosion, classic gully erosion, excessive suspended sediment and turbidity in surface water, excessive nutrients and organics in surface water, and excessive runoff, flooding or ponding. These concerns exist on developing, newly developed, and existing urban areas. According to the Environmental Protection Agency (EPA), non-porous urban landscapes impede runoff from slowly percolating into the ground, therefore, water remains above the surface, where it accumulates and runs off in large amounts.

Cities install storm sewer systems that quickly channel this runoff from roads and other impervious surfaces. When water leaves the storm water system and empties into a stream or river, large volumes of quickly flowing runoff erodes stream banks and damages streamside vegetation. Also, discharged storm water tends to have higher temperatures resulting from heating on impervious surfaces. Native fish and other aquatic species cannot survive in urban streams severely impacted by urban runoff (13).

Urban runoff increases the variety and amount of pollutants transported to receiving waters. Sediment from development and new construction, oil, grease, toxic chemicals from automobiles, nutrients and pesticides from turf management and gardening, viruses and bacteria from failing septic systems, road salts, and heavy metals are examples of pollutants generated in urban areas (13). Urban runoff most dramatically impacts urbanizing smaller watersheds with higher percentages of urban land compared to large watersheds (many times over 30%). These types of streams experience frequent localized flooding that is aggravated by urban runoff (13).

Some of the conservation practices implemented on urban areas include: bio-retention (rain gardens); bio-swales; soil quality restoration; permeable pavements; storm water wetlands; wet detention ponds; and native landscaping. During active development or construction of new urban areas in which land use is being converted, practice implementation includes silt fence, sediment basins, temporary seeding, mulching, polymers, rolled erosion control products (i.e. blankets), and compost blankets. (21)

Levee and drainage laws in Iowa are contained in the Code of Iowa. Chapter 465 applies to individual levee and drainage rights, including tile drainage. Chapter 455 applies to levee and drainage districts, and Chapter 455B applies to the Department of Natural Resources.

Legal levee and drainage districts are formed according to state laws. Chapter 455 of the Code of Iowa applies to formation by County Board of Supervisors of legal levee and drainage districts. Two or more landowners can petition for the formation of a drainage district, and single individuals can petition for sub-districts (10). Once established, construction, installation, and maintenance is under the direct control of the County Board of Supervisors or Drainage District Trustees.
Special Considerations (continued)

Iowa source water faces increasing pressure from development, pollution, land use changes, and growing demands for drinking water. Source water is a lake, stream, river, or aquifer where drinking water is obtained. Source Water Protection (SWP) is the act of preventing contaminants from entering public drinking water sources. SWP includes ground water (wellhead) protection and surface water protection. (11)

Iowa Department of Natural Resources’ (IDNR) SWP Program has three different phases to the SWP Program: SWP Assessments (Phase 1), the SWP Plan (Phase 2) and Implementation (Phase 3). In addition, the program has recently included implementation as part of the SWP planning. Communities will be targeted for developing a plan if their water supply systems have finished water with nitrate levels of 5 mg/L or greater and trending upward, and public wells not having a confining layer (termed as “shallow well”). (11)

IDNR’s SWP Program has developed a list of Priority Community Water Supplies. The Iowa River - Lower Watershed has no Priority SWP communities identified. However, the watershed has about 10 communities in the watershed identified as having possible highly susceptible systems. These communities are identified by the DNR SWP Program as highly susceptible based the geologic characteristics of the aquifer and is independent of well vulnerability. (11)

Human Considerations: Implementation of conservation practices and enhancements has the potential for change in management and cost of production. Installation of practices will have an upfront cost and require maintenance. In the short run, increased management may be required as new techniques are learned. Land may be taken out of production for installation of practices or conversion to other uses, such as wildlife habitat. Long term benefits should result from increased soil health, benefits to water quality, improved domestic livestock, air quality, and wildlife habitat. Other considerations by humans in the watershed may include recreation, rural and urban perceptions, market trends and how they relate to conservation practice costs, profitability, and current high land values.
References


2. Iowa Gap Analysis Program (01/01/2002). Iowa Department of Natural Resources (IDNR) and Iowa Department of Transportation (IDOT). INCORP Dataset, 1997.


10. Iowa Department of Natural Resources (IDNR). Geological Survey Bureau, Iowa City, Iowa. Data from county based drainage maps (February 2005).


17. Iowa Department of Natural Resources (IDNR). Iowa Natural Areas Inventory (INAI) Database records in each watershed as of August 12, 2009. Reflects INAI records as of January 2009.

18. U.S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Natural Resources Inventory (NRI). [Website Link]

19. Iowa Department of Natural Resources (IDNR). Final Regional Maps of 2010 303(d) Impaired Waters. [Website Link]

20. Iowa Department of Natural Resources (IDNR). Iowa DNR Water Quality Index [Website Link]


23. Iowa Department of Natural Resources (IDNR). [Website Link]


25. George, Gale (2003). Underground Storage Tanks in Iowa. Iowa City, IA: Iowa Department of Natural Resources. [Website Link]

26. Des Moines Register. Iowa Biofuels Database. Interactive Map. [Website Link]


28. Wolter, Calvin (February 6, 2006). Confinement Feeding Operations Registered With the Iowa Department of Natural Resources. Iowa Department of Natural Resources (IDNR), Geologic Survey Bureau. Iowa City, Iowa.
29. Clark, Kathryne (February 2005). Animal Feeding Operations under Regulation by the Department of Natural Resources in the State of Iowa. Iowa Department of Natural Resources (IDNR), Geologic Survey Bureau. Iowa City, Iowa.


32. Iowa NRCS Rapid Watershed Assessment meeting, Amana, Iowa, February 24, 2011

