Iowa

Turkey River – 07060004 **March 2012**

8-Digit Hydrologic Unit Profile

The Turkey River 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 Turkey River 8-Digit Hydrologic Unit Code (HUC) watershed contains 1,083,536 acres *(1)*. One-tenth percent of the watershed is in Allamakee County, 7.2 percent in Chickasaw County, 33.2 percent in Clayton County, 2.9 percent in Delaware County, 0.7 percent in Dubuque County, 29.8 percent in Fayette County, 14.1 percent in Howard County, and the remaining 12 percent is in Winneshiek County. *(1)*.

Almost ninety-one percent of the watershed is privately owned, 2.6 percent includes municipal areas, and the remaining 3.8 percent is split between public areas, railroads, and unincorporated areas *(2).*

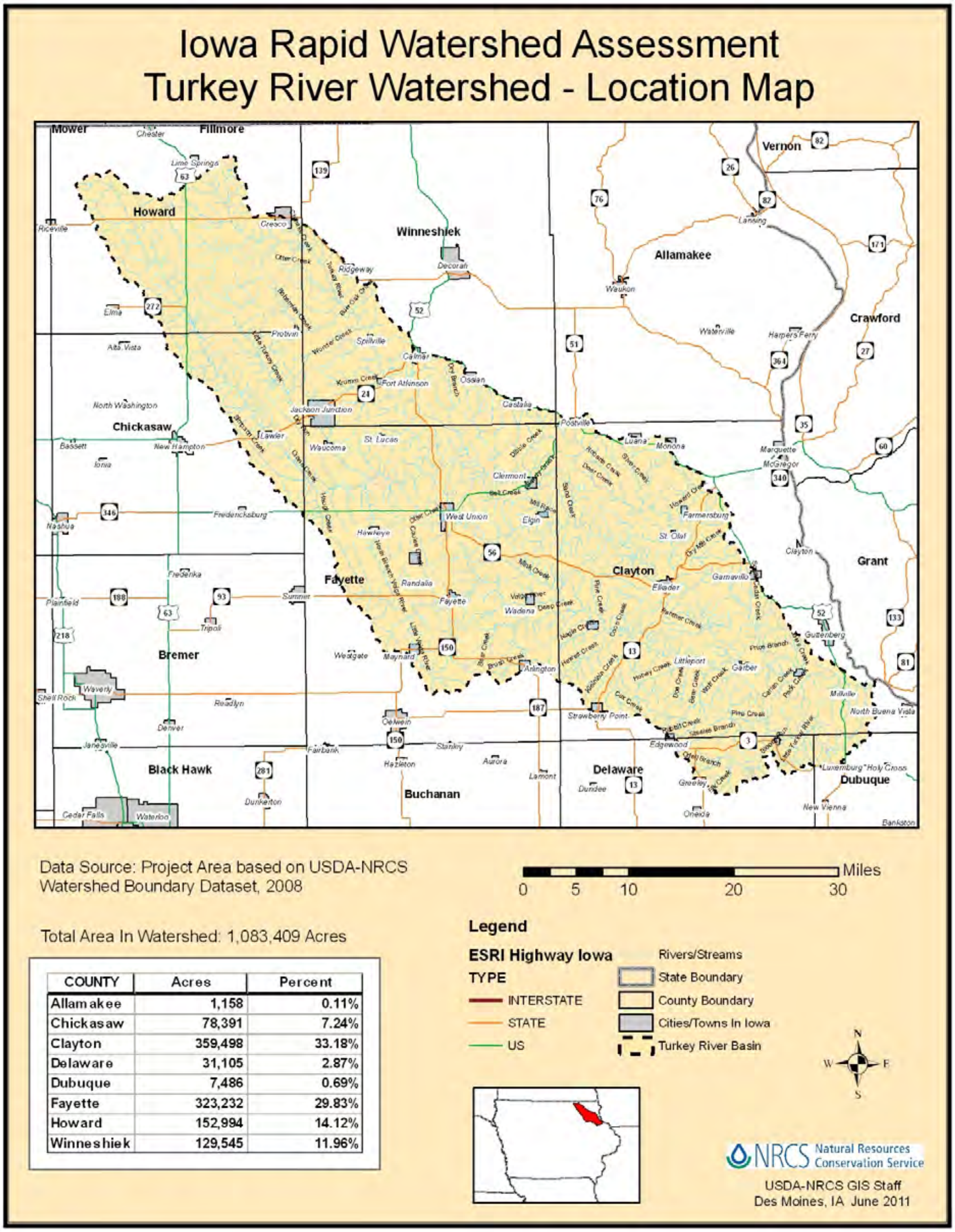
Over fifty-two percent of the watershed is in cropland, 27.3 percent is pasture or hayland, 14.4 percent is woodland or natural areas, 5.3 percent is developed urban land use, and 0.2 percent is water and 0.5 percent is in wetlands *(3)*.

Elevations range from 603 feet to 1,392 feet *(4)*. The average watershed slope is 6.6 percent (5). The primary Land Capability Class in the watershed is class 2. The Land Capability Class (LCC) breakdown for the watershed is: 1.5 percent in class 1; 44.8 percent in class 2; 26.4 percent in class 3; 9 percent in class 4; 1.5 percent in class 5; 7.9 percent in class 6; and the remaining 6.6 percent is in class 7 (*6*). Rainfall ranges from 33 to 35 inches per year *(7)*. The HUC includes three US highways (18, 52, 63,), and ten state highways (3, 9, 13, 24, 38, 56, 128, 150, 187, 272) *(8)*.

Conservation assistance is provided by seven Soil and Water Conservation Districts (SWCD) and Natural Resources Conservation Service (NRCS) field offices located in Cresco, Decorah, West Union, Elkader, New Hampton, Manchester, and Dubuque. An office locator is found at http://offices.sc.egov.usda.gov/locator/app

The Turkey River HUC includes 41 NRCS conservation easements totaling 2,460 acres. The easements include the Emergency Watershed Protection (EWP) program, Wetlands Reserve Program (WRP), and the Emergency Wetlands Reserve Program (EWRP). Fifty-four percent of the easement acres are in Fayette County, 36 percent in Clayton County, 6 percent in Howard County, 3.1 percent in Winneshiek County, and the remaining 0.9 percent in Chickasaw County *(9)*.

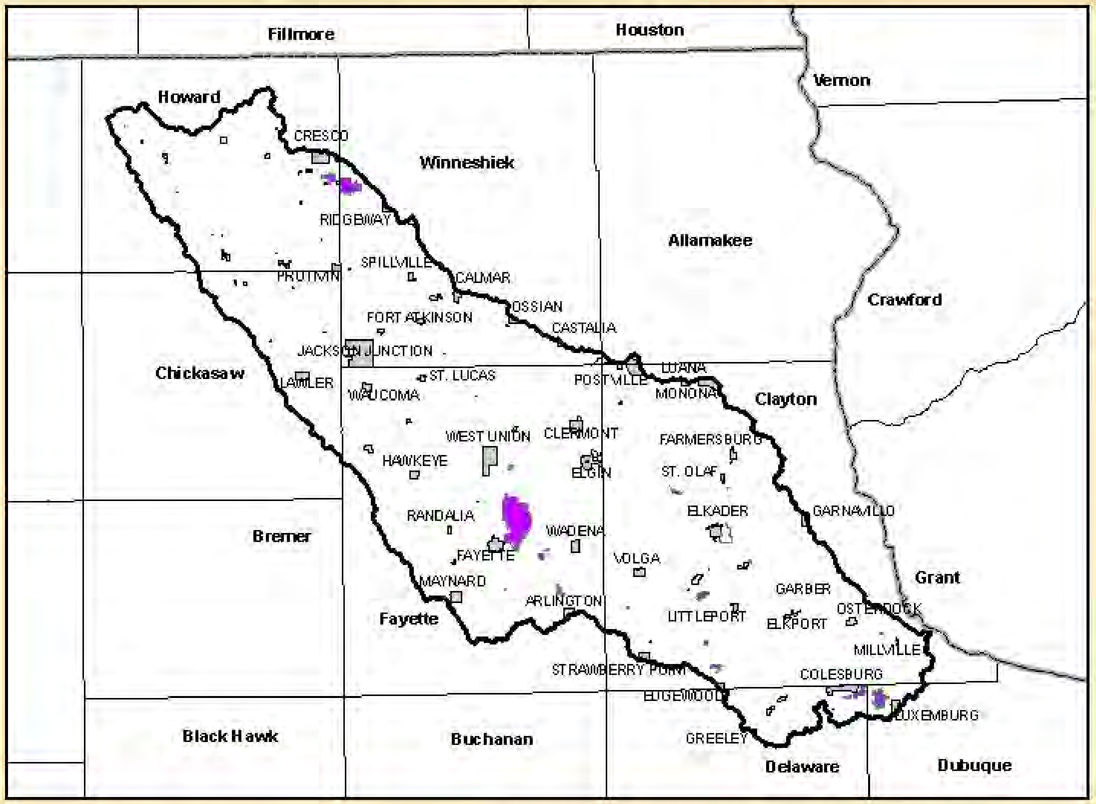
Physical Description



COUNTY	Acres	Percent
Allamakee	1,158	0.11%
Chickasaw	78,391	7.24%
Clayton	359,498	33.18%
Delaware	31,105	2.87%
Dubuque	7,486	0.69%
Fayette	323,232	29.83%
Howard	152,994	14.12%
Winneshiek	129,545	11.96%

Physical Description (continued)

Iowa Rapid Watershed Assessment
Turkey River - Ownership/Stewardship



Total Acres in Turkey River Watershed - 1,083,536
Municipal City Boundary Acres - 22,059 (2.0% of basin)
GAP Stewardship Acres - 14,800 (1.4% of basin)
Private Agricultural Land Acres- 1,033,425 (95.4%)

Stewardship data identifies ownership and management boundaries for conservation and recreation areas in the study area.

Data Source: Iowa Gap Analysis Program, 01/01/2002, Iowa DNR & Iowa DOT INCORP Data Set, 1997

Owner	No. of Areas	Acres
ACE	6	1,039
County Conservation Board	58	3,309
Iowa DNR	35	10,101
Local Land Trust	3	243
State Land	1	43
The Nature Conservancy	2	66
Municipal Areas (Citys/Towns)	42	22,059
Estimated Road Right-of-Ways - Rural	0	26,652

Miles 0 5 10 20 30

Legend

- State Boundary
- County Boundary
- Turkey River Basin
- Cities/Towns - Turkey

Stewardship - Turkey

- ACE
- County Conservation Board
- Iowa DNR
- Local Land Trust
- State Land
- The Nature Conservancy

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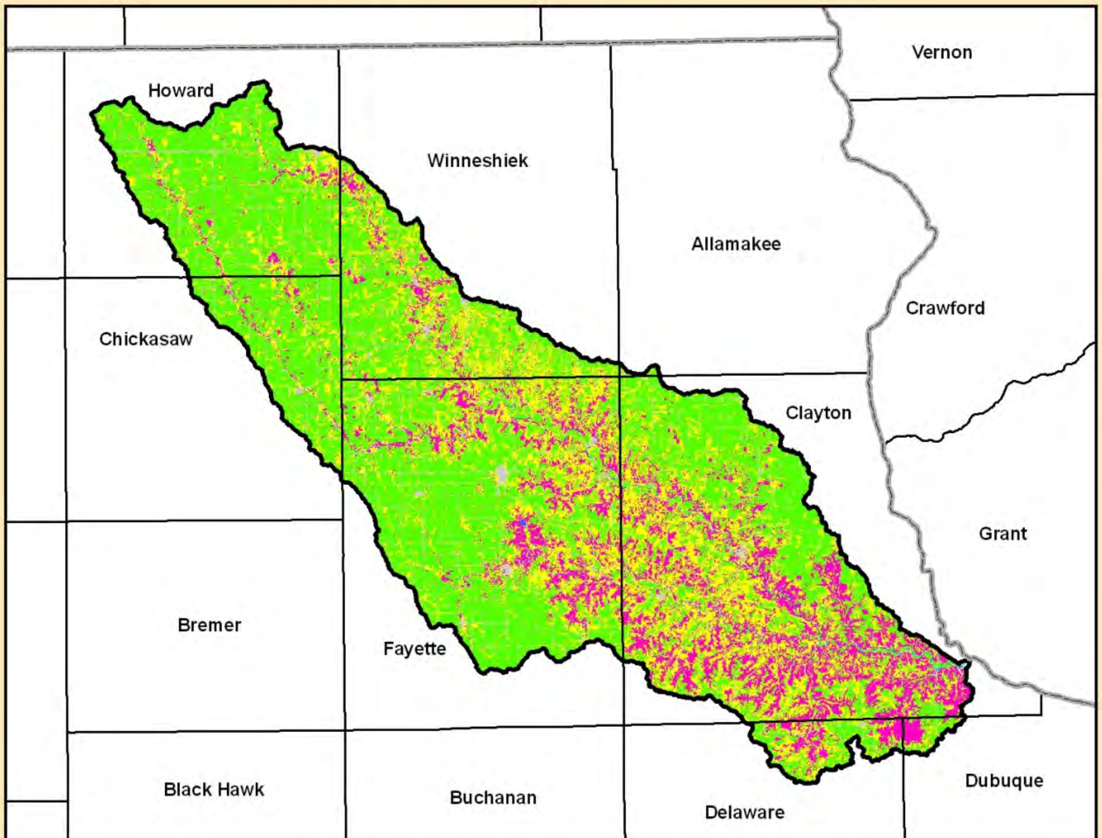
Des Moines, IA February 2012

Physical Description (continued)

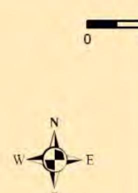
Iowa Rapid Watershed Assessment
Turkey River - Landcover/Landuse

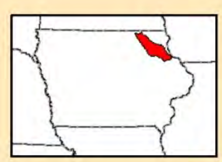


Originator: U.S. Department of Agriculture, National Agricultural Statistics Service (NASS), Research and Development Division, Geospatial Information Branch, Spatial Analysis Research Section (SARS)

Abstract: The USDA-NASS Cropland Data Layer is a raster, geo-referenced, categorized land cover data layer produced using satellite imagery from the Thematic Mapper (TM) instrument on Landsat 5, Landsat7, or the Advanced Wide Field Sensor (AWiFS) on RESOURCESAT-1. The imagery was collected between the dates of 03/01/1997 and now. The approximate scale is 1:100,000 with a ground resolution of 30 meters by 30 meters for the TM data, 56 meters by 56 meters for the AWiFS data. The data layer is aggregated to a possible 85 standardized categories for display purposes, with the emphasis being agricultural land cover. Most data layers average about 10 to 20 categories out of the 85 possible categories.

Landuse	Acres	% of Watershed
Developed-Urban	56,912	5.3%
Pasture/Hayland	295,331	27.3%
Row Crop	567,259	52.4%
Water	2,272	0.2%
Wetland	5,692	0.5%
Woodland	156,033	14.4%





Legend

State Boundary
County Boundary
Turkey River Basin

2010 NASS Landuse

Developed-Urban
Pasture/Hayland
Row Crop
Water
Wetland
Woodland

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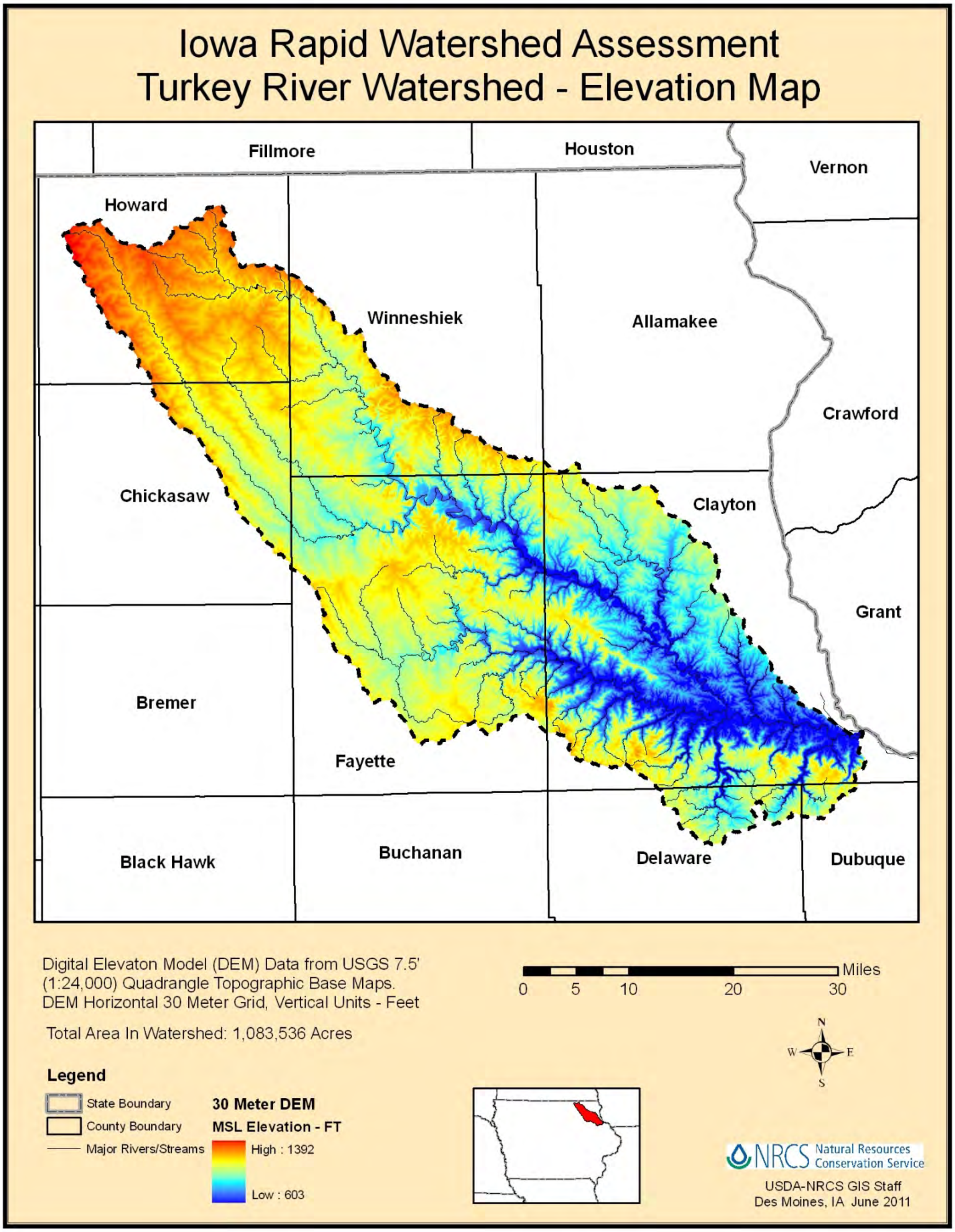
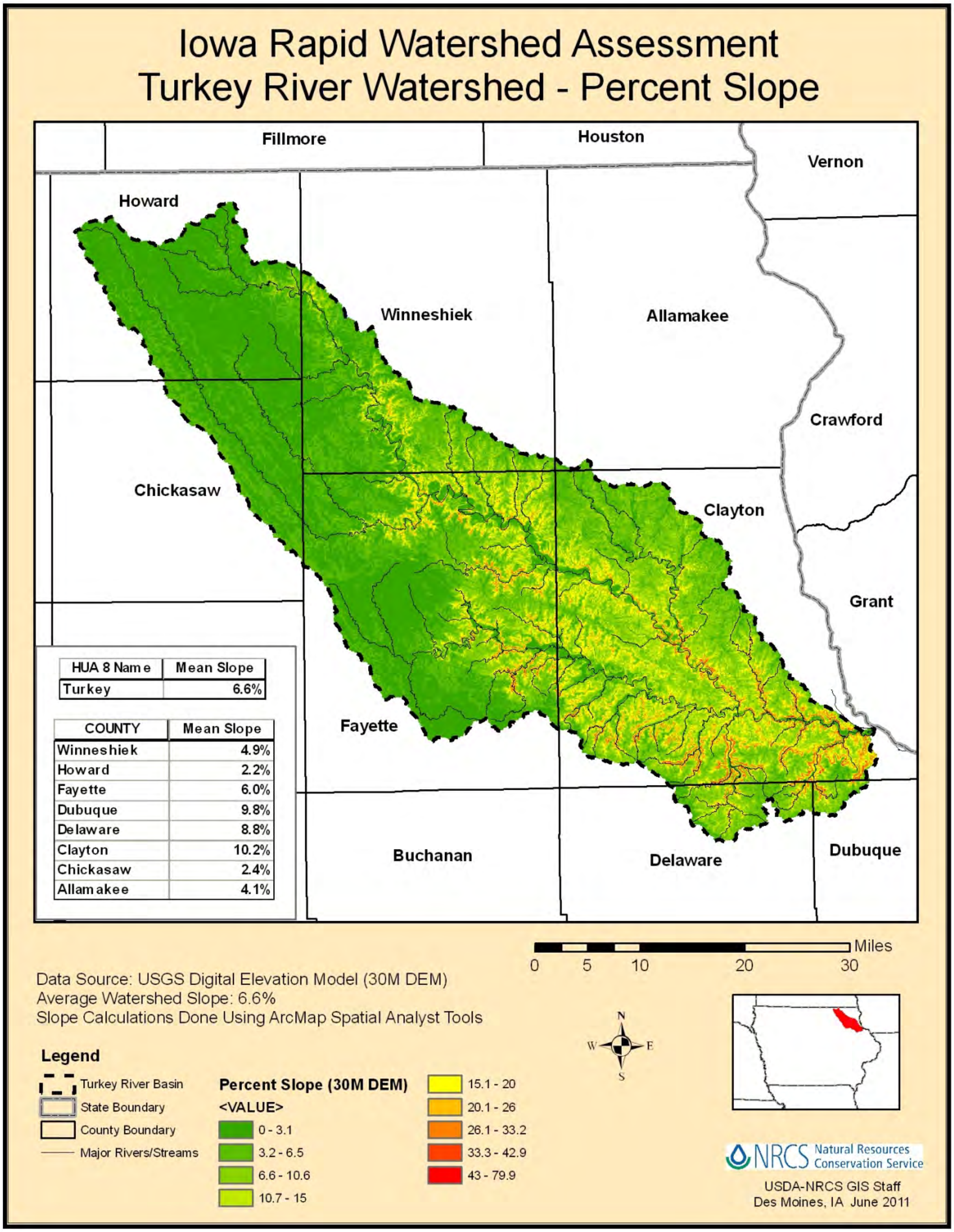
Des Moines, IA July 2011

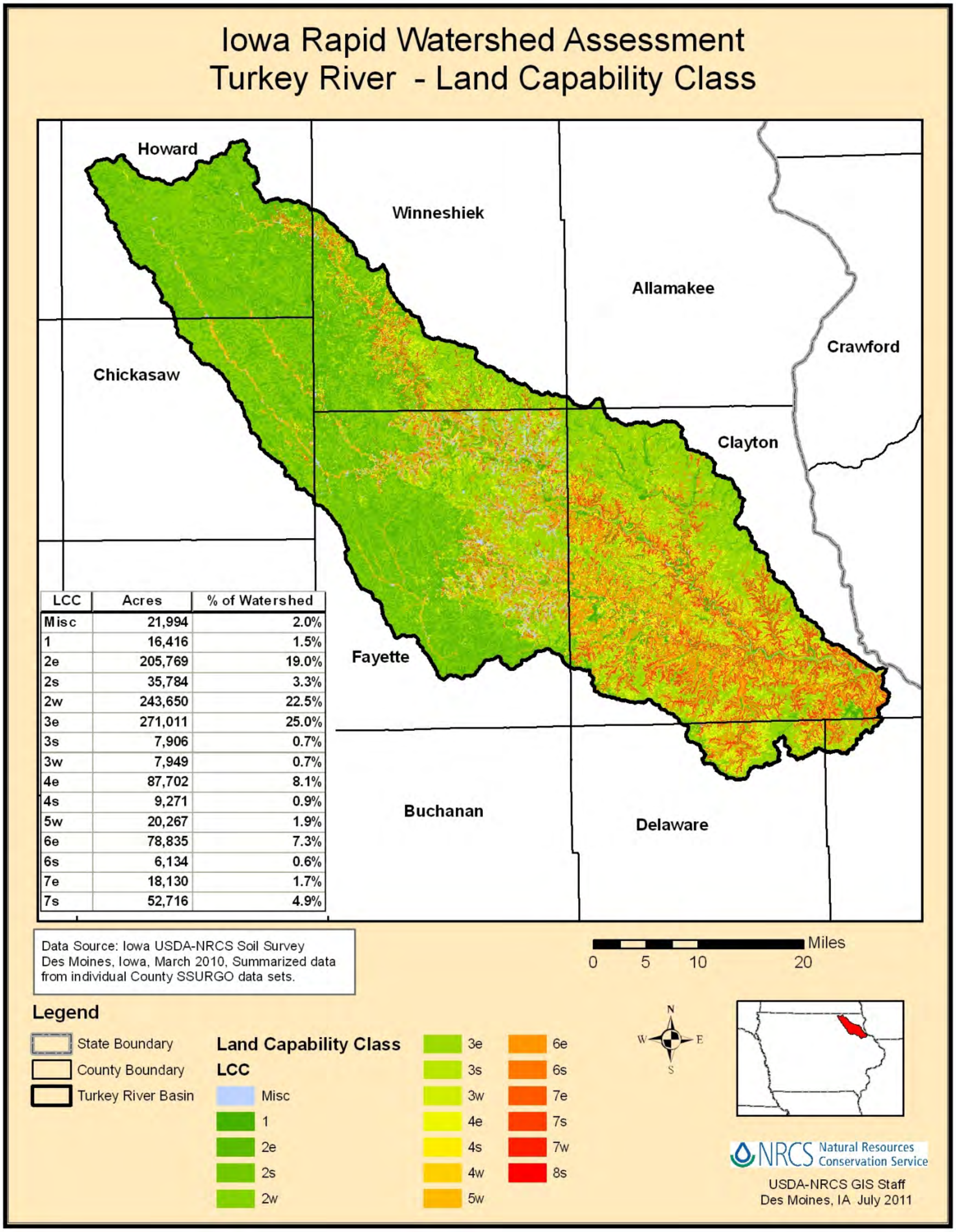
Physical Description (continued)



Physical Description (continued)

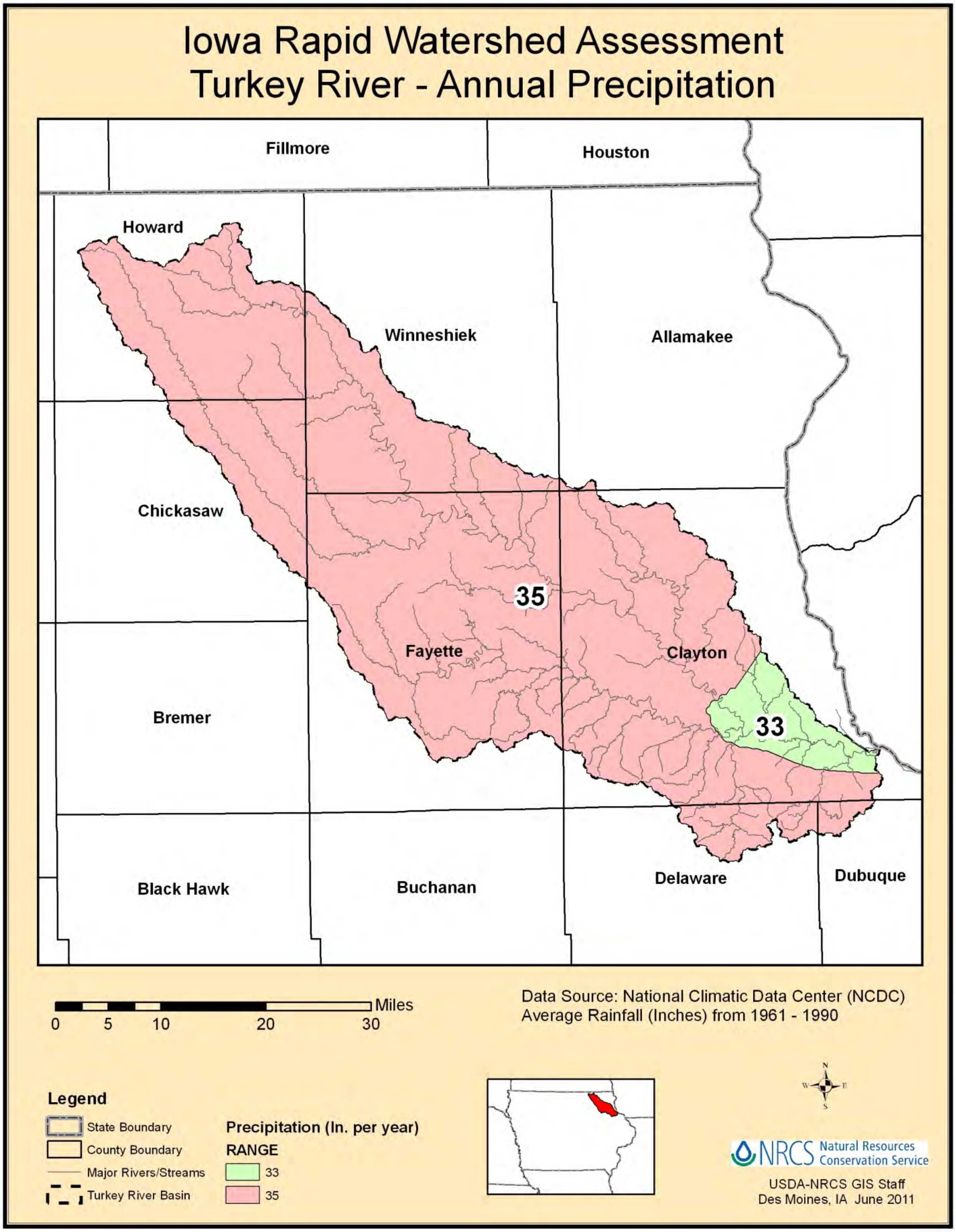


Physical Description (continued)

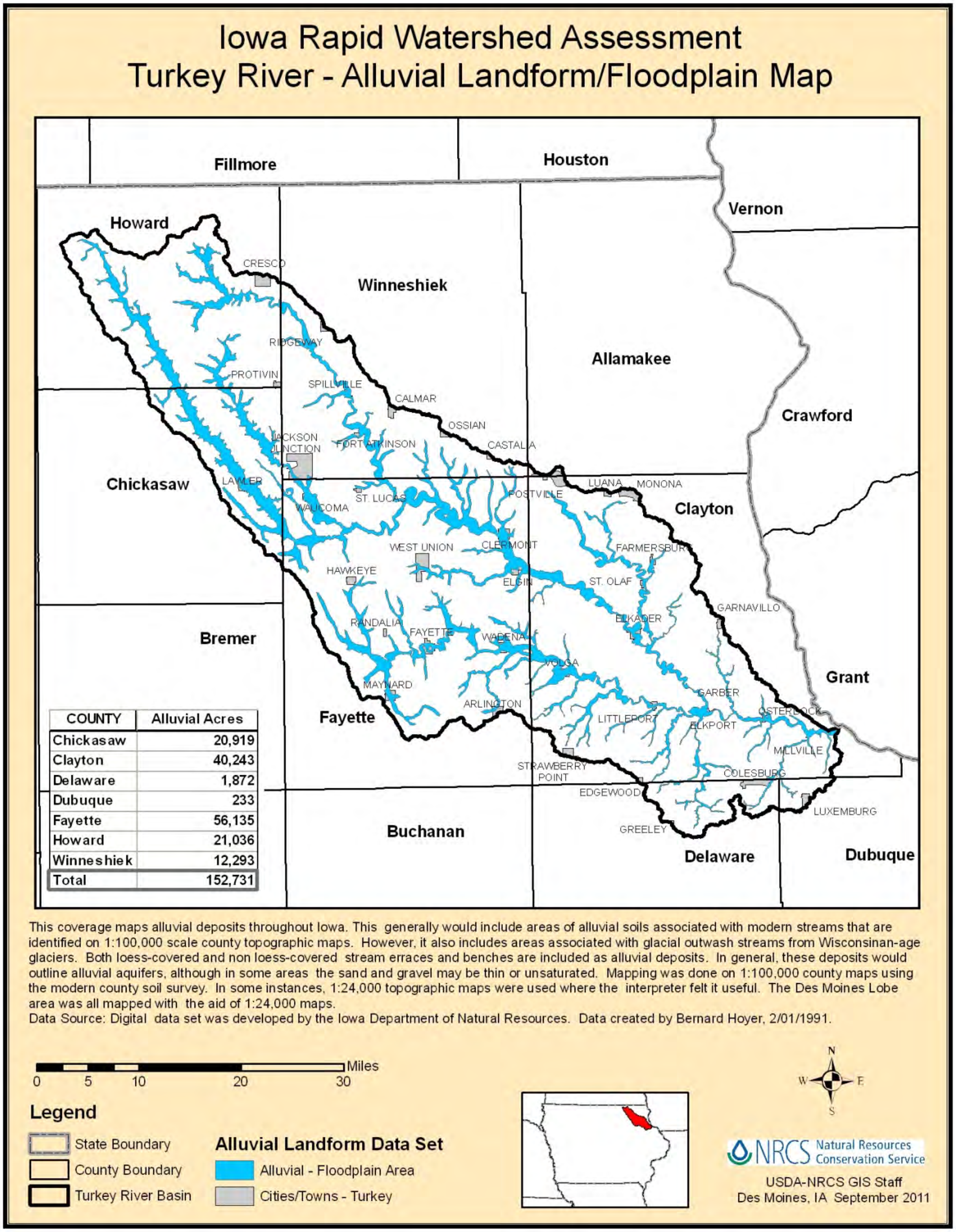


LCC	Acres	% of Watershed
Misc	21,994	2.0%
1	16,416	1.5%
2e	205,769	19.0%
2s	35,784	3.3%
2w	243,650	22.5%
3e	271,011	25.0%
3s	7,906	0.7%
3w	7,949	0.7%
4e	87,702	8.1%
4s	9,271	0.9%
5w	20,267	1.9%
6e	78,835	7.3%
6s	6,134	0.6%
7e	18,130	1.7%
7s	52,716	4.9%

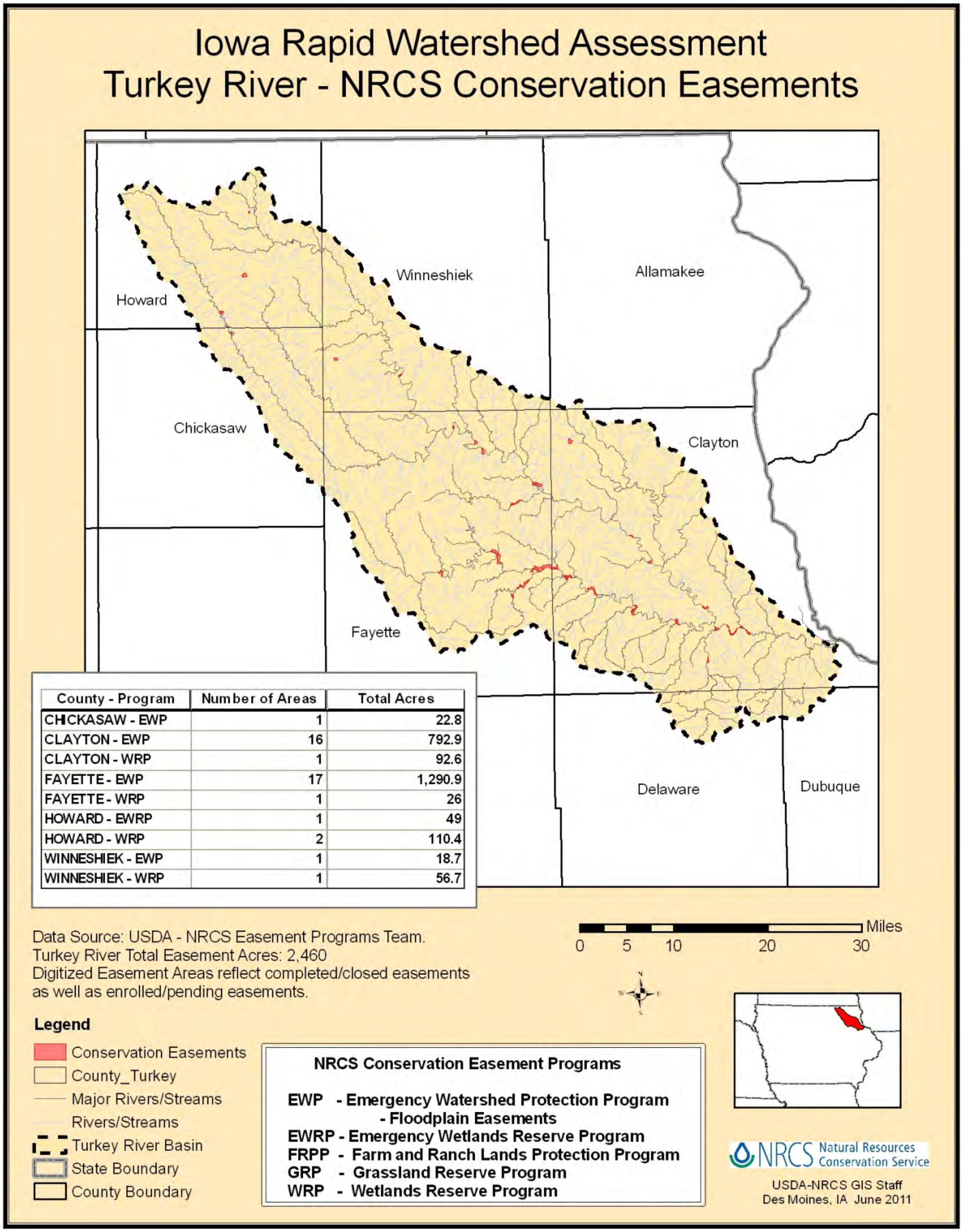
Physical Description (continued)



Physical Description (continued)

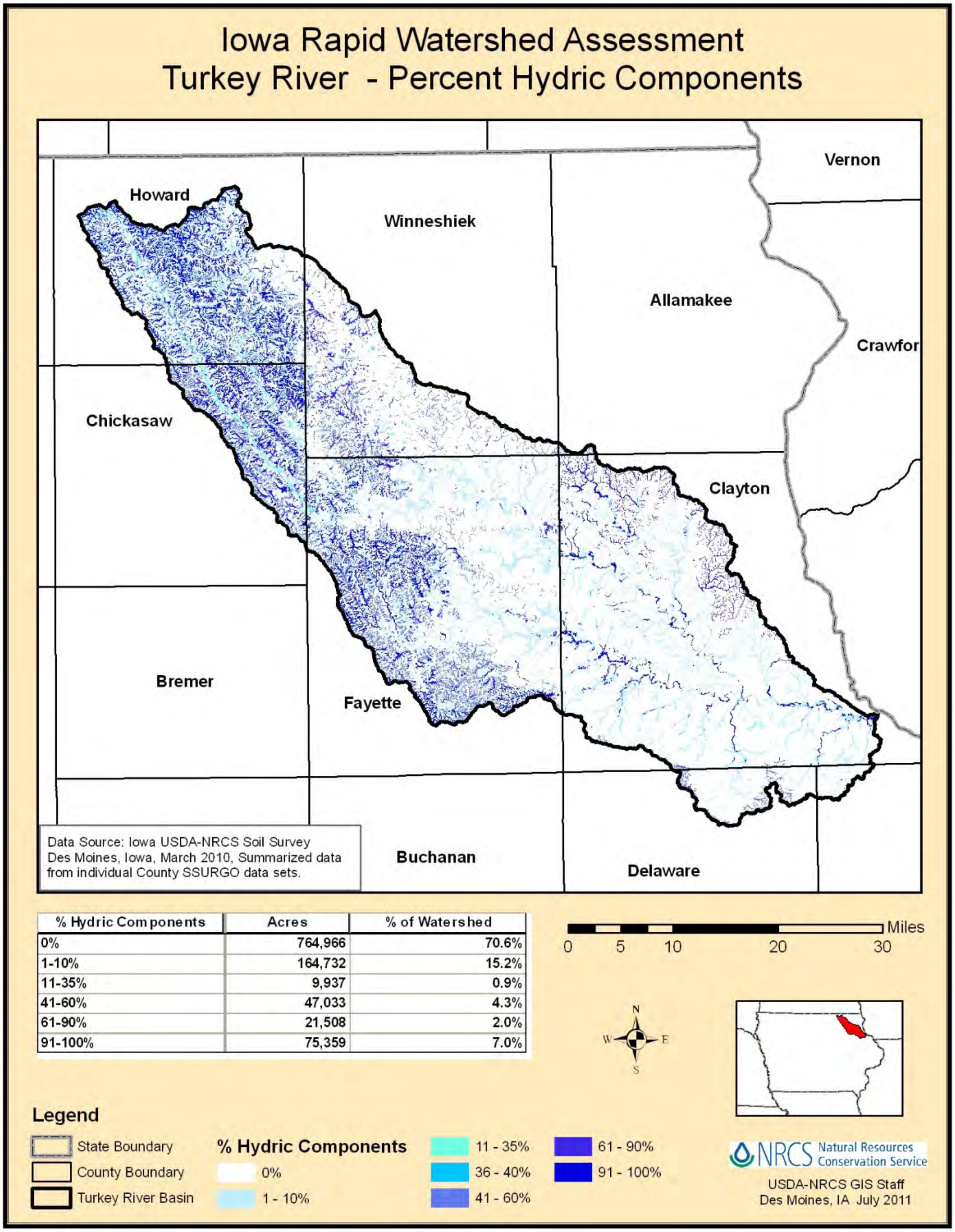


Physical Description (continued)



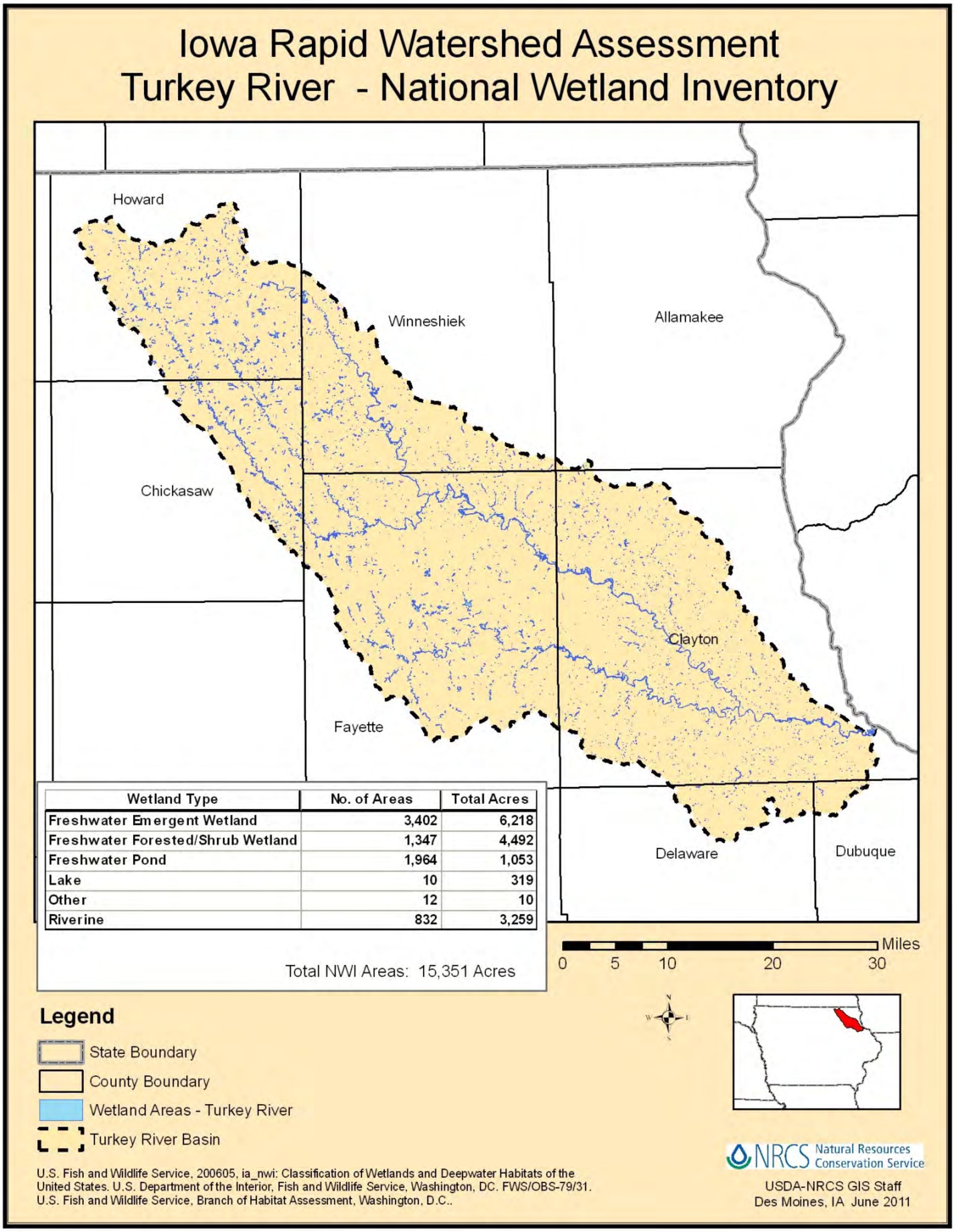
County - Program	Number of Areas	Total Acres
CHICKASAW - EWP	1	22.8
CLAYTON - EWP	16	792.9
CLAYTON - WRP	1	92.6
FAYETTE - EWP	17	1,290.9
FAYETTE - WRP	1	26
HOWARD - EWRP	1	49
HOWARD - WRP	2	110.4
WINNESHIEK - EWP	1	18.7
WINNESHIEK - WRP	1	56.7

Physical Description (continued)



% Hydric Components	Acres	% of Watershed
0%	764,966	70.6%
1-10%	164,732	15.2%
11-35%	9,937	0.9%
41-60%	47,033	4.3%
61-90%	21,508	2.0%
91-100%	75,359	7.0%

Physical Description (continued)



Wetland Type	No. of Areas	Total Acres
Freshwater Emergent Wetland	3,402	6,218
Freshwater Forested/Shrub Wetland	1,347	4,492
Freshwater Pond	1,964	1,053
Lake	10	319
Other	12	10
Riverine	832	3,259

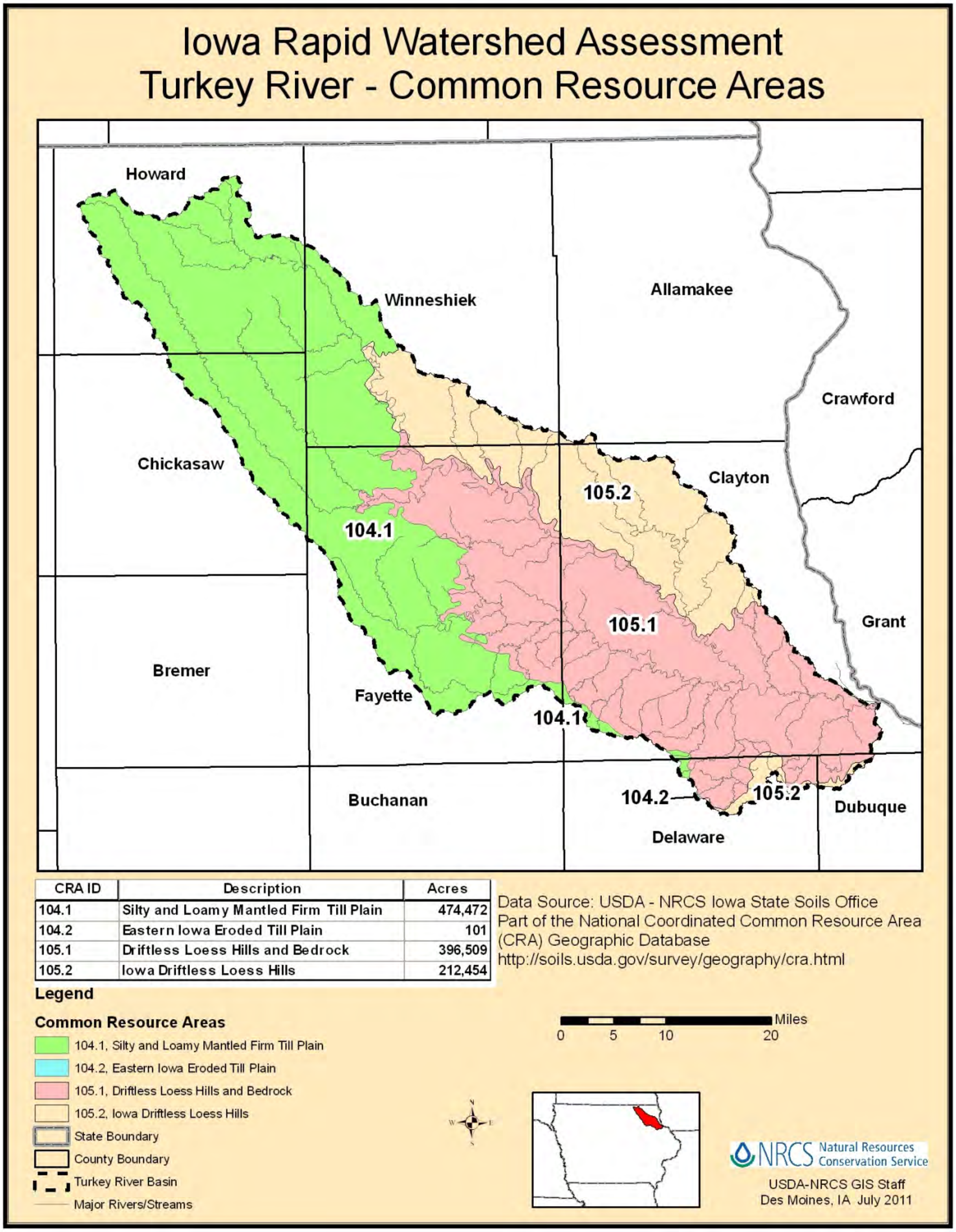
Physical Description (continued)

Common Resource Areas

The Turkey River HUC includes portions of four National Common Resource Areas (CRA): 104.1; 104.2; 105.1; and 105.2. Forty-four percent of the watershed is in CRA 104.1, 37 percent in 105.1, 20 percent in 105.2, and 0.00009 percent in 104.2 (*10, 11*).

The CRAs delineated below for the Turkey River HUC are described in the next section (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 (General Manual Title 450, Subpart C, §401.21) (*10, 11*).

Physical Description (continued)



Physical Description (continued)

Common Resource Area Descriptions (*10, 11*)

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.

104.1 Silty and Loamy Mantled Firm Till Plain

Gently sloping to very steep dissected till plain. Soils are predominantly well drained and are formed in thin silty material over loamy till, underlain by sedimentary bedrock. Cropland and grazing land on ridge tops and valley bottoms with a mix of dairy, beef and cash grain agricultural enterprises. Deciduous forest on side slopes. Primary resource concerns are cropland erosion, surface water quality, grazing land and woodland productivity, and soil erosion during timber harvest.

104.2 Eastern Iowa Eroded Till – Plain

This area is made up of broad upland, nearly level to moderately sloping, moderately well drained to poorly drained soils that formed in silty/loamy material over glacial till. Many low gradient drainage ways are common in this unit. Native vegetation was mostly prairie with timber and brush in valleys and steeper side slopes. Corn and soybeans are common crops with many swine and poultry production facilities. Resource concerns are soil erosion, water quality and nutrient management.

105.1 Driftless Loess Hills and Bedrock

Highly dissected hills and valleys. Well drained and moderately well drained silty soils over bedrock residuum. Predominantly cropland and grazing land on ridge tops and valley bottoms with a mix of dairy, beef and cash grain agricultural enterprises. Deciduous forest on steep side slopes. Primary resource concerns are cropland soil erosion, surface water quality, grazing land and forestland productivity, stream bank erosion, and erosion during timber harvest.

105.2 Iowa Driftless Loess Hills

This area consists of gently sloping to very steep soils on moderately broad to narrow ridges with highly dissected side slopes .Most of the soils formed in loess or colluvium from loess. Native vegetation was mostly deciduous forest. Deciduous forest dominates the steeper side slopes. Corn, soybeans, hay supporting cash crop and dairy and swine operations are dominate. Resource concerns are soil water erosion, soil quality, water quality and nutrient management.

Physical Description (continued)

Geology

The Turkey River watershed is drained by several major tributary channels including (from northwest to southeast) Crane Creek (which flows through Howard and Chickasaw counties and merges with the Little Turkey river in northwest Fayette County), Otter Creek, Nutting Creek, Dry Branch Creek, Roger's Creek, Wonder Creek, Bohemian Creek, Robert's Creek, Deer Creek, Silver Creek, South Cedar Creek, Elk Creek, the Volga River, and Dry Mill Creek. Soils and landforms of the watershed formed in isolated deposits of glacial drift laid down by ice and water over the last two million years during the Pleistocene and Holocene Epochs. Beneath the unconsolidated deposits is Paleozoic bedrock, which becomes generally older from northeast to southwest. In Howard County, underlying bedrock consists mainly of Devonian dolomite and limestone. Chickasaw and Winneshiek counties are underlain by Devonian dolomite and limestone, and Ordovician shale and dolomite. Fayette County bedrock consists of Devonian dolomite and limestone, Silurian limestone, and Ordovician shale and dolomite. Clayton County bedrock consists primarily of Silurian limestone and Ordovician shale and dolomite.

The landscape of the Turkey River RWA area falls primarily within two of Iowa's seven physiographic provinces (landform regions). The western 1/3 of the watershed is contained within the Iowan Surface physiographic region while most of the eastern portion is contained within Paleozoic Plateau. A very small portion of the southern tip of the watershed is within the Southern Iowa Drift Plain. Elevations from the head to the mouth of the watershed range from about 1,330 to 605 feet.

Northern/western portions of the watershed, within Howard, Chickasaw, western Winneshiek and Fayette counties are part of the Iowan Erosion Surface. The landscape is generally level to gently rolling and developed on Pre-Illinoian till as a result of the intense periglacial conditions and strong winds associated with the Late Wisconsinan glacial advance that formed the Des Moines Lobe to the west. In many places, the erosion left behind a lag deposit called a "stone line," which is covered by loamy sediments of variable thickness. Loess mantles the till on isolated topographic highs that survived the widespread erosion.

The eastern portion of the watershed in southern Winneshiek, eastern Fayette and Clayton counties are part of the Paleozoic Plateau landform region. The Paleozoic Plateau is characterized bedrock-controlled terrain dissected by steep V-shaped valleys with isolated patches of glacial drift with a thin loess cover.

Soils on the uplands are mainly loams and silt loams. Loamy soils of the Kenyon, Riceville, and Racine Series are common in the upstream portions of the watershed, all of which were formed in shallow till. Downstream portions of the watershed (primarily in Clayton County) contain silt loams of the Fayette, Downs, and Tama Series. All three soil series were formed in loess and are well-drained. On the lower slopes, silt loam soils are common, but are again dependant on the parent material in which they formed. Soils formed in shallow to bedrock conditions (e.g. Winneshiek Co.) include the Marlean and Nordness Series. Those formed in shallow to till conditions (e.g. Howard Co.) include the Floyd Series. Finally for those formed in loess (e.g. Fayette and Clayton counties) the Fayette series is common. Loams and silt loams derived from variable materials dominate in the Turkey River Valley. In upstream portions of the watershed (Howard, Winneshiek, and Fayette counties) soils of the Colo, Spillville, and Caneek Series are common in the stream valleys, all of which vary from moderate to somewhat poorly drained. In downstream portions of the watershed (primarily Clayton County) soils from the Dorchester and Caneek Series are common. The Dorchester is typically well to moderately well drained and the Caneek is somewhat poorly to poorly drained. (*12*)

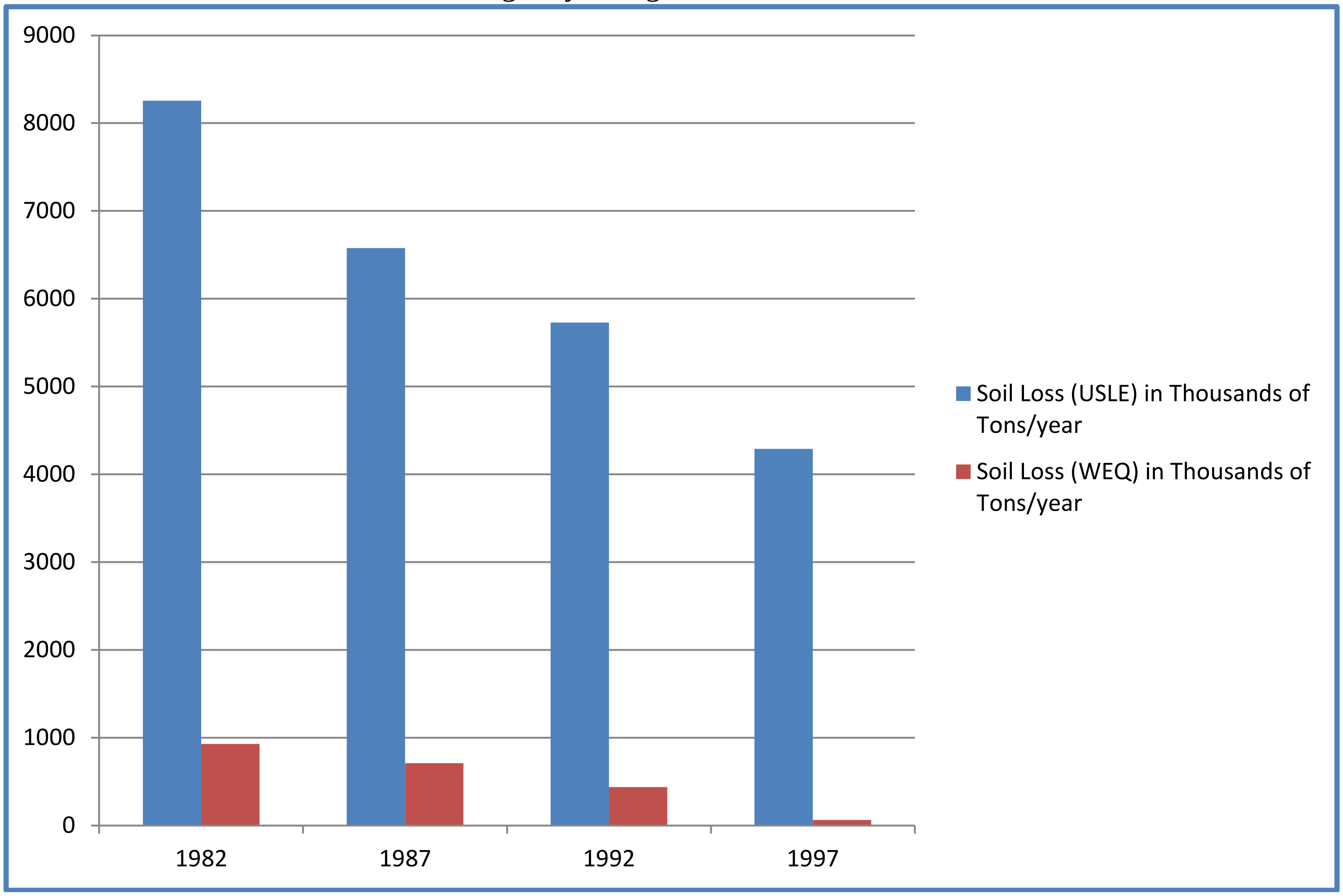
Physical Description (continued)

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 5 tons/acre/year (*22*).

National Resource Inventory (NRI) estimates for sheet and rill erosion (USLE) by water on cropland and pastureland decreased by approximately 3,966,100 tons (48 percent) of soil loss between 1982 and 1997. NRCS estimates indicate wind erosion rates (WEQ) decreased by 864,800 tons (93 percent) between 1982 and 1997 (*22*). The standard error for the USLE estimate is 324,879 tons for 1997(USLE) and 574,257 tons for 1982 (USLE). The standard error for the WEQ estimate is 20,455 tons for 1997(WEQ) and 74,601 tons for 1982 (WEQ). The margin of error at the 95% confidence limit is obtained by multiplying the standard error by 1.96

NRI Soil Loss Estimates


9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1982
1987
1992
1997
Soil Loss (USLE) in Thousands of Tons/year
Soil Loss (WEQ) in Thousands of Tons/year

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 *(14)*.

Bacteria and biological pollutants and their affects are the major pollutants impacting surface waters of the Turkey River Watershed. Surface waters, especially lakes and ponds, have a repeated history of algal blooms and concern of pH, bacteria and turbidity. 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.

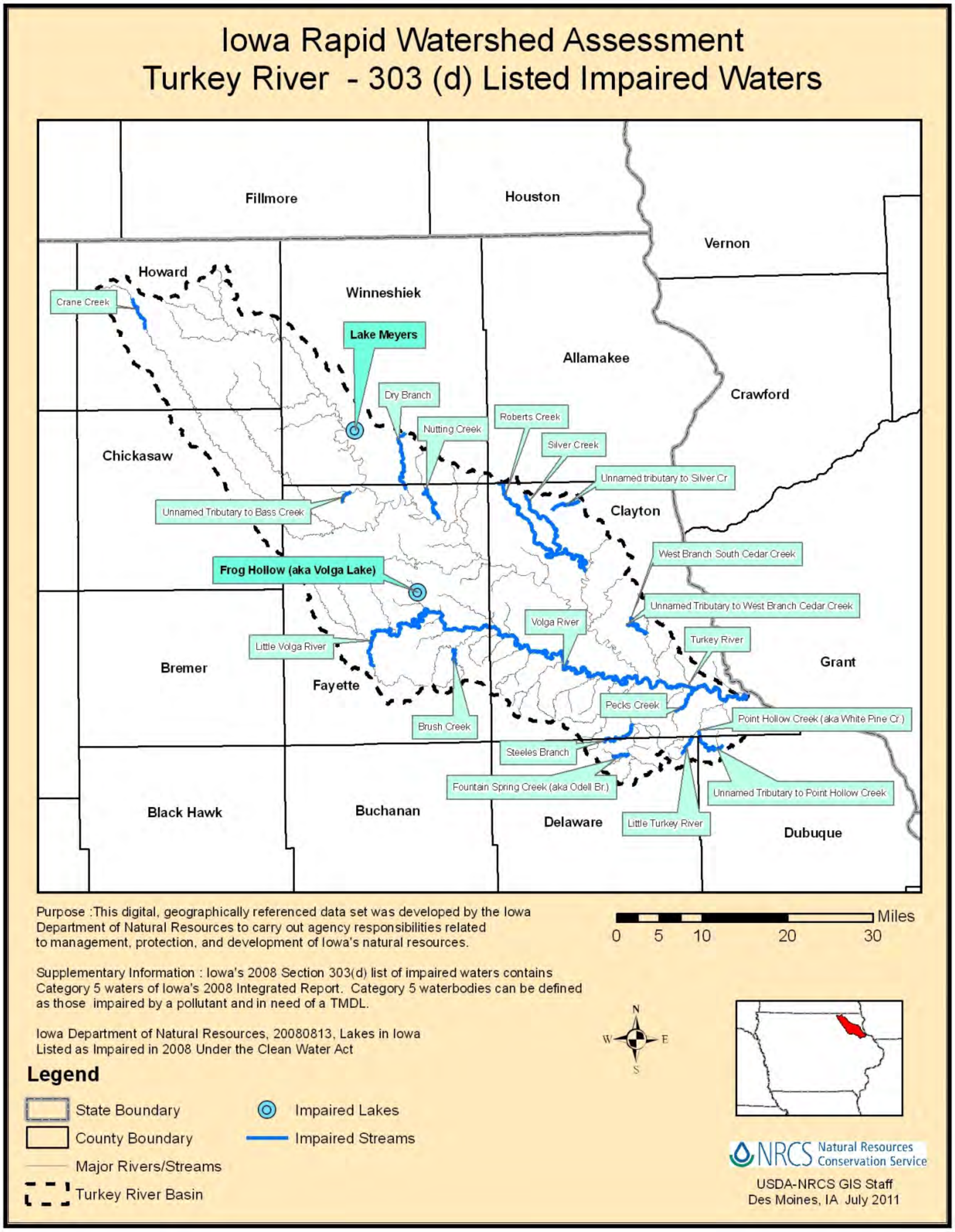
Conservation practices that can be used to address these water quality issues include erosion control structures, residue management, nutrient management, riparian buffers, drainage control structures, wetland restoration, urban Best Management Practices (BMPs), and improved septic systems *(15)*.

For more information on water quality and the Iowa Department of Natural Resources (IDNR) Water Quality Index, go to the following website:
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 (continued)

Water Quality Concerns Data Graph/Table (*16, 17*)

Impaired Water Bodies	Algae	pH	Biological	Bacteria	Ammonia	Turbidity	Mercury (in fish)	Fish Kill	Low DO
Turkey River IA 01-TRK-0200_0				X					
Little Turkey River IA 01-TRK-0230_3			X						
Point Hollow Creek IA 01-TRK-0240_0			X						
Unnamed Tributary to Point Hollow Creek IA 01-TRK-02415_0			X		X			X	X
Pecks Creek IA 01-TRK-0260_0			X						
Roberts Creek IA 01-TRK-0360_3			X	X				X	X
Silver Creek IA 01-TRK-0381_0			X	X					
Unnamed Tributary to Silver Creek IA 01-TRK-03817_0					X				
Nutting Creek IA 01-TRK-0416_0				X					
Crane Creek IA 01-TRK-0440_4			X						
Unnamed Tributary to Bass Creek IA 01-TRK-04515_0			X		X			X	X
Volga River IA 01-VOL-0010_3							X		
Frog Hollow (aka Volga Lake) IA 01-VOL-00130-L_0	X	X							

Water Quality (continued)

Water Quality Concerns Data Graph/Table (*16, 17*)

Impaired Water Bodies	Algae	pH	Biological	Bacteria	Ammonia	Turbidity	Mercury (in fish)	Fish Kill	Low DO
Brush Creek IA 01-VOL-0120_2			X						
Little Volga River IA 01-VOL-0150_1							X		

The schedule of TMDL development can be found at:
http://www.iowadnr.gov/Environment/WaterQuality/WatershedImprovement/WatershedResearchData/WaterImprovementPlans/PlanSchedule.aspx

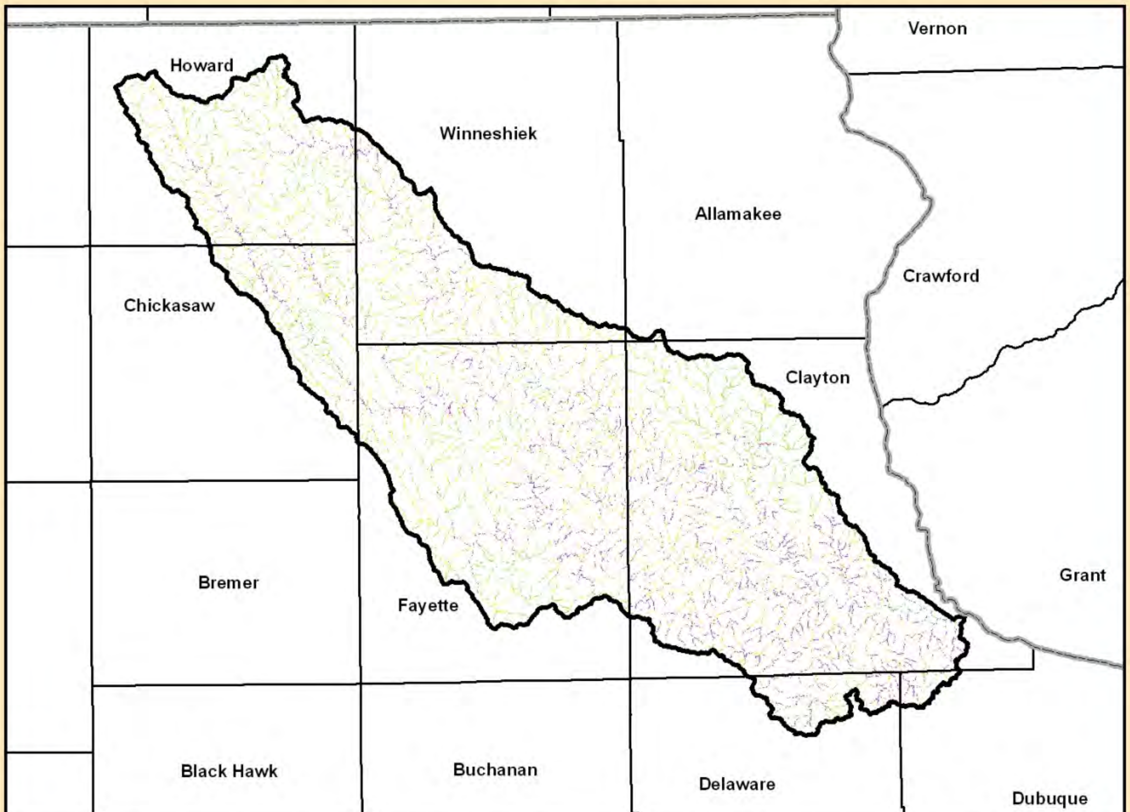
Water Quality (continued)

Watershed Projects, Plans, Studies, and Assessments	
Iowa Watershed Improvement Review Board (WIRB) Projects *(18)*	**IDNR TMDLs** *(14)*
Funded 2009 **9005-002 Silver Creek Watershed Clayton County** **9029-015 Otter Creek, Fayette County**	*Scheduled 2012* **Volga Lake**
Water Quality Improvement Projects* *(19)*	
Elk Creek Area Watershed Project (Delaware) Completed **Ensign Hollow Watershed Water Quality Protection (Clayton) Completed** **Ensign Hollow II Watershed Project (Clayton) Completed** **Silver Creek Watershed Project (Clayton) Active** **Glovers Creek Water Protection Fund Project (Fayette) Completed** **Glovers Creek Water Quality Evaluation Plan (Fayette) Completed** **Grannis Creek Watershed Project (Fayette) Completed** **Mink Creek Watershed Project (Fayette) Completed** **Nutting Creek Watershed Project (Fayette) Active** **Lake Meyer Watershed (Winneshiek) Active**	

***** 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
Turkey River - 100' Stream Buffer Landuse



Originator: U.S. Department of Agriculture, National Agricultural Statistics Service (NASS), Research and Development Division, Geospatial Information Branch, Spatial Analysis Research Section (SARS)

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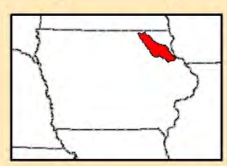
Landuse	Acres	% of Total Stream Buffer
Developed-Urban	2,221	3.7%
Pasture/Hayland	25,245	41.7%
Row Crop	14,318	23.6%
Water	864	1.4%
Wetland	2,033	3.4%
Woodland	15,910	26.3%

NHD Stream Layer buffered 100' on each side to develop a single polygon shape that was used to extract the 2010 NASS Landuse

0 5 10 20 30 Miles

N W E S



Legend

State Boundary
County Boundary
Turkey River Basin

100' Stream Buffer Landuse

Developed-Urban
Pasture/Hayland
Row Crop
Water
Wetland
Woodland

NRCS Natural Resources Conservation Service

USDA-NRCS GIS Staff
Des Moines, IA July 2011

Threatened and Endangered Species *(20)*

	SPECIES	Status: State	Status: Federal
Animals	Acadian Hairstreak	S	
	American Brook Lamprey	T	
	Bald Eagle (Haliaeetus leucocephalus	S	
	Black Redhorse	T	
	Blanding's Turtle (Emydoidea blandingii)	T	
	Bluff Vertigo	E	
	Burbot	T	
	Central Newt	T	
	Columbine Dusky Wing	S	
	Ellipse	T	
	Frigid Ambersnail	E	
	Henslow's Sparrow	T	
	Hubricht's Vertigo	T	
	Indiana Bat	E	E
	Iowa Pleistocene Snail	E	E
	Iowa Pleistocene Vertigo	E	
	Long-eared Owl	T	
	Midwest Pleistocene Vertigo	T	
	Northern Harrier	E	
	Ornate Box Turtle	T	
	Powesheik Skipperling	T	
	Smooth Green Snake	S	

	SPECIES	Status	
		State	Federal
Animals	Spotted Skunk	E	
	Variable Pleistocene Vertigo	T	
	Wood Turtle	E	

	SPECIES	Status	
		State	Federal
Plants	Alderleaf Buckthorn	S	
	American Speedwell	S	
	Balsam Fir	S	
	Beakrush	T	
	Bearberry	E	
	Bicknell Northern Crane's-bill	S	
	Bog Bedstraw	E	
	Bog Birch	T	
	Bog Bluegrass	S	
	Bog Willow	T	
	Brook Lobelia	S	
	Stalked Bulrush	S	
	Bunchberry	T	
	Cliff Conobea	E	
	Crowfoot Clubmoss	S	
	Drooping Bluegrass	S	

	SPECIES	Status	
		State	Federal
Plants	Dwarf Scouring-rush	S	
	Earleaf Foxglove	S	
	False Mermaid-weed	E	
	Fineberry Hawthorn	S	
	Flat Top White Aster	S	
	Frost Grape	S	
	Glade Mallow	S	
	Golden Saxifrage	T	
	Grape-stemmed Clematis	S	
	Grass Pink	S	
	Green Violet	T	
	Green's Rush	S	
	Hill's Thistle	S	
	Hooker's Orchid	T	
	Kidney-leaf White Violet	T	
	Kitten Tails	T	
	Leathery Grape Fern	T	
	Ledge Spikemoss	S	
	Limestone Oak Fern	S	
	Low Bindweed	S	
	Low Nut Rush	T	
	Marginal Shield Fern	T	

	SPECIES	Status	
		State	Federal
	Meadow Bluegrass	S	
	Mountain Maple	S	
	Mountain Ricegrass	S	
Plants	Muskroot	S	
	Nodding Onion	T	
	Northern Adder's-tongue	S	
	Northern Black Currant	T	
	Northern Lungwort	E	
	Northern Monkshood	T	T
	Nuttall Pondweed	S	
	Oak Fern	T	
	One-sided Pyrola	T	
	Ovate Spikerush	S	
	Pale Green Orchid	E	
	Partridge Berry	T	
	Pearly Everlasting	S	
	Pinesap	T	
	Prairie Bush Clover	T	T
	Prickly Rose	E	
	Prince's Pine	T	
	Purple Angelica	S	
	Purple Cliff-brake Fern	E	

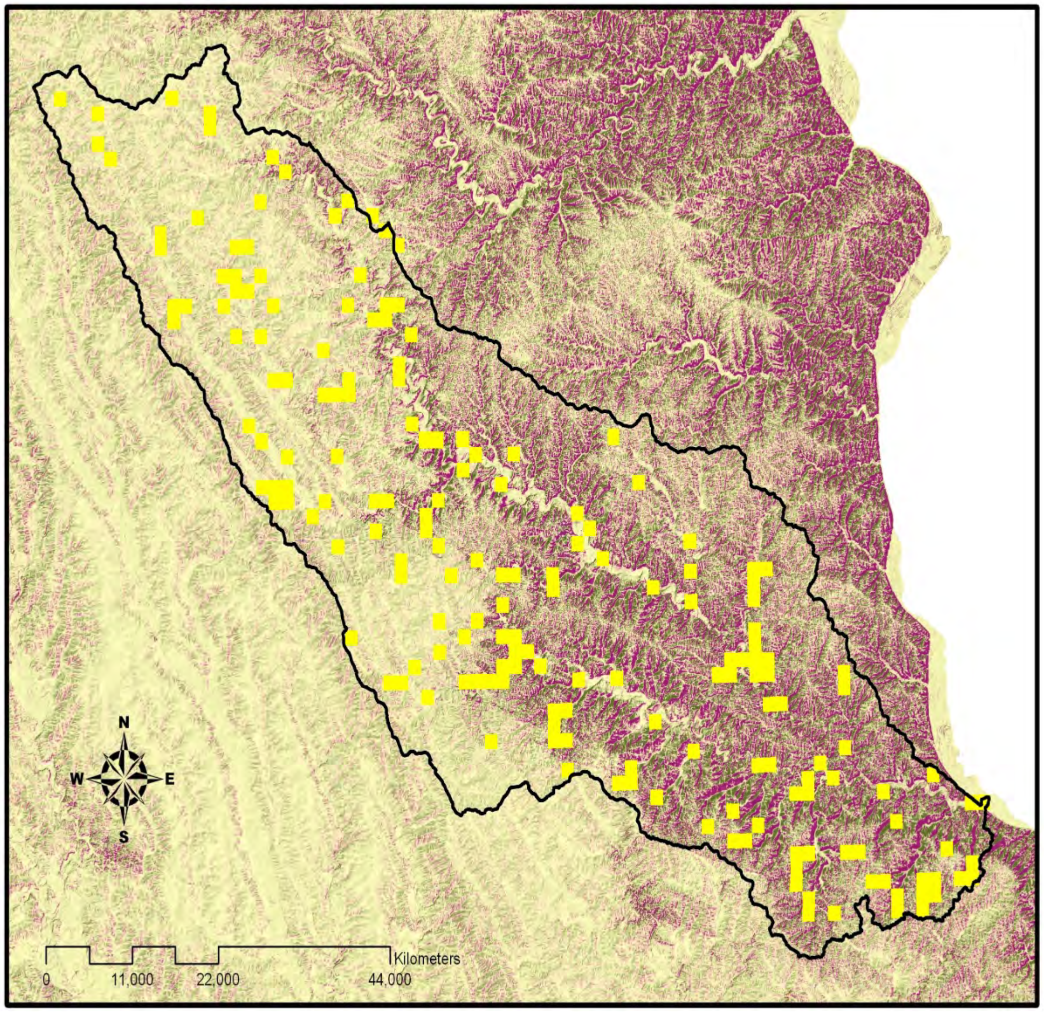
	SPECIES	Status	
		State	Federal
Plants	Purple Fringed Orchid	T	
	Rock Sandwort	S	
	Rosy Twisted Stalk	T	
	Rough Bedstraw	S	
	Roundstem Foxglove	T	
	Rush Aster	T	
	Sage Willow	S	
	Saskatoon Service-berry	S	
	Scarlet Hawthorn	S	
	Star Sedge	S	
	Shadbush	S	
	Shining Willow	T	
	Showy Lady's Slipper	T	
	Slender Arrow Grass	T	
	Slim-leaved Panic Grass	T	
	Small Fringed Gentian	S	
	Small Green Woodland Orchid	S	
	Small Sundrops	T	
	Small White Lady's Slipper	S	
	Snowberry	S	
	Spotted Coralroot	T	
	Tinted Woodland Spurge	S	

	SPECIES	Status	
		State	Federal
Plants	Summer Grape	S	
	Swamp Thistle	S	
	Sweet Indian Plantain	T	
	Tall Cotton Grass	S	
	Tree Clubmoss	T	
	Twinleaf	T	
	Upland Boneset	S	
	Valerian	S	
	Small White Violet	S	
	Virginia Spiderwort	S	
	Water Starwort	S	
	Western Prairie Fringed Orchid	T	T
	Wood Stonecrop	S	
	Woodland Horsetail	T	
	Yellow Monkey Flower	T	
	Yellow Trout-lily	T	
	Yellow-eyed Grass	E	

E = Endangered Species
T = Threatened Species
S = Candidate/Species of Concern

Threatened and Endangered Species (continued)

Turkey River Watershed Iowa Natural Areas Inventory
Threatened and Endangered Species Sections (based on records as of 8/20/10)

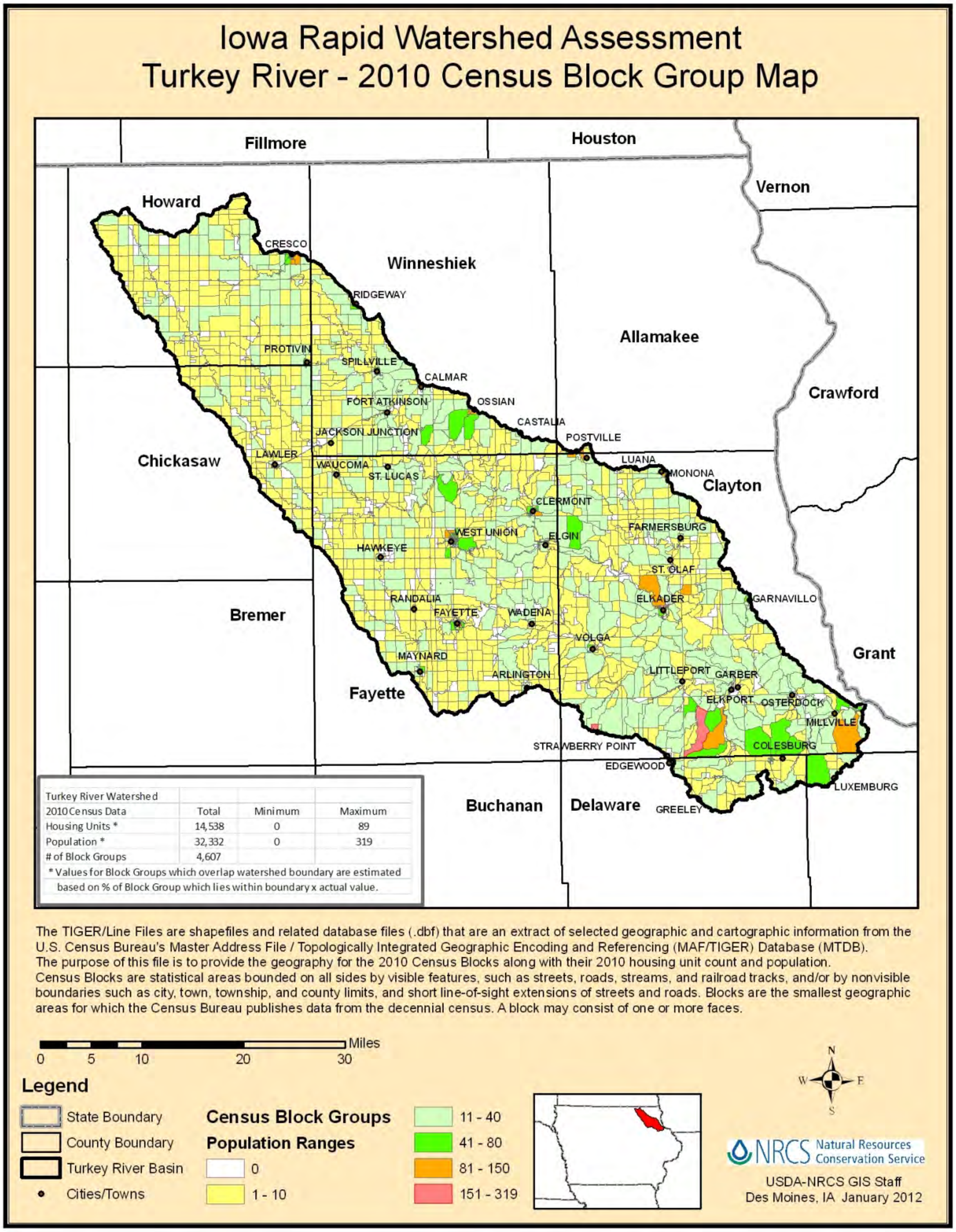


Census and Social Data

There are 5,090 total farm operators in the watershed. Of these, 3,716 are male and 1,374 are female. Seventy-eight percent of the farm operators in the watershed are full time farmers (*21*).

There are 3,404 farms in the Turkey River Watershed with farm size ranging from one acre to over 1,000 acres. Size of farms: 8 percent are 1-9 acres; 19 percent are 10-49 acres; 30 percent are 50-179 acres; 28 percent are 180-499 acres; 10 percent are 500-999 acres; and 5 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 (*21*).

Census and Social Data (continued)



Turkey River Watershed			
2010 Census Data	Total	Minimum	Maximum
Housing Units *	14,538	0	89
Population *	32,332	0	319
# of Block Groups	4,607		

* Values for Block Groups which overlap watershed boundary are estimated based on % of Block Group which lies within boundary x actual value.

Census and Social Data (continued)

NASS Farm Operators Per County
Turkey River Watershed

COUNTY	Acres	% of Watershed	Operators(M/F)	Female Operators	Male Operators	Part-Full Time Op	Full Time Op	Part Time Op
Winneshiek	129,568	12.0%	617	163	454	678	487	191
Howard	153,182	14.1%	655	183	472	706	513	193
Fayette	323,173	29.8%	1,393	352	1,041	1,554	1,129	425
Dubuque	7,484	0.7%	44	11	33	45	31	13
Delaware	31,102	2.9%	190	54	136	195	141	55
Clayton	359,509	33.2%	1,805	502	1,303	1,862	1,369	493
Chickasaw	78,362	7.2%	382	108	274	409	289	120
Allamakee	1,155	0.1%	4	1	3	4	3	1
Total	1,083,535	100.0%	5,090	1,374	3,716	5,453	3,962	1,491

* 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

USDA-NASS Quickstats Query
Weblink - http://quickstats.nass.usda.gov/
Sector: Demographics
Community: Operators
Data Item: Operators, Principal
Domain: Primary Occupation
Locale: County State: Iowa Counties: Select All
Year: 2007

Census and Social Data (continued)

Total Farms By Size Per County
Turkey River Watershed

County	Acres In Wtshd	% of Watershed	1 - 10 Ac	10 - 50 Ac	50 - 180 Ac	180 - 500 Ac	500 - 1000 Ac	> 1000 Ac	Estimated Total
Winneshiek	129,568	12.0%	31	89	138	112	31	16	417
Howard	153,182	14.1%	27	99	135	106	46	30	443
Fayette	323,173	29.8%	81	182	259	274	116	54	966
Dubuque	7,484	0.7%	2	5	10	8	3	1	29
Delaware	31,102	2.9%	15	23	34	35	12	3	122
Clayton	359,509	33.2%	94	197	376	353	112	41	1,173
Chickasaw	78,362	7.2%	27	54	63	65	27	15	251
Allamakee	1,155	0.1%	0	1	1	1	0	0	3
Total	1,083,535	100.0%	277	650	1,016	954	347	160	3,404

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: Economics
Community: Farm Operations
Data Item: Farm Operations
Domain: Area Operated
Locale: County State: Iowa Counties: Select All

Resource Concerns

Resource Concerns by Land Use

Pasture (*22*)

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 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 (*23*)

Cropland is intensively used, primarily for corn and soybeans production, with less than one percent in hay as part of a rotation. Hayland consist of introduced species, predominantly Smooth Bromegrass, Orchardgrass, and Alfalfa. The average slope is 5 percent in the northwestern reach and closer to 10 in the southeastern reach. Soil erosion (sheet and rill, and ephemeral gully), over-application of nutrients (commercial and manure-based) and pesticides, and the effects of these on water quality are the primary resource concerns. Soybean acres have increased in recent years, compared to hayland acres.

Natural Areas/Forestland (*24*)

The most common bottomland species in the Turkey River Valley would be in the following order of abundance: cottonwood, American elm, hackberry, boxelder, willow, walnut, silver maple, black ash, green ash, basswood, bur oak and river birch. The uplands are oak-hickory, or mixed hardwoods (a.k.a. Central Hardwoods) and maple-basswood.

In the bottomland floodplains, the trees are being severely impacted from scour erosion, river meandering and extreme sand and silt depositions from frequent flooding (probably ranging from 3 to 6 year intervals between floods that are so severe they could almost be called, “stand replacing disturbances”). Woody regeneration is also being moderately to severely impacted by heavy deer browsing and heavy herbaceous plant competition. The riparian zones are also being impacted by invasive exotic species like Asian hops, reed canary grass and Japanese knotweed. Most of the recruitment of young trees in the floodplain occurs after severe floods when cottonwood and willow seed germinate on the fresh bare alluvial materials. The upland forests are in relatively good health except for the threat from Emerald Ash Borer.

More recently, we are losing many acres of forestland to row crop conversion because of high commodity prices.

Storm damage from ice, snow, wind and rain is the biggest negative impact on the health of Iowa's existing forests. However, evidence of these disturbances is usually short lived because most landowners will savage harvest any storm damaged trees that are merchantable very quickly after the storm event.

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 and pest management plans; the use of cover crops; agricultural waste structures; and the implementation of water quality improvement projects.

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. Ongoing efforts are needed to increase utilization of conservation tillage, no-till, cover crops and contoured buffer strips. Educational activities are needed to promote extension of expiring CRP contracts and cover crops.

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.

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. *(23)*

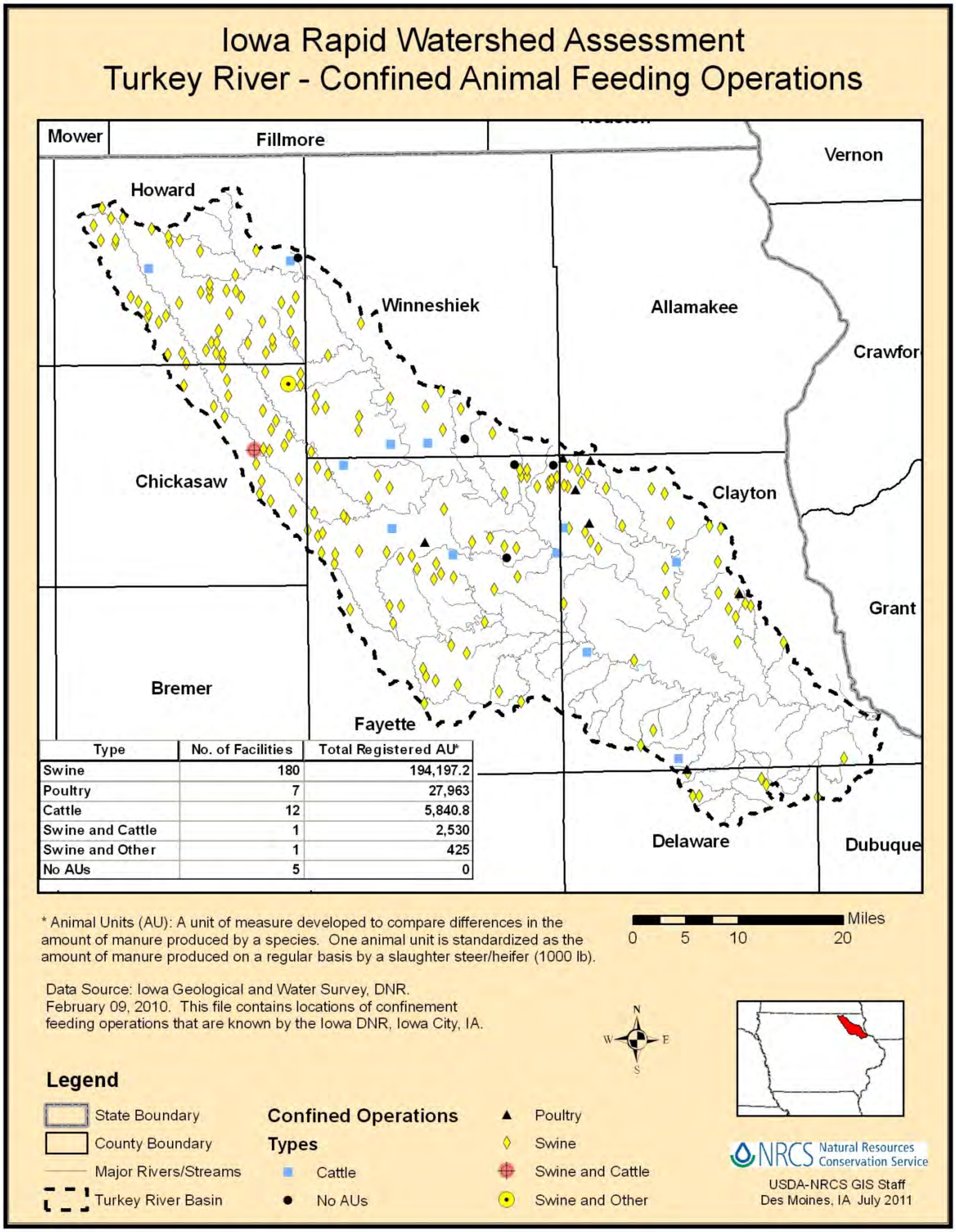
Other concerns that will be addressed in the future include the preservation, protection, and enhancement of natural areas, including rare plant and animal species. This will require species inventories and an educational campaign. *(23)*

In the state of Iowa, as of October 2012, there were no biofuel plants in operation or under construction. At this time, there is one ethanol plant that is in operation located near Lawler, Iowa.

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.

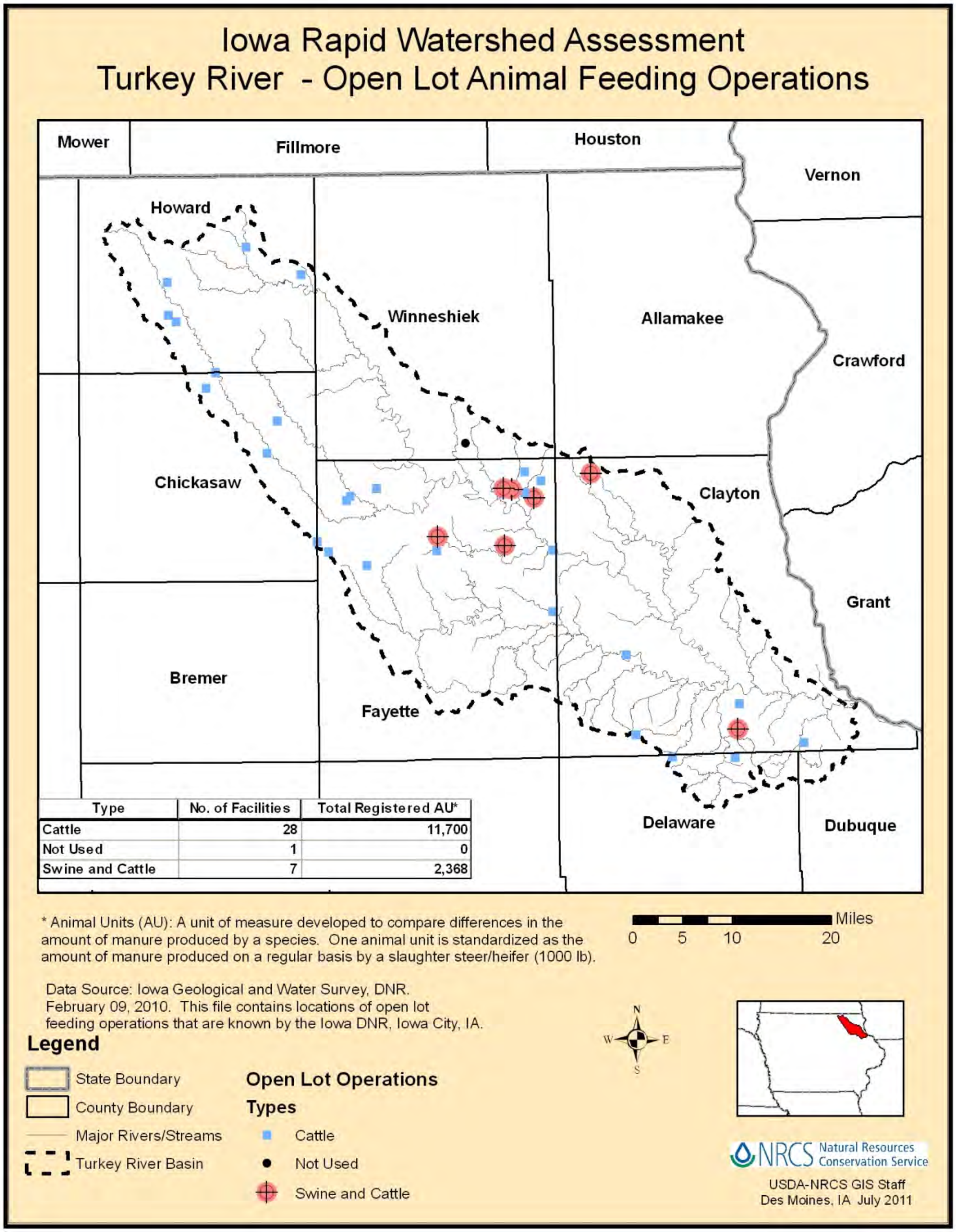
The primary natural resource concerns with animal feeding operations are water and air pollution. Manure contains the nutrients nitrogen and phosphorus, which, when not managed properly on agricultural land, can pollute nearby streams, lakes, and other waters. EPA's regulation of Animal Feeding Operations (AFOs) and Confined Animal Feeding Operations (CAFOs) provide pollution prevention and environmental protection, while maintaining the country's economic and agricultural competitiveness. There are 206 Confined Animal Feeding Operations (CAFO) in the watershed, with a total of 230,956 animal units. Eighty-seven percent of the CAFOs are swine and the remaining thirteen percent are split between cattle, poultry and not recorded operations. There are 36 Open Lot Animal Feeding Operations (OLAFO) in the watershed, with a total number of 14,068 animal units. Eighty-three percent of the OLAFOs are cattle, and the remaining seventeen percent are split between swine, swine and cattle, cattle and horses, and not recorded operations (*25*).

Resource Concerns (continued)



Type	No. of Facilities	Total Registered AU*
Swine	180	194,197.2
Poultry	7	27,963
Cattle	12	5,840.8
Swine and Cattle	1	2,530
Swine and Other	1	425
No AUs	5	0

Resource Concerns (continued)



Type	No. of Facilities	Total Registered AU*
Cattle	28	11,700
Not Used	1	0
Swine and Cattle	7	2,368

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. *(26)*

SWAPA *	Specific Resource Concerns/Issues	Cropland	Pasture	Natural Areas
Soil Erosion	Sheet and Rill	X		
	Ephemeral Gully	X		
	Classic Gully		X	
	Streambank	X	X	
	Wind	X		
	Shoreline			X
Water Quality, Surface	Suspended Sediment & Turbidity	X	X	
	Pesticides	X		
	Excessive Nutrients & Organics	X	X	
	Pathogens	X	X	
Water Quality, Ground	Excessive Nutrients & Organics	X		
Water Quantity	Excessive Runoff, Flooding or Ponding	X		
	Excessive Seepage	X		
Soil Condition	Animal Waste & Other Organics (N,P,K)	X		
	Organic Matter Depletion	X		
	Compaction			
	Subsidence			
	Damage from Soil Deposition			
Plant Condition	Productivity, Health, & Vigor		X	X
	Forage Quality & Palatability		X	X
	Noxious & Invasive Species		X	X
Domestic Animals	Inadequate Quantity & Quality Feed & Forage		X	
	Inadequate Stock Water		X	
	Inadequate Shelter			
	Stress & Mortality		X	
Air Quality	Excessive Greenhouse Gas (CO2)		X	
	Particulate Matter (PM 10&2.5)		X	
	Objectionable Odors		X	
	Undesirable Air Movement		X	
	Adverse Air Temp			
Wildlife	Inadequate cover & shelter			X
	T & E Species			X
	Inadequate Food, Water & Space			X

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

Special Considerations

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 (27).

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"). *(27)*.

IDNR's SWP Program has developed a list of Priority Community Water Supplies. The Turkey River Watershed includes three Priority SWP communities, including the towns of Elgin and West Union, which are located in Fayette County. The watershed also includes the Priority SWP community of Strawberry Point located in Clayton County. These communities are identified by the DNR SWP Program as three of the top 40 priority communities listed for high nitrates *(27)*.

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.

Flooding has also been a problem for the Turkey River watershed. As an example of how flooding can be mitigated, a feasibility study was conducted on Otter Creek watershed in Fayette County. The study consists of analyzing the watershed in a future condition without detention structures and reanalyzed later with 55 detention structures placed strategically in the watershed. The peaks flows for all frequency storms were reduced with detention in the watershed. For more details, see Appendix A at the end of this assessment.

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Appendix A

Otter Creek Flood Mitigation Feasibility Study

Otter Creek is a cold water stream which drains 47.2 square miles and is located in Fayette County, Iowa. It was chosen by NRCS's Hydrologist to demonstrate how flooding can be mitigated with detention structures placed within its tributaries.

The two main reasons Otter Creek was chosen as a feasibility study is due to its environmental value as a cold water stream and because it has caused flooding problems for the cities of West Union and Elgin, Iowa.

The first part of the study is a hydrologic analysis of the watershed where peak flows for the 2, 5, 10, 25, 50 and 100 year floods are modeled. These flows have the probability of occurring 50%, 20%, 10%, 4%, 2%, and 1% of the time in any given year, respectively. To do this, five U.S.G.S. stream gages in the Turkey River watershed were statistically analyzed using the Log Pearson III plotting positions of annual peak discharges and the Weibull method. Frequency discharges were also computed using a computer model called "Sites". "Sites" computes runoff peaks and volumes when rainfall depths, runoff curve number, and time of concentration are input for the 2 through 100 year rainfall events. The comparison of Site's output and the gage data show the model has reasonable results. This initial analysis assumes that no detention structures are located in the watershed and is considered the "future without project" condition.

The second part of the study consisted of placing 55 detention structures in the tributaries of Otter Creek to determine their affect on peak flows. These structures were placed strategically considering adequacy of topography for a structure location as well as placement above roads to be protected. The drainage areas for these detention sites range from 54 to 597 acres, with the total area behind structures of 18.2 square miles (39% of the watershed). With structures in place, the study is considered the "future with project" condition.

The "future with project" condition was compared to the "future without project" condition. The results show that the "future with project" condition flood flows were approximately 35-39% lower than the "future without project" condition (See Peak Discharge Table). Discharges from the structures can vary somewhat depending on their design criteria, so it is important to note that some structures will not have auxiliary spillway flow until after the 100-year rainfall is exceeded, primarily those sites which are larger in drainage area. Smaller structures similarly will have their auxiliary spillways flow during lower depth rainfall events, such as the 50-year rainfall.

Peak Discharge Table

Peak Discharge Method	2-year Peak Discharge (cfs)	5-year Peak Discharge (cfs)	10-year Peak Discharge (cfs)	25-year Peak Discharge (cfs)	50-year Peak Discharge (cfs)	100-year Peak Discharge (cfs)
USGS Regional Equation	**1459**	**3067**	**4370**	**6130**	**7467**	**8912**
USGS WIE Estimates*	**1000**	**2500**	**4000**	**6000**	**7500**	**9000**
Sites model Version 2005.1.5- No Structures in Place	**1798**	**3443**	**4376**	**5837**	**6900**	**8766**
Sites model with Structures in Place (39% of area behind strs)	**1105**	**2115**	**2689**	**3586**	**4239**	**5385**
Little Paint Gage @ Waterville 42.8 sq.mi. (Log Pearson III)	**2188**	**3658**	**4669**	**5950**	**6962**	**7949**

*Weighting of Independent Estimates from USGS

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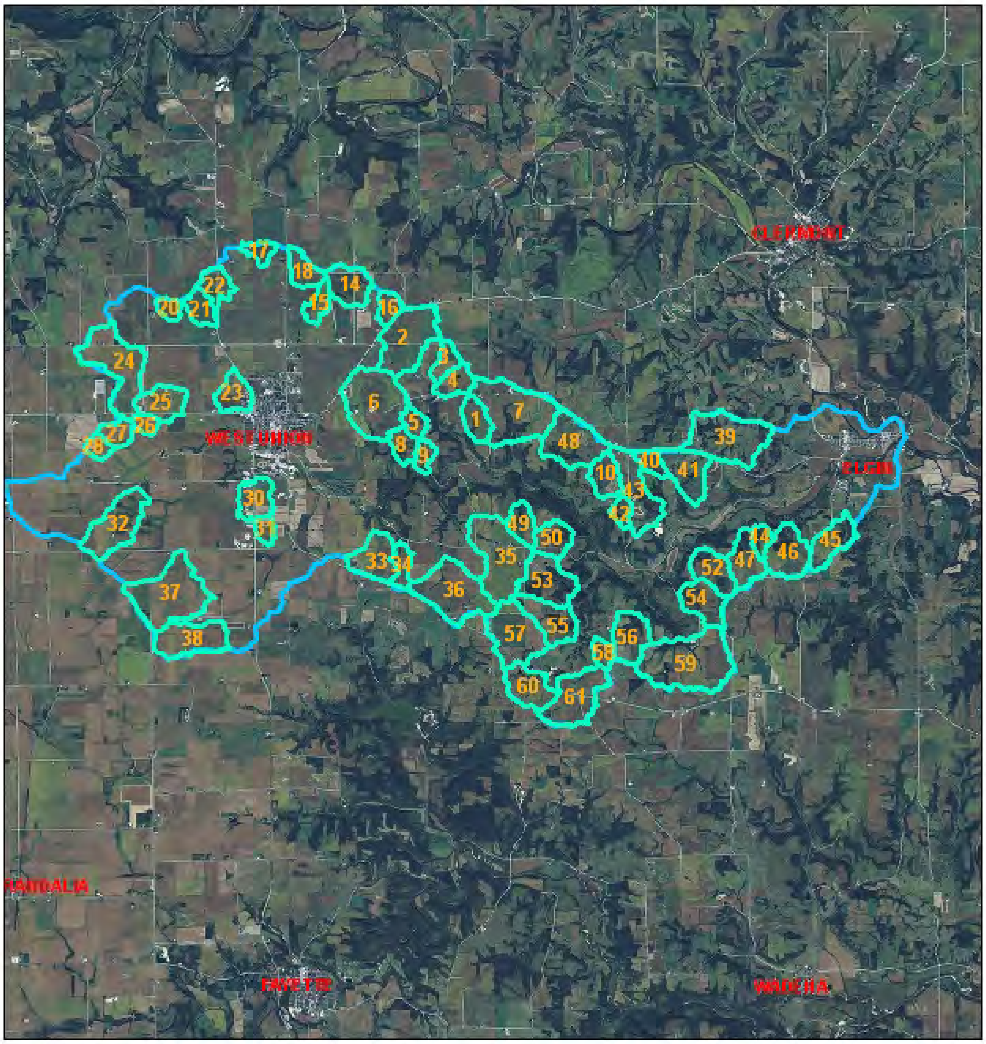
January 2013

Turkey River Watershed
Otter Creek Feasibility Study
Fayette County, Iowa



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L. Foreman
NRCS
Des Moines
January 2013

Legend

otter_creek_site_watersheds

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