Price Creek Watershed Management Plan

Iowa and Benton County Soil and Water Conservation Districts

APPROVED OCTOBER 2010

Cover Graphic: *Young Corn* by Grant Wood, 1931. According to historical accounts is of an actual Price Creek hillside.

PRICE CREEK WATERSHED MANAGEMENT PLAN
Iowa and Benton County Soil and Water Conservation Districts

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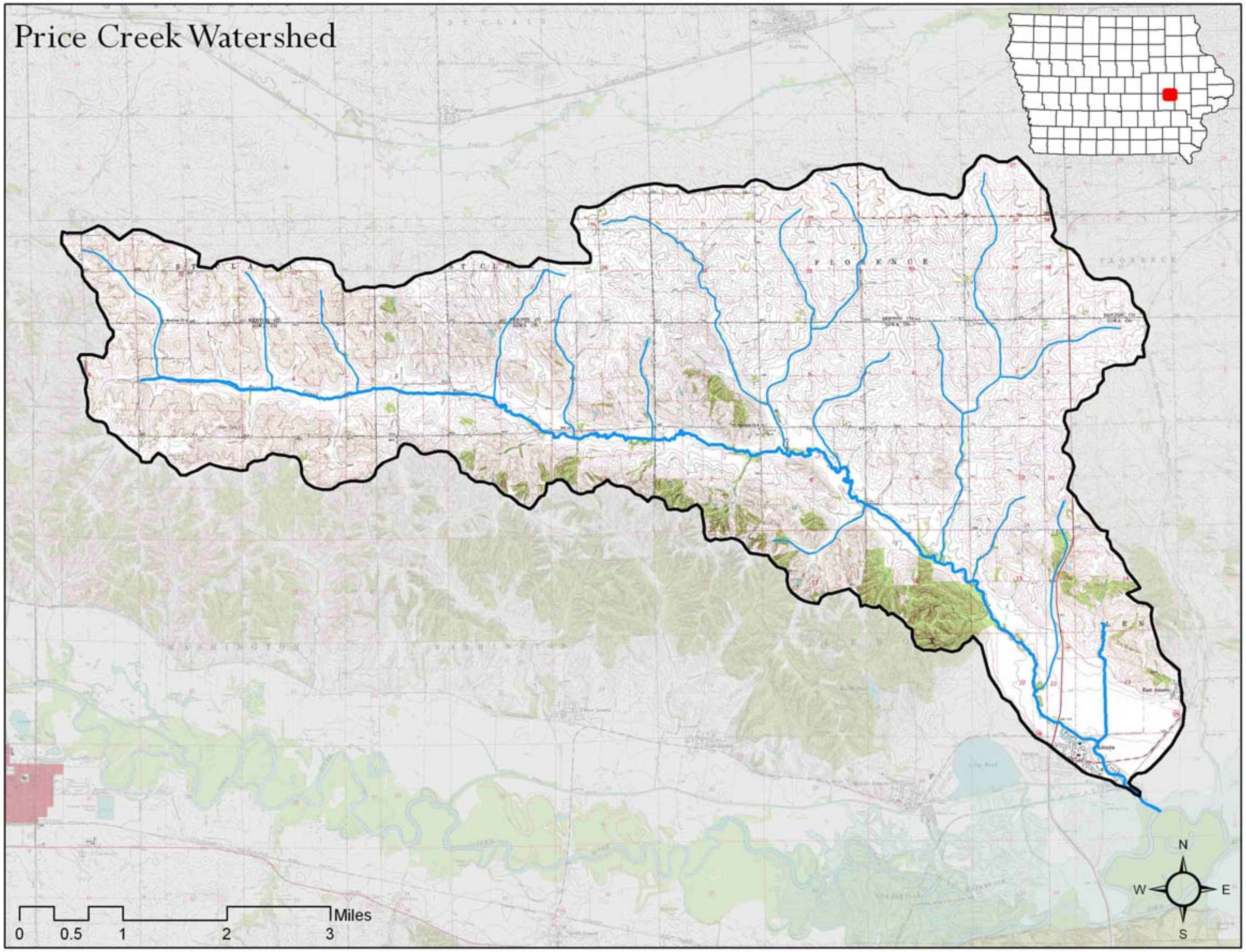
PART 1

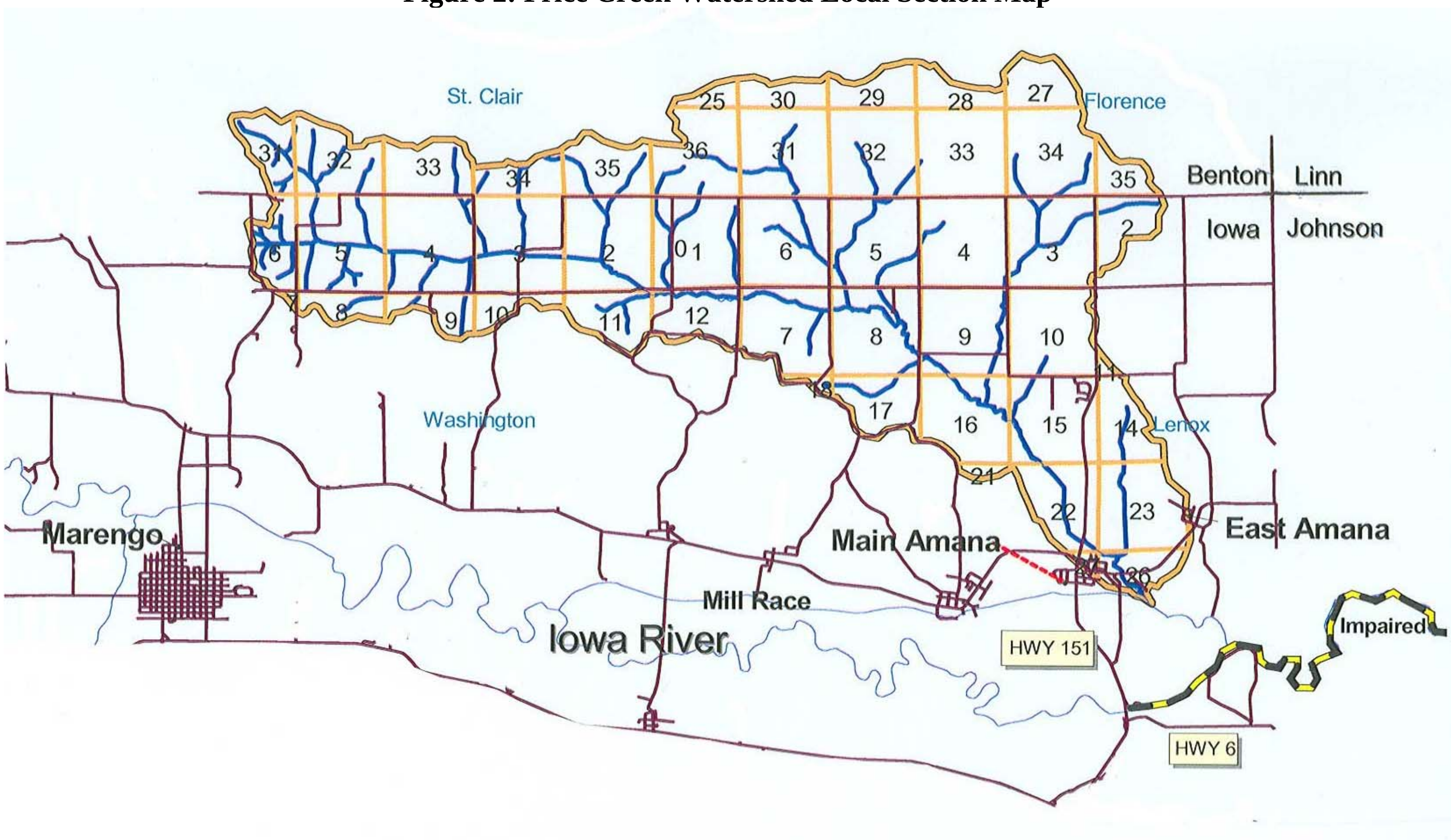
Figure 1: Price Creek Watershed Map



WATERSHED CHARACTERISTICS:

Price Creek is located in Washington and Lenox Townships in northeastern Iowa County and St. Clair and Florence Townships in southeastern Benton County. Price Creek's watershed is 18,838 acres in size. Price Creek is 13 miles long and its tributaries and perennial flowing ditches contribute an additional 28.5 miles. The 8-digit Hydrologic Unit Code (HUC) is 07080208 - Iowa Middle. The stream has its origins in Section 6 of Washington Township and flows through Sections 5, 4, 3, 2, 11, and 12 before entering Lenox Township, where it flows through sections 7, 8, 9, 16, 15, 22 before it joins the Mill Race southeast of Amana as it enters the Iowa River in Section 26. See Figure 2 Watershed Local Section Map below.

Figure 2: Price Creek Watershed Local Section Map



The majority of the watershed is rural (99%) with the primary land use being cropland and livestock production. Price Creek serves as an important source of water for livestock in the watershed. In addition, Price Creek is a highly visible stream in Iowa because it runs through the Village of Amana, one of the State's top visited tourist destinations.

The largest percentage of the watershed is in crop production and is predominantly classified as highly erodible land (HEL). The additional one percent is located at the bottom of the watershed where the stream passes through the Amana Colonies. Main Amana, through which Price Creek flows, is the primary visitors' destination of the seven villages. Main Amana is home to the Old Amana Convention Center and Theater, which is located within 1/3 mile of the stream. A sixty-acre RV campground site with 420 hook-ups is also immediately adjacent to Price Creek. Housing developments have been expanding further into the rural areas north and west of Main Amana within the Price Creek Watershed. Additionally, the Amana Society is planning new developments including a 100-room hotel, water park, timeshare condos, and most recently, a large state of the art pasta manufacturing facility. All of these would be located in the Price Creek Watershed within one mile of the stream.

Since 2005 the Iowa and Benton Soil and Water Conservation Districts (ICSWCD/BCSWCD) in a collaborative effort with the Iowa Department of Natural Resources' Watershed Improvement Section (IDNR), Iowa Department of Agriculture and Land Stewardship's Division of Soil Conservation (IDALS-DSC), USDA's Natural Resources Conservation Service (NRCS), local landowners, and volunteers have prioritized the Price Creek Watershed.

HYDROLOGY

Price Creek is 13 miles long and its tributaries and perennial flowing ditches contribute an additional 28.5 miles. The drainage network in the cropland is well connected by tile of varying extent and age.

CLIMATE

The average annual rainfall in the Price Creek Watershed is about 36 inches. Approximately 50% of the precipitation falls during the growing season. The average growing season is 143 days, nine years in ten. Approximately 60% of the yearly precipitation falls within the growing season.

GEOLOGICAL CHARACTARISTICS

The Price Creek valley is two miles wide at the upper reach and up to 4 miles at it's widest. The watershed landscape consists of narrow ridges and moderate to steep slopes that developed on the northern part of the Southern Iowa Drift Plain. Landforms here consist of a layer of loess - windblown glacial silt- over an earlier layer of Kansan glacial drift. The topography of this region consists of rolling hills and level upland areas cut by small drainages, like Price Creek, and flat alluvial plains along major rivers.

In 1910, S.W. Stookey provided the first detailed description of the geology of Iowa County in a report published in the Iowa Geological Survey. Stookey noted that the county had not been the subject of much prior inquiry because there were few outcroppings of rocks, and that the county lay north of the Iowa coal fields and contained "no mineral deposits of economic importance."
Among the few geologists to work in Iowa County prior to Stookey was Dr. David Dale Owen (1807-1860), a pioneering American geologist, who traveled past the mouth of Price Creek during his survey of Iowa and Wisconsin in 1849. Owen made a boat trip up the Iowa River in 1849, giving

his impressions of the topography along the river. In Iowa County, he made special note of the Carboniferous limestone that he observed across the county.

James Hall and J. D. Whitney, in their 1858 *Report on the Geological survey of the state of Iowa : embracing the results of investigations made during portions of the years 1855, 56 & 57*, noted the almost complete lack of rock exposed in Iowa county. In his 1910 study, Stookey noted that Iowa County is covered with a thick mantle of drift that ranges from a few feet to more than 300 feet in its depth. The topographic features of the county, Stookey noted, are due to the distribution of this drift material rather than to any rocks. Price Creek is located in part in the flood plain of the Iowa River which, as Stookey noted, is bordered by hills from 100 to 200 feet above the level of the river. In Lenox Township, these hills extend 1 -3 miles from the river and end in "an irregular line of spurs and ridges." Of Price Creek, Stookey noted that the exposure of Kinderhook limestone at Amana in the bank of Price Creek, together with some outcroppings of Carboniferous sandstones all within 8 – 10 miles, were, according to Stookey, the only exposed indurated rocks in the entire county.

Also along the creek, although not specifically mentioned by Stookey, was an outcropping of sandstone quarried by the Amana settlers for building purposes. Stookey quoted the description of Samuel Calvin (1840 - 1911) a legendary professor at the University of Iowa and State Geologist, of the Des Moines sandstone found in the Amana area: *The deposit is here heavy bedded, and often across bedded sandstone, composed of coarse grains of silica imperfectly cemented with iron oxide and calcium carbonate. The colors are dingy red and brown with some darker purplish streaks*.

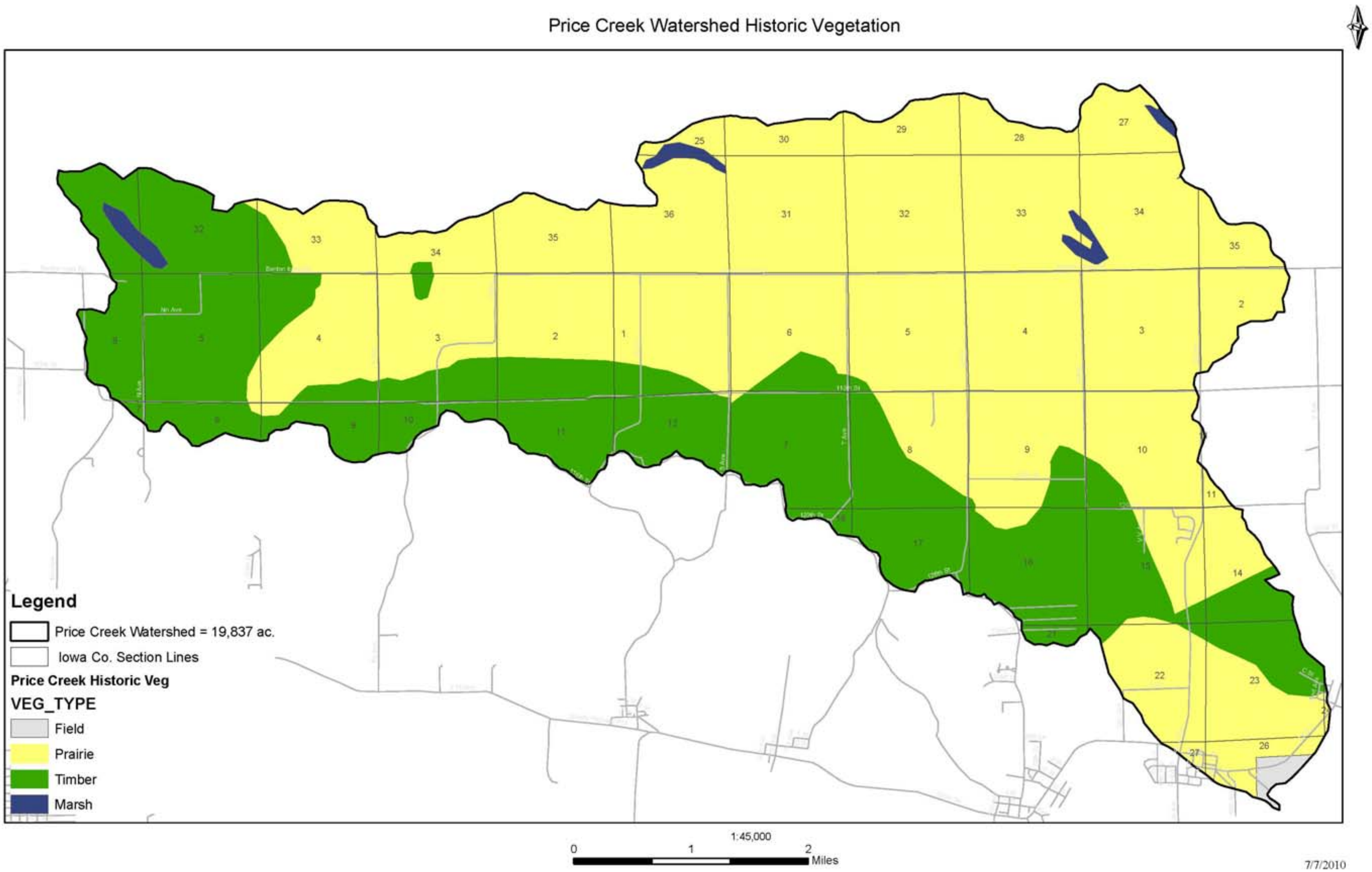
SOILS

The southern and western third of the watershed are primarily a Fayette-Downs Association. The northern and eastern parts of the watershed are Bassett-Dinsdale-Kenyon Association. The stream and bottomlands are a Colo-Bremer-Nevin-Nodaway Association.

HISTORICAL LAND COVER - Government Land Office Survey (1843)

After acquiring the land that includes most of Iowa County by treaty from the Sauk and Fox (Meskwaki) Indians in 1842, the government set about the process of preparing the land for settlement. Before the government could sell land it had acquired to aspiring pioneers or speculators, the land had to be surveyed. It was this survey that placed the one-mile square grid over Iowa's landscape. The grid itself was the invention of Thomas Jefferson, who believed that distributing land in 40 to 80 acre parcels to yeomen farmers would be the best way to build his idea of a civil society. During the survey land characteristics were noted including vegetation. The Price Creek Watershed was 65% Prairie and 34% Timber (Figure 3).

Figure 3: Price Creek Watershed Historic Land Cover



CURRENT LAND COVER

Table 1 below provides a more detailed summary of the existing land use and other data relative to the Price Creek Watershed.

Table 1: Price Creek Watershed Land Use Data

Land use	Acres	Percent
Cropland	11,460	58%
Pasture	2,700	14%
Hayland	1,685	9%
CRP	2,150	11%
Woodlands	450	2%
Farmsteads & Roads	350	2%
Urban (Amana & East Amana)	190	1%
Parkland	100	<1%
Water & Streams	125	1%
HEL	12,600	64%
NHEL	7,238	36%
Hydric	200	<1%
Producers	53	100%
Livestock Producers	28	53%
Benton County land	6,002	30%
Iowa County land	13,836	70%
Total land in watershed	18,838	100%

Typical Cropping and Management Practices: According to land use and tillage inventory surveys there are six typical row crop and two typical row crop with meadow rotations practiced in the Price Creek Watershed. The Price Creek Watershed Existing Land Use is shown in Figure 4.

For continuous cropland:
- C-B NT
- C-B SMT-NT
- C-B NT-SMT
- C-C-B NT-FMT-NT
- C-B SMT-FMT
- C-B CONVENTIONAL SMT-FMT

For row crop with meadow:

C-B-C-O-M-M-M

C-O-M-M-M

Legend:

NT=no till

SMT=spring mulch till

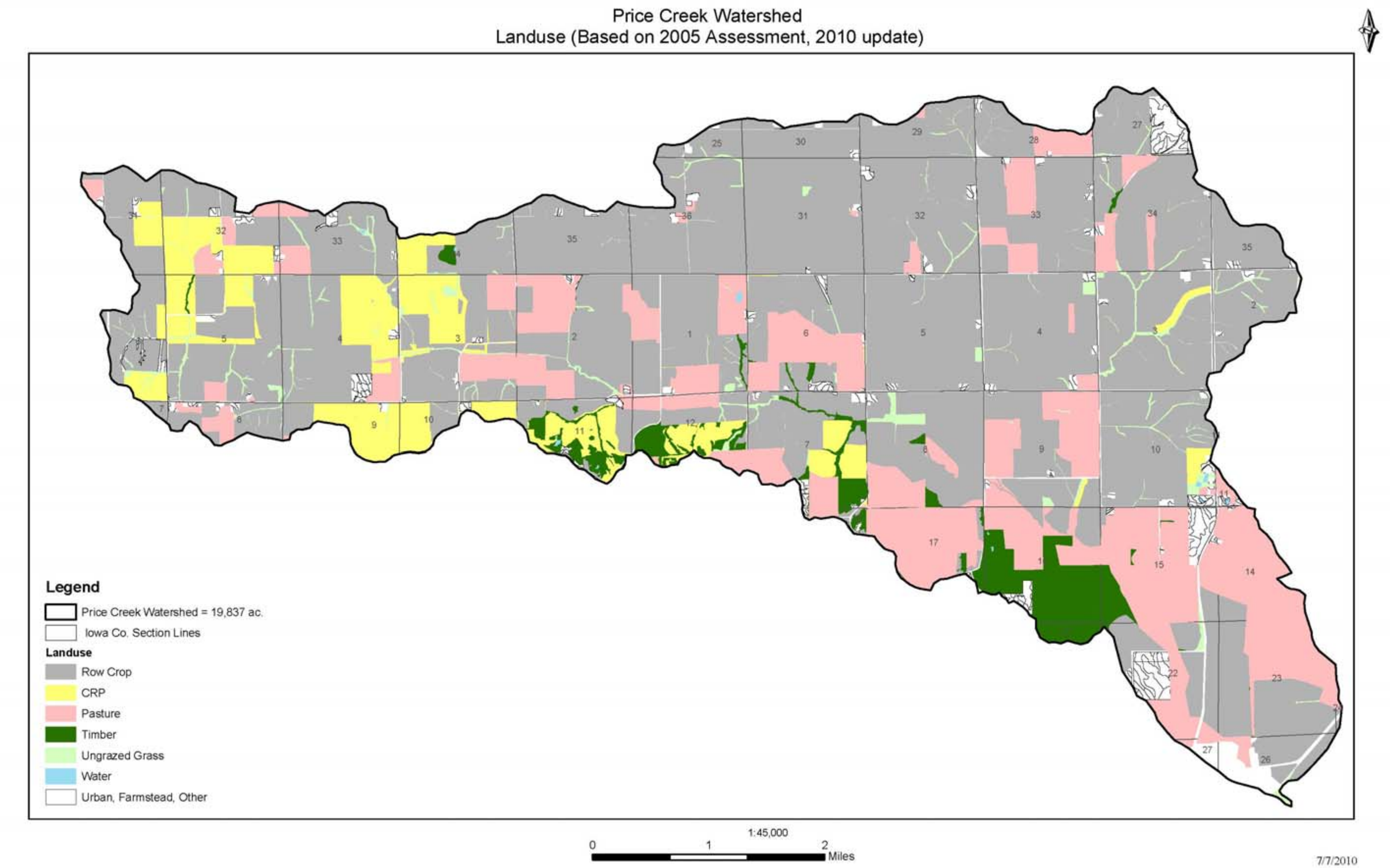
FMT=fall mulch till

B=beans

C=corn

O=oats M-meadow

Figure 4: Price Creek Watershed Existing Land Use



PART 2

IDENTIFICATION OF CAUSES AND SOURCES OF IMPAIRMENT

WATER QUALITY STANDARDS AND DESIGNATIONS

Price Creek's watershed is 18,838 acres in size. Price Creek is 13 miles long and its tributaries and perennial flowing ditches contribute an additional 28.5 miles. The 8-digit Hydrologic Unit Code (HUC) is 07080208 - Iowa Middle. The 10 Digit HUC is 0708020810 – Iowa River, Coralville Reservoir. The 12 Digit HUC is 070802081002 – Price Creek.

Price Creek is divided into two segments (IA 02-IOW-0175_1 and IA 02-IOW-0175_2) and is listed in the 305(b) report as such. The main segment, IA 02-IOW-0175_2, is 5.5 miles and has designated uses of aquatic life (BWW-1) and recreation (A1). The shorter segment, IA 02-IOW-0175_1 is 1.3 miles has designated uses of aquatic life (BWW-1), fish consumption (HH) and recreation (A1). These designations are relatively new for this waterbody, prior to 2006 Price Creek was designated as general use under the Iowa Water Quality Standards and little water quality data was collected.

In 1992 a stream use assessment was completed and in the 1996 and 1998 305(b) report Price Creek was found to be a threatened water body. However it was never officially added to the 303(d) list because of its general use designation at the time. In 2006 the Iowa Department of Natural Resources passed new Iowa Water Quality Standards that changed Price Creek's designations' to BWW-1, A1 and HH. Due to the previous general use designation and lack of data at that time it was not included on Iowa's list of 2008 impaired waters. The Iowa 2008 305(b) report indicates there is insufficient water quality information available to assess use support for both Price Creek segments. Thus, this water body is considered not assessed for the 2008 303(d) list.

The local Iowa Soil and Water Conservation District saw there were apparent resource concerns in the Price Creek Watershed. Price Creek watershed was theorized to contribute bacteria to the Iowa River. Years of data and additional modeling is needed to appropriately quantify the bacteria load from Price Creek to the Iowa River.

IOWATER, a volunteer water quality monitoring program identified numerous sites with high *E. coli* levels on Price Creek since it began testing in 2005. Consequently since 2005, additional data has been gathered and Price Creek will be added to Iowa's 2010 303(d) list due to high bacteria. 85% of the bacteria samples collected since 2005 were above the Iowa Water Quality Standard daily maximum of 235 cfu/100ml.

Land use assessment information gathered since 2005 also indicated soil erosion is another issue in this watershed. The land use assessments, water quality data, and local interests indicate the primary pollutants needing to be addressed are sediment and bacteria. There are no Iowa Water Quality Standards for sediment, however locally this is an important issue to address.

Water quality data on the following page in Table 2, shows the high levels of bacteria found in Price Creek.

Table 2: Price Creek Watershed Bacteria Data

Highlighted samples exceed the bacteria limit as listed in the Iowa Water Quality Standards. The daily sample max cannot exceed 235 cfu/100ml, the average monthly sample cannot exceed 126 cfu/100ml. For simplicity sake only values above 235 cfu/100ml were highlighted. The boxes with the bold borders indicate the southern most outlet point on Price Creek which drains to the Iowa River.

	Station Name	Start Date	Parameter	Result	Units
1	Price Creek (PP Ave. - PC03)	7/16/2005	*E. coli*	5400	cfu/100ml
2	Price Creek and Hwy 151 (PC10)	7/16/2005	*E. coli*	4800	cfu/100ml
3	Price Creek (New Jerusalem Church T Ave. - PC07)	7/16/2005	*E. coli*	3600	cfu/100ml
4	Price Creek (above campground - PC09)	7/16/2005	*E. coli*	2100	cfu/100ml
5	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	7/16/2005	*E. coli*	1200	cfu/100ml
6	Price Creek (110th St. and S Ave. - PC06)	7/16/2005	*E. coli*	1100	cfu/100ml
7	Price Creek (Amana - PC11)	7/16/2005	*E. coli*	1000	cfu/100ml
8	Price Creek (R Ave. - PC05)	7/16/2005	*E. coli*	810	cfu/100ml
9	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	7/16/2005	*E. coli*	750	cfu/100ml
10	Price Creek (U Ave. and 118th St. - PC08)	7/16/2005	*E. coli*	580	cfu/100ml
11	Price Creek (P Ave. - PC02)	7/16/2005	*E. coli*	560	cfu/100ml
12	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	10/15/2005	*E. coli*	1000	cfu/100ml
13	Price Creek (110th St. and S Ave. - PC06)	10/15/2005	*E. coli*	840	cfu/100ml
14	Price Creek and Hwy 151 (PC10)	10/15/2005	*E. coli*	820	cfu/100ml
15	Price Creek (R Ave. - PC05)	10/15/2005	*E. coli*	490	cfu/100ml
16	Price Creek (New Jerusalem Church T Ave. - PC07)	10/15/2005	*E. coli*	450	cfu/100ml
17	Price Creek (P Ave. - PC02)	10/15/2005	*E. coli*	360	cfu/100ml
18	Price Creek (U Ave. and 118th St. - PC08)	10/15/2005	*E. coli*	120	cfu/100ml
19	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	10/15/2005	*E. coli*	100	cfu/100ml
20	Price Creek (U Ave. and 118th St. - PC08)	5/13/2006	*E. coli*	590	cfu/100ml
21	Price Creek (Amana - PC11)	5/13/2006	*E. coli*	510	cfu/100ml
22	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	5/13/2006	*E. coli*	470	cfu/100ml
23	Price Creek (PP Ave. - PC03)	5/13/2006	*E. coli*	400	cfu/100ml
24	Price Creek (R Ave. - PC05)	5/13/2006	*E. coli*	370	cfu/100ml
25	Price Creek (110th St. and S Ave. - PC06)	5/13/2006	*E. coli*	360	cfu/100ml
26	Price Creek (above campground - PC09)	5/13/2006	*E. coli*	290	cfu/100ml
27	Price Creek and Hwy 151 (PC10)	5/13/2006	*E. coli*	280	cfu/100ml
28	Price Creek (New Jerusalem Church T Ave. - PC07)	5/13/2006	*E. coli*	240	cfu/100ml
29	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	5/13/2006	*E. coli*	100	cfu/100ml
30	Price Creek (P Ave. - PC02)	5/13/2006	*E. coli*	91	cfu/100ml
31	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	10/14/2006	*E. coli*	1800	cfu/100ml
32	Price Creek (R Ave. - PC05)	10/14/2006	*E. coli*	1100	cfu/100ml
33	Price Creek (above campground - PC09)	10/14/2006	*E. coli*	1100	cfu/100ml
34	Price Creek (110th St. and S Ave. - PC06)	10/14/2006	*E. coli*	810	cfu/100ml
35	Price Creek and Hwy 151 (PC10)	10/14/2006	*E. coli*	720	cfu/100ml
36	Price Creek (Amana - PC11)	10/14/2006	*E. coli*	370	cfu/100ml
37	Price Creek (U Ave. and 118th St. - PC08)	10/14/2006	*E. coli*	120	cfu/100ml
38	Price Creek (PP Ave. - PC03)	10/14/2006	*E. coli*	64	cfu/100ml
39	Price Creek (New Jerusalem Church T Ave. - PC07)	10/14/2006	*E. coli*	50	cfu/100ml
40	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	5/12/2007	*E. coli*	430	cfu/100ml
41	Price Creek (Amana - PC11)	5/12/2007	*E. coli*	360	cfu/100ml
42	Price Creek and Hwy 151 (PC10)	5/12/2007	*E. coli*	290	cfu/100ml
43	Price Creek (R Ave. - PC05)	5/12/2007	*E. coli*	240	cfu/100ml
44	Price Creek (110th St. and S Ave. - PC06)	5/12/2007	*E. coli*	240	cfu/100ml

45	Price Creek (above campground - PC09)	5/12/2007	*E. coli*	210	cfu/100ml
46	Price Creek (New Jerusalem Church T Ave. - PC07)	5/12/2007	*E. coli*	200	cfu/100ml
47	Price Creek (U Ave. and 118th St. - PC08)	5/12/2007	*E. coli*	140	cfu/100ml
48	Price Creek (P Ave. - PC02)	5/12/2007	*E. coli*	100	cfu/100ml
49	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	5/12/2007	*E. coli*	73	cfu/100ml
50	Price Creek (PP Ave. - PC03)	5/12/2007	*E. coli*	64	cfu/100ml
51	Price Creek (above campground - PC09)	7/14/2007	*E. coli*	1400	cfu/100ml
52	Price Creek (P Ave. - PC02)	7/14/2007	*E. coli*	990	cfu/100ml
53	Price Creek and Hwy 151 (PC10)	7/14/2007	*E. coli*	950	cfu/100ml
54	Price Creek (PP Ave. - PC03)	7/14/2007	*E. coli*	710	cfu/100ml
55	Price Creek (Amana - PC11)	7/14/2007	*E. coli*	650	cfu/100ml
56	Price Creek (U Ave. and 118th St. - PC08)	7/14/2007	*E. coli*	590	cfu/100ml
57	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	7/14/2007	*E. coli*	530	cfu/100ml
58	Price Creek (R Ave. - PC05)	7/14/2007	*E. coli*	420	cfu/100ml
59	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	7/14/2007	*E. coli*	410	cfu/100ml
60	Price Creek (110th St. and S Ave. - PC06)	7/14/2007	*E. coli*	410	cfu/100ml
61	Price Creek (New Jerusalem Church T Ave. - PC07)	7/14/2007	*E. coli*	310	cfu/100ml
62	Price Creek (Amana - PC11)	10/13/2007	*E. coli*	2000	MPN/100ml
63	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	10/13/2007	*E. coli*	1900	MPN/100ml
64	Price Creek (110th St. and S Ave. - PC06)	10/13/2007	*E. coli*	1500	MPN/100ml
65	Price Creek and Hwy 151 (PC10)	10/13/2007	*E. coli*	1500	MPN/100ml
66	Price Creek (above campground - PC09)	10/13/2007	*E. coli*	1400	MPN/100ml
67	Price Creek (R Ave. - PC05)	10/13/2007	*E. coli*	1100	MPN/100ml
68	Price Creek (PP Ave. - PC03)	10/13/2007	*E. coli*	840	MPN/100ml
69	Price Creek (P Ave. - PC02)	10/13/2007	*E. coli*	720	MPN/100ml
70	Price Creek (New Jerusalem Church T Ave. - PC07)	10/13/2007	*E. coli*	680	MPN/100ml
71	Price Creek (U Ave. and 118th St. - PC08)	10/13/2007	*E. coli*	660	MPN/100ml
72	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	10/13/2007	*E. coli*	220	MPN/100ml
73	Price Creek and Hwy 151 (PC10)	5/10/2008	*E. coli*	1000	MPN/100ml
74	Price Creek (P Ave. - PC02)	5/10/2008	*E. coli*	960	MPN/100ml
75	Price Creek (110th St. and S Ave. - PC06)	5/10/2008	*E. coli*	740	MPN/100ml
76	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	5/10/2008	*E. coli*	670	MPN/100ml
77	Price Creek (above campground - PC09)	5/10/2008	*E. coli*	570	MPN/100ml
78	Price Creek (Amana - PC11)	5/10/2008	*E. coli*	560	MPN/100ml
79	Price Creek (New Jerusalem Church T Ave. - PC07)	5/10/2008	*E. coli*	500	MPN/100ml
80	Price Creek (U Ave. and 118th St. - PC08)	5/10/2008	*E. coli*	330	MPN/100ml
81	Price Creek (R Ave. - PC05)	5/10/2008	*E. coli*	300	MPN/100ml
82	Price Creek (PP Ave. - PC03)	5/10/2008	*E. coli*	290	MPN/100ml
83	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	5/10/2008	*E. coli*	240	MPN/100ml
84	Price Creek (Amana - PC11)	7/12/2008	*E. coli*	65000	MPN/100ml
85	Price Creek and Hwy 151 (PC10)	7/12/2008	*E. coli*	52000	MPN/100ml
86	Price Creek (above campground - PC09)	7/12/2008	*E. coli*	46000	MPN/100ml
87	Price Creek (U Ave. and 118th St. - PC08)	7/12/2008	*E. coli*	37000	MPN/100ml
88	Price Creek (New Jerusalem Church T Ave. - PC07)	7/12/2008	*E. coli*	17000	MPN/100ml
89	Price Creek (110th St. and S Ave. - PC06)	7/12/2008	*E. coli*	16000	MPN/100ml
90	Price Creek (R Ave. - PC05)	7/12/2008	*E. coli*	13000	MPN/100ml
91	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	7/12/2008	*E. coli*	6100	MPN/100ml
92	Price Creek (PP Ave. - PC03)	7/12/2008	*E. coli*	4600	MPN/100ml
93	Price Creek (P Ave. - PC02)	7/12/2008	*E. coli*	3700	MPN/100ml
94	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	7/12/2008	*E. coli*	2400	MPN/100ml

95	Price Creek (P Ave. - PC02)	10/11/2008	*E. coli*	1500	MPN/100ml
96	Price Creek (above campground - PC09)	10/11/2008	*E. coli*	880	MPN/100ml
97	Price Creek (110th St. and S Ave. - PC06)	10/11/2008	*E. coli*	430	MPN/100ml
98	Price Creek (New Jerusalem Church T Ave. - PC07)	10/11/2008	*E. coli*	420	MPN/100ml
99	Price Creek (U Ave. and 118th St. - PC08)	10/11/2008	*E. coli*	360	MPN/100ml
100	Price Creek (110th St., 0.5 mile west of R. Ave. - PC04)	10/11/2008	*E. coli*	320	MPN/100ml
101	Price Creek (PP Ave. - PC03)	10/11/2008	*E. coli*	280	MPN/100ml
102	Price Creek (R Ave. - PC05)	10/11/2008	*E. coli*	250	MPN/100ml
103	Price Creek and Hwy 151 (PC10)	10/11/2008	*E. coli*	240	MPN/100ml
104	Price Creek (N Ave, 0.5 mile N of 110th St. - PC01)	10/11/2008	*E. coli*	150	MPN/100ml
105	Price Creek (Amana - PC11)	10/11/2008	*E. coli*	150	MPN/100ml

Figure 5: Price Creek Southern Most Sampling Location and Iowa River Impairment

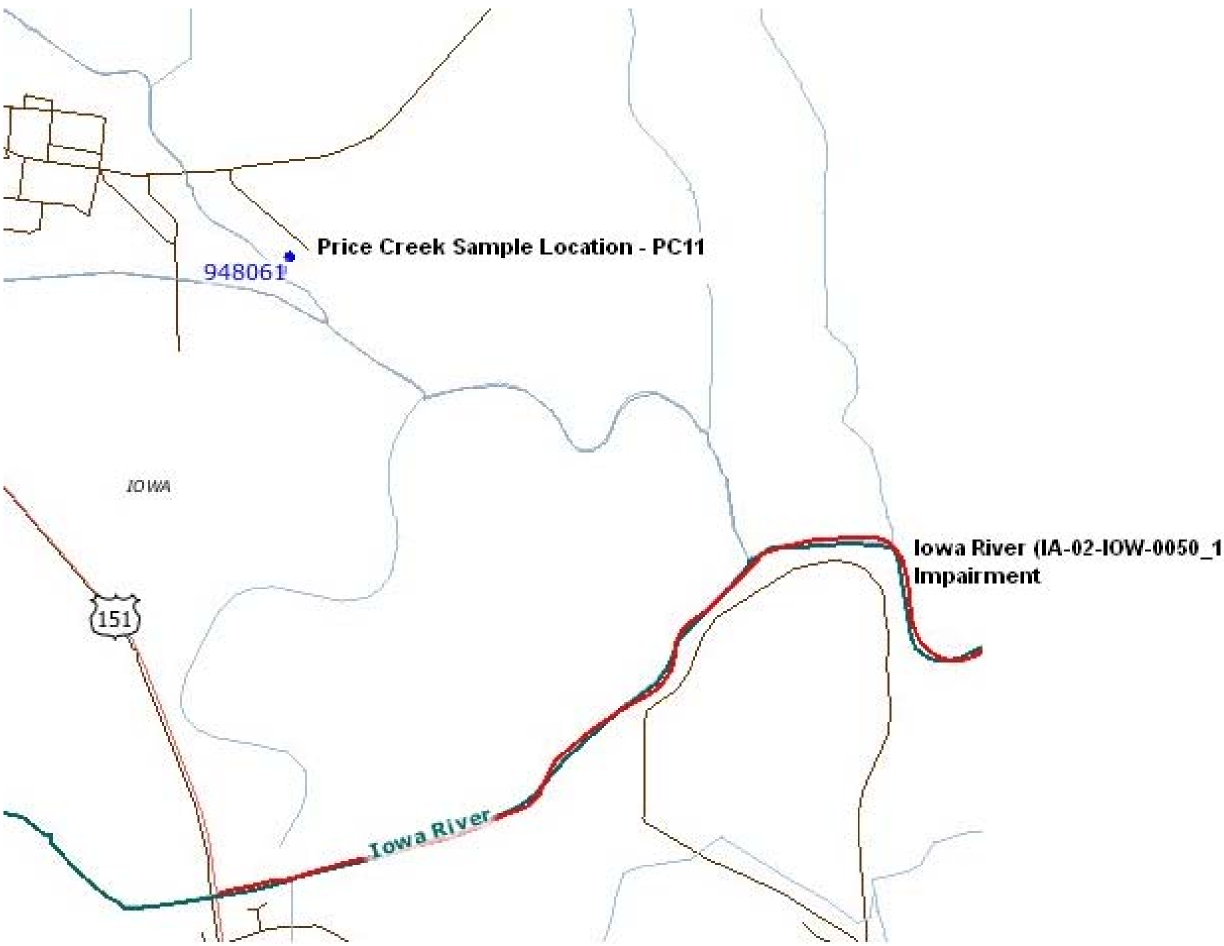


Figure 6: Price Creek Water Quality Sampling Locations

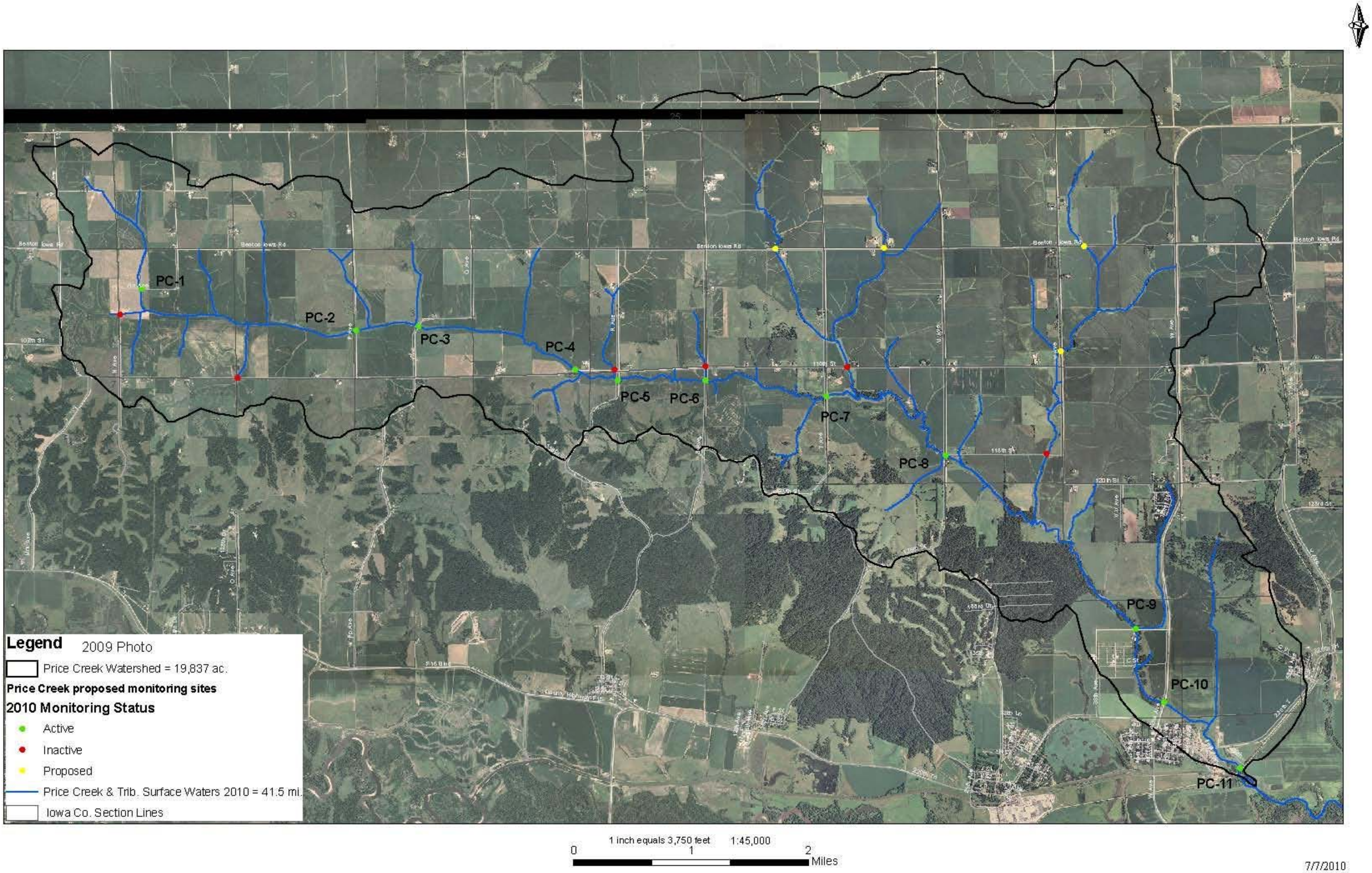


Figure 7: Price Creek Watershed and Iowa River Bacteria Impairment

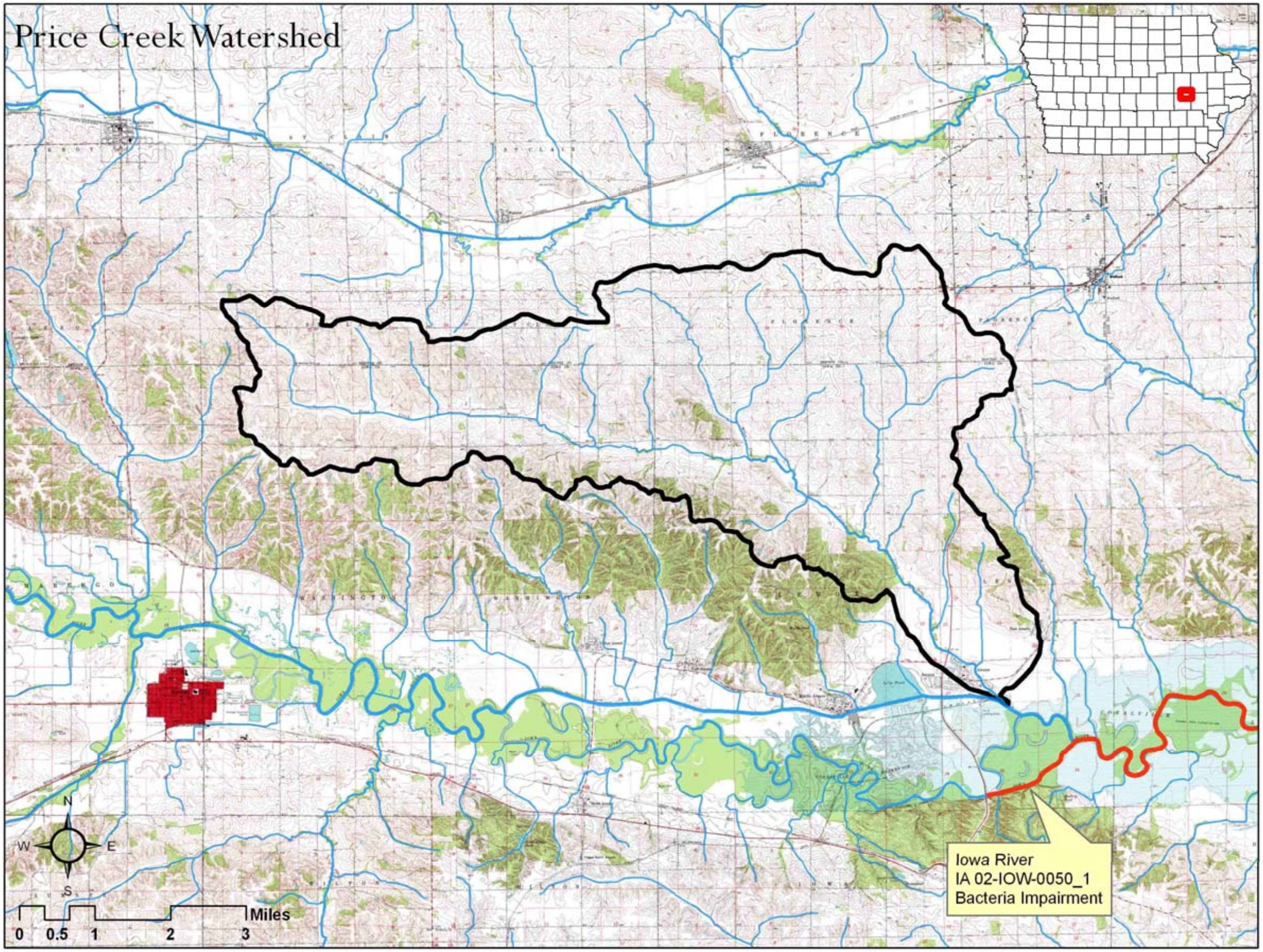
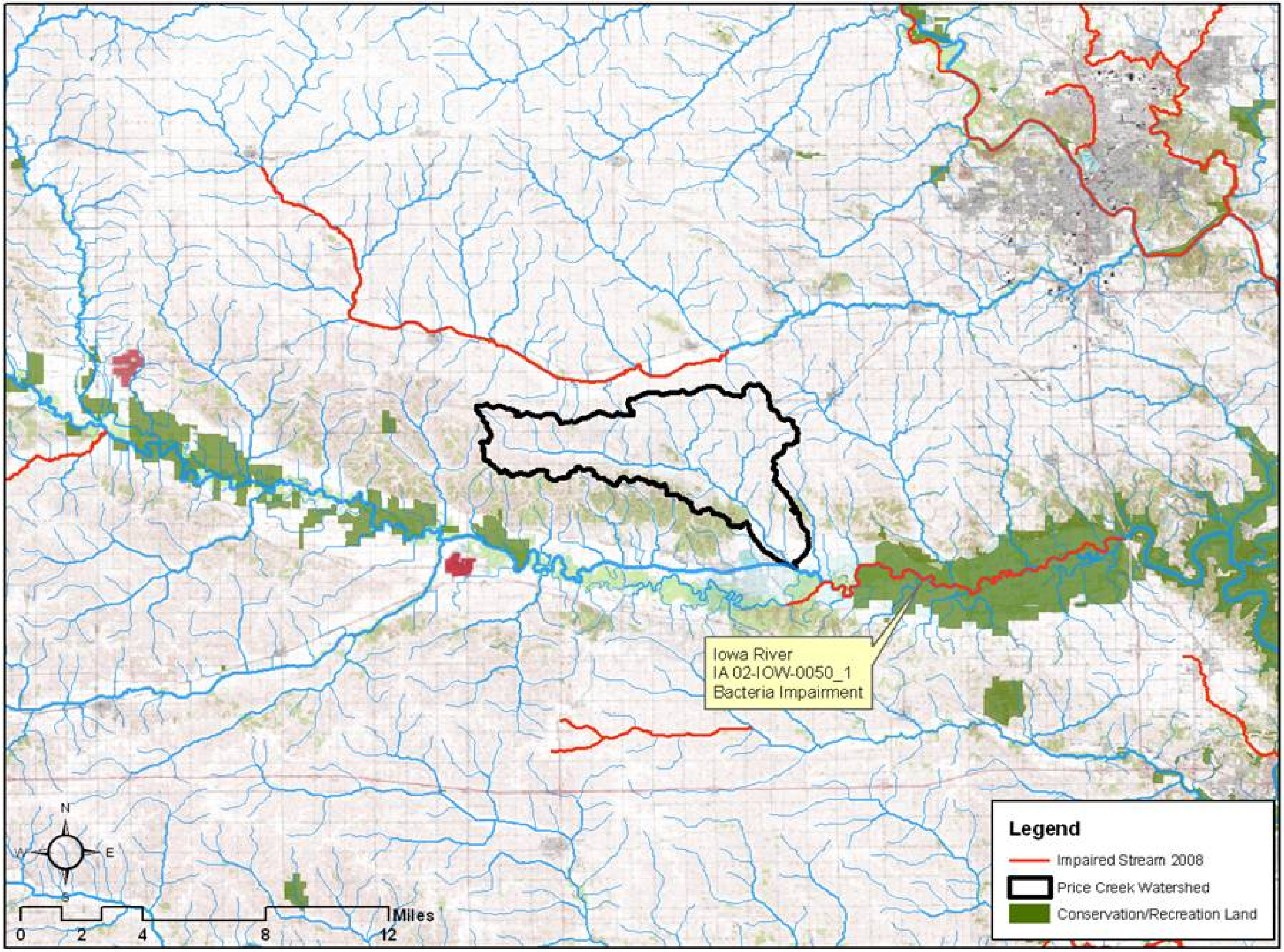


Figure 8: Price Creek Watershed in Relation to Iowa River Impairment

In combination with land uses and water quality data it is theorized that Price Creek contributes a bacteria load to the Iowa River.



POLLUTANT SOURCES AND LOADS

Assessments
The land use assessments and water quality data indicate the primary pollutants needing to be addressed are sediment and bacteria.

During the winter of 2005 a detailed assessment of Price Creek was completed by the ICSWCD. Field data was collected on current land use and land cover as well as existing best management practices (BMPs). In-stream data was collected on riparian zone width, livestock access, substrate, bank stability, canopy cover, channel alterations, hydrologic variability, bank height, and point discharges (tile, culverts, septics). The ICSWCD revised the assessment data in 2009 to account for recently applied BMPs. The resulting maps (Figures 7-9) were very useful in providing erosion and sediment delivery details and identified the likely sources of bacteria. In 2009-2010 with the help of the IDNR Watershed Improvement section, further analysis of bacteria loading to the creek was completed using the Soil and Water Assessment Tool (SWAT). The SWAT computer model used new and existing watershed assessment parameters to model the hydrology of Price Creek and its tributaries. The result includes bacteria loading estimates for existing conditions and reductions needs to meet current water quality use designations.

Sedimentation
Sediment is delivered to Price Creek in three basic methods 1) Sheet and rill erosion 2) Gully erosion and 3) Stream bank erosion. Soil loss from crop ground and eroding stream banks are the two largest sources of sedimentation in the watershed. The watershed assessment identified nearly 7 miles of stream bank as unstable, 1.5 miles of which is in need of structural bank stabilization. Using the USDA Volumetric Method, it is estimated that 16,000 tons/yr are delivered into Price Creek from streambank erosion alone. The current Price Creek Project average RUSLE soil loss for the watershed was estimated at 3.56 ton/ac/yr although there are 3,500 acres with estimated sheet and rill erosion between 5-10 tons/acre/year and 1,800 acres with losses exceeding 10 tons/acre/year (Figure 7).

Figure 9 describes the quantity of sheet and rill erosion that reaches Price Creek. Over 4,000 acres of land has estimated sediment delivery rates to Price Creek from sheet and rill erosion in excess of 1 ton/acre/year.

Figure 9: Sheet and Rill Erosion Estimates

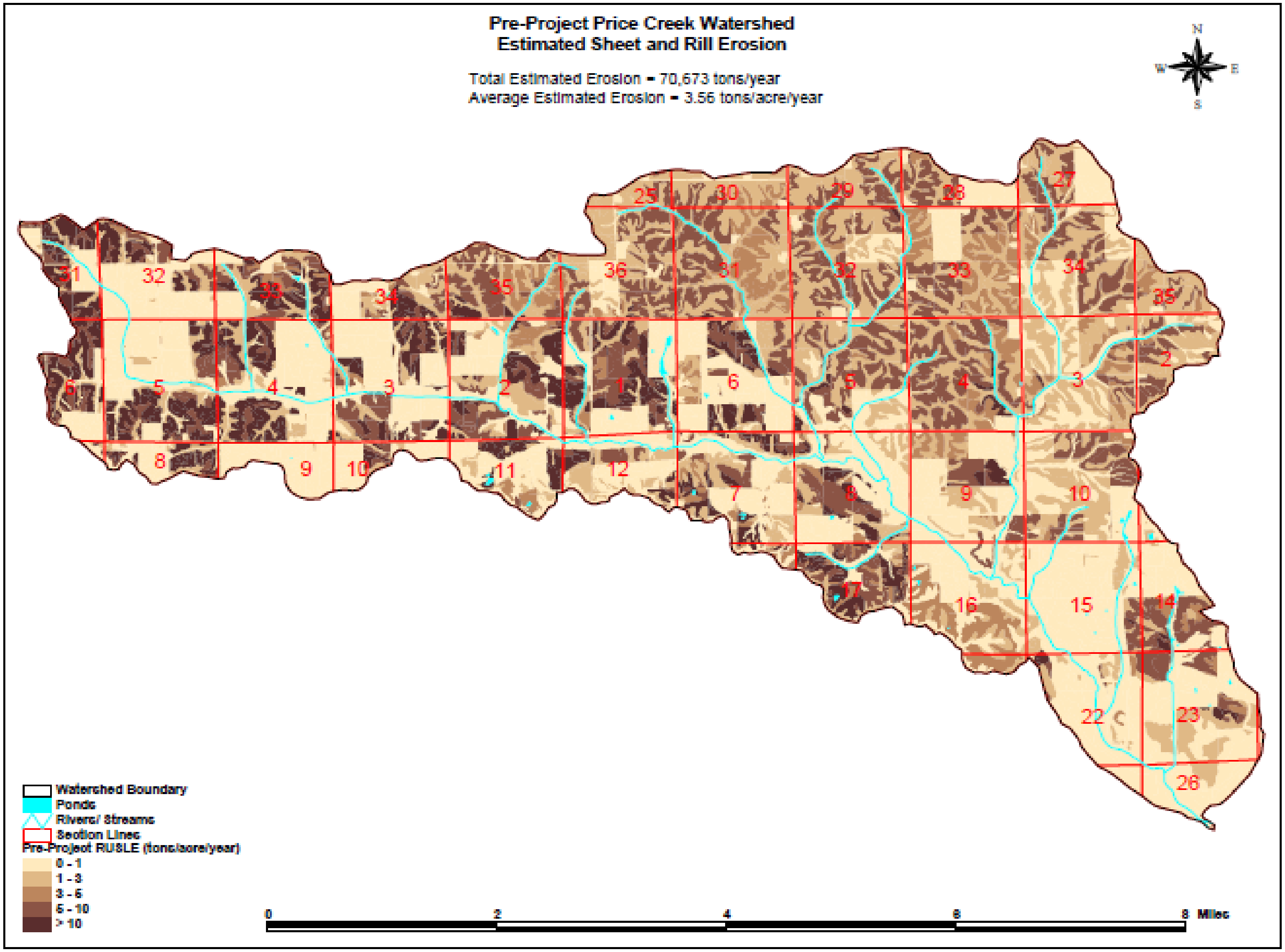


Figure 10: Sediment Delivery Estimates

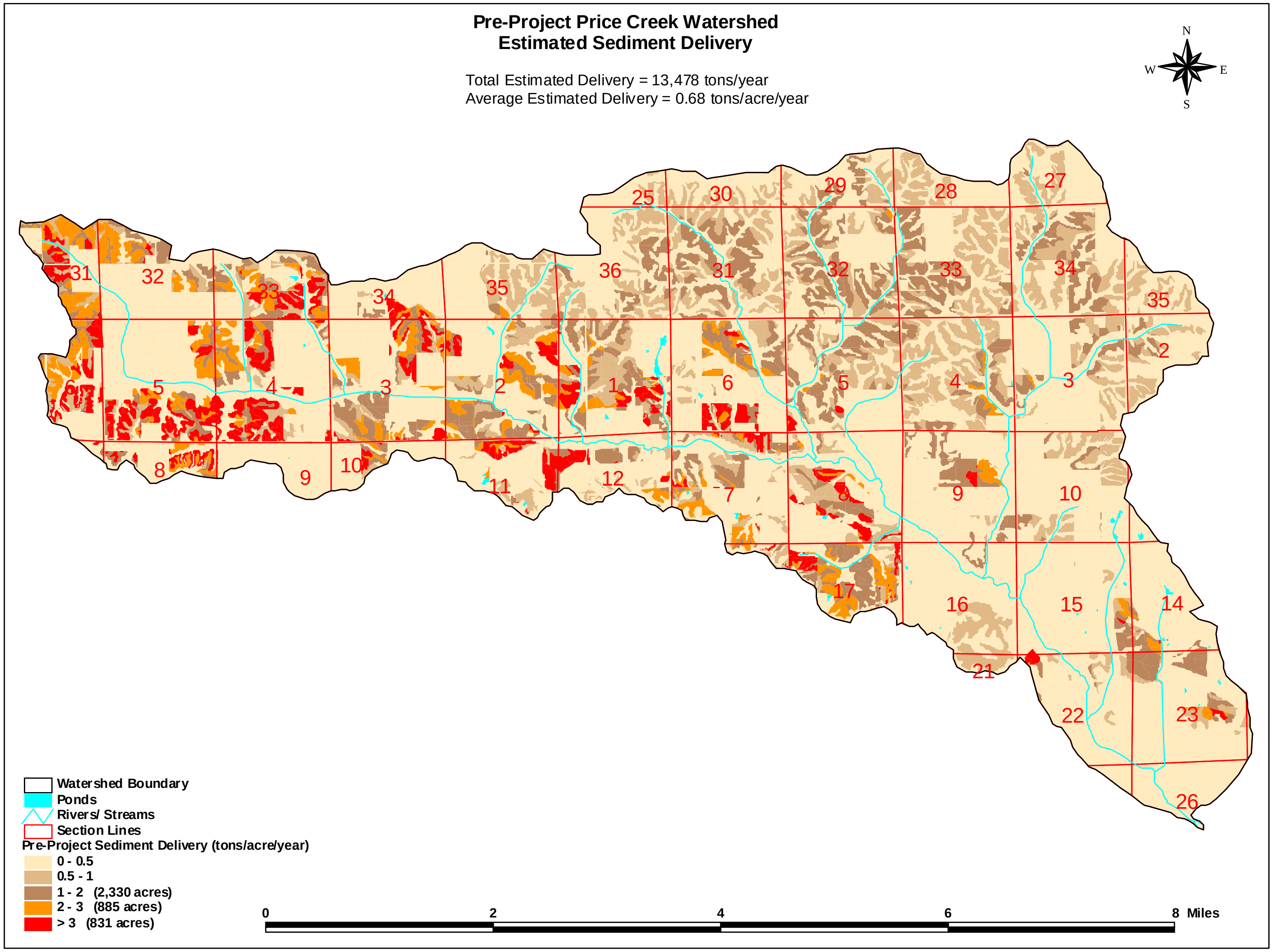
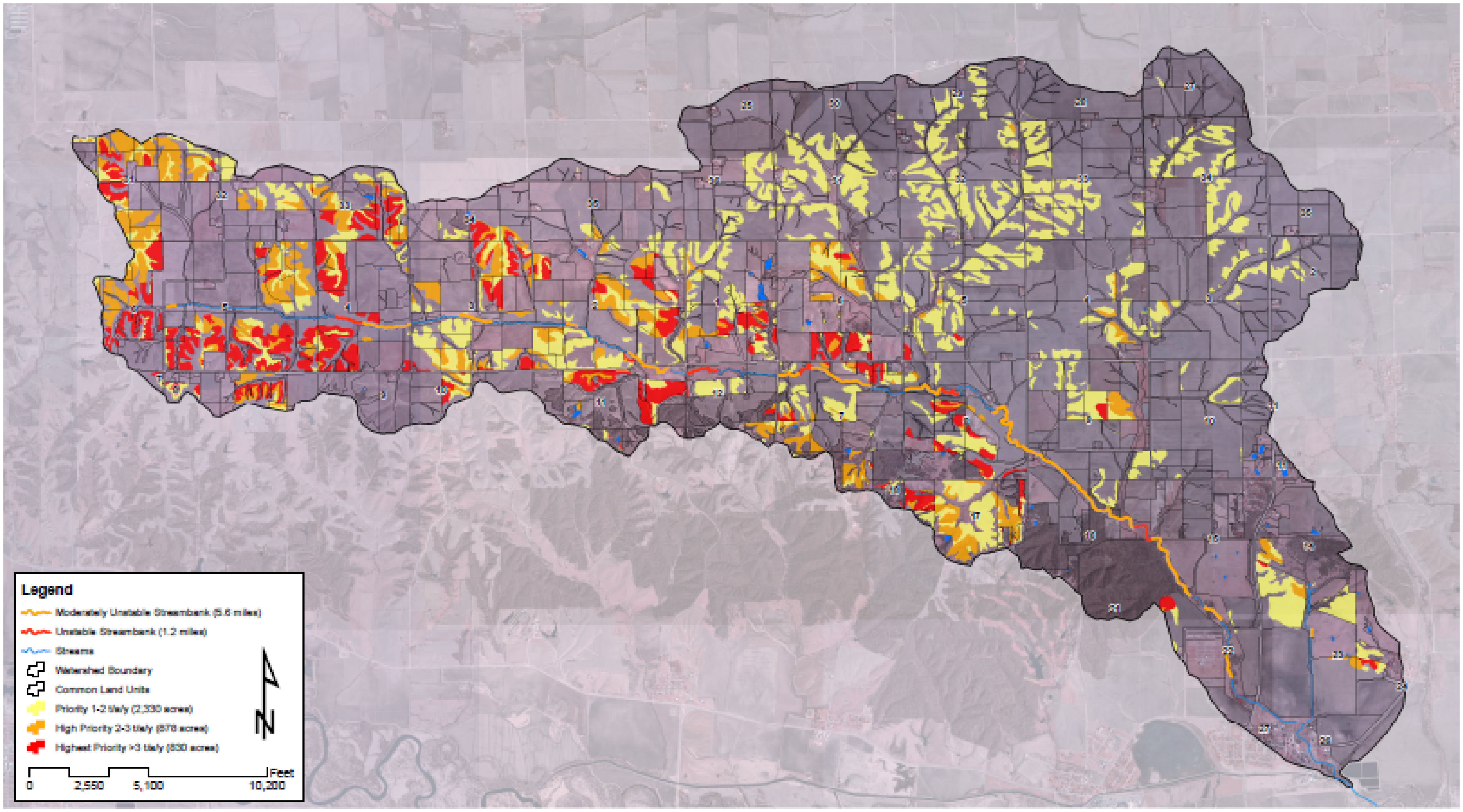


Figure 11: Sediment Delivery & Bank Stability

Price Creek Watershed- Benton & Iowa Counties

High Priority Areas (Sediment Delivery & Streambank Stability)



Bacterial Contamination

Due to land use assessments and water quality data, it is likely that Price Creek is a contributor to the Iowa River Bacteria impairment. Additionally, data gathered since 2005 shows high bacteria levels in the Price Creek watershed and Price Creek will be included on Iowa's 2010 list of impaired waters. Failing and outdated septic systems (Potentials Figure 12), livestock access to streams and lack of open lot manure storage and management are the three largest sources of fecal contamination in the watershed. The watershed assessment identified 12 miles of stream in which livestock have full or limited access to Price Creek or its tributaries. Also identified, were 32 open lot livestock feeding operations and 5 confinement operations, most of which are in very close proximity to Price Creek or one of its tributaries (Figure 13).

Figure 12: Price Creek Watershed Septic System locations

Homes built prior to 1990 were not under any legal requirements to have updated septic systems, therefore we assume anything prior to 1990 may have a faulty septic system.

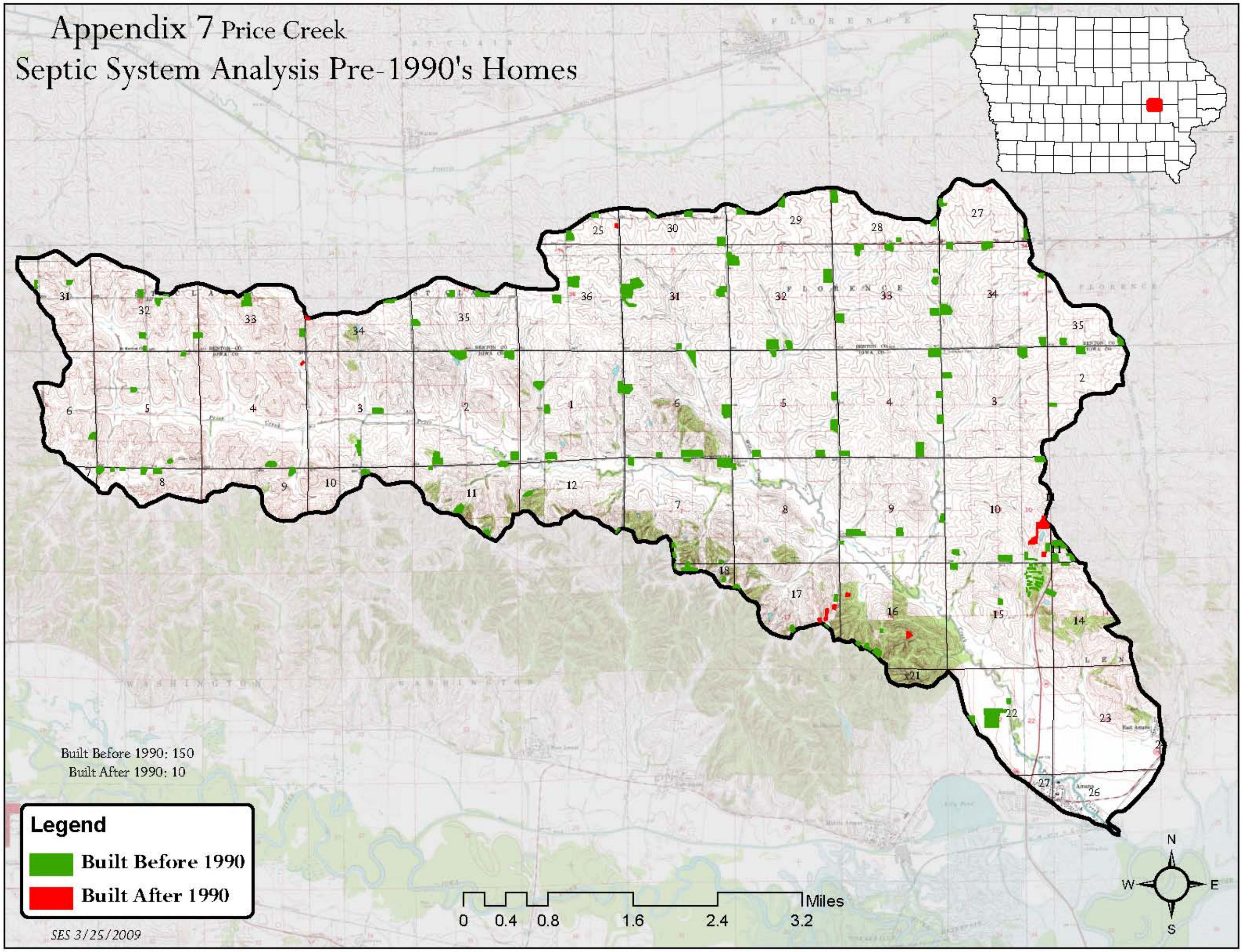
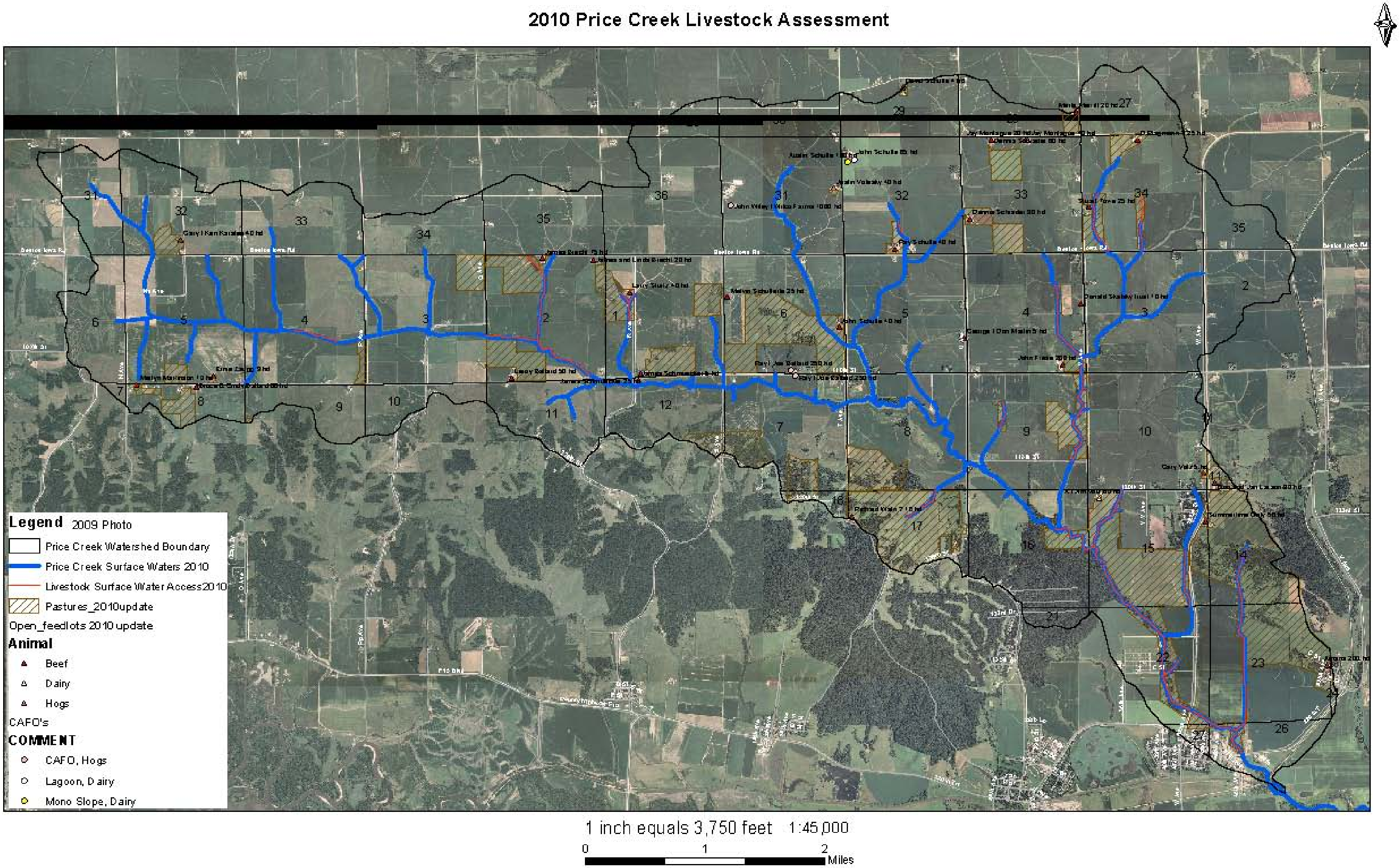


Figure 13: Price Creek Livestock Operations



Livestock: Over ninety percent of the livestock raised in the watershed are cattle. There are 28 beef cow operations with an average herd size of 43. The Amana livestock herd is over 5000, but approximately 200 are present in the watershed. There are 2 dairy operations totaling 225 cows, 5 hog confinements of less than 1,000 animal units, and one producer raises sheep. There are no permitted animal waste facilities and no open lagoons. Cattle manure that is accumulated or stored, is spread over the crop fields from fall through the spring or on pastures during the summer.

During the livestock assessment, animal numbers and producers were quantified by the ICSWCD. Table 3 lists each by subbasin.

Table 3: Producers and Livestock by Subbasin

Subbasin	Producers	Cattle	Hogs	Dairy
1	3	70	0	0
2	0	0	0	0
3	5	113	0	0
4	0	0	0	0
5	1	75	0	0
6	3	40	1040	0
7	6	154	40	165
8	1	60	0	0
9	2	50	0	0
10	0	0	0	0
11	2	55	500	0
12	1	5	0	0
13	0	10	0	0
14	1	210	0	0
15	0	0	0	0
16	3	0	0	60
17	4	85	0	0
18	1	0	0	0
19	1	150	0	0
20	1	50	0	0
Total:	35*	1,127	1,580	225

* 28 unique producers, some have operations in multiple basins.

Table 4 describes the frequency that each flow condition occurs throughout the year in Price Creek. Most of the Water Quality Standard (WQS) violations in Price Creek occur during runoff events, and are primarily due to runoff from manure application areas, pastures, feedlots, and areas containing wildlife. However, violations occur during dry periods (dry to normal conditions) as well. Violations under dry conditions are primarily due to E. coli sources that are independent of flow, such as direct deposition of fecal material into the lake or streams by livestock, wildlife, and septic systems. Water quality can be impaired by much smaller E. coli loads during dry periods, because there is less dilution of pollutants.

Table 4. SWAT flow condition descriptions and midpoint percentiles

Flow Condition	Duration Interval (%)	Description	Midpoint (%)
High	0-10	Infrequent storm events; runoff dominates	5
Moist	10-40	Runoff component large but decreasing	25
Mid-Range	40-60	Both runoff and continuous flows	50
Dry	60-90	Continuous flows begin to dominate	75
Low	90-100	Infrequent low flow; point sources dominate	95

SWAT modeling simulations estimated the existing median E. coli load to Price Creek to be 8.33E+11 cfu/day, and the existing maximum (median) load is 2.61E+12 (Table 5).

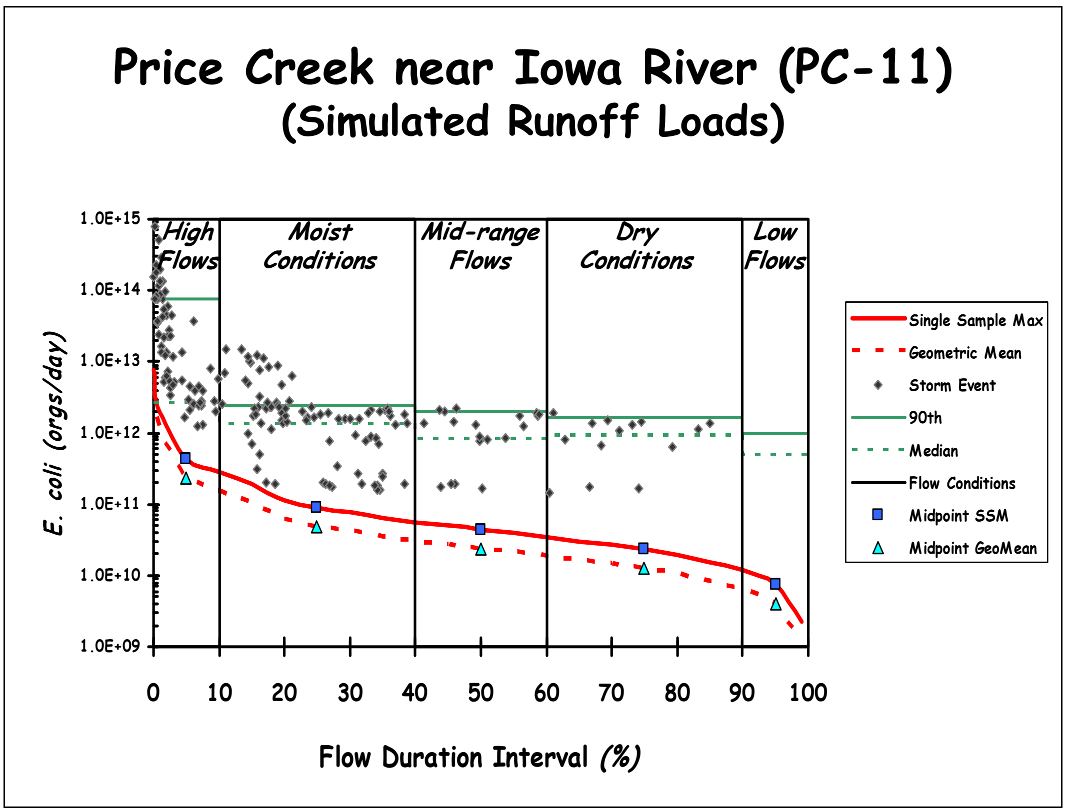
Note that for the tables and figures that follow, PC-11 stands for Price Creek water monitoring site 11. This is the monitoring location near the outlet of Price Creek into the Mill Race / Iowa River (see figure 30 in Part 9)

Table 5. Existing load estimates at Price Creek outlet (PC-11)

Existing Load Summary	Existing Loads (orgs/day)				
	High	Moist	Mid-Range	Dry	Low
90th Percentile Load	7.50E+13	2.38E+12	1.98E+12	1.66E+12	9.61E+11
Median Load	2.61E+12	1.36E+12	8.33E+11	9.42E+11	5.00E+11
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Figure 14 illustrates the existing bacteria load estimates from Table 6 as compared to the current WQS (single sample max (SSM) = 235 and geometric mean (GM) = 126).

Figure 14: SWAT - Existing Bacteria Loads

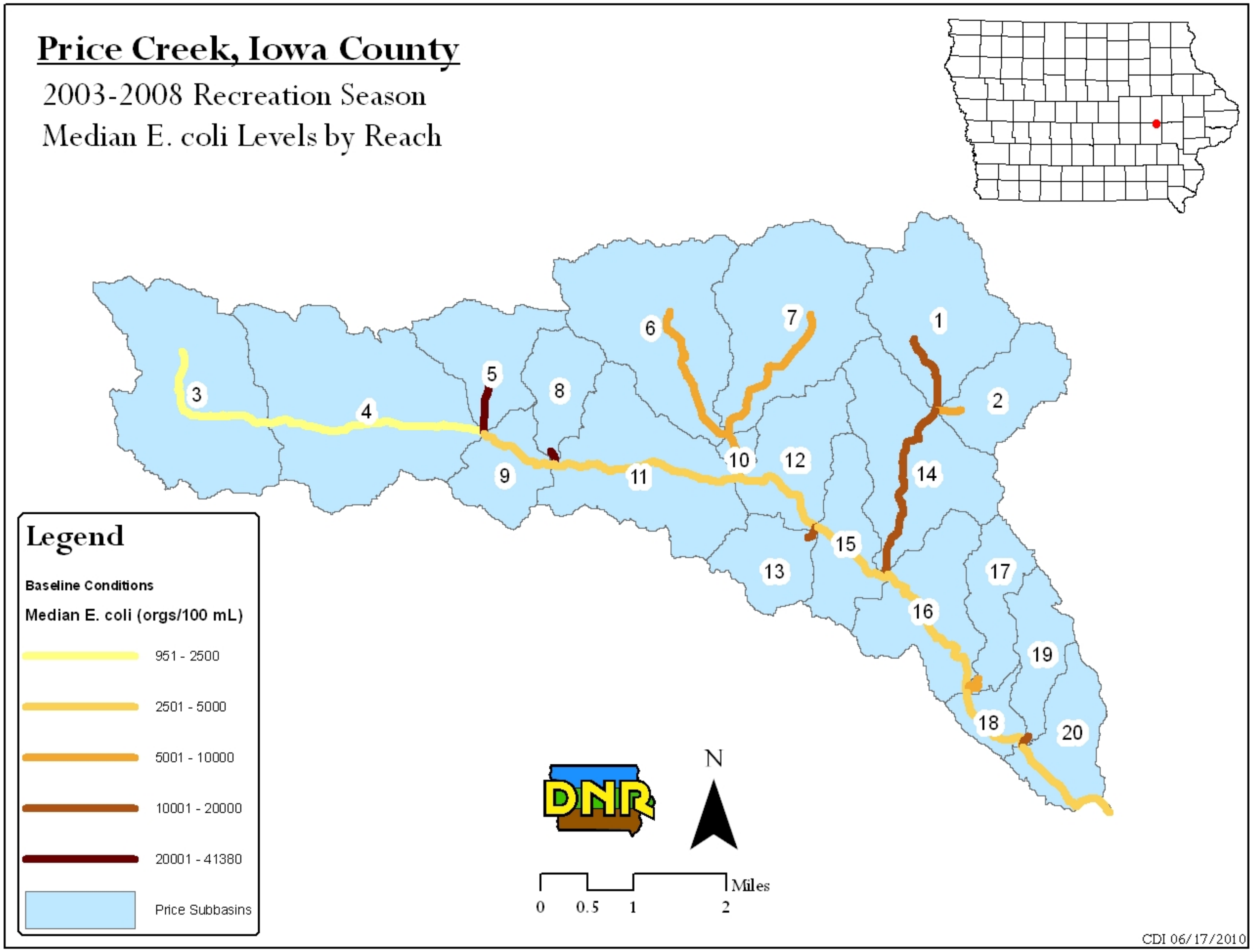


According to SWAT, table 6 describes the quantity of bacteria in the creek under each flow conditions Midpoint SSM and Midpoint GM. Numbers above this would violate the current WQS.

Table 6. Flow variable loading capacity at Price Creek outlet (PC-11)

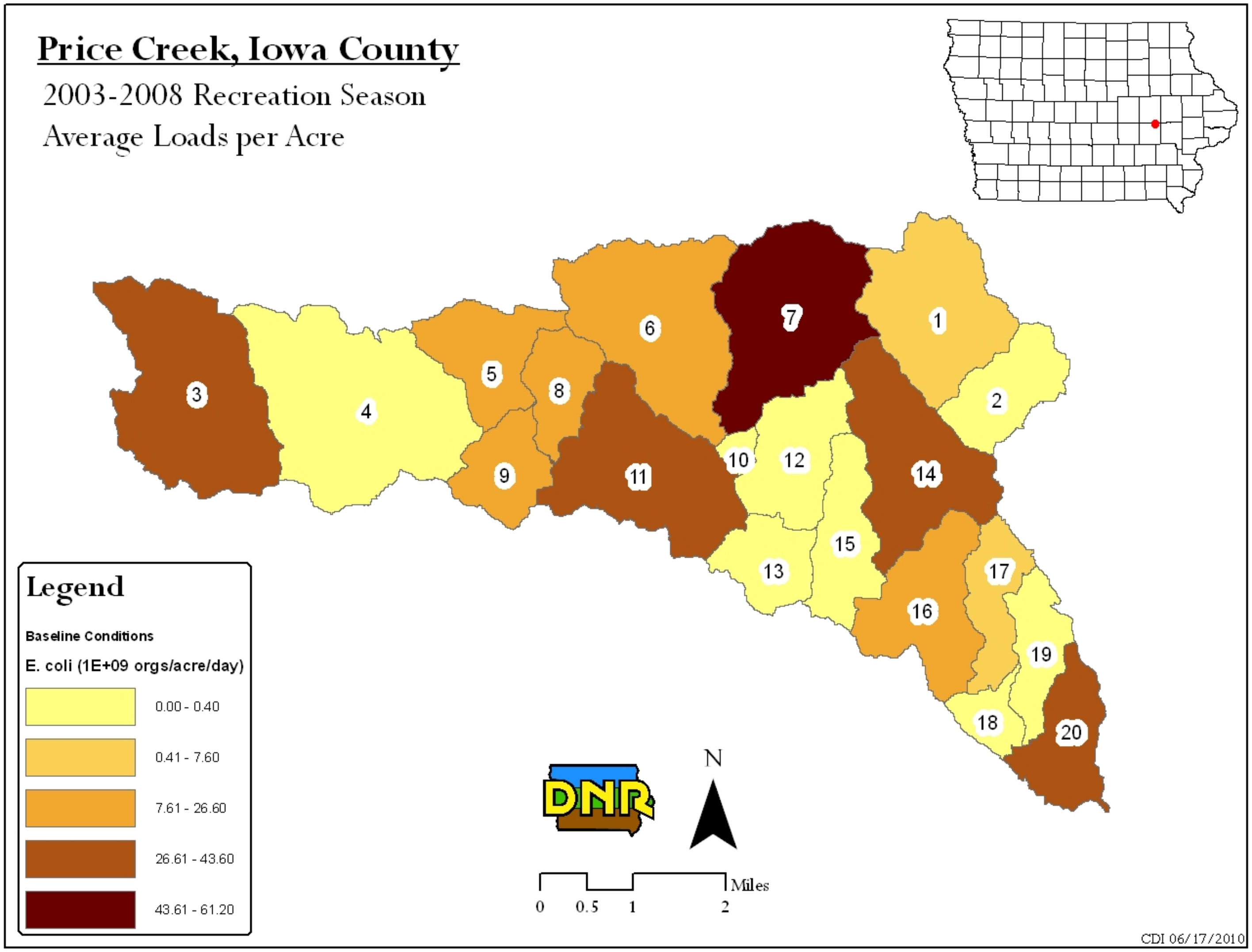
Loading Capacity Summary	Loading capacities (orgs/day)				
	High	Moist	Mid-Range	Dry	Low
SSM Load	4.33E+11	9.11E+10	4.40E+10	2.34E+10	7.34E+09
GM Load	2.32E+11	4.89E+10	2.36E+10	1.25E+10	3.94E+09
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Figure 15: Median E. coli load in Price Creek and Tributaries under Existing Conditions



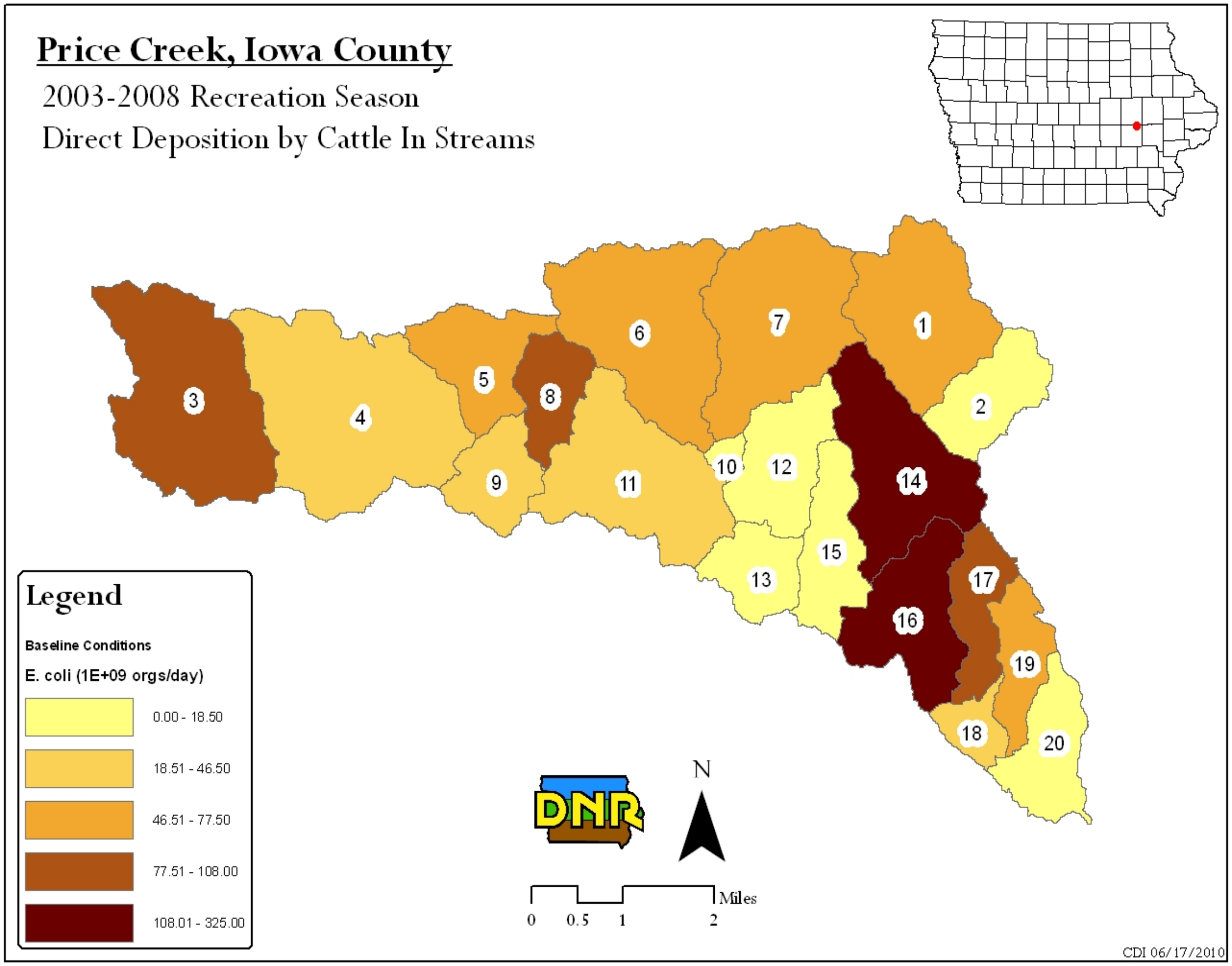
The top 5 highest subbasins based on average load contributed per acre include: 3, 7, 11, 14, 20.

Figure 16: Average Bacteria Loads per Acre by Subbasin under Existing Conditions



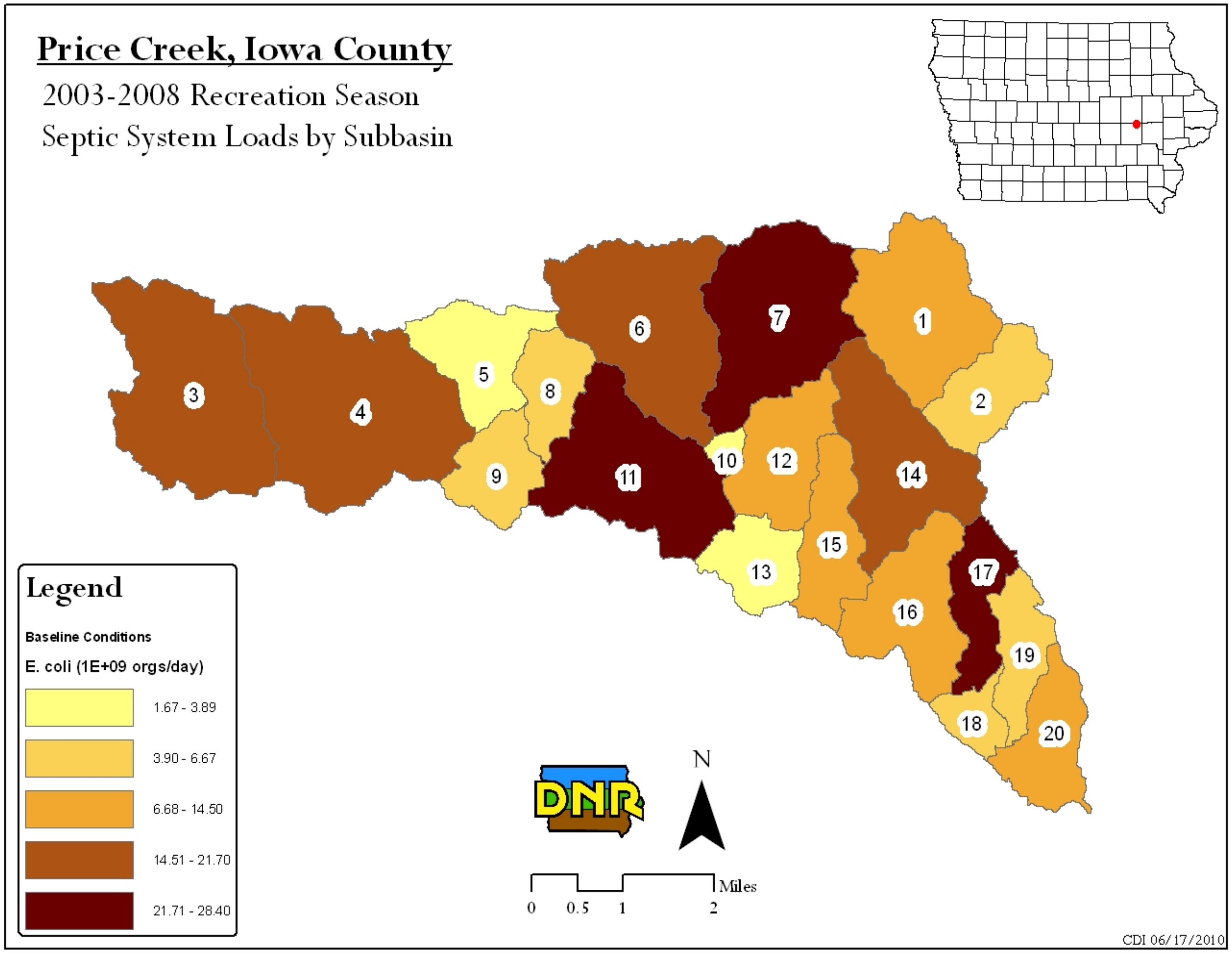
The top 5 highest subbasins based on cattle access / deposition in the stream include: 3, 8, 14, 16, 17

Figure 17: Bacteria Load by Deposition by Cattle by Subbasin under Existing Conditions



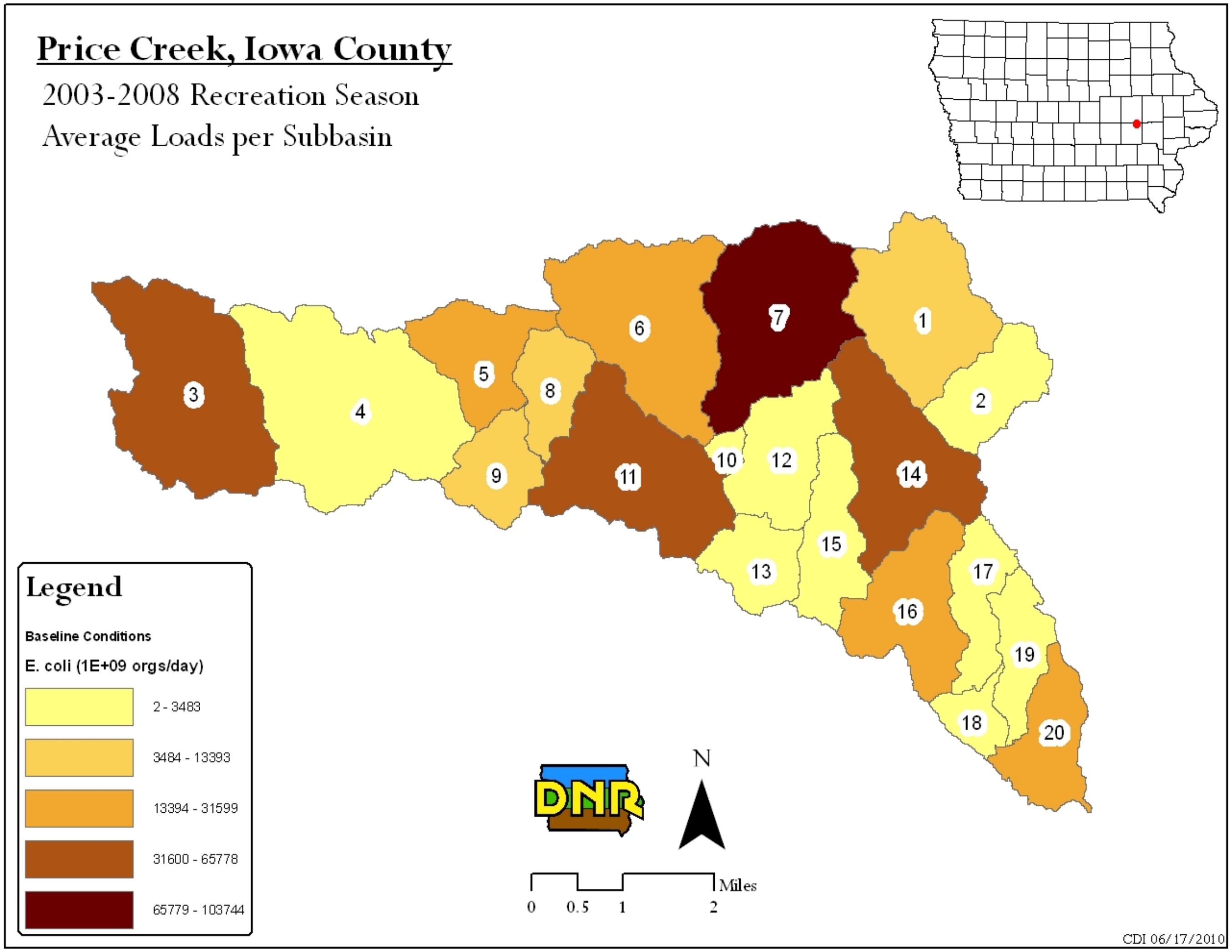
The top 5 highest subbasins based on septic system load include: 6, 7, 11, 14, 17

Figure 18: Septic System Bacteria Load under Existing Conditions



The top 5 highest subbasins based on the total load produced from all sources include: 3, 6, 7, 11, 14

Figure 19: Bacteria Load from All Sources under Existing Conditions



Figures 16-19 suggest different priorities based on the source and weather the bacteria load is normalized by basin size or by actual loads. **Comparing the four figures suggests the top 6 subbasins to consider as a priority are 3, 6, 7, 11, 14, and 17.**

Table 7 compares the basins of the highest bacteria with priority sediment delivery reduction areas (>1 t/ac/yr). Estimates are based on SWAT modeling, in-field assessments and RUSLE. **This comparison suggests that the subbasins of highest importance to both sediment and bacteria are: 3, 7, 11, 14, 20.** Though not included in the SWAT model, the similarity identifies the importance of both bacteria and sediment control BMPs being planned together.

Table 7: Subbasin Bacteria Loads & Sediment Delivery by Subbasin

*Sediment Delivery total is based on areas averaging > 1 ton/ac/yr

Basin ID	Bact Load / 1E+09 orgs/ac/day	Bact Load / acre Rank	Soil Delivered t / yr *	Acres Eroded from
1	7.6	11th	31	138
2	0.0	20	27	50
3	32.7	4	978	777
4	0.0	19	947	730
5	23.6	7	100	108
6	17.8	10	200	367
7	61.2	1	205	500
8	26.6	6	197	154
9	20.0	8	260	144
10	0.0	18	74	28
11	31.2	5	640	324
12	0.0	17	127	80
13	0.0	16	492	236
14	43.6	2	108	189
15	0.0	15	26	45
16	19.2	9	22	17
17	6.3	12	38	95
18	0.2	14	0	0
19	0.4	13	28	38
20	37.6	3	27	25
Total:	328.0		4,527	4,045

PART 3

EXPECTED LOAD REDUCTIONS

As discussed in Part 2, the SWAT model was used to develop existing loads as well as expected load reductions for Price Creek. The required reductions in bacteria load to Price creek are nearly 100% during any given flow condition (Table 8). Figure 20 illustrates the reduction needed under each flow condition.

Table 8. Required reductions for each flow condition at Price Creek outlet (PC-11)

Departure from Capacity	Required load reduction (%)				
	High	Moist	Mid-Range	Dry	Low
SSM Reduction	99.4	96.2	97.8	98.6	99.2
GM Reduction	91.1	96.4	97.2	98.7	99.2
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

SSM Reduction = % reduction required to meet 235 cfu/100 mL
GM Reduction = % reduction required to meet 126 cfu/100 mL
Midpoint flow = flow at the mid-point of each flow condition

Figure 20: Bacteria Load Reductions to meet WQS at Price Creek outlet (PC11)

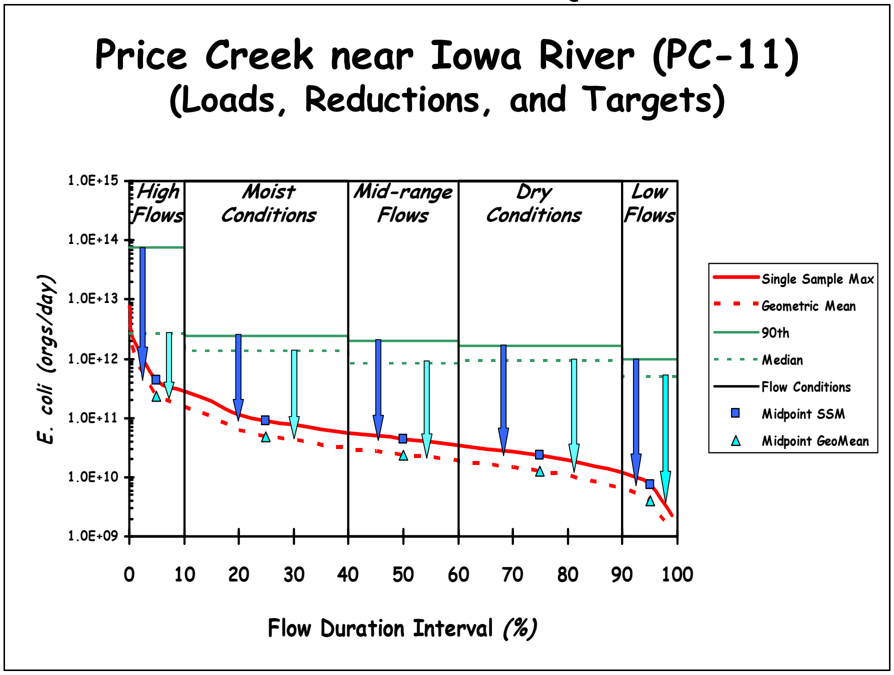


Table 9 quantifies the reduction needed under each flow condition to meet the WQS. Note the largest reduction in actual quantity is during high flow. In terms of meeting the WQS during the greatest number of days during the year, the reduction would need to occur during the mid to dry flows. The mid to dry flows are most impacted by malfunctioning septic systems and direct deposition by cattle.

Table 9. Departure from loading capacity at Price Creek outlet (PC-11)

Departure from Capacity	Departure in orgs/day and (%)				
	High	Moist	Mid-Range	Dry	Low
SSM Departure	7.45E+13 (99.4%)	2.29E+12 (96.2%)	1.94E+12 (97.8%)	1.64E+12 (98.6%)	9.54E+11 (99.2%)
GM Departure	2.37E+12 (91.1%)	1.31E+12 (96.4%)	8.10E+11 (97.2%)	9.29E+11 (98.7%)	4.96E+11 (99.2%)
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Figure 21 illustrates the SWAT output after 100% of the livestock that currently have access to the creek are removed.

Figure 21: *E. coli* Load Duration Curve (streamflow) at Price Creek outlet After Livestock Exclusions (PC11)

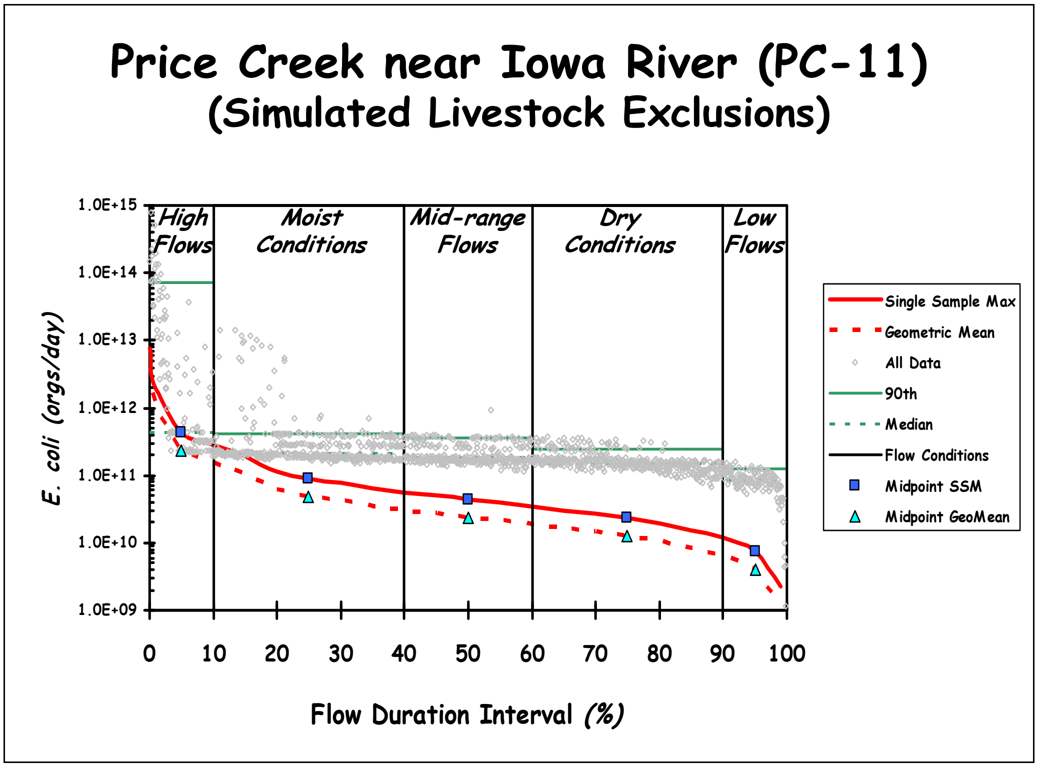


Table 10 quantifies the load reduction shown in figure 21. Comparing tables 10 and 11 reflects the difference between the reduction needed to meet the WQS and the actual reduction from livestock exclusion alone. The additional reductions needed after livestock exclusion are illustrated in figure 22.

Table 10. Load estimates after livestock exclusions (PC-11)

Existing Load Summary	Existing Loads (orgs/day)				
	High	Moist	Mid-Range	Dry	Low
90^{th} Percentile Load	7.34E+13	4.11E+11	3.60E+11	2.48E+11	1.23E+11
Median Load	4.40E+11	2.08E+11	1.79E+11	1.52E+11	8.45E+10
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Figure 22: Required reductions at Price Creek outlet After Livestock Exclusions (PC11)

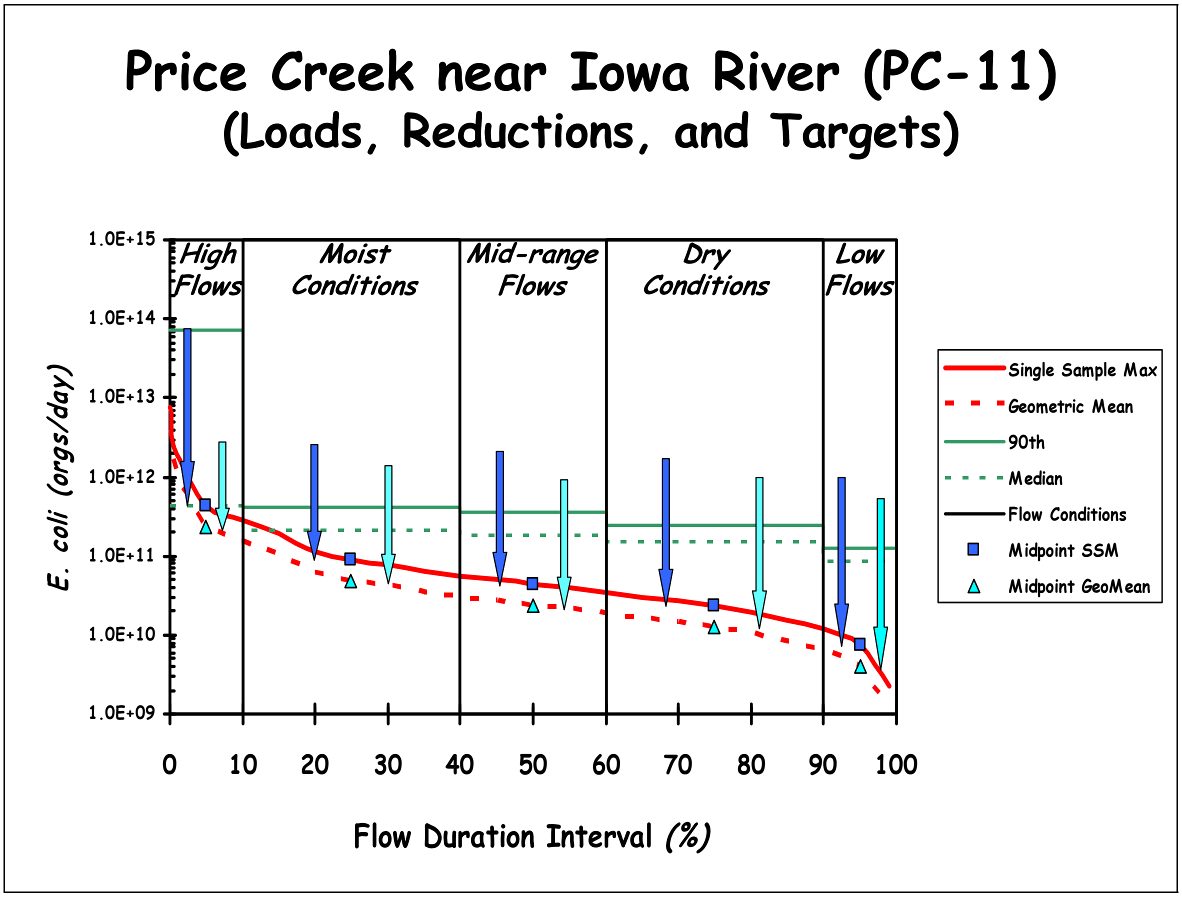


Table 11 quantifies the additional reduction shown in figure 22 under each flow condition to meet the WQS after livestock exclusion. Note the additional reductions during the mid and dry flows are still very high, 86.8% and 91.8%. The additional reductions needed after livestock exclusion are illustrated in figure 23.

Table 11. Departure from loading capacity and additional reductions required after livestock exclusions (PC-11)

Departure from Capacity	Departure in orgs/day and (%)				
	High	Moist	Mid-Range	Dry	Low
SSM Departure	7.30E+13 (99.4)	3.20E+11 (77.8)	3.16E+11 (87.8)	2.24E+11 (90.6)	1.16E+11 (94.0)
GM Departure	2.08E+11 (47.3)	1.59E+11 (76.5)	1.55E+11 (86.8)	1.40E+11 (91.8)	8.06E+10 (95.3)
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Figure 23: Required reductions at Price Creek outlet after livestock exclusions, ponds, and ag waste structures have been applied (PC11)

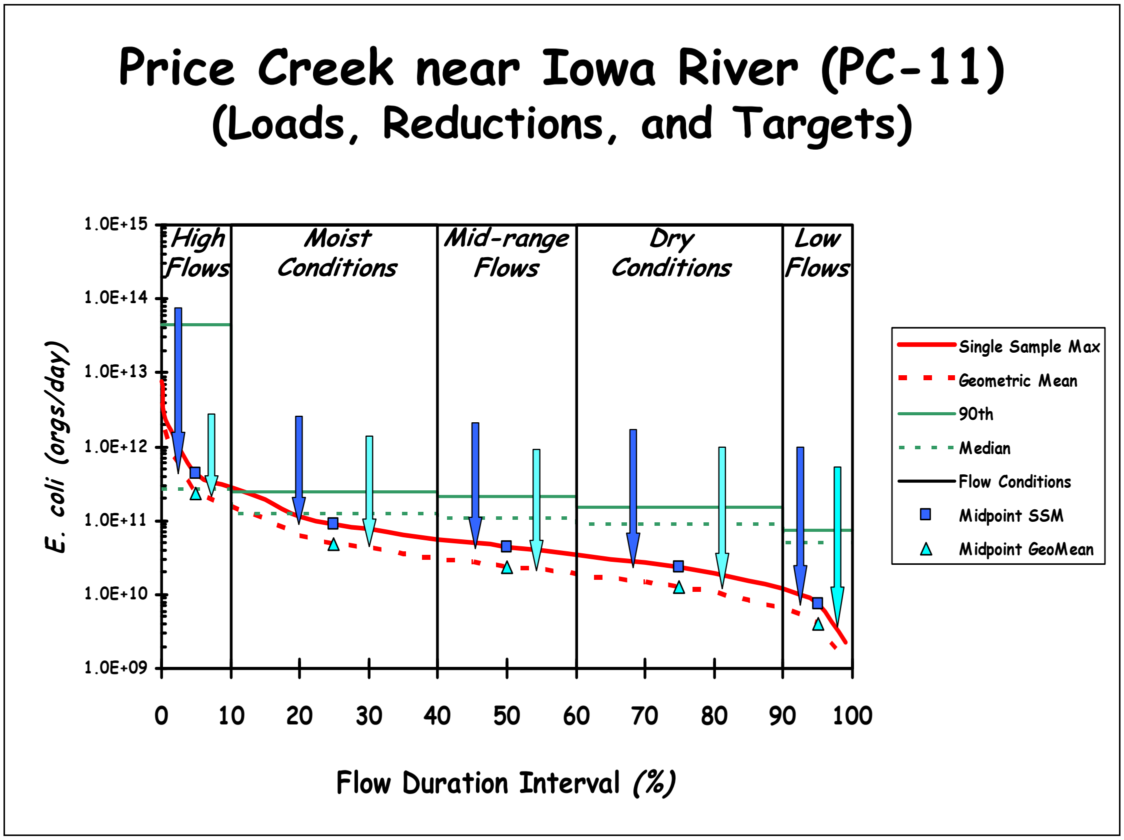


Table 12 quantifies the additional reduction shown in figure 24 under each flow condition to meet the WQS after livestock exclusions, ponds, and ag. waste structures have been applied. Note the reductions during peak flows reduced dramatically during the mid and dry flows are still very high, 77.9% and 86.2%. Table 13 goes on to show the resulting bacteria load estimate in Price Creek.

Table 12. Departure from loading capacity and additional reductions required after livestock exclusions, ponds, and ag waste structures (PC-11)

Departure from Capacity	Departure in orgs/day and (%)				
	High	Moist	Mid-Range	Dry	Low
SSM Departure	4.35E+13 (99.0)	1.55E+11 (63.0)	1.72E+11 (79.6)	1.48E+11 (84.2)	7.39E+10 (90.1)
GM Departure	3.16E+10 (12.0)	7.56E+10 (60.8)	8.34E+10 (77.9)	7.87E+10 (86.2)	4.67E+10 (92.2)
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Table 13. Load estimates after livestock exclusions, ponds, and ag waste structures (PC-11)

Existing Load Summary	Existing Loads (orgs/day)				
	High	Moist	Mid-Range	Dry	Low
90th Percentile Load	4.40E+13	2.46E+11	2.16E+11	1.48E+11	7.39E+10
Median Load	2.64E+11	1.25E+11	1.07E+11	9.12E+10	5.06E+10
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

The additional reductions needed to meet the WQS are from the estimated 30% of existing septic systems in the watershed that are malfunctioning and contributing to the Price Creek bacteria load. Figure 24 illustrates the bacteria load after all livestock exclusion, ponds, wetlands, ag waste structures and septic systems are applied.

Figure 24: *E. coli* Load Duration Curve (streamflow) at Price Creek outlet After Full BMP Implementation (PC11)

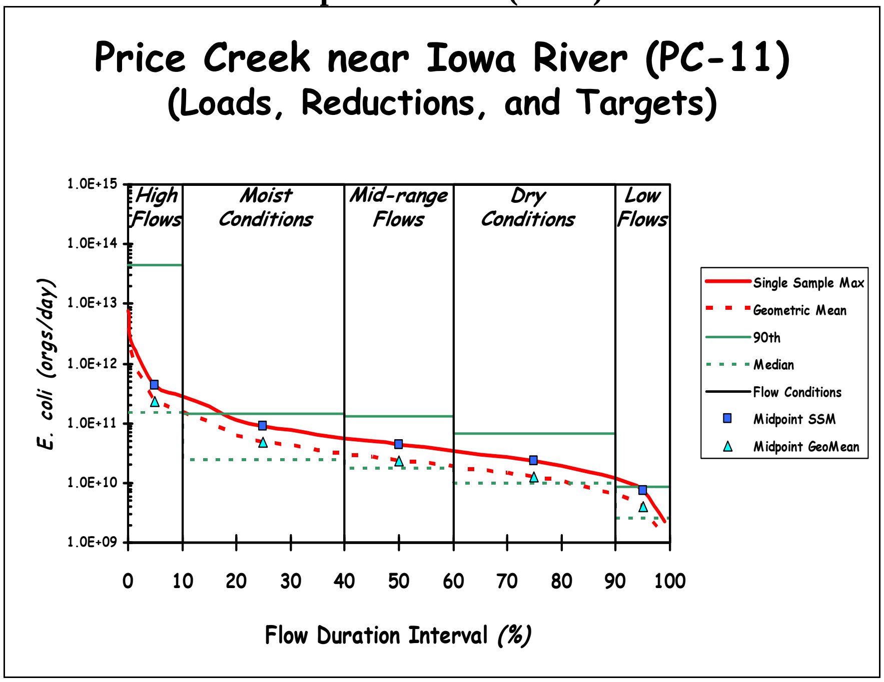


Table 14 lists the resulting bacteria load after all BMPs identified during the field assessments are implemented. Table 15 goes on to show the resulting load meets the WQS during all flow events.

Table 14. Load estimates after livestock exclusions, ponds, ag waste structures, and 100% septic system compliance (PC-11)

Existing Load Summary	Existing Loads (orgs/day)				
	High	Moist	Mid-Range	Dry	Low
90^{th} Percentile Load	4.39E+13	1.46E+11	1.34E+11	6.62E+10	8.74E+09
Median Load	1.52E+11	2.42E+10	1.74E+10	1.01E+10	2.64E+09
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

Table 15. Departure from loading capacity after livestock exclusions, ponds, ag waste structures, and 100% septic system compliance (PC-11)

Departure from Capacity	Departure in orgs/day and (%)				
	High	Moist	Mid-Range	Dry	Low
SSM Departure	4.34E+13 (99.0)	5.51E+10 (37.7)	8.96E+10 (67.0)	4.28E+10 (64.7)	1.40E+09 (16.0)
GM Departure	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Midpoint flow (cfs)	75	16	7.7	4.1	1.3

PART 4
PROPOSED MANAGEMENT MEASURES

The Iowa and Benton SWCDs estimate that Price Creek will meet the bacteria criteria after 10 years of management and conservation funding.

PROJECT GOALS

The primary goal of the Price Creek Water Quality Project is to reduce bacteria loading by 95% to meet the WQS caused by livestock access and failed septic systems, through better manure storage practices and management techniques.

The secondary goal of this project is to reduce sediment delivery to Price Creek by 4,500 t/y through the implementation of erosion prevention and sediment control practices and stream bank stabilization techniques.

PROJECT OBJECTIVES

1: Eliminate livestock access (approximately 12 miles) to Price Creek and its tributaries by:

- Providing alternative watering sources on 8 operations.
- Controlling access on all 12 miles.
- Improving grazing efficiency on 480 acres.
- Holding 1 educational workshops/field days/yr on grazing systems including demonstrations on fencing & watering systems.

2: Reduce bacteria loading by breaking the delivery network on the most critical areas by:

- Developing nutrient management systems for 4,045 acres.
- Installing 76 acres of Pasture buffers to stop bacteria and sediment movement.
- Implementing a manure testing program with ISU extension/project partners and 1 workshop/yr to improve manure management and application methods.

3: Reduce sediment loading by 4,500 t/y on the most critical cropland and stream bank by:

- Install 102 acres of buffers and 4,045 acres of cover crops to stop sediment movement (reducing 500 t/y).
- Controlling soil loss through the use of 8 grade stabilization practices, 2,000 ft of terrace, and 20 water and sediment control basins (reducing 3,000 t/y).
- Stabilizing 1.5 mi. of the most critically eroding stream bank (reducing 1,000 t/y).

4: Eliminate bacteria loading from failing septic systems:

- Provide 54 vouchers for households needing septic inspection / clean-outs.
- Provide an incentive payment for new installations on 3 of the highest priority sources and for use as demonstration sites during field days.
- Hold 1 information & educational meetings / field days / yr on septic systems.

To meet the project goals and objectives, the following BMPs will be considered during planning sessions with landowners and producers. The practices and quantities are based on the field assessment work completed by the ICSWCD in 2005 with revisions in 2009-10. Table 16 lists all practices, tables 17-18 provides a break down by sub basin and figures 25 and 26 show the BMP locations in the watershed.

Table 16: BMPs needed to meet Bacteria and Sediment Delivery Goals:

BMP	Amount
Livestock	
Waste Storage Facility	13 ea
Critical Area Planting	25 ac
Livestock Watering Pond	8 ea
Fencing	110,880 ft (21 mi)
Marg. Pasture Riparian Buffer	76 ac (110,880 ft / 21 mi)
Access Control	76 ac
Pasture/Hayland Planting	270 ac
Pipeline	20,000 ft
Prescribed Grazing	480 ac
Shallow Pond	4 ea
Well for livestock	4 ea
Pumping plant for well	4 ea
Heavy Use Protection	6 ac
Stream Crossing	8 ea
Watering Facility	30 ea
Cropland	
Contour Buffer Strip	30 ac
Cover Crop	4,045 ac
Filter Strip with crop history	56 ac (15.5 mi)
Filter Strip no crop history	16 ac (3.6 mi)
Grade Stab. Structure	8 ea
Grassed Waterway	30 ac
Streambank Stabilizaton	7,900 ft (1.5 mi)
Nutrient Management	4,045 ac
Terrace	2,000 ft
Water & Sed. Cntrl. Basin	20 ea
Rural Farmstead/Acreage	
Septic Systems	54 ea

Table 17: BMPs needed to meet the WQS for Bacteria by Sub Basin:

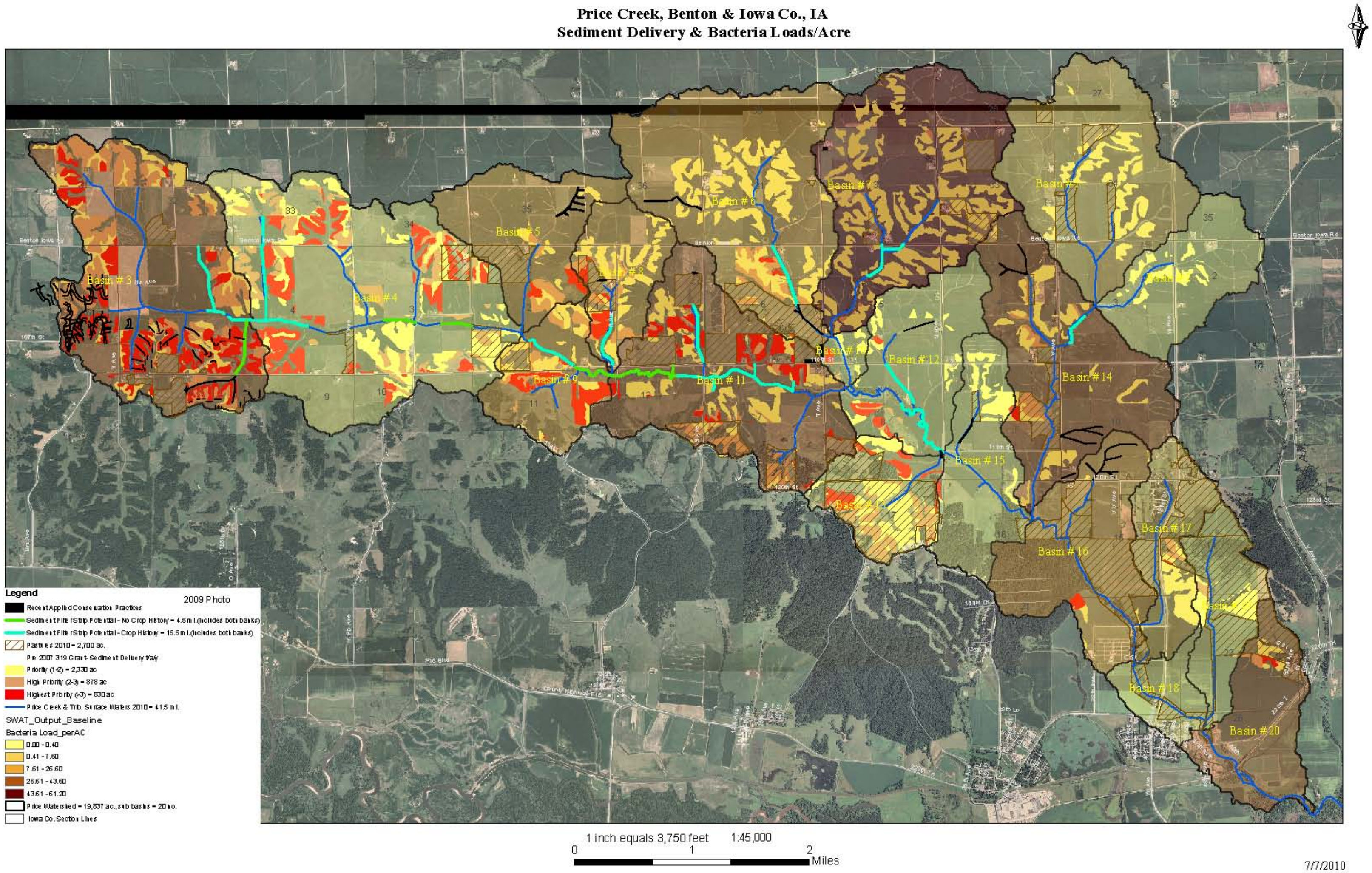
Subbasin	Acres	Load_Gorgs	BMP's	Buffer & Fence	Pond/Wetland	Ag Waste Strucuture	Septics fixed
1	1382	7958		5,300 ft	1 ea	1 ea	2 ea
2	677	0		0	0	0	2
3	2011	36042		2,200	2	2	4
4	2429	0		4,600	0	0	4
5	784	18419		5,300	0	0	2
6	1770	24802		0	0	1	4
7	1696	38975		1,700	4	4	5
8	503	9014		3,100	0	1	2
9	564	1687		500	0	1	1
10	97	0		0	0	0	1
11	1594	31279		0	1	2	5
12	833	0		0	0	0	2
13	528	3		0	1	0	1
14	1394	45861		17,500	1	1	4
15	707	0		0	0	0	2
16	1045	18316		29,000	1	0	3
17	552	3088		5,000	0	0	6
18	275	0		17,000	0	0	1
19	509	150		0	1	0	1
20	684	11836		0	0	0	2
				91,200	12	13	54

Table 18: BMPs needed to meet the Sediment Delivery Reduction Goals by Sub Basin:

* Sediment Delivery total is based on areas averaging >1 ton/ac/yr

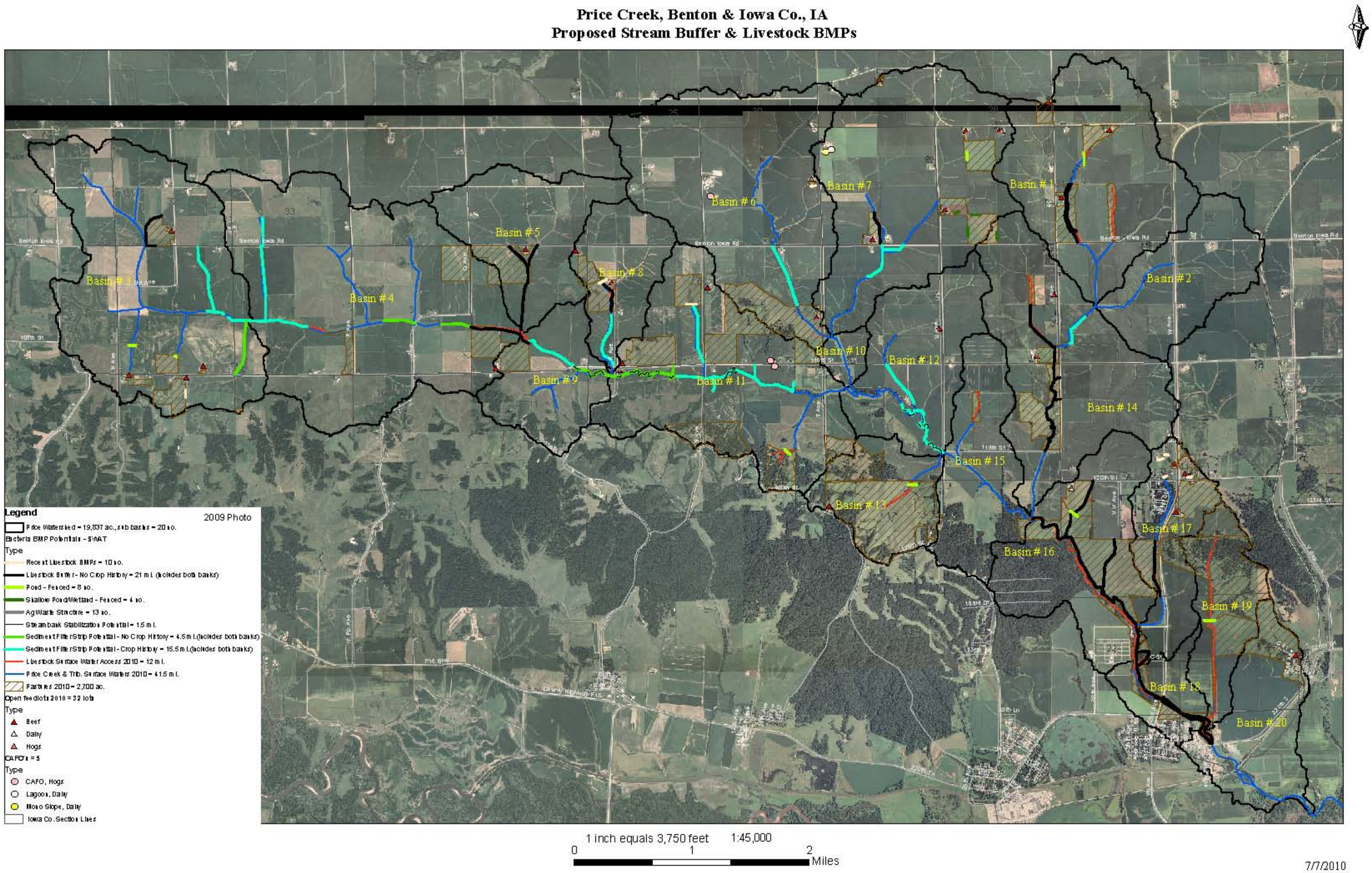
Basin ID	Basin Sed. Delivery	S. Bank Sed. Delivery	BMP's	Contour Buffer	Cover Crop	Filter Strip	Grade Stab. Structure	Grassed Waterway	S. Bank Stab.	Terrace	WASCOB
1	31 t/yr*	0 t/yr		0 ac	138 ac	ft	0 ea	0 ac	0 ft	0 ft	0 ea
2	27	0		0	50	0	0	0	0	0	0
3	978	650		15	777	15,000	2	5	0	1,000	10
4	947	650		15	730	20,500	1	5	0	1,000	5
5	100	0		0	108	0	0	0	0	0	0
6	200	250		0	367	5,800	0	5	0	0	1
7	205	0		0	500	5,600	0	5	0	0	2
8	197	0		0	154	5,000	0	5	0	0	2
9	260	2,300		0	144	7,800	1	0	1,320	0	0
10	74	0		0	28	0	0	0	0	0	0
11	640	4,900		0	324	25,000	1	5	3,400	0	0
12	127	3,700		0	80	13,500	1	0	2,500	0	0
13	492	0		0	236	0	0	0	0	0	0
14	108	0		0	189	3,000	1	0	0	0	0
15	26	650		0	45	0	0	0	0	0	0
16	22	650		0	17	0	1	0	0	0	0
17	38	0		0	95	0	0	0	0	0	
18	0	1,500		0	0	0	0	0	700	0	0
19	28	0		0	38	0	0	0	0	0	0
20	27	750		0	25	0	0	0	0	0	0
Total:	4,527	16,000		15	4,045	101,200 ft	8	30	7,920 ft / 1.5 mi	2,000	20

Figure 25: Priority Map – Sediment Delivery Rates and Bacteria Loads / Acre



Refer back to table 7. Figure 25 illustrates the subbasins and locations where bacteria load and sediment delivery are each priorities. This comparison suggests that the subbasins of highest importance to both sediment and bacteria are: 3, 7, 11, 14, 20. Though not included in the SWAT model, the similarity identifies the importance of both bacteria and sediment control BMPs.

Figure 26: Priority Map -Stream Buffers and Livestock BMP



Figures 27-29 illustrates the resulting loads by sub-basin after full BMP implementation compared to existing conditions figures 16 - 19. *Note: Each map states 2003-2008 Recreation Season, because the model is based on stream flow during that time. These maps are future projections, using average stream flow and estimating load after implementation of practices.*

Figure 27: Price Creek Bacteria Load After 100% Implementation

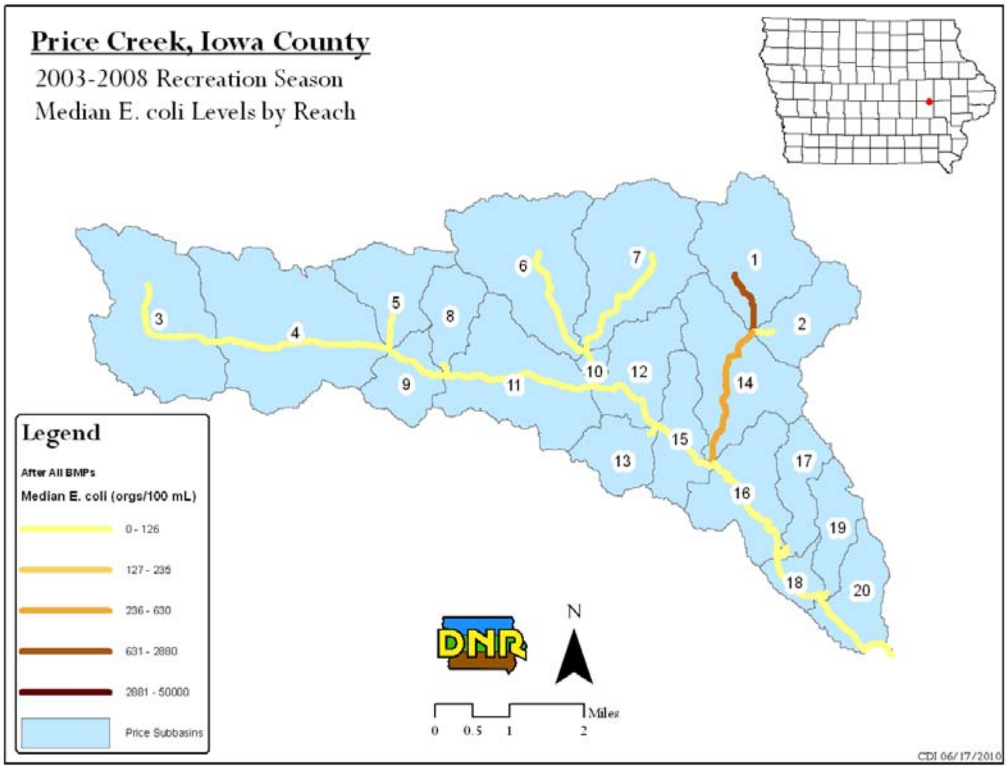


Figure 28: Average Load per Acre by Subbasin After 100% Implementation

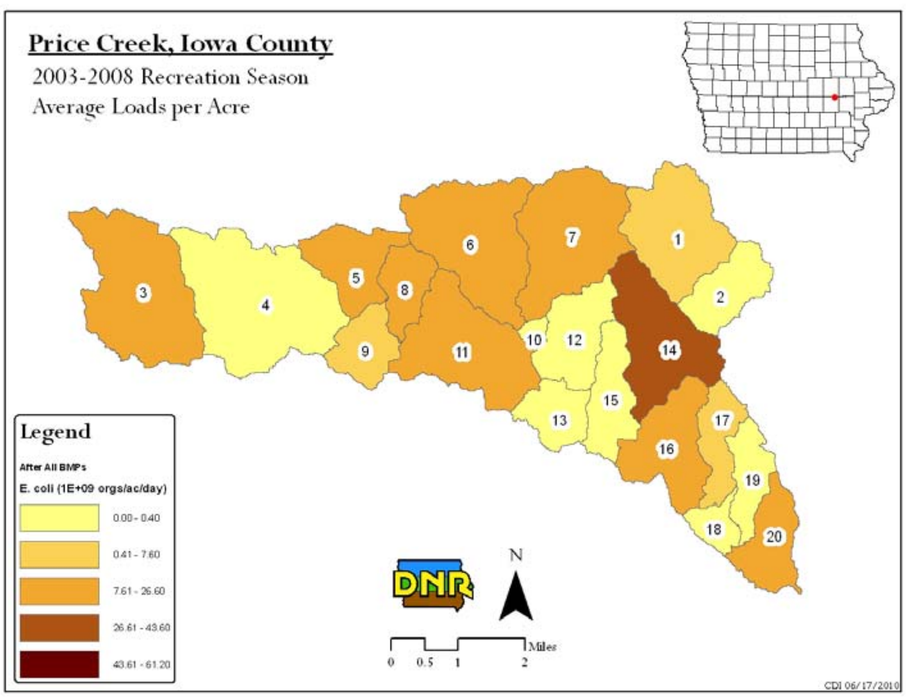
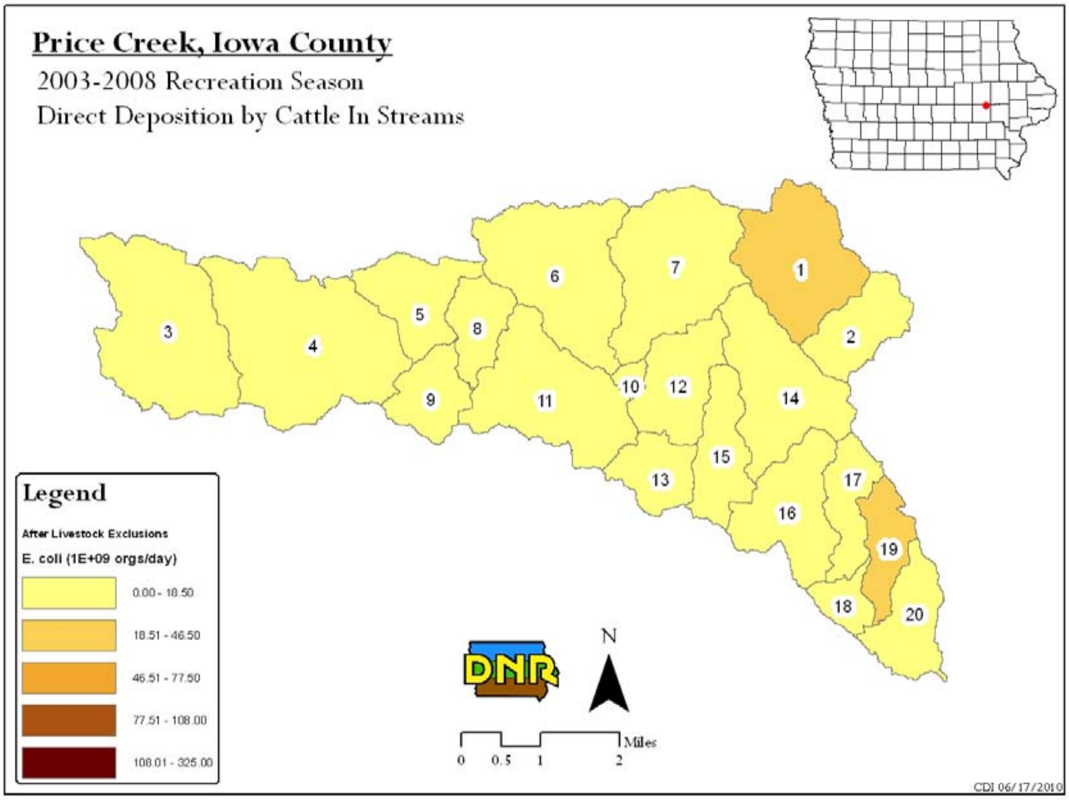


Figure 29: Average Load by Subbasin after Livestock Exclusion



PART 5

TECHNICAL AND FINANCIAL ASSISTANCE NEEDS

Table 19: Funding Needed for BMPs and Administration:

BMP	Amount	Estimated Project Funds Cost ($)	Expected Fund Sources
Livestock			
Waste Storage Facility	13 ea	487,500	EQIP,319
Critical Area Planting	25 ac	3,750	EQIP,WSPF
Livestock Watering Pond	8 ea	120,000	EQIP,WIRB,319
Fencing	110,880 ft (21 mi)	249,480	EQIP,WIRB,319
Marg. Pasture Riparian Buffer	76 ac (110,880 ft / 21 mi)	11,400	WIRB, 319
Access Control	76 ac	3,800	EQIP,WSPF,319
Pasture/Hayland Planting	270 ac	13,500	EQIP,WSPF
Pipeline	20,000 ft	60,000	EQIP,WSPF,319
Prescribed Grazing	480 ac	19,200	EQIP,WSPF
Shallow Pond	4 ea	5,100	EQIP,319
Well for livestock	4 ea	36,000	EQIP,319
Pumping plant for well	4 ea	12,000	EQIP,319
Heavy Use Protection	6 ac	9,000	EQIP,WSPF
Stream Crossing	8 ea	12,000	EQIP,WSPF
Watering Facility	30 ea	45,000	EQIP,WSPF
Cropland			
Contour Buffer Strip	30 ac	3,000	CRP
Cover Crop	4,045 ac	809,000	EQIP,WSPF,319
Filter Strip with crop history	56 ac (15.5 mi)	5,600	CRP
Filter Strip no crop history	16 ac (3.6 mi)	8,400	EQIP,319
Grade Stab. Structure.	8 ea	90,000	EQIP,WSPF,WIRB
Grassed Waterway	30 ac	101,250	EQIP,WSPF,WIRB
Streambank Stabilizaton	7,900 ft (1.5 mi)	1,185,000	EQIP,WSPF,WIRB
Nutrient Management	4,045 ac	40,450	EQIP
Terrace	2,000 ft	8,500	EQIP,WSPF,WIRB
Water & Sed. Cntrl. Basin	20 ea	25,500	EQIP,WSPF,WIRB
Rural Farmstead/Acreage			
Septic System	54 ea	-	-
BMP Incentives			
Livestock/Cropland Cost-Share	75-90 %	3,364,430	EQIP,WSPF, 319 WIRB
Pasture Riparian Buffer	$1,000 / ac	76,000	WIRB/319
Septic System Voucher	$100 ea.	5,400	WIRB/319
Septic System Cost-Share	3 ea. - $3,000 ea	9,000	WIRB/SRF Funds
Total BMP:		$ 3,454,830	
Administrative			

Local FTE Project Coordinator	10 YR	975,000	WPF,WSFP,319
Travel, Training, Supplies		20,000	WSPF,WPF
Water Monitoring		25,000	319
Information Education		10,000	WPF
Contractual Services		12,000	WPF
Total Administrative		$1,042,000	-
Total Admin. + BMPs		**$4,496,830.00**	-

PART 6

INFORMATION AND EDUCATION - PUBLIC OUTREACH PLAN

1. PLAN GOALS

- The primary goal of the Price Creek Water Quality Project is to reduce bacteria loading to meet the WQS caused by livestock access and failed septic systems, through better manure storage practices and management techniques.

- The secondary goal of this project is to reduce sediment delivery by 4,500 t/y to Price Creek through the implementation erosion prevention and sediment control practices and stream bank stabilization techniques.

2. TARGET AUDIENCES

Who do you depend on to make changes to the land and in the watershed?

- Landowners
- Operators
- Rural residents
- DNR, IDALS-DSC, NRCS

Who do you depend on to keep your project afloat?

- Price Creek Advisory Committee / Benton and Iowa Co. Soil & Water Conservation Districts
- Landowners, operators and rural residents
- Amana Society
- State Senator Thomas Rielly
- State Senator Tim Kapucian
- State Representative Dawn Pettengill
- State Representative Betty De Boef
- U.S. Senators Chuck Grassley and Tom Harkin
- U.S. Representative Dave Loebsack
- DNR, IDALS-DSC, NRCS
- ISU-Extension
- Iowa Valley RC&D
- Benton and Iowa County Public Health / Sanitarians

- Other partners / organizations - as they develop

Who do you depend on to spread your message to these people?

- Respected individuals in the community that can serve as project leaders and spokespeople (referred to in plan as "community leaders")
    - SWCD Commissioners
    - Price Creek Advisory committee
- Project partners and stakeholders
    - DNR,IDALS-DSC ,NRCS, Benton and Iowa Co. SWCDs
    - Iowa Valley RC&D
    - Iowa and Benton county boards of supervisors
    - Iowa Cattlemen's Association
    - Iowa Soybean Association
    - Iowa State University Extension
    - Trees Forever

- Newspapers:
    - Newspapers of Iowa County
    - Cedar Rapids Gazette
- Radio:
    - WMT (600 AM), Cedar Rapids
    - KHAK (98.1 FM), Cedar Rapids
    - KXIC (800 AM), Iowa City
    - KCRG (1600 AM), Cedar Rapids
    - KUNI (90.9 FM), Public Radio
    - WSUI (910 AM), Public Radio
- Television:
    - KCRG, Cedar Rapids
    - KGAN, Cedar Rapids
    - KWWL, Waterloo
    - KIIN / KRRN, Iowa City / Waterloo Public

3. RESEARCH of TARGET AUDIENCES

A landowner / operator survey was mailed in 2004 and tabulated in 2005. Twenty-six percent of the total producers in the watershed (representing and operating about 46% of the land in the watershed) responded. Those results indicated that fifty percent of the survey respondents identified themselves as livestock producers. Two thirds of those livestock producers indicated their cattle have unrestricted access to Price Creek. Of those livestock producers, 50% indicated they would be willing to consider excluding livestock from the stream if other watering sources were available and 100% of the livestock producers indicated they would incorporate other conservation practices if 75% cost share were available.

The results indicated producers felt a lack of awareness about NRCS and District available information. However, over 80% of the livestock producers responding indicated they would be willing or would consider working with the districts to discuss conservation options indicating a current openness to alternatives.

Only four livestock producers in the watershed have actually developed manure management plans. Eighty percent of our survey respondents considered using their own judgment as the most important factor in determining their current manure application rates but 50% of the survey respondents did indicate that crop nutrient requirements, the use of soil tests, and the ease of application were important considerations when applying manure. Fifty percent or more of the same respondents also indicated that manure sampling and following manufacture's and agriculture scientist's recommendations to be the least important to them in determining their application rates. This will be a major challenge for our project.

ISUE has agreed to host manure management field days jointly with NRCS and the Districts to work with producers to test manure, do soil tests, and develop strategies to better manage manure and nutrients. This will include Nutrient Management plans but will also incorporate strategies and options for some "cook-book" approaches that producers can use that won't require a lot of record keeping to implement as 83% of the livestock producers who returned our survey indicated they didn't feel that better record keeping was effective in improving water quality.

Of greatest concern was that 56% of our respondents indicated that their septic systems were more than 25 years old and another 22% indicated their systems were 10-25 years old. A third of the respondents did express interest in learning about the state's low interest loan program to update their septic systems. A few sites have already been identified where tile lines are known to dump human waste into Price Creek. Since there are 160 septic systems being used in the watershed, our intent is to conduct an information and education program in the two counties to facilitate getting information to rural residents regarding water quality issues relating to untreated human waste and how to update their systems and what programs exist to help.

The watershed management plan provided a second formal process to gather input from landowners, producers, advisory boards and partner organizations. During the 2009-10 year the project coordinator met with advisory boards six times, members of the Amana society twice, partner organizations twice, organized two public meetings, mailed one newsletter, had two newspaper articles published and finished the process with a livestock producer survey. There remains strong support among advisors and partners however, enthusiasm varied with livestock producers. But there are some important observations from the livestock producers mail survey. The survey was short and rather to-the-point and returned by 24% of recipients. The results suggest six conclusions. 1.) Contour buffers would be considered if they approached the rates currently offered on stream filter strips 2.) Filter strips would be considered if they approached $300 /ac/yr 3.) Both would be adopted in greater quantity if CRP did not penalize livestock producers for gleaning cornstalks from fields that had CRP 4.) Non-CRP pasture buffers would be considered at 30-50ft for $60-100/ac/yr 5.) Ag. Waste structures would be considered if 75% cost share was available 6.) Cover Crops might be considered if incentives covered all the costs to implement.

Over the last four years of the existing Price Creek Project, nearly every landowner / producer has become aware of the project through face-to-face contacts, phone conversations, mailings, field days and workshops. Project partners will continue to work together to provide an information program that will inform the public on project activities, progress and to provide cooperators with the technical information needed to help implement watershed protection BMP's. Particular attention will be geared to maintaining an on-the-ground presence with livestock producers. Informational activities will be focused toward improving communication, providing needed technical information and relaying project information and progress to landowners and producers in the watershed and to the local public.

4. OUTREACH STRATEGY

Goal 1: Reduce bacteria loading to meet the WQS caused by livestock access and failed septic systems, through better manure storage practices and management techniques.

Audience:

- Landowners /operators
- Rural residents

Barriers to landowners/operators adopting practices

- Reluctant to work with government officials and programs
- Lack of understanding about project goals and issues
- Increased costs to install practices during harsh economic times
- Lack of understanding regarding nutrient management planning
- Costs and changes in practice that could affect profit margins
- Working with government programs / paperwork
- Potential loss of productivity and crop area
- Concerns about loss of control of land use by property owners
- Whether applying practices to some land will benefit the entire watershed
- Absentee landowners may have different motivations
- Aging farmers show reluctance to change at this point in life

Barriers to rural residents

- Little or no understanding of how watershed improvement works and why it is necessary
- Little or no understanding of water quality problems associated with septic systems
- Feeling that there's nothing they can do to help
- Increased costs to install practices during harsh economic times

Possible solutions landowners/operators:

- Funding assistance will defray costs to install conservation practices
- Projects will help make the land more sustainable and provide a positive image
- Develop education programs and collect data to clarify source of bacterial problem.
- Provide better use of pasture lands through prescribed grazing, allowing for greater carrying capacity (more cows)
- Show landowners how conservation practices can benefit their land and farming operations through field days and workshops
- Show landowners how practices will protect their land and land down the watershed

Possible solutions for rural residents:

- Financial benefits to the home, knowing the septic system meets current law
- Improving surface water will safeguard their well water
- Improving the water quality will make it safer to be in contact with
- Improving the water quality will increase the aesthetic value in the areas of high tourist traffic

Message - landowners/operators:

- Cattle access to the creek and manure are major sources of bacteria in Price Creek
- Existing levels exceed recommendations for human contact
- Conservation pasture and manure management practices can increase productivity, profitability, animal health and improve water quality
- Funding and technical assistance are available

Message – rural residents:

- Septic systems are a major source of bacteria in Price Creek
- Existing levels exceed recommendations for human contact
- Good drinking water quality starts with good surface water quality
- Funding and technical assistance are available

Message delivery (both landowners/operators and rural residents):

- In-person meetings with landowners
- Have "community leaders," explain why they adopted them
- Newsletters
- Direct mailings as needed
- Field days, workshops and demonstrations

Goal 2: The secondary goal of this project is to reduce sediment delivery to Price Creek through the implementation erosion prevention and sediment control practices and stream/ bank stabilization techniques.

Audience:

- Landowners / operators

Barriers to landowners adopting practices:

- Adopting some practices may reduce profits and affect land uses.
- Costs of installing practices are prohibitive during these tough economic times
- Costs and changes in practice that could affect profit margins
- Working with government programs / paperwork
- Potential loss of productivity and crop area
- Concerns about loss of control of land use by property owners
- Whether applying practices to some land will benefit the entire watershed
- Absentee landowners may have different motivations
- Aging farmers show reluctance to change at this point in life

Possible solutions:

- Show landowners how conservation practices can benefit their land and farming operations
- Show landowners how practices will protect their land and land down the watershed through field days and workshops
- Improving the watershed will reduce soil loss and improve the value of the land

Message:

- Conservation practices can reduce erosion, increase soil quality and protect cropland.
- Reduced need for fertilizers and repair work in fields after storms will help profits

Message delivery:
- In-person meetings with landowners
- Have “community leaders,” explain why they adopted them
- News releases
- Newsletter
- Direct mail as needed
- Field days and demonstrations

5. OUTREACH PLAN

Over the life of the project information activities will include:
- A project logo for Price Creek signage and cooperating landowner recognition
- Local news coverage during the Price Creek Project period
- Submit newsletters / articles to the local media and partner newsletters
- Develop and distribute a summary of progress, including water monitoring and sediment delivery reduction data
- Individual meetings with livestock landowners and producers on priority land to inform them of project activities, conservation planning and follow up.
- Manure management educational workshops on manure testing and management
- Establish nutrient and manure management demo sites
- Hold pasture management workshops
- Establish pasture management demonstration sites
- Hold stream bank stabilization field days to demonstrate stabilization needs and options
- Establish a stream bank stabilization demonstration site
- Hold a field day on well-water testing and septic systems in the watershed
- Establish up to three septic system demonstration sites

YEAR 1 (2010):
First quarter:
- Sent newsletter to watershed residents / operators
- Article in Newspapers of Iowa County regarding the Watershed Management Planning Process and public comment opportunities
- Public Meetings on bacteria pollution, sources and alternative practices
- SentPre Project Phase 1 survey to livestock producers
- Work with the Iowa Soybean Association on nutrient management / conservation planning program opportunities

Second quarter:
- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Provide news article on project goals and status
- Meet with Iowa State University Extension / NRCS to re establish a cooperative agreement for the remainder of the projects education event needs
- Work with the Iowa Valley RC&D and the Amana Society to develop Price creek signage / interpretive display in Amana
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting

Third quarter:
- Mail a winter/spring newsletter
- Work with Trees Forever on possible Amana gateway visioning project opportunity
- Conduct individual meetings with area producers
- Organize a cover crop field day

Fourth quarter:
- Conduct individual meetings with area producers
- Organize a pasture management related field day
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Conduct septic system educational meeting
- Annual review of project with project partners
- Annual review of project with advisory board

YEAR 2(2011):

First quarter:
- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Organize a streambank stabilization field day
- Re-visit the Iowa Soybean Association on nutrient management / conservation planning program status
- Re-visit / start the Trees Forever visioning project – Organize meeting
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:
- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a cover crop field day
- Organize a watershed advisory meeting

Third quarter:
- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:
- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board
- Conduct follow-up septic system educational forum.- offer vouchers to participants

YEAR 3 (2012):

First quarter:
- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed

- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a cover crop field day
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board
- Conduct follow-up septic system educational forum.- offer vouchers to participants

YEAR 4 (2013):

First quarter:

- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a streambank stabilization field day
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board

- Conduct follow-up septic well / system field day at a recently installed system - offer vouchers to participants

YEAR 5 (2014):
First quarter:
- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:
- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting
- Mail a mid project review survey to producers

Third quarter:
- Tabulate survey results for use in project Phase 2 application
- Annual review of project with project partners
- Mail a winter/spring newsletter
- Public Meetings on bacteria pollution, sources and alternative practices
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers

Fourth quarter:
- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with advisory board
- Conduct follow-up septic well / system meeting at a recently installed system - offer vouchers to participants

YEAR 6 (2015):
First quarter:
- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Mail a project newsletter / submit articles with project Phase 2 related information
- Organize a pasture management related field day
- Organize a cover crop field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:
- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a streambank stabilization field day
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board
- Conduct follow-up septic well / system meeting

YEAR 7 (2016):

First quarter:

- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Organize a cover crop field day
- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board

YEAR 8 (2017):

First quarter:

- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board

YEAR 9 (2018):

First quarter:

- Conduct individual meetings with area producers
- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting

Third quarter:

- Mail a winter/spring newsletter
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers
- Conduct nutrient management planning sessions

Fourth quarter:

- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with project partners
- Annual review of project with advisory board

YEAR 10 (2019):

First quarter:

- Conduct individual meetings with area producers

- Install signage for conservation practices in watershed
- Organize a pasture management related field day
- Review possible SWCD annual banquet award winners for participating producers

Second quarter:

- Continue to develop photo journal, local history data and other information
- Mail a fall newsletter – related to winding down of Phase 2
- Ongoing process of meeting local producers
- Organize a field day at a recently constructed manure management facility
- Organize a watershed advisory meeting - needs assessment for possible Phase 3
- Mail a final project review survey to producers

Third quarter:

- Tabulate survey results for use in project final reporting and future projects
- Annual review of project with project partners – needs assessment for possible Phase 3
- Public Meetings on bacteria pollution, sources and alternative practices
- Article in Newspapers of Iowa County regarding recent fall BMP installations
- Conduct individual meetings with area producers

Fourth quarter:

- Mail a summer newsletter
- Conduct individual meetings with area producers
- Review water monitoring data for the year
- Evaluate sediment delivery from project sites
- Project evaluations and progress summarizations.
- Annual review of project with advisory board

6. MEASURE AND EVALUATE EFFECTIVENESS; PROMOTE SUCCESSES

Success will be measured through calculating and meeting Sediment Delivery Reduction goals, the number of people attending workshops, organizations participating and partnering with us, farm follow-ups completed, by the number, acres, or feet of best management practices that are installed, number of acres of critically eroding acres treated, number of wells tested, septic systems updated, and water quality improvement documented through IOWATER monitoring. Additionally, before, during, and after photos will be taken to visually document watershed improvements. Another method of evaluation will be through the quarterly and annual project reports and reviews which can be used to make adjustments to work plans as needed throughout the period. The WMP will be assessed on an annual basis to determine if milestones are being met. The WMP will also be assessed at the end of each phase to determine if goals and reductions are being achieved or if there needs to be adjustments to the plan.

PART 7

Implementation Schedule & Project Outcomes

Table 20: Project Implementation Schedule Phase 1

Goal 1: The primary goal of the Price Creek Water Quality Project is to reduce bacteria loading by 95% to meet the WQS caused by livestock access and failed septic systems, through better manure storage practices and management techniques. *				**Phase 1 (Yrs 1-5)**					
Goal 2: The secondary goal of this project is to reduce sediment delivery to Price Creek by 4,500 t/y through the implementation of erosion prevention and sediment control practices and stream bank stabilization techniques.*									
Objective # 1	Reduce livestock access to Price Creek and its tributaries (12mi.)	Milestone metric	Milestone totals	SFY 2011	2012	2013	2014	2015	Project Outcome
Task 1:	Provide alternative watering sources on 8 operations	Pond	4 no	0	1	1	1	1	Reduction in bacteria load caused by livestock access to creek
		Pipeline	10,000 ft	0	2,500	2,500	2,500	2,500	
		Well	4 no	0	1	1	1	1	
		Pump	4 no	0	1	1	1	1	
		Watering Facility	15 no	0	4	4	4	3	
		Heavy Use Protection	3 ac	0	0.75	0.75	0.75	0.75	
Task 2:	Control Access on 12 mi.	Access Control	36 sc	4	8	8	8	8	Reduction in bacteria load Creeks Access reduced by 50%
		Stream Crossing	4 no	0	1	1	1	1	
		Fencing	55,440 ft	0	13,860	13,860	13,860	13,860	
Task 3:	Improve Grazing efficiency on 480 ac	Prescribed Grazing	240 ac	48	48	48	48	48	Reduction sediment and attached bacteria due to increased forage quality
		Pasture Planting	135 ac	27	27	27	27	27	

Objective # 2	Reduce bacteria loading by breaking the delivery network on the most critical areas	Milestone metric	Milestone totals	SFY 2011	2012	2013	2014	2015	Project Outcome
Task 1:	Develop nutrient management systems on 4,045 ac.	Nutrient Management	2,000 ac	0	500	500	500	500	Reduction in bacteria load from manure application and better open lot runoff control
		Waste Storage Facility	4 no	1	1	1	1	1	
Task 2:	Install buffers to stop bacteria and sediment movement on 178 ac.	Pasture Buffer	36 ac	4	8	8	8	8	Reduction in bacteria load caused by runoff in pasture
		Critical Area Planting	13 ac	1	3	3	3	3	
		Wetland Creation	2 no	0	0	1	1	0	
Objective # 3	Reduce sediment loading by 1/3 on the most critical cropland and 1.5 mi of stream bank								
Task 1:	Install buffers to stop sediment movement by installing 102 buffer ac, and 4,045 ac cover crops	Contour buffer	15 ac	3	3	3	3	3	Reduction in sediment delivery (estimated sediment reduction of 250 t/y)
		Cover Crop	2,000 ac	0	500	500	500	500	
		Filter Strip	36 ac	4	8	8	8	8	
Task 2:	Control soil loss through use of structural practices 8 grade stab. Structures, 2,000 ft. terrace and 20water and sediment control basins	Grade Stabilization Structure	4 no	0	1	1	1	1	Reduction in sediment delivery (estimated sediment reduction of 2,000 t/y)
		Grass Waterway	15 ac	3	3	3	3	3	
		Stream bank Stabilization	3,950 ft	0	0	1,975	0	1,975	
		Terrace	1,000 ft	200	200	200	200	200	
		Water & Sed. Control Basin	10 no	2	2	2	2	2	

Objective # 4	Eliminate bacteria loading from failing septic systems	Milestone metric	Milestone totals	SFY 2011	2012	2013	2014	2015	Project Outcome
Task 1	Provide 54 vouchers for septic inspections / cleanouts	30 % of rural homes **	54	0	16	14	14	10	Reduction in bacteria load
Task 2	Provide an incentive payment for new installations on 3 high priority sources to be used as demonstration sites for field days	3	3	0	0	1	1	1	Reduction in bacteria load

* See Targeted areas for BMPs – Figures 23-24

**There are an estimated 54 septic systems (30% of the homes in the watershed) that are not functioning correctly.

ALL MILETONES WILL BE EVALUATED ON A YEARLY BASIS. ALL MILESTONES WILL BE EVAULATED ON A PHASE BASIS.

EACH STATE FISCAL YEAR THIS IMPLEMENTATION SCHEDULE WILL BE UPDATED ACCORDINGLY TO ACCOUNT FOR ANY UNFORSEEN CHANGES.

Table 21: Project Implementation Schedule Phase 2

Goal 1: The primary goal of the Price Creek Water Quality Project is to reduce bacteria loading by 95% to meet the WQS caused by livestock access and failed septic systems, through better manure storage practices and management techniques. *				**Phase 2 (Yrs 6-10)**						
Goal 2: The secondary goal of this project is to reduce sediment delivery to Price Creek by 4,500 t/y through the implementation of erosion prevention and sediment control practices and stream bank stabilization techniques.*										
Objective # 1	Reduce livestock access to Price Creek and its tributaries (12 mi.)	Milestone metric	Milestone totals	SFY 2016	2017	2018	2019	2020	Project Outcome	
Task 1:	Provide alternative watering sources on 8 operations	Pond	4 no	0	1	1	1	1	Reduction in bacteria load caused by livestock access to creek	
		Pipeline	10,000 ft	0	2,500	2,500	2,500	2,500		
		Well	4 no	0	1	1	1	1		
		Pump	4 no	0	1	1	1	1		
		Watering Facility	15 no	0	4	4	4	3		
		Heavy Use Protection	3 ac	0	0.75	0.75	0.75	0.75		
Task 2:	Control Access on 12 mi.	Access Control	40 sc	8	8	8	8	8	Reduction in bacteria load Creeks Access reduced by 50%	
		Stream Crossing	4 no	1	1	1	1	0		
		Fencing	55,440 ft	0	13,860	13,860	13,860	13,860		
Task 3:	Improve Grazing efficiency on 480ac	Prescribed Grazing	240 ac	48	48	48	48	48	Reduction sediment and attached bacteria due to increased forage quality	
		Pasture Planting	135 ac	27	27	27	27	27		

Objective # 2	Reduce bacteria loading by breaking the delivery network on the most critical areas	Milestone metric	Milestone totals	SFY 2016	2017	2018	2019	2020	Project Outcome
Task 1:	Develop nutrient management systems on 4,045 acres	Nutrient Management Waste Storage Facility	2,045 ac 9 no	445 1	400 2	400 2	400 2	400 2	Reduction in bacteria load from manure application and better open lot runoff control
Task 2:	Install buffers to stop bacteria and sediment movement 178 acres	Pasture Buffer Critical Area Planting Wetland Creation	40 ac 12 ac 2 no	8 0 2	8 3 0	8 3 0	8 3 0	8 3 0	Reduction in bacteria load caused by runoff in pasture
Objective # 3	Reduce sediment loading by 1/3 on the most critical cropland and 1.5 mi. of stream bank								
Task 1:	Install buffers to stop sediment movement by installing 102 buffer ac, and 4,045 ac cover crops	Contour buffer Cover Crop Filter Strip	15 ac 2,045 ac 36 ac	3 445 4	3 400 8	3 400 8	3 400 8	3 400 4	Reduction in sediment delivery (estimated sediment reduction of 250 t/y)
Task 2:	Control soil loss through use of structural practices 8 grade stab. Structures, 2,000 ft. terrace and 20water and sediment control basins	Grade Stabilization Structure Grass Waterway Stream bank Stabilization Terrace Water & Sed. Control Basin	4 no 15 ac 3,950 ft 1,000 ft 10 no	1 3 0 200 2	1 3 1,975 200 2	1 3 0 200 2	1 3 1,975 200 2	0 3 0 200 2	Reduction in sediment delivery (estimated sediment reduction of 2,000 t/y)

Objective # 4	Eliminate bacteria loading from failing septic systems	Milestone metric	Milestone totals	SFY 2016	2017	2018	2019	2020	Project Outcome
Task 1	Provide vouchers for 54 septic inspections / cleanouts ***	This task should be complete if landowners cooperate. Next step will be to monitor the practices to ensure they are functioning properly and reducing pollutants. See Water Monitoring Plan Section.							
Task 2	Provide an incentive payment for new installations on 3 high priority sources to be used as demonstration sites for field days. ****	This task should be complete if weather and landowners cooperate. Next step will be to monitor the practices to ensure they are functioning properly and reducing pollutants. See Water Monitoring Plan Section.							

* See Targeted areas for BMPs – Figures 23-24

ALL MILETONES WILL BE EVALUATED ON A YEARLY BASIS. ALL MILESTONES WILL BE EVAULATED ON A PHASE BASIS.
EACH STATE FISCAL YEAR THIS IMPLEMENTATION SCHEDULE WILL BE UPDATED ACCORDINGLY TO ACCOUNT FOR ANY UNFORSEEN CHANGES.

PART 8 – Load Reductions Evaluation

Table 22: Bacteria Load Reductions Evaluation by Project BMP * ***See Targeted areas for BMPs – Figures 25, 26***

Basin_ID	Id	BMP_Type	Drain_Acre	Head_Exclu	Sub_Ac	Perc_Sub	Notes	Bacteria Reduction (%)	
1	1	Vegetated Native Filter Strip - Livestock Fenced	0	25	1382.160	0.000		Modeled in SWAT	
1	2	Wet Pond with Livestock Fenced	360	25	1382.160	0.260	Treats runoff from 25 acres of pasture (27% of pasture in the subbasin)	18.9	23.5
1	4	Ag Waste Structure	0	0	1382.160	0.000	1 of 3 open lots in the subbasin	28.1	
3	0	Wet Pond built in 2008 - Livestock Fenced	50	60	2010.770	0.025	Treats runoff from 35 acres of pasture (38% of pasture in the subbasin)	Included in 47.6	
3	1	Vegetated Native Filter Strip - Livestock Fenced	0	40	2010.770	0.000	Excludes cattle and filters runoff from 29 ac pasture (32% of pasture in the s	Modeled in SWAT	45.1
3	2	Wet Pond	85	10	2010.770	0.042	Filters runoff from 8 acres of pasture (9% of pasture in the subbasin)	47.6	
3	2	Wet Pond with Livestock Fenced	40	60	2010.770	0.020	Treats runoff from 19 acres of pasture (21% of pasture in the subbasin)	Included in 47.6	
3	4	Ag Waste Structure	0	0	2010.770	0.000	1 of the 4 open lots in the subbasin	42.5	
3	4	Ag Waste Structure	0	0	2010.770	0.000	1 of the 4 open lots in the subbasin	Included in 42.5	
4	1	Vegetated Native Filter Strip - Livestock Fenced	0	50	2429.340	0.000		Modeled in SWAT	
5	1	Vegetated Native Filter Strip - Livestock Fenced	0	75	784.310	0.000		Modeled in SWAT	
5	1	Vegetated Native Filter Strip - Livestock Fenced	0	75	784.310	0.000		Modeled in SWAT	
6	0	Wet Pond - Existing	2	40	1770.330	0.001	Treats runoff from open lot	0.1	21.3
6	4	Ag Waste Structure	0	0	1770.330	0.000	1 of 2 open lots in the subbasin	42.5	
7	0	Ag Waste Struture built in 2009	0	100	1695.760	0.000	Mono Slope building		
7	0	Ag Waste Structure - Existing	0	65	1695.760	0.000	lagoon		
7	1	Vegetated Native Filter Strip - Livestock Fenced	0	40	1695.760	0.000		Modeled in SWAT	
7	2	Wet Pond with Livestock Fenced	140	120	1695.760	0.083	Treats runoff from 43 acres of pasture (38% of pasture in the subbasin)		
7	3	Wetland - Livestock Fenced	13	30	1695.760	0.008	Treats runoff from 13 acres of pasture (11% of pasture in the subbasin)	56.8	62.4
7	3	Wetland - Livestock Fenced	9	30	1695.760	0.005	Treats runoff from 13 acres of pasture (11% of pasture in the subbasin)		
7	3	Wetland - Livestock Fenced	3	30	1695.760	0.002	Treats runoff from 13 acres of pasture (11% of pasture in the subbasin)		
7	4	Ag Waste Structure	0	0	1695.760	0.000	1 of 5 open lots in the subbasin	68.0	
7	4	Ag Waste Structure	0	0	1695.760	0.000	1 of 5 open lots in the subbasin		
7	4	Ag Waste Structure	0	0	1695.760	0.000	1 of 5 open lots in the subbasin		
7	4	Ag Waste Structure	0	0	1695.760	0.000	1 of 5 open lots in the subbasin		
8	0	Wet Pond built in 2008 - Livestock Fenced	142	40	503.350	0.282	Treats runoff from 22 acres of pasture (36% of pasture in the subbasin)	22.9	
8	1	Livestock Fenced	0	40	503.350	0.000			32.2
8	4	Ag Waste Structure	0	0	503.350	0.000	1 of the 2 open lots in the subbasin	42.5	
9	1	Vegetated Native Filter Strip - Livestock Fence	0	25	564.170	0.000		Modeled in SWAT	85.0
9	4	Ag Waste Structure	0	0	564.170	0.000		85.0	
11	0	Wet Pond - Existing	112	0	1594.420	0.070	Treats runoff from 39 acres of pature (10% of pasture in the subbasin)	17.5	
11	1	Vegetated Native Filter Strip - Treat Manure App	0	0	1594.420	0.000		Modeled in SWAT	37.1
11	2	Wet Pond with Livestock Fenced	81	0	1594.420	0.051	Treats runoff from 57 acres of pasture (15% of pasture in the subbasin)		
11	4	Ag Waste Structure	0	0	1594.420	0.000	1 of 3 open lots in the subbasin	56.7	
11	4	Ag Waste Structure	0	0	1594.420	0.000	1 of 3 open lots in the subbasin		
13	2	Wet Pond with Livestock Fenced	397	10	528.410	0.751	Treats runoff from 312 acres of pasture (82% of pasture in the subbasin)	57.4	54.7
14	1	Vegetated Native Filter Strip - Livestock Fenced	0	200	1394.020	0.000		Modeled in SWAT	
14	1	Vegetated Native Filter Strip - Livestock Fenced	0	200	1394.020	0.000		Modeled in SWAT	24.1
14	3	Wetland - Livestock Fenced	4	30	1394.020	0.003	Treats runoff from 9 acres of pasture (7% of pasture in the subbasin)	5.6	
14	4	Ag Waste Structure	0	0	1394.020	0.000	1 of 2 open lots in the subbasin but 95% of the cattle	42.5	
16	0	Wet Pond - Livestock Fenced	244	0	1044.660	0.000	Treats runoff from 36 acres of pasture (11% of pasture in the subbasin)	7.7	
16	1	Vegetated Native Filter Strip - Livestock Fenced	0	60	1044.660	0.000		Modeled in SWAT	
16	1	Livestock Fenced	0	200	1044.660	0.000	Amana		
16	1	Vegetated Native Filter Strip - Livestock Fenced	0	200	1044.660	0.000	Amana	Modeled in SWAT	7.7
17	0	Wet Pond - Existing - Livestock Fenced	12	30	552.450	0.022	Treats runoff from 10 acres of pasture (5% of pasture in the subbasin)		
17	0	Wet Pond - Existing	22	5	552.450	0.040	Treats runoff from 6 acres of pasture (3% of pasture in the subbasin)	8.3	
17	0	Wet Pond - Existing	5	0	552.450	0.009	Rec pond		8.3
17	0	Wet Pond - Existing	14	0	552.450	0.025	Treats runoff from 5 acres of pasture (3% of pasture in the subbasin)		
17	1	Vegetated Native Filter Strip - Livestock Fenced	0	200	552.450	0.000	Amana	Modeled in SWAT	
18	1	Livestock Fenced	0	200	274.780	0.000	Amana		
18	1	Vegetated Native Filter Strip	0	200	274.780	0.000	Amana	Modeled in SWAT	
18	1	Livestock Fenced	0	200	274.780	0.000	Amana		
19	2	Wet Pond - Livestock Fenced	305	200	508.570	0.600	Treats runoff from 277 acres of pasture (77% of pasture in the subbasin)	53.9	53.9

Table 22 lists the BMP inputs to the SWAT model and will be used by the project coordinator in the Price Creek GIS to track and quantify the expected load reductions as they are implemented in each subbasin.

PART 9

WATER QUALITY MONITORING / QUALITY ASSURANCE PROJECT PLAN (QAPP)

Price Creek is the first tributary to empty into the portion of the Iowa River that is currently listed on the Iowa 303d list as an impaired water body for bacteria. This segment of the Iowa River, within the boundary of the Coralville Reservoir flood elevation level, is listed as a 303d impaired water body for bacteria. According to the IDNR TMDL Section, a TMDL is not scheduled for this segment of the Iowa River in the near future. However, with its documented bacteria levels since 2005, Price Creek is a contributor to the impaired portion of the Iowa River. The stream is a possible contributor to reservoir/lake shoreline impairment as well. To facilitate future documentation for the 303d / TMDL programs, credible data will be collected through the protocols established in the Price Creek Watershed QAPP as approved by the IDNR.

In terms of the Price Creek project goals, E. coli, transparency, ammonia and chloride are particularly important parameters. Per state of Iowa law, the geometric mean standard for E. coli is 126 CFU/100ml. Out of 116 E. coli samples from Price Creek, the State standard was met only 9% of the time. There is not a State standard for transparency; however values of 41mg/L or greater are often grouped in the high quality tier by IOWATER. Of the 112 Price Creek transparency samples, 60% fell into the top tier. Ammonia was not tested as consistently as the other parameters. In terms of the ammonia samples taken by the Iowa DNR ambient monitoring program, the 75th percentile value is less than 0.1 mg/L. In Price Creek 82% of samples were less than 0.1. Chloride is an indicator of human waste sources such as failed septic systems. The Iowa DNR ambient monitoring program's 90th percentile value is 42 mg/L. In Price Creek, more than 98% of the 111 chloride samples taken had values less than 50 mg/L.

Water Monitoring Plan:

- Sites will be monitored by ICSWCD/IDNR staff up to 2 times each month throughout the life of the project.
- Monitoring data will be used to evaluate the performance of BMPS implemented throughout the watershed to determine if load reduction goals are being met
- Currently 11 sites are monitored with 6 additional sites having very limited data and 4 sites to be added to the group (Figure 28). It is likely that all 21 will be included in the Price Creek QAPP.

Water Quality Parameters

A volunteer water monitoring effort was initiated in 2005. Currently, 11 points along the stream are monitored three times a year as part of the IOWATER volunteer water monitoring program for a variety of physical and chemical parameters. These "Snapshot" sampling events currently gather data on eleven different parameters including: 1) water temperature 2) chloride 3) pH 4) nitrate 5) nitrite 6) dissolved oxygen 7) transparency and 8) orthophosphate. In addition to the IOWATER protocol, The University of Iowa Hygienic Lab tests for: E. coli, Nitrate + Nitrite Nitrogen, and Ammonia concentrations. This data is used to provide snapshots of water quality in Price Creek throughout the year.

A greater focus on bacteria and TSS sampling, use of ISCO event-samplers, flow gauges and optical brighteners may be used as outlined in the Price Creek QAPP. The results will help calibrate future SWAT model runs on the watershed and target sub basins with BMPs and verify their effectiveness after construction.

Figure 30: Price Creek Water Quality Monitoring Map