Acknowledgements

Crow Creek Watershed Steering Committee

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The Crow Creek Watershed consists of a diverse cross section of Class 2 perennial streams, municipal-use water reservoirs, and intermittent streams. In 1998 one reach of Crow Creek was listed as impaired by the Wyoming Department of Environmental Quality (DEQ) and placed on the Clean Water Act (CWA), Section 303(d) list of waters not meeting CWA goals. The listed impairments were ammonia, cadmium, and fecal coliform. DEQ compiles this list every two years. Impaired waters are those waters that are not meeting their designated uses based on the stream's classification. The reach of Crow Creek from the City of Cheyenne to the Wyoming/Colorado border was listed for these impairments. The Laramie County Conservation District (LCCD) feels strongly that the placement of any water body on the 303(d) list should occur based on sound scientific data.

Water quality is a very important issue that affects all people within the watershed. Resolving this issue will require local people making and implementing local solutions. LCCD applied for and has received CWA Section 319 grant funding from the United States Environmental Protection Agency (EPA), administered by the Wyoming DEQ to develop the Crow Creek Watershed Plan.

The Laramie County Conservation District (LCCD) held a public meeting in February 1999 to determine if there was local support for a watershed planning effort and to solicit volunteers. Volunteers from local government, F.E. Warren Air Force Base, private industry, farming, ranching, and local citizens became the Watershed Steering Committee for the local watershed planning effort. LCCD sponsored the planning effort and the Natural Resources Conservation Service (NRCS) and other agencies provided technical assistance.

Further driving the need for this planning effort was the reclassification of Crow Creek in 2001 from a Class 4 stream (supports agriculture, municipal use, and contact recreation) to a Class 2AB (supports drinking water and game fish) above Avenue C in Cheyenne and a class 2C (supports non-game fish) below Avenue C. The change in stream classification from Class 4 to Class 2C has resulted in the City of Cheyenne Board of Public Utilities (BOPU) initiating an upgrade to their wastewater treatment plants to reduce ammonia from the plants' effluent flow stream.

1.1 Need for Planning Effort

Explanation of 303(d) List

The driving force behind the Crow Creek Watershed Plan was the 1998 303(d) listing of segments of Crow Creek as a water impaired by ammonia, cadmium, and fecal

coliform. It was this listing that led LCCD to pursue the development of a locally led watershed plan resulting in this document.

LCCD has implemented a water quality monitoring program for Crow Creek. The Wyoming DEQ, United States Geological Survey (USGS), and F. E. Warren Air Force Base are also monitoring water quality of the stream. LCCD's monitoring efforts revealed that ammonia has only been detected below the BOPU Waste Water Treatment Plants and will be addressed when the plants' expansions are completed about 2007. Sampling completed prior to January 2001 revealed cadmium could no longer be detected and has subsequently been removed from the 303(d) list for Crow Creek completed in 2002. Fecal coliform concentrations exceed the standard within the City of Cheyenne and near Carpenter. Contamination is both a point source and non point source problem. Point sources of fecal coliform can be addressed through National Pollution Discharge Elimination Permits (NPDES) and non point sources through Best Management Practices (BMPs).

Wyoming DEQ is required under section 305(b) of the CWA to complete an assessment of Wyoming's surface waters every two years. From this assessment a 303(d) list of impaired water bodies is developed. These are waters that are not currently meeting their designated uses because of impairments to the waters.

Stream Classification (the designated uses that are assigned to Crow Creek)

In 2001 the classification for Crow Creek changed from being solely Class 4 (Agriculture, Industry, Recreation and Wildlife) to various segments receiving classifications as indicated below:

- Class 2AB (supports drinking water & game fish) Above Avenue C in Cheyenne
- Class 2C (supports non-game fish) Below Avenue C in Cheyenne to the Wyoming/ Colorado border
- Some tributaries (higher in the watershed) are Class 2AB
- Some tributaries (lower in the watershed) are Class 3B (supports other aquatic life use)

For a more complete reference to the stream classification table refer to the Wyoming DEQ Water Quality Rules and Regulations, Chapter 1, Wyoming Surface Water Quality Standards, Section 4 (Appendix D).

1.2 Authority for Planning

Local conservation districts are charged under Wyoming Statute, 11-16-103 (b) to "provide for the conservation of the soil and water resources of this state, and for the control and prevention of soil erosion and for flood prevention or the conservation, development, utilization, and disposal of water, and thereby to stabilize ranching and farming operations to preserve natural resources, protect the tax base, control floods, prevent impairment of dams and reservoirs, preserve wildlife, protect public lands, and protect and promote the health, safety and general welfare of the people of this state."

Further, Wyoming Statute 11-16-122(b)(v) grants conservation district's the authority to "conduct surveys, investigations and research and disseminate information relating to range management, the character of soil erosion, flood prevention or the conservation, development, utilization and disposal of water, and the prevention and control measures and works of improvement needed. But in order to avoid duplication of research activities, no district shall initiate any research program except in cooperation with the government of this state or its agencies, or with the United States or its agencies."

Based on the above referenced statutory authority LCCD has the legal authority to lead the watershed planning process. Further, in 1996 Wyoming Conservation Districts with the support of the Natural Resources Conservation Service (NRCS) and the Wyoming Department of Agriculture (WDA) saw an increasing need for conservation districts to represent local interests and take the lead in watershed planning efforts. As a result they developed the Watershed Strategic Plan to guide this process. This document was developed prior to the Total Maximum Daily Loads (TMDL) issue in Wyoming and shows the responsibility and leadership role districts have exercised towards locally led watershed planning.

1.3 Background

The development of the Crow Creek Watershed Plan began in 1998 when Crow Creek was included on the 303(d) list of impaired water bodies. This section is a chronology of events starting with the listing of Crow Creek on the 303(d) list in 1998 and ending with the completion of the final draft of the Crow Creek Watershed Plan in 2004.

May/June 1998

- Clean Water Act 303(d) list of impaired streams included the listing of Crow Creek, from the confluence of Dry Creek to the Wyoming/Colorado border, for three impairments (ammonia, cadmium, and fecal coliform).

September 1999, the Laramie County Conservation District (LCCD) applied for a Clean Water Act, Section 319 grant for:

- Collection of credible water quality information.
- Compilation, assimilation and summarization of all available historical water quality information.
- Development of information and education on the water quality issue, and the need for a local watershed plan.
- Initiation of the formation of a Steering Committee and the development of a watershed plan to address and alleviate the known water quality concerns.

January 2000 – First watershed meeting with LCCD and NRCS

- Crow Creek on 303d list for ammonia, cadmium, and fecal coliform.
- LCCD decided on a public meeting to address a watershed plan or TMDLs.
- LCCD will collect baseline data for the watershed, delineate watershed boundaries, and identify stakeholders.
- LCCD received CWA 319 grant.

February 2000 – Second watershed meeting with LCCD and NRCS

- LCCD recommended forming a Steering Committee.
- LCCD would be lead in planning effort and serve as representative on the Steering Committee.

May 2000 – Third watershed meeting with LCCD and NRCS

- Reviewed status of Sampling Analysis Plan.
- Completed Agenda for the Public Meeting.

May 2000 – Public meeting

- Determined public interest in watershed plan or TMDLs – Crow Creek Watershed Steering Committee selected.
- Compiled letter to Crow Creek landowners stating Steering Committee makeup/function.

July 2000 - First Steering Committee meeting

- Each Steering Committee member explained “Why they volunteered to serve on the committee.”
- Reviewed and agreed upon the planning process.
- Discussed Steering Committee members’ roles and responsibilities.
- Identified a Water Quality Technical Team to help with historic water quality review.
- The Steering Committee discussed chairmanship and facilitation.

September 2000 – Steering Committee meeting

- Finalized Vision Statement and Mission Statement.
- Approved monitoring sites on Crow Creek.
- Began work on Issues, Concerns and Opportunities.

January 2001

- Assisted in securing a DEQ 319 Water Quality Grant for the City of Cheyenne.
- Continued to develop issue statements.

March 2001

- Completed issue statements.
- Began work on Goals & Objectives.

September 2001

- Updated water quality monitoring plan.
- Completed Goals & Objectives.
- Developed an outline for the watershed plan.

January 2002

- Developed an informational brochure on progress of Crow Creek Watershed Plan and mailed to stakeholders in watershed.
- Met with DEQ to discuss delisting Crow Creek for cadmium.
- LCCD received an additional CWA Section 319 Grant.

May 2002

- Developed action items for the watershed plan.
- Approval of several small acreage grazing demonstration projects.

November 2002

- Received grant from Wyoming Department of Agriculture.
- Completed first draft of watershed plan.

May 2003

- Completed second draft of watershed plan.

October 2003

- Completed final draft of watershed plan.

November 2003

- Sent plan out for public review and comment.
- Open House hosted to present the plan to the public.

December 2003

- Public comment period ended.
- 2004 Draft 303(d) list includes North Branch and Middle Fork of Crow Creek for fecal coliform impairment.

January 2004

- Steering Committee reviewed and responded to public comments.
- Crow Creek Watershed Plan approved by Steering Committee.

February 2004

- Final watershed plan submitted to LCCD Board of Supervisors for approval.
- Final watershed plan submitted to DEQ for approval.

Steps in Watershed Planning

The Steering Committee adopted the following steps:

- Know and understand your watershed, inventory and assessment
- Decide and prioritize issues
- Set goals and objectives based on issues
- Develop and document actions/ policy to implement
- Find resources to implement course of action
- Implement
- Evaluate
- Adopt plan

2. WATERSHED DESCRIPTION

2.1 Project Area

The Crow Creek Watershed is located in Laramie and Albany Counties in Southeastern Wyoming. Crow Creek (water body ID #WYSP 10190009-002) consists of a diverse cross section of Class 2 perennial streams, municipal-use water reservoirs, and a number of intermittent streams. Map 2.1 depicts the Crow Creek Watershed.

There are three distinct partitions of the Crow Creek watershed:

1) The upper watershed is represented by state lands, national forest lands, and private lands surrounding municipal water supply reservoirs. These reservoirs and tributaries are potentially affected by forest management, livestock grazing, intense recreational uses, and development for small acreage housing.

2) The middle section is characterized as urban, suburban, and industrial use with suspected affects on water quality stemming from storm sewers, street and parking lot runoff, wastewater treatment facilities, and housing development.

3) The lower section of Crow Creek from Cheyenne to the Wyoming/Colorado border is represented predominantly by dryland farming, center pivot irrigation, livestock grazing, and small acreage housing development uses. Affects in this area result from storm water carry-over, wastewater treatment facilities, livestock grazing, small acreage housing, and irrigation practices.

The major urban areas served by this watershed include the City of Cheyenne, F.E. Warren Air Force Base, as well as the unincorporated town of Carpenter. There are two major interstate highways (I-80 and I-25) that intersect near Cheyenne. Also, within the watershed, the main line of the Union Pacific Railroad runs through the county along with the Burlington Northern Railroad and the Santa Fe Railroad. Both bus and air services are also available and located within the watershed.

Elevations range from 8,200 feet in the western part to 4,800 feet in the eastern part of the watershed. The surrounding county landscape is mostly rolling prairie, which is primarily used for grazing, dry cropland and irrigated cropland.

Crow Creek is a tributary to the South Platte River. Within Wyoming the Crow Creek watershed consists of about 247,470 acres, which lies in both Laramie and Albany Counties. The Crow Creek watershed is the most populated watershed within the State of Wyoming.

Landownership	**Acres**	**% of Watershed**
Private	224,657	90
State	12,221	5
Federal	9,912	4
Water	680	1

Land use	Acres	% of Watershed
Rangeland	177,970	72
Urban & resident	50,000	20
Irrigated cropland	12,000	5
Dry cropland	7,500	3

2.2 Climate

The climate in Laramie County is temperate with cool, moist springs; warm, moist summers; and cold, dry winters. The average annual precipitation ranges from 14 to 17 inches in the plains region of the county and from 17 to 19 inches in the Laramie Mountains. The frost-free period ranges from 120 to 140 days in the eastern part of the county and about 90 to 100 days in the western part.

2.3 Soils

The Crow Creek Watershed originates in the Laramie Mountains on very shallow steep soils. These types of soils make up 37% of the Crow Creek Watershed and have a high rate of water runoff potential. The other area in the watershed where high runoff occurs is the Cheyenne area. 3% of the watershed is made up of the town of Cheyenne that has mostly impermeable areas from rooftops, streets and parking lots. These areas have a high potential for runoff water to reach the stream during storm events. This also makes these areas more likely to contribute pollutants to the stream during storm events.

Most of the remaining watershed area, 60%, has soils with a moderate to low rate of water runoff potential. These soils consist of deep well-drained loamy textures. Although these soils can contribute runoff to the stream during larger storm events or if they are in close proximity to the stream, they are more likely to contribute pollutants to groundwater. Map 2.2 depicts Crow Creek Watershed runoff potential.

2.4 Social / Economic

Cheyenne is the largest and only incorporated town in the Crow Creek Watershed with a population of about 53,000. However, with the growth surrounding Cheyenne, the population of the greater Cheyenne area is over 70,000. Not all of this development lies within the Crow Creek watershed boundaries, but a significant portion of it does.

Other population centers include Carpenter, F.E. Warren Air Force Base, South Cheyenne, and a subdivision development in the Table Mountain area west of Cheyenne.

Laramie County population has increased steadily over the last 40 years. Growth in number of residents has gone from 60,149 in 1960 to 81,607 in 2000 (Census data). The towns and Census Designated Places (CDPs) in the watershed make up the majority of the county's population. Cheyenne houses about 65% of the county's population.

Approximately 33% of the population resides in unincorporated areas. The unincorporated areas also saw the largest percentage of growth, up by almost 25% since the 1990 Census.

Many areas of the state are expected to see population declines, but urban and resort areas are expected to continue to experience growth. Laramie County is one of these "urban" areas. The county is home to F.E. Warren Air Force Base and the state's capitol, which will play a large role in the economic and demographic growth patterns of the future. In addition, Laramie County sits at the northern end of the growth corridor that extends along I-25. This placement will likely impact the positive growth predicted (Laramie County Comprehensive Plan 2001).

One of the biggest trends in the agricultural community and agriculture in general is conversion of agriculture land to other uses. A shift away from resource development toward urban development is causing this. It can be seen in the subdivision of land over time in the county. Subdivision of the land was quite dramatic in the second half of the 1970s with a total of 11,539 acres being given to subdivision. However, much of that subdivided land remains vacant today. The period from 1980 to 1994 saw only 3,767 acres (270 acres per year) being subdivided with 1,478 new residential lots. However, from 1994 through 2000, approximately 7,400 acres (over 1,000 acres per year) with 1,337 new residential lots were created.

Laramie County and the Crow Creek Watershed have seen continual, steady growth over time. It is predicted that population growth will continue. Most of the growth can be contributed to housing F.E. Warren Air Force Base within the county as well as the state capitol, along with being "urban" and part of the "front range" growth corridor.

2.5 Wildlife Fisheries

The Wyoming Game and Fish Department (WGFD) has conducted numerous fish surveys throughout the Crow Creek Watershed, from the town of Carpenter to the Shell Back Ranch above the City of Cheyenne. The fish species that were found during these surveys and the locations are shown in Table 2.1:

Table 2.1. Fish Collection On Crow Creek
X indicates species present/shaded areas indicate game fish

Fish Species Collected	Above Cheyenne	Within Cheyenne	Below Cheyenne
Brown Trout	X	X	
Brook Trout	X		
Brassy Minnow		X	X
Carp			X
Common Shiner	X	X	X
Creek Chub	X	X	X
Fathead Minnow	X	X	X
Green Sunfish		X	X
Johnny Darter	X	X	X
Longnose Dace	X	X	X
Longnose Sucker		X	
Plains Killfish			X
Stoneroller	X	X	
White Sucker	X	X	X

There were eleven total fish capture sites, two above Cheyenne, two within Cheyenne, and seven below Cheyenne. Information was gathered from WGFD reports (early 1990's).

Surface Water Quality Classes and Uses

Stream classification is directly related to what types of fish are found in the creek, whether they are game fish or non-game fish. There are three game species located in Crow Creek; they are the Brown Trout, Brook Trout, and Green Sunfish. Game fish were found above Cheyenne, within Cheyenne and below Cheyenne which is depicted in Table 2.1.

The classification for Crow Creek is:

- Class 2AB (supports drinking water & game fish) Above Avenue C in Cheyenne
- Class 2 C (supports non-game fish) Below Avenue C in Cheyenne to the State line
- Some tributaries (higher in the watershed) are Class 2AB
- Some tributaries (lower in the watershed) are Class 3B (supports other aquatic life use)

The Stream Classification Table shows all the classification specifications. The shaded areas in Table 2.2 indicate classification for Crow Creek.

Table 2.2. Stream Classification
Shaded areas indicate classification for Crow Creek

Class	Drinking Water	Game Fish	Non Game Fish	Fish Con-sump-tion	Other Aquatic Live	Recreation	Wildlife	Agriculture	Industry Value	Scenic
1	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2AB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2A	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
2B	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2C	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3A	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3B	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
3C	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
4A	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
4B	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
4C	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes

2.6 Rare & Endangered Species

The sensitive animal species known or suspected to occur in the Crow Creek Watershed riparian area are listed in Table 2.3. This information was obtained from the Wyoming Natural Diversity Database.

Table 2.3. Sensitive Animal Species Located in the Crow Creek Watershed

Species	*Status or Source*	*Habitat or Distribution*
Preble's meadow jumping mouse	Threatened	Riparian grassland

2.7 Rare Plants

Approximately twenty sensitive plant species are known or suspected to occur in the County. Specific information can be obtained from the Wyoming Natural Diversity Database at the University of Wyoming. Among these species are two federally protected plants that are listed in Table 2.4. Any occurrence of these species should be treated as an important natural resource deserving avoidance and protection.

Table 2.4. Sensitive Plant Species Located in the Crow Creek Watershed

Species	***Status***	***Habitat or Distribution***
Colorado butterfly plant	Protected	Sub-irrigated alluvium
Ute Ladies-tresses	Protected	Riparian areas

2.8 Credible Data Monitoring

State law requires that only credible data be used in making water quality condition determinations. Credible data means scientifically valid chemical, physical and biological monitoring data collected under a sampling and analysis plan including quality control, quality assurance procedures and available historical data.

The credible data rule is found in Chapter 1, Section 35, of the Wyoming Surface Water Quality Standards and states the following:

(a) Development of scientifically valid chemical, physical and biological monitoring data shall:

(i) Consist of data collection using accepted referenced laboratory and field methods employed by a person who has received specialized training and has field experience in developing a monitoring plan, a quality assurance plan, and employing the methods outlined in such plans; or works under the supervision of a person who has these qualifications. Specialized training includes a thorough knowledge of written sampling protocols and field methods such that the data collection and interpretation are reproducible, scientifically defensible, and free from preconceived bias; and

(ii) Includes documented quality assurance consisting of a plan that details how environmental data operations are planned, implemented, and assessed with respect to quality during the duration of the project.

(b) Credible data shall be collected on each water body, as required in this section and shall be considered for purposes of characterizing the integrity of the water body including soil, geology, hydrology, geomorphology, climate, stream succession and the influences of man upon the system. These data in combination with other available and applicable information shall be used through a weight-of-evidence approach to designate uses and determine whether those uses are being attained. In those instances where numerical standards contained in these rules are exceeded or on ephemeral and intermittent water bodies where chemical and biological sampling may not be practical or feasible, less than a complete set of data may be used to make a decision on attainment.

(c) All changes to use designations after the effective date of this rule shall include the consideration of credible data relevant to the decision. Changes which involve the removal of a use designation or the replacement of a designation shall be supported by a use attainability analysis (UAA).

(d) After the effective date of this rule, credible data shall be utilized in determining a water body's attainment of designated uses.

SAMPLING HISTORY

The Laramie County Conservation District (LCCD) has been sampling Crow Creek for ammonia, cadmium and fecal coliform since April of 2000. Ammonia was not detected anywhere other than below the two wastewater treatment plants during the 2001 monitoring season and was not analyzed for in 2002. However, the Crow Creek Steering Committee and LCCD decided to reestablish monitoring for ammonia on a quarterly basis and it is included in the 2003 Sampling Plan

Cadmium was not detected in the sampling sites by LCCD. Recent sampling by other agencies was well below the Maximum Contaminant Level. This combined data was used to remove cadmium from the 303(d) impairment list.

Fecal coliform exceeded the standards at all sampling sites in Cheyenne (MLK Park, Ames Ave, Morrie Ave) since the spring of 2001. These fecal coliform counts are associated primarily with the storm drains in the City of Cheyenne. The sites below Cheyenne either had trace or low amounts of fecal coliform exceeding the standard occasionally. Please refer to Appendix C for sampling results.

Bacterial sampling will continue during the 2003 season for fecal coliform and *E.coli*. In 2002, it was decided by the Crow Creek Steering Committee and LCCD to introduce *E.coli* monitoring in addition to fecal coliform. This was due to the fact that *E.coli* may prove to be a better indicator of bacterial pollution and the United States

EPA and the Wyoming DEQ are in the process of developing standards for *E.coli* that may be in place in 2004.

The currently established sampling sites for Crow Creek are based on recommendations from the Water Quality Technical Team depicted on Map 2.3:

1. Roundtop Road (Above Cheyenne)
2. Martin Luther King, Jr. Park (In Cheyenne)
3. Ames Ave (In Cheyenne)
4. Morrie Ave (In Cheyenne)
5. Above the Crow Creek WWTP (Below Cheyenne)
6. Missile Road 217 (Below Cheyenne)
7. State Section Road 207 (Below Cheyenne)

Urbanization within the Crow Creek watershed is progressing and probably provides the greatest impacts to the watershed. Impacts include degradation of water quality, increased runoff to Crow Creek, loss of wildlife habitat, open spaces, and agricultural lands, and numerous other impacts. The goals, objectives, and action items identified in the Crow Creek Watershed Plan provide a means to minimize adverse impacts and to promote actions that will benefit the community and the watershed. Community involvement in the implementation of this plan will be the key to maintaining or improving conditions in the Crow Creek Watershed.

2.9 Protection of Aquatic Life: Ammonia

The aquatic toxicity of ammonia varies with pH and temperature and the applicable limitations for Crow Creek are included in the charts in Appendix B. Within the Standard, Section 21, states "…the numeric ammonia criteria apply to all Class 1 and Class 2 waters." Additionally the Standard states in Section 21, "In all Class 3 waters within the State, concentrations of ammonia attributable to or influenced by human activities shall not be present in concentrations which could result in harmful acute or chronic effects to aquatic life which would not fully support existing and designated uses." The reaches of Crow Creek impaired by ammonia are shown on Map 2.4.

2.10 Cadmium Levels in Crow Creek

In the early 1990's the U.S. Geological Survey (USGS) conducted sampling of Crow Creek for cadmium. Test results of this sampling exceeded the Standard for Aquatic Life. These values were enough to put Crow Creek on the DEQ 303(d) list of impaired water bodies in 1998. In 1994 the USGS changed their sampling protocol for cadmium

in surface waters. As a result of this change in protocol and further sampling conducted by the USGS showed that the water in Crow Creek was far below the standard for aquatic life and the detection limit of 0.001 milligrams per liter (mg/L). In 2002 cadmium was taken off the 303(d) list as a result of sampling done by the conservation district and USGS. These standards are from the Wyoming Surface Water Quality Standards Rules and Regulations.

2.11 Fecal Coliform and *E.coli* Sampling in Crow Creek

In 2001 the Laramie County Conservation District (LCCD) began collecting fecal coliform samples at established sites on Crow Creek. In 2002 LCCD began sampling for *E.coli* as well as fecal coliform. This was due in part to the fact that *E.coli* bacteria are a better indicator of a health hazard due to bacterial contamination in surface waters. Please refer to Appendix C for sampling results. The reaches of Crow Creek listed as impaired by fecal coliform are shown on Map 2.5.

The Wyoming Department of Environmental Quality (DEQ) has established a compliance standard for fecal coliform. The standard states, "... during the entire year, fecal coliform concentrations shall not exceed a geometric mean of 200 organisms per 100 milliliters (based on a minimum of not less than five samples obtained during separate 24 hour periods for any 30 day period) nor shall the geometric mean of three separate samples collected within a 24 hour period exceed 400 organisms per 100 milliliters in any Wyoming surface water" (Wyoming Surface Water Quality Standards Rules and Regulations Chapter 1, Section 35).

DEQ is currently proposing a standard for *E.coli* of a 30 day geometric mean of 126 colonies/100 mL for primary contact waters (swimming, white water activities, etc.) This standard will apply from May 1st through September 30th. Also proposed is a Secondary Contact standard for waters that do not have full body contact recreation. This standard is 630 colonies/100 mL. Secondary Contact Criteria also applies on all waters from October 1st through April 30th.

2.12 Summary

Cheyenne's wastewater treatment plants are known sources of ammonia. The plants will be upgraded in 2007, which will address ammonia discharge into the stream. If ammonia continues to be detected above accepted levels after the facility upgrades, further efforts will be necessary to find additional ammonia sources. High ammonia levels result in negative impacts on aquatic animal life.

In 2002 cadmium was removed from the 303(d) list as a result of sampling by LCCD and USGS. It is not fully understood what led to the cadmium detection. However, regular monitoring shows that cadmium is not a constant presence and does not warrant additional efforts.

Fecal coliform levels in Crow Creek consistently exceed DEQ standards in the urban area of Cheyenne and near the Wyoming/Colorado border. Urban fecal coliform levels are most likely the result of storm water runoff. It is unlikely that there is cross contamination with sanitary sewage lines. If sewage lines were a contributing factor, bacteria counts would be much higher than what is currently detected. Fecal coliform is most likely runoff related because the highest peaks occur after storm events. Possible contributors include domestic animal waste, wildlife waste, illegal wastewater discharge from RV tanks and septic systems. At this time, the City of Cheyenne is taking steps to correct fecal coliform impairments through increased street sweeping, improved maintenance of storm drains, and the construction of wetlands and infiltration trenches. They are also conducting a storm drain system analysis to assess the current storm drain system in Cheyenne (Map 2.6). Homeowners can address fecal coliform impairments through proper design, operation and maintenance of septic systems and pet waste disposal.

In the rural area near the Colorado/Wyoming border, fecal coliform levels are also storm related because high peaks occur following storm events. Possible contributors to fecal coliform in this area include septic systems, livestock waste and wildlife waste. To correct these high levels, BMPs (Appendix E) should be implemented to address septic systems and livestock waste. It was also noted that reaches of the stream with healthy riparian areas tended to have lower fecal coliform counts. The riparian area acts as a buffer to keep sediment out of the stream and help filter impurities out of the water.

At this time, the reach of stream in urban Cheyenne is the highest priority for BMPs. The implementation plan places greater focus on this area of Crow Creek because fecal coliform counts are much higher than in rural areas and greater public access to the stream in urban areas poses increased human health risks.

3.1 Goals & Objectives

The Steering Committee identified concerns and issues and from those developed the following goals, objectives and action items for the Crow Creek Watershed:

VISION STATEMENT

Promote actions that lead to a healthy and sustainable watershed.

MISSION STATEMENT OF CROW CREEK WATERSHED

Develop a watershed management plan for Crow Creek that considers water quality, water quantity, property rights, sustainable and diverse wildlife communities, legal requirements, defensible data, planned development, land-use planning, and functions of riparian and flood plain areas.

GOAL #1: To enhance communication with local, state and federal agencies and the steering committee, agree on objectives, and utilize agency expertise and programs.

OBJECTIVE 1: Identify the affected agencies and organizations.

ACTION ITEMS

- Work with steering committee to develop list of agencies and organizations and contact persons.
- Meet with identified people to gain interest and support.

OBJECTIVE 2: Define means of communication.

ACTION ITEMS

- Include affected agencies and entities on LCCD's newsletter mailing list.
- Utilize LCCD's web site to include information on the watershed plan.
- Use monthly State Water Forum meetings as an opportunity to keep agencies informed of progress on Crow Creek.
- Newspapers and press releases
- Radio
- Personal contacts
- Representatives (i.e. wildlife, agriculture) on steering committee take an active role in keeping those agencies and organizations informed.

OBJECTIVE 3: Communicate steering committee activities to affected agencies and entities.

ACTION ITEMS

- Include steering committee activities and Crow Creek activities in newsletter and on web site.
- Give updates on Crow Creek progress at State Water Forum meetings.
- Submit draft watershed plan to affected agencies and entities.
- Present draft watershed plan to list of agencies and organizations.
- Continue dialogue with agencies to identify strategies to improve water quality.

OBJECTIVE 4: Consider input from affected agencies and entities in plan development.

ACTION ITEMS

- Invite agencies to give presentations at Steering Committee Meetings.
- Incorporate suggestions from agencies into watershed plan.
- Provide each affected agency and organization a final watershed plan.

OBJECTIVE 5: Continue dialogue with agencies to identify strategies to improve water quality.

ACTION ITEMS

- Meet at least one time annually with list of affected agencies and organizations to provide an annual update of progress.

GOAL # 2: Improve the quality and quantity of water in the Crow Creek Watershed by identifying the general relationship of flow patterns and fluctuations on water quality and identify water management alternatives.

OBJECTIVE 1: Identify users (land uses, major categories of uses) of the Crow Creek Watershed.

ACTION ITEMS

- Work with City of Cheyenne and Laramie County to develop a GIS map and database of landowners/land use in the watershed.
- Update this database annually.
- Get information from agencies and organizations (i.e. Audubon) that are the users of the watershed.

OBJECTIVE 2: Identify the uses of water in Crow Creek.

ACTION ITEMS

- Work with the Wyoming State Engineer's Office (SEO) to develop a GIS map and database of inflows, permitted uses, assigned, water rights and associated beneficial uses from Crow Creek.
- Work with the steering committee and the community to identify other water uses in the watershed (i.e. recreation, fisheries, etc.)
- Transbasin Diversion, (other uses not associated with the SEO), city of Cheyenne, Game and Fish, Frontier Refinery, (NRCS has hydrologist that has ability to calculate the inflows into the Crow Creek Watershed).

OBJECTIVE 3: Clarify water quality objectives.

ACTION ITEMS

- Meet or exceed Wyoming water quality standards for ammonia (refer to Appendix B) within 5 years.
- Meet or exceed Wyoming water quality standards for cadmium (refer to Appendix F) within 5 years.
- Meet or exceed Wyoming water quality standards for fecal coliform (refer to Appendix C) within 5 years.

OBJECTIVE 4: Identify patterns of water use and define flow patterns in various segments.

ACTION ITEMS

- Work with USGS, SEO, BOPU, DEQ, WWDC, irrigators and monitoring data to identify when and where water is withdrawn from and returned to Crow Creek.
- Work with LCCD, USGS and monitoring data to identify and map flows in various segments of Crow Creek.
- Develop GIS map and database of water use.

OBJECTIVE 5: Determine water quantity needed to meet water quality objectives. (Identify and explore opportunities for additional water to help water quality objectives.)

ACTION ITEMS

- Measure and calculate impairment loads from various sources.
- Evaluate urban and agriculture BMPs to conserve water and explore opportunities to redirect salvage water to the stream.

OBJECTIVE 6: Identify legal constraints and opportunities.

ACTION ITEMS

- Work with Wyoming Water Development Commission to study effects on Crow Creek.
- Work with the State Engineers office and Board of Control to research

legal liabilities on the stream.
- Brief discussion of Wyoming Water Law in the plan.

OBJECTIVE 7: Keep abreast of Stage II Water marketing.

ACTION ITEMS
- Maintain contact with BOPU and WWDC for update on Stage II Water.
- Determine what changes will occur if Stage II Water is sold out of basin.
- Explore opportunities to use Stage II Water to improve water quality.

GOAL # 3: Define the origin, type, degree and geographic extent of impairments.

OBJECTIVE 1: Use historical data from a variety of sources.

ACTION ITEMS
- Gather data from all available sources. (DEQ, BOPU, USGS, F.E. Warren Air Force Base)
- Review data for relevant information.
- Compile data in database.
- Create GIS map layer of sampling sites.
- Identify and map impaired areas.

OBJECTIVE 2: Develop monitoring plan to supplement historical data.

ACTION ITEMS
- Form a technical advisory group.
- Review historical and current data.
- Design a monitoring plan to meet Steering Committee objectives.
- Review and update the monitoring plan on an annual basis with the Water Quality Technical Team and Steering Committee.

OBJECTIVE 3: Gather, analyze and submit additional credible data.

ACTION ITEMS
- Monitor water quality on Crow Creek as per monitoring plan including Quality Assurance and Quality Control.
- Analyze and compare current and historical data for trends.
- Compile data in database.
- Create GIS map layer of sampling sites.
- Identify and map impaired areas.
- Determine the source of contaminants. (point or non-point)
- Monitor water quality to evaluate the effectiveness of watershed plan and/or BMPs.
- Submit data to DEQ to document status of water quality.

OBJECTIVE 4: Coordinate future testing efforts.

ACTION ITEMS

- Identify agencies or organizations conducting water quality monitoring on Crow Creek
- Coordinate LCCD monitoring with DEQ, USGS and F.E. Warren Air Force Base.

GOAL # 4: Elevate public awareness on the listing of Crow Creek as an impaired water body and the importance of improving water quality.

OBJECTIVE 1: Identify and develop methods and strategy of public outreach, involvement and education.

ACTION ITEMS

- Contract with public relations firm.
- Stencil all storm drains within the watershed (Dump no Waste, Drains to Crow Creek).
- Hold three tours or seminars addressing NPS pollution prevention.
- Teach NPS pollution in 105 classroom presentations.
- Distribute NPS pollution prevention information at six public events.
- Develop NPS pollution prevention brochure and provide to Laramie County Planning Department to be distributed with all new building permit requests.
- Provide lawn watering educational brochures and rain gauges to 1000 local residents.
- Hold annual tour or other event to highlight the progress of the implementation of the Crow Creek Watershed Plan.

OBJECTIVE 2: Make a special effort to reach out to potentially affected interests.

ACTION ITEMS

- Identify potential opponents to the implementation of the watershed plan.
- Identify potential proponents or beneficiaries of the watershed plan.
- Steering committee and LCCD jointly make one-on-one contacts to encourage support and involvement.

OBJECTIVE 3: Identify the implications of listing and the benefits of local management.

ACTION ITEMS

- Hold public meeting and illustrate the differences between a watershed plan and TMDLs.
- Hold open house or other event to present the draft watershed plan.

- Provide a legal notice in local newspapers with a draft plan and allow for public comment.
- Analyze and incorporate public comments in the final watershed plan.

GOAL # 5: Develop a watershed plan, which can be successfully implemented to achieve water quality goals and delisting of Crow Creek from the 303(d) list of impaired water bodies.

OBJECTIVE 1: Recommend possible solutions within the limits of available data.

ACTION ITEMS

- Complete a study on feasibility of improving the quality of water discharge from Cheyenne's storm water drains.
- Recommend potential solutions identified in the feasibility study.

OBJECTIVE 2: Identify other areas that need BMPs and work with landowners to install.

ACTION ITEMS

- Develop list of urban and agriculture BMPs to improve water quality within Crow Creek (including the following):
- Develop wetlands.
- Fence riparian areas and develop off-site water.
- Develop small acreage grazing demonstration sites.
- Plant tree rows for riparian buffers.

OBJECTIVE 3: Coordinate activities related to implementing the plan.

ACTION ITEMS

- LCCD will provide leadership for implementing and updating the Crow Creek Watershed Plan.

OBJECTIVE 4: Ensure acceptance by appropriate state and federal agencies.

ACTION ITEMS

- Submit completed plan to DEQ for approval.
- Identify which BMPs will need state and/or federal approval.
- LCCD will provide assistance for obtaining the necessary permits.

OBJECTIVE 5: Ensure that plan components are voluntary and are effectively implemented.

ACTION ITEMS

- LCCD will provide assistance in obtaining cost share incentives and technical support to affected entities and landowners.
- Ensure that BMPs are installed to accepted standards.

GOAL #6: Gain public acceptance and support of the plan by considering the needs and concerns of all stakeholders in the Crow Creek Watershed.

OBJECTIVE 1: Ensure that needs and concerns are clearly defined.

ACTION ITEMS

- Utilize Steering Committee Members to represent their area of interest in identifying needs and concerns of stakeholders.

OBJECTIVE 2: Work with affected users to assure public acceptance and support.

ACTION ITEMS

- LCCD will provide technical assistance to develop conservation plans to meet users needs.
- Define the benefits of the watershed plan.
- Provide information to stakeholders regarding the benefits of the watershed plan.

3.2 Plan Implementation

The Crow Creek Watershed Plan should be implemented in a cycle which involves selecting and acting on the most important elements, monitoring the watershed's response, reviewing the results, updating the plan and resuming implementation of the most important elements. The duration of each work plan cycle should be three to five years to obtain adequate physical, chemical, and biological data as well as political and institutional support and resources.

It is necessary to select the elements from the list of BMPs, which address the most pressing issues in the watershed. At the same time, it is prudent to start work on some actions that are most promising in terms of the expected benefits to be attained from their implementation, or are most critical to future decision-making. This should also include those strategies which may take many years to fully implement but do not require a large amount of effort to start.

In order to obtain commitment to move forward with implementation, it is necessary to assign responsibilities for work plan items and to estimate the cost associated with the selected actions. Expectantly, the following plan of work will begin to show improvements in Crow Creek's water quality.
It is also recognized that many of the recommended actions do not fit precisely into the mandate or constrained budget of any single agency, group or organization. Accordingly, it is expected that to make reasonable progress in watershed management, it will be necessary to cultivate partnerships between agencies and across various sectors of watershed interests for effective delivery of watershed actions.

On a regular basis, the Crow Creek Watershed Plan needs to be reviewed and updated based on the additional information gathered through the monitoring activities, on the completion of tasks in the work plan, and on the need to respond to emerging issues and concerns in the watershed. A bi-annual report on progress is desirable to keep the community focused on the watershed and our conservation activities. This report should coincide with the 305(b) report issued by DEQ and include the following:

- Progress made on watershed management actions listed in the work plan.
- Observed trends in watershed conditions as indicated by monitoring efforts, correlated as much as possible with the BMPs which have been implemented.
- Changes in external influences on watershed conditions since the last review.
- Modifications to the overall strategy, as determined through dialogue and consensus- building among watershed stakeholders.
- Priority actions to be pursued for the next phase of watershed management work.

As part of its ongoing watershed management program, LCCD accepts the coordinating role, in consultation with municipalities, the county government, federal and state departments, the Crow Creek Watershed Steering Committee and other non-governmental organizations to ensure that the periodic review, analysis and watershed reporting is done in an efficient manner through an open and accountable process.

3.3 Plan of Work

Goal 1: To enhance communication with local, state and federal agencies and the steering committee, agree on objectives, and utilize agency expertise and programs.

Objective 1: Identify the affected agencies and organizations

Action	Product	Completed by	Completion date
Work with Steering Committee to develop list of agencies and organizations and contact persons	10 Contacts	Steering Committee District Manager	November 2003 **COMPLETED**
Meet with identified people to gain interest and support	10 Contacts	District Manager Water Specialist	February 2004

Objective 2: Define means of communication

Action	Product	Completed by	Completion date
Include affected agencies and entities on district newsletter mailing list	10 Contacts	Administrative Assistant	On-going
Utilize LCCD's web site to include information on the watershed plan	1 Site	Education Specialist	On-going
Use monthly State Water Forum meetings as an opportunity to keep agencies informed of progress on Crow Creek	Monthly	Water Specialist	On-going
Newspapers and press releases	4/Year	District Manager Education Specialist	On-going
Radio	1/Year	District Manager Water Specialist	On-going
Personal contacts	100 Contacts	Steering Committee LCCD Board LCCD Staff	February 2004
Representatives on Steering Committee take an active role in keeping those agencies and organizations informed	10 Contacts	Steering Committee	On-going

Objective 3: Communicate Steering Committee activities to affected agencies and entities

Action	Product	Completed by	Completion date
Include Steering Committee activities and Crow Creek activities in newsletter and on web site	3/Year	Water Specialist Education Specialist	On-going
Give updates on Crow Creek progress at State Water Forum meetings	Monthly	Water Specialist	On-going

Submit draft watershed plan to affected agencies and entities	1 Plan	District Manager Administrative Assistant	December 2003
Present draft watershed plan to list of agencies and organizations	1 Plan	Steering Committee LCCD Board	December 2003
Continue dialogue with agencies to identify strategies to improve water quality	10 Contacts	Water Specialist Wildlife Specialist	On-going

Objective 4: Consider input from affected agencies and entities in plan development

Action	Product	Completed by	Completion date
Invite agencies to give presentations at Steering Committee meetings	10 Presentations	District Manager	July 2002 **COMPLETED**
Incorporate suggestions from agencies in watershed plan	10 Contacts	District Manager Water Specialist	December 2003
Provide each affected agency and organization a final watershed plan	10 Contacts	Administrative Assistant	January 2004

Objective 5: Continue dialogue with agencies to identify strategies to improve water quality

Action	Product	Completed by	Completion date
Meet at least one time annually with list of affected agencies and organizations to provide an annual update of progress	Yearly meeting	District Manager Water Specialist	On-going

Goal 2: Improve the quality and quantity of water in the Crow Creek watershed by identifying the general relationship of flow patterns and fluctuations on water quality and identify water management alternatives.

Objective 1: Identify users (land uses, major categories of uses) of the Crow Creek Watershed

Action	Product	Completed by	Completion date
Work with City of Cheyenne and Laramie County to develop a GIS map and database of landowners/ land-use in the watershed	1 Map	Water Specialist GIS Technician	January 2002 **COMPLETED**

Update this database annually	1 Update	GIS Technician	Yearly
Get information from agencies and organizations that are the users of the watershed	All users	District Manager Water Specialist	November 2004

Objective 2: Identify the uses of water in Crow Creek

Action	Product	Completed by	Completion date
Work with the SEO to develop a GIS map and database of inflows, permitted uses, assigned water rights, and associated beneficial uses from Crow Creek	1 Map	Water Specialist GIS Technician	November 2004
Work with the Steering Committee and the community to identify other water uses in the watershed	1 Map	Steering Committee Water Specialist GIS Technician	November 2004
Identify other uses not associated with SEO	1 Map	Water Specialist GIS Technician	November 2004

Objective 3: Clarify water quality objectives

Action	Product	Completed by	Completion date
Meet or exceed Wyoming Water Quality Standards for ammonia	1 Stream	Steering Committee LCCD Board LCCD Staff	January 2008
Meet or exceed Wyoming Water Quality Standards for cadmium LCCD Staff	1 Stream	Steering Committee LCCD Board	January 2008 **COMPLETED**
Meet or exceed Wyoming Water Quality Standards for fecal coliform	1 Stream	Steering Committee LCCD Board LCCD Staff	January 2008

Objective 4: Identify patterns of water use and define flow patterns in various segments.

Action	Product	Completed by	Completion date
Work with USGS, SEO, BOPU, DEQ Irrigators and monitoring data toidentify when and where water is withdrawn from and returned to Crow Creek	1 Map	Water Specialist GIS Technician	November 2004
Work with LCCD, USGS and monitoring data to identify and map flows in various segments of Crow Creek	1 Map	Water Specialist GIS Technician	November 2004

Develop GIS map and database of water use	1 Map	Water Specialist GIS Technician	November 2004

Objective 5: Determine water quantity needed to meet water quality objectives

Action	Product	Completed by	Completion date
Measure and calculate impairment loads from various sources	Cheyenne Storm Water System	Water Specialist	November 2003
Evaluate urban and agriculture BMPs to conserve water and explore opportunities to redirect salvage water to the stream	5 BMPs	Water Specialist Wildlife Specialist	January 2004

Objective 6: Identify legal constraints and opportunities

Action	Product	Completed by	Completion date
Work with WWDC to study effects on Crow Creek	1 Study	District Manager Water Specialist	November 2004
Work with the SEO and Board of Control to research liabilities on the stream	1 Study	District Manager Water Specialist	November 2003
Brief discussion of Wyoming Water Law in the plan	1 Plan	District Manager	December 2003 **COMPLETED**

Objective 7: Keep abreast of Stage II Water marketing

Action	Product	Completed by	Completion date
Maintain contact with BOPU and WWDC for update on Stage II Water	Yearly update	Water Specialist	On-going
Determine what changes will occur if Stage II Water is sold out of basin	1 Study	District Manager Water Specialist	November 2004
Explore opportunities to use Stage II Water to improve water quality	1 Study	District Manager Water Specialist	November 2004

Goal 3: Define the origin, type, degree and geographic extent of impairments.

Objective 1: Use historical data from a variety of sources.

Action	Product	Completed by	Completion date
Gather historical data from all available sources	5Sources	Water Specialist	January 2002 **COMPLETED**

Review historical data for relevant information	1Review	Water Specialist	January 2002 **COMPLETED**
Compile historical data in database	1Database	Water Specialist	January 2002 **COMPLETED**
Create GIS map layer of historical sampling sites	1 Map	Water Specialist	January 2002 **COMPLETED**
Identify and map impairedareas	1 Map	Water Specialist	January 2002 **COMPLETED**

Objective 2: Develop monitoring plan to supplement historical data

Action	Product	Completed by	Completion date
Form a technical advisory group	1 Group	Water Specialist	February 2002 **COMPLETED**
Review historical and current data	1 Review	Water Specialist	February 2002 **COMPLETED**
Design a monitoring plan to meet Steering Committee objectives	1 Plan	Water Specialist	February 2002 **COMPLETED**
Review and update the monitoring plan on an annual basis with the Water Quality Technical Team and Steering Committee	1 Plan	Water Specialist	On-going

Objective 3: Gather, analyze and submit additional data

Action	Product	Completed by	Completion date
Monitor water quality on Crow Creek as per monitoring plan including QA/QC	Credible data	Water Specialist	On-going
Analyze and compare current and historical data for trends	Measure change	Water Specialist	On-going
Compile sampling results in database	1 Database	Water Specialist	On-going
Create GIS map layer of sampling sites	1 Map	GIS Technician	On-going
Identify and map impaired areas	1 Map	Water Specialist	January 2002 **COMPLETED**
Determine the source of contaminates (point or non-point)	1 Map	Water Specialist	January 2003 **COMPLETED**
Monitor water quality to evaluate the effectiveness of the watershed plan and BMPs	Measure change	Water Specialist	On-going
Submit data to DEQ to document status of water quality	Yearly	Water Specialist	On-going

Objective 4: Coordinate future testing efforts

Action	Product	Completed by	Completion date
Identify agencies or organizations conducting water quality monitoring	Yearly	District Manager Water Specialist	On-going
Coordinate district monitoring with DEQ, USGS, and F.E. Warren Air Force Base	Yearly	Water Specialist	On-going

Goal 4: Elevate public awareness on listing of Crow Creek as an impaired water body and the importance of improving water quality

Objective 1: Identify and develop methods and strategy of public outreach, involvement and education.

Action	Product	Completed by	Completion date
Contract with public relations firm	1Contract	District Manager	July 2004
Stencil all storm drains and greenway corridor within the watershed	200 / Year	Education Specialist	December 2006
Hold three tours or seminars addressing NPS pollution prevention	1/ Year	District Manager Education Specialist	December 2005
Distribute NPS pollution prevention info at six public events	2/ Year	LCCD Staff	December 2005
Develop NPS pollution prevention brochure	1000 Brochures	Education Specialist LCCD Staff	May 2004
Provide lawn watering educational brochures and rain gauges	1000 Brochures	LCCD Staff	December 2004
Teach NPS pollution prevention classes	105 Classes	Education Specialist	December 2004
Hold annual event to highlight progress on Crow Creek Watershed Plan	1/ Year	LCCD Staff	On-going
Coordinate with City of Cheyenne, Laramie County and WYDOT for Phase II stormwater permitting	Annual Agreement	District Manager	On-going

Objective 2: Make a special effort to reach out to potentially affected interest

Action	Product	Completed by	Completion date
Identify potential opponents to implementation of the watershed plan	1 List	Steering Committee	May 2004

Identify potential proponents or beneficiaries of the watershed plan	1 List	Steering Committee	May 2004
Steering Committee and LCCD jointly make one-on-one contacts to encourage support and involvement	100 Contacts	LCCD Board Steering Committee	December 2003

Objective 3: Identify the implications of listing and the benefits of local management

Action	Product	Completed by	Completion date
Hold public meeting and illustrate the differences between a watershed plan and TMDLs	1Meeting	LCCD Board LCCD Staff	May 2000 **COMPLETED**
Hold open house or other event to present the draft watershed plan	1Event	Steering Committee LCCD Board LCCD Staff	October 2003 **COMPLETED**
Provide a legal notice in local newspapers with a draft plan and allow for public comment	2 Notices	District Manager	October 2003 **COMPLETED**
Analyze and incorporate public comments in the final watershed plan	FinalPlan	Steering Committee	January 2004 **COMPLETED**

Goal 5: Develop a watershed plan, which can be successfully implemented to achieve water quality goals and de-listing of Crow Creek from the 303(d) list of impaired water bodies.

Objective 1: Recommend possible solutions within the limits of available data.

Action	Product	Completed by	Completion date
Complete a study on feasibility of improving the quality of water discharged from Cheyenne's storm water drains	1 Study	Water Specialist City of Cheyenne	January 2004
Recommend potential solutions identified in the study	1 Meeting	LCCD Staff City of Cheyenne	January 2004

Objective 2: Identify other areas that need BMPs and work with landowners to install.

Action	Product	Completed by	Completion date
Develop list of urban and agricultural BMPs to improve water quality within Crow Creek	1 List	Water Specialist	January 2003 **COMPLETED**

Develop wetlands at (1) Dry Creek to treat all runoff prior to convergence with Crow Creek; (2) Ames Ave where highest level of fecal coliform is found; and (3) Missile Drive to provide a highly visible wetland demonstration	3 Wetlands	Water Specialist Wildlife Specialist	January 2005
Fence riparian areas at the North Crow Reservoir and North Crow Diversion to reduce fecals from storm water runoff entering municipal drinking water supply and develop off-site stock water	18,000 Linear feet	Water Specialist Wildlife Specialist	January 2005
Develop small acreage grazing demonstration sites in highly visible areas surrounding Cheyenne to reduce sediment and storm water runoff	5 sites	Wildlife Specialist Water Specialist	January 2005
Plant tree rows for riparian buffers below Hereford Reservoir #2 to reduce storm water runoff and buffer the affects from livestock grazing	9,000 Linear feet	Wildlife Specialist Tree Specialist	January 2005 **COMPLETED**

Objective 3: Coordinate activities related to implementing the plan.

Action	Product	Completed by	Completion date
LCCD will provide leadership for implementing and updating the Crow Creek Watershed Plan	1 Plan	LCCD Board LCCD Staff	On-going

Objective 4: Ensure acceptance by appropriate state and federal agencies.

Action	Product	Completed by	Completion date
Submit completed plan to DEQ for approval	1 Plan	District Manager	December 2003
Identify which BMPs will need state and/or federal approval	All	Water Specialist	July 2003 **COMPLETED**
LCCD will provide assistance for obtaining the necessary permits	All	District Manager Water Specialist	January 2005

Objective 5: Ensure that plan components are voluntary and are effectively implemented.

Action	Product	Completed by	Completion date
LCCD will provide assistance in obtaining cost share incentives and technical support to affected entities and landowners	As needed	District Manager Water Specialist Wildlife Specialist	January 2005

Ensure that BMPs are installed to accepted standards	As needed	LCCD Board NRCS Staff	January 2005

Goal 6: Gain public acceptance and support of the plan by considering the needs and concerns of all stakeholders in the Crow Creek Watershed.

Objective 1: Ensure that needs and concerns are clearly defined.

Objective 2: Work with affected users to assure public acceptance and support.

Action	Product	Completed by	Completion date
LCCD will provide technical assistance to develop conservation plans to meet users needs	As needed	LCCD Staff NRCS Staff	On-going
Define the benefits of the watershed plan	All stakeholders	Steering Committee LCCD Board	July 2003 **COMPLETED**
Provide information to stakeholders regarding the benefits of the watershed plan	All stakeholders	LCCD Staff	July 2003

RECOMMENDATIONS

The Crow Creek Steering Committee recommends implementing the action items described in the Crow Creek Watershed Plan. This is by no means a complete list of the actions that will be necessary to solve this problem, but should provide tools and direction to land managers and landowners on the types of projects that can be voluntarily installed to improve the quality of water in Crow Creek. Another key component of the watershed plan is communication throughout the process. Communication between agencies at all levels (local, state and federal) and communication with the stakeholders is integral to the success of the Crow Creek Watershed Plan.