WATER QUALITY SURVEY SUMMARY

FOR THE

DRY CIMARRON RIVER WATERSHED

(AND SELECTED TRIBUTARIES)

2000

Prepared by

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1.0 EXECUTIVE SUMMARY

Water quality surveys and assessments are completed in fulfillment of Section 106 of the Clean Water Act (CWA), *Work Program for Water Quality Management.* The purpose of the water quality survey is to collect water quality data to identify and prioritize water quality problems within a watershed and to evaluate the effectiveness of water quality based controls. The data collected as part of the survey are compared to current United State Environmental Protection Agency (USEPA) approved water quality standards to determine if waterbodies throughout the watershed are supporting their designated uses, such as the fishable and swimmable goals set forth in the CWA §102(a).

Water Quality Survey Summary Reports focus on information and data collected by the New Mexico Environment Department's (NMED) Surface Water Quality Bureau (SWQB) pertaining to stream reaches that were identified as NOT meeting water quality standards. All data collected as part of a survey are available upon request to the SWQB and can be downloaded from USEPA's computerized environmental data system known as STORET (http://www.epa.gov/storet/). The data collected as part of this study are later combined with all other readily available or submitted data that meet state quality assurance/quality control requirements to form the basis of designated use attainment determinations summarized in the *Integrated CWA §303(d)/305(b) Water Quality Monitoring and Assessment Report.*

The headwaters of the Dry Cimarron River watershed, including the tributary Oak Creek had no water quality impairments. There was one marginal exceedence of pH in this area of the Dry Cimarron River above Oak Creek which can be likely be attributed to the photosynthetic activity of algae and may warrant attention during future surveys. The Dry Cimarron River from the Oklahoma border to Oak Creek is impaired due to temperature and total dissolved solids (TDS). Long Canyon that enters the Dry Cimarron River in this area is also impaired due to temperature. However, both of these assessment units are currently classified as coldwater fisheries, which is likely not an existing or attainable designated use. There is no evidence that coldwater fish have ever been supported or propagated in these stream reaches. A Use Attainability Analysis is needed to support a change in the designated use. Minor exceedence of dissolved oxygen were observed at various sampling stations along this stretch of the Dry Cimarron River which probably reflect slow recovery from depressed nocturnal dissolved oxygen concentrations which could possibly be indicative of excessive enrichment and should be watched during future surveys. Carrizozo Creek is not considered to have any water quality impairments, however, exceedemces were observed for dissolved oxygen, chloride, aluminum, and temperature.

2.0 INTRODUCTION

Between May 2 and November 1 of 2000, the Surface Water Quality Bureau (SWQB) of the New Mexico Environment Department (NMED) conducted a series of multiple-day intensive water quality surveys of the Dry Cimarron River watershed and three tributary systems, Carrizozo Creek, Long Canyon Creek and Oak Canyon Creek. The Dry Cimarron drainage extends from the eastern slopes of Dale Mountain (elev. ~2500 m/8200 ft) for about 80 miles to the New Mexico/Oklahoma line (elev. ~1300 m/4200 ft) near Kenton, Oklahoma. Much of the 1100 sq. mi. drainage is scenic, high relief canyon. Land uses include pasture and irrigated agriculture. The New Mexico Department of Game and Fish stocks rainbow trout at Folsom Falls, near the village of Folsom in the upper watershed. The Dry Cimarron River is classified as a coldwater fishery. The findings of this survey indicate that this classification is, largely, in error.

The first Anglo-Americans to enter the valley of the Dry Cimarron in the mid-nineteenth century were beaver trappers. The subsequent removal of the beaver, and the later arrival of large herds of livestock, initiated an episode of channel destabilization that has resulted in many of the hydro-geomorphic impacts seen today. The inability of the uplands to absorb precipitation and the lack of a functional floodplain cause the river to flood destructively on a fairly regular basis. The loss of the floodplain to downcutting has rendered the surrounding grasslands totally dependent on precipitation or irrigation for moisture.

3.0 NM WATER QUALITY STANDARDS

General standards and standards applicable to attainable or designated uses for portions of the Dry Cimarron River watershed that were surveyed in this study are set forth in sections 20.6.4.12 and 20.6.4.900, of *Standards for Interstate and Intrastate Surface Waters* (20.6.4 NMAC, October 11, 2002). Segment specific standards for the Dry Cimarron River watershed are set forth in 20.6.4.701 and read as follows:

> **20.6.4.701 DRY CIMARRON RIVER - Perennial portions of the Dry Cimarron river in Union and Colfax counties and perennial reaches of Oak creek, Long canyon, and Corrumpa and Carrizozo creeks.**

A. Designated Uses: coldwater fishery, irrigation, livestock watering, wildlife habitat, and secondary contact.

B. Standards:

(1) In any single sample: pH shall be within the range of 6.6 to 8.8, temperature shall not exceed 25°C (77°F), TDS shall not exceed 1,200 mg/L, sulfate shall not exceed 600 mg/L, and chloride shall not exceed 40 mg/L. The use-specific numeric standards set forth in 20.6.4.900 NMAC are applicable to the designated uses listed above in Subsection A of this section.

(2) The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 mL; no single sample shall exceed 200/100 mL (see Subsection B of 20.6.4.13 NMAC).

[20.6.4.701 NMAC – Rp 20 NMAC 6.1.2701, 10-12-00]

4.0 METHODS

Water quality sampling methods were in accordance with the approved Quality Assurance Project Plan for Water Pollution Control Programs (QAPP) (NMED 2000).

Sampling was conducted on a seasonal basis, with visits on May 2-3, August 28-30 and October 30-November 1, 2000. Water chemistry sampling at Dry Cimarron stations included total nutrients, total and dissolved metals, major ions, total dissolved solids (TDS), hardness, alkalinity, radionuclides, organic scans, and microbiological collections.

5.0 SAMPLING SUMMARY

A map of the study area is presented in Figure 1. The STORET identification codes (where available) and location descriptions of sampling stations selected for this survey are provided in Table 1.

Figure 1. Dry Cimarron River Watershed Sampling Stations

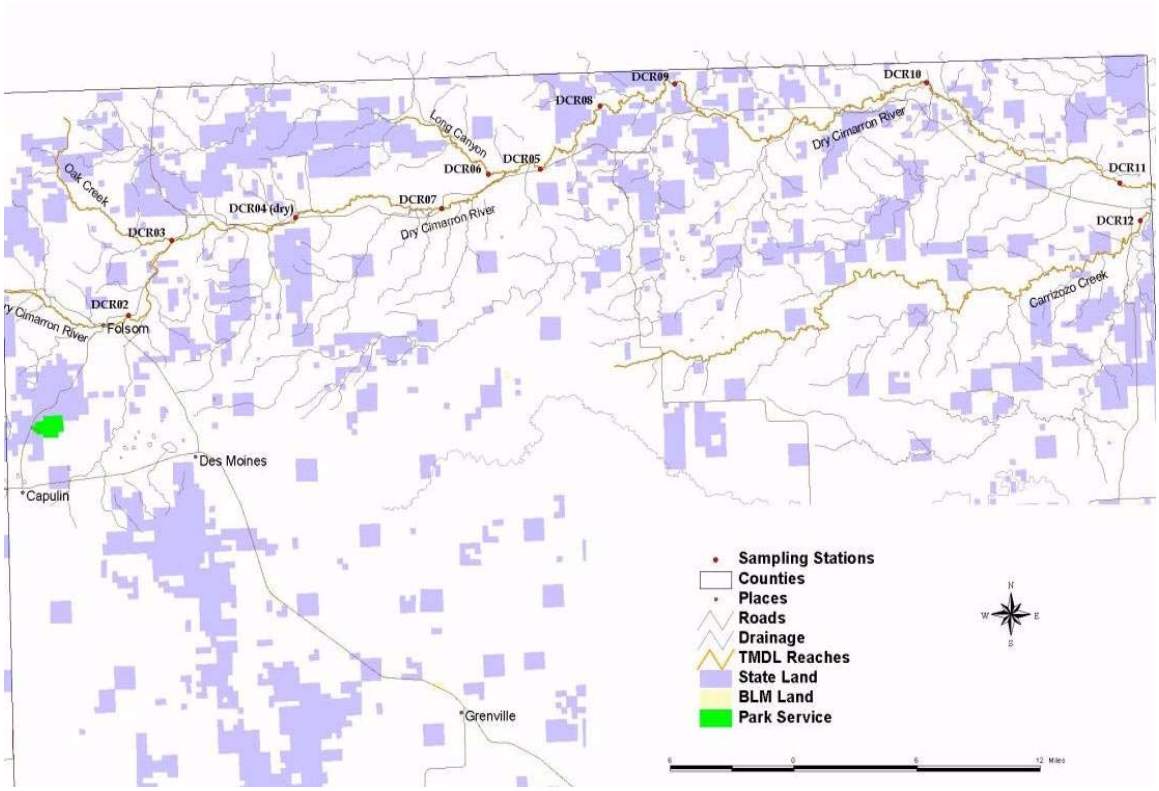

Table 1. Sampling Stations

Station Number	Station Code	Location description
DCR 01*	02DryCim120.0	Dry Cimarron River at Hereford Park Ranch
DCR 02	02DryCim108.2	Dry Cimarron River at Folsom Falls
DCR 03	02OakCre000.1	Oak Creek above Dry Cimarron River
DCR 04*	02DryCim075.0	Dry Cimarron River below Oak Creek
DCR 05	02DryCim074.5	Dry Cimarron River above Long Canyon
DCR 06	02LongCa004.1	Long Canyon about 2 miles above NM 456
DCR 07	02DryCim070.3	Dry Cimarron River below Long Canyon
DCR 08**		Dry Cimarron River at Spool Road
DCR 09	02DryCim047.2	Dry Cimarron River at Jesus Mesa Road
DCR 10	02DryCim024.6	Dry Cimarron River at Wedding Cake Butte
DCR 11	02DryCim003.2	Dry Cimarron River at Wiggins Road
DCR 12	02Carriz002.7	Carrizozo Creek near NM 406

* Stations were dropped when streams went dry early in survey.
** Station was dropped when access to sites could not be obtained.

6.0 WATER QUALITY ASSESSMENT (RESULTS AND DISCUSSION)

6.1 Assessment Units (Stream Reaches)

The following water quality assessment summary is divided into Assessment Units (also known as waterbody or stream reaches). Assessment Units and their associated sampling stations are given in Table 2.

Table 2. Assessment Units and Associated Sampling Stations

Assessment Unit	Sampling Stations
Dry Cimarron River (Oak Creek to headwaters)	1, 2
Oak Creek (Dry Cimarron River to headwaters)	3
Dry Cimarron River (perennial portions OK boundary to Oak Creek)	5, 7, 9, 10, 11
Long Canyon (perennial reaches above Dry Cimarron River)	6
Carrizozo Creek (Dry Cimarron River to headwaters	12

6.2 Water Quality Standards Exceedences

For many water quality parameters, the State of New Mexico maintains numeric water quality standards. However, for several parameters (e.g., plant nutrients, stream bottom deposits), only narrative standards exist. Data are assessed for designated use attainment status for both numeric and narrative water quality standards by application of the *Assessment Protocol* and associated appendices (NMED/SWQB, 2004a).

Table 3 includes information pertaining to all exceedences of water quality standards found during the intensive watershed survey. The purpose of this section of the report is to provide the reader with information on where current water quality standards are being exceeded within the watershed. These exceedences are used to determine designated use impairment status. Final assessment determinations as to whether or not a stream reach is considered to be meeting its designated uses depend on the overall amount and type of data available during the assessment process (Refer to NMED/SWQB's *Assessment Protocol* for additional information on the assessment process, NMED/SWQB 2004a). When available, outside sources of data that meet quality assurance requirements are combined with data collected by SWQB during intensive watershed survey to determine final impairment status. Final designated use impairment status is housed in the Assessment Database (ADB) and is reported in *Appendix B* of the *Integrated Clean Water Act §303(d)/ §305(b) Report* (NMED/SWQB, 2004b).

Table 3. Water Quality Standards Exceedences

Dry Cimarron River (2000)
Chemical and physical Exceedences

This report lists physical/chemical exceedences of standards for the Dry Cimarron study. These data are broken out by Assessment Units, then "Citations", then sampling stations. The "citations" are designated uses, with these additions:
- Segment-specific criteria.
- criteria common to various fisheries (cold and warm, acute and chronic).

Carrizozo Creek (Dry Cimarron River to headwaters)
20.6.4.701. Perennial reaches of Oak Creek, Long Canyon, and Corrumpa and Carrizozo creeks. There are no use-specific numeric criteria for secondary contact (20.6.4.900.I).

coldwater fishery

Dissolved oxygen

Carrizozo Creek near NM406 (DCR 12)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Dissolved oxygen	No	4.35	6	mg/L	08/28/2000
Yes	Dissolved oxygen	No	1.27	6	mg/L	08/29/2000
Yes	Dissolved oxygen	No	1.63	6	mg/L	08/30/2000
Yes	Dissolved oxygen	No	3.87	6	mg/L	10/30/2000
Yes	Dissolved oxygen	No	2.44	6	mg/L	10/31/2000
Yes	Dissolved oxygen	No	2.59	6	mg/L	11/01/2000

fishery (chronic)

Dissolved aluminum

Carrizozo Creek near NM406 (DCR 12)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	aluminum	No	0.1	0.087	mg/L	10/30/2000
Yes	aluminum	No	0.11	0.087	mg/L	10/31/2000
Yes	aluminum	No	0.19	0.087	mg/L	11/01/2000

segment specific criteria

Chloride

Carrizozo Creek near NM406 (DCR 12)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Chloride	No	41.1	40	mg/L	05/03/2000

Temperature

Carrizozo Creek near NM406 (DCR 12)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	25.6	25	mg/L	08/28/2000

Dry Cimarron River (Oak Creek to headwaters)

20.6.4.701. Perennial portions of the Dry Cimarron River in Union and Colfax counties. There are no use-specific numeric criteria for secondary contact (20.6.4.900.I).

segment specific criteria

pH, upper limit

Dry Cimarron River at Folsom Falls (DCR 02) (above Oak Creek)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	pH, upper limit	No	8.87	8.8	su	05/02/2000

Dry Cimarron River (Perennial portions OK border to Oak Creek)

20.6.4.701. Perennial portions of the Dry Cimarron River in Union and Colfax counties. There are no use-specific numeric criteria for secondary contact (20.6.4.900.I).

coldwater fishery

Dissolved oxygen

Dry Cimarron River above Long Canyon (DCR 05)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Dissolved oxygen	No	5.97	6	mg/L	10/30/2000

Dry Cimarron River at Wiggins Road (DCR 11)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Dissolved oxygen	No	5.83	6	mg/L	08/29/2000

TDS

Dry Cimarron River above Long Canyon (DCR 05)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Total Dissolved Solids	No	1220	1200	mg/L	05/02/2000

Dry Cimarron River at Wedding Cake Butte (DCR 10)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Total Dissolved Solids	No	1220	1200	mg/L	05/02/2000
Yes	Total Dissolved Solids	No	1250	1200	mg/L	05/03/2000

Dry Cimarron River at Wiggins Road (DCR 11)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Total Dissolved Solids	No	1335	1200	mg/L	05/02/2000
Yes	Total Dissolved Solids	No	1320	1200	mg/L	05/03/2000

Dry Cimarron River below Long Canyon (DCR 07)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Total Dissolved Solids	No	1270	1200	mg/L	05/02/2000
Yes	Total Dissolved Solids	No	1290	1200	mg/L	05/03/2000
Yes	Total Dissolved Solids	No	1210	1200	mg/L	08/29/2000
Yes	Total Dissolved Solids	No	1220	1200	mg/L	08/30/2000

Temperature

Dry Cimarron River at Jesus Mesa Road (DCR 09) (downstream of old USGS gage)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	28.1	25	mg/L	08/28/2000

Dry Cimarron River at Wedding Cake Butte (DCR 10)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	28.3	25	mg/L	08/28/2000

Dry Cimarron River at Wiggins Road (DCR 11)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	26.3	25	mg/L	08/28/2000

Temperature

Dry Cimarron River below Long Canyon (DCR 07)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	25.3	25	mg/L	08/28/2000

Long Canyon (Dry Cimarron to headwaters)

20.6.4.701. Perennial reaches of Oak Creek, Long Canyon, and Corrumpa and Carrizozo creeks. There are no use-specific numeric criteria for secondary contact (20.6.4.900.I).

segment specific criteria

Temperature

Long Canyon about 2 miles above NM 456 (DCR 06)

Exceeds:	Analyte:	LessThan:	Result:	Standard:	Units:	Sampling date:
Yes	Temperature	No	26.5	25	mg/L	08/28/2000

Loss of infiltration in the uplands, the loss of the woody riparian cover that supported the beaver and heavy diversion of base flows has left a river that is subject to significant evaporative concentration of dissolved solids. High dissolved solids concentrations coupled with irrigation in a high desert environment tend to increase the salt content of soils, reducing their productivity and increasing the amount of water needed to produce crops.

Massive inputs of erosional sediments to the channel retard the evolution of a new floodplain by replacing material carried away during flood events. While the establishment of a new floodplain some twenty feet below the surrounding terraces is a less than optimal outcome, a functional, well managed floodplain would serve to reduce the destructiveness of floods, provide at least some forage and perhaps foster the growth of willow thickets to support beaver. In time, sediments trapped behind beaver dams will begin to raise the level of the channel.

It is recommended that several changes be made to the status of the Dry Cimarron in the State water quality standards. The designated use of coldwater fishery should be replaced in the lower segment (below Oak Canyon) with warmwater fishery and the use of warmwater fishery should be added to the upper segment to reflect the native fishery found in that reach. The word "marginal" should be added to the coldwater designation in this upper segment to indicate why the temperature criterion is set at 25°C. The only habitat capable of supporting coldwater fish is the reach immediately below Folsom Falls. This reach is stocked by NM Game and Fish. Appropriate adjustments in criteria should be made to match the new uses.

7.0 CONCLUSIONS

The headwaters of the Dry Cimarron River watershed, including the tributary Oak Creek had no water quality impairments. There was one marginal exceedence of pH in this area of the Dry Cimarron River above Oak Creek which can be likely be attributed to the photosynthetic activity of algae and may warrant attention during future surveys. The Dry Cimarron River from the Oklahoma border to Oak Creek is impaired due to temperature and total dissolved solids (TDS). Long Canyon that enters the Dry Cimarron River in this area is also impaired due to temperature. However, both of these assessment units are currently classified as coldwater fisheries, which is likely not an existing or attainable designated use. There is no evidence that coldwater fish have ever been supported or propagated in these stream reaches. A Use Attainability Analysis is needed to support a change in the designated use. Minor exceedence of dissolved oxygen were observed at various sampling stations along this stretch of the Dry Cimarron River which probably reflect slow recovery from depressed nocturnal dissolved oxygen concentrations which could possibly be indicative of excessive enrichment and should be watched during future surveys. Carrizozo Creek is not considered to have any water quality impairments, however, exceedemces were observed for dissolved oxygen, chloride, aluminum, and temperature.

8.0 REFERENCES

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