WATER QUALITY

Designated Beneficial Uses

The main stem of the Chariton River is the only stream in this basin classified for whole-body contact recreation and boating. Water quality, per se, does not impede recreational activity on the Chariton River. It is the sediment-choked and therefore shallow condition of the channelized portion that restricts boating and canoeing during times of low flow. The unchannelized portion of the Chariton River has a narrower, deeper channel, and due to releases from Lake Rathbun will support boat and canoe traffic in all but the winter months (ice cover). Occasional large log jams deter recreational use of this section.

Chemical Quality of Stream Flow

General water quality data have been collected intermittently on the Chariton River since 1962 at the gage station near Prairie Hill. An "average" water year (1986) and a flood year (1993) were chosen for comparison (Table 7). Both iron and manganese can exceed secondary drinking water standards in the Chariton River and the alluvial aquifer (MDNR unpublished). Occasionally high concentrations of phosphorus are most likely attributable to agricultural runoff.

Non-Point Source Pollution

The primary pollutant in Chariton River basin streams is sediment delivered by the processes of sheet, rill, gully and stream bank erosion throughout the watershed. Average sheet erosion rate was estimated to be 10.3 tons of soil per acre of watershed per year (tons/A/yr) in 1978, at which time it was estimated that 2.7 tons/A/yr were actually yielded to basin streams. Of that total sediment yield, sheet and rill erosion were estimated to be responsible for 71%, gully erosion for 11% and stream bank erosion for 16% of the sediment delivered to streams in this basin (Anderson 1980). Though erosion on agricultural lands has been greatly reduced in the last 15 years, severe sedimentation problems continue to plague basin streams. Active head-cutting associated with channelization performed decades ago continues to create deep gullies, even on completely forested slopes approaching the highest elevations in the watershed.

Uncontrolled or poorly controlled sheet and rill erosion from road construction, road maintenance, and other large construction projects yield unknown amounts of fine sediment and suspended clay particles to receiving streams and subsequently turbid reservoirs. Those projects that fail to incorporate adequate erosion control and re-vegetation practices (true of many county road and right-of-way projects) yield much more than the average 10.3 tons/A/yr of sediment.

Nutrient enrichment from livestock (mostly cattle grazing near or in streams) is most noticeable during the summer at times of low flow. At such times, excessive animal waste and algal growth can cause locally high ammonia and low dissolved oxygen concentrations in headwater streams (MDNR unpublished). These conditions have not been recorded to cause fish kills, though they likely restrict the distribution of pollution-sensitive aquatic species.

Acid mine drainage affects several streams within the Chariton River basin. Drainage from abandoned strip mines and gob piles from old shaft mines causes the waters of receiving streams to become "mineralized". Mineralization generally refers to an increase in one or more of the following parameters: total dissolved solids, specific conductance, total recoverable iron (>500 μg/L), manganese (>500 μg/L), and sulfate concentration (>75 μg/L); and mineralization is sometimes accompanied by a drop in pH, or acidity being greater than alkalinity (DeTroy and Skelton 1983). Several miles of Shoal, Sandy and Little Sandy creeks in eastern Putnam County are mineralized. In western Adair County, approximately 0.9 mile of Billy Creek receives acid mine drainage from a gob pile. There are several thousand acres of strip-mined lands within the basins of East Fork and Middle Fork Little Chariton rivers. Heavily impacted tributaries of East Fork include Sinking, Sugar, Dark and North Fork Claybank creeks (MDNR unpublished, USGS 1986). Reclamation is either underway or planned for most of these areas (MDNR unpublished, MDNR 1990).

Point Source Pollution

Oil and petroleum product pipelines belonging to Amoco, Arco and Mapco companies cross the basin from east to west for its entire length. An Amoco pipeline break in 1990 spilled 86,000 gallons of crude oil and impacted over 35 miles of Little Turkey Creek and the Chariton River. Though devastating to aquatic invertebrates and mammals, very few dead fish were found in this isolated incident.

Two wastewater treatment facilities present problems regularly – the City of Salisbury's discharge to Puzzle Creek in Chariton County, and effluent from Moberly West's wastewater plant, which impacts at least 2.5 miles of an unclassified tributary to East Fork Little Chariton River (MDNR unpublished).

MDNR has identified acid mine drainage to Sandy Creek in Putnam County from Missouri Mining Company's coal preparation plant near Hartford. However, it is unclear whether the mineralization and depressed pH are due to point source drainage or non-point sources from other mined lands (MDNR unpublished). The Thomas Hill power plant ash pond discharges into Middle Fork Little Chariton River, and during drought these discharges can exceed that of the reservoir. Though the effluent tested as nontoxic in 1991, Associated Electric Cooperative, Inc. is conducting a three-year study to assess the impact of that effluent on heavy metals in the river (MDNR unpublished).

Concentrated Animal Feeding Operations

Large corporate hog farms pose a potential threat to aquatic life at times of system failure. PSF-ContiGroup is the only corporate farm venture in the Missouri portion of the basin. In the latter half of 1995, manure spills by then Premium Standard Farms resulted in three fish kills – one on the headwaters of Mussel Fork Creek (T62N R18W Sec 2), impacting nine miles of stream; one on a 0.4-mile reach of a tributary to Spring Creek (T64N R19W Sec 13); and a third killing all fish in a 1.0-mile portion of North Blackbird Creek (T66N R18W Sec 21). Public outcry and a federal pollution lawsuit filed by the Citizens Legal Environmental Action Network (CLEAN), along with stricter DNR enforcement of engineering standards, seem to have reduced the probability of recurrence of events of such magnitude that would create fish kills.

If not carefully monitored and regulated, large corporate hog farms also have potential to develop into a source of nutrient enrichment and perhaps heavy metal contamination due to the approved

surface disposal of liquid manure (lagoon effluent) onto fields. In the late 1990s, PSF-ContiGroup "land applied" effluent from each lagoon at a rate of 4.2 million gallons per 110 acres of field annually. It is unknown whether these fields will retain and recycle applied nutrients long enough to prevent runoff, percolation, and ultimate release of nutrients at pollutant levels into receiving waters. As of November 2001, alternative methods of waste treatment and disposal, including nutrient recycling, were being explored by PSF-ContiGroup under terms of a proposed settlement of the aforementioned federal lawsuit.

Table 7. Selected water quality data for the Chariton River near Prairie Hill, MO at gage station 06905500 during water years 1986 and 1993 (USGS 1986, 1993; Code of State Regulations 10 CSR 20.7). Protection Class Codes: I = Aquatic Life; III = Drinking Water Supply; VI = Whole-Body-Contact Recreation; VII = Ground Water.

Parameter	State Standard				Water Year	
	I	III	VI	VII	1986	1993
Temperature (F°)	90° max				32-79	32-78
Specific Conductance (µmhos/cm)					190-389	144-345ª
рН		6.5 - 9.0			7.3-8.1	7.4-8.0
Turbidity (NTU)					37-430	-
Oxygen, Dissolved (mg/L)	5				6.3-15.6	4.7-15.6
Coliform, Fecal (cols/100ml)				200 non-storm runnoff	34-11,000 ^b	34-14,000 ^b
Streptococci, Fecal (cols/100ml)					24-20,000 ^b	36-25,000 ^b
Total Hardness (mg/L CaCO ₃)					91-200	61-140
Alkalinity, Total (mg/L as CaCO ₃)					73-130	58-116
Nitrogen, Total Ammonia (mg/L as N)	Depends on temp & pH				0.04-0.28	0.02-0.11
Phosphorus, Total (mg/L as P)					0.14-0.39	0.09-0.62
Manganese, Dissolved (μg/L as Mn)		50		50	<1-80	3-80
Iron, Dissolved (μg/L as Fe)	1,000	300		300	7-2,900	78-190
Sulfate, Dissolved (mg/L as SO ₄)		20% increase from background levels			23-77	11-43
Atrazine, Dissolved (μg/L)		3		3	-	0.16-0.49

^a Laboratory value replacing missing field value

^b Non-ideal count of colonies (e.g., sample was not diluted enough, colonies merged)