Minnesota Pollution Control Agency

Minnesota River Basin

Lac Qui Parle Watershed.

Physiography And Description

The Lac Qui Parle Watershed, a major watershed of the Minnesota River Basin, drains an area of 806 square miles in Minnesota as well as another 350 in South Dakota. The river's name is a French translation of the Dakota Indian name for the lake it impounded --"The Lake Which Talks."

The Lac Qui Parle River has its ultimate origin in Lake Hendricks on the South Dakota border in northwestern Lincoln County. Winding northward as an intermittent stream on the Coteau des Prairies (meaning Highland of the Prairies, so named by French explorers), a morainal plateau and important drainage divide that also occupies the headwaters of several of the Minnesota River's major tributaries, the stream plunges down the slope of the Coteau for about eight stream miles and drops 250 feet. Except for a few isolated wetlands set aside by state and federal agencies, many of the Coteau's wetlands have been drained and converted to cultivated fields. In addition, a large proportion of the Coteau's small creeks and streams have been ditched and straightened, permitting earlier planting and allowing more acres to be placed into production. Near Canby, the Lac Qui Parle enters the Blue Earth till plain, and then begins a long, slow course generally northeast across the western panhandle of Yellow Medicine County and diagonally across Lac Qui Parle County to the Minnesota River. It falls 210 feet in its final eighteen-mile descent into the

Minnesota Valley. In both the headwaters and lower gorge sections it flows through wooded valleys, and on the low plains an occasional willow or cottonwood grows along the banks. Paralleling the river's course down the Coteau is Canby Creek, a small trout stream joining the Lac Qui Parle farther downstream. As it flows toward the Minnesota, the Lac Qui Parle receives it's largest tributary near Dawson, the West Branch, which drains much of western Lac Qui Parle County and originates in South Dakota. In the lower Minnesota Valley reach, the Lac Qui Parle collects from the south, Ten Mile Creek (the lower section is also known as Three Mile Creek), and other small tributaries, the majority having been largely channelized or ditched.

The Lac Qui Parle River Watershed is situated in the Northern Glaciated Plains Ecoregion. Further sub-division places Minnesota's portion of the watershed fall within one of two geomorphic settings: the Coteau des Prairies and the Blue Earth Till Plain. The Coteau des Prairie is characterized by landscapes with long northeast facing slopes which are undulating to rolling (4-6%), and loamy well drained soils, the majority (72%) classified as having a high water erosion potential. The portion of the watershed within the Blue Earth Till Plain is represented by nearly level to gently sloping lands, ranging from 0-6% in steepness. Soils are predominantly loamy, with landscapes having a complex mixture of well and poorly drained soils. Drainage of depressional areas is often poor, and tile drainage is common. Water erosion potential is moderate on much of the land within this geomorphic setting.

Overall, according to information compiled by The Department of Soil, Water, and Climate at the University of Minnesota, over 69% of the tillable acres within Minnesota's section of the Lac Qui Parle Watershed have a high potential for water erosion, 29% are ranked as having moderate water erosion potential, and 1.7% have the potential for significant wind erosion. As a result, erosion control and water conservation are important within this watershed

The Lac Qui Parle river flows for a total of sixty six miles and drops over 800 feet at an average gradient of more than twelve feet per mile. Minnesota counties within the watershed include parts of Lac Qui Parle, Lincoln, and Yellow Medicine.

Geology And Land Use

Cretaceous rock and glacial drift overly crystalline Precambrian bedrock within the Lac Qui Parle Watershed. Although depths vary throughout the watershed, till deposits generally range from 100-300 feet deep with the exception of lands adjacent to the Minnesota River where glacial and fluvial processes have eroded till deposits to thin veneers or have exposed underlying bedrock deposits.

Land use is primarily agricultural, with approximately 79% of the available acres utilized for production of grain crops, mainly corn and soybeans. Of these acres, the majority (96%) are classified as moderately productive. Sixty eight percent of agricultural lands are classified as well drained, thirty one percent as poorly drained and roughly one percent have

been tiled to improve drainage. 1996 estimates place 11% of the Lac Qui Parle Watershed's agricultural acres as grasslands, enrolled in the federal Conservation Reserve Program (CRP), a voluntary federal program that offers annual rental payments to farmers in exchange for planting areas of grass and trees on lands subject to erosion.

The 1996 figures estimated there are roughly one million cattle and three million hogs in the Minnesota River Basin, of which, approximately 30 percent of the cattle and 50 percent of the hogs are raised within the southeastern section of the basin. An additional 30 percent of the cattle and 25 percent of the hogs are located in the southwestern portion of the basin.

Climate

The climate is continental, with cold dry winters and warm wet summers. Average annual precipitation is 24 to 26 inches with two thirds normally falling in the five months from May through September. Average annual runoff is estimated at 1-2 inches. Average monthly temperatures recorded at Madison range from 12.40 F in Jan., to 68.80 F in July.

Water Quality

Ground Water

Ground water in the Lac Qui Parle Watershed's glacial-drift aquifers generally is of acceptable quality for most uses, including household supply, industrial use, and irrigation. The aquifers generally contain calcium/magnesium/ bicarbonate type waters.

Surface Waters

The four rivers draining the Coteau and emptying into the Minnesota -- the Lac Qui Parle, Yellow Medicine, Redwood, and Cottonwood Rivers -- share many of the same characteristics. The headwaters, although generally hard, with alkalinities from 150-200 ppm., are relatively clear, flowing through rapids and over gravel bars. The lowland stretches, collecting discharges and sediments from the extensively ditched plains, transform to soft, silty-clay bottomed channels, turbid with suspended sediments. In the lower gorge, although stream bottoms are generally of large rocks and boulders, the waters retain much of the silt from upstream reaches, which then settles out on the rocks and in receiving waters as velocities subside. In the low water of autumn and winter, however, the four rivers may become clear throughout their courses.

Today, pollution of surface waters in the Minnesota River's major watersheds is a moderate to severe problem. Constituents of concern often include: suspended sediments, excess nutrients (primarily nitrogen and phosphorus), pesticides, pathogens, and biochemical oxygen demand. High concentrations and loads of suspended sediments and nutrients can often be linked to artificial drainage patterns (ditches, tile, etc.) and wetland reductions. Alone or in combination, these landscape alterations have effectively increased the

hydraulic efficiency and magnitude of storm and snowmelt runoff events. Estimates vary, but about 80 percent of the wetlands in the Minnesota River Basin have been drained and converted to other uses. High nutrient levels in lakes and streams often result from over-land runoff across erodible soils. Eroded soils and the runoff which transport these particles often carry pesticides and excess nutrients to receiving waters. Increased discharges and elevated flood peaks also erode streambanks, destroy shoreline vegetation and deposit sediment on floodplains, in streams, and in downstream receiving waters. Sediment in water often leads to impaired habitat for aquatic life, decreased photosynthetic activity, and reduced recreational quality. Excessive levels of nutrients often promote eutrophication; defined as nutrient rich oxygen poor water. Elevated nutrient levels often promote abundant algal populations which in turn can cause large diurnal fluctuations in dissolved oxygen concentrations (photosynthesis being responsible for daytime highs, respiration for nighttime lows). In addition, algal decomposition is often a major factor responsible for high biochemical oxygen demand (BOD) levels. BOD is the amount of oxygen consumed-biologically and chemically-over a five day period. The BOD test reflects the effect of easily decomposed organic materials on oxygen depletion. Other sources of organic materials include eroded organic materials associated with sediment or manure, and discharges from faulty wastewater treatment plants, and faulty septic systems. The presence of water-borne pathogens is often characterized by determining the population of fecal coliform in water quality monitoring samples. Fecal coliform are a subset of bacterial populations, and generally arise from the fecal excrement of humans, livestock, and water fowl. Common sources of fecal coliform include feedlots, faulty wastewater treatment plants, and faulty septic systems.

Among the nutrients, phosphorus is a pollutant of major concern to the water quality of the Minnesota River and its tributaries. Any strategy to restore the Minnesota River will require the major watersheds to take part in reducing phosphorus loadings to the main stem. Eventually, through basin management, a basinwide phosphorus loading reduction goal can be established. Through a collaborative process involving local, state and federal government, in addition to watershed residents and other stakeholders, this whole-basin load-reduction goal can be allocated among the 13 major watersheds. Within each major watershed, in turn, the total watershed load-reduction goal can be further allocated among point and nonpoint sources.

In preparation for this process, several kinds of information on phosphorus pollution sources, concentrations and loads have been collected. This includes an estimate of phosphorus loads from point sources within the major watershed (Table 4.13), together with watershed specific monitoring data on recent phosphorus concentrations, flows, total phosphorus load estimates, ecoregion specific phosphorus values, and basin wide ecoregion weighted phosphorus values (Table 4.14 and 4.15). As mentioned, livestock feedlots are a major potential source of several pollutants: phosphorus, nitrogen, and pathogens in particular. Considerable progress has been made through the state feedlot program in recent years. Attached is a map (Figure 4.05) of feedlots in the Lac Qui Parle River Watershed that have received certificates of compliance, often referred to as feedlot permits *(coming soon).*

Table 4.13: Estimates of Point Source Phosphorus Loads (1996)

07020003	**Lac Qui Parle Watershed**					
MN0059692	ISD#6011	0.0230	san-pond	2.00	140	
MN0050946	Marietta	0.0043	POTW-pond	2.00	26	
MN0021121	Hendricks	0.0254	POTW-pond	2.00	154	
MN0021881	Dawson	0.2516	POTW	4.00	3,059	
MN0020354	Canby	0.2856	POTW-pond	2.00	1,736	
MN0051764	Madison	0.2767	POTW	4.00	3,364	
MN0040134	AG Processing	1.4600	cooling	1.00	4,437	
MN0048968	AMPI-Dawson	0.4700	dairy	16.75	23,927	
MN0043028	Canby WTP	0.0042	water	1.00	13	
MN0042315	Hendricks WTP	0.0006		water	1.00	2

Table 4.14

Mean Total Phosphorus Concentrations Lac Qui Parle River		
		Mean Annual TP Concentration (mg/l)
Lac Qui Parle River	annual	NA
Lac Qui Parle River	summer only	NA
Northern Glaciated Plains Ecoregion	annual	0.218
Minnesota River Basin	annual	0.251

Table 4.15

Water Quality Characteristics Phosphorus and Total Suspended Sediment	
Lac Qui Parle River Mean Annual Flow	134 cfs[c]
Minnesota River Mean Annual Flow	4,266 cfs
Total Phosphorus Estimated TP Load (March - Aug)[b] % of MN R Basin TP Load[a]	21.83 tons 1.85%
Total Suspended Sediment	3,817 tons

Estimated TSS Load (March - Aug)[b] % of MN R Basin TSS Load[a]	.81%

[a] - based on total load contributions to the Minnesota River (point and nonpoint sources)
[b] - based on yields from the Pomme de Terre River Watershed

Although no long term monitoring within the Lac Qui Parle River has been done per se, results from the Minnesota River Assessment Project (MRAP), published in 1994, concluded that concentrations and loads of suspended sediments recorded at the watershed outflow at Lac Qui Parle Lake were considerably less than those recorded at other points along the Minnesota River mainstem. Settling of sediments in the headwater reservoirs was cited as the likely cause. The median total phosphorus concentration at the Lac Qui Parle outflow was computed to be 0.26 mg/l during the study period, slightly above the median value of 0.22 mg/l for all water samples collected at mainstem sites. Increased nitrate concentrations during periods of increasing stream discharge was common to all sites sampled during the MRAP study. However, the effect was less pronounced in the headwater source region. Nitrate concentrations were elevated during runoff from the Minnesota River at Montevideo, but did not exceed 3 mg/l, well below the federal maximum drinking water standard of 10 mg/l.

Recreation

The lakes and wetlands of the Chippewa River watershed provide rich fish and wildlife resources, especially in the higher headwater regions. Many of these lakes contain a wide variety of sport fish, including, walleye, largemouth bass, northern pike, and panfish. Rough fish are abundant in the marginal-shallow lakes subject to occasional winterkill. In the lower area of the watersheds many wetlands and small tributaries provide rich resources for production of waterfowl and pheasants. Many of these areas are protected in state wildlife management areas and federal waterfowl production areas, both open to public hunting.

There are several state and county parks within the Chippewa River Watershed, including: Glacial Lakes State Park in the upper Chippewa watershed, containing outstanding examples of glacial moraines and outwash plains, Monson Lake State Park in the eastern part of the Chippewa River Watershed, the site of an Indian massacre of settlers during the 1862 Sioux uprising, Swift Falls County Park, on a wooded rocky section of the Chippewa which includes waterfalls, Sibley State Park on Lake Andrew, a headwater lake of Shakopee Creek

References

General

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More Information

For questions about the Minnesota River Basin management framework, contact Norm Senjem at (507)280-3592.