Weber River Watershed Management Water Quality Assessment Report

August
2000

Department of Environmental Quality
Division of Water Quality
Salt Lake City, Utah
Division of Water Quality

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EXECUTIVE SUMMARY

In June 1999, the Division of Water Quality (DWQ) completed its second intensive monitoring of the Weber River Watershed Management Unit. Fifty-five sites were monitored to assess water quality. The monitoring project was started in July 1998. Samples were collected twice a month during spring runoff and once during other months. Samples were not collected in December of 1998. In the previous intensive monitoring, 12 sites located on streams that flow into Farmington Bay on the Great Salt Lake were monitored. They were not monitored during this intensive survey because of staff and laboratory allocations. However they were included in the overall assessment of the management unit as streams that were 'evaluated'.

Streams were assessed against State water quality standards and pollution indicators to determine if their designated beneficial uses were being met. The streams in the Weber Basin and along the Wasatch Front are all designated as Class 4 waters, protected for agricultural use, including stock watering. In addition, all rivers and streams in the study area also have water quality standards that are set to protect various forms of aquatic life. These classifications include cold water game fish (3A), warm water game fish (3B), warm water non-game fish (3C), and waterfowl (3D). With the exception of the Weber River from the Slaterville Diversion to the Great Salt Lake and a few of the Farmington Bay area streams from the U.S. Forest Service boundary to the Great Salt Lake, all rivers and streams are classified as 3A (cold water fishery). The lower Weber River has been designated as Class 3C and 3D waters and most of the streams flowing into Farmington Bay have a 3B or 3C classification downstream from the Forest Service boundary to the Great Salt Lake. All streams have also been classified as 2B, protected for recreation. This classification was not assessed for bacteria and this category was listed as not being assessed. Approximately 877 stream miles are also classified as a source of drinking water (Class 1C).

There are approximately 1,065 perennial stream miles within the management unit. Of these, 845 (79.3%) stream miles were assessed for aquatic life and agricultural use support. Seven-hundred forty-seven miles of streams were assessed as possible sources of drinking water. Table 1 lists the stream miles and percent of stream miles that were assessed as fully, partially, or not supporting their beneficial uses.

Table 1. Individual Use Support Summary
Weber River Basin and Farmington Bay Area Streams

Goals[a]	Use	Size Assessed (miles)	Size Fully Supporting (miles)	Size Fully Supporting but Threatened (miles)	Size Partially Supporting (miles)	Size Not Supporting (miles)	Size Not Attainable (miles)
Protect & Enhance Ecosystems	Aquatic Life	845.4	564.2 (66.7%)	0.0	229.1 (27.1%)	52.1 (6.2%)	0.0
Protect & Enhance Public Health	Fish Consumption	0.0		0.0			
	Swimming[b,c]	0.0		0.0			
	Secondary Contact[c]	0.0		0.0			

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Weber River Basin and Farmington Bay Area Streams

Goals[a]	Use	Size Assessed (miles)	Size Fully Supporting (miles)	Size Fully Supporting but Threatened (miles)	Size Partially Supporting (miles)	Size Not Supporting (miles)	Size Not Attainable (miles)
	Drinking Water[c]	757.0	707.1 (93.4%)	0.0	28.5 (3.8%)	21.4 (2.8%)	0.0
Social and Economic	Agricultural	845.4	795.5 (94.1%)	0.0	28.5 (3.4%)	21.4 (2.5%)	0.0

[a] These goals are part of the national water quality goals adopted by the EPA Office of Water and the ITFM in their Environmental Goals and Indicators effort.

[b] Class 2B (secondary contact) streams were evaluated as swimmable for proposes of the CWA goals, therefore the swimming and secondary contact classification categories are the same.

[c] Waters in this basin were chemically assessed, but not assessed bacteriologically.

All streams assessed in the Ogden River watershed except the North Fork of the Ogden River were determined to be supporting all of their beneficial use designations that were evaluated. Watersheds that were assessed as still having water quality impairments were Echo Creek, Chalk Creek, East Canyon Creek, and Silver Creek.

The causes of water quality had high levels of nutrients (total phosphorus) and low dissolved oxygen. The major sources of nutrients and sediments in Chalk Creek were agricultural practices, oil and gas exploration, and stream channel degradation. The East Canyon wastewater treatment plant discharges significant amounts of total phosphorus into East Canyon Creek, which eventually enters East Canyon Reservoir, causing impacts to both the stream and lake fishery. Elevated concentrations of zinc and cadmium were the cause for Silver Creek being assessed as not fully supporting its Class 3A (cold water fishery), Class 1C (source of drinking water) and Class 4 (agricultural use). Heavy sediment loads from Echo Creek were caused by hydrological modification of the stream. With the building of the interstate highway, much of the storage capacity of stream riparian habitat was eliminated and now the stream channel has become degraded because it cannot hold the amount of runoff that enters the stream. Some agricultural practices have also impacted the stream causing sediment to wash into the stream.

Silver Creek, Echo Creek, Fort Creek, the lower portion of Beaver Creek, the lower portion of East Canyon Creek and several segments of the Weber River were identified as having elevated levels of total phosphorus. These levels can be an indicator of water quality problems and need to be assessed further to determine if any water quality problems exist that affect aquatic life, recreation, or the use of the water as a source for drinking water. These waters will be listed, along with others in the State, and prioritized as to which ones need to be evaluated sooner than others.

In 1998, the U.S. Environmental Protection Agency (EPA) approved a Total Maximum Daily Load (TMDL) program for the Chalk Creek Watershed. Implementation projects are continuing in this watershed. One major project is the combining of several ditch companies into one and building a gravity fed sprinkler irrigation system in the lower part of the watershed. This will improve irrigation

practices and reduce return irrigations flows. This should reduce total phosphorus and sediment inputs to the creek. Preliminary evaluations indicated that current projects have reduced the total phosphorus in Chalk Creek, but that sediment continues to be a problem. It will require a concerted effort on the part of land owners and oil and gas companies to reduce sediment loading into the stream.

The Division of Water Quality submitted TMDLs for East Canyon Reservoir and East Canyon Creek above East Canyon Reservoir to EPA for approval on April 1, 2000. The TMDLs for total phosphorus in East Canyon Creek and East Canyon Reservoir were approved.

Weber River Watershed Management Unit Water Quality Assessment Report

Introduction

The Weber River rises in Summit County near Reids Peak (11,708 ft), then flows west to Oakley, Utah, then turns and flows in a northwesterly direction to the Great Salt Lake (4200 ft). The Weber River is approximately 125 miles long; one-half of which lies in Summit County, 25 miles in Morgan County, and 30 miles in Weber County. The Ogden River, the major tributary to the Weber River, lies within Weber County and enters the Weber River about 12 miles upstream from its mouth. The other major tributaries to the Weber River are East Canyon Creek, Lost Creek, Chalk Creek, and Beaver Creek. Two smaller tributaries that can affect the water quality of the Weber River are Echo Creek and Silver Creek.

The Weber River Basin encompasses about 2,080 square miles and includes approximately 968 miles of perennial streams and 1,254 miles of intermittent streams.

The flows of the Weber River and its tributaries are heavily regulated by seven major reservoirs which can have an effect on the water quality of the river. Echo and Rockport Reservoirs are main-stem reservoirs, while Pineview, Causey, East Canyon, Lost Creek, and Smith and Morehouse Reservoirs are tributary reservoirs. There are numerous small lakes, irrigation reservoirs and ponds throughout the basin, but only two, Joyce Lake and Boyer Lake, are known to have a significant effect on the flow of waters within the basin. They are located in the headwaters of the East Fork Chalk Creek and releases from them in late July and August help maintain the flows in Chalk Creek during the summer irrigation season (Toole, 1993).

Near Ogden, Utah, water from the Weber River is diverted at the Slaterville Diversion into Willard Bay Reservoir, the last major reservoir in the Weber River Basin. Water from Willard Reservoir, located on the shores of the GSL, is used for irrigation in the lower Weber River basin. This large reservoir, commonly known as Willard Bay, is also heavily utilized for fishing and boating.

Materials and Methods

Field and Laboratory--Fifty-five sites were monitored from July 1998 through June 1999 (Table 1). Samples were collected twice a month during the spring runoff period and then monthly during the remainder of the survey. Samples were not collected during December 1998. Dissolved metals were collected quarterly (4 times). For the majority of monitoring sites, oxygen, pH, water temperature, and conductivity were measured *in situ* using a Hydrolab. Instantaneous flows were measured using a Marsh-McBurney flow meter during each survey unless the station was located at or near a U.S.G.S. gaging station. Water quality samples were collected according to standard field procedures defined and adopted by the Division of Water Quality in 1996 (DWQ, 1996). Chemical analysis in the laboratory included ammonia, total phosphorus, dissolved nitrate-nitrite, dissolved total phosphorus, total suspended solids, total dissolved solids, dissolved calcium, dissolved magnesium, dissolved potassium, dissolved sodium chloride concentration, sulfate, alkalinity and hardness. Turbidity was also determined in the laboratory. Concentrations for the following dissolved metals were determined: arsenic, barium, cadmium, chromium, copper, iron, lead, selenium, silver, zinc, and mercury.

Beneficial Use Assessment--Beneficial use support assessments were made based upon the methodology listed in Appendix A. Water

chemistry data were compared against Utah's standards listed in **'Standards of Quality for Waters of the State', R317-2, Utah Administrative Code (DWQ, 1999),** to determine if the beneficial use designations for the different waterbodies were being supported. Waters that had elevated levels of phosphorus were identified as needing further study. Benthic macroinvertebrate data were used as supplemental data in assessing water quality in the Chalk Creek drainage. Chalk Creek is a Non Point Source project area.

Stream segments (waterbodies) that a TMDL that was approved by the U.S. Environmental Protection Agency (EPA) during the 1998 305(b) cycle were assessed the same as they were in 1998. These stream waterbodies will be evaluated by determining if the criteria established in TMDL have been met and determining if the beneficial use is no longer impaired.

The first intensive water quality survey was completed from April 1993 through June 1994. The second Weber Basin intensive survey was implemented from July 1, 1998 to June 30, 1999. During the 1993-1994 monitoring, 12 stations located on streams that flow into Farmington Bay were also monitored. These sites were not monitored in the 1998-1999 intensive survey because there were not sufficient staff and manpower to monitor these during this survey. However, they were included in the overall assessment of waters in the management unit and were identified as waters that are evaluated, not monitored. Their assessment was based upon the 1993-1994 data. The Farmington Bay Area streams that were monitored during 1993-94 were North Fork Kays Creek, South Fork Kays Creek, Kays Creek, Holmes Creek, Farmington Creek, Stone Creek, and Mill Creek (Bountiful). Much of the water from these streams is diverted at the U.S. Forest Service boundary for culinary or irrigation water. Some of the streams are considered intermittent from the Forest Service boundary to the GSL and irrigation return flows and urban stormwater runoff are large contributors to their flows after they leave forest lands.

All rivers and streams in the state have been assigned beneficial use classifications. These rivers and streams are protected for those designated beneficial uses by water quality standards that have been set and adopted by the State for the protection of each beneficial use (DWQ, 1999). All streams within the Weber River Basin and Farmington Bay Area have been classified as Class 2B and Class 4 streams. A 2B classification means that standards have been set to protect the waters for secondary contact recreation such as boating and wading. Class 4 streams have standards set to protect them for agricultural use, including stockwatering. In addition, most of the rivers and streams have been classified as 1C, a surface source of drinking water requiring treatment before use. There are approximately 877 miles of rivers and streams that have been designated as sources of drinking water. All rivers and streams also have water quality standards that are set to protect various forms of aquatic life. These classifications include cold water game fish (3A), warm water game fish (3B), warm water non-game fish (3C), and waterfowl (3D). With the exception of the Weber River from the Slaterville Diversion to the Great Salt Lake and a few of the Farmington Bay area streams from the U.S. Forest Service boundary to the Great Salt Lake, all rivers and streams are classified as 3A (cold water fishery). The lower Weber has been designated as 3C and 3D waters and several of the streams flowing into Farmington Bay have a 3B or 3C classification downstream from the Forest Service boundary to the Great Salt Lake.

Results

Thirteen (13) survey runs were made during the intensive monitoring period, but samples from some of the stations were not collected because of inaccessibility or there was no flow at the

site. The stations that were located higher in the watersheds near the Forest Service boundaries were inaccessible at times during the survey because of snow and road conditions.

Beneficial Use Support Assessment--The overall beneficial use support for Class 1C, 3A, 3B, 3C, 3D, and 4 waters is summarized in Figure 1. Of the approximately 845 miles assessed 66.7% were assessed as fully supporting all of their beneficial uses, 27.1% were assessed as partially supporting at least one beneficial use and 6.2% were found to be not supporting at least one beneficial use.

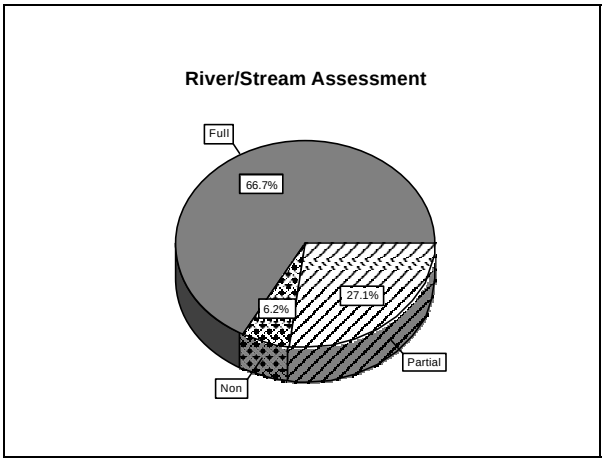

Figure 1. Overall beneficial use support excluding Class 2B waters.

Table 3 describes the beneficial use support by beneficial use category. Of the 757 miles of perennial stream miles assessed as Class 1C waters, source of drinking water, 707 miles (93.4%) were found to be fully supporting, 28.5 miles (3.8%) were partially supporting and 21.4 miles (2.8%) were non supporting. Eight-hundred forty-five miles (845) of Class 4, agricultural use, stream miles were assessed. Seven-hundred ninety-five miles (94.1%) were fully supporting, 29 miles (3.4%) were partially supporting, and 21 miles (2.5%) were not supporting their agricultural beneficial use designation. Eight-hundred fory-five (845) stream miles assessed for support of aquatic life (Classes 3A, 3B, 3C, and 3D), 564 miles (66.7%) were determined to be fully supporting, 229 miles (27.1%) were assessed as partially supporting, and 52 miles (6.2%) were assessed as not supporting this beneficial use.

Figure 2 illustrates the overall beneficial use assessment for perennial streams that have stream classifications 1C, 3A, 3B, 3C, and 3D. Table 4 describes the stream segments assessed as not fully supporting their beneficial use designations, the sampling station used to assess the stream segment, and the cause and sources of impairment. Figure 3 depicts the stream segments that have elevated levels of total phosphorus. Nine waterbodies (161.6 miles) had elevated levels of total phosphorus indicating that they need additional evaluations to determine if they are impacting water quality (Table 5). They included Silver Creek, Echo Creek, Fort Creek and segments of the Weber River and the lower segment of East Canyon Creek.

Tables 6 and 7 list the total stream miles impaired by cause and source categories. Figure 4 shows the percent of stream miles affected by various causes. Figure 5 represents the relative contributions of impairments for each cause. Figures 6 and 7 depict the percent of stream miles affected by the various sources and the relative impact of each source.

East Canyon Creek Watershed--The causes of impairment in this watershed continue to be low dissolved oxygen and total phosphorus. The source of total phosphorus that enters the stream includes discharges from the Snyderville Wastewater Treatment Plant and nonpoint sources related to development and some agricultural activities. Data collected in 1993-1994 indicated a potential oxygen problem in the stream from the East Canyon Resevoir upstream. A diurnal dissolved oxygen evaluation verified that dissolved oxygen was very low during the night when oxygen is used by aquatic plants. Data collected during this sampling period indicated a dissolved oxygen problem at the

station above the reservoir. Because of the large quantity of emergent vegetation and periphyton found in the stream, excess amounts of oxygen are produced during the day and therefore there may not be any violations during daytime.

On April 1, 2000, the State submitted Total Maximum Daily Load (TMDLs) to EPA for approval for East Canyon Creek above the Reservoir. The parameters of concern were dissolved oxygen and total phosphorus. The recommended concentration of total phosphorus in the stream was set at 0.05 mg/l below the treatment plant. Best management practices have been recommended to reduce the input of total phosphorus that enters the stream from development and agricultural activities and a reduction in the load from the treatment plant has been recommended to meet the goal of 0.05 mg/l. East Canyon Creek from its confluence with the Weber River to East Canyon reservoir was assessed as partially supporting its beneficial uses because two pH values that were greater than the State standard of 9.0. However, this segment was not listed on the 303(d) list. This was the first time that pH had been identified as a potential problem for this section of the stream. It was decided to obtain more data before any decision to list this stream segment is made.

Chalk Creek Watershed--An approved TMDL is in place for the Chalk Creek watershed and implementation work is continuing throughout the basin. Recently, several irrigation companies combined to form one company and a gravity fed sprinkler irrigation system will be built in the lower part of the watershed. This will provide better control of irrigation times and rates of application and should reduce nutrient and sediment input related to irrigation return flows.

Preliminary evaluations of sediment and phosphorus loadings comparing the pre-implementation period with the implementation period indicates that there has been a reduction in total phosphorus loadings, but there is not a significant reduction in sediment loadings. The data indicated that significant work needs to be done on the South Fork Chalk Creek and the main stem. This will require a concerted effort by the oil and gas companies and farmers and ranchers to reduce the amount of sediment entering the system.

Chalk Creek continues to be the major contributor of sediment to the Weber River. However, the majority of it settles out in Echo Reservoir and most of it is not carried downstream into the lower Weber River. The upper end of the reservoir is filling in and when the reservoir is drawn down completely, the sediment is down-cut by the river flowing through it and is carried down stream in the Weber River.

Echo Creek--Echo Creek continues to be a significant contributor of sediment to the Weber River. Spring runoff and summer rain events contribute to the sediment loading. Hydrological modification of the stream is the major source of the problem with agricultural activities effecting the sediment loading to some extent during summer and fall when flows were significantly less.

Silver Creek--Silver Creek continues to have elevated levels of zinc that exceed the State standard for aquatic life. However, during this intensive monitoring period, zinc levels did not exceed the State standard near Wanship where the stream enters the Weber River. Cadmium concentrations exceeded the State standard for a source for drinking water and agricultural use in the upper portion of the stream. Silver Creek was also identified as a stream that has high levels of total phosphorus with the mean concentration being 0.332 mg/l near its confluence with the Weber River. Stations located above the Silver Creek Wastewater treatment plant had mean concentrations near 0.05 mg/l indicating that the treatment plant may be a major source of total phosphorus.

Main Stem of the Weber River--With the

exception of the segment between the Stoddard Diversion to the Lost Creek confluence, all segments of the Weber River were assessed as supporting their designated beneficial uses. The above segment was assessed as partially supporting its beneficial uses because it exceeded the standard for pH twice. This segment of the Weber River had never been identified in any previous surveys as having pH problems and because the exceedances were small, it was decided that more data needs to be collected before it is listed on the 303(d) list.

Ogden River Basin–The only segment found not supporting all of its beneficial use classifications in the Ogden River Valley was the North Fork Ogden River. It did not meet the oxygen criteria for a Class 3A stream. It is recommended that more data be collected to determine the cause of low dissolved oxygen and that a diurnal dissolved oxygen study be done at several locations to determine if there is an oxygen problem.

Table 2. Sampling Sites for the Weber Watershed Management Unit Intensive Monitoring 1998-1999.

STORET No.	Site Description	STORET No.	Site Description
492005	WEBER R S OF PLAIN CITY	492608	HEINERS CK AB CNFL/ ECHO CK
492012	WEBER R AB CENTRAL WEBER WWTP	492610	WEBER R BL ECHO RES
492100	WEBER R AT GATEWAY TO POWER HOUSE	492626	HUFF CK AB CNFL/ CHALK CK
492299	WEBER R AB CNFL/ OGDEN R	492628	CHALK CREEK AT UT/WYO STATELINE
492301	OGDEN R AB CNFL / WEBER R	492629	CHALK CREEK AB CNFL/ SOUTH FORK
492320	OGDEN R AT MOUTH OF CANYON AT VALLEY DRIVE	492635	CHALK CK AT US189 XING
492451	MIDDLE FK OGDEN R @ FOREST BNDRY	492636	CHALK CK S FK 1 MI AB CHALK CK
492459	WHEELER CK AB CNFL / OGDEN R	492637	CHALK CK EAST FK AB CNFL/ CHALK CK
492460	OGDEN R BL PINEVIEW RES DAM	492638	CHALK CK AT CULVERT 0.8MI AB PINE CLIFF CA
492465	N FK OGDEN R AT USGS GAGE BL BRIDGE ON U16	492639	CHALK CREEK 4 MILES EAST OF UPTON
492467	S FK OGDEN R USGS GAGE SOUTH LEG BL U166 X	492640	WEBER R AB ECHO RES
492469	S FK OGDEN R AT L MAGPIE CMPGD	492674	SILVER CK AT FARM XING IN ATKINSON
492496	EAST CANYON CK AB CNFL/ WEBER R	492675	SILVER CK AT WANSHIP AB CNFL / WEBER R
492515	EAST CANYON CK BL EAST CANYON RES	492680	SILVER CK AB ATKINSON
492519	EAST CAN CK AB RES AT SEC RD NR USGS GAGIN	492685	SILVER CK AT US40 XING E OF PARK CITY
492521	EAST CANYON CK O.5 MI AB CLAYTON HIST MARK	492695	SILVER CK @ CITY PARK AB PROSPECTOR SQUARE
492523	EAST CANYON CK BL JEREMY RANCH GOLF COURSE	492697	PARK MEADOW DRAIN CK FROM GOLF COURSE AB S
492524	EAST CANYON CK BL EAST CANYON WWTP	492701	WEBER R BL WANSHIP RES
492526	E CAN CK AB EAST CANYON WWTP	492725	WEBER R AB WANSHIP RES
492536	KIMBLE CREEK AT I-80 XING	492830	BEAVER CK AB CROOKED CK
492544	MCLEOD CREEK AT U-224 XING	492853	BEAVER CREEK AB0VE WEBER-PROVO CANAL
492551	STODDARD SLOUGH AT MILTON/STODDARD RD XING	492854	BEAVER CK AT BRIDGE TO LUMBER MILL 1MI AB
492552	WEBER R @ MILTON/STODDARD RD XING	492910	BEAVER CK AT USFS BOUNDARY 10
492554	WEBER R AB MORGAN LAGOONS	492920	WEBER R AB WEBER/PROVO DIVERSION
492576	LOST CK AB CONFLUENCE WITH IDEAL CEMENT	492949	SMITH MOREHOUSE CK AB CNFL/ WEBER R
492590	LOST CK BL LOST CK RES	492959	WEBER R AB CNFL/ SMITH MOREHOUSE CK
492600	WEBER R AB HENEFER LAGOONS	592400	SMITH AND MOREHOUSE CK AB SMITH AND MOREHO
492607	ECHO CREEK AB CONFLUENCE WITH WEBER RIVER		

Table 3. Individual Use Support Summary
Weber River Basin and Farmington Bay Area Streams

Goals[a]	Use	Size Assessed (miles)	Size Fully Supporting (miles)	Size Fully Supporting but Threatened (miles)	Size Partially Supporting (miles)	Size Not Supporting (miles)	Size Not Attainable (miles)
Protect & Enhance Ecosystems	Aquatic Life	845.4	564.2 (66.7%)	0.0	229.1 (27.1%)	52.1 (6.2%)	0.0
Protect & Enhance Public Health	Fish Consumption	0.0	0.0	0.0			
	Swimming[b,c]	0.0		0.0	28.8		
	Secondary Contact[c]	0.0		0.0	28.8		
	Drinking Water	757.0	707.1 (93.4%)	0.0	28.5 (3.8%)	21.4 (2.8%)	0.0
Social and Economic	Agricultural	845.4	795.5 (94.1%)	0.0	28.5 (3.4%)	21.4 (2.5%)	0.0

[a] These goals are part of the national water quality goals adopted by the EPA Office of Water and the ITFM in their Environmental Goals and Indicators effort.

[b] Class 2B (secondary contact) streams were evaluated as swimmable for proposes of the CWA goals, therefore the swimming and secondary contact classification categories are the same.

[c] Waters in this basin were chemically assessed, but not assessed bacteriologically.

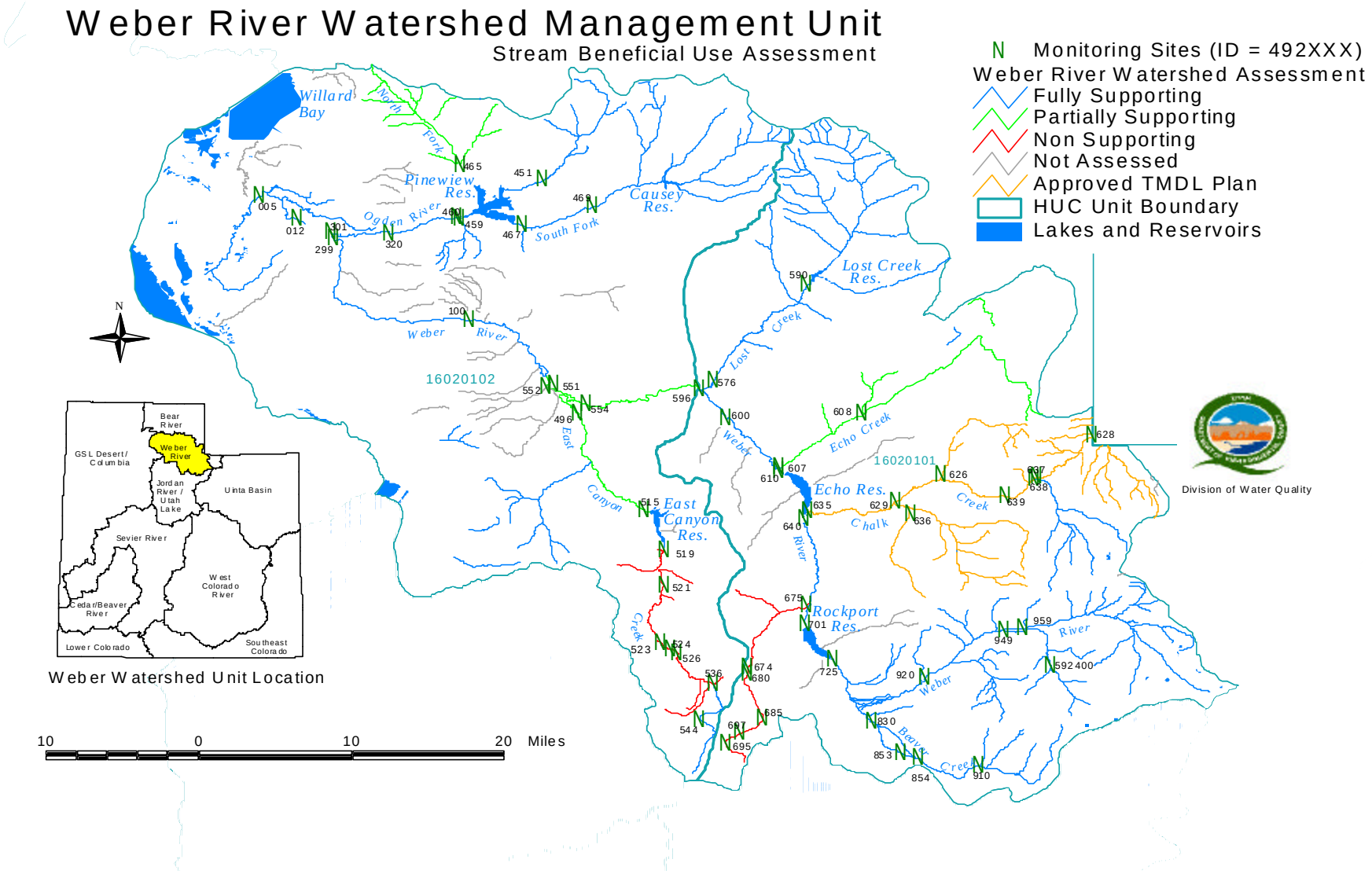

Figure 2. Overall beneficial use support in the Weber River Watershed Management Unit.

Table 4. Causes and Sources of Stream Impairment in the Weber River Watershed Management Unit.

STORET No.	Waterbody Name	Waterbody Description	HUC	Beneficial Use Class	Stream Miles	Beneficial Use Support	Parameter or Stressor Of Concern	Impact Of Cause	Probable Source	Impact of Source	EPA Approved TMDL
	North Fork Ogden River	Pineview Reservoir to headwaters-tribs	16020202	3A	38.20	PS	Dissolved Oxygen	Moderate	Unknown	Moderate	
492552	Weber River-5	segment between East Canyon Creek confluence and Lost Creek confluence	16020202	1C	14.70	PS	pH	Moderate	Unknown	Moderate	
492552	Weber River-5	segment between East Canyon Creek confluence and Lost Creek confluence	16020202	2B	14.70	PS	pH	Moderate	Unknown	Moderate	
492552	Weber River-5	segment between East Canyon Creek confluence and Lost Creek confluence	16020202	3A	14.70	PS	pH	Moderate	Unknown	Moderate	
492552	Weber River-5	segment between East Canyon Creek confluence and Lost Creek confluence	16020202	4	14.70	PS	pH	Moderate	Unknown	Moderate	
492607	Echo Creek	confluence w/ Weber River to headwaters-tribs	16020202	3A	43.00	PS	Sediment	Moderate	Hydromodification	Moderate	
492607	Echo Creek	confluence w/ Weber River to headwaters-tribs	16020202	3A	43.00	PS	Sediment	Moderate	Ag Grazing	Minor	
492496	East Canyon Creek -1	confluence w/ Weber River to East Canyon Dam	16020201	1C	13.80	PS	pH	Moderate	Unknown	Moderate	
492496	East Canyon Creek -1	confluence w/ Weber River to East Canyon Dam	16020201	2B	13.80	PS	pH	Moderate	Unknown	Moderate	
492496	East Canyon Creek -1	confluence w/ Weber River to East Canyon Dam	16020201	3A	13.80	PS	pH	Moderate	Unknown	Moderate	
492496	East Canyon Creek -1	confluence w/ Weber River to East Canyon Dam	16020201	4	13.80	PS	pH	Moderate	Unknown	Moderate	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Total Phosphorus	Moderate	Municipal Discharge	Major	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Total Phosphorus	Moderate	Construction	Major	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Total Phosphorus	Moderate	Ag Grazing	Minor	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Total Phosphorus	Moderate	Ag Irrigation	Minor	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Dissolved Oxygen	Moderate	Municipal Discharge	Major	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Dissolved Oxygen	Moderate	Construction	Major	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Dissolved Oxygen	Moderate	Ag Grazing	Minor	
Several Sites	East Canyon Creek-2	East Canyon Creek from East Canyon Reservoir to headwaters.	16020201	3A	30.70	NS	Dissolved Oxygen	Moderate	Ag Irrigation	Minor	
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Ag Grazing	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Hydromodification	Moderate	1998

Table 4. Causes and Sources of Stream Impairment in the Weber River Watershed Management Unit.

STORET No.	Waterbody Name	Waterbody Description	HUC	Beneficial Use Class	Stream Miles	Beneficial Use Support	Parameter or Stressor Of Concern	Impact Of Cause	Probable Source	Impact of Source	EPA Approved TMDL
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492635	Chalk Creek-1	confluence w/ Weber River to South Fork confluence	16020202	3A	7.40	PS	Sediment	Moderate	Natural	Minor	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Ag Grazing	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Hydromodification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Sediment	Moderate	Natural	Minor	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Total Phosphorus	Moderate	Ag Grazing	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Total Phosphorus	Moderate	Oil & Gas Exploration	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Stream Habitat	Moderate	Hydromodification	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Stream Habitat	Moderate	Ag Grazing	Moderate	1998
492629	Chalk Creek-2	South Fork confluence to Huff Creek confluence	16020202	3A	6.50	PS	Stream Habitat	Moderate	Habitat Modification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Ag Grazing	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Hydromodification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Sediment	Moderate	Natural	Minor	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Total Phosphorus	Moderate	Ag Grazing	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Total Phosphorus	Moderate	Oil & Gas Exploration	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Stream Habitat	Moderate	Hydromodification	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Stream Habitat	Moderate	Ag Grazing	Moderate	1998
492636	South Fork Chalk Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	47.10	PS	Stream Habitat	Moderate	Habitat Modification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Ag Grazing	Moderate	1998

Table 4. Causes and Sources of Stream Impairment in the Weber River Watershed Management Unit.

STORET No.	Waterbody Name	Waterbody Description	HUC	Beneficial Use Class	Stream Miles	Beneficial Use Support	Parameter or Stressor Of Concern	Impact Of Cause	Probable Source	Impact of Source	EPA Approved TMDL
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Hydromodification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Sediment	Moderate	Natural	Minor	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Total Phosphorus	Moderate	Ag Grazing	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Total Phosphorus	Moderate	Oil & Gas Exploration	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Stream Habitat	Moderate	Hydromodification	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Stream Habitat	Moderate	Ag Grazing	Moderate	1998
492626	Huff Creek	confluence w/ Chalk Creek to headwaters-tribs	16020202	3A	15.50	PS	Stream Habitat	Moderate	Habitat Modification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Ag Grazing	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Hydromodification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Sediment	Moderate	Natural	Minor	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Total Phosphorus	Moderate	Ag Grazing	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Total Phosphorus	Moderate	Oil & Gas Exploration	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Stream Habitat	Moderate	Hydromodification	Moderate	1998
492639	Chalk Creek-3	Huff Creek confluence to East Fork confluence	16020202	3A	9.50	PS	Stream Habitat	Moderate	Ag Grazing	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Ag Grazing	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Oil & Gas Exploration	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Hydromodification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Habitat Modification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Ag Irrigation	Minor	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Sediment	Moderate	Natural	Minor	1998

Table 4. Causes and Sources of Stream Impairment in the Weber River Watershed Management Unit.

STORET No.	Waterbody Name	Waterbody Description	HUC	Beneficial Use Class	Stream Miles	Beneficial Use Support	Parameter or Stressor Of Concern	Impact Of Cause	Probable Source	Impact of Source	EPA Approved TMDL
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Total Phosphorus	Moderate	Ag Grazing	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Total Phosphorus	Moderate	Oil & Gas Exploration	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Total Phosphorus	Moderate	Hydromodification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Total Phosphorus	Moderate	Habitat Modification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Total Phosphorus	Moderate	Ag Irrigation	Minor	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Riparian Habitat	Moderate	Ag Grazing	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Riparian Habitat	Moderate	Hydromodification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Stream Habitat	Moderate	Hydromodification	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Stream Habitat	Moderate	Ag Grazing	Moderate	1998
492638	Chalk Creek-4	from East Fork Chalk Creek confluence to headwaters-tribs	16020202	3A	33.40	PS	Stream Habitat	Moderate	Habitat Modification	Moderate	1998
Several Sites	Silver Creek	from cnfl / Weber River to headwaters	16020202	1C	21.40	NS	Cadmium	Major	Resource Extraction	Major	
Several Sites	Silver Creek	from cnfl / Weber River to headwaters	16020202	3A	21.40	PS	Dissolved Oxygen	Moderate	Unknown	Moderate	
Several Sites	Silver Creek	from cnfl / Weber River to headwaters	16020202	3A	21.40	NS	Zinc	Major	Resource Extraction	Major	
Several Sites	Silver Creek	from cnfl / Weber River to headwaters	16020202	4	21.40	NS	Cadmium	Major	Resource Extraction	Major	

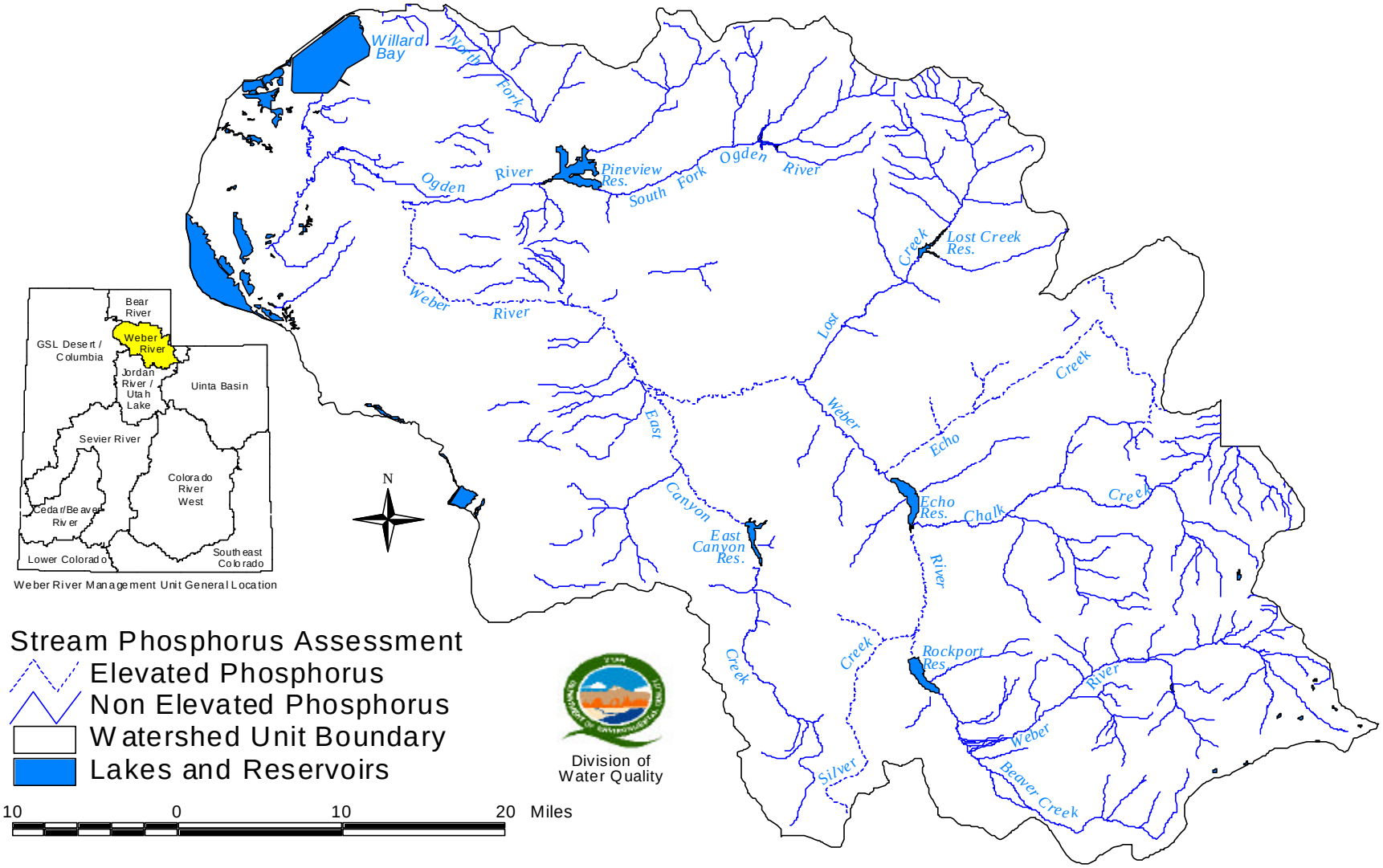

Figure 3. Stream segments in the Weber River Watershed Management Unit.

Table 5. Waterbodies With Elevated Levels of Total Phosphorus.			
STORET No.	**Waterbody Name**	**Waterbody Description**	**Stream Miles**
492100	Weber River-4	Cottonwood Creek confluence to East Canyon Creek confluence	7.6
492299	Weber River-3	Ogden River confluence to Cottonwood Creek confluence	23.8
492496	East Canyon Creek -1	confluence w/ Weber River to East Canyon Dam	13.8
492520	Weber River-5	segment between East Canyon Creek confluence and Lost Creek confluence	14.7
492607	Echo Creek	confluence w/ Weber River to headwaters-tribs	43
492640	Weber River-7	Echo Reservoir to Rockport Reservoir	10.7
492675	Silver Creek	Silver Creek at Wanship ab cnfl / Weber River	21.4
492750	Fort Creek	confluence w/ Weber River to headwaters-tribs	10.2
492830	Beaver Creek-1	confluence with Weber River to Kamas	16.4

Table 6. Total Waters Impaired by Various Cause Categories - Weber River Basin Farmington Bay Area Streams.		
Cause Category	**Contribution to Impairments**	
	Major	Moderate/Minor
Cause unknown	0.0	0.0
Unknown toxicity	0.0	0.0
Pesticides	-	-
Priority organics	-	-
Nonpriority organics	-	-
Metals	21.4	0.0
Ammonia	0.0	0.0
Chlorine	0.0	0.0
Other inorganics	0.0	0.0
Nutrients	30.7	119.4
pH	0.0	0.0
Siltation/Sediments	0.0	162.4
Organic enrichment/low DO	30.7	38.2
Salinity/TDS/Chlorides	0.0	0.0
Thermal modifications	0.0	0.0
Flow alterations	0.0	0.0
Other habitat alterations	0.0	119.4
Pathogen Indicators	-	-
Radiation	-	-
Oil and grease	-	-
Taste and odor	0.0	0.0
Noxious aquatic plants	0.0	0.0
Total toxics	-	-
Turbidity	-	-
Exotic Species	-	-

* = Category not applicable.
- = Category applicable, no data available.
0 = Category applicable, but size of waters in the category is zero.
Note: **Major** category is now used only for waters found not supporting.

Table 7. Total Waters Impaired by Various Source Categories - Weber River Basin and Farmington Bay Area Streams		
Source Category	**Contribution to Impairments**	
	Major	**Moderate/Minor**
Industrial Point Sources	0.0	0.0
Municipal Point Sources	30.7	0.0
Combined Sewer Overflow	0.0	0.0
Agriculture	0.0	193.1
Silviculture	-	-
Construction	30.7	0.0
Urban Runoff/Storm Sewers		
Resource Extraction	21.4	119.4
Land Disposal	-	0.0
Hydromodification	0.0	162.4
Habitat Modification	0.0	119.4
Marinas	*	*
Atmospheric Depostion	-	-
Contaminated Sediments	-	-
Unknown Source	0.0	88.1
Natural Sources	0.0	119.4
Reservoir Releases	0.0	0.0
Recreation	0.0	0.0

* = Category not applicable.
- = Category applicable, no data available.
0 = Category applicable, but size of waters in the category is zero.
Note: **Major** category is now used only for waters found not supporting.

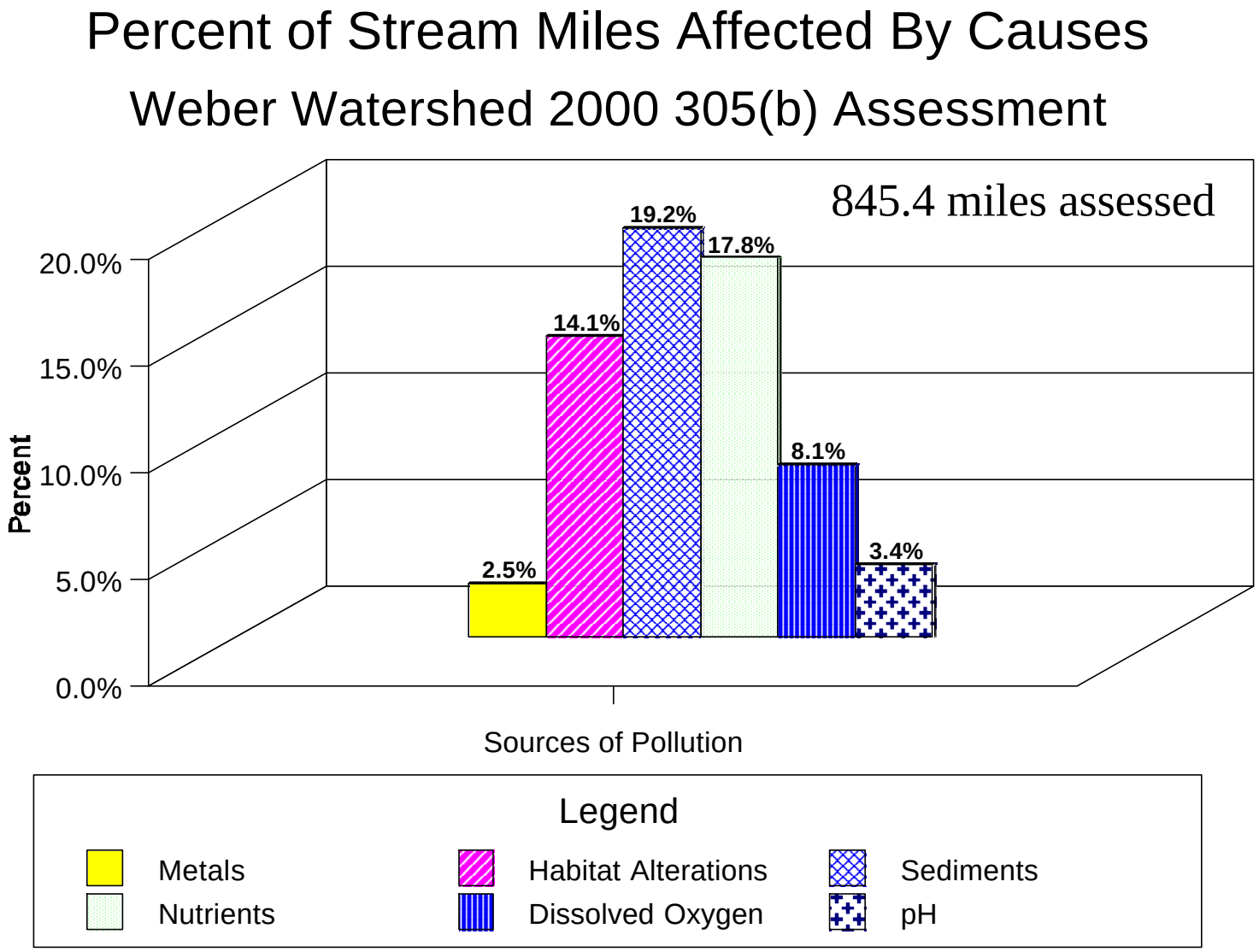

Figure 4. Percent of assessed stream miles in the Weber Watershed Management Unit impacted by causes - 2000 305(b)

Causes of Stream Water Quality Impairments

Weber Watershed 2000 305(b)

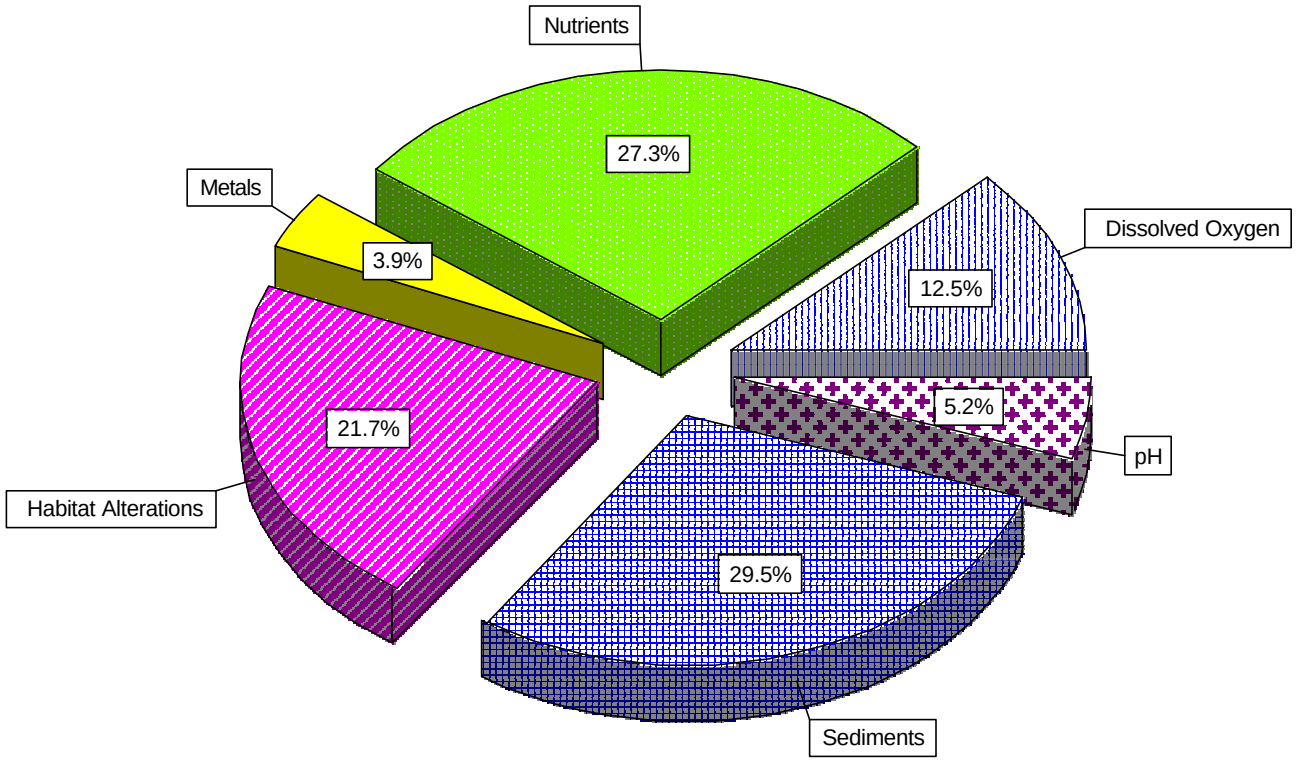

Figure 5. Relative percent impact by causes in the Weber Watershed Management Unit - 2000 305(b)

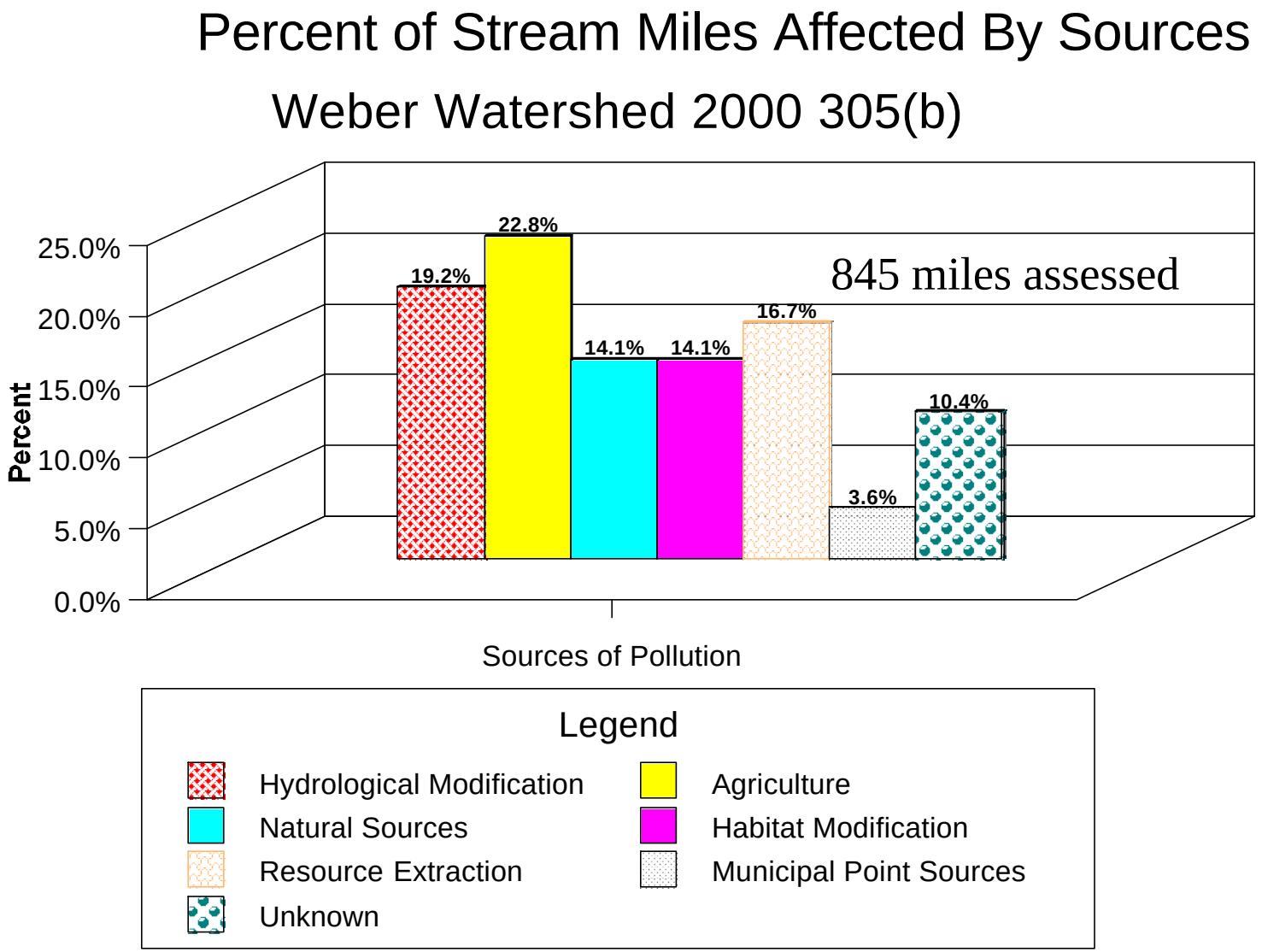

Figure 6. Percent of assessed steams miles in Weber Watershed Management Unit impacted by sources - 2000 305(b).

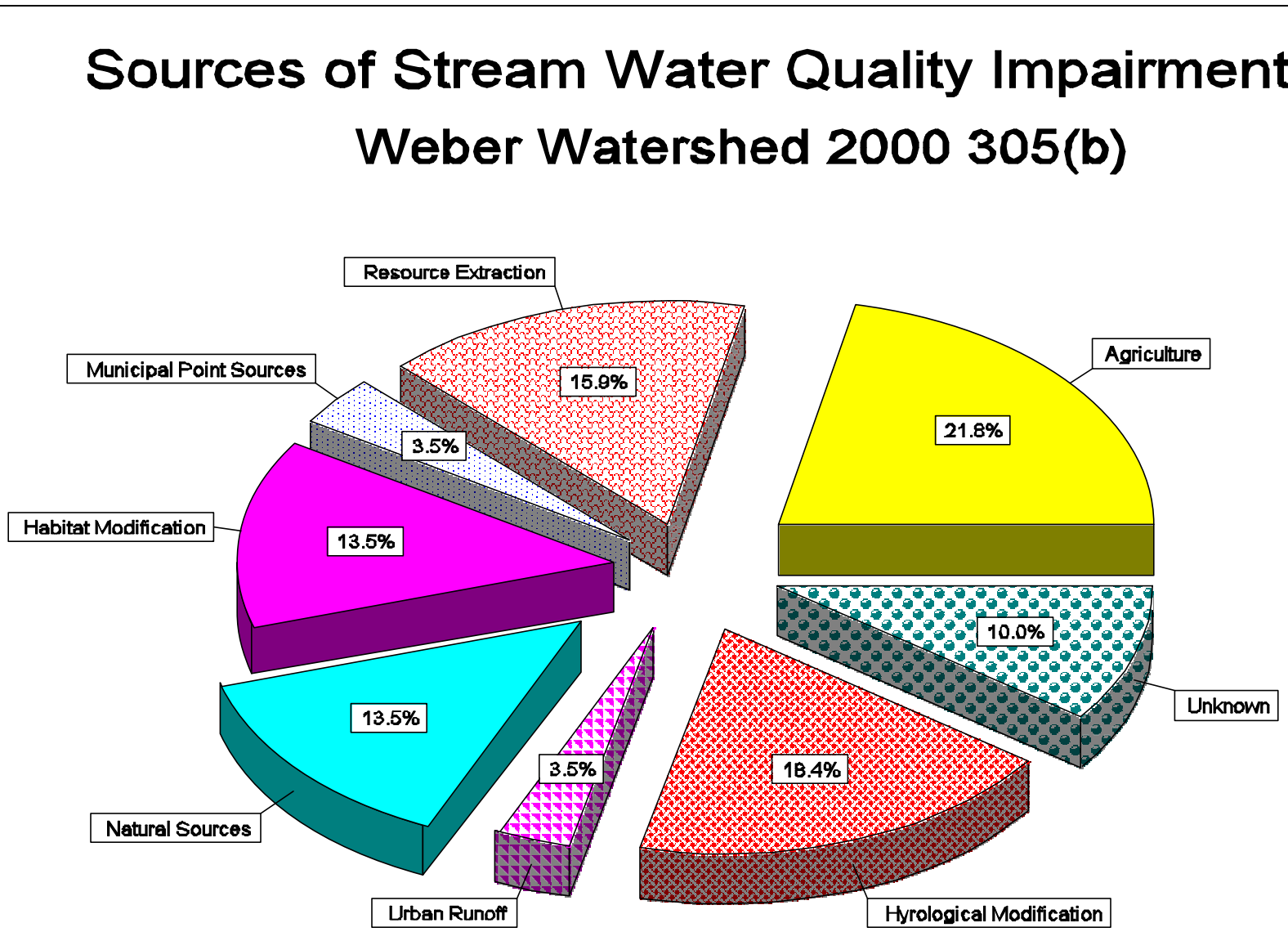

Figure 7. Relative percent impact in the Weber Watershed Management Unit by sources on stream water quality - 2000 305(b).

REFERENCES

Division of Water Quality. 1999. Standards of quality for waters of the State, R317-2, Utah Administaive Code, Utah Division of Water Quality, Utah Department of Environmental quality, Salt Lake City, UT.

Division of Water Quality. 1993. Quality assurance and standard operating procedures manual. Utah Division of Water Quality, Utah Department of Environmental quality, Salt Lake City, UT.

Toole, T. W. 1993. Water quality assessment: Chalk Creek, Summit County. Utah Division of Water Quality, Utah Department of Environmental Quality. Salt Lake City, UT.

APPENDIX A

Methods for Determining Beneficial Use Support

Tables 1 through 4 are the criteria used to compare data against standards and pollution indicators found in ***Standards of Quality for Waters of the State, R317-2, Utah Administrative Code*** to determine beneficial use support of waterbodies. The State of Utah exercises discretion in using data on that goes beyond the criteria listed in the following tables and/or narrative for determining beneficial use support and can include other types of information and best professional judgement.

Table A-1. Criteria for Assessing Water as a Source of Drinking Water-Class 1C

Degree of Use Support	Field Monitoring (Toxicants)	Restrictions
Full	For any one pollutant, no more than one violation of criterion.	No source water closures or advisories
Partial	For any one pollutant, two or more violations of the criterion, but violations occurred in 10% of the samples.	One or more drinking water source advisories lasting less than 30 days per year.
Non	For any one pollutant, two or more violations of the criterion, and violations occurred in more than 10% of the samples.	One or more drinking water source advisories lasting greater than 30 days.

Table A-2. Criteria for Assessing Primary and Secondary Contact Beneficial Use - Class 2A and 2B

Degree of Use Support	Restrictions	Fecal Coliform Bacteria
Full	No bathing area closures or restrictions in effect during reporting period.	Criterion 1 and Criterion 2 met.
Partial	On average, one bathing area closure per year of less than one week's duration.	Geometric mean met; not more than 25 percent of samples exceed 400 per 100 ml.
Non	On average, one bathing area closure per year of greater than one week's duration, or more than one bathing area closure per year.	Neither geometric mean nor maximum criteria limits achieved.

Bacterial Criterion

Criterion 1 = The geometric mean of the fecal coliform bacteria level should not exceed 200 per 100 mL for any 30-day period.

Criterion 2 = Not more than 10 percent of the total samples taken during any 30 day period should have a density that exceeds 400 per 100 mL.

Table A-3. Criteria for Assessing Aquatic Life Beneficial Support-Classes 3A, 3B, 3C, 3D		
Degree of Use Support	**Conventional Parameters (pH, DO, Temperature)**	**Toxic Parameters (priority pollutants, chlorine, and ammonia)**
Full	For any one pollutant, no more than one exceedance of criterion or criterion was not exceeded in < 10% of the samples if there were two or more exceedances.	For any one pollutant, no more than one violation of acute criteria.
Partial	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.	For any one pollutant, two or more violations of the acute criterion, but violations occurred in 10% of the samples.
Non	For any one pollutant, criterion was exceeded two times, and criterion was exceeded in more than 25% of the samples.	For any one pollutant, two or more violations of the acute criterion, and violations occurred in more than 10% of the samples.

Total Phosphorus Assessment

For **total phosphorus** , the following criteria were used to identify waters as '**needing further evaluation**'.

If the **pollution indicator value** for total phosphorus (**0.05 mg/L**) was exceeded in more than 10% of the samples, and the mean of all samples was > **0.06 mg/L** the waterbody was identified as 'needing further evaluation or study' before a decision to list a stream waterbody on the 303(d) list. Additional evaluations could include benthic macroinvertebrate data, diurnal dissolved oxygen data, habitat quality evaluations, and fisheries data. Reports published or information collected by other entities can be used to determine beneficial use support.

Table A-4. Criteria for Assessing Agricultural Beneficial Use Support - Class 4		
Degree of Use Support	**Conventional Parameter (Total Dissolved Solids)**	**Toxic Parameters**
Full	Criterion exceeded in less than two samples and in < 10% of the samples if there were two or more exceedances.	For any one pollutant, no more than one violation of criterion.
Partial	Criterion was exceeded two times, and criterion was exceeded in more than 10% but not more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, but violations occurred in 10% of the samples.
Non	Criterion was exceeded two times, and criterion was exceeded in more than 25% of the samples.	For any one pollutant, two or more violations of the criterion, and violations occurred in more than 10% of the samples.