State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

Utah Water Quality Board Meeting
DEQ Board Room 1015
195 North 1950 West
Salt Lake City, UT 84116
January 23, 2018

<u>Headwater Numeric Nutrient Criteria - Work Meeting Begins @ 8:30am</u>

AGENDA

A. Water Quality Board Meeting – Roll Call

B. Minutes:

Approval of minutes for December 3, 2018 Water Quality Board Meeting ....Myron Bateman

C. Executive Secretary's Report..Jim Harris

D. Funding Requests:

1. **Financial Report** .... Emily Cantón
2. **Lewiston City Request for Hardship Planning Advance** ....Skyler Davies
3. **ARDL Loan Interest Payback Program for AFO/CAFOs & MOU** .... Jim Bowcutt
   - **a.** Approval of Interest Buy Down Program and Signing of MOU
   - **b.** Fitzgerald Dairy Interest Buy Down Approval
   - **c.** McKee Dairy Interest Dairy Buy Down Approval

E. Rule Making

1. **Request for Approval to Commence Rulemaking, R317-2 Standards of Quality For Waters of the State** ....Chris Bittner

F. Other Business:

1. **Spring Creek (Heber) E. coli TMDL Introduction**................................... Sandy Wingert
2. **Wastewater Operator Certification Council Member Appointment Recommendations for 2019-2022** ....Judy Etherington

G. Public Comment Period

H. Meeting Adjournment

Next Meeting February 27, 2019
DEQ Board Room 1015
195 North 1950 West
Salt Lake City, UT 84116

Revised 1/9/2019

In compliance with the American Disabilities Act, individuals with special needs (including auxiliary communicative aids and services) should contact Larene Wyss, Office of Human resources, at (801) 536-4281, TDD (801) 536-4284, or by email at lwyss@utah.gov, at least five working days prior to the scheduled meeting.

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MINUTES

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY

UTAH WATER QUALITY BOARD
195 North 1950 West
Salt Lake City, UT 84116
December 3, 2018

UTAH WATER QUALITY BOARD MEMBERS PRESENT

Myron Bateman	Clyde Bunker
Steven Early	Gregg Galecki
Jennifer Grant	Mike Luers
Scott Baird	

Excused: David Ogden

DIVISION OF WATER QUALITY STAFF MEMBERS PRESENT

Erica Gaddis	Skyler Davies	John Mackey	Kim Shelley
Jim Harris	Ken Hoffman	Marsha Case	Emily Cantón
Jerry Rogers	Brenda Johnson		

OTHERS PRESENT

Name	Organization Representing
Thomas Holstrom	Central Valley Water Reclamation
Justin Zollinger	Central Valley Water Reclamation
Phil Heck	Central Valley Water Reclamation
Kyle Kershaw	City of South Salt Lake
Dennis Pay	City of South Salt Lake
Cherie Wood	City of South Salt Lake
Mark Kindred	City of South Salt Lake
Ray Dewolfe	City of South Salt Lake
Jon Beesley	Plain City
Dan Schuler	Plain City
Jimmy McKnight	Provo City
Dave Decker	Provo City
David Torgersen	Provo City

Name *(continued)*	**Organization Representing**
Mark Ogren	Provo City
Gary Calder	Provo City
Rebecca Andrus	Provo City
Isaac Paxman	Provo City
Michelle Kaufusi	Provo City
Shane Jones	Provo City
Joan Powell	Wellington City
Kory Moosman	Wellington City
Marv Allen	Hansen, Allen & Luce
Mike Chambers	Hansen, Allen & Luce
Justin Atkinson	Sunrise Engineering
Gary Vance	JUB
Shane McFarland	JUB
Cory Christiansen	Waterworks Engineering
Jesse Ralphs	Sunrise Engineering
Brian Baker	Zion Bank
Eric Ellis	ULC
Richard Mickelsen	ISSD
Ryan Bench	Carollo
Trevor Lindley	Brown & Caldwell

Mr. Bateman called the Board meeting to order at 9:30 AM and took roll call for the members of the Board and audience.

APPROVAL OF MINUTES OF THE OCTOBER 24, 2018 MEETING

Motion: **Ms. Grant moved to approve the minutes of the October 24, 2018 meeting. Mr. Galecki seconded the motion. The motion passed unanimously.**

EXECUTIVE SECRETARY REPORT

- Dr. Gaddis informed the Board that the EPA released a 2018 to 2022 strategic plan called "Back to Basics Agenda".
- Dr. Gaddis gave an update on the Rule Making Fiscal Accountability Amendments.
- Dr. Gaddis informed the Board about a Ground Water Management Plan for Mapleton, Utah Aquifers that are contaminated by explosives. There is a corrective action plan in place to remediate the situation.
- Dr. Gaddis updated the Board on the Utah Lake Water Quality Study.
- The 2018 Harmful Algal Bloom finished up with the Monitoring Section pulling all of the buoys for the season. Those buoys will be deployed in March and April of 2019.
- Dr. Gaddis updated the board on the Gold King Mine project.
- The Water Operator Certification Program testing was a record with 213 exams completed in 7 locations.

FUNDING REQUESTS

Financial Report: Ms. Cantón updated the Board on the Loan Funds and Hardship Grant Funds, as indicated in the packet.

Plain City Introduction Request for Financial Assistance: Mr. Hoffman introduced the request for financial assistance for a construction project of a new lift station, headworks building and land application infrastructure. The City will return to a future Board meeting to request authorization of a funding package.

Wellington City: Mr. Mackey introduced the request for financial assistance in the amount of $96,600 for emergency replacement of portions of the sewer main under US Highway 6.

Motion: **Mr. Bunker moved to approve the funding of $96,600. Ms. Grant moved to amend the motion with a presentation by Wellington City in 6 months, Mr. Galecki seconded the motion. The motion passed unanimously.**

South Salt Lake City: Mr. Davis presented the request for authorization of construction assistance in the amount of $11,248,000. The funding will cover South Salt Lake's share of the Central Valley Water Reclamation Facility (CVWRF) project.

Motion: **Ms. Grant moved to approve funding in the amount of $11,248,000, including a loan in the amount of $9,248,000 at a 0% interest rate with a term of 20 years and principal forgiveness in the amount of $2,000,000.In addition to Special Conditions outlined in the feasibility report, the City of South Salt Lake must present its Storm Water compliance resolution to the Board prior to loan closing. Mr. Early seconded the motion. The motion passed unanimously.**

Central Valley Water Reclamation Facility: Mr. Davis presented the request for authorization of construction assistance in the amount of $81,100,000for the upgrade of the Central Valley Water Reclamation Facility.

Motion: **Mr. Luers moved to approve a loan in the amount of $65,100,000 at a 1.5% interest rate with a term of 20 years. The funding will be subject to Special Conditions as outlined in the feasibility report.. Ms. Grant seconded the motion. The motion passed by the majority with Mr. Bunker opposing.**

Provo City: Mr. Hoffman presented the request for authorization of construction assistance in the amount of $121,262,000 for the construction of a new wastewater reclamation plant.

Motion: **Mr. Luers moved to approve funding in the amount of $77,800,000, including a loan in the amount of $75,800,000 at a 0.5% interest rate with a term of 20 years and principal forgiveness in the amount of $2,000,000. Mr. Early seconded the motion. The motion passed by the majority with Mr. Bunker opposing.**

Public Comments: None

To listen to the full recording of the Board meeting go to: http://www.utah.gov/pmn/index.html

Next Meeting – January 23, 2019

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Myron Bateman, Chair
Utah Water Quality Board

LOAN FUNDS
FINANCIAL STATUS REPORT
JANUARY 2019

STATE REVOLVING FUND (SRF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
2015 - 2018 Capitalization Grants	21,210,000	-	-	-	-	-	-
2015 - 2018 State Match	3,230,401	-	-	-	-	-	-
Future Capitalization Grants (estimated)	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000	7,000,000
Future State Match (estimated)	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000	1,400,000
SRF - 2nd Round	114,709,175	95,376,680	71,245,021	41,216,406	21,688,042	(243,850)	6,560,704
Interest Earnings at 2.5%	1,986,686	2,477,791	1,850,874	1,070,761	563,434	-	170,441
Loan Repayments	6,823,417	14,049,551	14,969,510	18,351,876	17,354,674	17,453,554	17,339,830
Total Funds Available	156,359,680	120,304,021	96,465,406	69,039,042	48,006,150	25,609,704	32,470,974
Project Obligations							
Duchesne City	(265,000)	-	-	-	-	-	-
Logan City	(23,131,000)	(23,000,000)	(23,000,000)	-	-	-	-
Logan City - Supplemental Loan	(9,000,000)	(10,000,000)	-	-	-	-	-
Moab City	(80,000)	-	-	-	-	-	-
Salem City	(2,156,000)	(4,313,000)	-	-	-	-	-
San Juan Spanish Valley SSD	-	(1,997,000)	-	-	-	-	-
Loan Authorizations							
Central Valley Water Reclamation Facility	-	(5,000,000)	(15,000,000)	(20,100,000)	(23,000,000)	(2,000,000)	-
Provo City	-	-	(15,000,000)	(25,000,000)	(23,000,000)	(14,800,000)	-
South Davis Sewer District (with NPS)	(26,351,000)	(2,500,000)	-	-	-	-	-
South Salt Lake City	-	(2,249,000)	(2,249,000)	(2,251,000)	(2,250,000)	(2,249,000)	-
Planned Projects							
None at this time							
Total Obligations	(60,983,000)	(49,059,000)	(55,249,000)	(47,351,000)	(48,250,000)	(19,049,000)	-
SRF Unobligated Funds	$ 95,376,680	$ 71,245,021	$ 41,216,406	$ 21,688,042	$ (243,850)	$ 6,560,704	$ 32,470,974

UTAH WASTEWATER LOAN FUND (UWLF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
UWLF	$ 18,787,525	$ 7,624,553	$ 11,358,404	$ 15,319,885	$ 18,946,292	$ 22,123,379	$ 25,283,770
Sales Tax Revenue	-	3,587,500	3,587,500	3,587,500	3,587,500	3,587,500	3,587,500
Loan Repayments	1,512,879	3,139,250	3,366,881	3,031,806	2,582,488	2,565,791	2,565,235
Total Funds Available	20,300,404	14,351,304	18,312,785	21,939,192	25,116,279	28,276,670	31,436,505
General Obligations							
State Match Transfers	(4,630,401)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)	(1,400,000)
DWQ Administrative Expenses	(796,450)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)	(1,592,900)
Project Obligations							
Grantsville City	(3,728,000)	-	-	-	-	-	-
Loan Authorizations							
Kane Co Water Conservancy Dist (Duck Creek)	(1,000,000)	-	-	-	-	-	-
Planned Projects							
Plain City	(2,521,000)	-	-	-	-	-	-
Total Obligations	(12,675,851)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)	(2,992,900)
UWLF Unobligated Funds	$ 7,624,553	$ 11,358,404	$ 15,319,885	$ 18,946,292	$ 22,123,379	$ 25,283,770	$ 28,443,605

Contingency Calculation for Authorized Projects							
Total Unobligated Loan Funds	$ 103,001,233	$ 82,603,425	$ 56,536,291	$ 40,634,334	$ 21,879,529	$ 31,844,474	$ 60,914,579
25% Contingency for Authorized Projects	$ (27,351,000)	$ (9,749,000)	$ (32,249,000)	$ (47,351,000)	$ (48,250,000)	$ (19,049,000)	$ -
Remaining Balance	$ 75,650,233	$ 72,854,425	$ 24,287,291	$ (6,716,666)	$ (26,370,471)	$ 12,795,474	$ 60,914,579

*WQB Agenda Items

HARDSHIP GRANT FUNDS
FINANCIAL STATUS REPORT
JANUARY 2019

HARDSHIP GRANT FUNDS (HGF)	State Fiscal Year 2019	State Fiscal Year 2020	State Fiscal Year 2021	State Fiscal Year 2022	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025
Funds Available							
Beginning Balance		$ 2,879,574	$ 3,041,769	$ 3,486,612	$ 3,919,520	$ 4,332,865	$ 4,729,539
Federal HGF Beginning Balance	6,647,784	-	-	-	-	-	-
State HGF Beginning Balance	1,721,091	-	-	-	-	-	-
Interest Earnings at 2.5%	144,943	74,808	79,022	90,579	101,825	112,564	122,869
UWLF Interest Earnings at 2.5%	325,387	198,078	295,080	397,995	492,206	574,743	656,847
Hardship Grant Assessments	853,518	768,980	666,402	571,300	473,841	392,175	309,384
Interest Payments	180,448	420,329	404,339	373,034	345,473	317,191	289,421
Advance Repayments	220,000	-	-	-	-	-	-
Total Funds Available	10,093,171	4,341,769	4,486,612	4,919,520	5,332,865	5,729,539	6,108,059
Financial Assistance Project Obligations							
Duchesne City - Construction Grant	(13,503)	-	-	-	-	-	-
Eagle Mountain City - Construction Grant	(510,000)	-	-	-	-	-	-
Emigration Sewer Imp Dist - Planning Grant	(26,158)	-	-	-	-	-	-
Kane Co Water Conservancy Dist (Duck Creek) - Hardship Grant	(2,997,000)						
USU Extension - Hardship Grant	(42,000)	-	-	-	-	-	-
Non-Point Source/Hardship Grant Obligations							
(FY11) Gunnison Irrigation Company	(48,587)	-	-	-	-	-	-
(FY11) DEQ - Willard Spur Study	(113,326)	-	-	-	-	-	-
(FY12) Utah Department of Agriculture	(504,551)	-	-	-	-	-	-
(FY13) DEQ - Great Salt Lake Advisory Council	(185,713)	-	-	-	-	-	-
(FY15) DEQ - Ammonia Criteria Study	(41,130)	-	-	-	-	-	-
(FY15) DEQ - Nitrogen Transformation Study	(14,500)	-	-	-	-	-	-
(FY16) DEQ - San Juan River Monitoring	(125,083)	-	-	-	-	-	-
(FY17) DEQ - GW Quality Study	(5,051)	-	-	-	-	-	-
(FY17) DEQ - Utah Lake Water Quality Study	(573,753)	(300,000)	-	-	-	-	-
FY 2015 - Remaining Payments	(4,223)	-	-	-	-	-	-
FY 2016 - Remaining Payments	(224,436)	-	-	-	-	-	-
FY 2017 - Remaining Payments	(138,245)	-	-	-	-	-	-
FY 2018 - Remaining Payments	(607,668)	-	-	-	-	-	-
FY 2019 - Remaining Payments	(796,353)						
Future NPS Annual Allocations	-	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)
Planned Projects							
*Wellington City	(96,000)	-	-	-	-	-	-
*Fitzgerald ARDL interest-rate buy down	(51,056)						
*Lewiston - Planning Advance	(40,000)						
*McKees ARDL interest-rate buy down	(55,261)						
Total Obligations	(7,213,597)	(1,300,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)	(1,000,000)
HGF Unobligated Funds	$ 2,879,574	$ 3,041,769	$ 3,486,612	$ 3,919,520	$ 4,332,865	$ 4,729,539	$ 5,108,059

*WQB Agenda Items

State of Utah
Wastewater Project Assistance Program
Project Priority List

As of January 15, 2019

Rank	Project Name	Funding Authorized	Total Points	Point Categories			
				Project Need	Potential Improvement	Population Affected	Special Consideration
1	Logan City	x	148	50	28	10	60
2	Provo City	x	144	50	24	10	60
3	Central Valley Water Reclamation Facility	x	143	50	23	10	60
4	South Davis Sewer District	x	138	50	18	10	60
5	Salem City	x	108	50	12	6	40
6	Plain City		105	50	10	5	40
7	Grantsville City	x	94	35	12	7	40
8	San Juan Spanish Valley SSD	x	86	45	0	1	40
9	Kane County Water Conservancy District (Duck Creek)	x	62	40	21	1	0
10	Wellington City	x	37	35	0	2	0

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WATER QUALITY BOARD
REQUEST FOR HARDSHIP PLANNING ADVANCE TO PREPARE WASTEWATER COLLECTION/TREATMENT FEASIBILITY STUDY AUTHORIZATION

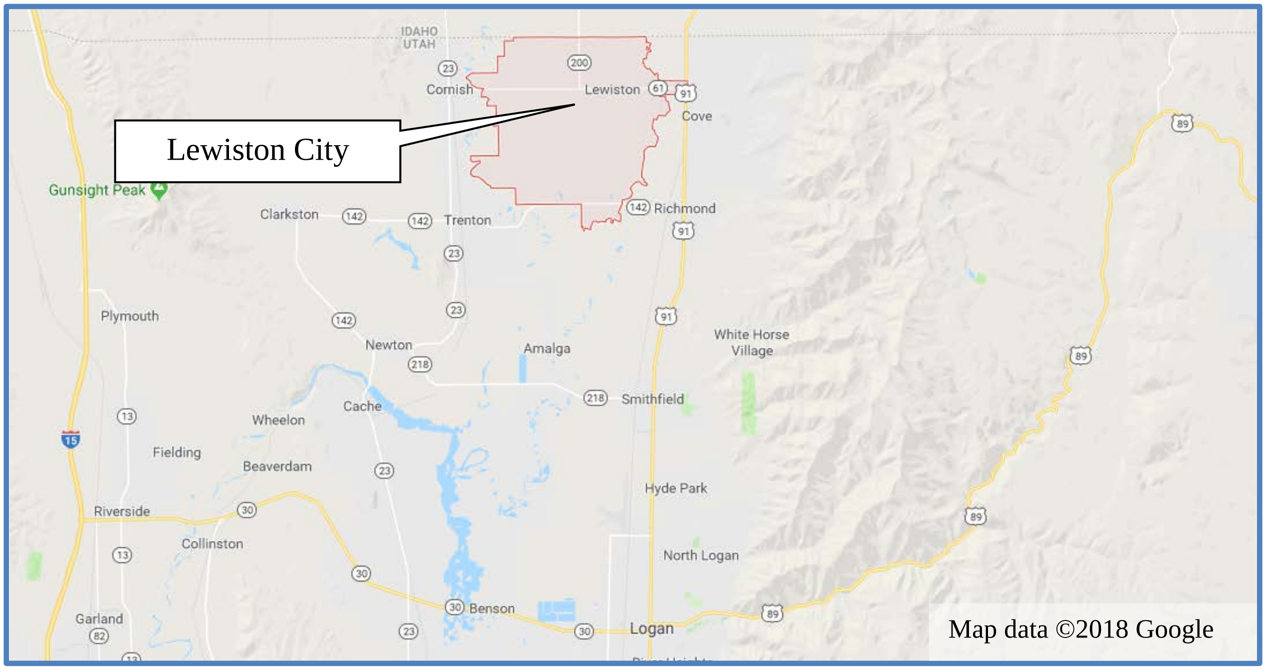
APPLICANT:	Lewiston City 29 South Main Lewiston, Utah 84320 Telephone: (435)-258-2141
PRESIDING OFFICIAL:	Mayor Kelly Field
CONTACT PERSON:	Mayor Kelly Field
TREASURER:	Mary Simpson
RECORDER:	Julie Bergeson
CONSULTING ENGINEER:	Gary Vance, P.E. J-U-B Engineers. 466 North 900 West Kaysville, Utah 84103 (801)-547-0393
CITY ATTORNEY:	Miles P. Jensen Olson & Hoggan P.C. 130 South Main, Suite 200 Logan, Utah 84321 (435)-752-1551
BOND COUNSEL:	TBD

<u>APPLICANT'S REQUEST</u>:

Lewiston City is requesting a **hardship planning advance in the amount of $40,000** to complete a wastewater facility plan to evaluate alternatives to meet expected growth and identify needed wastewater treatment and collection system improvements.

<u>APPLICANT'S LOCATION</u>

Lewiston City is located approximately 104 miles north of Salt Lake City on the Utah-Idaho Border.



<u>BACKGROUND</u>

Lewiston City is a growing community located in the northern portion of Cache County. Lewiston has long been considered a rural, agricultural community but recent growth in Cache Valley has resulted in the city becoming more of a bedroom community for Logan. This growth has taxed the City's infrastructure, particularly the sewer collection and treatment systems. J-U-B Engineers completed a Wastewater Collection System and Treatment Facilities Plan for the city in 2009. The Facilities Plan recommended land application to deal with future nutrient limits that could be imposed by the Cub River TMDL, the phosphorus load cap rule, and growth in the community.

The Lewiston WWTP was constructed in 1974 and was designed as a three-cell total containment facultative lagoon treatment system. Chlorine disinfection and sulfur dioxide dechlorination were added to the treatment facility in 1999. The lagoons discharge intermittently to the Cub River. The lagoons generally operate well but there are issues with aging infrastructure in addition to occasional challenges meeting permit limits. The town's lift station is also 45 years old and has become problematic in recent years. This lift station needs to be replaced. Growth, new permit limits, and aging infrastructure will impact the ability of the lagoon system to consistently remain in compliance in future years.

The sewer system includes a lift station, and around 3.3 miles of 8 inch and 1.3 miles of 10” bell and spigot concrete pipe constructed in 1974. The lagoons have a design flow capacity of 180,000 gallons per day (gpd). With the current population, the average daily flow was estimated to be about 95,000 gpd.

Lewiston City currently charges $26 per month with a tiered overage rate, for average winter water usage over 3,000 gallons per month. Their current rate is still below what is affordable based on their MAGI of $42,523. This would support a recommendation that a planning advance be paid back as part of any future projects resulting from the plan.

PROJECT DESCRIPTION:

The Wastewater Treatment Facilities Plan will update the facilities plan that was completed in 2009. It will include planning and evaluation of the City’s wastewater treatment system, including a thorough alternatives evaluation with life cycle cost analysis for a minimum 20 year planning period.

This plan will evaluate the current and future conditions and, recommend a path forward that will serve the City’s needs and maintain regulatory compliance over the next 20 years. The focus of the plan will be to evaluate alternatives for wastewater treatment. The following alternatives for addressing growth and nutrient removal will be investigated.

- No action alternative.
- Lagoon Upgrades and Reuse via Land Application
- Hybrid/Mechanical Lagoon Alternative
- Mechanical Facility with Conventional Activated Sludge
- Mechanical Facility with Membrane Bioreactor (MBR) Technology and Type I Reuse
- Regionalization – Connect to Richmond’s MBR System

Although this facility plan is focused on the treatment system, this report will update the collection system analysis from the 2009 collection system model and evaluating any changes that have occurred in the system since then. However, the primary focus will be dedicated to the City’s aging and problematic lift station that needs to be replaced. In addition, areas near this lift station are slated to be developed in the near future, and this area/topography will be analyzed to optimize lift station requirements versus gravity sewer service.

IMPLEMENTATION SCHEDULE:

The facility plan is scheduled to take six months with an estimated completion in July 2019.

PROJECT PRIORITY LIST:

This is a planning project. It will be ranked when a recommended project alternative has been identified and a request for funding has been submitted.

COST ESTIMATE:

The City is requesting $40,000 from the Water Quality Board to fund this Study.

STAFF RECOMMENDATION:

Staff recommends the Board **authorize a hardship planning advance of $40,000** to Lewiston City to be repaid when a project is identified and funded.

SPECIAL CONDITIONS:

The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.

DWQ-2019-000021
File: SRF-Lewiston City, Planning, Section 1

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M E M O R A N D U M

TO: Water Quality Board

Through: Erica Brown Gaddis, Director, Division of Water Quality (DWQ)

FROM: Jim Bowcutt, Nonpoint Source Program Coordinator, DWQ

DATE: January 23, 2019

SUBJECT: AFO/CAFO ARDL Loan Buy Down

Request

At the September, 2018 Water Quality Board (WQB) Meeting, Division of Water Quality (DWQ) staff proposed a funding/loan mechanism to assist Animal Feeding Operations (AFO) and Concentrated Animal Feeding Operations (CAFO) to comply with state water quality standards and prevent unregulated discharges of animal wastewater. The mechanism discussed was to use Hardship Grant funds to buy down the interest rate of Agricultural Resource Development Loans (ARDL) for qualifying AFO/CAFO projects. Since the September Board meeting, DWQ has met with Utah Department of Agriculture and Food (UDAF) and the Utah Conservation Commission (UCC) to solidify the process. A Memorandum of Understanding (MOU) between UDAF in association with UCC and DWQ in association with the WQB has been drafted and awaits the Board's approval. DWQ requests a motion from the WQB to accept the interest buy down process and for the WQB Executive Secretary to enter into the MOU.

Process

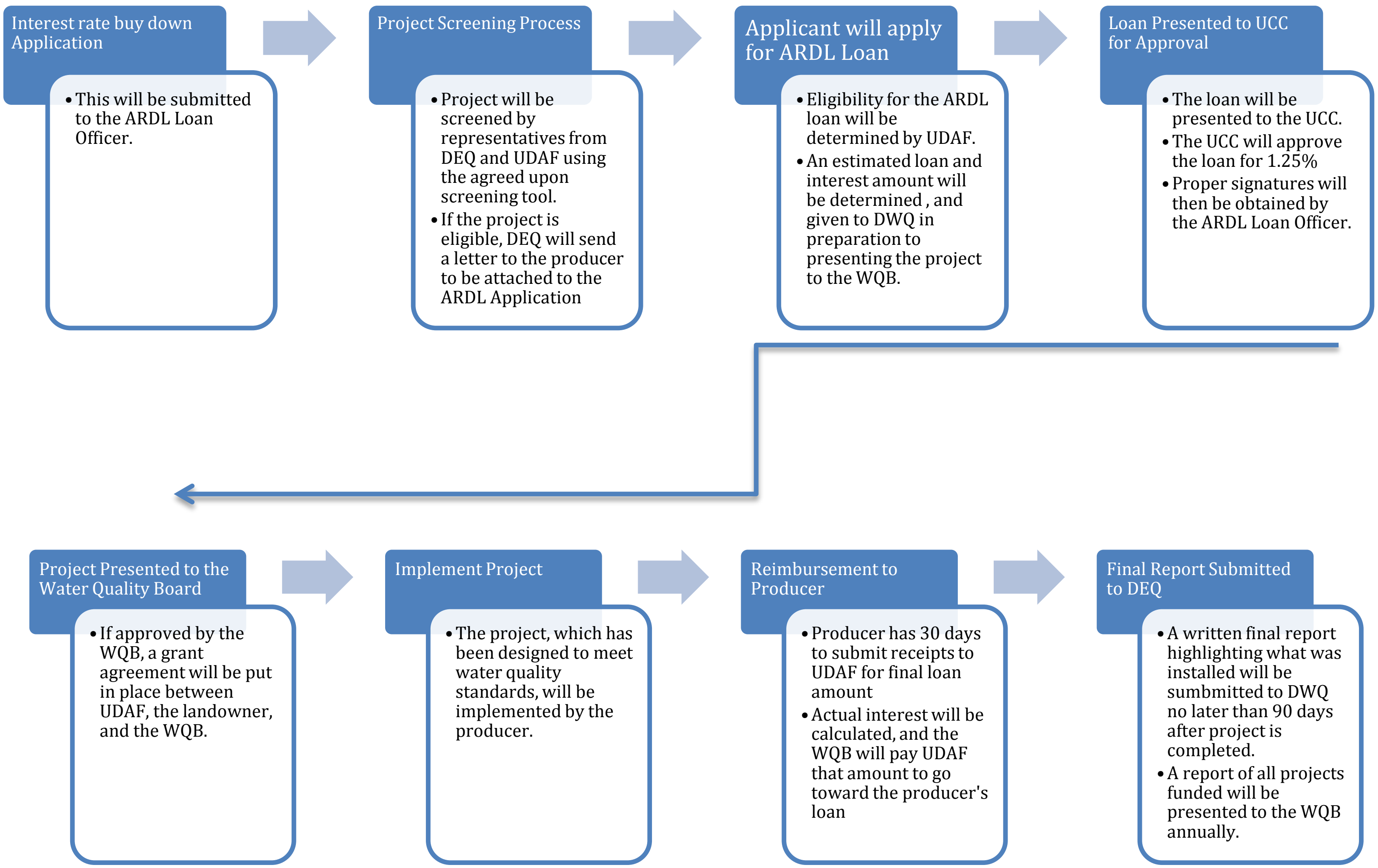
All AFO/CAFO operations eligible for an interest rate buy down will be screened by UDAF and DWQ using the agreed upon screening tool to determine if the project is at high risk for discharging animal waste to the waters of the state. UDAF planners will work with the AFO/CAFO producer to develop a conservation plan and nutrient management plan to assure that the project complies with Utah water quality standards. UDAF will also verify that the applicant is eligible for an ARDL loan and has adequate collateral.

If it is determined that the applicant is eligible for an ARDL loan, has passed the screening process, and is therefore eligible for an interest free loan, DWQ will send a letter to the producer included with the ARDL loan application. This letter will signify and state UCC to drop the interest rate from 2.5% to 1.25%.

Once it is determined that the producer is eligible for the ARDL Interest Buy down Program, and the ARDL loan has been approved by the UCC, the project will be presented to the WQB for approval and will include the total loan amount, and an estimate of how much interest will be paid over the 15-year life of the loan. Upon approval, the WQB will enter into a grant agreement with UDAF on behalf of the producer. The producer can implement the project after the grant agreement is in place. When the project has been completed and certified by a UDAF conservation planner, the WQB will pay the interest on the total cost of the project based on a 15-year loan. This payment will be made directly to UDAF on behalf of the producer. This payment will be used to buy down the remaining balance of the ARDL loan. The producer will then have 90 days to submit a final report to DWQ. All AFO/CAFO interest rate buy down projects will be presented annually to the WQB and UCC.

DWQ-2019-00146

Proposed Interest Rate Buy down Timeline



MEMORANDUM OF UNDERSTANDING
AGRICULTURAL RESOURCE DEVELOPMENT LOAN INTEREST RATE BUY DOWN FOR AFO/CAFO PROJECTS

I. PARTIES TO THE MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding (MOU) is made by and between the Utah Department of Environmental Quality (DEQ) for and on behalf of the Division of Water Quality (UDWQ) Water Quality Board (WQB), and the Department of Agriculture and Food (UDAF) on behalf of the Utah Conservation Commission (UCC). DEQ and UDAF are sometimes jointly referred to hereinafter as the “Parties”.

II. PURPOSE

The purpose of this MOU is to help improve and protect surface and ground water quality in the State of Utah by assisting agricultural producers that own or operate Animal Feeding Operations (AFOs) or Concentrated Animal Feeding Operations (CAFOs) meet state water quality standards. This MOU outlines the roles and responsibilities of the Parties in implementing an Agriculture Resource Development Loan (ARDL) interest rate buy down program for AFO/CAFO projects.

III. AUTHORITIES, ROLES AND RESPONSIBILITIES

Utah Conservation Commission- Utah Department of Agriculture and Food

Authority: The Utah Conservation Commission Act (Act), Utah Code Ann., §§ 4-18-101 *et seq*., created the Utah Conservation Commission (UCC). The Purpose Declaration (4-18-102) of the Act, states that the soil and water resources of this state constitute one of its basic assets and that the preservation of these resources requires planning and programs to ensure the development, utilization, and preservation of these resources from the adverse effects of wind and water erosion, sediment, and sediment related pollutants. The functions and duties of the UCC as described in Utah Code Ann., § 4-18-105 include, among other things, the implementation and coordination of programs with agencies necessary to protect and conserve water resources. The Act also provides for a revolving loan fund known as the Agriculture Resource Development Loan fund (ARDL), Utah Code Ann., §§ 4-18-105 &106. The objectives of the ARDL program include maintaining and improving water quality (UAC R64-1-3).

Role: The ARDL program (UAC R64-1-3), under the direction of the UCC may make low interest rate loans to agricultural producers to help improve their operations, while helping protect and preserve natural resources. Interest rates for ARDL loans are currently set at 3.00% for loans less than $52,000, 2.75% for loans between $52,001 and $103,999, and 2.5% for all loans over $104,000. The minimum loan amount that can be requested is $5,000. UDAF performs a policy compliance review, credit analysis, and underwriting on any applications received. UDAF/UCC must be the first lien holder on any real estate used as collateral to secure the loan. These loans are for a 15-year period, but may be paid off sooner with no prepayment penalty.

Responsibilities: All AFO/CAFO operations that have been approved for an ARDL Loan and have expressed interest in the ARDL interest rate buy down program more fully described hereinafter, will be screened by UDAF and UDWQ, using the agreed upon screening tool. This tool helps determine if the project is at high risk for discharging animal waste to the waters of the state. UDAF planners will work with the agricultural producers to develop a conservation plan verifying the operation is in compliance with Utah water quality standards, by designing proper waste storage structures, and developing a certified nutrient management plan that includes animal waste disposal. If approved through the screening process, UDWQ will then send a letter to the agricultural producer and UDAF stating the project is eligible for the ARDL interest rate buy down program pending WQB approval. Once this letter has been received by UDAF, it will allow the interest rate level to be reduced by one-half, based on the loan amount approved by the UCC.

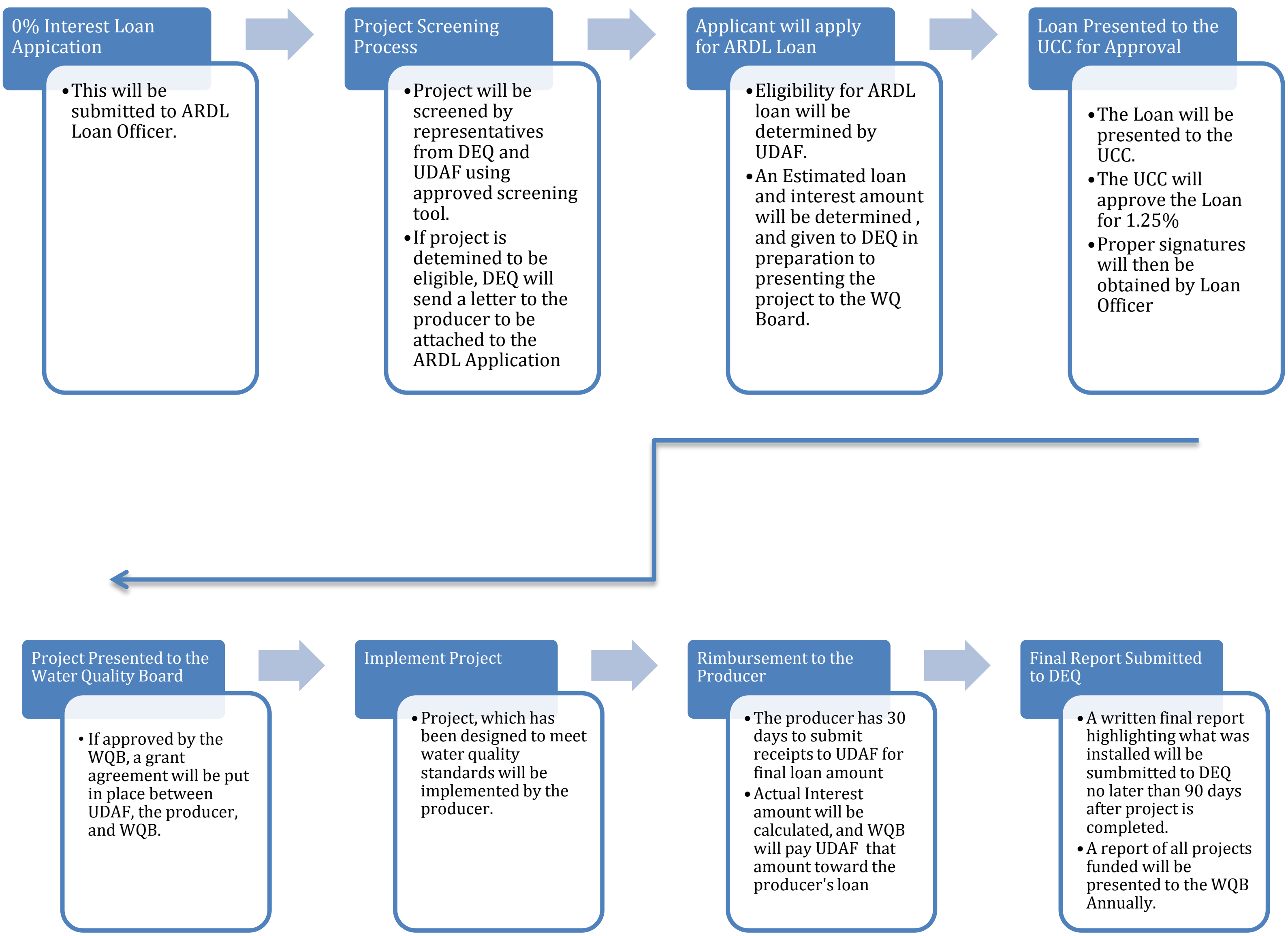
Utah Water Quality Board- Utah Division of Water Quality

Authority: The UDWQ is the state's water pollution control agency which has the authority to implement the Federal Clean Water Act and is charged to maintain, protect, and enhance the quality of Utah's surface and ground water resources. UDWQ, serves as staff to the WQB in the implementation of the Utah Water Quality Act Utah Code Ann., Title 19 Chapter 5.

Role: UDWQ, with oversight from the WQB, serves as the lead agency for the State Nonpoint Source Pollution Management Program pursuant to Utah's Nonpoint Source Pollution Management Plan approved by the Environmental Protection Agency in October 2018. UDWQ is the designated state agency responsible for the development and implementation of water quality standards (UAC R317-2), Total maximum Daily Load Studies, and water quality certifications.

To help implement projects focused on improving and protecting water quality, UDWQ utilizes various sources of both state and federal funding. The WQB oversees the Utah Wastewater Project Assistance Program, Utah Code Ann., § 73-10c-401 and the Wastewater State Revolving Fund (SRF) program. This SRF program (UAC R317-102) allows the WQB to give loans to various entities to implement water quality projects, including nonpoint source pollution control management projects, throughout the state. The interest generated by the SRF fund can be reallocated in the form of low interest rate loans or grants, as determined by the WQB.

Responsibilities: Once it is determined that an agricultural producer is eligible for the ARDL interest rate buy down program, the project will be presented to the WQB for approval, and will include the total loan amount, and an estimate of how much interest will be paid over the 15 year life of the loan. Upon approval, the WQB will enter into a grant agreement with UDAF, on behalf of the agricultural producer. The agricultural producer can implement the project after the grant agreement is in place. When the project has been completed and certified by a UDAF conservation planner, the WQB will pay the interest on the total cost of the project based on a 15-year loan. This payment will be made directly to UDAF on behalf of the agricultural producer. This payment will be used to buy down the interest balance of the ARDL loan. The agricultural producer will then have 90 days to submit a final report to UDWQ. All completed ARDL interest rate buy down projects for AFO/CAFOs will be presented annually to the WQB and UCC.



IV. THERFORE, THE PARTIES AGREE TO:

Utah Conservation Commission - Utah Department of Agriculture and Food

1) Notify UDWQ of all applicants interested in applying for the ARDL interest rate buy down program for AFO/CAFOs.

2) With the assistance of UDWQ, UDAF will screen all AFO/CAFO projects and determine eligibility for the interest rate buy down program.

3) Verify that the applicants are eligible for an ARDL loan, and present an estimated loan, and total interest amount to UDWQ prior to presenting the project to the WQB.

4) With the assistance of a UDAF conservation planner, verify that the project is designed to meet all state water quality standards.

5) Reduce the interest rate of the ARDL loan to one-half based on the projected loan amount.

6) Verify that the project has been installed according to the specifications and standards of the original project design.

7) Submit to the WQB a final amount of interest that will be generated by the loan over a 15-year period, and apply this funding toward the loan of the respective agricultural producer once the interest buy down payment is made.

Water Quality Board-Division of Water Quality

1) With the Assistance of UDAF, UDWQ will screen all projects eligible for the ARDL interest rate buy down program for AFO/CAFOs and will submit a letter to the producer and UDAF stating if the project is eligible to be presented to the WQB for an ARDL loan buy down.

2) UDWQ and the agricultural producer will present the proposed project to the WQB for approval of the ARDL interest rate buy down.

3) Upon certification of the completed project, UDWQ will submit payment to UDAF, on behalf of the agricultural producer for the calculated interest based on a 15 year loan.

4) UDWQ will give an annual report of all reported projects that were funded by the ARDL interest rate buy down program to the WQB and the UCC.

V. <u>GENERAL PROVISIONS</u>

1) Nothing in this MOU shall be construed as limiting or affecting the legal authority of the Parties.

2) Nothing in this MOU shall be construed as obligating the Parties to expend funds or incur any other obligation for future payment of funds or services.

3) Nothing in this MOU shall be deemed to waive governmental immunity.
4) The Parties will periodically review this MOU and make revisions and updates, as needed, to meet the purpose of the MOU. Amendments shall become effective following written approval of the Parties.

5) This MOU shall become effective upon signature of the Parties and shall continue in force unless terminated upon a thirty day notice in writing to the other Party of the intention to terminate upon a date indicated.

6) This MOU is subject to the laws and rules of the State of Utah.

7) Nothing in this MOU shall be construed as creating a right of action between the Parties, or any other entity.

8) Each of the parties will handle their own activities and utilize their own resources, including the expenditure of their own funds, in pursuing these objectives. Each party will carry out its separate activities in a coordinated and mutually beneficial manner.

9) The principal representatives of the Parties to this MOU are:

    - UDEQ
    - UDAF

10) Modifications within the scope of the MOU shall be made by mutual consent of the Parties, by the issuance of a written modification, signed and dated.

11) This MOU in no way restricts the Parties from participating in similar activities with other public or private agencies, organizations, and individuals.

12) By signature below, the Parties certify that the individuals listed in this document, as representatives of their respective agencies, are authorized to act in their respective areas for matters related to this MOU.

Signatories to this MOU:

____ __________________

Erica Brown Gaddis PhD. Director, Utah Division of Water Quality Executive Secretary of the Water Quality Board	Date

LuAnn Adams Commissioner, Utah Department of Agriculture and Food Chair of the Utah Conservation Commission	Date

DWQ-2019-000363

State of Utah
GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

M E M O R A N D U M

TO: Water Quality Board

THROUGH: Erica Brown Gaddis, Director, Division of Water Quality (DWQ)

FROM: Jim Bowcutt, Nonpoint Source Program Coordinator, DWQ

DATE: January 10, 2018

SUBJECT: Fitzgerald Dairy Interest Buy Down Request

The Fitzgerald Dairy will be requesting an Agricultural Resource Development Loan (ARDL) Interest Rate buy down from the Water Quality Board (WQB). Fitzgerald Dairy was recently approved for an ARDL loan from the Utah Department of Agriculture and Food (UDAF) for $510,000. The estimated interest on this loan will be $102,112 at 2.5%. UDAF has agreed to waive 1.25% of the interest, leaving $51,056 in interest to be bought down by the WQB.

The owners of the dairy would like to install various best management practices (BMPs) to assure that no runoff from the dairy will make it to the Waters of the State. These BMPs include storage ponds for runoff that passes through the dairy, concrete aprons to intercept the runoff, and concrete corrals to help facilitate the removal of animal waste from the operation. The Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet estimates that by installing these BMPs, the risk of runoff from this operation entering into Waters of the State will go from “medium risk” to “low risk”. This project was also screened by representatives from UDAF and DWQ on December 4th, 2018. During this visit, it was determined that this project is a good candidate for the ARDL buy down program.

Much of the Fitzgerald Dairy is located on a slope with a canal positioned at the bottom of it. The tail waters of this canal flow into the Pariette Draw that is listed as impaired on the 303(d) list for temperature. DWQ is currently implementing a Total Maximum Daily Load for Total Dissolved Solids, Boron, and Selenium for the Pariette Draw.

195 North 1460 West • Salt Lake City, UT
Mailing Address: P.O. Box 144870 • Salt Lake City, UT 84114-4870
Telephone (801) 536-4300 • Fax (801) 536-4301 • T.D.D. (801) 536-4284
www.deq.utah.gov

Date Received: July 1, 2018
Date Presented to the WQB: January 23, 2019

WATER QUALITY BOARD
AGRICULTURAL RESOURCE DEVELOPMENT LOAN BUY DOWN PROJECT
AUTHORIZATION

APPLICANT:	Fitzgerald Dairy HC 64 Box 165 Duchesne, Utah 84012
CONTACT PERSON:	Richard B. Fitzgerald
CONSERVATION PLANNER:	Andrew Wallace USDA-NRCS Soil Conservationist Vernal, UT Work Cell (435) 790-3862 Vernal Office: (435) 789-2100 ext. 133 Roosevelt Office: (435) 722-4621 ext. 114

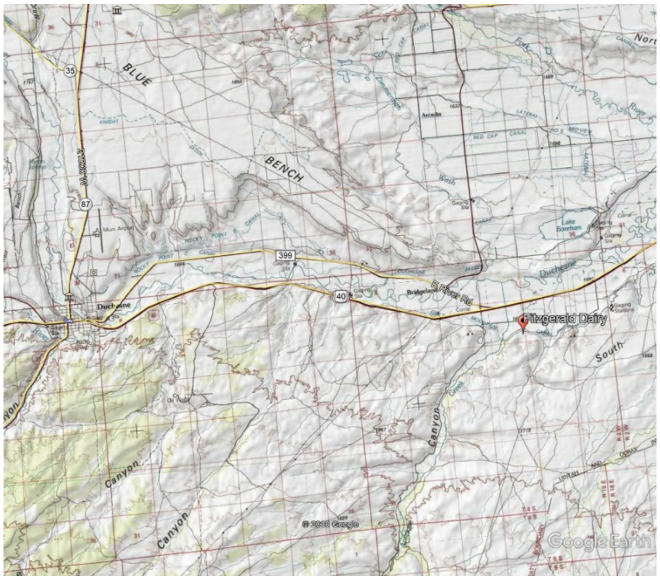
APPLICANT'S REQUEST:

Fitzgerald Dairy is requesting financial assistance in the form of an interest buy-down for an Agricultural Resource Development Loan (ARDL) loan previously approved by the Utah Conservation Commission on January 17th, 2019. The total ARDL loan amount is $510,000. This is a 15 year amortized loan at 1.25% interest. The total amount being requested for the buy down of this loan will be $51,056.

APPLICANT'S LOCATION:

Fitzgerald Dairy is located approximately 11 miles East of Duchesne.

MAP OF APPLICANT'S LOCATION:



BACKGROUND:

Fitzgerald Dairy is located approximately 11 miles east of Duchesne, Utah. There are currently 550 animals present on the dairy including the calves and dries present in the feedlot. Much of the dairy is located on a slope with a canal positioned at the bottom of it. The tail waters of this canal flow into the Pariette Draw, which is listed as impaired on the 303(d) list for temperature. The Division of Water Quality (DWQ) is currently implementing a Total Maximum Daily Load for Total Dissolved Solids, Boron, and Selenium for the Parriette Draw. The purpose of this project is to reduce the amount of runoff entering the dairy by installing berms above the operation higher on the hill, installing several liquid storage ponds that collect and store runoff that enters into the dairy, construction of an earthen berm by the canal to stop runoff from entering into the canal, and the installation of additional concrete to help with the collection of manure. The NRCS is also working with the Fitzgerald Dairy to develop a nutrient management plan that will help them know when and where they can apply manure and liquids to their fields.

PROJECT NEED:

This project will help the Fitzgerald Dairy eliminate all runoff from the operation. It will also allow the Dairy to store all animal waste and contaminated runoff for a period of 90 days during the winter months when the ground is frozen or snow covered. Since much of the operation is located on a fairly steep slope, the main focus of the project is to reduce, and store the amount of runoff entering and leaving this operation. According to the Utah Animal Feedlot Runoff Risk Index, the potential pollutant load reductions could be as much as 1470 lbs. of phosphorous and 7,359 lbs. of nitrogen per year by implementing the practices recommended by the NRCS conservation planner.

PROJECT DESCRIPTION:

The Fitzgerald Dairy is proposing the following:

- The installation of 8 waste storage facilities, 7 concrete structures (a total of 64,686 cubic feet) and one earthen storage facility (150,000 cubic feet) with accompanying safety fences, waste transfer stations, and pumping plants.
- Installation of water diversion (1445 linear feet)
- Installation of concrete corrals and feeding lanes (37,220 square feet)
- Installation of watering facilities (3)
- Installation of concrete aprons on selected corrals
- Develop nutrient management plan.

IMPLEMENTATION SCHEDULE:

Application first received by DEQ	February 2018
Application for ARDL loan	December 2018
Application for ARDL loan approved	January 2019
Project presented to WQB	January 2019
Projected project completion date	December 2020

COST SHARING:

Funding from the Natural Resource Conservation Service	$422,581
State Nonpoint Source Grant	$40,000
ARDL Loan	$510,000
Interest Buy Down from WQB	$51,056
Total Project Cost	**$1,023,637**

STAFF RECOMMENDATIONS:

Staff recommends that the Water Quality Board authorize Fitzgerald Dairy an interest buy down of their existing ARDL loan of $510,000 at 1.25% for a total of $51,056. This agreement will be between DEQ and UDAF. Once the project has been completed and certified by a certified conservation planner, DEQ will issue payment to UDAF, and the buy down will be applied directly to the ARDL loan held by Fitzgerald Dairy.

SPECIAL CONDITIONS:

1) The Fitzgerald Dairy must adhere to the developed nutrient management plan
2) A final project report will be submitted to DEQ within 90 days of project completion.

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

MEMORANDUM

TO: Water Quality Board

THROUGH: Erica Brown Gaddis, Director, Division of Water Quality (DWQ)

FROM: Jim Bowcutt, Nonpoint Source Program Coordinator, DWQ

DATE: December 27, 2018

SUBJECT: Mckee Dairy Interest Buy Down Request

The Mckee Dairy will be requesting an Agricultural Resource Development Loan (ARDL) buy down from the Water Quality Board (WQB). They have been approved for an ARDL loan from the UDAF for $552,000. The estimated interest on this loan will be $110,522 at 2.5%. The Utah Department of Agriculture and Food (UDAF) has agreed to waive 1.25% of the interest, leaving $55,261 in interest to be bought down by the WQB.

This dairy and its accompanying corrals are located on an intermittent channel of the Uinta River. The Uinta River is listed on the 303(d) list of impaired waterbodies for pH, Dissolved Aluminum, and Dissolved Zinc. DWQ is currently implementing a TMDL for Total Dissolved Solids.

The owners of the dairy would like to install various best management practices (BMPs) to verify that no runoff from the dairy will make it to the Waters of the State. These BMPs include storage ponds for liquids coming from the dairy, concrete aprons to intercept runoff, and the creation of new corrals so that the old corrals located in the river channel can be abandoned. The Utah Animal Feedlot Runoff Risk Index (UAFRRI) worksheet estimates that by installing these practices the risk of runoff from this operation entering into Waters of the State will go from “high risk” to “very low risk”. This project was also screened by representatives from UDAF and DWQ on December 4th, 2018. During this visit it was determined that this project is a good candidate for the Agricultural Resource Development Loan (ARDL) buy down program.

Date Received: July 1, 2018
Date Presented to the WQB: January 23, 2019

WATER QUALITY BOARD
AGRICULTURAL RESOURCE DEVELOPMENT LOAN BUY DOWN PROJECT
AUTHORIZATION

APPLICANT:	Loren R Mckee and Sons Enterprises PO Box 760037 Tridell, Utah 84076
CONTACT PERSON:	Loren R Mckee
CONSERVATION PLANNER:	Andrew Wallace USDA-NRCS Soil Conservationist Vernal, UT Work Cell (435) 790-3862 Vernal Office: (435) 789-2100 ext. 133 Roosevelt Office: (435) 722-4621 ext. 114

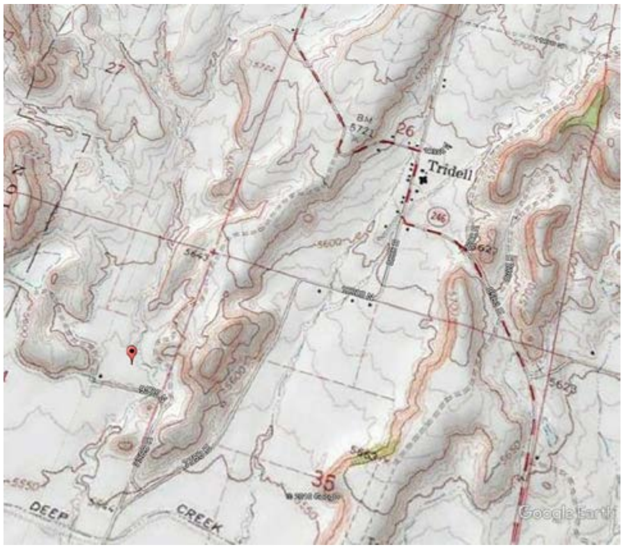
APPLICANT'S REQUEST:

Mckee Dairy is requesting financial assistance in the form of an interest buy-down for an Agricultural Resource Development Loan (ARDL) loan previously approved by the Utah Conservation Commission on January 17th, 2019. The total ARDL loan amount is $552,000. This is a 15 year amortized loan at 1.25% interest. The total amount being requested for the buy down of this loan will be $55,261.

APPLICANT'S LOCATION:

The Mckee Dairy is located approximately one mile southwest of Tridell, Utah in the Uinta Basin.

MAP OF APPLICANT'S LOCATION:



BACKGROUND:

The Mckee Dairy is located approximately one mile southwest of Tridell, Utah in the Uinta Basin. There are currently 600 animals present on the dairy including the calves and dry cows. This dairy and its accompanying corrals are located on an intermittent channel of the Uinta River. All runoff from this operation drains to a gully that eventually reaches the Uinta River. The Uinta River is listed on the 303(d) list of impaired waterbodies for pH, Dissolved Aluminum, Dissolved Zinc. The Division of Water Quality (DWQ) is currently implementing a Total Maximum Daily Load for Total dissolved Solids. The Dairy is currently discharging all parlor water into the Uinta River. The producer is in the process of updating the operation including making improvements to the milking parlor, abandoning many corrals currently in use, and installing berms for the corrals to use in the future. The project includes the installation of a liquid separator and a large clay lined storage pond to store liquids. The NRCS is working with the Mckee Dairy to develop a nutrient management plan that will help the producer know when and where to apply manure and liquids to the fields.

PROJECT NEED:

This project will help the dairy eliminate all runoff from the operation. It will allow the dairy to store all animal waste for a period of 90 days during the winter months when the ground is frozen or snow covered. Currently much of the runoff from the corrals, as well as much of the parlor water is entering directly into the Uinta River. According to the Utah Animal Feedlot Runoff Risk Index, the potential pollutant load reductions could be as much as 4,245 lbs. of phosphorous and 21,251 lbs. of nitrogen per year by implementing the practices recommended by the NRCS conservation planner.

PROJECT DESCRIPTION:

The Mckee Dairy is proposing the following:

- Abandon roughly 8.5 acres of corrals currently located in abandoned stream channel
- Construct additional corrals located off the stream channel including watering facilities, 5380 feet of fence, access roads, and concrete aprons to eliminate runoff from the corrals.
- Install multi cell waste separation facility and waste transfer station.
- Install large liquid storage pond with clay lining and flexible membrane, 3200 SQYD of clay required.
- Install pumping plant and irrigation pipeline to apply liquids to adjacent field
- Install berms in corrals with runoff potential approximately 7260 linear feet.
- Develop nutrient management plan.
- Dredge animal waste from adjacent gullies and stream channels.

IMPLEMENTATION SCHEDULE:

Application first received by DEQ	February 2018
Application for ARDL loan	December 2018
Application for ARDL loan approved	January 2019
Project presented to WQB	January 2019
Projected project completion date	December 2021

COST SHARING:

Funding from the Natural Resource Conservation Service	$438,364
State Nonpoint Source Grant	$40,000
ARDL Loan	$552,000
Interest Buy Down from WQB	$55,261
Total Project Cost	**$1,085,625**

STAFF RECOMMENDATIONS:

Staff recommends that the Water Quality Board authorize Mckee Dairy an interest buy down of their existing ARDL loan of $552,000 at 1.25% for a total of $55,261. This agreement will be between DEQ and UDAF. Once the project is completed and certified by a certified conservation planner, DEQ will issue payment to UDAF, and the buy down will be applied directly to the ARDL loan held by Mckee Dairy.

SPECIAL CONDITIONS:

1) Mckee Dairy must adhere to the developed nutrient management plan
2) A final project report will be submitted to DEQ within 90 days of project completion.

DWQ-2019-000538

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

M E M O R A N D U M

TO: Utah Water Quality Board

THROUGH: Erica Gaddis, PhD, Director

FROM: Chris Bittner, Standards Coordinator

DATE: January 23, 2019

SUBJECT: Staff requests approval from the Board to initiate rulemaking;
Proposed Revisions to Standards of Water Quality for the State UAC R317-2

Background

This package includes several proposed water quality standards that staff has discussed directly with affected stakeholders and the Water Quality Standards Workgroup. No substantive concerns were identified. The proposed revisions are summarized below. Detailed explanations are provided in Attachments 1 through 4 and a mark-up of the rule showing the proposed changes is provided as Attachment 5. Staff will present each of the changes summarized below for discussion at the Board meeting.

If the Board approves staff to proceed with rulemaking, staff will initiate rulemaking with the Division of Administrative Rules. Staff will notify local government officials, hold public hearings, and solicit comments from the public and other interested parties as required by Statute. Staff will schedule the hearings and then return to the Board with an invitation for a Board member to serve as a public hearing officer. After the public comment period, staff will summarize the comments and responses for the Board and provide the Board with a recommendation to revise the proposed rule or to adopt the rule.

Summary of Proposed Standards Revisions

1. The following summary is based on the data and findings presented in the *Criteria Support Document: Site-specific criteria based on recalculated aquatic life water quality criteria for ammonia for a segment of Mill Creek and the Jordan River, Salt Lake County, Utah* provided as Attachment 1. Staff is proposing site-specific ammonia criteria for the protection of aquatic life for Mill Creek and a segment of the Jordan River, Salt Lake County. The criteria apply to Mill Creek from I-15 to the Jordan River, the Jordan River

from Mill Creek to 900 South and the Surplus Canal from the Jordan River to 900 South. The proposed criteria are based on the latest scientific information recommended by the EPA (2013) water quality criteria. The site-specific criteria are based on the absence of unionid mussels and salmonids (trout) as presented in Appendix N of EPA (2013).

Unionid mussels have not been discovered in recent surveyed portions of the Jordan River, but historically they were documented to be present in tributaries and were likely present in the Jordan River. Today, this segment of the Jordan River is biologically and chemically degraded as indicated by the water quality impairments identified in Utah's Integrated Report. The mussels rely on a fish host to complete their life cycle and questions remain regarding the suitability of the fish that are present to serve as hosts. There is no evidence that these mussels are present in the identified portions of Mill Creek, Jordan River, Surplus canal, or surrounding watersheds. Therefore, these mussels are unlikely to return within a reasonable planning horizon without human intervention. Efforts to restore the Jordan River are ongoing but are unlikely to be sufficient to support the potential reintroduction of unionid mussels within the reasonable planning horizon of the next 30 years. The Utah Division of Wildlife supports this conclusion and they are responsible for identifying, protecting and reintroducing unionid mussels in Utah waters.

The current designated uses are to protect warm water aquatic life and do not include salmonids. Additionally, there is no evidence that salmonids reside in this reach of Mill Creek or this reach of Jordan River or Surplus Canal. Therefore, neither unionid mussels nor salmonids are residents for the purpose of determining the ammonia criteria.

In addition to the presence/absence of unionid mussels and salmonids, the ammonia criteria consider the presence of the early life stages of fish, temperature and pH. Early life stages of fish can be more sensitive to ammonia at certain temperatures and pH. When early life stages are more sensitive to ammonia toxicity, the criteria are more stringent for the months that they are present. UDWQ protects for early life stages of fish for those applicable months for which they are likely to occur in the identified reaches of Mill Creek, Jordan River, and Surplus Canal.

As shown in the rule mark-up below, the proposed criteria are expressed as mathematical equations that include both pH and temperature:

R317-2-14, Table 2.14.2, Footnote 9

(9a) The thirty-day average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average, the chronic criterion calculated using the following equations.

Fish Early Life Stages are Present:

mg/l as N (Chronic) = $((0.0577/(1+10^{7.688\text{-pH}})) + (2.487/(1+10^{\text{pH-}7.688}))) * \text{MIN}(2.85, 1.45*10^{0.028*(25\text{-T})})$

Fish Early Life Stages are Absent:

mg/1 as N (Chronic) = $((0.0577/(1+10^{7.688\text{-pH}})) + (2.487/(1+10^{\text{pH-}7.688}))) * 1.45*10^{0.028*}$

$^{(25\text{-MAX}(T,7))})$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, Fish Early Life Stages are Present:

mg/l as N (Chronic) = $0.9405 * ((0.0278/(1+10^{7.688\text{-pH}})) + ((1.1994/(1+10^{\text{pH}-7.6888}))) * \text{MIN}(6.920,(7.547*10^{0.028*(20\text{-T})})))$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, Fish Early Life Stages are Absent:

mg/L as N (chronic) = $09.405 * (((0.0278/(1+10^{7.688\text{-pH}}))+(1.1994/(1+10^{\text{pH}-7.688}))) * (7.547*10^{0.028*(20\text{-MAX }(T,7))})$

(9b) The one-hour average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average the acute criterion calculated using the following equations.

Class 3A:

mg/l as N (Acute) = $(0.275/(1+10^{7.204\text{-pH}})) + (39.0/1+10^{\text{pH}-7.204}))$

Class 3B, 3C, 3D:

mg/l as N (Acute) = $0.411/(1+10^{7.204\text{-pH}})) + (58.4/(1+10^{\text{pH}-7.204}))$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River:

mg/l as N (Acute) = $0.729 * (((0.0114/(1+10^{7.204\text{-pH}}))+(1.6181/(1+10^{\text{pH}-7.204}))) * \text{MIN}(51.93,(62.15*10^{0.036*(20\text{-T})}))$

In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion. The "Fish Early Life Stages are Present" 30-day average total ammonia criterion will be applied by default unless it is determined by the Director, on a site-specific basis, that it is appropriate to apply the "Fish Early Life Stages are Absent" 30-day average criterion for all or some portion of the year. At a minimum, the "Fish Early Life Stages are Present" criterion will apply from the beginning of spawning through the end of the early life stages. Early life stages include the pre-hatch embryonic stage, the post-hatch free embryo or yolk-sac fry stage, and the larval stage for the species of fish expected to occur at the site. The Director will consult with the Division of Wildlife Resources in making such determinations. The Division will maintain information regarding the waterbodies and time periods where application of the "Early Life Stages are Absent" criterion is determined to be appropriate.

The table below shows an example of the existing and proposed ammonia water quality criteria at a pH of 8.0 and a water temperature of 24°C.

Comparison of Existing Ammonia Criteria to Proposed Criteria at a pH of 8.0 and Temperature of 24°C, Jordan River Segment, Salt Lake County		
	Existing Criteria, (mg/L)	**Proposed Criteria, (mg/L)**
1-hour average	8.4	7.5
30-day average (mg/L) when early life stages of fish present	1.3	2.3
30-day average, when early life stages of fish absent	1.3	2.3

While these proposed ammonia criteria are limited to a specific segment of the Jordan River, staff expects to return to the Board in the future with revised criteria recommendations for ammonia for the rest of the Jordan River and eventually statewide as additional mussel surveys are completed.

2. The summary below is based on the data and findings presented in the *Criteria Support Document: Use and Value Assessment and Site-specific Criteria for Total Dissolved Soils (TDS): Silver Creek, Version 2.1* provided as Attachment 2. A site-specific total dissolved solids (TDS) criterion to protect the agricultural designated use is proposed for a portion of Silver Creek, Summit County. Specifically, a maximum TDS criterion of 1,900 mg/L is proposed for Silver Creek and tributaries from Tollgate Creek to headwaters.

   Road salting in the Park City area is impacting the water quality of Silver Creek by increasing the concentrations of TDS. The water quality of Silver Creek is also adversely impacted by water diversions and metals contamination from the historic mining activities in the Park City area.

   The TDS criterion is intended to protect the agricultural uses of Silver Creek water. After determining that road salt was the primary source of the anthropogenic portion of TDS loadings to Silver Creek, local and state road maintenance agencies were contacted and their best management practices (BMPs) reviewed. BMPs are currently being implemented (primarily liquid potassium chloride pre-treatment of roads, sweeping and metered application) but salt application on private properties remains unregulated. The governmental agencies emphasized the importance of road salting for public safety. This road salting to protect human life and health is considered an irreversible human-caused condition.

   After considering all of the current and likely future irrigation practices with Silver Creek water and researching the salt tolerances of the irrigated crops, staff concluded that a higher criterion will protect the agricultural uses. The irrigation uses in this reach are primarily for moderately salt-tolerant pasture grasses. Staff is proposing to change the TDS criterion from 1,200 mg/L to 1,900 mg/L. Although a criterion higher than 1,900 mg/L would likely still be protective of the agricultural uses, limiting the criterion to 1,900 mg/L will support the continued attainment of the 1,200 mg/L criterion downstream.

The following changes to R317-2-13.4 Weber River Basin are recommended by staff.
(a) Weber River Drainage
Weber River and tributaries, from Stoddard diversion to Headwaters, except as listed below
1C 2B 3A 4
Silver Creek and tributaries, from confluence with Weber River to below the confluence with Tollgate Creek
1C 2B 3A 4
Silver Creek and tributaries, from confluence with Tollgate Creek to Headwaters 1C 2B 3A 4*

R317-2-14. Numeric Criteria Table 2.14.1
FOOTNOTE: (4)
Silver Creek and tributaries, Summit County, from confluence with Tollgate Creek to headwaters: maximum 1,900 mg/L.

3. At the June, 2018 meeting, the Water Quality Board adopted revisions to Utah’s human health water quality criteria and aquatic life criteria for cadmium as staff recommended. After the revisions were published in the Utah Administrative Code, several discrepancies were identified between the revised criteria adopted and the criteria that were presented in the supporting documents. Staff is proposing to correct these criteria and a complete list is provided as Attachment 3.

4. Addition of Class 1C drinking water use to portions of the Blacksmith Fork and tributaries from the confluence with Left Hand Fork Blacksmith Fork to headwaters, Cache County. The homeowners association petitioned for this change and the change is supported by the Utah Division of Drinking Water. Their request and a watershed map delineating the proposed change is provided as Attachment 4. The proposed changes to R317-2-13. are:

Blacksmith Fork and tributaries, from confluence with Logan River to headwaters except as listed below		2B	3A	4
Sheep Creek and tributaries from confluence with Blacksmith Fork River to headwaters.	1C	2B	3A	4

Supporting Documents

Attachment 1: *Criteria Support Document: Site-specific criteria based on recalculated aquatic life water quality criteria for ammonia for a segment of Mill Creek and the Jordan River, Salt Lake County, Utah*

Attachment 2: *Criteria Support Document: Use and Value Assessment and Site-specific Criteria for Total Dissolved Soils (TDS): Silver Creek, Version 2.2*

Attachment 3: December 10, 2018 Memorandum to Water Quality Standards Workgroup, Subject: Corrections to human health criteria in Table 2.14.1 and Table 2.14.2 and chronic cadmium criterion in Footnote (7) to Table 2.14.2

Attachment 4: September 17, 2018 Memorandum to Water Quality Standards Workgroup Subject: Addition of Class 1C to portions of the Blacksmith Fork and tributaries from the confluence with Left Hand Fork Blacksmith Fork to headwaters, Cache County, Utah

Attachment 5: Complete markup of all proposed changes to R317-2

DWQ-20198-014290

Attachment 1

Criteria Support Document: Site-specific criteria based on recalculated aquatic life water quality criteria for ammonia for a segment of Mill Creek and the Jordan River, Salt Lake County, Utah:

UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY
WATER QUALITY

Criteria Support Document:
Site-specific criteria based on recalculated aquatic life water quality criteria for ammonia for a segment of Mill Creek and the Jordan River, Salt Lake County, Utah

November 21, 2018 Review Draft

Executive Summary

Mill Creek from below I-15 to the Jordan River and the Jordan River downstream to 900 South Street including the Surplus Canal (the Site) were evaluated to determine appropriate water quality for ammonia. The principle objective was to determine if mussels belonging to the Superfamily Unionoidea (unionids) are U.S. Environmental Protection Agency (USEPA) residents at the Site. The methods are recommended by USEPA as part of the update of the ammonia water quality criteria in 2013. The conclusions are:

1. Unionid mussels historically were present upstream in the Jordan and Utah Lake, tributaries to Jordan River and were also likely present at the Site.

2. Unionid mussels are not currently present at the Site or in the nearby waters that were surveyed because of degraded conditions. Not all nearby waters were surveyed.

3. Non-pulmonate snails are present, or were recently present at the Site and are residents.

4. The Jordan River is physically, biologically and chemically degraded at the Site. Efforts to restore the Jordan River are ongoing but are unlikely to be sufficient to support the potential reintroduction of unionid mussels within the reasonable planning horizon of the next 30 years, if ever.

Contents

Introduction

The United States Environmental Protection Agency (USEPA) published updated Clean Water Act Section 304(a) water quality criteria for ammonia in 2013. The updated criteria are based in-part on new toxicity data for mussels from the Superfamily Unionoidea, herein referred to as unionid mussels, and non-pulmonate snails. Non-pulmonate snails have gills but the presence of gills is not discriminating for snail taxonomy. The unionid mussels species native to the eastern United States were the most sensitive species tested, and when present, the USEPA (2013) ammonia criteria are substantially more stringent than the existing Utah ammonia criteria. Although not as sensitive to the toxic effects of ammonia as the unionid mussels, non-pulmonate snail species were the 10^{th} most sensitive taxa for acute toxicity and 5^{th} most sensitive for chronic toxicity (Tables 3 and 4, USEPA, 2013).

Data characterizing the specific sensitivity of the two potential unionid mussel species native to Utah (*Anodonta californiensis/nutaliana* and *Margaritifera falcata*) are unavailable. As recommended by USEPA (1984), toxicity data from species within the same family are assumed to be representative of untested species from the same family. Specifically, other species of unionid mussels for which toxicity data are available are considered appropriate surrogates for the Utah unionid mussel species.

In response to the updates of the 2013 EPA ammonia criteria, OreoHelix Consulting, on behalf of the Central Valley Water Reclamation Facility (CVWRF), conducted several physical surveys to determine what mollusks were present in the Jordan River and adjacent waterbodies beginning in 2014. The results of these surveys are documented in a series of reports discussed in more detail later in this document. Initially, the purpose was to determine if ammonia-sensitive mollusks were present in the entire Jordan River watershed. Subsequently, the efforts were focused on Mill Creek upstream of the CVWRF and downstream in the Jordan River (Figure 1). The quantity and quality of these surveys are sufficient to conclude absence of the target mussels if they were not observed. These specific segments, hereafter referred to as the Site, are the focus of this document:

> Mill Creek from I-15 downstream to the confluence with the Jordan River. The Jordan River from the confluence with Mill Creek downstream to 900 South Street and the Surplus Canal downstream to 900 South Street.

Figure 1 shows the Site boundaries and the location of the Central Valley Water Reclamation Facility. The downstream boundary for the Site is based on the modelled extent of the Central Valley Waste Water Treatment Facility’s potential ammonia influence; i.e., based on a chronic ammonia concentration of 3.7 mg/L in the CVWRF effluent, ammonia concentrations in the Jordan River downstream of 900 South would meet the USEPA (2013a) water quality criteria protective of unionid mussels (DWQ, 2017). The upstream boundary is based primarily on a change in the designated beneficial uses. Mill Creek upstream of I-15 is classified as Class 3A: protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain. Mill Creek downstream of I-15 to the Jordan River confluence is Class 3C: protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain. Moving downstream, the Jordan River to 900 South is Class 3B: protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. The Surplus Canal (begins at approximately 2100 South) is Class 3C and also Class 3D: protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.

Site Setting

The Jordan River is approximately 50 miles long, originating at Utah Lake and ending at Great Salt Lake. The surrounding land use is urban. The majority of tributaries to the Jordan River originate in the Wasatch Mountains to the east and a few from the Oquirrh Mountains to the west. The Jordan River and its tributaries are physically biologically and chemically altered primarily from urban influences.

Several water quality impairments have been identified for the Site. The water quality of Mill Creek from the I-15 to the confluence with the Jordan River is currently impaired for benthic macroinvertebrates and microbial pathogens. The water quality of the Jordan River from the confluence with Little Cottonwood Creek to 2100 South Street is impaired for benthic macroinvertebrates, microbial pathogens and total dissolved solids. The water quality of the Jordan River from 2100 South to North Temple Street is impaired for benthic macroinvertebrates, microbial pathogens, dissolved oxygen and total phosphorus.

The Jordan River is extensively altered hydraulically. The river channel is regularly dredged in some reaches, The Surplus Canal at about 2100 South Street diverts much of the Jordan River flow for flood control. A significant amount of water is diverted upstream of the Site for potable water (upstream of Utah Lake) and by extensive diversions both upstream and along the Jordan River for secondary water.

Mollusk Surveys

Two species of indigenous unionid mussels potentially occur in Utah: *Anodonta californiensis* and *Margaritifera falcata* (Hovingh, 2004). Other bivalves include clams in the Family Sphaeriidae and non-natives *Corbicula fluminea* and the unionid *Utterbackia imbecillis*. Seven species of non-pulmonate snails are potentially present in the Jordan River watershed: *Fluminicola coloradoensis,* at least two *Pyrgulopsis* species, and two heterobranch snails: *Valvata humeralis* and *Valvata utahensis* (USU, 2017).

Existing records on the statewide occurrence of unionid mussels and non-pulmonate snails are summarized in USU (2017). The existing records for the Jordan River watershed were also reviewed by Oreohelix (2014a). Records from pre-1978 are considered historic and records after 1978 are considered recent (DWQ, 2017). Existing records document that *Anodonta* was historically present in the Jordan River (1942) and was also found in Jordan River tributaries at eight other locations including Hot Springs Lake (no longer exists), Decker Pond and Big Cottonwood Creek. Historic and recent records show unionid mussels were also present upstream in Utah Lake and some Utah Lake tributaries. The non-unionid mussel, *Sphaerium,* was historically present in the Jordan River at Utah Lake and in the Narrows. Sphaeriidae and *Anodonta* were found in Mill Pond on Spring Creek (Utah Lake tributary) in 1989 (Hovingh, 2016).

For non-pulmonate snails, records document the presence of *Fluminicola* and *Pyrgulopsis* in the Jordan River at the Site (near the Peace Gardens) post-2000.These two taxa were also reported to be recently present in the Jordan River upstream of the Site at the City of Riverdale. *Fluminicola* and *Pyrgulopsis* were also documented in Mill Pond on Spring Creek (Utah Lake tributary). No recent (after 1978) records exist for the presence of *Valvata* in Jordan River or tributaries but historic records document their presence at locations within the Jordan River (USU, 2017).

Oreohelix conducted several physical surveys for mollusks in the Jordan Basin from 2014 through 2018. The methods and results of the surveys are presented in a series of reports prepared by Oreohelix (2014a, 2015, 2017a, 2017b, 2017c). Surveys were conducted by searching shorelines for shells, benthic surveys using aquascopes, and intrusive surveys using either a shovel, net or suction dredge. Figures 2 and 3 show the specific sample locations of the surveys for the Site. Additional survey locations are presented in the other Oreohelix reports.

The results of the Oreohelix surveys for the Site and other relevant locations are summarized below:

1. Physical surveys of the Jordan River did not find any live unionid mussels nor were any found in the surveyed segments of Mill Creek. A single *A. californiensis* shell fragment was found in the Jordan River near 11000 South and fragments were observed in a Mill Creek bank cut stratum near the confluence with the Jordan River (Figure 4). Large numbers of *Corbicula*, both living and shells were found at the Site during the surveys (Figure 5). *A. californiensis* whole shells were found in Spring Creek (Figure 6) and Currant Creek that are tributaries to Utah Lake and not part of the Site.

2. The closest known extant unionid mussels to the Jordan River are located in Salt Creek (Great Salt Lake tributary), Beaver Creek (Weber River tributary), Currant Creek (Utah Lake tributary), and as shown in Figure 7, Beer Creek (Utah Lake tributary).

   A. californienisis was found in Salt Creek. The hydraulic connectivity between Salt Creek and the Jordan River is through hypersaline portions of Great Salt Lake that is an effective barrier to migrating fish hosts.

   M*. falcata* was found in Beaver Creek. Beaver Creek is a tributary to the Weber River and to the Provo River via a diversion. The Weber River discharges to Willard Bay Reservoir on the Great Salt Lake shoreline and irrigation return flows from the Weber River eventually discharge to Great Salt Lake. The Provo River diversion from Beaver Creek is identified as a fish barrier by the Utah Division of Wildlife Resources.

   A. californiensis was reported to be present recently in the Burraston Ponds (Mock 2004) and Currant Creek (Richards 2016c) but were recently not found in the ponds by Richards (2016c). The Provo River, Burraston Ponds (via Currant Creek) and Beer Creek (via Benjamin Slough) are tributaries to Utah Lake.

3. Shells and live bivalves from the Family Sphaeriidae were observed in the Jordan River (Oreohelix, 2014). USEPA (2013a) indicates that these taxa are more closely related to the non-unionid fingernail clam *Musculium* than to unionid mussels.

4. Oreohelix found no live non-pulmonate snails in the main stem Jordan River, except for the invasive New Zealand mudsnail. Oreohelix (2014) reports that empty shells of *Fluminicola coloradoensis*, *Pyrgulopsis sp*., *Valvata humeralis*, and *V. utahensis* were found in the main stem but their age and origin are unknown. “It is likely that empty non-pulmonate shells found in the Jordan River samples were either deposited from tributaries where extant populations exist or from relatively recently extirpated (> 10-20 ybp) main stem Jordan River populations.” Oreohelix was unable to verify the presence of non-pulmonate snails at the locations where they were found in 2004 (USU, 2017). Oreohelix notes that snail population abundances can fluctuate yearly and may naturally have greater abundances in the future and therefore may be more detectable. Snail shells were also observed in the cut-bank stratum shown in Figure 3.

USEPA (2013) “Residents” Tests

<u>Are usually present at the site</u>.

> The surveys conducted by Oreohelix (2017) support that *A. californiensis and M. falcata* are not currently present at the Site. Observed bivalves include *Corbicula* and *Sphaerium* from these surveys.

Oreohelix did not observe any non-pulmonate snails at the site but they were observed in tributaries and recently at the Site during other surveys (see USU, 2017).

Are present at the site only seasonally due to migration.

The unionid mussels do not migrate seasonally although their obligate fish hosts may migrate; nor do non-pulmonate snails migrate seasonally.

Are present at the site intermittently because they periodically return to or extend their ranges into the site.

No mussels were observed during the surveys. Adult mussels are sessile, and if present, would be present permanently. Non-pulmonate snails were recently observed at the Site but were not observed in the later surveys conducted by Oreohelix. This may represent an intermittent presence.

Were present at the site in the past (a), are not currently present at the site due to degraded conditions (b), but are expected to return to the site when conditions improve (c);

Are present in nearby bodies of water (a), are not currently present at the site due to degraded conditions (b), but are expected to be present at the site when conditions improve (c).

Were once present at the site (a), but cannot exist at the site now due to permanent (physical) alterations of the habitat or other conditions (b), that are not likely to change within reasonable planning horizons (c).

(a) Historical records document that unionid mussels were previously present in the Jordan River, the Jordan River watershed in Big Cottonwood Creek and Utah Lake. No specific records document past presence of unionid mussels at the Site. However, indirect evidence consisting of unionid shells was observed in a cutbank stratum in Mill Creek near the confluence with the Jordan River and shell fragments were found in the Jordan River near 11000 South. The origin or age of these shells is unknown.

The closest known extant unionid mussels to the Jordan River are located in Beer Creek shown in Figure 7 and Currant Creek (*A. californiensis*), tributaries to Utah Lake; and Beaver Creek (*M. falcata*), a tributary to the Weber River that discharges to Great Salt Lake. Oreohelix found *A. californiensis* shells in the Jordan River upstream of the Site at about 11000 South. (Mock et al., (2010; 2014) recently found live *A. californiensis* in Currant and Spring Creeks (tributaries to Utah Lake). Anecdotal historical records indicate that unionid mussels were common in Utah Lake.

Limited reconnaissance surveys were conducted on some of the tributaries to the Jordan River and upstream in Utah Lake and tributaries. No evidence of unionid mussels was observed but not all waters were surveyed or surveyed comprehensively.

Historical and recent records document the presence of non-pulmonate snails at the Site (e.g., see USU, 2017).

(b)(c) The surveys conducted by Oreohelix support that *A. californiensis and M. falcata* are not currently present at the Site. Observed bivalves include *Corbicula* and *Sphaerium* from these surveys. The Jordan River is degraded physically, biologically and chemically and there are likely additional factors that have contributed to the extirpation of unionid mussels.

Several water quality impairments have been identified for the Site. The water quality of Mill Creek from the confluence with the Jordan River to I-15 is currently impaired for benthic macroinvertebrates and microbial pathogens. The water quality of the Jordan River from 2100 South to the confluence with Little Cottonwood Creek is impaired for benthic macroinvertebrates, microbial pathogens and total dissolved solids. The water quality of the Jordan River from North Temple Street to 2100 South is impaired for benthic macroinvertebrates, microbial pathogens, dissolved oxygen and total phosphorus.

The Site is affected by other forms of degradation. Lower Mill Creek and portions of the Jordan are regularly dredged for flood control. Portions of the creek and river have been channelized and hardened. Flow regimes have been altered by upstream dams, diversions, water transfers and the Central Valley Water Reclamation Facility discharge. Abundant invasive *Corbicula* and New Zealand mud snails currently inhabit the Site.

Some of the degradation is expected to be improved in the future pending the outcome and implementation of Total Maximum Daily Loads for the identified water quality impairments but these activities are not expected to ever fully restore the Jordan River. The return of unionid mussels is unexpected but not impossible. No obvious mechanisms were identified for unionid mussels to return assuming that the restoration is sufficient.

If unionid mussels are present in nearby waters, they would require one of three mechanisms to become established at the Site: 1) juvenile mussels transported downstream, 2) transport of glochidia via an infected fish host or 3) reintroduction.

1) Juvenile mussels transported downstream to the Site would require a sufficient population upstream and sufficient flow for transport for juvenile mussels to be transported downstream.
2) Alternatively, an infected fish host could reintroduce unionid mussels to the Site. The fish host species for *A. californiensis* and *M. falcata* have not been fully characterized but based on their historical presence in the area, some or all of the indigenous fish species are viable hosts.

   A. californiensis is regarded more as a generalist for fish hosts (BHreference). Xerces reports that green sunfish (even as nonindigenous) are suitable hosts (http://xerces.org/california-and-winged-floaters/). Bonneville cutthroat trout (*Oncorhynchus clarki utah*) are likely suitable hosts for *M. falcata* based on trout and salmon being suitable hosts for *M. falcata* across its range (Howard and Cuffey, 2006, etc.). The suitability of other indigenous species to serve as hosts for unionid mussels, such as the Utah chub, Utah sucker and June sucker are unconfirmed. Introduced salmonids such as rainbow and brown trout may be suitable hosts.

   Bonneville cutthroat trout have been reintroduced in to tributaries of the Jordan River including Red Butte Creek and Mill Creek. Fish species currently presumed to reproduce in the Jordan River include Utah sucker, Utah chub, Channel catfish, Black bullhead, Mosquitofish, Green sunfish, Redside shiner, Fathead minnow ,Walleye, Asian carp, and White bass (DWQ, 2016). Other species observed include Black crappie, Brown trout, Rainbow trout, , Smallmouth Bass, and Yellow Perch (DWQ, 2016). Anecdotally, law enforcement officers patrolling the Jordan River Parkway told DWQ staff that fishermen fish for large trout in Mill Creek immediately upstream of the CVWRF discharge. Reintroduction of unionid mussels by fish hosts from the known existing mussel populations is judged unlikely because of the distances and potential intervening fish barriers.

3) Unionid mussels could be intentionally reintroduced by the Utah Division of Wildlife Resources.

In summary, unionid mussels were likely historically present at the Site but as discussed further below, are unlikely to return within the reasonable planning horizon of the next 30 years.

Discussion

Based on the recent observations of non-pulmonate snails at the Site and within hydraulically connected waters, nonpulomonate snails are residents for the purpose of calculating appropriately protective ammonia water quality criteria.

The historical records support that unionid mussels were likely present in portions of the Jordan River and likely in Mill Creek but recent surveys support that they are not currently present. The unionid mussels are not expected to return within the reasonable planning horizon of the next 30 years because of degraded conditions. The degraded conditions include water quality impairments but these impairments cannot be directly linked to the absence of unionid mussels. While restoration efforts for both the physical and chemical degradation are onging, these efforts are still in the planning stages and the achievable end state is not yet defined, i.e., the highest attainable use. Once a restoration plan is established, these efforts are expected to take decades to implement.

The Utah Division of Wildlife Resources is scoping plans for reestablishing unionid mussels in Utah but these plans do not include the Jordan River for the foreseeable future. Other higher quality habitat and stabilizing extant unionid mussel populations will be the focus of the initial recovery efforts.

The existing *E. coli* impairments throughout the Jordan River are for human health and are not expected to directly adversely affect the mussels.

The dissolved oxygen impairments could adversely affect the ability of mussels to inhabit the Site. The ongoing investigations of these impairments for the Jordan River suggest that sediment oxygen demand coupled with reduced flushing flows due to flood management and stormwater are primary contributors to the impairments (Cirrus, 2017). A less stringent, site-specific dissolved oxygen criteria for portions of the Jordan River downstream of the site were previously established to reflect these conditions. Oreohelix (2017b) reports anoxic sediments in several of the surveyed locations. The primary evidence that dissolved oxygen is not a primary cause of unionid mussel absence is the presence of abundant populations of Asian clams. Like unionid mussels, these clams are sessile and would have a similar vulnerability to low dissolved oxygen conditions. Asian clams and unionid mussels are competitors but a key difference is that Asian clams do not rely on fish hosts as do unionid mussels for reproduction. While Asian clams are likely an additional stressor for unionid mussels, they have not been demonstrated to preclude the presence of unionid mussels (see discussion and references in DWQ, 2016a).

The water quality of the Jordan River is impaired for total dissolved solids (TDS) and TDS can adversely affect mussel survival (Patnode et al., 2015). Ongoing investigations to resolve the TDS impairments suggest natural and irreversible anthropogenic conditions are responsible for the impairment. Diversions upstream of Utah Lake divert water with low TDS concentrations for use as drinking water for Salt Lake and Utah Counties. Significant secondary water diversions, such as those above the Narrows, further dewater the Jordan River. The headwater for the Jordan River is Utah Lake which is also cyclically impaired for TDS. Utah Lake is large and shallow (95,000 acres, maximum depth 14') that results in high evaporative losses relative to the volume. Groundwater with elevated TDS concentrations discharges to the Jordan River including via several springs in the Narrows. Regardless of the causes of the TDS impairments, the magnitudes of the exceedances are low compared to the applicable agricultural use criterion of 1,200 mg/L (Table 1). While salt is known to be toxic to unionid mussels, the tolerance varies between species and is inversely correlated with hardness (Gillis, 2011). The hardness of the Jordan River is about 300 mg/L $CaCO^3$ (DWQ 3/21/2017 UPDES Permit for CVWRF) which combined suggest that TDS is unlikely to be a primary cause.

Oreohelix (2016a) discusses the potential negative impacts of suspended solids on unionid mussels. The degree to which the water turbidity is man-caused versus natural conditions has not been estimated.

The specific causes of the benthic macroinvertebrate impairments and the relationships to unionid mussels are less certain but are likely correlated for some of the causes, i.e., the same factors limiting the potential for unionid mussels to be present are also adversely affecting benthic macroinvertebrates.

Current data regarding fish populations are inadequate to evaluate whether an absence of fish hosts is a major impediment to the reintroduction of mussels at the Site. Introduced fish species and a loss of native species is one of the degradations likely affecting the ability of unionid mussels to inhabit or recolonize the Jordan River. If insufficient fish populations are determined to be one of the impediments, the reasons for insufficient fish populations need to be evaluated using the same USEPA (2013) resident procedures.

Table 1 All TDS data from 1990 to 2012 from five Jordan River stations to determine 90th percent confidence interval between 1,279 and 1,585 mg/L

Jordan River Location	**N**	**Arithmetic Mean (mg/L)**	**Standard Deviation (mg/L)**	**90^{th} Percentile Prediction Limit (mg/L)**
2100 South	100	870	246	1,279
Pedestrian Bridge	105	1,110	236	1,434

near 5400 South				

Conclusions

1. Unionid mussels historically were present upstream in the Jordan and Utah Lake, tributaries to Jordan River and were also likely present at the Site.
2. Unionid mussels are not currently present at the Site or in the nearby waters that were surveyed because of degraded conditions. Not all nearby waters were surveyed.
3. Non-pulmonate snails are present, or were recently present at the Site and are residents.
4. The Jordan River is physically, biologically and chemically degraded at the Site. Efforts to restore the Jordan River are ongoing but are unlikely to be sufficient to support the potential reintroduction of unionid mussels within the reasonable planning horizon of the next 30 years, if ever.

Recommendations

Ammonia criteria protective of the aquatic life uses at the Site does not need to be protective of unionid mussels during this current planning horizon. Unless unionid mussels are demonstrated to not be residents downstream of 900 South Street in the Jordan River and Surplus Canal, permit limits CVWRF and other dischargers must assure downstream protection for unionid mussels. Non-pulmonate snails are present and the ammonia criteria are required to be protective of these taxa. The criteria should be calculated consistent with USEPA (2013c). The underlying assumptions and conclusions supporting these recommendations should be periodically reviewed as progress is made on restoring the Jordan River.

Criteria Calculation.

USEPA (2013a) provides procedures for calculating the ammonia criteria to represent the site-specific aquatic life to be protected. As recommended by Oreohelix (2014) the criterion maximum concentration (aka, acute criterion) should be based on unionids and trout not being residents. At a pH of 7 and temperature of 20 °C, the total ammonia nitrogen is 38 mg/L. Criteria for other pH and temperature conditions are provided in Table N.4 of USEPA (2013a). The following equation can be used to calculate the criterion maximum concentration:

$$CMC = 0.7249 \times \left(\frac{0.0114}{1+10^{7.204-pH}} + \frac{1.6181}{1+10^{pH-7.204}}\right) x\ MIN(\left(51.93, \left(62.15 \times 10^{0.036\times(20-T)}\right)\right)$$

For the criterion continuous concentration (aka, chronic criterion), unionid mussels are not residents. When early life stages of fish are present, the criterion continuous ammonia criterion at a pH of 7 and temperature of 20 °C, is 6.5 mg/L total ammonia nitrogen. Table N.8 in USEPA (2013a) shows the criteria for other temperature and pH combinations that are calculated using the following equation:

$$CCC = 0.9405 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times MIN\left(6.920, (7.547 \times 10^{0.028\times(20-T)})\right)$$

When early life-stages of fish are not present, the criterion continuous ammonia criterion at a pH of 7 and temperature of 20 °C, is 7.1 mg/L total ammonia nitrogen. Table N.9 in USEPA (2013a) shows the criteria for other temperature and pH combinations that are calculated using the following equation:

$$CCC = 0.9405 \times \left(\frac{0.0278}{1+10^{7.688-pH}} + \frac{1.1994}{1+10^{pH-7.688}}\right) \times \left(7.547 \times 10^{0.028\times(20-MAX(T,7))}\right)$$

Figures

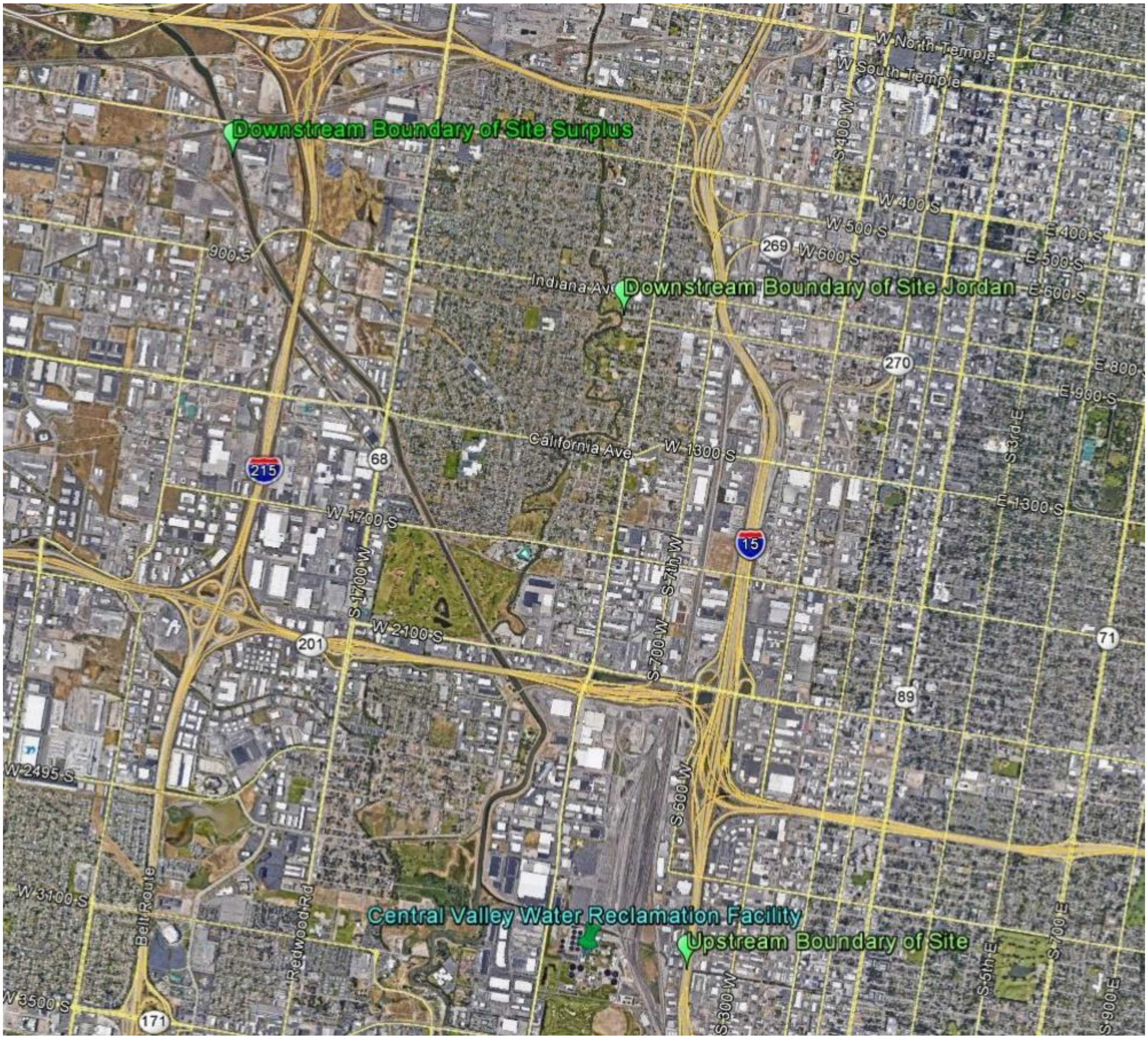


Figure 1. The Site and location of the Central Valley Water Reclamation Facility

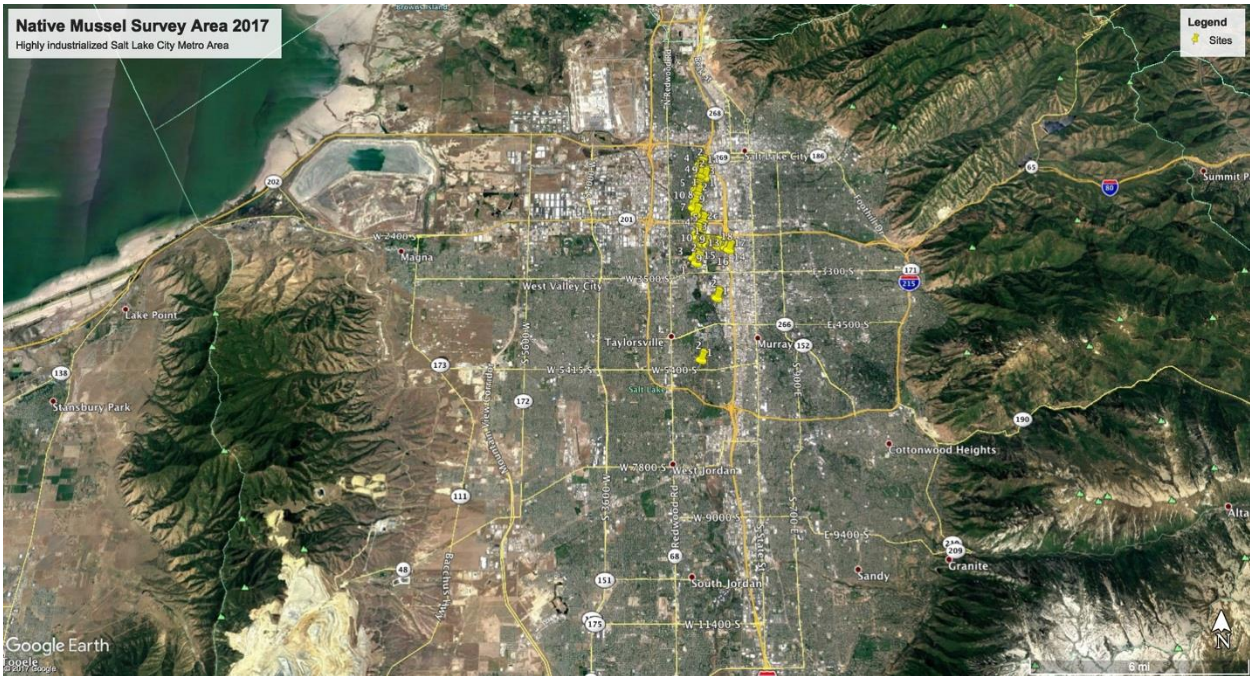


Figure 2. Overview of mussel survey locations at the Site (adapted from Figure 6, Oreohelix, 2017a).

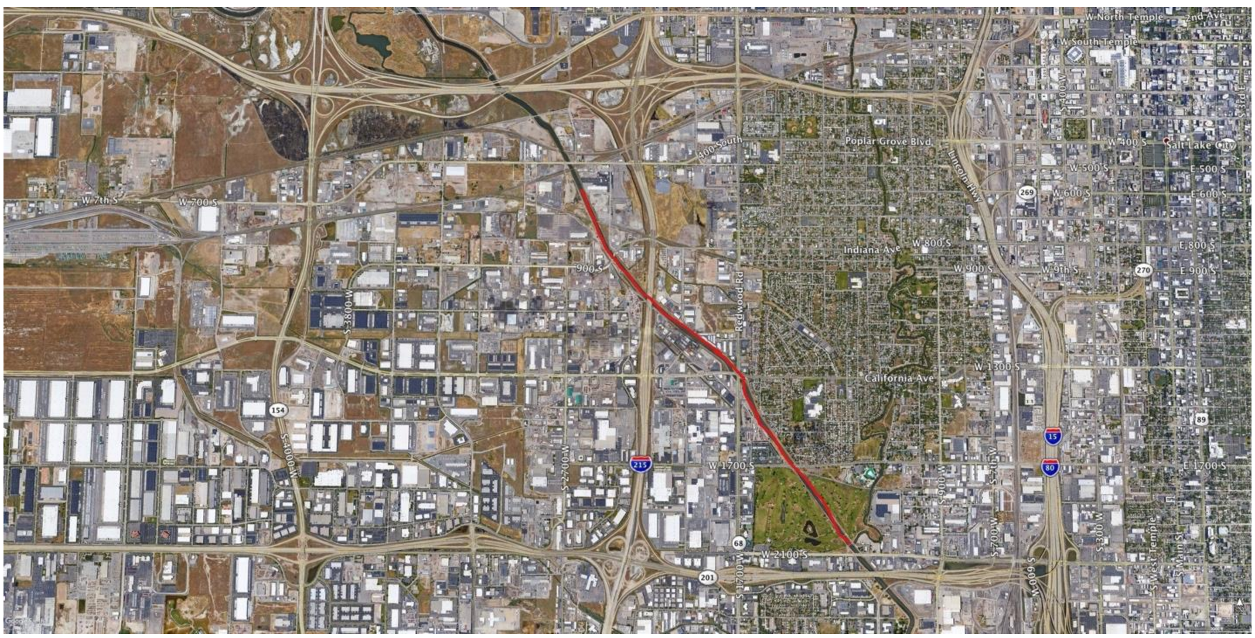


Figure 3. Surveyed portion of Surplus Canal (adapted from Figure 5, Oreohelix, 2018)

Figure 4. Soil profile of Mill Creek between the CVWRF and confluence with the Jordan River. Several easily observable soil layers can be seen. Physidae and Lymnaeidae shells typically were found in the darker layers suggesting warm water, wetland habitat conditons, whereas Fluminicola were found in slightly coarser sediment layers suggesting cold-water conditions. Potential Anodonta fragments were found somewhat in between these layers.(Figure 17, Oreohelix, 2016c)

Figure 5. Clamming on the Jordan River at 1700 South. Corbicula sp. at extreme high densities. This is also the location of the muskrat midden shown in the appendices. (Figure 38, Oreohelix, 2014)

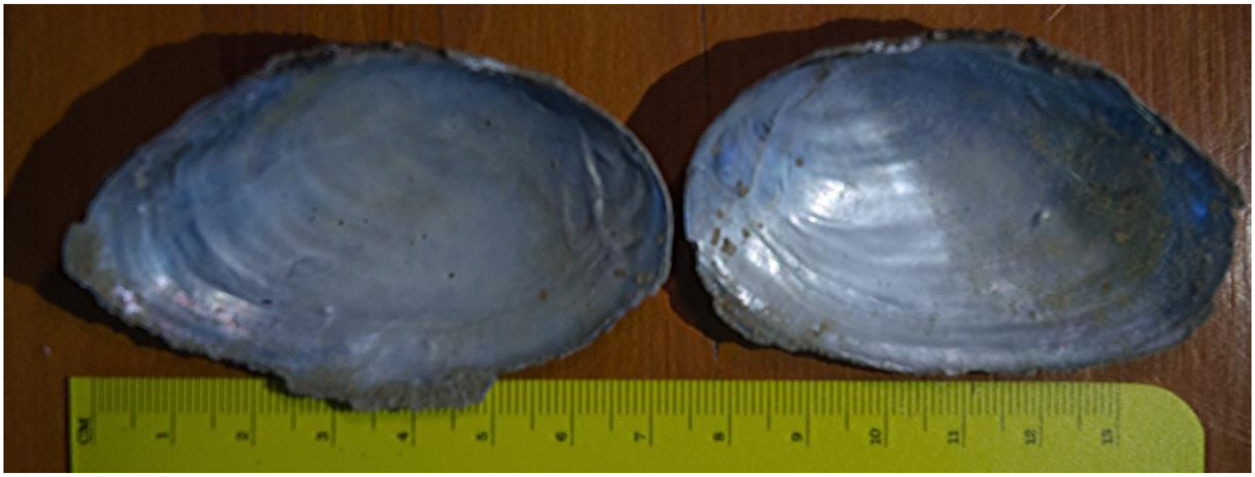


Figure 6. Complete Anodonta sp. shell from Mill Pond, Utah County, April 2014. No body tissue was present and the time since death is unknown. (Figure 27, Oreohelix, 2014)

Figure 7. Location of Beer Creek, the closest known population of Anodonta californiensis/nuttalliana to Mill Creek evaluation site and CVWRF (adapted from Oreohelix, 2016c)

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Attachment 2

Criteria Support Document: Use and Value Assessment and Site-specific Criteria for Total Dissolved Soils (TDS): Silver Creek, Version 2.2

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

Criteria Support Document

12/19/2018

Use and Value Assessment and Site-specific Criteria for Total Dissolved Soils (TDS): Silver Creek, Version 2.2

Contents

EXECUTIVE SUMMARY

A Use and Value Assessment was conducted for total dissolved solids (TDS) criterion to protect the agricultural designated use for Silver Creek, Summit County. Based on the use and value of the water, a maximum TDS criterion of 1,900 mg/L is proposed for Silver Creek and tributaries from Tollgate Creek to headwaters.

Road salting in the Park City area is impacting the water quality of Silver Creek by increasing the concentrations of TDS. The water quality of Silver Creek is also adversely impacted by water diversions and metals contamination from the historic mining activities in the Park City area.

The TDS criterion protects the agricultural uses of Silver Creek water. After determining that road salt was the primary source of man-caused portion of TDS to Silver Creek, local and state road maintenance agencies were contacted and their best management practices (BMPs) reviewed. BMPs are currently being implemented (primarily liquid potassium chloride pre-treatment of roads, sweeping and metered application) but salt application on private properties remains unregulated. This road salting is essential to protect human life and health resulting in an irreversible human-caused condition.

After considering all of the current and likely future irrigation practices with Silver Creek water and researching the salt tolerances of the irrigated crops, the higher criterion will protect the agricultural uses. The irrigation uses in this upper reach are primarily moderately salt-tolerant pasture grasses. Agriculture is more intensive downstream and includes alfalfa and grains. The TDS criterion for upper Silver Creek from the existing criterion of 1,200 mg/L to 1,900 mg/L is proposed. The 1,900 mg/L criterion in upper Silver Creek will be protective of the existing agricultural uses and will support the continued attainment of the 1,200 mg/L criterion downstream.

The following changes to R317-2-13.4 Weber River Basin are recommended.

(a) Weber River Drainage

Weber River and tributaries, from Stoddard diversion to Headwaters, except as listed below

1C 2B 3A 4

Silver Creek and tributaries, from confluence with Weber River to below the confluence with Tollgate Creek 1C 2B 3A 4

Silver Creek and tributaries, from confluence with Tollgate Creek to Headwaters 1C 2B 3A 4*

R317-2-14. Numeric Criteria Table 2.14.1

FOOTNOTE: (4)

Silver Creek and tributaries, Summit County, from confluence with Tollgate Creek to headwaters: maximum 1,900 mg/L.

LIST OF ACRONYMS

-A-		**-N-**	
AGRC	Automated Geographic Reference Center	NRCS	Natural Resources Conservation Service
AMRP	Abandoned Mine Reclamation Program	**-P-**	
ASOC	Administrative Settlement and Order on Consent	PCMC	Park City Municipal Corporation
AU	Assessment Unit	**-S-**	
-B-		SBWRD	Snyderville Basin Water Reclamation District
BMPs	Best Management Practices	SCO	Stipulated Compliance Order
-C-		SCWRF	Silver Creek Water Reclamation Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (aka Superfund)	**-T-**	
CFR	Code of Federal Regulations	TDS	Total Dissolved Solids
CWA	Clean Water Act (FKA Federal Water Pollution Control Act)	TMDL	Total Maximum Daily Load
-D-		**-U-**	
DDW	(Utah) Division of Drinking Water	UGS	Utah Geological Survey
DEQ	(Utah) Department of Environmental Quality	UHP	Utah Highway Patrol
DWQ	(Utah) Division of Water Quality	UPCM	United Park City Mines
-E-		USGS	United States Geological Survey
EPA	Environmental Protection Agency	**-W-**	
-K-		WQS	Water Quality Standard
KVCD	Kamas Valley Conservation District	WWTP	Wastewater Treatment Plant
-L-			
LDC	Load Duration Curve		
-M-			
MLID	Monitoring Location ID		
MS4	Municipal Separate Storm Sewer Systems		

INTRODUCTION

Purpose of Document

The purpose of this document is to present supporting documentation for a revised TDS criterion in Silver Creek. Data for this study were collected and analyzed according to the Sampling and Analysis Plan for TDS (DWQ, 2016) and the Silver Creek and East Canyon Creek TDS Study Work Plan (DWQ, 2017).

Regulatory Basis

As specified by UAC R317-2-7.1, site-specific standards may be adopted by rulemaking where biomonitoring data, bioassays, or other scientific analyses indicate that the statewide criterion is over or under protective of the designated uses or where natural or un-alterable conditions or other factors as defined in 40 CFR 131.10(g) prevent the attainment of the statewide criteria as prescribed in Subsections R317-2-7.2, and R317-2-7.3, and Section R317-2-14. As documented herein, the proposed criterion is protective of the uses.

The applicable federal requirements are specified in 40 CFR 131.10(a) "Each State must specify appropriate water uses to be achieved and protected. The classification of the waters of the State must take into consideration the use and value of water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation in and on the water, agricultural, industrial, and other purposes including navigation. If adopting new or revised designated uses other than the uses specified in section 101(a)(2) of the Act, or removing designated uses, States must submit documentation justifying how their consideration of the use and value of water for those uses listed in this paragraph appropriately supports the State's action. A use attainability analysis may be used to satisfy this requirement."

DWQ is proposing to revise the magnitude and duration of the water quality criterion for TDS for the Class 4 beneficial use in the upper Silver Creek watershed because of irreparable human-caused conditions. This requires splitting the Silver Creek Assessment Unit 16020101-020_00 into Silver Creek-1 (16020101-020_01) and Silver Creek-2 (16020101-020_02). A higher criterion in (Upper) Silver Creek-2 will continue to protect the existing Class 4 Agricultural uses because the irrigated pastures have a medium tolerance for salinity (USU, 1999; USDA, 2018). The salinity tolerances of crops are also affected by soil type, specific ions present and irrigation practices (USU, 1999). If sufficient irrigation water is applied at 1,900 mg/L (2,289 µS/cm) so that 15% is available for percolation through the root zone, predicted reductions in alfalfa yields are 15% (USU,1999).

Downstream agricultural uses for Silver Creek-1 include crops such as alfalfa that are more sensitive to TDS than the pastures but alfalfa is still classified as having medium salinity tolerance (USDA, 2018). No change to the TDS criterion is proposed for Silver Creek-1.

Watershed Description

The Silver Creek watershed is located in north-central Utah approximately 20 miles east of Salt Lake City (Figure 1). It is part of what has been defined by the Utah Geological Survey as the Snyderville Basin, which contains all of the East Canyon Creek drainage within Summit County and includes Silver Creek from its headwaters to the confluence with Tollgate Canyon (Figure 2) (Brooks et al., 1998). The headwaters for both Silver Creek and East Canyon Creek are in the Park City Municipal area.

Silver Creek flows east from its headwaters in Park City, then north through meadows along Highway 40, and finally through Silver Creek Canyon to the confluence with the Weber River downstream of Rockport Reservoir. The watershed drains approximately 48 square miles, and elevations range from >9,900 feet at the headwaters to 5,825 feet in the lower watershed (DWQ, 2013). The majority of Silver Creek's flow occurs during spring runoff, and the stream reach between Highway 40 and the USGS Gage at Atkinson often has little to no streamflow at other times of the year.

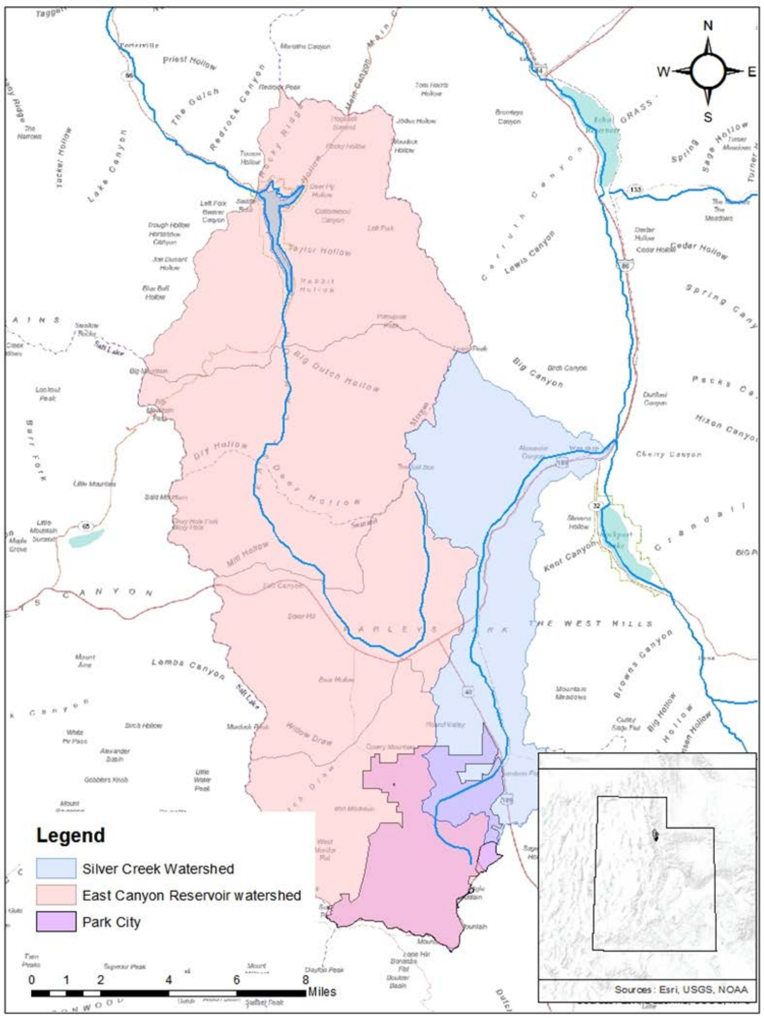

FIGURE 1. LOCATION OF SILVER CREEK WATERSHED (BLUE). PARK CITY'S BOUNDARIES ARE IN PURPLE. SILVER CREEK'S HEADWATERS ARE LOCATED IN PARK CITY.

Geology

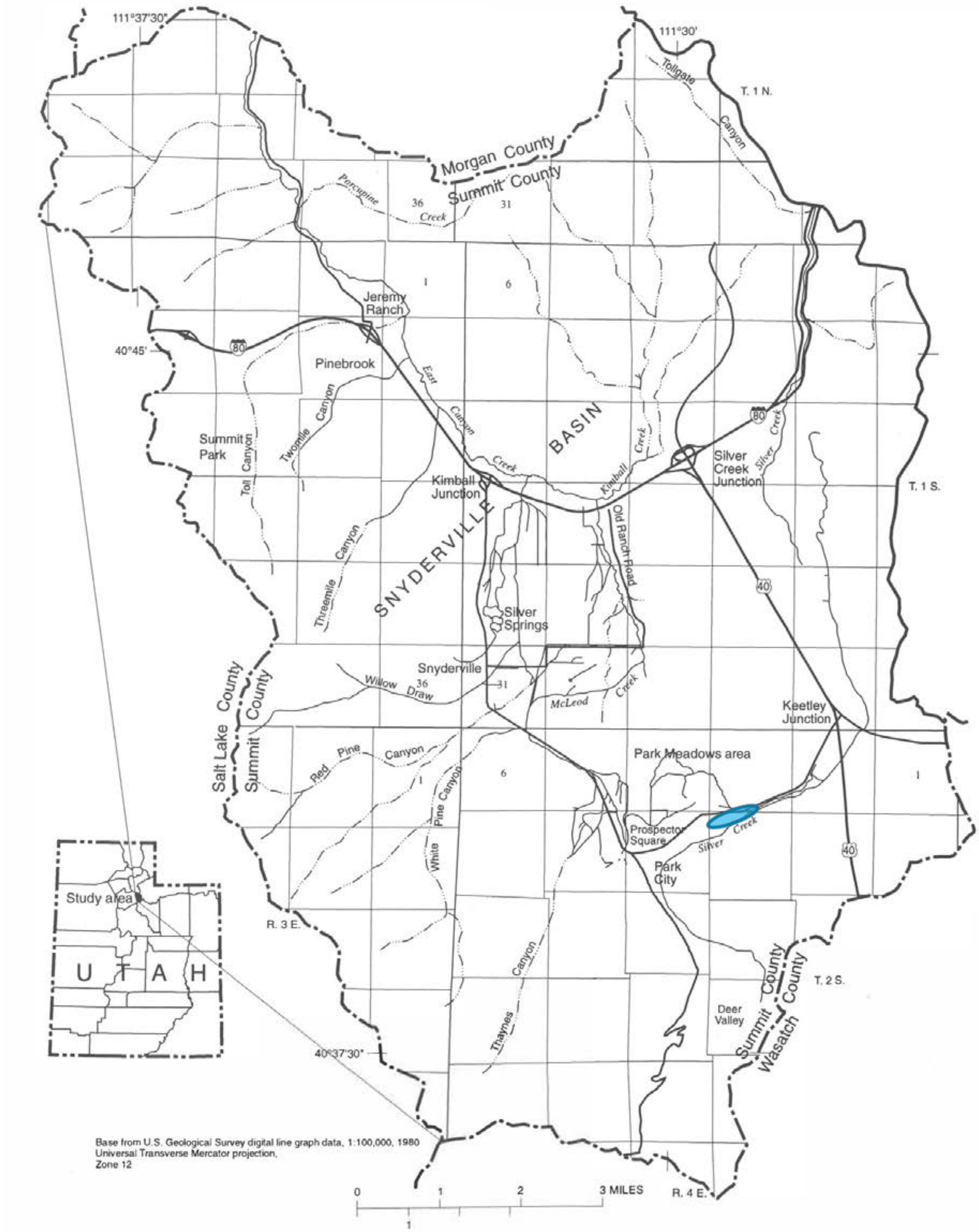

FIGURE 2. HYDROLOGIC BOUNDARY OF THE SNYDERVILLE BASIN, SUMMIT COUNTY, UTAH (MODIFIED FROM BROOKS ET AL., 1998). ORANGE OVAL MARKS THE APPROXIMATE LOCATION OF THE SINKHOLES THAT APPEARED IN 1982 AND 2008.

Figure 2 shows the boundary of the Snyderville Basin, which includes all of East Canyon Creek within Summit County and Silver Creek from the headwaters to the confluence with Toll Creek Canyon

(Brooks et al., 1998). This area has been studied by the United States Geological Survey (USGS), Utah Geological Survey (UGS), and the Utah Division of Water Rights since the 1990s due to increasing development and the need to characterize available groundwater resources.

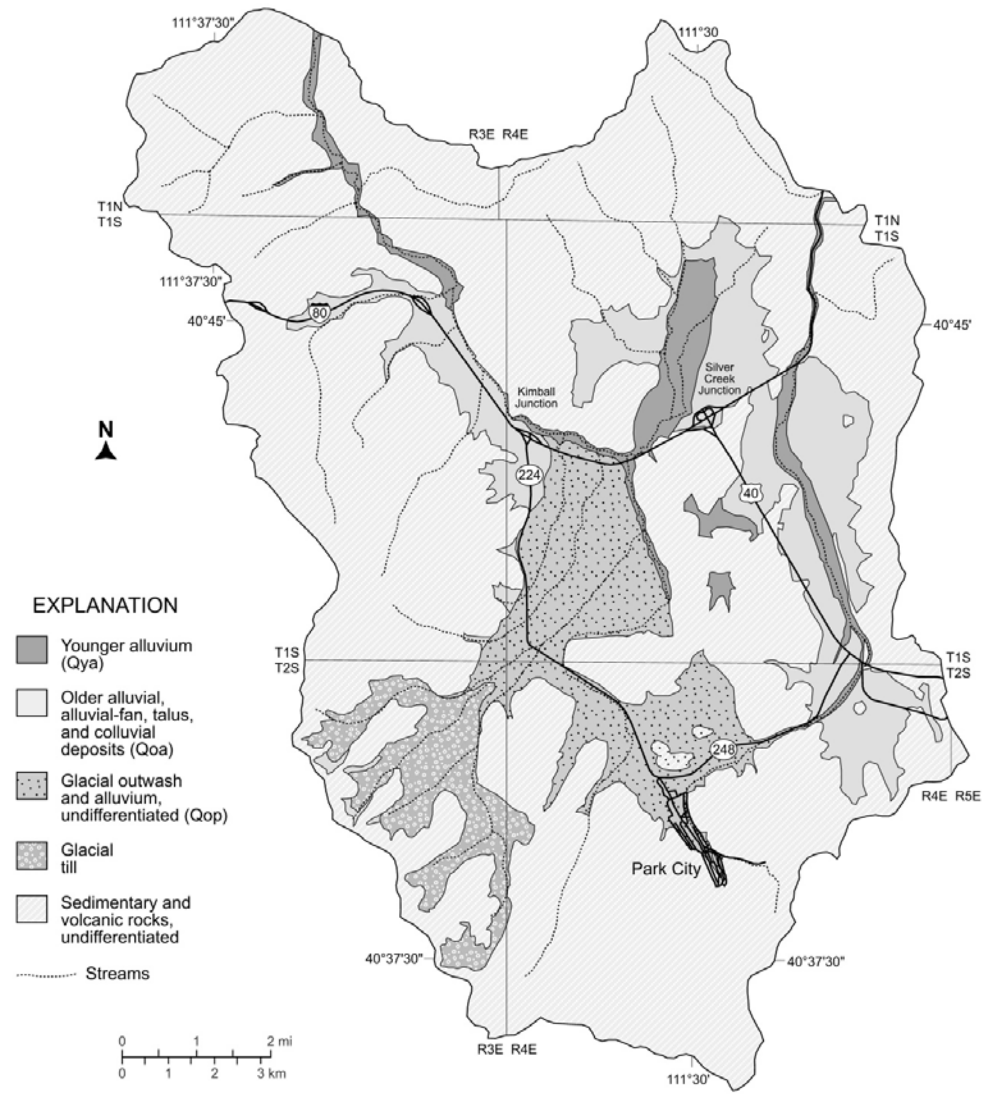

FIGURE 3. GEOLOGIC MAP OF THE SNYDERVILLE BASIN (MODIFIED FROM ASHLAND, ET AL, 2001). ORANGE OVAL MARKS THE APPROXIMATE LOCATION OF THE SINKHOLES THAT APPEARED IN 1982 AND 2008.

Figure 3 is a simplified geologic map of the Snyderville Basin. Groundwater in the basin is present in consolidated bedrock and in the unconsolidated valley fill. The principal water bearing formations consist of folded and fractured sandstone, limestone, shale, and quartzite in the northwest and central portions of the valley; volcanic rocks in the northeast and east; and siltstone, conglomerate, and sandstone in the north. The valley fill aquifers comprise alluvium, glacial outwash and glacial till (Brooks et al., 1998).

Groundwater in the study area is primarily influenced by the consolidated bedrock. Weathering of limestone and sandstone yield calcium, magnesium, bicarbonate and sulfate, which result in high hardness (>400 mg/L on average [DWQ 2004]). According to Brooks et al. and Susong et al. (1998), groundwater TDS concentrations in the Snyderville Basin range from 200 – 600 mg/L in the unconsolidated deposits. TDS concentrations in the unconsolidated aquifer may influence sodium and chloride concentrations in the underlying consolidated bedrock aquifer. Chloride in wells and springs near Park City, and in the creek near I-80, was attributed to road salt application (1998).

Headwater streams in the Snyderville Basin originate in the Wasatch Range, which constitute the southern and western borders of the basin. The canyons are a source of surface water, which flows north, and a recharge area for the consolidated bedrock and the unconsolidated valley fill aquifers (Brooks et al., 1998). Groundwater is discharged near Kimball Junction and in Park Meadows (Figure 2). The rapid response of streamflow to snowmelt conditions indicates limited groundwater storage capacity, such that streamflow is highly variable depending upon the amount of precipitation available (Susong et al., 1998).

Tunnels from legacy mining in the Park City area are also a source of surface water. Flow from the Judge and Spiro Tunnels is used for drinking, and any excess water flows to Silver Creek (or Mcleod Creek in the East Canyon Watershed).

SINKHOLES

Sinkholes formed in faulted limestone, quartzite and shale during May and June of 2008 in the reach of Silver Creek approximately 0.6 miles east-northeast of the trail gate at Wyatt Earp Way and South of U-248 (SBWRD, 2009) (Figures 2 and 3). This was approximately 200 feet west of a sinkhole that appeared in May 1982. The sinkholes captured the entire flow of Silver Creek and were subsequently plugged to restore streamflow. There is disagreement between USGS and the Abandoned Mine Reclamation Program (AMRP) and Loughlin Water Associates as to how they formed – USGS and AMRP contend that they were an abandoned adit while Loughlin Water Associates argue that they developed naturally (2009). Regardless, the geology in that stream reach is not well understood, and the reach can alternate between gaining and losing streamflow.

LEGACY MINING

Silver mining occurred in Park City from approximately 1868 to 1949 (http://historicparkcityutah.com). This history has resulted in metals contamination in soil, sediment, and surface water from Silver Creek's confluence with Tollgate Creek to the headwaters. Most of the mining activity occurred within the headwaters, particularly in Empire Canyon. Tailings from the mines were typically stored onsite or sluiced downstream. Several downstream locations were used to further reduce and process the discarded mine tailings in an attempt to recover additional metals. The middle reaches of the stream have significant amounts of mine tailings, including Silver Maple Claims, Richardson Flats, Flood Plain Tailings and the Meadow area (Figure 4). The ground water table is high and appears to exchange freely with water in Silver Creek, so contamination pathways are generally attributed to surface or ground water contact with mine tailings contaminated with metals. The Prospector Drain, a shallow groundwater drain installed to lower the water table in a portion of Prospector Square, is also a significant source of metals (and TDS) to the creek. The stream reach in Silver Creek Canyon between

Atkinson (MLID 492674 on figure) and Wanship has no tailings or other sources of metals other than existing sediment loads.

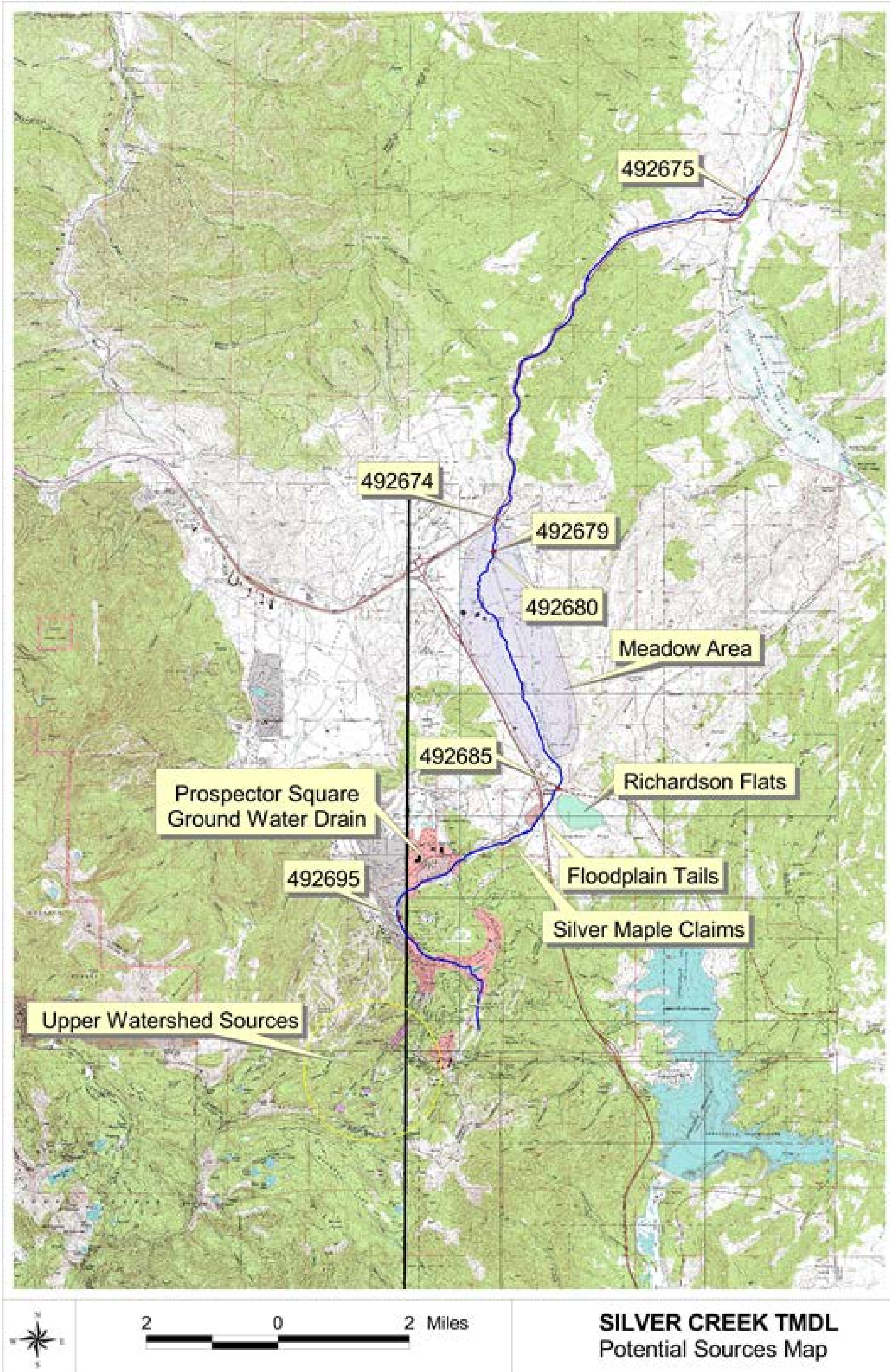

FIGURE 4. MAP OF POTENTIAL SOURCES FROM THE 2004 SILVER CREEK TMDL. MINE TAILING LOCATIONS AND MLIDS IN THE SILVER CREEK WATERSHED ARE ACCURATE, BUT THE LOCATION OF THE PROSPECTOR DRAIN IS APPROXIMATE. NOTE: ZEROS HAVE BEEN ADDED TO MLID SINCE 2004. FOR EXAMPLE, 492674 IS NOW 4926740.

Land Use

Based on the most recent water related land use information (AGRC, 2018), land use in the Silver Creek watershed is approximately 13% agricultural, 86% urban, and 1% riparian. Of the agricultural uses, approximately 10% are pasture, 1% alfalfa, 1% grass hay, and less than 1% idle (Table 1, Figure 5).

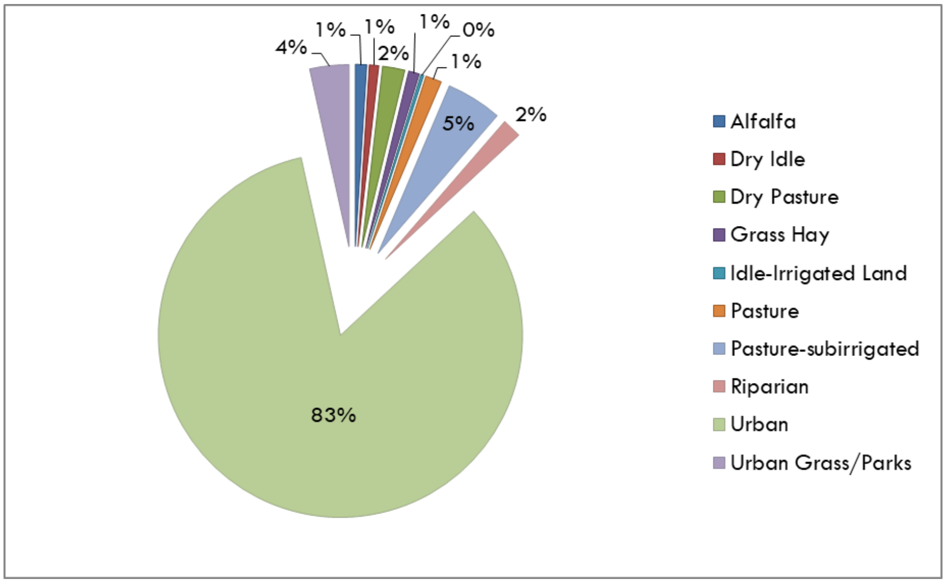

FIGURE 5. PROPORTIONAL LAND USE IN THE SILVER CREEK WATERSHED BY SUBCATEGORY (E.G. URBAN & URBAN GRASS AND PARKS). DATA IS FROM WATER RELATED LAND USE INFORMATION COMPILED BY THE UTAH DIVISION OF WATER RESOURCES – SURVEY YEAR 2007 (AGRC 2018).

According to NRCS, agricultural irrigation uses are primarily in Wanship, and crops include wheat, oats, and barley rotated with alfalfa (K.Lundeen, personal communication with NRCS 5/2/2016).

TABLE 1. LAND USE IN THE SILVER CREEK WATERSHED (DATA FROM AGRC, 2018).

Water Related Land Use	# of Acres	% Acres
Irrigated		
Alfalfa	21.37	1.04%
Grass Hay	20.48	1.27%
Pasture	30.65	2.84%
Total Irrigated:	**72.5**	**5.15%**
Not Irrigated		
Dry Idle	17.78	0.23%
Dry Pasture	42.12	1.98%
Idle-Irrigated Land	5.38	0.08%
Total Not Irrigated:	**65.28**	**2.29%**
Riparian		1.21%
Total Riparian:	**36.72**	**1.21%**
Sub-Irrigated		
Pasture-Sub-Irrigated	106.35	5.60%
Total Sub-Irrigated:	**106.35**	**5.60%**
Urban		
Urban	1,793.81	83.29%
Urban Grass/Parks	74.59	2.47%
Total Urban:	**1,868.4**	**85.75%**
Grand Total	**2,149.25**	**100.00%**

Figure 6 shows the land uses within the Silver Creek watershed. According to data from AGRC and the NRCS Resource Assessment for Summit County, Utah (2005), nearly all land is privately owned (i.e. city, county, or private citizens). Approximately 3% of land is federally or state owned (1.4% Bureau of Land Management, 0.2% Army Corps of Engineers/Department of Defense, and 0.3% owned by Utah School and Institutional Trust Lands Administration.

Irrigation

As discussed above, a limited (13%) quantity of agricultural land use is present in the Silver Creek watershed. Water rights to support new irrigation are unavailable and arable land is limited by ongoing growth. Irrigation is primarily used for pastures, grass hay and alfalfa which is rotated with wheat, barley or oats. Of the irrigated crops in the Silver Creek watershed, alfalfa is likely the most sensitive to TDS. However, alfalfa is primarily grown near the town of Wanship where no changes to the TDS criterion are proposed. There is one exception in the Park City area (Figure 7). This is the only plot of alfalfa in the Upper Silver Creek watershed, and it is irrigated using water from a private well. Since the water rights are limited to that source, this particular alfalfa field is not using and will not use water from Silver Creek (K. Lundeen, personal communication with Park City Municipal Corporation [PCMC], 7/26/2018). Pace Homer ditch, the other major irrigation diversion, collects water from Dorrity Spring, Spiro Tunnel, Mcleod Creek, and groundwater seepage (Brooks et al., 1998). Water from these sources is also below 1,200 mg/L TDS.

USU (1999), USDA (2018) and the Canadian Alberta Ag-info Center (AA, 2001) classify all of these crops as having a high- or medium salt tolerance. Based on the data presented in these sources, the 1,900 mg/L TDS criterion will not adversely affect the existing agricultural uses of water. If alfalfa crops were irrigated with TDS concentrations of 1,900 mg/L in the future, yields could be by reduced 15% (USU, 1999).

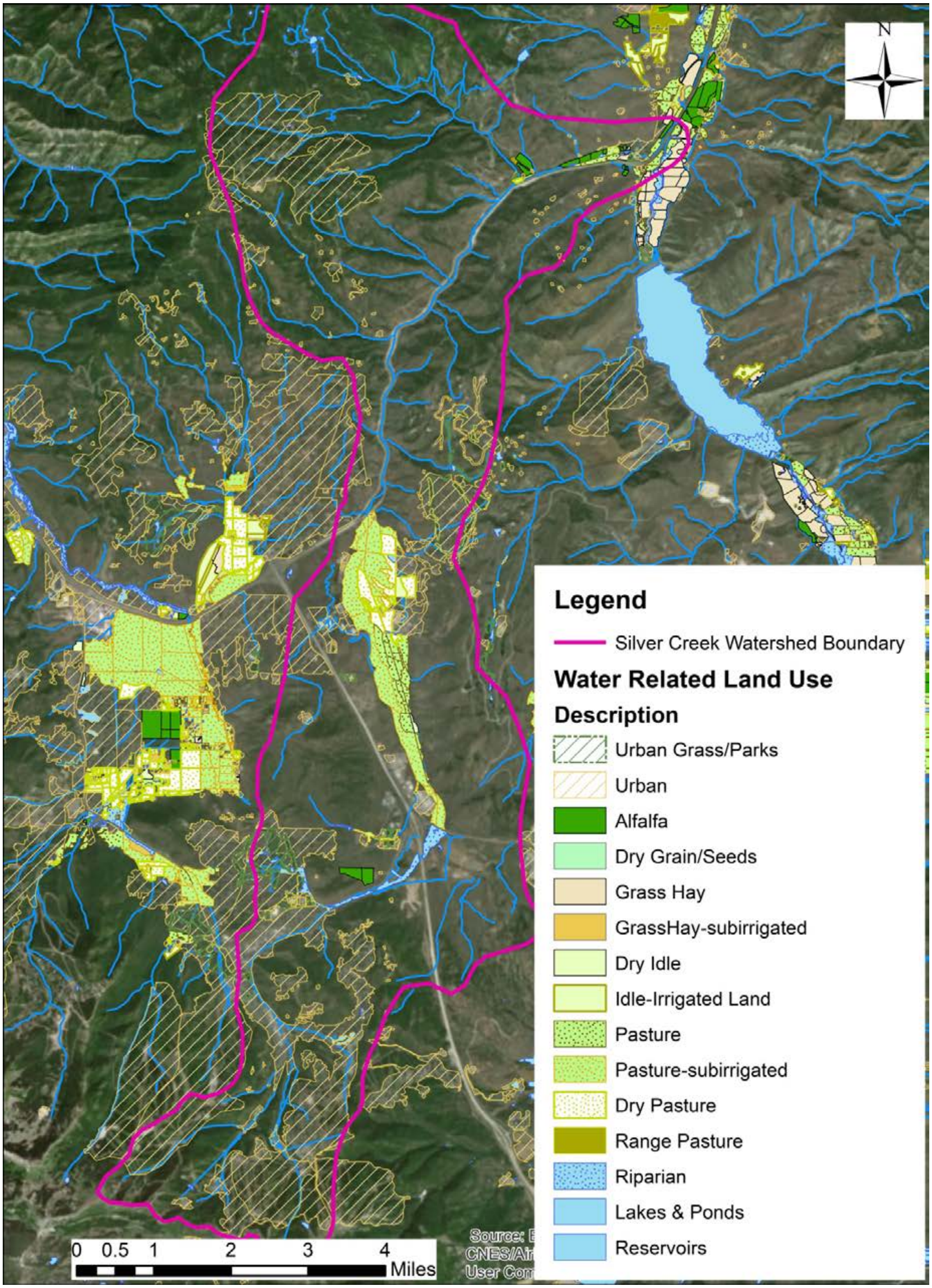

FIGURE 6. MAP OF LAND USES IN THE SILVER CREEK WATERSHED. (WATER RELATED LAND USE DATA COMPILED BY THE UTAH DIVISION OF WATER RESOURCES – SURVEY YEAR 2007 [AGRC 2018])

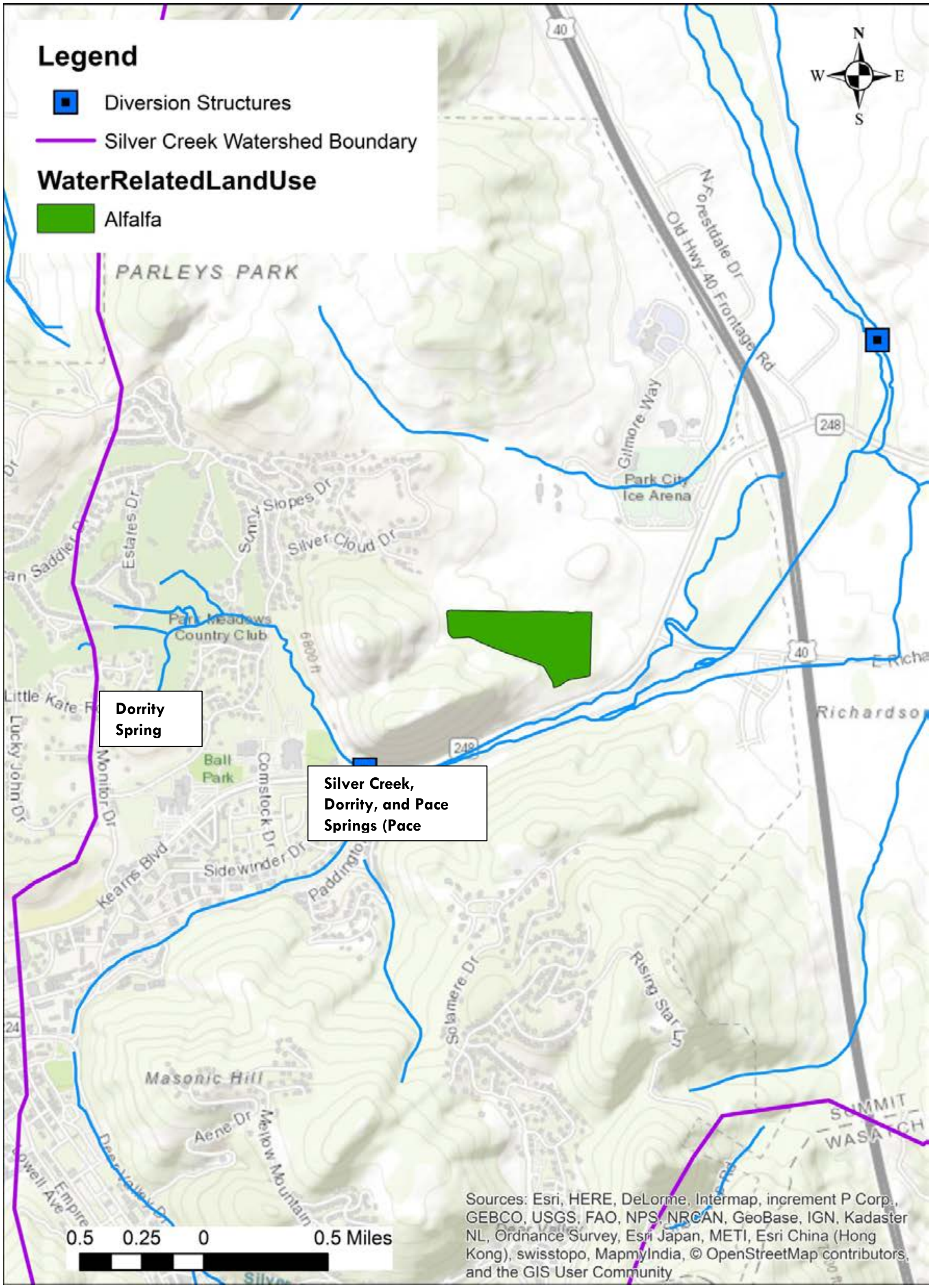

FIGURE 7. IRRIGATION DIVERSIONS IN THE SILVER CREEK WATERSHED AS THEY PERTAIN TO IRRIGATED LAND USE (DIVERSION DATA PROVIDED BY TROUT UNLIMITED). ALFALFA GROWN IN THIS LOCATION IS IRRIGATED BY A PRIVATE WELL.

Beneficial Uses

Silver Creek is protected for the following designated uses:

1C Protected for domestic purposes with prior treatment by processes required by the Utah Division of Drinking Water.

2B Protected for infrequent primary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water, such as boating, wading, or similar uses.

3A Protected for cold-water species of game fish and other cold-water aquatic life, including the necessary aquatic organisms in their food chain.

4 Protected for agricultural uses including irrigation of crops and stock watering.

DISCUSSION OF IMPAIRMENTS

1C - Domestic

The water quality of Silver Creek is not meeting its 1C beneficial use criteria for arsenic, nitrate, and pH. The nitrate impairments have been addressed through the Rockport and Echo Reservoir TMDL (2014). Arsenic will be addressed by a Stipulated Compliance Order (SCO) between DWQ and PCMC.

2B - Recreation

According to the 2016 Integrated Report, the water quality of Silver Creek is not meeting its 2B beneficial use criteria for pH.

3A - Aquatic Life

As described in the table, the water quality of Silver Creek is not meeting the Class 3A cold-water fishery beneficial use based on cadmium, zinc, arsenic, DO, pH, and biological assessments.

The stream channel between Silver Creek Canyon and the headwaters has high in-stream metal concentrations due to legacy mine tailings. DWQ completed TMDLs for cadmium and zinc in 2004. The 2004 TMDL recommended best management practices (BMPs) to reduce metals loading, including removal of the mine tailings, slope protection, proper routing of storm runoff, isolation measures, soil ordinances, temporary erosion controls, and water treatment such as water and sediment separators and treatment wetlands. Remediation was completed in Empire Canyon in 2007 and in part of Richardson Flat in 2012. EPA continues to oversee remediation under Administrative Orders on Consent (AOCs) with PCMC and United Park City Mines (EPA 2013 and 2014). Completed and planned remedial actions are expected to address all metal impairments.

DWQ addressed the DO impairment in the 2014 TMDL for Rockport and Echo Reservoirs. However, DWQ does not expect to attain the 3A use until the remedial actions are complete due to the tailings in the stream channel that degrade aquatic habitat.

4 - Agricultural Water Uses

The water quality of Silver Creek exceeds the Class 4 beneficial use criteria of 1,200 mg/L TDS for irrigation and stock watering (Utah Administrative Code R317-2-14). As such, Silver Creek was included on Utah's 303(d) list of impaired waters in 2014 for TDS. Data indicates that TDS concentrations are higher in Silver Creek during the winter when road salt is applied with concentrations higher at the upstream sites.

TABLE 2. DESCRIPTION OF BENEFICIAL USES, IMPAIRMENTS, AND TMDL STATUS.

Name	Assessment Unit	Impaired Beneficial Use	2016 Assessment	TMDL Status
Silver Creek	UT16020101-020	1C	Arsenic	4B*
		1C	Cadmium	Approved 2004
		1C	pH, nitrate	Approved 2014
		3A	OE Bioassessment	4B*
		3A	Cadmium, Zinc	Approved 2004
		3A	Arsenic	4B*
		3A	Temperature	4B*
		3A	Dissolved oxygen, pH	Approved 2014
		4	Total Dissolved Solids	2015-2018

**Pending submission to and approval by EPA, Category 4B is a listing category indicating that a plan is in place to address this parameter (currently in development).*

SOURCE ASSESSMENT

Conceptual Site Model

DWQ has developed a conceptual model for sources of TDS impairment in the Silver Creek watershed based on examination of existing data, discussions with stakeholders, and comparisons with similar TDS impaired waterbodies (Figure 8).

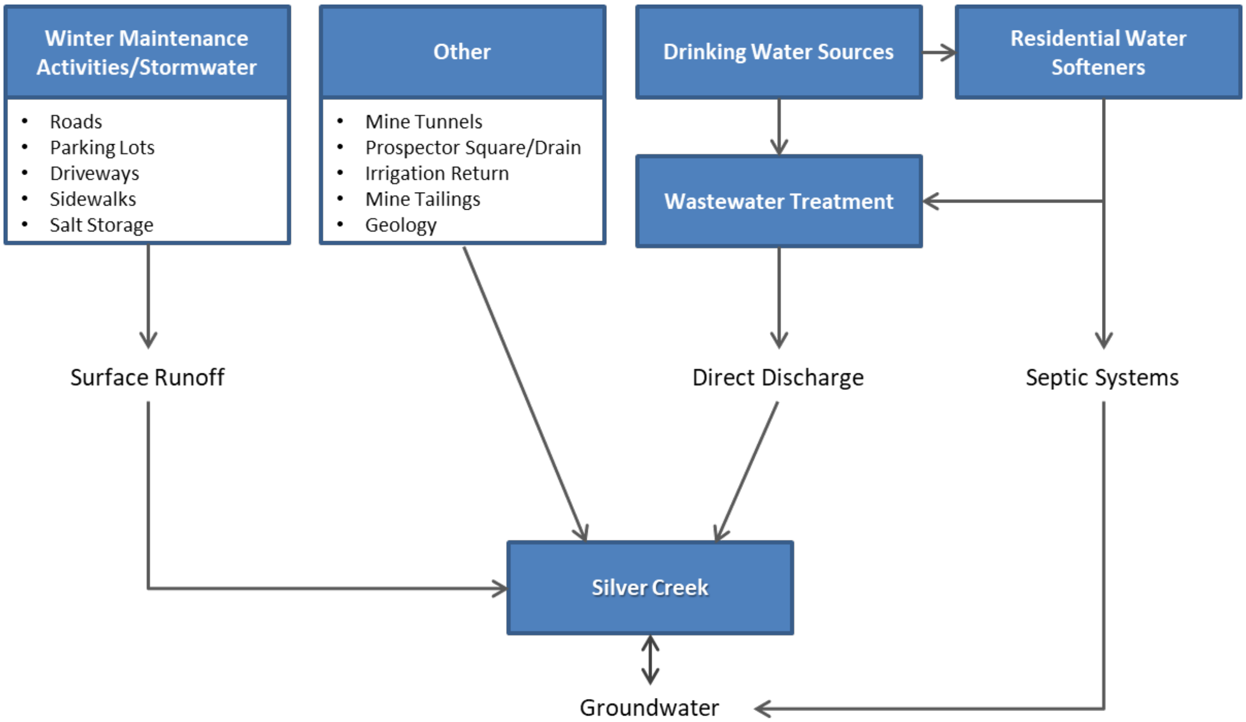

FIGURE 8. CONCEPTUAL SITE MODEL.

Winter Maintenance Activities

Park City is a tourist destination with steep mountain roads and receives an average of 340” of snowfall during the winter. Road salt is used so that residents and tourists may safely access home, work, two ski resorts, the Sundance Film Festival, and other winter activities. Figure 9 shows three photographs of road salt applied in the Park City area during a snowstorm in February 2018. In addition to applying salt to roads, snow is removed from areas of that do not have sufficient space for stockpiling. Summit County and PCMC are restricted in where they may store snow, but private contractors pile snow in various locations throughout Park City and Summit County, and sites are selected solely based on landowner willingness to accept the snow piles (K.Lundeen, personal communication with Kamas Valley Conservation District [KVCD], 5/1/2018).

FIGURE 9. SUMMIT PARK EXIT, I-80, PARK CITY AREA, FEBRUARY 22, 2018. PHOTOS SUBMITTED BY MIKE LUERS.

JURISDICTIONS AND REGULATORY OVERSIGHT

There are three different jurisdictions for road salt application in the Park City area - the Utah Department of Transportation – Region 2 (UDOT), Summit County, and Park City Municipal Corporation. All three entities are designated Municipal Separate Storm Sewer Systems (MS4s) and are subject to stormwater permitting, which requires that they keep and update stormwater management plans. Summit County was designated as of July 1, 2015 and Park City was designated as of July 1, 2016.

Multiple private contractors within the watershed remove snow and apply salt to parking lots, driveways, and sidewalks. No regulatory oversight exists for their application rates or snow disposal methods.

EXISTING BEST MANAGEMENT PRACTICES

Salt Storage and Truck Maintenance

UDOT stores salt at various locations throughout the state. Most of the sheds are covered; all of them will be covered by June of 2019. Additional salt storage BMPs include sweeping excess salt back into covered storage areas, washing trucks in contained areas that divert the water to retention ponds, and regular pumping and proper disposal of retention pond water. UDOT is investigating ways they can prevent excess water from entering their retention ponds to enhance storage capacity. Summit County and PCMC have fully covered salt storage, including clay-lined holding ponds and improved truck maintenance procedures.

Truck Calibration and Salt Application

UDOT trucks are maintained regularly and are calibrated in the fall to prepare for the winter season. Mechanics check the hydraulics, chains, and salt spreaders. The mechanics are given control of the spreader, and truck drivers are locked out of the controls so that the standard rate of 250 pounds/lane mile is maintained. The truck drivers are still able to get in the back of the truck and adjust the gate, but UDOT discourages this through training. The standard application rate of 250 pounds/lane mile has been developed based on experience with salt effectiveness on Utah roads and cost. Summit County and

PCMC use 300 pounds/lane mile at 20 miles per hour. Summit County also uses a brine solution with the salt that enhances snow melting.

PCMC has made a concerted effort over the last several years to optimize salt application and reduce the overall amount applied to roads (Figure 10). They have achieved some reductions, particularly since 2016.

While PCMC and Summit County have made efforts to reduce salt application, local contractors are incentivized to apply as much salt as possible. Contractors are paid a bonus for the amount of salt applied on top of the pay they receive for clearing snow (K.Lundeen, personal communication with KVCD, 5/1/2018).

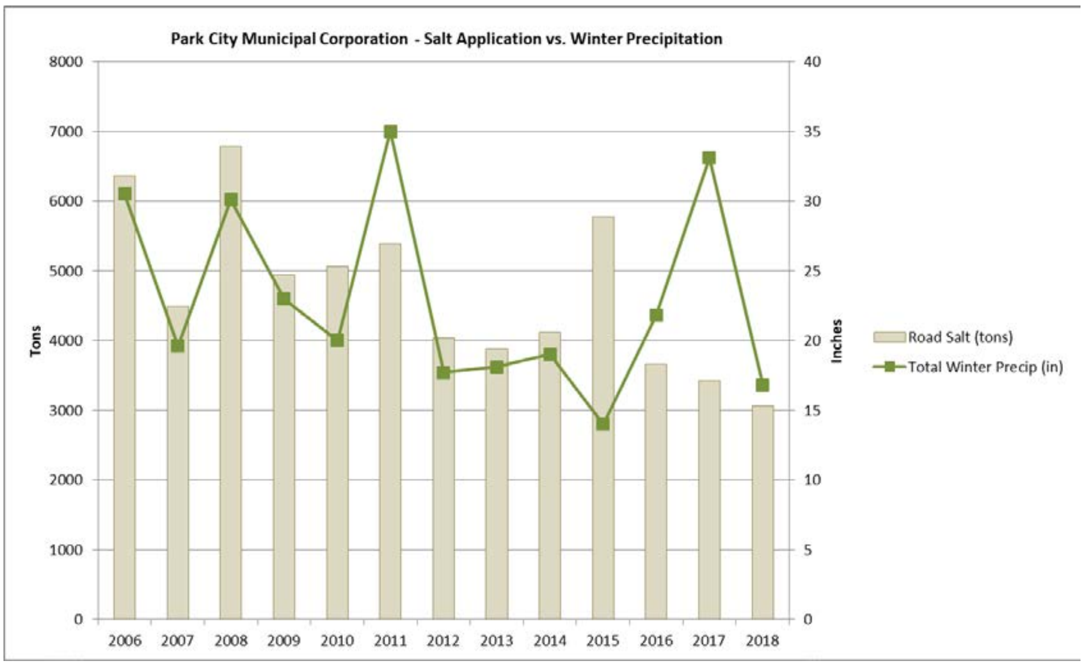

FIGURE 10. ROAD SALT APPLIED IN PARK CITY IN TONS PER WINTER SEASON

COMPARED TO SNOW PRECIPITATION TOTALS IN EQUIVALENT INCHES OF WATER FOR THAT SEASON (SOURCE – PCMC AND NRCS SNOTEL DATA).

Road Maintenance

Each entity works to maintain roads to ensure effective drainage, prevent icy spots, and reduce the need for salt. UDOT sweeps the roads in their jurisdiction on days that it is not snowing while Summit County and PCMC sweep in the spring.

Education and Training

Each entity trains drivers annually on truck maintenance, truck calibration, and salt application rates. Challenges lie in retaining drivers and in finding new drivers during the winter season.

Frequently, extra salt is added to roads at the request of the Utah Highway Patrol (UHP) or local law enforcement. UDOT has equipped their trucks with GPS so that when they receive a request for additional salt they can respond more efficiently – if the truck has already visited a location they can convey that to UHP, or they could send a driver if the area has not been salted yet. PCMC has invited local law enforcement to the training for their drivers so that they understand the logistics involved in clearing the roads and the desire to be as judicious as possible with salt application.

FUTURE BEST MANAGEMENT PRACTICES

Each entity is developing BMPs as part of their MS4 permits. Below is a list of recommended and planned BMPs.

- Recommended Education and Training
  - Provide annual education and training to private contractors responsible for snow removal (all)
  - Actively discourage excessive salt application (through ordinances or permitting requirements) (all)
  - Invite state highway patrol and other law enforcement to trainings (all)
  - Send mailers to the public in their utility bills to educate them on the need for optimized salt use
  - Provide incentives to operators for optimizing salt use

- Planned Education and Training
  - Enhance annual operator training with additional information to be provided by DWQ (all)
  - Develop trackable training modules for operators (UDOT)
  - Develop a mentoring program in maintenance sheds (UDOT)
- Other Suggested BMPs
  - Identify a local repository for snow piles away from surface waters, including irrigation canals (PCMC, Summit County)
- Other Planned BMPs
  - Complete covered salt storage (UDOT, by 2019)
  - Enhanced control systems on trucks
    - Controls that prevent operators from over-applying salt (UDOT, Summit County)
    - Pre-wetting to minimize the amount of salt, prevent bouncing, and prevent ice from bonding to the road (PCMC)

Stormwater

Stormwater runoff from roads and active construction is considered a potential source of TDS (Figure 11). However, the majority of stormwater runoff associated with high TDS loads were correlated with events that require road salt or during spring runoff.

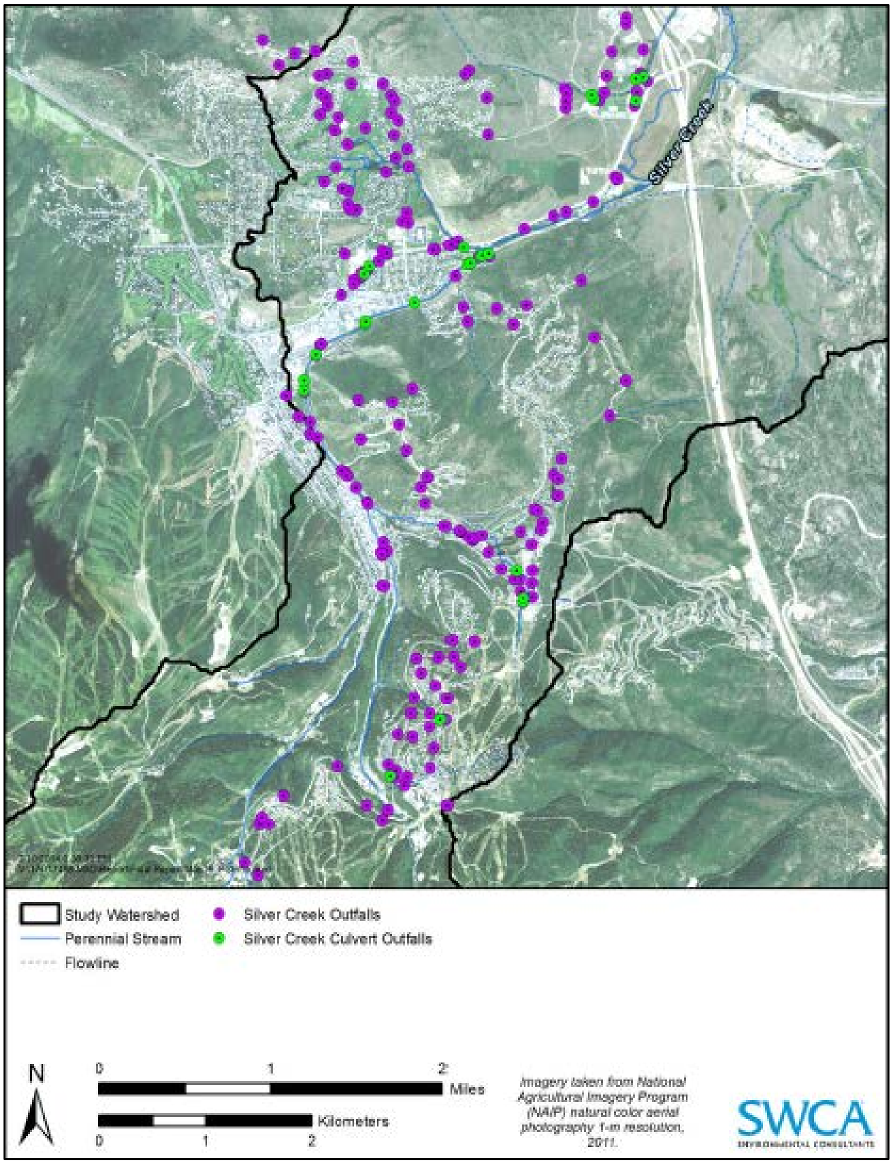

FIGURE 11. LOCATIONS OF STORMWATER OUTFALLS IN THE SILVER CREEK WATERSHED (DEQ, 2014).

Septic systems

Many homes in Summit County are still on septic systems, another potential source of TDS loading (Figure 12). There are three types of residences within the watershed, primary residence (212 homes), secondary residence (40), and recreational homes (310). SBWRD is collaborating with Summit County Health Department and DWQ to connect neighborhoods to sewer and require new developments to meet stringent septic system requirements in order to reduce nutrient loading, which may also reduce TDS contributions to groundwater.

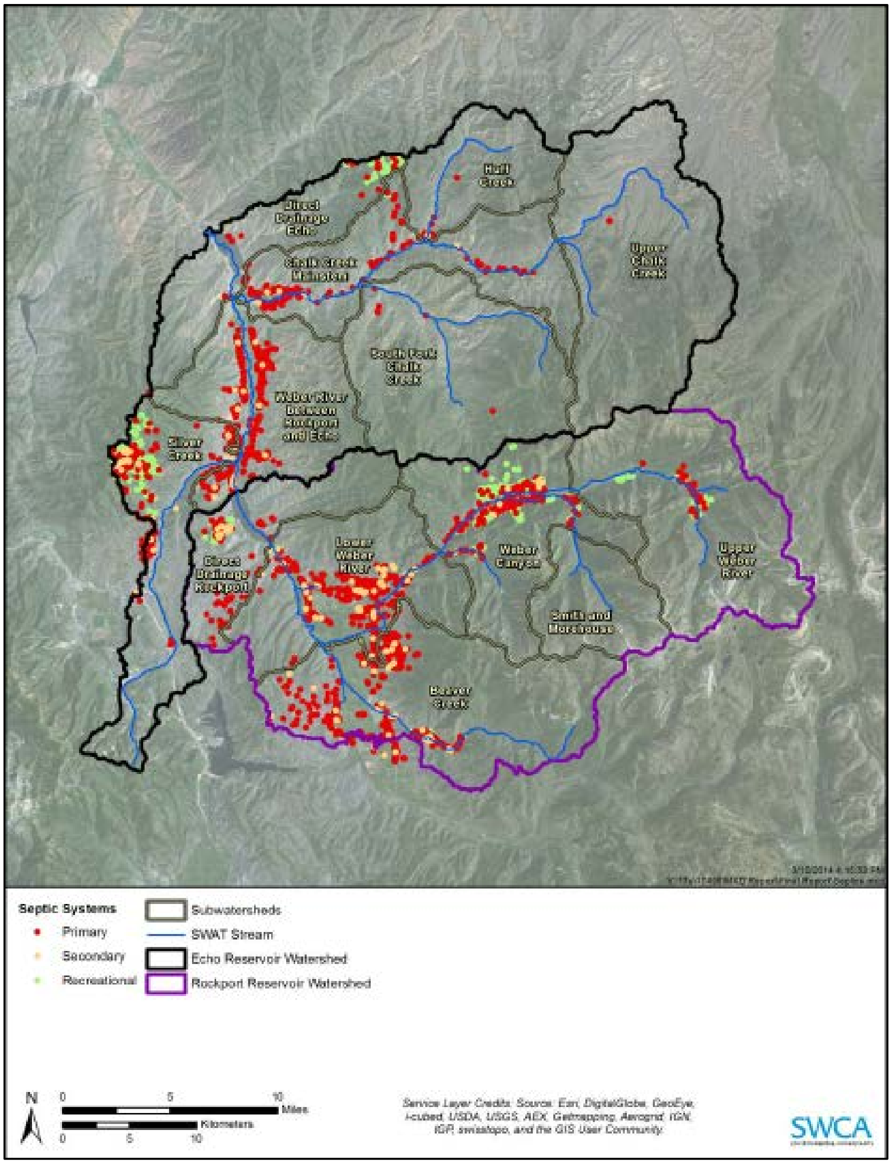

FIGURE 12. SEPTIC SYSTEM MAPPED IN THE UPPER WEBER RIVER WATERSHED, INCLUDING SILVER CREEK (DWQ, 2014).

Mine tailings

Extensive mining occurred in this area historically and mine tailings compose at least a portion of the stream channel between Silver Creek Canyon and the headwaters. As shown in Figure 13, metal concentrations increase from upstream to downstream. This is opposite of TDS concentrations which decrease downstream, indicating that the tailings are not the dominant source of TDS. Any TDS loading from the tailings is anticipated to decrease once remediation is complete. EPA is overseeing remediation, and it is anticipated to take at least 20 years.

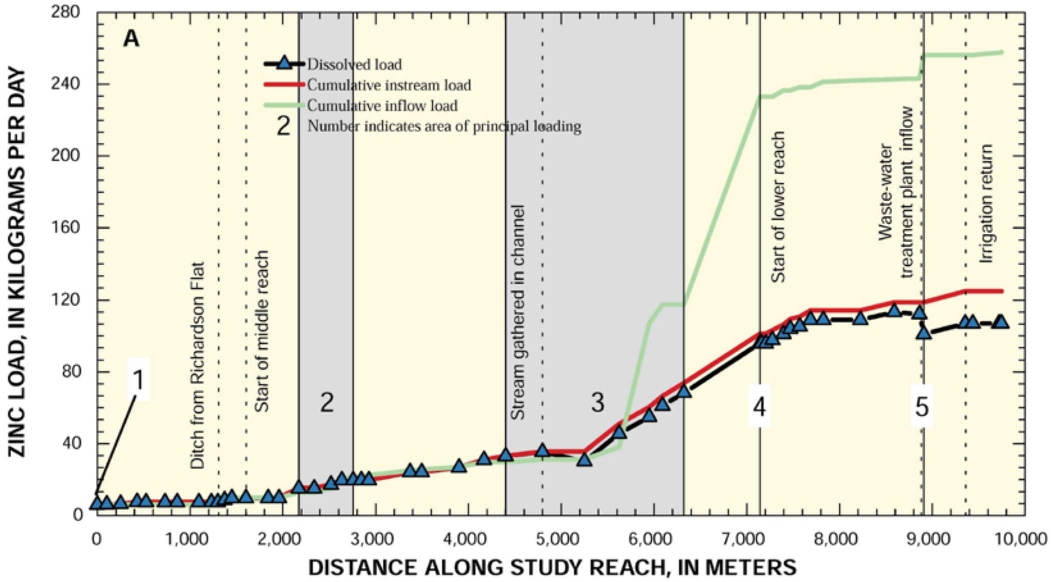

FIGURE 13. METAL LOADING FROM THE HEADWATERS OF SILVER CREEK (1) THROUGH ATKINSON (FAR RIGHT) (KIMBALL ET AL., 2007).

Prospector Square

Prospector Square is a commercial and residential area that was built in the 1980s on legacy mine tailings. A drain was installed to lower the water table in a portion of the area to facilitate development, and that drain is a known source of metals and TDS (Figure 14). In 2009, PCMC installed a bio-cell as passive treatment for metal contamination from Prospector Drain (Figure 15). While the bio-cell does reduce metals, it does not reduce TDS and treats only a portion of the flow from the Prospector Drain. Remediation of this area is being addressed in an Administrative Settlement and Order on Consent (ASOC) between PCMC and EPA that should consider TDS.

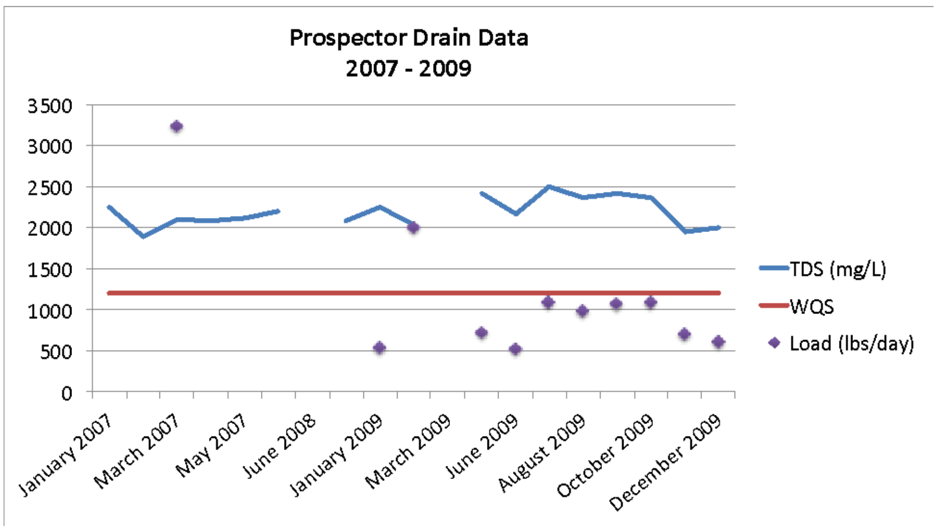

FIGURE 14. DATA FROM PROSPECTOR DRAIN, COLLECTED AND PROVIDED BY PCMC FROM 2007 TO 2009 Y AXIS IS IN MG/L.

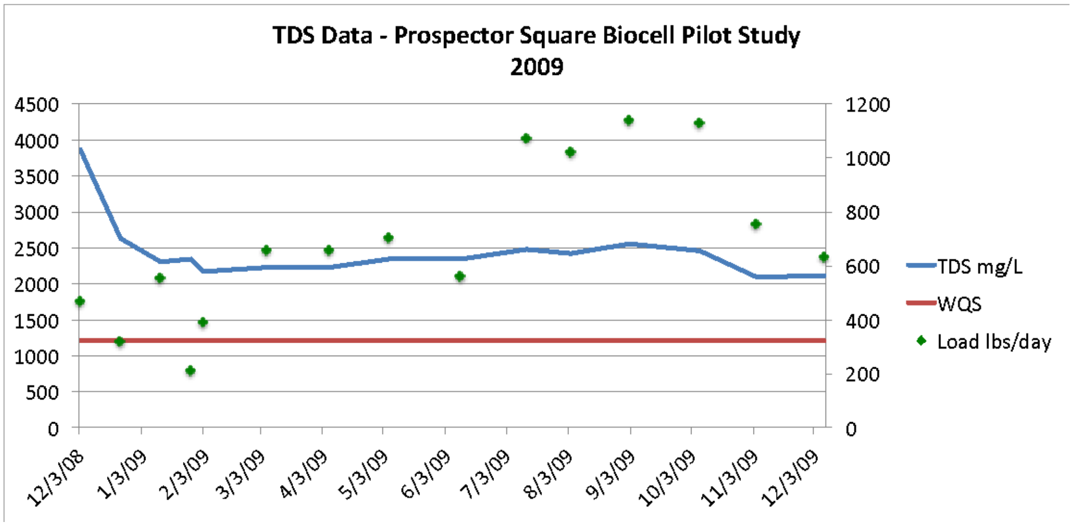

FIGURE 15. DATA FROM THE PROSPECTOR SQUARE BIOCELL PILOT STUDY, COLLECTED AND PROVIDED BY PCMC FROM 2007 TO 2009 Y AXIS ON THE LEFT IS IN MG/L AND THE RIGHT IS LBS/DAY .

Wastewater Treatment Facility

The Snyderville Basin Water Reclamation District (SBWRD) operates two wastewater treatment facilities in the Park City Municipal area: Silver Creek Water Reclamation Facility (SCWRF) (UPDES #UT0024414) and East Canyon Water Reclamation Facility (UPDES # UT0020001). These treatment facilities discharge to Silver Creek and East Canyon Creek, respectively.

Sampling indicates that influent TDS concentrations can be high, ranging from 900 to 2000 mg/L at SCWRF that pass through the facility and result in elevated effluent concentrations (Figure 16). Figure 17 plots the monthly effluent TDS values from SCWRF and shows the highest concentrations of TDS passes through their system in late fall, winter, and spring. Although their system is not specifically designed to remove TDS, it is consistently reduced. The sources of TDS loading to the treatment facilities are water softeners, drinking water sources, and seasonal infiltration and inflow. Infiltration and inflow averages 14% of total inflow volume and is higher during spring runoff when salty water from the streets enters through manholes (K. Lundeen, personal communication with SBWRD, 12/27/2017).

RESIDENTIAL WATER SOFTENERS

Home water softeners are used throughout this watershed due to high hardness of culinary water. While hardness varies in the Silver Creek watershed, samples collected throughout the 2000s average above 400 mg/L (DEQ, 2004).

Few BMPs exist for water softeners. There are programmable softeners available that reduce the amount of sodium chloride required by setting the hardness and allowing specific dosing; alternatively, potassium chloride can be used. Either option would be voluntary, as no regulatory authority exists to require homeowner participation. Information and education campaigns to address this concern are being considered by SBWRD.

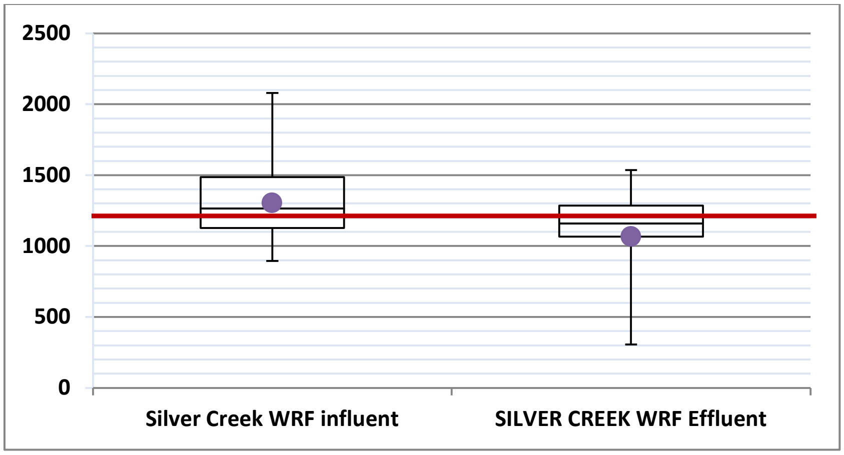

FIGURE 16. BOX PLOTS OF INFLUENT AND EFFLUENT TDS CONCENTRATIONS AT SCWRF (MG/L) (2015-2016). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

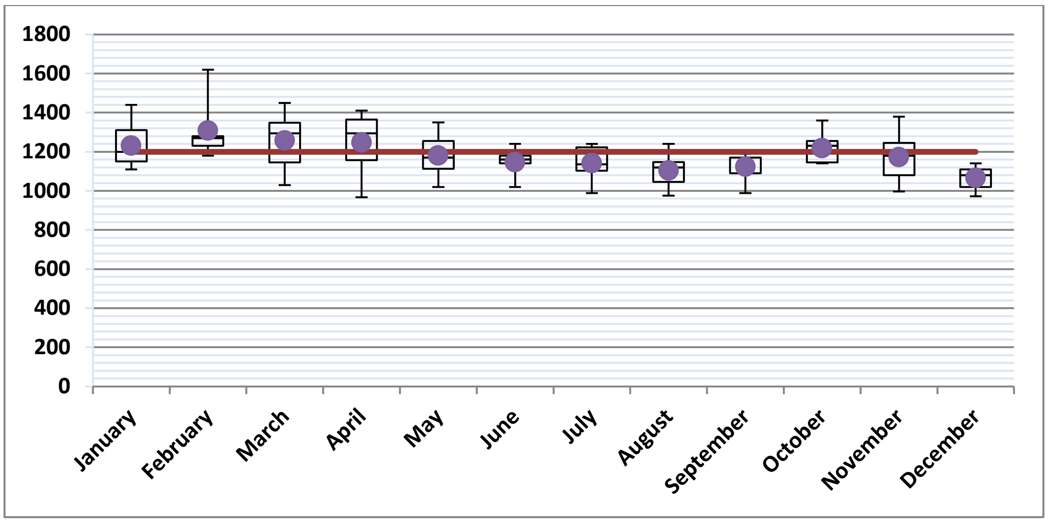

FIGURE 17. BOX PLOTS OF EFFLUENT TDS VALUES FROM SCWRF (MG/L)(2008-2017). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

DRINKING WATER SOURCES

Drinking water sources include springs, wells, and mine tunnels surrounding Park City, operated by PCMC, Mountain Regional Water, and Summit Water. Table 3 provides information on TDS in some of the drinking water sources. Drinking water enters the SCWRF through routine use, but water from the mine tunnels is also discharged directly to Silver Creek.

TABLE 3. TDS CONCENTRATIONS FOR DRINKING WATER SOURCES IN THE PARK CITY AREA.

Drinking Water Source	# of Samples	Min (mg/L)	Mean (mg/L)	Max
PCMC Wells	221	500	735	1530
PCMC Springs	34	216	257	600
PCMC Tunnels	90	184	417	808
PCMC Treated Water (Quinn's Junction Water Treatment Plant)	19	180	239	300
Summit Water Wells	807	111	334	768

Population Growth

Park City and Summit County have been experiencing explosive growth over the past 20 years (Figure 18). Based on data from the Governor's Office of Management and Budget (2012), Summit County's population grew 91.6% from 1990 to 2000 and is expected to increase by another 97% between 2010 and 2040. Park City's population has nearly doubled from 4,468 residents in 1990 to 7,547 in 2010. Population estimate reports show Park City growing to 13,744 in 2040, an 82% increase from 2010. Because of this growth, TDS contributions are anticipated to increase. All jurisdictions that apply road salt anticipate an increase in salt use as a higher population of residents and tourists use the roads during winter. More homes and sewer connections will also increase the TDS load to the WWTP.

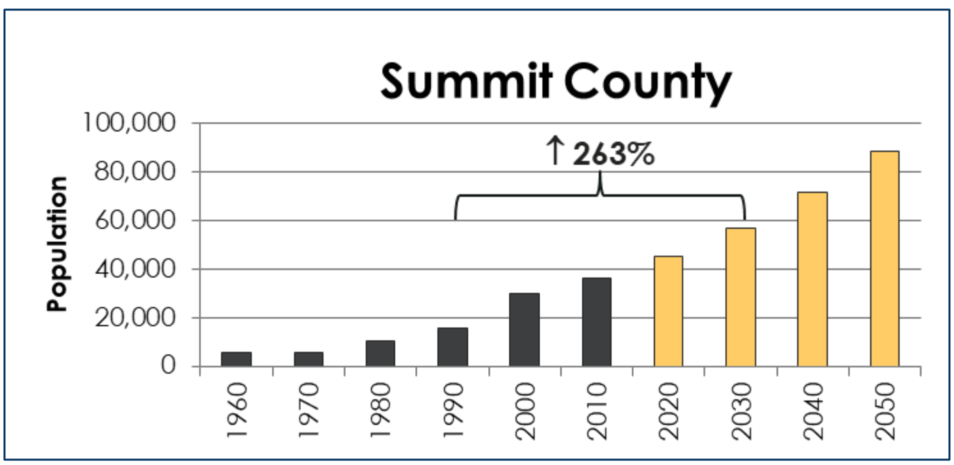

FIGURE 18. PROJECTED POPULATION GROWTH BASED ON CENSUS DATA (DWQ, 2014).

DATA COLLECTION AND ANALYSIS

Data Collection

DWQ and SBWRD collaborated to collect data in support of a TDS study from January through December 2016. DWQ's monitoring group also collected data as part of the intensive monitoring run beginning in October 2015 and ending September 2016. Table 4 presents the available data for each monitoring location, ordered from upstream to downstream.

TABLE 4. INVENTORY OF SILVER CREEK TDS DATA

MLID	Station Description	Samples Collected by	Start Date	End Date	Count
4926950	Silver Ck @ City Park Ab Prospector Square	DWQ DWQ/SBWRD	7/18/2008 10/27/2015	6/18/2009 12/1/2016	11 25
4926850	Silver Ck @ US40 Xing E of Park City	DWQ DWQ/SBWRD	1/21/2009 10/27/2015	6/18/2009 12/01/2016	6 25
4926800	Silver Ck Ab Silver Ck WWTP @ Promontory Ranch Rd Xing	DWQ DWQ/SBWRD	9/11/2008 10/27/2015	11/05/2009 12/01/2016	9 24
4926803	Silver Creek WWTP (influent)	DWQ/SBWRD	07/02/2015	12/01/2016	24
4926790	Silver Creek WWTP (effluent)	DWQ DWQ/SBWRD SBWRD	02/25/2009 10/27/2015 5/2008	8/20/2012 12/1/2016 6/2017	14 23 104
4926740	Silver Ck @ Farm Xing in Atkinson	DWQ DWQ/SBWRD	7/18/2008 10/27/2015	11/05/2009 12/1/2016	13 25
4926750	Silver Creek @ Wanship Ab Cnfl/Weber R	DWQ DWQ/SBWRD	7/17/2008 10/27/2015	6/17/2009 12/01/2016	12 24

Site Descriptions

Figure 19 displays where TDS data were collected (identified by Monitoring Location ID [MLID]). The monitoring site Silver Creek @ City Park Above Prospector Square (4926950) is located in the most developed area of Park City adjacent to Bonanza Drive. US40 Xing (4926850) is downstream of Prospector Square and the sinkhole location and is between U248 and the Rail Trail. Promontory (4926800) is upstream of SCWRF in the meadows area (Figure 7). SCWRF influent and effluent are 4926803 and 4926790, respectively. SCWRF is located on the uplands near the northern end of the meadows area. Atkinson (4926740) is at the USGS Gage at the northern end of the meadows area, just upstream of Silver Creek Canyon. Wanship (4926750) is in the town of Wanship, approximately 6 miles downstream of Atkinson. It is near the mouth of Silver Creek Canyon, upstream of the confluence with the Weber River.

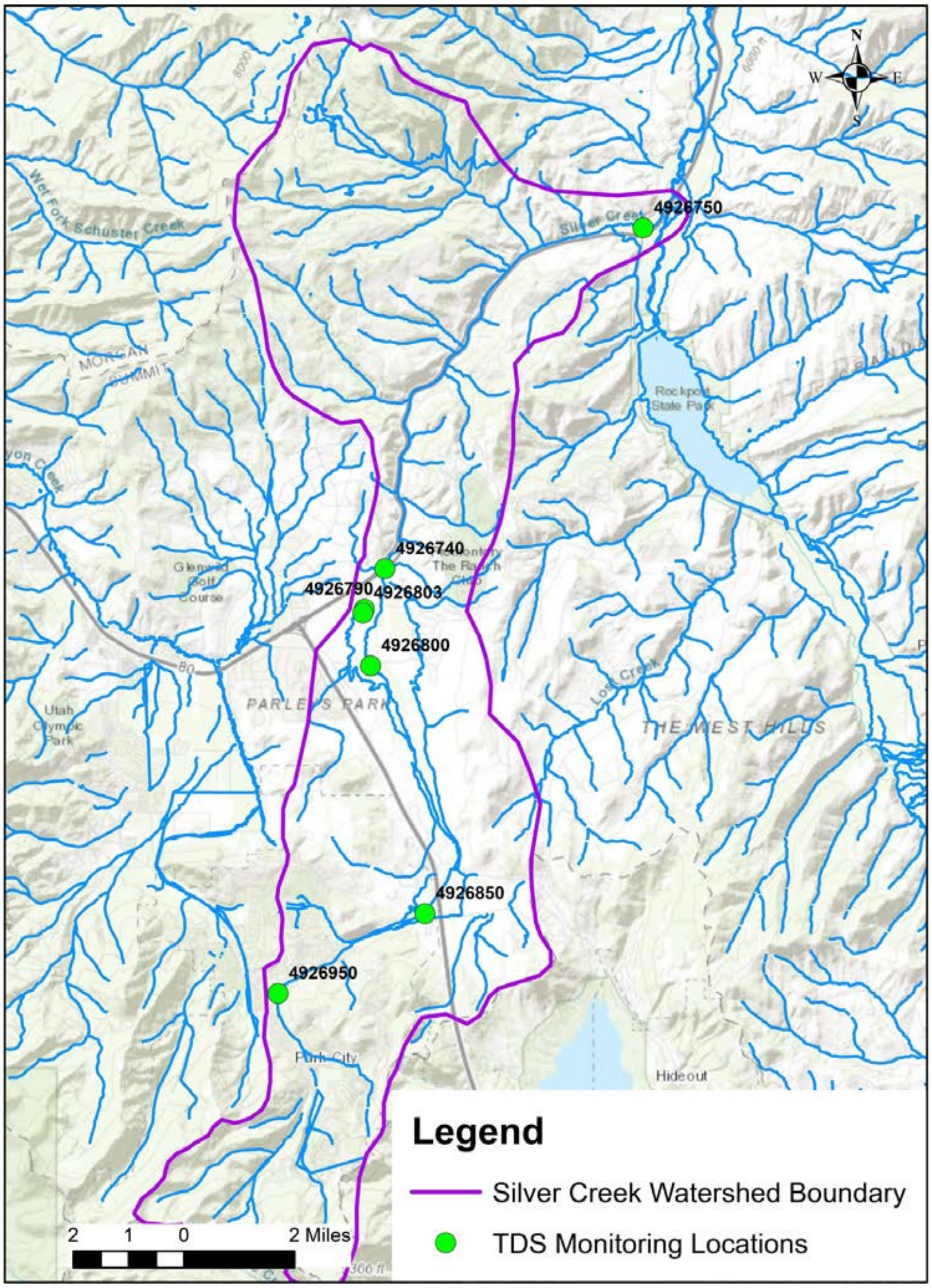

FIGURE 19. MONITORING LOCATIONS IN THE SILVER CREEKWATERSHED.

Data Analyses

Statistics by Monitoring Location - Upstream to downstream

Table 5 and Figure 20 present summary statistics and box plots for each monitoring location.

TABLE 5. SUMMARY STATISTICS - ALL TDS DATA.

MLID	Station Description	Count	Min. (mg/L)	Mean (mg/L)	Median (mg/L)	Max. (mg/L)	# Greater Than Criterion	% Greater than Criterion
4926950	Silver Ck @ City Park Ab Prospector Square	36	358	1051	721	5412	9	25%
4926850	Silver Ck @ US40 Xing E of Park City	31	572	1061	812	2524	8	26%
4926800	Silver Ck Ab Silver Ck WWTP @ Promontory Ranch Rd Xing	33	706	1146	1130	1912	12	36%
4926803	Silver Creek WWTP influent	24	896	1304	1265	2080	NA	NA
4926790	Silver Creek WWTP effluent (DWQ) Silver Creek WWTP effluent (SBWRD)	37 104	306 968	1069 1183	1160 1170	1536 1620	17 38	46% 37%
4926740	Silver Ck @ Farm Xing in Atkinson	38	792	1077	1046	1392	7	18%
4926750	Silver Creek @ Wanship Ab Cnfl/Weber R	36	334	799	820	1270	1	3%

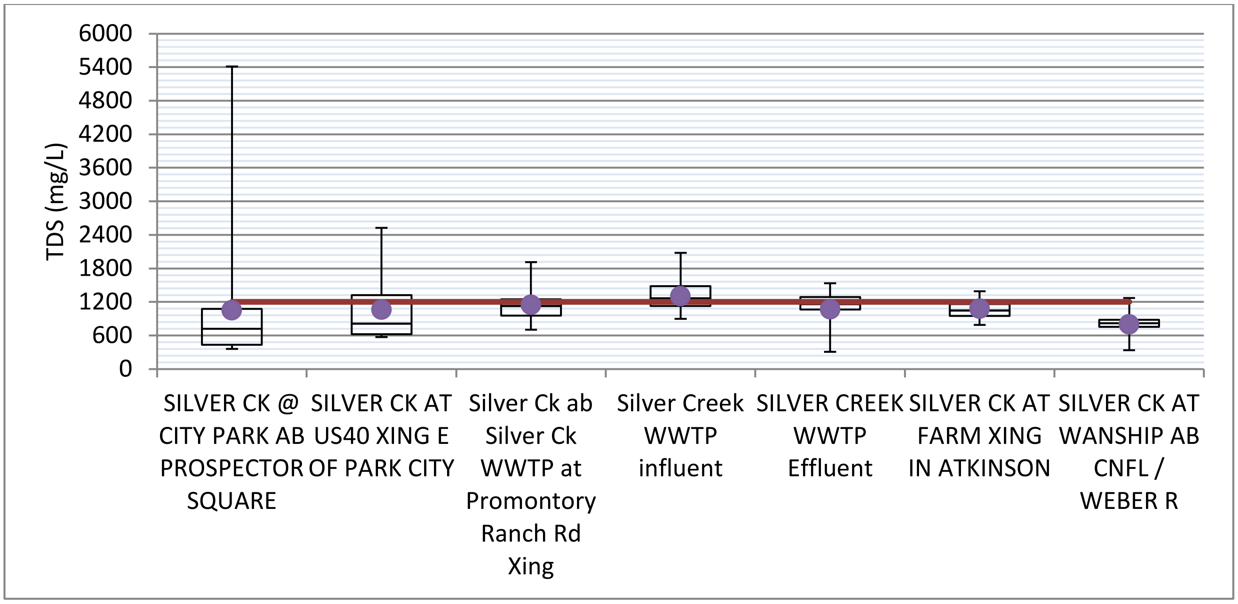

FIGURE 20. BOX PLOTS PRESENTED FROM UPSTREAM TO DOWNSTREAM, AND INCLUDE INFLUENT AND EFFLUENT CONCENTRATIONS FROM THE SCWRF FOR REFERENCE. PURPLE DOTS ARE MEAN VALUES. DATA PRESENTED IS FROM JULY 2008 – DECEMBER 2016. RED LINE IS THE 1,200 MG/L CURRENT CRITERION.

Variability is highest at the upstream site and generally decreases downstream. This is especially true of the Above Prospector site (4926950), which is adjacent to Bonanza Drive. Road drainage has been piped directly to Silver Creek along this reach.

Silver Creek at Wanship has less than 10% exceedance and complies with the 1,200 mg/L criterion.

Specific Conductance/TDS Regression

In addition to performing statistical analysis on TDS data from each site, DWQ used paired data to correlate specific conductance measurements collected at the USGS gage with TDS concentrations quantified in the lab (Figure 21). The regression analysis was then used to examine long-term USGS gage measurements of specific conductance to calculate TDS values for the stream at Atkinson (4926740, USGS Gage 10129900).

TDS = 0.58 x Specific Conductance

$R^2 = 0.82$

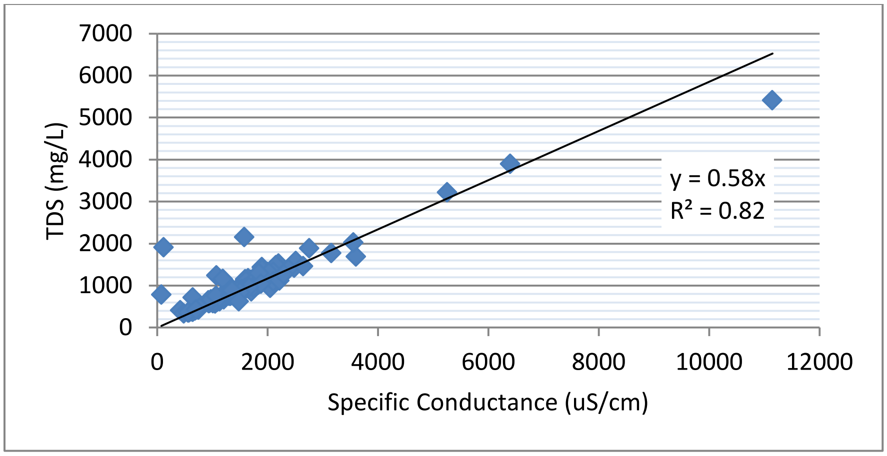

FIGURE 21. REGRESSION OF CONDUCTANCE DATA FROM THE USGS GAGE AT ATKINSON AND PAIRED TDS CONCENTRATIONS. DATA FROM 1/1/2008 THROUGH 12/31/2016.

Figure 22 shows the daily average specific conductance (blue line) compared to both the calculated daily TDS value and the current criterion. Based on the calculated daily averages for TDS, Atkinson is meeting the criterion in March through November. Values are at or slightly above the criterion in December through February.

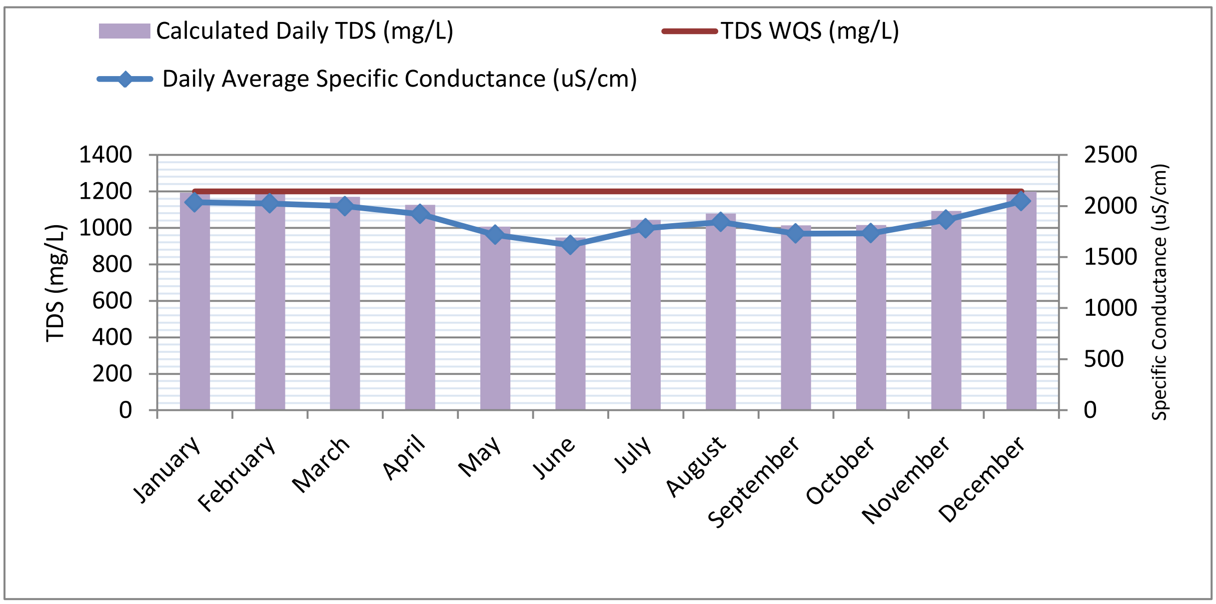

FIGURE 22. AVERAGE SPECIFIC CONDUCTANCE AND CALCULATED TDS BY MONTH AT USGS GAGE 1012990 ATKINSON (BELOW SCWRF).

Analyses by Season

Box plots were constructed for all data available for each site based on season. Climatic seasons were defined as: Fall – September, October, November; Winter – December, January, February; Spring – March, April, May; Summer – June, July, August. Water right agreements define the irrigation season in the Snyderville Basin as May through September.

SEASONS – CLIMATIC

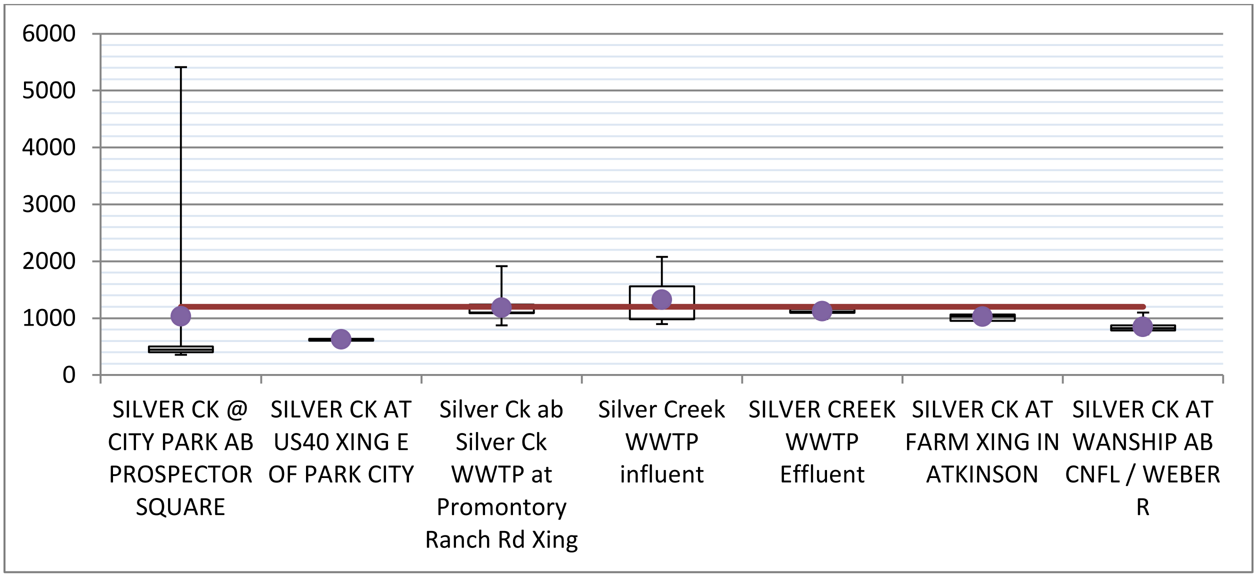

FIGURE 23. FALL TDS CONCENTRATIONS (MG/L). INFLUENT AND EFFLUENT ARE INCLUDED FOR COMPARISON. THE PURPLE DOTS REPRESENT THE MEAN VALUE, AND THE RED LINE IS THE CURRENT CRITERION.

Fall TDS concentrations are highly variable, particularly at Prospector Square. WQS are met at Atkinson and Wanship.

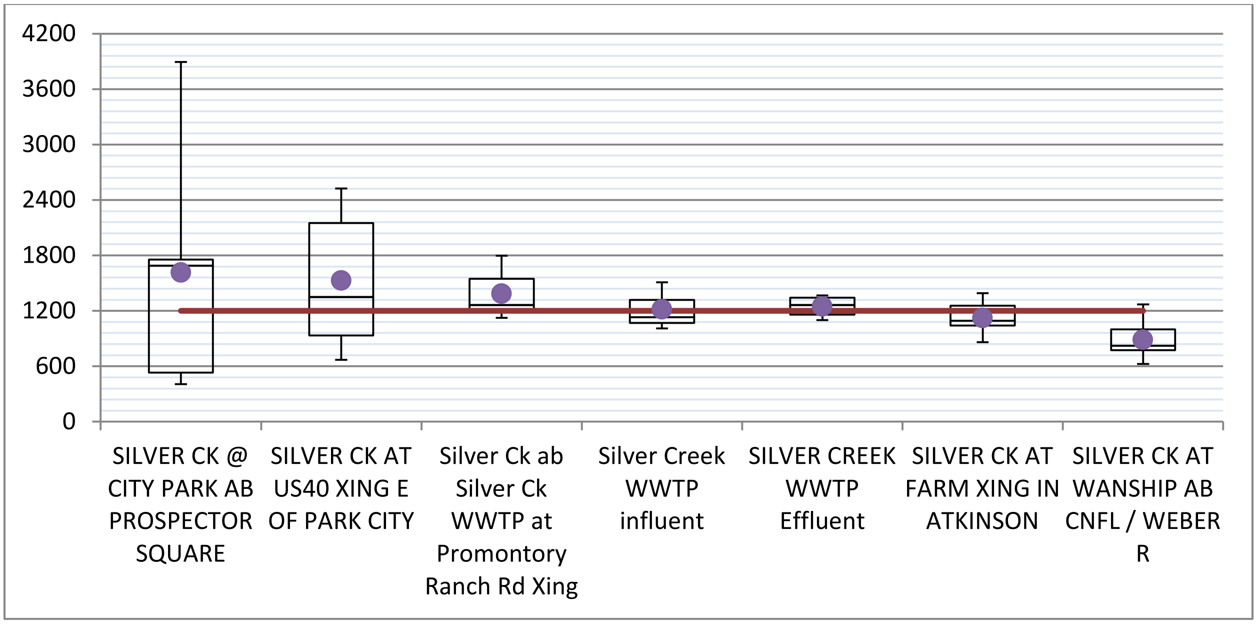

FIGURE 24. WINTER TDS CONCENTRATIONS (MG/L) - PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS CURRENT CRITERION.

Winter TDS concentrations are also highly variable, with the highest variability in the upstream sites.

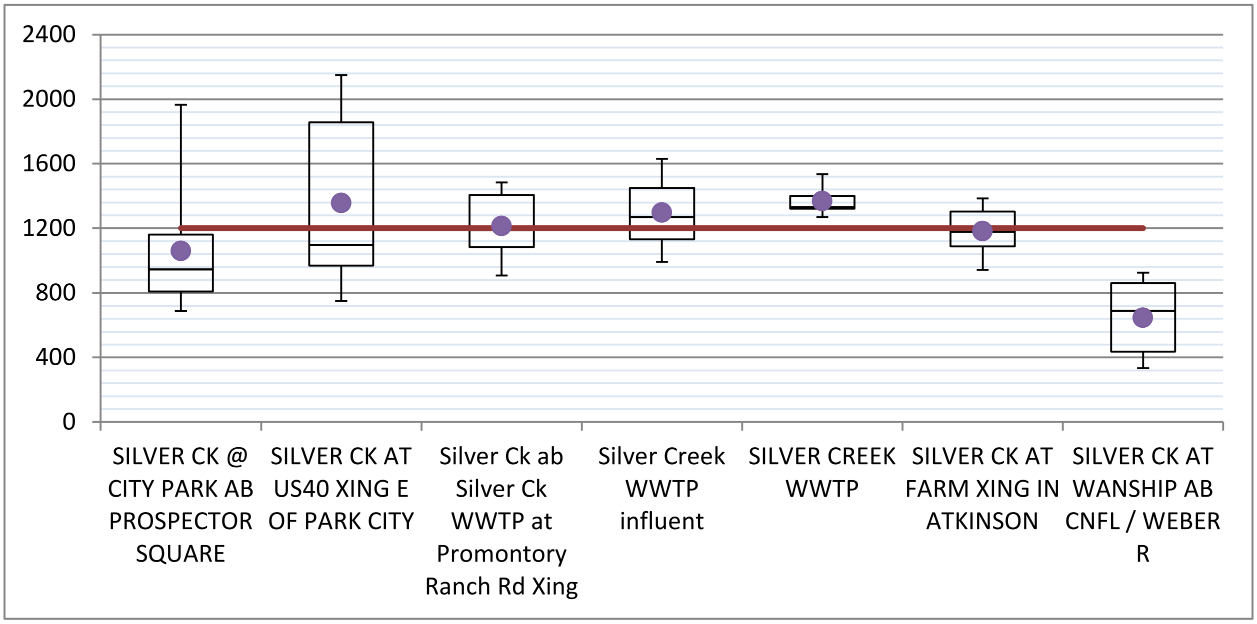

FIGURE 25. SPRING TDS CONCENTRATIONS (MG/L) - PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

Spring TDS concentrations are variable and the means are at or above the current criterion at all sites but Wanship, which meets the current criterion.

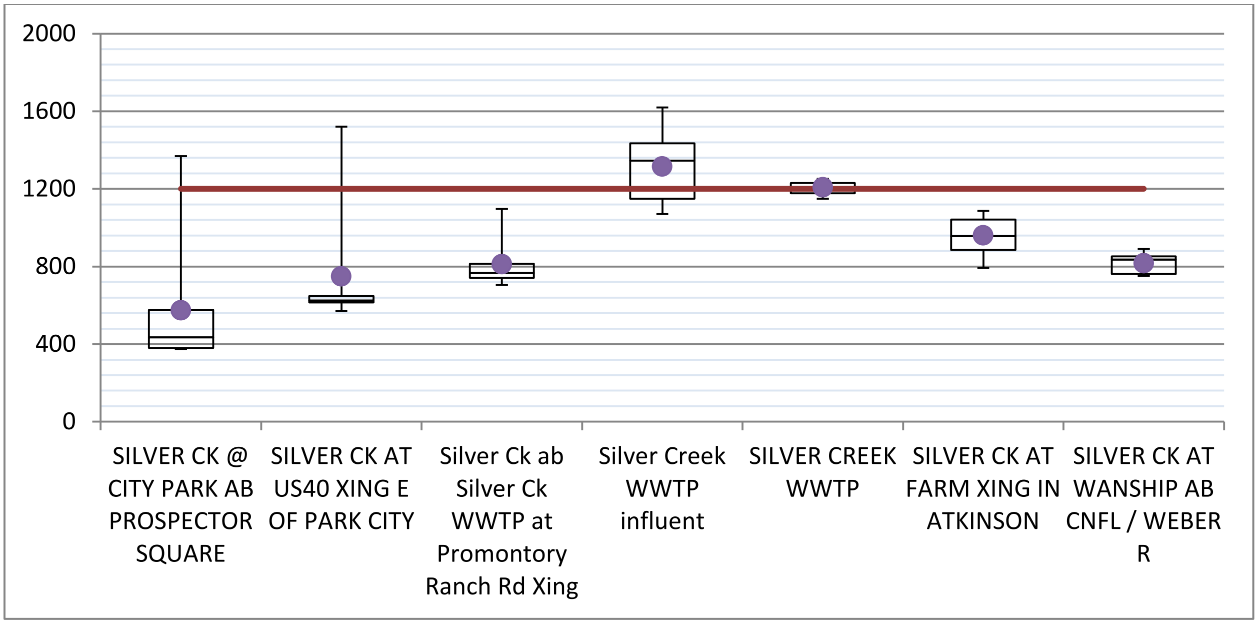

FIGURE 26. SUMMER TDS CONCENTRATIONS (MG/L) - PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

The current criterion is exceeded at upstream sites periodically in the summer, but the mean values meet criterion. Atkinson and Wanship comply with the TDS criterion during summer. On average, summer concentrations in Silver Creek above the WWTP are 59% lower than in the winter months supporting that road salting is the primary source of TDS in Silver Creek in the winter.

SEASONS - IRRIGATION AND NON-IRRIGATION

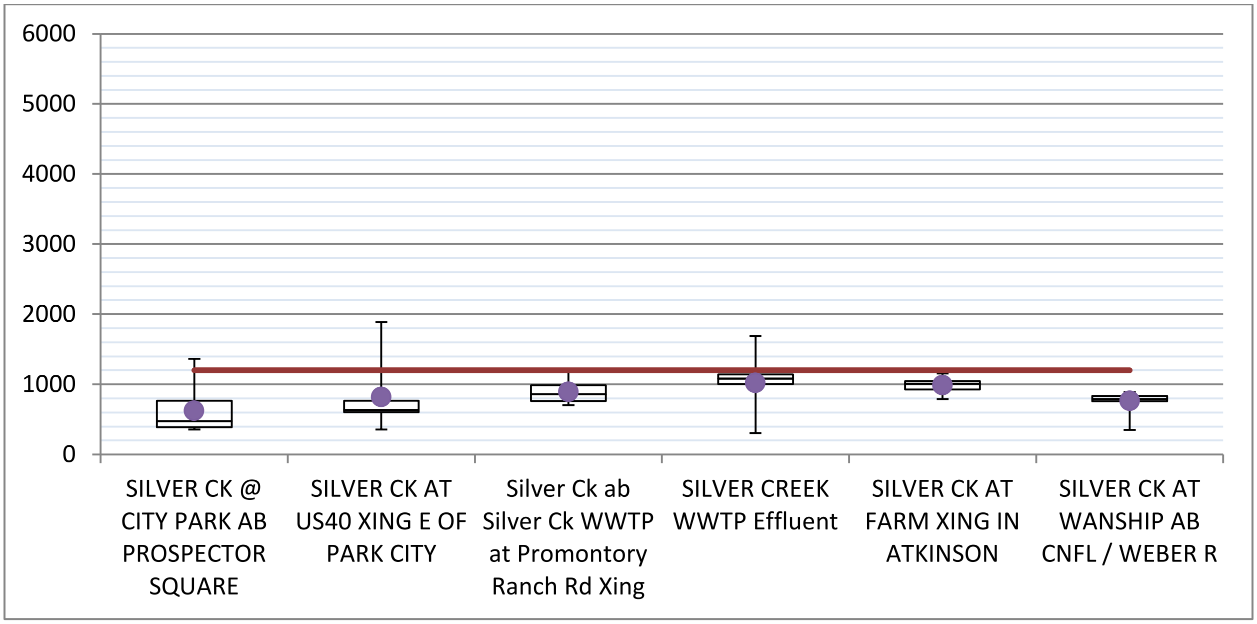

FIGURE 27. IRRIGATION SEASON TDS CONCENTRATIONS (MAY – SEPTEMBER) (MG/L). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

The data were also summarized and compared by irrigation/non-irrigation season. Means meet the current criterion in the irrigation season, but there are periodic exceedances in the upstream sites. The criterion is met at Atkinson and Wanship.

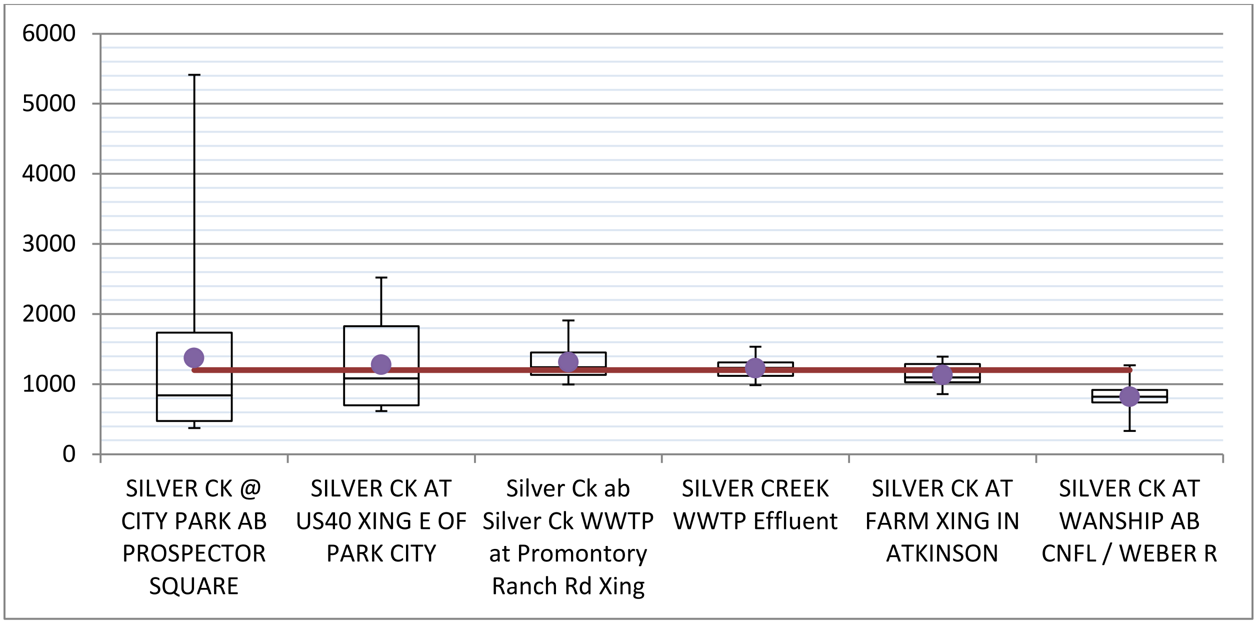

FIGURE 28. NON-IRRIGATION SEASON TDS CONCENTRATIONS (OCTOBER – APRIL) (MG/L). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

During the non-irrigation season, the means for all upstream sites are near or above the current criterion. At Wanship there was one exceedance of the criterion (Table 4).

Load Duration Curves

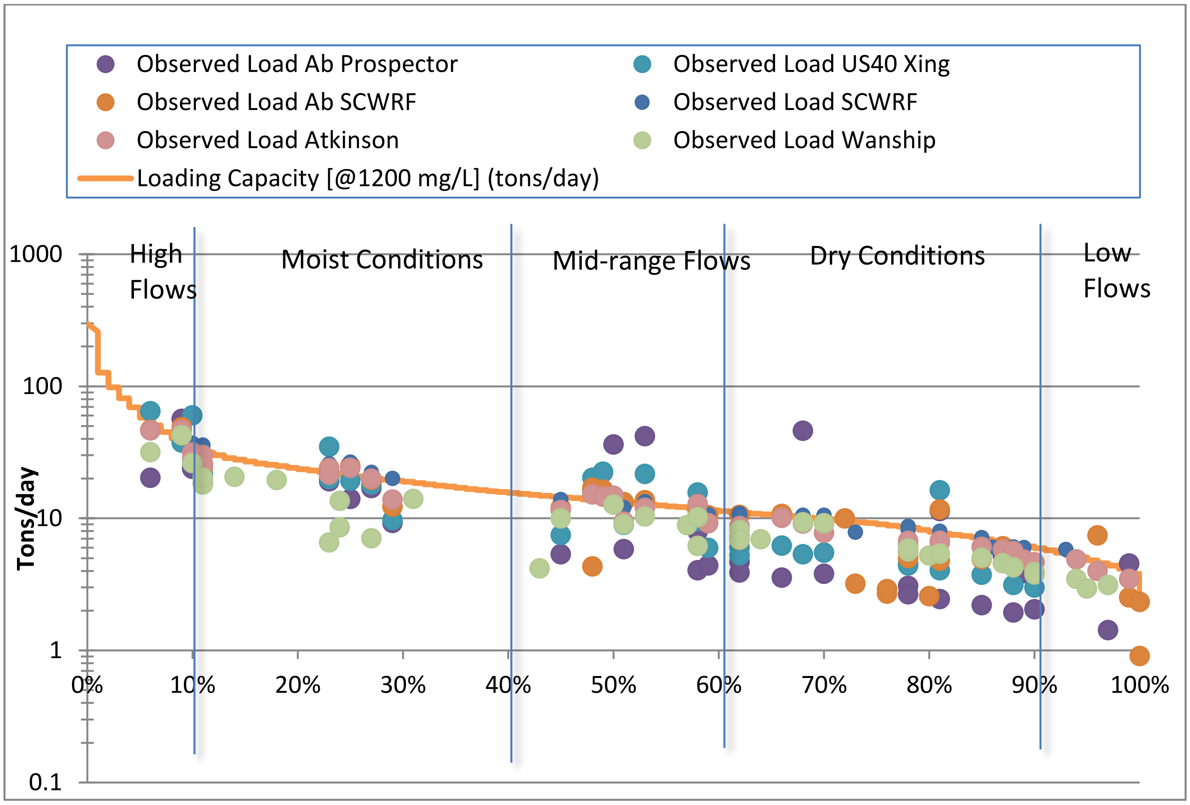

FIGURE 29. LOAD DURATION CURVE DEMONSTRATING THE LOADING CAPACITY OF SILVER CREEK IN TONS PER DAY (ORANGE LINE) PLOTTED WITH OBSERVED LOADS AT EACH MONITORING LOCATION FOR THE YEARS 2008 THROUGH 2016.

Load duration curves (LDCs) are used in TMDL development to identify relationships between streamflow regimes (dry, moist, high flow) and pollutant loading. They are based on flow duration curves, which model the cumulative frequency of flow data for a period of record. The flow duration curve is multiplied by the water quality criterion for a given parameter and a conversion factor for that parameter (EPA, 2007). The LDC is then compared to the loading data to look for patterns. For example, a pattern of loading above the LDC at high flows may represent surface runoff and erosional sources, while a pattern of loading above the curve during dry conditions or low flow may represent consistent groundwater and/or wastewater inputs.

A LDC was developed for Silver Creek to determine whether loading patterns indicated a particular source of TDS loading in the watershed (Figure 29). The LDC for Silver Creek is compared to loads at each Silver Creek location. No clear pattern was observed between flow regime and load. That is, no particular flow condition results in excess TDS loading to the stream indicating a combination of sources.

Analysis – Influence of water from Judge Tunnel

Judge Tunnel is a legacy mine tunnel used as a drinking water source for the Park City area. Depending on the demand for drinking water, Judge Tunnel can contribute a significant amount of water to Silver Creek and Mcleod Creek in the East Canyon watershed. Stakeholders in the watershed indicated that

Judge Tunnel has had an influence on water quality in Silver Creek over the past decade. Prior to 2013, Judge Tunnel did not discharge regularly to Silver Creek because it was diverted for drinking water use. PCMC stopped using Judge Tunnel water as a drinking source in 2013 until further treatment options could be put in place. As such, Judge Tunnel flow resumed to Silver Creek in 2013. In 2024, PCMC will be diverting Judge Tunnel water out of Silver Creek once again as part of their SCO with DWQ and DDW. To determine the effect of Judge Tunnel water on Silver Creek TDS concentrations data was analyzed from before and after 2013.

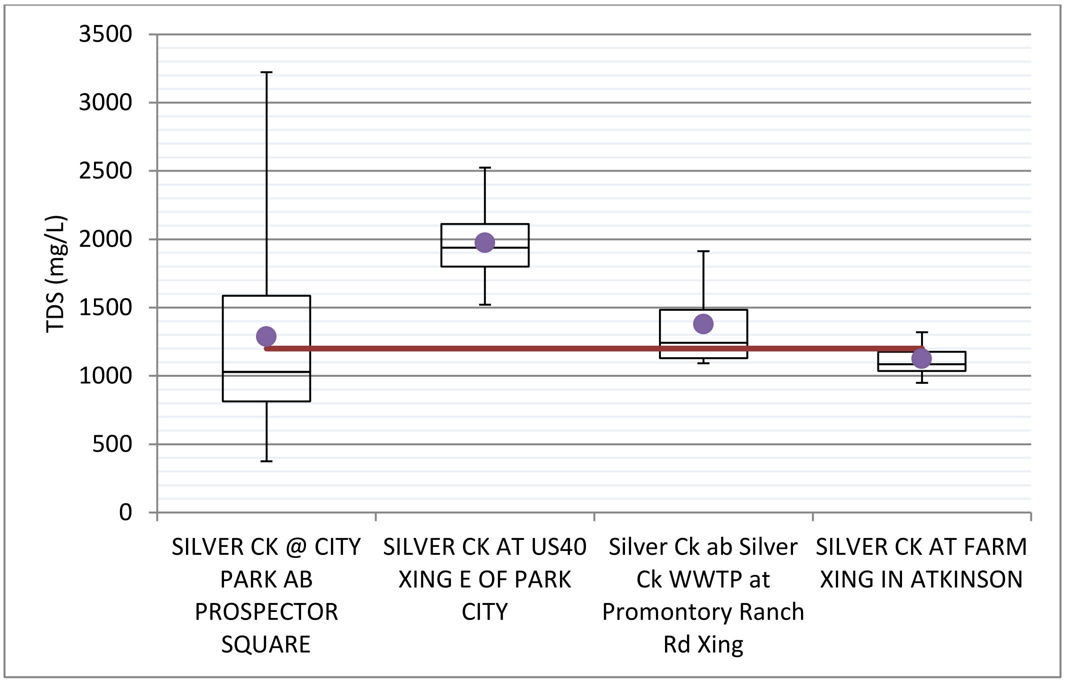

FIGURE 30. SILVER CREEK SITES PRE-2013 (WITHOUT JUDGE TUNNEL WATER). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

Figure 30 shows the data available prior to 2013. It indicates that TDS was variable and exceeded the criterion, particularly at US40 Xing East of Park City.

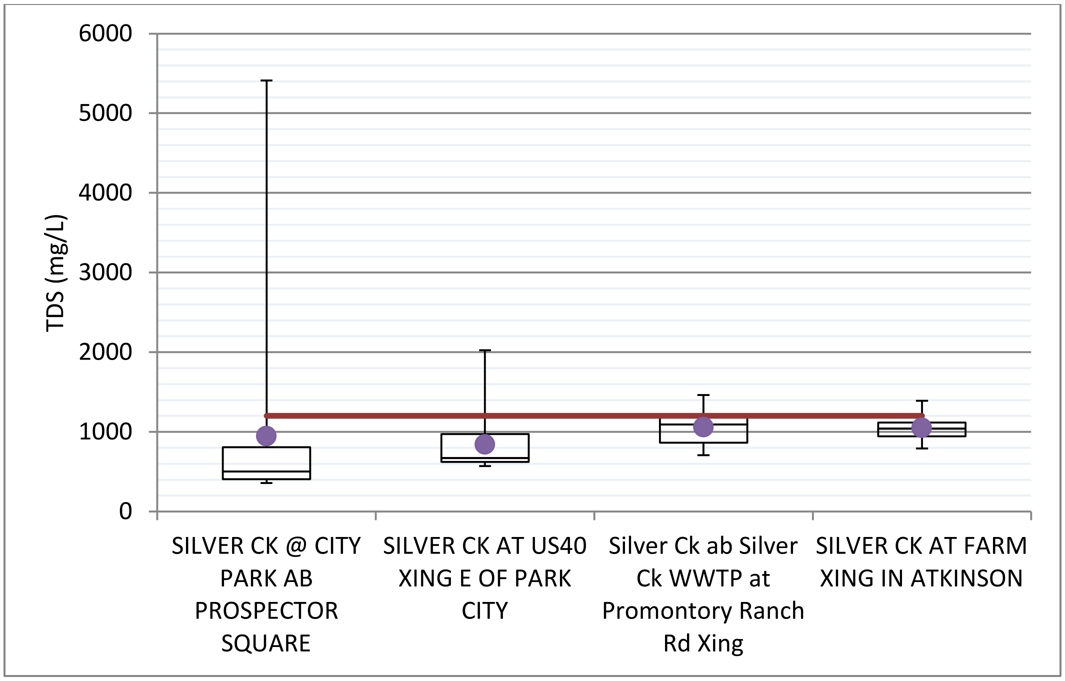

FIGURE 31. SILVER CREEK SITES POST 2013 (WITH JUDGE TUNNEL WATER). PURPLE DOTS REPRESENT THE MEAN VALUE, RED LINE IS THE CURRENT CRITERION.

Figure 31 shows box plots for data collected after 2013. While the Prospector site is still quite variable, the mean values meet the current criterion and the variability of downstream sites is lower.

STATISTICS AND HYPOTHESIS TESTING

TABLE 6. SUMMARY OF STATISTICS - SILVER CREEEK WITHOUT AND WITH JUDGE TUNNEL WATER.

Statistics	Pre 2013 (without Judge Tunnel input)	Post 2013 (with Judge Tunnel input)
Number of Valid Observations	39	99
Number of Distinct Observations	37	89
Minimum	376	358
Maximum	3222	5412
Mean	1360	973.9
Median	1200	914
Standard Deviation	541.5	629.6
90^{th} Percentile with 95% Confidence (bootstrap method)	2364	1442

Statistics were calculated using ProUCL 5.1.002, statistical software developed by the Environmental Protection Agency for analyzing environmental data (Table 6). The histogram and goodness of fit tests indicate that the data is not normally distributed; as such, non-parametric statistical tests were used to calculate descriptive statistics and determine the 90th percentile with a 95% confidence level. Bootstrap methods (3,000 intervals) yielded 90th percentile values of 2,364 mg/L and 1,442 mg/L, respectively.

A t-test was performed to determine if the means of the data pre- and post-2013 data differ. The hypothesis was that there is no difference in the means before and after 2013. This hypothesis was rejected at the 0.05 confidence level, which indicates that the mean values differ. Based on the data, the mean was greater in 2013 without Judge Tunnel water (Figure 32). Thus, Judge Tunnel water dilutes TDS concentrations in Silver Creek. DWQ considered whether to propose a criterion based on the potential future condition in 2024 when PCMC removes Judge Tunnel water from Silver Creek, however, setting the criterion based on this condition would not be as protective of the existing use downstream. If the criterion is violated after 2024, the impact of removing Judge Tunnel's input should be considered.

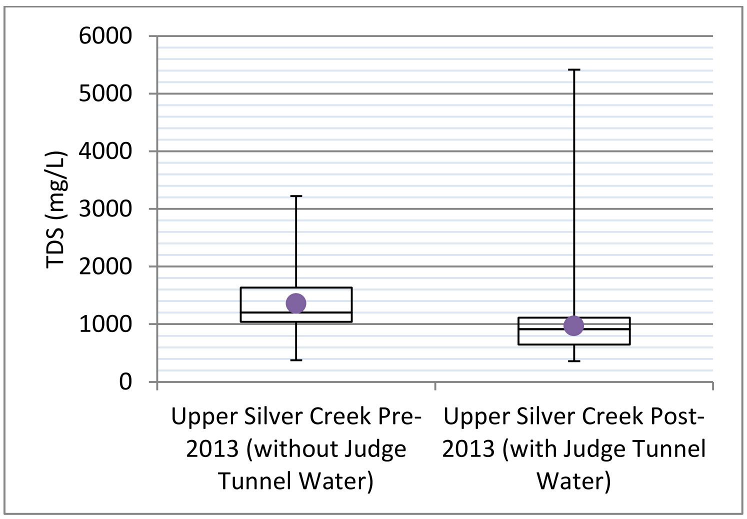

FIGURE 32. UPPER SILVER CREEK SITES PRE AND POST 2013.

RESULTS

Assessment Unit Split

Based on the data analysis, Silver Creek at Wanship is meeting the current criterion of 1,200 mg/L TDS. DWQ proposes to split the assessment unit into and upper and lower Silver Creek based on the properties of the watershed and the hydrologic boundary defined by the USGS. Upper Silver Creek (Silver Creek – 2) will include Silver Creek and tributaries from the confluence with Tollgate Creek to the headwaters (Figure 33). Lower Silver Creek (Silver Creek – 1) will include Silver Creek from the confluence with the Weber River to below the confluence with Tollgate Creek.

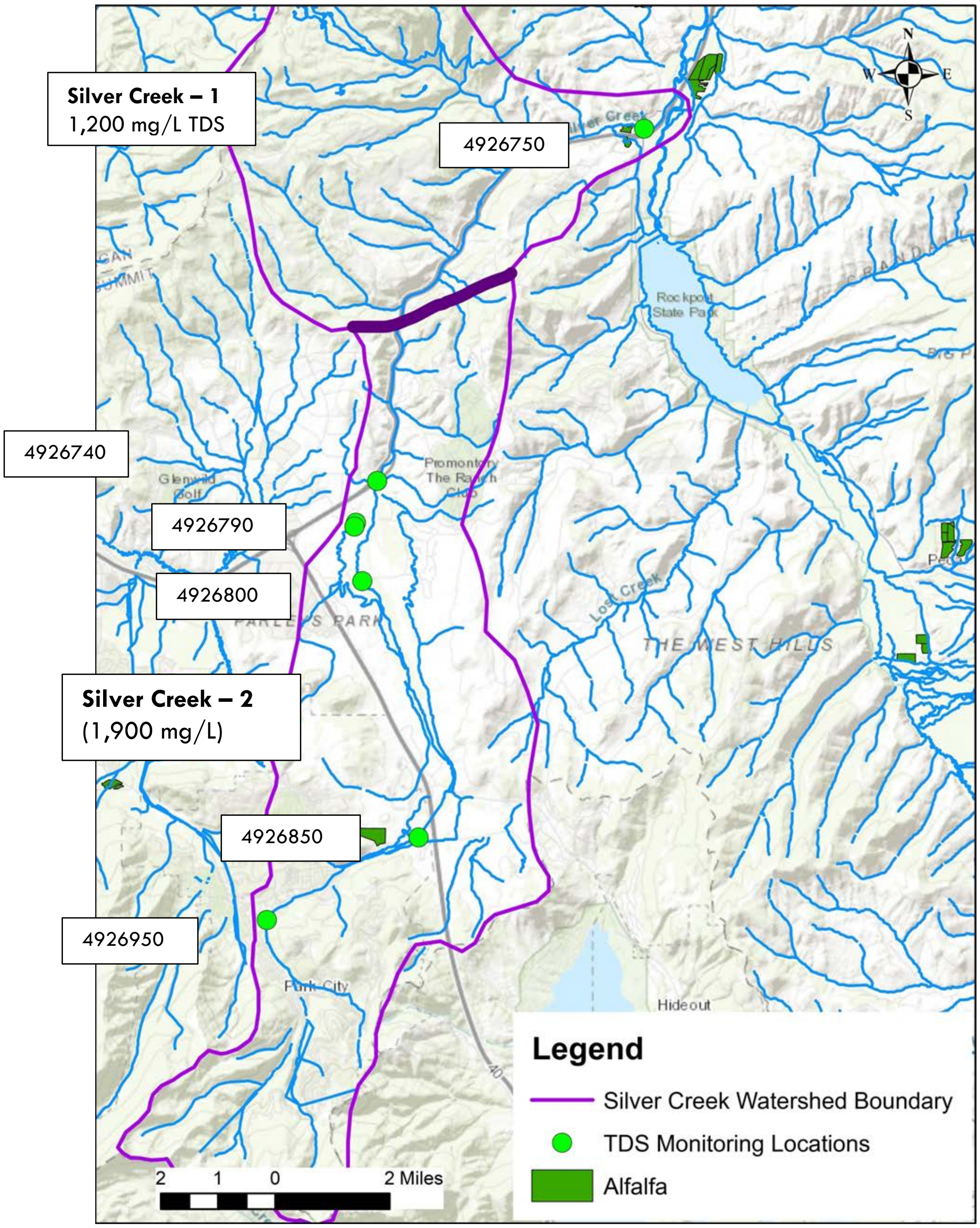

FIGURE 33. SKETCH MAP OF PROPOSED ASSESMENT UNIT BOUNDARIES AND TDS WATER QUALITY CRITERIA.

Silver Creek-2

Data Summary for Silver Creek - 2

Silver Creek-2 includes all stream sites from Atkinson (4926740) upstream to Silver Creek above Prospector Square (4926950). Mine tailings are prevalent in the stream channel at all of these sites, particularly at Promontory Ranch Road (4926800) (Table 7).

TABLE 7. COMBINED DATA SUMMARY FOR THE 4 MLIDS IN SILVER CREEK-2.

MLIDs	Station Descriptions: Stations located in Silver Creek-2	Count	Min. (mg/L)	Mean (mg/L)	Median (mg/L)	Max. (mg/L)	Standard Deviation	90th Percentile
4926950, 4926850, 4926800, 4926740	Silver Ck @ City Park Ab Prospector Square, Silver Ck @ US40 Xing E of Park City, Silver Ck Ab Silver Ck WWTP @ Promontory Ranch Rd Xing, Silver Ck @ Farm Xing in Atkinson	142	358	1103	1033	5412	637	1,909

Statistical Analysis for Upper Silver Creek

The 90th Percentile of the data for Silver Creek upstream of and including the USGS gage was calculated using ProUCL 5.1.002. The histogram and goodness of fit tests indicate that the data is not normally distributed; as such, non-parametric statistical tests were used to determine the 90th percentile with a 95% confidence level. Bootstrap methods (3,000 intervals) yielded a 90th percentile value of 1,909 mg/L.

Revised TDS Criterion for Upper Silver Creek – Silver Creek - 2

A maximum TDS concentration of 2,300 mg/L is potentially protective of the irrigation uses in the watershed (see Irrigation Section). However, DWQ proposes to use the 90th percentile of 1,900 mg/L (rounded down from 1,909) as a maximum criterion for Upper Silver Creek. Although Judge Tunnel has provided dilution of TDS concentrations in Silver Creek that will be removed in 2024, DWQ is not proposing to adjust the criterion in anticipation of that future condition. Rather, DWQ proposes to use the 90th percentile value because this protects the existing and potential future irrigation downstream uses at Wanship. Based on a mass balance analysis, 1,900 mg/L is the highest the criterion could be set to protect the downstream uses by meeting the 1,200 mg/L criterion at Wanship (discussed below).

The 1,900 mg/L TDS criterion is necessary because of uncontrollable man-caused conditions primarily from winter applications of road salt to protect human life. The Silver Creek watershed is extensively impacted by historical mining activities and determining natural conditions is difficult because of the lack of reference conditions. Based on measurements of unimpacted groundwater and PCMC Springs

(Table 3), natural TDS concentrations could be approximately 250 mg/L on average. Comparing this TDS concentration to an approximate average concentration in Silver Creek above the WWTP of 1,100 mg/L (Table 5) suggests that approximately 75 percent of the TDS in Silver Creek comes from man-caused nonpoint sources. Coincidentally, the approximate average of the Silver Creek WWTP effluent is 1,100 mg/L supporting that the WWTP effluent is not increasing TDS concentrations in Silver Creek. Estimating the specific contributions of the nonpoint sources discussed in Conceptual Site Model are difficult. The Load-Duration curves did not identify specific relationships.

Road salt is the dominant source of TDS in Silver Creek because summer TDS concentrations were 59 percent of winter concentrations (see discussion for Figure 26). Groundwater impacted by road salting and septic systems also likely contributes TDS to Silver Creek year round. As previously discussed, Brooks et al. and Susong et al. (1998) attributed elevated chloride concentrations in groundwater to road salting. In the summer, approximately 70% of the TDS is estimated to be from man-caused sources based on a comparison of observed TDS concentrations in Silver Creek above the WWTP to the naturally occurring 250 mg/L.

Because of these uncertainties, the criterion may be revised in the future during a Triennial Review of the water quality standards if TDS concentrations in Silver Creek are observed to change. The influences of the Judge Tunnel may affect future TDS concentrations. The BMPs for road salting being implemented by governmental transportation agencies may reduce TDS contributions but weather will have a larger impact. Winter maintenance contributions of TDS concentrations will increase or decrease in response to weather. The overwhelming concerns for traffic accidents or other impacts to life and safety will continue to trump the attainment of water quality goals.

Protection of Downstream Uses – Silver Creek -1

Flow Regression

To consider the mass balance of TDS and protection of downstream uses, a flow regression was completed in order to estimate flows at the Wanship site based on the gaged site at Atkinson. Gage data was paired with flows measured in the field at Wanship to develop a regression ($R^2 = 0.95$) (Figure 34). Since flow at Wanship is much higher during spring runoff due to input from intermittent streams, spring runoff flows were not used in the regression. While this makes the model more representative of standard conditions, it also makes the model a conservative estimate during high flows, since dilution at Wanship can also be expected to be higher than modeled during high flow conditions. The regression formula is: $Flow_{(Wanship)} = 1.61 \times Flow_{(Atkinson\ USGS)}$

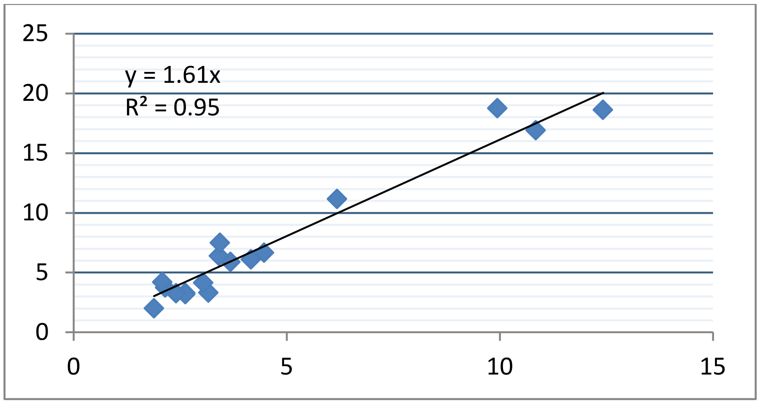

FIGURE 34. REGRESSION OF FLOW FROM USGS GAGE AND PAIRED FLOW MEASUREMENTS AT WANSHIP.

Mass Balance

A mass balance calculation was performed in order to determine if the proposed criterion is protective of downstream uses. This was performed using calculated TDS, flow values from the USGS gage, and paired modeled values at Wanship. $TDS(Wanship) = \frac{TDS(Atkinson)\ x\ Discharge(Atkinson)}{Discharge(Wanship)}$

Model results are shown in Figure 35.

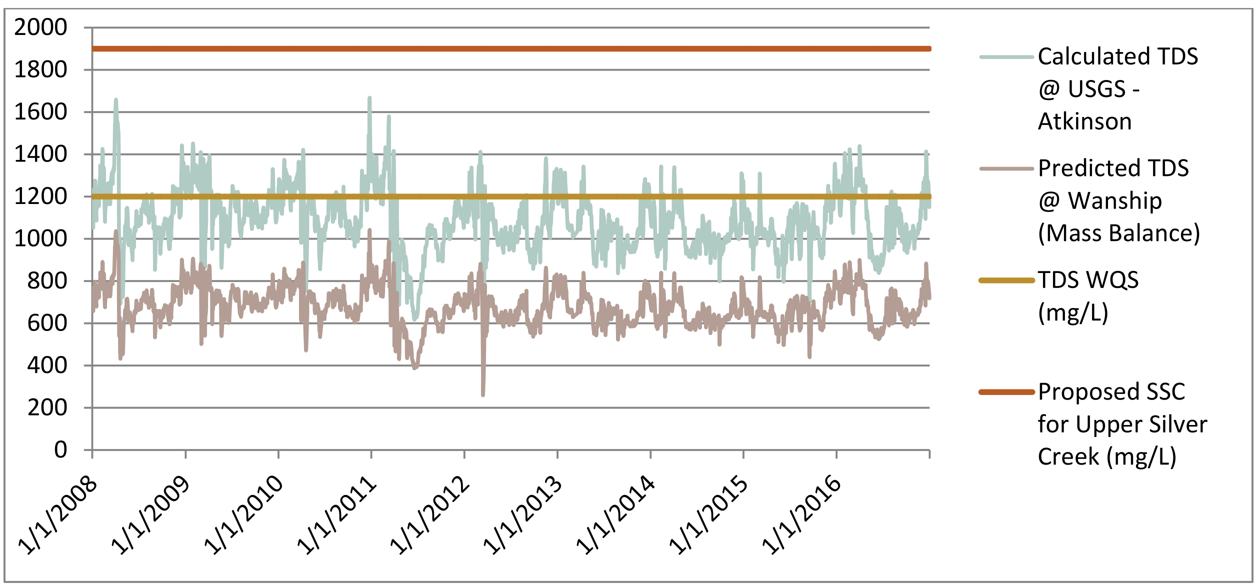

FIGURE 35. GRAPH OF THE CALCULATED TDS CONCENTRATION AT ATKINSON (BASED ON REGRESSION) AND THE PREDICTED TDS AT WANSHIP (BASED ON MASS BALANCE). WHEN THE ATKINSON SITE ATTAINS 1,900 MG/L, WANSHIP ATTAINS 1,200 MG/L.

Criterion Change: Impact on Class 4 Agricultural Use

Based on mass balance calculations, when the magnitude of the criterion is set at 1,900 mg/L at Atkinson the maximum concentration at Wanship is 1,188 mg/L, which attains the statewide criterion of 1,200 mg/L. This is a conservative estimate on concentrations at the outlet of Silver Creek-2 (Atkinson).

Since 1,900 mg/L is the 90th percentile value based on existing conditions and Wanship currently attains 1,200 mg/L, the downstream agricultural use will be protected with a year-round instantaneous criterion of 1,900 mg/L in Silver Creek-2.

In rule, this will appear in R317-2-13.4 Weber River Basin (a) Weber River Drainage, and in R317-2-14. Numeric Criteria Table 2.14.1.

R317-2-13.4 Weber River Basin

(a) Weber River Drainage

Weber River and tributaries, from Stoddard diversion to Headwaters, except as listed below	1C	2B	3A	4
Silver Creek and tributaries, from confluence with Weber River to below the confluence with Tollgate Creek	1C	2B	3A	4
Silver Creek and tributaries, from confluence with Tollgate Creek to Headwaters	1C	2B	3A	4*

R317-2-14. Numeric Criteria Table 2.14.1

FOOTNOTE: (4)

Silver Creek and tributaries, Summit County, from confluence with Tollgate Creek to headwaters: January through December, maximum 1,900 mg/L. Assessments will be based on TDS concentrations measured at the location of MLID/STORET 4926740.

Criterion Change: Impact on Fishable/Swimmable Uses (CWA Section 101(a)(2))

The proposed Silver Creek – 1 assessment unit is attaining all beneficial uses (1C, 2B, 3A, and 4).

1C DRINKING WATER

A change to the TDS criterion based on existing conditions is unlikely to affect the 1C drinking water standard, as there is no criterion for TDS. The existing drinking water use is unaffected because the points of diversion are the Judge and Spiro tunnels. DWQ is working with PCMC and DDW on treatment of drinking water sources in the Park City area.

2B SECONDARY CONTACT RECREATION

The 2B secondary contact recreation beneficial use is being attained in Silver Creek-2.

3ACOLD WATER FISHERY

A change to the TDS standard based on existing conditions is unlikely to affect the existing uses of the Class 3A cold-water fishery because the other stressors likely existed since mining occurred in Park City. Other constituents including low DO, high pH, and elevated cadmium and zinc remain current causes of the 3A impairment. Sources of cadmium and zinc include the mine tunnels where most of the water originates. While PCMC is addressing the mine tunnel sources under their discharge permit, fully meeting the water quality criteria is unlikely within the next 30 years. Additionally, much of Silver

Creek comprises mine tailings in the stream channel and degraded physical habitat. The remediation that EPA is coordinating under the Superfund program may improve physical habitat conditions for fish and their supporting food web in addition to raising DO, raising pH, and lowering in-stream metal concentrations and TDS. However, completion is uncertain because EPA does not currently have the resources to fully remediate the area. EPA and DEQ are coordinating with the United States Fish and Wildlife Service on a Natural Resource Damage Assessment and Restoration process for Silver Creek that may help fund future remediation and restoration. The highest attainable aquatic life use cannot be confidently determined at this time but the toxic metals zinc and cadmium, not TDS, are predicted to remain the stressors that limit attainment of the use.

CONCLUSIONS

Use and Value

TDS concentrations in Silver Creek are elevated because of road salt applied for human safety. This human-caused source of pollution prevent the attainment of 1,200 mg/L statewide criterion and cannot be remedied. DWQ determined that a revised TDS criterion is protective of the existing and anticipated future agricultural uses in Silver Creek-2. The 1,900 mg/L criterion for Silver Creek-2 will also protect downstream uses. The revised criterion is also protective of existing aquatic life uses and is anticipated to be protective of potential future determinations of the highest attainable aquatic life use. For the aquatic life uses, based on 40 CFR 131.10(g)(3): "human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place." If TDS concentrations in Silver Creek change in the future, the criterion should be reevaluated during a Triennial Review.

DWQ will split the assessment unit into Silver Creek – 1 (from the confluence with the Weber River to Tollgate Canyon) and Silver Creek – 2 (from Tollgate Canyon to the headwaters). Silver Creek – 1 will retain the 1,200 mg/L TDS criterion for Class 4 agricultural use. Silver Creek – 2 will have a 1,900 mg/L TDS instantaneous criterion year-round. This will be protective of the agricultural uses downstream.

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DWQ-2018-013090

Attachment 3

December 10, 2018 Memorandum to Water Quality Standards Workgroup
Subject: Corrections to human health criteria in Table 2.14.1 and Table 2.14.2 and chronic cadmium criterion in Footnote (7) to Table 2.14.2

State of Utah
GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

MEMORANDUM

TO: Water Quality Standards Workgroup

FROM: Chris Bittner, Chair

DATE: December 10, 2018

SUBJECT: Corrections to human health criteria in Table 2.14.1 and Table 2.14.2 and chronic cadmium criterion in Footnote (7) to Table 2.14.2

In the summer of 2018, the Water Quality Board adopted revisions to Utah's human health criteria. The U.S. Environmental Protection Agency identified several discrepancies between the criteria that the supporting documents indicated would be adopted and the criteria that were actually adopted. The U.S. Environmental Protection Agency also identified some additional inconsistencies where MCL-only criteria were not moved from Table 2.14.6 to Table 2.14.1 Class 1C. The table below summarizes the proposed corrections and is followed by a markup of Tables 2.14.1 and 2.14.6.

The chronic cadmium criterion equation will also be updated as follows:

CADMIUM $CF * e^{(0.7977*\ln(hardness)-3.909)}$

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Human Health Criteria Corrections and Intended Revisions From the Utah 2018 Water Quality Standards Revisions				
CAS	**Pollutant**	**Organism +Water**	**Organism only**	**Explanation**
57-12-5	Cyanide	4	400	Criteria not updated as intended
107-02-8	Acrolein	3		Delete significant figure
117-81-7	Bis(2-Ethylhexyl)Phthalate		0.37	Criteria updated but more stringent than EPA (2015)
85-68-7	Butylbenzyl Phthalate	0.010	0.010	Add significant figure
108-90-7	Chlorobenzene		800	Incorrect CAS # and organism only not updated
124-48-1	Chlorodibromomethane	0.80	21	Criteria not updated as intended
67-66-3	Chloroform	60	2000	Criteria not updated as intended
75-27-4	Dichlorobromomethane	0.95	27	Criteria not updated as intended
74-83-9	Methyl Bromide	100		Old criteria not deleted, result 47100
205-99-2	Benzo(b)fluoranthene		0.0013	Criteria not updated as intended
111-44-4	Bis(2-chloroethylether)			Correct CAS
218-01-9	Chrysene	0.12	0.13	Criteria not updated as intended
53-70-3	Dibenz(a,h)anthracene	0.00012	0.00013	Criteria not updated as intended
91-94-1	3,3-Dichlorobenzidine	0.049		Add significant figure ,revised more stringent than EPA (2015)
84-66-2	Diethyl Phthalate			Correct CAS
121-14-2	2,4-Dinitrotoluene	0.049		Correct criteria, revised less stringent than EPA (2015)
122-66-7	1,2-Diphenylhydrazine	0.03	0.2	Criteria not updated as intended
67-72-1	Hexachloroethane	0.1	0.1	Criteria not updated as intended
621-64-7	N-nitrosodi-n-propylamine	0.0050		Add significant figure to be consistent, no changes were made to act on
120-82-1	1,2,4-Trichlorobenzene	0.071		Add significant figure, revised more stringent than EPA (2015)
319-84-6	Alpha_BHC		0.00039	More stringent than EPA (2015)
319-85-7	Beta-BHC	0.0080		Add significant figure

Human Health Criteria Corrections and Intended Revisions From the Utah 2018 Water Quality Standards Revisions				
57-74-9	Chlordane	0.00031		Add significant figure, revised more stringent than EPA (2015)
50-29-2	DDT	0.000030		Revised less stringent than EPA
72-20-8	Endrin		0.03	Old criterion not deleted
8001-35-2	Toxaphene	0.00070		Add significant figure
1912-24-9	Atrazine	3.0		MCL only, moved to Table 2.14.1, need to delete from 2.14.6
75-99-0	Dalapon			MCL only, moved to Table 2.14.1, need to delete from 2.14.6
156-59-2	Dichloroethylene (cis-1,2)			MCL only, move to Table 2.14.1
85-00-7	Diquat			MCL only, moved to Table 2.14.1, need to delete from 2.14.6
1071-83-6	Glyphosate			MCL only, move to Table 2.14.1
1330-20-7	Xylenes			MCL only, move to Table 2.14.1
542-88-1	Bis(2-chloro1methylether)			Delete duplicated entry
108-60-1	Bis(2-chloromethylethylether			Delete duplicated entry
930-55-2	N-Nitrosopyrrolidine			Correct spelling
72-43-5	Methoxychlor			Delete MCL label

R317-2-14. Numeric Criteria.

TABLE 2.14.1
NUMERIC CRITERIA FOR DOMESTIC,
RECREATION, AND AGRICULTURAL USES

Parameter	Domestic Source 1C(1)	Recreation and Aesthetics 2A	2B	Agri-culture 4
BACTERIOLOGICAL (30-DAY GEOMETRIC MEAN) (NO.)/100 ML) (7)				
E. coli	206	126	206	
MAXIMUM (NO.)/100 ML) (7)				
E. coli	668	409	668	
PHYSICAL				
pH (RANGE)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)		10	10	
METALS (DISSOLVED, MAXIMUM MG/L) (2)				
Arsenic	0.01			0.1
Barium	1.0			
Beryllium	<0.004			
Cadmium	0.01			0.01
Chromium	0.05			0.10
Copper				0.2
Lead	0.015			0.1
Mercury	0.002			
Selenium	0.05			0.05
Silver	0.05			
INORGANICS (MAXIMUM MG/L)				
Bromate	0.01			
Boron				0.75
Chlorite	<1.0			
Fluoride	4.0			

Nitrates as N	10		
Total Dissolved Solids (4)			1200
	RADIOLOGICAL		
(MAXIMUM pCi/L)			
Gross Alpha	15		15
Gross Beta	4 mrem/yr	Radium 226, 228	
(Combined)	5		
Strontium 90	8		
Tritium	20000		
Uranium	30		
ORGANICS (MAXIMUM UG/L)			
2,4-D 94-75-7	70		
2,4,5-TP 93-72-1	10		
Alachlor 15972-60-8	2		
Atrazine 1912-24-9	3		
Carbofuran 1563-66-2	40		
Dichloroethylene (cis-1,2) 156-59-2	70		
Dalapon 75-99-0	200		
Di(2ethylhexl)adipate 103-23-1	400		
Dibromochloropropane 96-12-8	0.2		
Dinoseb 88-85-7	7		
Diquat 85-00-7	20		
Endothall 145-73-3	100		
Ethylene Dibromide 106-93-4	0.05		
Glyphosate 1071-83-6	700		
POLLUTION INDICATORS (5)			
BOD (MG/L)	5	5	5
Nitrate as N (MG/L)	4	4	
Total Phosphorus as P (MG/L)(6)	0.05	0.05	

FOOTNOTES:

(1) See also numeric criteria for water and organism in Table 2.14.6.

(2) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by approved laboratory methods for the required detection levels.

(3) Reserved

(4) SITE SPECIFIC STANDARDS FOR TOTAL DISSOLVED SOLIDS (TDS)

Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir:
March through October daily maximum 4,900 mg/l and an average of 3,800 mg/l; November through February daily maximum 6,300 mg/l and an average of 4,700 mg/l. Assessments will be based on TDS concentrations measured at the location of STORET 4960740.

Blue Creek Reservoir and tributaries, Box Elder County, daily maximum 2,100 mg/l;

Castle Creek from confluence with the Colorado River to Seventh Day Adventist Diversion: 1,800 mg/l;

Cottonwood Creek from the confluence with Huntington Creek to Highway U-57: 3,500 mg/l;

Ferron Creek from the confluence with San Rafael River to Highway U-10: 3,500 mg/l;

Huntington Creek and tributaries from the confluence with Cottonwood Creek to Highway U-10: 4,800 mg/l;

Ivie Creek and its tributaries from the confluence with Muddy Creek to the confluence with Quitchupah Creek: 3,800 mg/l provided that total sulfate not exceed 2,000 mg/l to protect the livestock watering agricultural existing use;

Ivie Creek and its tributaries from the confluence withQuitchupah Creek to Highway U-10: 2,600 mg/l;

Lost Creek from the confluence with Sevier River to U.S. National Forest boundary: 4,600 mg/l;

Muddy Creek and tributaries from the confluence with Ivie Creek to Highway U-10: 2,600 mg/l;

Muddy Creek from confluence with Fremont River to confluence with Ivie Creek: 5,800 mg/l;

North Creek from the confluence with Virgin River to headwaters: 2,035 mg/l;

Onion Creek from the confluence with Colorado River to road crossing above Stinking Springs: 3000 mg/l;

Brine Creek-Petersen Creek, from the confluence with the Sevier River to Highway U-119 Crossing: 9,700 mg/l;

Price River and tributaries from confluence with Green River to confluence with Soldier Creek: 3,000 mg/l;

Price River and tributaries from the confluence with Soldier Creek to Carbon Canal Diversion: 1,700 mg/l;

Quitchupah Creek and tributaries from the confluence with Ivie Creek
to Highway U-10: 3,800 mg/l provided that total sulfate not exceed
2,000 mg/l to protect the livestock watering agricultural existing use;

Rock Canyon Creek from the confluence with Cottonwood Creek to headwaters: 3,500 mg/l;

San Pitch River from below Gunnison Reservoir to the Sevier River: 2,400 mg/l;

San Rafael River from the confluence with the Green River to Buckhorn Crossing: 4,100 mg/l;

San Rafael River from the Buckhorn Crossing to the confluence with Huntington Creek and Cottonwood Creek: 3,500 mg/l;

Sevier River between Gunnison Bend Reservoir and DMAD Reservoir: 1,725 mg/l;

Sevier River from Gunnison Bend Reservoir to Crafts Lake: 3,370 mg/l;

South Fork Spring Creek from confluence with Pelican Pond Slough Stream to U.S. Highway 89 1,450 mg/l (Apr.-Sept.)
1,950 mg/l (Oct.-March)

Virgin River from the Utah/Arizona border to Pah Tempe Springs: 2,360 mg/l

(5) Investigations should be conducted to develop more information where these pollution indicator levels are exceeded.

(6) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(7) Where the criteria are exceeded and there is a reasonable basis for concluding that the indicator bacteria E. coli are primarily from natural sources (wildlife), e.g., in National Wildlife Refuges and State Waterfowl Management Areas, the criteria may be considered attained provided the density attributable to non-wildlife sources is less than the criteria. Exceedences of E. coli from nonhuman nonpoint sources will generally be addressed through appropriate Federal, State, and local nonpoint source programs.

Measurement of E. coli using the "Quanti-Tray 2000" procedure is approved as a field analysis. Other EPA approved methods may also be used.

For water quality assessment purposes, up to 10% of representative samples may exceed the 668 per 100 ml criterion (for 1C and 2B waters) and 409 per 100 ml (for 2A waters). For small datasets, where exceedences of these criteria are observed, follow-up ambient monitoring should be conducted to better characterize water quality.

--------------------------**BREAK**---------------------------------

TABLE 2.14.6

LIST OF HUMAN HEALTH CRITERIA (CONSUMPTION)

Chemical Parameter and CAS #	Water and Organism (ug/L)	Organism Only (ug/L)
	Class 1C	Class 3A,3B,3C,3D
Antimony 7440-36-0	5.6	640
Arsenic 7440-38-2	A	A
Beryllium 7440-41-7	C	C
Chromium III 16065-83-1	C	C
Chromium VI 18540-29-9	C	C
Copper 7440-50-8	1,300	
Mercury 7439-97-6	A	A
Nickel 7440-02-0	610	4,600
Selenium 7782-49-2	170	4,200
Thallium 7440-28-0	0.24	0.47

Zinc 7440-66-6	7,400	26,000
Free Cyanide 57-12-5	[~~140~~] 4	[~~140~~]400
Asbestos 1332-21-4	7 million Fibers/L	
2,3,7,8-TCDD Dioxin 1746-01-6	5.0 E -9 B	5.1 E-9 B
Acrolein 107-02-8	3[~~.0~~]	400
Acrylonitrile 107-13-1	0.061	7.0
[~~Atrazine 1912-24-9~~	~~3.0~~	
]Benzene 71-43-2	2.1 B	51 B
Bromoform 75-25-2	7.0 B	120 B
Carbon Tetrachloride 56-23-5	0.4 B	5 B
Chlorobenzene [~~57-12-5~~]108-90-7	100 MCL	1,600
Chlorodibromomethane 124-48-1	[~~0.40~~]0.80 B	[~~13~~]21 B
Chloroform 67-66-3	[~~5.7~~]60 B	470 B
[~~Dalapon 75-99-0~~	~~200~~	
]Dichlorobromomethane 75-27-4	[~~0.55~~]0.95 B	[~~17~~]27 B
1,2-Dichloroethane 107-06-2	9.9 B	[~~650~~]2,000 B
1,1-Dichloroethylene 75-35-4	300 MCL	20,000
[~~Dichloroethylene (cis-1,2) 156-59-2~~	~~70~~	
~~Diquat 231-36-7~~	~~20~~	
]1,2-Dichloropropane 78-87-5	0.90 B	31 B
1,3-Dichloropropene 542-75-6	0.27	12
Ethylbenzene 100-41-4	68	130
[~~Glyphosate 1071-83-6~~	~~700~~	
]Methyl Bromide 74-83-9	[~~47~~]100	10,000
Methylene Chloride 75-09-2	20 B	1,000 B
1,1,2,2-Tetrachloroethane 79-34-5	0.2 B	3 B
Tetrachloroethylene 127-18-4	10 B	29 B
Toluene 108-88-3	57	520
1,2 -Trans-Dichloroethylene 156-60-5	100 MCL	4,000
1,1,1-Trichloroethane 71-55-6	10,000 MCL	200,000
1,1,2-Trichloroethane 79-00-5	0.55 B	8.9 B
Trichloroethylene 79-01-6	0.6 B	7 B
Vinyl Chloride 75-01-4	0.022	1.6
[~~Xylenes 1330-20-7~~	~~10,000~~	
]2-Chlorophenol 95-57-8	30	800
2,4-Dichlorophenol 120-83-2	10	60
2,4-Dimethylphenol 105-67-9	100	3,000
2-Methyl-4,6-Dinitrophenol 534-52-1	2	30
2,4-Dinitrophenol 51-28-5	10	300

3-Methyl-4-Chlorophenol
  59-50-7   500   2,000
Pentachlorophenol 87-86-5   0.03 B   0.04 B
Phenol 108-95-2   4,000   300,000
2,4,5-Trichlorophenol 95-95-4   300   600
2,4,6-Trichlorophenol 88-06-2   1.5 B   2.8 B
Acenaphthene 83-32-9   70   90
Anthracene 120-12-7   300   400
Benzidine 92-87-5   0.00014 B   0.011 B
BenzoaAnthracene 56-55-3   0.0012 B   0.0013 B
BenzoaPyrene 50-32-8   0.00012 B   0.00013 B
BenzobFluoranthene 205-99-2   0.0012 B   [~~0.018~~]0.0013
B
BenzokFluoranthene 207-08-9   0.012 B   0.013 B
Bis2-Chloro1methylether
  542-88-1   0.00015   0.017
Bis2-Chloro1methylethylether
  108-60-1   200 B   4000
Bis2-ChloroethylEther
  111-44-4[~~0~~]_   0.030 B   2.2 B
[~~Bis2-Chloro1methylether~~
~~542-88-1   0.00015   0.017~~
~~Bis2-Chloro1methylethylether~~
~~108-60-1   200 B   4000~~
]Bis2-ChloroisopropylEther
  39638-32-9   1,400   65,000
Bis2-EthylhexylPhthalate
  117-81-7   0.32 B   [~~0.037~~]0.37 B
Butylbenzyl Phthalate
  85-68-7   0.10[–]   0.10
2-Chloronaphthalene 91-58-7   800   1,000
Chrysene 218-01-9   0.0038 B   0.018 B
Dibenzoa,hAnthracene   53-70-3   [~~0.0038~~]0.00012   B[——]
[~~0.018~~]0.00013 B
1,2-Dichlorobenzene 95-50-1   1,000   3,000
1,3-Dichlorobenzene 541-73-1   7   10
1,4-Dichlorobenzene 106-46-7   300   900
3,3-Dichlorobenzidine
  91-94-1   0.049 B[–]   0.15 B
Diethyl Phthalate 84[~~64~~]-66-2   600   600
Dimethyl Phthalate 131-11-3   2,000   2,000
Di-n-Butyl Phthalate 84-74-2   20   30
2,4-Dinitrotoluene 121-14-2   0.049 B[–]   1.7 B
Dinitrophenols 25550-58-7   10   1,000
1,2-Diphenylhydrazine

122-66-7		[~~0.036~~]0.03 B
[~~0.20~~]0.2 B		
Fluoranthene 206-44-0	20	20
Fluorene 86-73-7	50	70
Hexachlorobenzene 118-74-1	0.000079 B	0.000079 B
Hexachlorobutadiene 87-68-3	0.01 B	0.01 B
Hexachloroethane 67-72-1	[~~1.4~~]0.1 B	[~~3.3~~]0.1
B		
Hexachlorocyclopentadiene		
77-47-4	4	4
Ideno 1,2,3-cdPyrene		
193-39-5	0.0012 B	0.0013 B
Isophorone 78-59-1	34 B	1,800 B
Nitrobenzene 98-95-3	10	600
N-Nitrosodiethylamine 55-18-5	0.0008 B	1.24 B
N-Nitrosodimethylamine		
62-75-9	0.00069 B	3.0 B
N-Nitrosodi-n-Propylamine		
621-64-7	0.0050 B[—]	0.51 B
N-Nitrosodiphenylamine		
86-30-6	3.3 B	6.0 B
N-Nitrosopyrrolidine 930-55-2	0.016 B	34 B
Pentachlorobenzene 608-93-5	0.1	0.1
Pyrene 129-00-0	20	30
1,2,4-Trichlorobenzene		
120-82-1	0.071 MCL[—]	0.076
Aldrin 309-00-2	0.00000077 B	0.00000077 B
alpha-BHC 319-84-6		0.00036 B
[~~0.000050~~]0.00039 B		
beta-BHC 319-85-7	0.0080 B[—]	0.014 B
gamma-BHC (Lindane) 58-89-9	4.2 MCL	4.4
Hexachlorocyclohexane (HCH)		
Technical 608-73-1	0.0066	0.010
Chlordane 57-74-9		[~~0.00030~~]0.00031 B
0.00032 B		
4,4-DDT 50-29-3		[~~0.000032~~]0.000030 B
0.000030 B		
4,4-DDE 72-55-9	0.000018 B	0.000018 B
4,4-DDD 72-54-8	0.00012 B	0.00012 B
Dieldrin 60-57-1	0.0000012 B	0.0000012 B
alpha-Endosulfan 959-98-8	20	30
beta-Endosulfan 33213-65-9	20	40
Endosulfan Sulfate 1031-07-8	20	40
Endrin 72-20-8	0.03	[~~0.060~~]0.03
Endrin Aldehyde 7421-93-4	1	1

Heptachlor 76-44-8	0.0000059 B	0.0000059 B
Heptachlor Epoxide 1024-57-3	0.000032 B	0.000032 B
Methoxychlor 72-43-5	0.02 [~~MCL~~]___	0.02
Polychlorinated Biphenyls (PCBs) 1336-36-3	0.000064 B,D	0.000064 B,D
Toxaphene 8001-35-2	0.00070 B[–]	0.00071 B

Footnotes:

A. See Table 2.14.2

B. Based on carcinogenicity of 10-6 risk.

C. EPA has not calculated a human criterion for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics

D. This standard applies to total PCBs.

Attachment 4

September 17, 2018 Memorandum to Water Quality Standards Workgroup

Subject: Addition of Class 1C to portions of the Blacksmith Fork and tributaries from the confluence with Left Hand Fork Blacksmith Fork to headwaters, Cache County, Utah

State of Utah
GARY R. HERBERT
Governor
SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality
Alan Matheson
Executive Director
DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

MEMORANDUM

TO: Water Quality Standards Workgroup

FROM: Chris Bittner, DWQ

DATE: September 17, 2018

SUBJECT: Addition of Class 1C to portions of the Blacksmith Fork and tributaries from the confluence with Left Hand Fork Blacksmith Fork to headwaters, Cache County, Utah

The Sheep Creek Cove Homeowners Association requested that the Class 1C drinking water use be added to Sheep Creek (attached). The Homeowners Association is supplementing their current source of potable water with additional water from Sheep Creek. DWQ staff confirmed the project details with the Utah Division of Drinking Water.

The watershed is shown on the attached figure. These waters are antidegradation Category 1 waters. DWQ recommends that Class 1C be added to Sheep Creek in R317-2-13.3:

Blacksmith Fork and tributaries, from confluence with Logan River to headwaters except as listed below	2B 3A	4
Sheep Creek and tributaries from Confluence with Blacksmith Fork River to headwaters.	1C 2B 3A	4

195 North 1460 West • Salt Lake City, UT
Mailing Address: P.O. Box 144870 • Salt Lake City, UT 84114-4870
Telephone (801) 536-4300 • Fax (801) 536-4301 • T.D.D. (801) 536-4284
www.deq.utah.gov

Sheep Creek Cove Homeowners, Assn. Inc.
4602 W 4950 S
Hooper, UT 84315
February 13, 2017

Ms. Erica Gaddis, Director
Utah Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870

Dear Ms. Gaddis:

The Sheep Creek Cove Homeowners Association, Inc. located in Cache County is requesting that Sheep Creek receive a new classification as a Class 1 category water under UAC R317-2. Sheep Creek is part of the Blacksmith Fork Drainage and the property involved with the HOA is located six miles south of Hardware Ranch off the Ant Flat Road.

The following details are included for your use:

Assessment Unit Name: Black Smiths Fork - 2
Assessment Unit Description: Blacksmith Fork and tributaries from confluence with Left Hand Fork Blacksmith Fork to headwaters
Assessment Unit ID: UT16010203-018_00

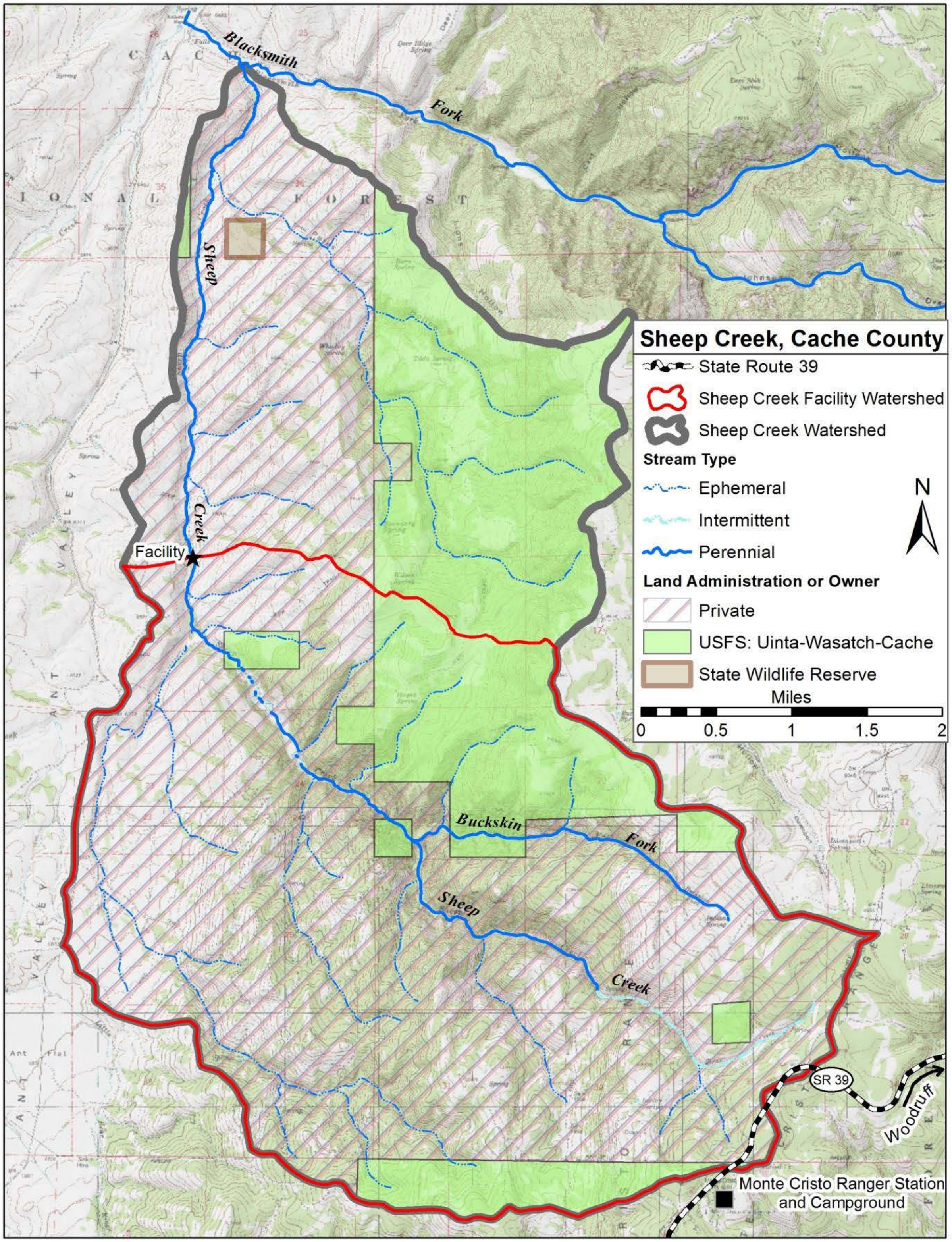
The Homeowners Association is in the process of obtaining design approval for a culinary water filtration system with the Utah Department of Environmental Quality Drinking Water. This system will augment our existing spring-fed culinary water system which has insufficient flow.

Please let us know if other/additional materials are needed to exact this classification.

Sincerely,

David A. Prevedel, Director
Sheep Creek Cove Homeowners Assn. Inc.

cc: Deidre Beck



Sheep Creek, Cache County
State Route 39
Sheep Creek Facility Watershed
Sheep Creek Watershed
Stream Type
Ephemeral
Intermittent
Perennial
Land Administration or Owner
Private
USFS: Uinta-Wasatch-Cache
State Wildlife Reserve
Miles
0
0.5
1
1.5
2
N
Blacksmith
Fork
Sheep
Creek
Facility
Buckskin
Fork
Sheep
Creek
SR 39
Woodruff
Monte Cristo Ranger Station
and Campground

Attachment 5

Complete markup of all proposed changes to R317-2
January 2019 Water Quality Board Meeting

The proposed deletions are shown in [~~strikeout~~] font. brackets and yellow highlighting
The proposed additions are shown as underlined and green highlighting

R317. Environmental Quality, Water Quality.
R317-2. Standards of Quality for Waters of the State.
R317-2-1A. Statement of Intent.

Whereas the pollution of the waters of this state constitute a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life, and impairs domestic, agricultural, industrial, recreational and other legitimate beneficial uses of water, and whereas such pollution is contrary to the best interests of the state and its policy for the conservation of the water resources of the state, it is hereby declared to be the public policy of this state to conserve the waters of the state and to protect, maintain and improve the quality thereof for public water supplies, for the propagation of wildlife, fish and aquatic life, and for domestic, agricultural, industrial, recreational and other legitimate beneficial uses; to provide that no waste be discharged into any waters of the state without first being given the degree of treatment necessary to protect the legitimate beneficial uses of such waters; to provide for the prevention, abatement and control of new or existing water pollution; to place first in priority those control measures directed toward elimination of pollution which creates hazards to the public health; to insure due consideration of financial problems imposed on water polluters through pursuit of these objectives; and to cooperate with other agencies of the state, agencies of other states and the federal government in carrying out these objectives.

R317-2-1B. Authority.

These standards are promulgated pursuant to Sections 19-5-104 and 19-5-110.

R317-2-1C. Triennial Review.

The water quality standards shall be reviewed and updated, if necessary, at least once every three years. The Director will seek input through a cooperative process from stakeholders representing state and federal agencies, various interest groups, and the public to develop a preliminary draft of changes. Proposed changes will be presented to the Water Quality Board for information. Informal public meetings may be held to present preliminary proposed changes to the public for comments and suggestions. Final proposed changes will be presented to the Water Quality Board for approval and authorization to initiate formal rulemaking. Public hearings will be held to solicit formal comments from the public. The Director will incorporate appropriate changes and return to the Water Quality Board to petition for formal adoption of the proposed changes following the requirements of the Utah Rulemaking Act, Title 63G, Chapter 3.

R317-2-2. Scope.

These standards shall apply to all waters of the state and shall be assigned to specific waters through the classification procedures prescribed by Sections 19-5-104(5) and 19-5-110 and R317-2-6.

R317-2-3. Antidegradation Policy.

3.1 Maintenance of Water Quality

Waters whose existing quality is better than the established standards for the designated uses will be maintained at high quality unless it is determined by the Director, after appropriate intergovernmental coordination and public participation in concert with the Utah continuing planning process, allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. However, existing instream water uses shall be maintained and protected. No water quality degradation is allowable which would interfere with or become injurious to existing instream water uses.

In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with Section 316 of the Federal Clean Water Act.

3.2 Category 1 Waters

Waters which have been determined by the Board to be of exceptional recreational or ecological significance or have been determined to be a State or National resource requiring protection, shall be maintained at existing high quality through designation, by the Board after public hearing, as Category 1 Waters. New point source discharges of wastewater, treated or otherwise, are prohibited in such segments after the effective date of designation. Protection of such segments from pathogens in diffuse, underground sources is covered in R317-5 and R317-7 and the rules for Individual Wastewater Disposal Systems (R317-501 through R317-515). Other diffuse sources (nonpoint sources) of wastes shall be controlled to the extent feasible through implementation of best management practices or regulatory programs.

Discharges may be allowed where pollution will be temporary and limited after consideration of the factors in R317-2-3.5.b.4., and where best management practices will be employed to minimize pollution effects.

Waters of the state designated as Category 1 Waters are listed in R317-2-12.1.

3.3 Category 2 Waters

Category 2 Waters are designated surface water segments which are treated as Category 1 Waters except that a point source discharge may be permitted provided that the discharge does not degrade existing water quality. Discharges may be allowed where pollution will be temporary and limited after consideration of the factors in R317-2-.3.5.b.4., and where best management practices will be employed to minimize pollution effects. Waters of the state designated as Category 2 Waters are listed in R317-2-12.2.

3.4 Category 3 Waters

For all other waters of the state, point source discharges are allowed and degradation may occur, pursuant to the conditions and review procedures outlined in Section 3.5.

3.5 Antidegradation Review (ADR)

An antidegradation review will determine whether the proposed activity complies with the applicable antidegradation requirements for receiving waters that may be affected.

An antidegradation review (ADR) may consist of two parts or levels. A Level I review is conducted to insure that existing uses will be maintained and protected.

Both Level I and Level II reviews will be conducted on a parameter-by-parameter basis. A decision to move to a Level II review for one parameter does not require a Level II review for other parameters. Discussion of parameters of concern is those expected to be affected by the proposed activity.

Antidegradation reviews shall include opportunities for public participation, as described in Section 3.5e.

a. Activities Subject to Antidegradation Review (ADR)

1. For all State waters, antidegradation reviews will be conducted for proposed federally regulated activities, such as those under Clean Water Act Sections 401 (FERC and other Federal actions), 402 (UPDES permits), and 404 (Army Corps of Engineers permits). The Director may conduct an ADR on any projects with the potential for major impact on the quality of waters of the state. The review will determine whether the proposed activity complies with the applicable antidegradation requirements for the particular receiving waters that may be affected.

2. For Category 1 Waters and Category 2 Waters, reviews shall be consistent with the requirement established in Sections 3.2 and 3.3, respectively.

3. For Category 3 Waters, reviews shall be consistent with the requirements established in this section

b. An Anti-degradation Level II review is not required where any of the following conditions apply:

1. Water quality will not be lowered by the proposed activity or for existing permitted facilities, water quality will not be

further lowered by the proposed activity, examples include situations where:

(a) the proposed concentration-based effluent limit is less than or equal to the ambient concentration in the receiving water during critical conditions; or

(b) a UPDES permit is being renewed and the proposed effluent concentration and loading limits are equal to or less than the concentration and loading limits in the previous permit; or

(c) a UPDES permit is being renewed and new effluent limits are to be added to the permit, but the new effluent limits are based on maintaining or improving upon effluent concentrations and loads that have been observed, including variability; or

2. Assimilative capacity (based upon concentration) is not available or has previously been allocated, as indicated by water quality monitoring or modeling information. This includes situations where:

(a) the water body is included on the current 303(d) list for the parameter of concern; or

(b) existing water quality for the parameter of concern does not satisfy applicable numeric or narrative water quality criteria; or

(c) discharge limits are established in an approved TMDL that is consistent with the current water quality standards for the receiving water (i.e., where TMDLs are established, and changes in effluent limits that are consistent with the existing load allocation would not trigger an anti-degradation review).

Under conditions (a) or (b) the effluent limit in an UPDES permit may be equal to the water quality numeric criterion for the parameter of concern.

3. Water quality impacts will be temporary and related only to sediment or turbidity and fish spawning will not be impaired,

4. The water quality effects of the proposed activity are expected to be temporary and limited. As general guidance, CWA Section 402 general discharge permits, CWA Section 404 general permits, or activities of short duration, will be deemed to have a temporary and limited effect on water quality where there is a reasonable factual basis to support such a conclusion. Factors to be considered in determining whether water quality effects will be temporary and limited may include the following:

(a) Length of time during which water quality will be lowered.

(b) Percent change in ambient concentrations of pollutants of concern

(c) Pollutants affected

(d) Likelihood for long-term water quality benefits to the segment (e.g., dredging of contaminated sediments)

(e) Potential for any residual long-term influences on existing uses.

(f) Impairment of the fish spawning, survival and development of aquatic fauna excluding fish removal efforts.

c. Anti-degradation Review Process

For all activities requiring a Level II review, the Division will notify affected agencies and the public with regards to the requested proposed activity and discussions with stakeholders may be held. In the case of Section 402 discharge permits, if it is determined that a discharge will be allowed, the Director will develop any needed UPDES permits for public notice following the normal permit issuance process.

The ADR will cover the following requirements or determinations:

1. Will all Statutory and regulatory requirements be met?

The Director will review to determine that there will be achieved all statutory and regulatory requirements for all new and existing point sources and all required cost-effective and reasonable best management practices for nonpoint source control in the area of the discharge. If point sources exist in the area that have not achieved all statutory and regulatory requirements, the Director will consider whether schedules of compliance or other plans have been established when evaluating whether compliance has been assured. Generally, the "area of the discharge" will be determined based on the parameters of concern associated with the proposed activity and the portion of the receiving water that would be affected.

2. Are there any reasonable less-degrading alternatives?

There will be an evaluation of whether there are any reasonable non-degrading or less degrading alternatives for the proposed activity. This question will be addressed by the Division based on information provided by the project proponent. Control alternatives for a proposed activity will be evaluated in an effort to avoid or minimize degradation of the receiving water. Alternatives to be considered, evaluated, and implemented to the extent feasible, could include pollutant trading, water conservation, water recycling and reuse, land application, total containment, etc.

For proposed UPDES permitted discharges, the following list of alternatives should be considered, evaluated and implemented to the extent feasible:

(a) innovative or alternative treatment options

(b) more effective treatment options or higher treatment levels

(c) connection to other wastewater treatment facilities
(d) process changes or product or raw material substitution
(e) seasonal or controlled discharge options to minimize discharging during critical water quality periods
(f) pollutant trading
(g) water conservation
(h) water recycle and reuse
(i) alternative discharge locations or alternative receiving waters
(j) land application
(k) total containment
(l) improved operation and maintenance of existing treatment systems
(m) other appropriate alternatives

An option more costly than the cheapest alternative may have to be implemented if a substantial benefit to the stream can be realized. Alternatives would generally be considered feasible where costs are no more than 20% higher than the cost of the discharging alternative, and (for POTWs) where the projected per connection service fees are not greater than 1.4% of MAGHI (median adjusted gross household income), the current affordability criterion now being used by the Water Quality Board in the wastewater revolving loan program. Alternatives within these cost ranges should be carefully considered by the discharger. Where State financing is appropriate, a financial assistance package may be influenced by this evaluation, i.e., a less polluting alternative may receive a more favorable funding arrangement in order to make it a more financially attractive alternative.

It must also be recognized in relationship to evaluating options that would avoid or reduce discharges to the stream, that in some situations it may be more beneficial to leave the water in the stream for instream flow purposes than to remove the discharge to the stream.

3. Does the proposed activity have economic and social importance?

Although it is recognized that any activity resulting in a discharge to surface waters will have positive and negative aspects, information must be submitted by the applicant that any discharge or increased discharge will be of economic or social importance in the area.

The factors addressed in such a demonstration may include, but are not limited to, the following:

(a) employment (i.e., increasing, maintaining, or avoiding a reduction in employment);
(b) increased production;

(c) improved community tax base;

(d) housing;

(e) correction of an environmental or public health problem; and

(f) other information that may be necessary to determine the social and economic importance of the proposed surface water discharge.

4. The applicant may submit a proposal to mitigate any adverse environmental effects of the proposed activity (e.g., instream habitat improvement, bank stabilization). Such mitigation plans should describe the proposed mitigation measures and the costs of such mitigation. Mitigation plans will not have any effect on effluent limits or conditions included in a permit (except possibly where a previously completed mitigation project has resulted in an improvement in background water quality that affects a water quality-based limit). Such mitigation plans will be developed and implemented by the applicant as a means to further minimize the environmental effects of the proposed activity and to increase its socio-economic importance. An effective mitigation plan may, in some cases, allow the Director to authorize proposed activities that would otherwise not be authorized.

5. Will water quality standards be violated by the discharge?

Proposed activities that will affect the quality of waters of the state will be allowed only where the proposed activity will not violate water quality standards.

6. Will existing uses be maintained and protected?

Proposed activities can only be allowed if "existing uses" will be maintained and protected. No UPDES permit will be allowed which will permit numeric water quality standards to be exceeded in a receiving water outside the mixing zone. In the case of nonpoint pollution sources, the non-regulatory Section 319 program now in place will address these sources through application of best management practices to ensure that numeric water quality standards are not exceeded.

7. If a situation is found where there is an existing use which is a higher use (i.e., more stringent protection requirements) than that current designated use, the Director will apply the water quality standards and anti-degradation policy to protect the existing use. Narrative criteria may be used as a basis to protect existing uses for parameters where numeric criteria have not been adopted. Procedures to change the stream use designation to recognize the existing use as the designated use would be initiated.

d. Special Procedures for Drinking Water Sources

Depending upon the locations of the discharge and its proximity to downstream drinking water diversions, additional treatment or more stringent effluent limits or additional monitoring, beyond that which may otherwise be required to meet minimum technology standards or in stream water quality standards, may be required by the Director in order to adequately protect public health and the environment. Such additional treatment may include additional disinfection, suspended solids removal to make the disinfection process more effective, removal of any specific contaminants for which drinking water maximum contaminant levels (MCLs) exists, and/or nutrient removal to reduce the organic content of raw water used as a source for domestic water systems.

Additional monitoring may include analyses for viruses, Giardia, Cryptosporidium, other pathogenic organisms, and/or any contaminant for which drinking water MCLs exist. Depending on the results of such monitoring, more stringent treatment may then be required.

The additional treatment/effluent limits/monitoring which may be required will be determined by the Director after consultation with the Division of Drinking Water and the downstream drinking water users.

e. Public Notice

The public will be provided notice and an opportunity to comment on the conclusions of all completed antidegradation reviews. When possible, public notice on the antidegradation review conclusions will be combined with the public notice on the proposed permitting or certifying action. In the case of UPDES permits, public notice will be provided through the normal permitting process, as all draft permits are public noticed for 30 days, and public comment solicited, before being issued as a final permit. The Statement of Basis for the draft UPDES permit will contain information on how the ADR was addressed including results of the Level I and Level II reviews. In the case of Section 404 permits from the Corps of Engineers, the Division of Water Quality will develop any needed 401 Certifications and the public notice may be published in conjunction with the US Corps of Engineers public notice procedures. Other permits requiring a Level II review will receive a separate public notice according to the normal State public notice procedures. The public will be provided notice and an opportunity to comment whenever substantive changes are made to the implementation procedures referenced in Subsection R317-2-3.5.f.

f. Implementation Procedures

The Director shall establish reasonable protocols and guidelines (1) for completing technical, social, and economic need demonstrations, (2) for review and determination of adequacy of

Level II ADRs and (3) for determination of additional treatment requirements. Protocols and guidelines will consider federal guidance and will include input from local governments, the regulated community, and the general public. The Director will inform the Water Quality Board of any protocols or guidelines that are developed.

R317-2-4. Colorado River Salinity Standards.

In addition to quality protection afforded by these rules to waters of the Colorado River and its tributaries, such waters shall be protected also by requirements of "Proposed Water Quality Standards for Salinity including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System, June 1975" and a supplement dated August 26, 1975, entitled "Supplement, including Modifications to Proposed Water Quality Standards for Salinity including Numeric Criteria and Plan of Implementation for Salinity Control, Colorado River System, June 1975", as approved by the seven Colorado River Basin States and the U.S. Environmental Protection Agency, as updated by the 1978 Revision and the 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005, 2008, and 2011 reviews of the above documents.

R317-2-5. Mixing Zones.

A mixing zone is a limited portion of a body of water, contiguous to a discharge, where dilution is in progress but has not yet resulted in concentrations which will meet certain standards for all pollutants. At no time, however, shall concentrations within the mixing zone be allowed which are acutely lethal as determined by bioassay or other approved procedure. Mixing zones may be delineated for the purpose of guiding sample collection procedures and to determine permitted effluent limits. The size of the chronic mixing zone in rivers and streams shall not to exceed 2500 feet and the size of an acute mixing zone shall not exceed 50% of stream width nor have a residency time of greater than 15 minutes. Streams with a flow equal to or less than twice the flow of a point source discharge may be considered to be totally mixed. The size of the chronic mixing zone in lakes and reservoirs shall not exceed 200 feet and the size of an acute mixing zone shall not exceed 35 feet. Domestic wastewater effluents discharged to mixing zones shall meet effluent requirements specified in R317-1-3.

5.1 Individual Mixing Zones. Individual mixing zones may be further limited or disallowed in consideration of the following factors in the area affected by the discharge:

a. Bioaccumulation in fish tissues or wildlife,

b. Biologically important areas such as fish spawning/nursery areas or segments with occurrences of federally listed threatened or endangered species,

c. Potential human exposure to pollutants resulting from drinking water or recreational activities,

d. Attraction of aquatic life to the effluent plume, where toxicity to the aquatic life is occurring.

e. Toxicity of the substance discharged,

f. Zone of passage for migrating fish or other species (including access to tributaries), or

g. Accumulative effects of multiple discharges and mixing zones.

R317-2-6. Use Designations.

The Board as required by Section 19-5-110, shall group the waters of the state into classes so as to protect against controllable pollution the beneficial uses designated within each class as set forth below. Surface waters of the state are hereby classified as shown in R317-2-13.

6.1 Class 1 -- Protected for use as a raw water source for domestic water systems.

a. Class 1A -- Reserved.

b. Class 1B -- Reserved.

c. Class 1C -- Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water

6.2 Class 2 -- Protected for recreational use and aesthetics.

a. Class 2A -- Protected for frequent primary contact recreation where there is a high likelihood of ingestion of water or a high degree of bodily contact with the water. Examples include, but are not limited to, swimming, rafting, kayaking, diving, and water skiing.

b. Class 2B -- Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing.

6.3 Class 3 -- Protected for use by aquatic wildlife.

a. Class 3A -- Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.

b. Class 3B -- Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

c. Class 3C -- Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.

d. Class 3D -- Protected for waterfowl, shore birds and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.

e. Class 3E -- Severely habitat-limited waters. Narrative standards will be applied to protect these waters for aquatic wildlife.

6.4 Class 4 -- Protected for agricultural uses including irrigation of crops and stock watering.

6.5 Class 5 -- The Great Salt Lake.

a. Class 5A Gilbert Bay

Geographical Boundary -- All open waters at or below approximately 4,208-foot elevation south of the Union Pacific Causeway, excluding all of the Farmington Bay south of the Antelope Island Causeway and salt evaporation ponds.

Beneficial Uses -- Protected for frequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

b. Class 5B Gunnison Bay

Geographical Boundary -- All open waters at or below approximately 4,208-foot elevation north of the Union Pacific Causeway and west of the Promontory Mountains, excluding salt evaporation ponds.

Beneficial Uses -- Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

c. Class 5C Bear River Bay

Geographical Boundary -- All open waters at or below approximately 4,208-foot elevation north of the Union Pacific Causeway and east of the Promontory Mountains, excluding salt evaporation ponds.

Beneficial Uses -- Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

d. Class 5D Farmington Bay

Geographical Boundary -- All open waters at or below approximately 4,208-foot elevation east of Antelope Island and south of the Antelope Island Causeway, excluding salt evaporation ponds.

Beneficial Uses -- Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

e. Class 5E Transitional Waters along the Shoreline of the Great Salt Lake Geographical Boundary -- All waters below approximately 4,208-foot elevation to the current lake elevation of the open water of the Great Salt Lake receiving their source water from naturally occurring springs and streams, impounded wetlands, or facilities requiring a UPDES permit. The geographical areas of these transitional waters change corresponding to the fluctuation of open water elevation.

Beneficial Uses -- Protected for infrequent primary and secondary contact recreation, waterfowl, shore birds and other water-oriented wildlife including their necessary food chain.

R317-2-7. Water Quality Standards.

7.1 Application of Standards

a. The numeric criteria listed in R317-2-14 shall apply to each of the classes assigned to waters of the State as specified in R317-2-6. It shall be unlawful and a violation of these rules for any person to discharge or place any wastes or other substances in such manner as may interfere with designated uses protected by assigned classes or to cause any of the applicable standards to be violated, except as provided in R317-1-3.1.

b. At a minimum, assessment of the beneficial use support for waters of the state will be conducted biennially and available for a 30-day period of public comment and review. Monitoring locations and target indicators of water quality standards shall be prioritized and published yearly. For water quality assessment purposes, up to 10 percent of the representative samples may exceed the minimum or maximum criteria for dissolved oxygen, pH, E. coli, total dissolved solids, and temperature, including situations where such criteria have been adopted on a site-specific basis.

c. Site-specific standards may be adopted by rulemaking where biomonitoring data, bioassays, or other scientific analyses indicate that the statewide criterion is over or under protective of the designated uses or where natural or un-alterable conditions or other factors as defined in 40 CFR 131.10(g) prevent the attainment of the statewide criteria as prescribed in Subsections R317-2-7.2, and R317-2-7.3, and Section R317-2-14.

7.2 Narrative Standards

It shall be unlawful, and a violation of these rules, for any person to discharge or place any waste or other substance in such a way as will be or may become offensive such as unnatural deposits, floating debris, oil, scum or other nuisances such as color, odor or taste; or cause conditions which produce undesirable aquatic life or which produce objectionable tastes in edible aquatic organisms; or result in concentrations or combinations of substances which produce undesirable physiological responses in desirable resident fish, or other desirable aquatic life, or undesirable human health effects, as determined by bioassay or other tests performed in accordance with standard procedures; or determined by biological assessments in Subsection R317-2-7.3.

7.3 Biological Water Quality Assessment and Criteria

Waters of the State shall be free from human-induced stressors which will degrade the beneficial uses as prescribed by the biological assessment processes and biological criteria set forth below:

a. Quantitative biological assessments may be used to assess whether the purposes and designated uses identified in R317-2-6 are supported.

b. The results of the quantitative biological assessments may be used for purposes of water quality assessment, including, but not limited to, those assessments required by 303(d) and 305(b) of the federal Clean Water Act (33 U.S.C. 1313(d) and 1315(b)).

c. Quantitative biological assessments shall use documented methods that have been subject to technical review and produce consistent, objective and repeatable results that account for methodological uncertainty and natural environmental variability.

d. If biological assessments reveal a biologically degraded water body, specific pollutants responsible for the degradation will not be formally published (i.e., Biennial Integrated Report, TMDL) until a thorough evaluation of potential causes, including nonchemical stressors (e.g., habitat degradation or hydrological modification or criteria described in 40 CFR 131.10 (g)(1 - 6) as defined by the Use Attainability Analysis process), has been conducted.

R317-2-8. Protection of Downstream Uses.

All actions to control waste discharges under these rules shall be modified as necessary to protect downstream designated uses.

R317-2-9. Intermittent Waters.

Failure of a stream to meet water quality standards when stream flow is either unusually high or less than the 7-day, 10-year minimum flow shall not be cause for action against persons discharging wastes which meet both the requirements of R317-1 and the requirements of applicable permits.

R317-2-10. Laboratory and Field Analyses.

10.1 Laboratory Analyses

All laboratory examinations of samples collected to determine compliance with these regulations shall be performed in accordance with standard procedures as approved by the Director by the Utah

Office of State Health Laboratory or by a laboratory certified by the Utah Department of Health.

10.2 Field Analyses

All field analyses to determine compliance with these rules shall be conducted in accordance with standard procedures specified by the Utah Division of Water Quality.

R317-2-11. Public Participation.

Public notices and public hearings will be held for the consideration, adoption, or amendment of the classifications of waters and standards of purity and quality. Public notices shall be published at least twice in a newspaper of general circulation in the area affected at least 30 days prior to any public hearing. The notice will be posted on a State public notice website at least 45 days before any hearing and a notice will be mailed at least 30 days before any hearing to the chief executive of each political subdivision and other potentially affected persons.

R317-2-12. Category 1 and Category 2 Waters.

12.1 Category 1 Waters.

In addition to assigned use classes, the following surface waters of the State are hereby designated as Category 1 Waters:

a. All surface waters geographically located within the outer boundaries of U.S. National Forests whether on public or private lands with the following exceptions:

1. Category 2 Waters as listed in R317-2-12.2.

2. Weber River, a tributary to the Great Salt Lake, in the Weber River Drainage from Uintah to Mountain Green.

b. Other surface waters, which may include segments within U.S. National Forests as follows:

1. Colorado River Drainage

Calf Creek and tributaries, from confluence with Escalante River to headwaters.

Sand Creek and tributaries, from confluence with Escalante River to headwaters.

Mamie Creek and tributaries, from confluence with Escalante River to headwaters.

Deer Creek and tributaries, from confluence with Boulder Creek to headwaters (Garfield County).

Indian Creek and tributaries, through Newspaper Rock State Park to headwaters.

2. Green River Drainage

Price River (Lower Fish Creek from confluence with White River to Scofield Dam.

Range Creek and tributaries, from confluence with Green River to headwaters.

Strawberry River and tributaries, from confluence with Red Creek to headwaters.

Ashley Creek and tributaries, from Steinaker diversion to headwaters.

Jones Hole Creek and tributaries, from confluence with Green River to headwaters.

Green River, from state line to Flaming Gorge Dam.

Tollivers Creek, from confluence with Green River to headwaters.

Allen Creek, from confluence with Green River to headwaters.

3. Virgin River Drainage

North Fork Virgin River and tributaries, from confluence with East Fork Virgin River to headwaters.

East Fork Virgin River and tributaries from confluence with North Fork Virgin River to headwaters.

4. Kanab Creek Drainage

Kanab Creek and tributaries, from irrigation diversion at confluence with Reservoir Canyon to headwaters.

5. Bear River Drainage

Swan Creek and tributaries, from Bear Lake to headwaters.

North Eden Creek, from Upper North Eden Reservoir to headwaters.

Big Creek and tributaries, from Big Ditch diversion to headwaters.

Woodruff Creek and tributaries, from Woodruff diversion to headwaters.

6. Weber River Drainage

Burch Creek and tributaries, from Harrison Boulevard in Ogden to headwaters.

Hardscrabble Creek and tributaries, from confluence with East Canyon Creek to headwaters.

Chalk Creek and tributaries, from Main Street in Coalville to headwaters.

Weber River and tributaries, from Utah State Route 32 near Oakley to headwaters.

7. Jordan River Drainage

City Creek and tributaries, from City Creek Water Treatment Plant to headwaters (Salt Lake County).

Emigration Creek and tributaries, from Hogle Zoo to headwaters (Salt Lake County).

Red Butte Creek and tributaries, from Foothill Boulevard in Salt Lake City to headwaters.

Parley's Creek and tributaries, from 13th East in Salt Lake City to headwaters.

Mill Creek and tributaries, from Wasatch Boulevard in Salt Lake City to headwaters.

Big Cottonwood Creek and tributaries, from Wasatch Boulevard in Salt Lake City to headwaters.

Little Willow Creek and tributaries, from diversion to headwaters (Salt Lake County.)

Bell Canyon Creek and tributaries, from Lower Bells Canyon Reservoir to headwaters (Salt Lake County).

South Fork of Dry Creek and tributaries, from Draper Irrigation Company diversion to headwaters (Salt Lake County).

8. Provo River Drainage

Upper Falls drainage above Provo City diversion (Utah County).

Bridal Veil Falls drainage above Provo City diversion (Utah County).

Lost Creek and tributaries, above Provo City diversion (Utah County).

9. Sevier River Drainage

Chicken Creek and tributaries, from diversion at canyon mouth to headwaters.

Pigeon Creek and tributaries, from diversion to headwaters.

East Fork of Sevier River and tributaries, from Kingston diversion to headwaters.

Parowan Creek and tributaries, from Parowan City to headwaters.

Summit Creek and tributaries, from Summit City to headwaters.

Braffits Creek and tributaries, from canyon mouth to headwaters.

Right Hand Creek and tributaries, from confluence with Coal Creek to headwaters.

10. Raft River Drainage

Clear Creek and tributaries, from state line to headwaters (Box Elder County).

Birch Creek (Box Elder County), from state line to headwaters.

Cotton Thomas Creek from confluence with South Junction Creek to headwaters.

11. Western Great Salt Lake Drainage

All streams on the south slope of the Raft River Mountains above 7000' mean sea level.

Donner Creek (Box Elder County), from irrigation diversion to Utah-Nevada state line.

Bettridge Creek (Box Elder County), from irrigation diversion to Utah-Nevada state line.

Clover Creek, from diversion to headwaters.

All surface waters on public land on the Deep Creek Mountains.

12. Farmington Bay Drainage

Holmes Creek and tributaries, from Highway US-89 to headwaters (Davis County).

Shepard Creek and tributaries, from Haight Bench diversion to headwaters (Davis County).

Farmington Creek and tributaries, from Haight Bench Canal diversion to headwaters (Davis County).

Steed Creek and tributaries, from Highway US-89 to headwaters (Davis County).

12.2 Category 2 Waters.

In addition to assigned use classes, the following surface waters of the State are hereby designated as Category 2 Waters:

a. Green River Drainage

Deer Creek, a tributary of Huntington Creek, from the forest boundary to 4800 feet upstream.

Electric Lake.

R317-2-13. Classification of Waters of the State (see R317-2-6).

a. Colorado River Drainage

13.1 Upper Colorado River Basin

TABLE

Paria River and tributaries, from state line to headwaters		2B	3C	4
All tributaries to Lake Powell except as listed below:		2B	3B	4
Tributaries to Escalante River from confluence with Boulder Creek to headwaters, including Boulder Creek		2B	3A	4
Dirty Devil River and tributaries, from Lake Powell to Fremont River		2B	3C	4
Deer Creek and tributaries, from confluence with Boulder Creek to headwaters		2B	3A	4
Freemont River and tributaries from confluence with Muddy Creek to Capitol Reef National Park, except as listed below:	1C	2B	3C	4

Pleasant Creek and tributaries, from confluence with Fremont River to East boundary of Capitol Reef National Park			2B		3C	4
Pleasant Creek and tributaries, from East boundary of Capitol Reef National Park to headwaters	1C		2B	3A		
Fremont River and tributaries, through Capitol Reef National Park to headwaters	1C	2A		3A		4
Muddy Creek and tributaries, from Confluence with Fremont River to Highway U-10 crossing, except as listed below			2B		3C	4
Muddy Creek from confluence with Fremont River to confluence with Ivie Creek			2B		3C	4*
Muddy Creek and tributaries from the confluence with Ivie Creek to U-10			2B		3C	4*
Ivie Creek and its tributaries from the confluence with Muddy Creek to the confluence with Quitchupah Creek			2B		3C	4*
Ivie Creek and its tributaries from the confluence with Quitchapah Creek to U-10, except as listed below:			2B		3C	4*
Quitchupah Creek from the confluence with Ivie Creek to U-10			2B		3C	4*
Quitchupah Creek and tributaries, from Highway U-10 crossing to headwaters			2B	3A		4
Ivie Creek and tributaries,						

from Highway U-10 to headwaters			2B	3A			4
Muddy Creek and tributaries, from Highway U-10 crossing to headwaters	1C		2B	3A			4
San Juan River and tributaries from Lake Powell to state line except as listed below:	1C	2A			3B		4
Johnson Creek and tributaries, from confluence with Recapture Creek to headwaters	1C		2B	3A			4
Verdure Creek and tributaries, from Highway US-191 crossing to headwaters			2B	3A			4
North Creek and tributaries, from confluence with Montezuma Creek to headwaters	1C		2B	3A			4
South Creek and tributaries, from confluence with Montezuma Creek to headwaters	1C		2B	3A			4
Spring Creek and tributaries, from confluence with Vega Creek to headwaters			2B	3A			4
Montezuma Creek and tributaries, from U.S. Highway 191 to headwaters	1C		2B	3A			4
Colorado River and tributaries, from Lake Powell to state line except as listed below:	1C	2A			3B		4
Indian Creek and tributaries, through Newspaper Rock State Park to headwaters	1C		2B	3A			4
Kane Canyon Creek and tributaries, from confluence with Colorado River to headwaters			2B			3C	4

Mill Creek and tributaries, from confluence with Colorado River to headwaters	1C	2A		3A			4
Castle Creek from confluence with the Colorado River to Seventh Day Adventist Diversion	1C	2A			3B		4*
Onion Creek from the confluence with Colorado River to road crossing above Stinking Springs	1C	2A			3B		4*
Dolores River and tributaries, from confluence with Colorado River to state line			2B			3C	4
Roc Creek and tributaries, from confluence with Dolores River to headwaters			2B	3A			4
LaSal Creek and tributaries from state line to headwaters			2B	3A			4
Lion Canyon Creek and tributaries, from state line to headwaters			2B	3A			4
Little Dolores River and tributaries, from confluence with Colorado River to state line			2B			3C	4
Bitter Creek and tributaries, from confluence with Colorado River to headwaters			2B			3C	4

(*) Site-specific criteria are associated with this use.

b. Green River Drainage

TABLE

Green River and tributaries, from confluence with Colorado River to state line, except as listed below:	1C	2A			3B		4
Thompson Creek and tributaries							

from Interstate 70 to headwaters		2B		3C	4
San Rafael River and tributaries from confluence with Green River to confluence with Ferron Creek, except as listed below:		2B		3C	
San Rafael River from the confluence with the Green River to Buckhorn Crossing		2B		3C	4*
San Rafael River from Buckhorn Crossing to the confluence with Huntington Creek and Cottonwood Creek		2B		3C	4*
Ferron Creek and tributaries, from confluence with San Rafael River to Millsite Reservoir, except as listed below:		2B		3C	4
Ferron Creek from the confluence with San Rafael River to Highway 10		2B		3C	4*
Ferron Creek and tributaries, from Millsite Reservoir to headwaters	1C	2B	3A		4
Huntington Creek and tributaries, from confluence with Cottonwood Creek to Highway U-10 crossing		2B		3C	4*
Huntington Creek and tributaries from Highway U-10 crossing to headwaters	1C	2B	3A		4
Cottonwood Creek and tributaries from confluence with Huntington Creek to Highway U-57 crossing, except as listed below:		2B		3C	4
Cottonwood Creek from the confluence with Huntington Creek to U-57		2B		3C	4*

Rock Canyon Creek from the confluence with Cottonwood Creek to headwaters		2B		3C		4*
Cottonwood Creek and tributaries from Highway U-57 crossing to headwaters	1C	2B	3A			4
Cottonwood Canal, Emery County	1C	2B			3E	4
Price River and tributaries, from confluence with Green River to Carbon Canal Diversion at Price City Golf Course, except as listed below		2B		3C		4
Price River and tributaries from confluence with Green River to confluence with Soldier Creek		2B		3C		4*
Price River and tributaries from the confluence with Soldier Creek to Carbon Canal Diversion		2B		3C		4*
Grassy Trail Creek and tributaries, from Grassy Trail Creek Reservoir to headwaters	1C	2B	3A			4
Price River and tributaries, from Carbon Canal Diversion at Price City Golf Course to Price City Water Treatment Plant intake		2B	3A			4
Price River and tributaries, from Price City Water Treatment Plant intake to headwaters	1C	2B	3A			4
Range Creek and tributaries, from confluence with Green River to Range Creek Ranch		2B	3A			4
Range Creek and tributaries, from Range Creek Ranch to headwaters	1C	2B	3A			4
Rock Creek and tributaries, from						

confluence with Green River to headwaters		2B	3A			4
Nine Mile Creek and tributaries, from confluence with Green River to headwaters		2B	3A			4
Pariette Draw and tributaries, from confluence with Green River to headwaters		2B		3B	3D	4
Willow Creek and tributaries (Uintah County), from confluence with Green River to headwaters		2B	3A			4
White River and tributaries, from confluence with Green River to state line, except as listed below:		2B		3B		4
Bitter Creek and tributaries from White River to headwaters		2B	3A			4
Duchesne River and tributaries, from confluence with Green River to Myton Water Treatment Plant intake, except as listed below		2B		3B		4
Uinta River and tributaries from confluence with Duchesne River to U.S. Highway 40 crossing		2B		3B		4
Uinta River and tributaries, from U.S. Highway 40 crossing		2B	3A			4
Power House Canal from confluence with Uinta River to headwaters		2B	3A			4
Whiterocks River and Canal, from Tridell Water Treatment Plant to headwaters	1C	2B	3A			4
Duchesne River and tributaries, from Myton Water Treatment Plant intake to headwaters	1C	2B	3A			4

Lake Fork River and tributaries, from confluence with Duchesne River to headwaters	1C		2B	3A					4
Lake Fork Canal from Dry Gulch Canal Diversion to Moon Lake	1C		2B					3E	4
Dry Gulch Canal, from Myton Water Treatment Plant to Lake Fork Canal	1C		2B					3E	4
Ashley Creek and tributaries, from confluence with Green River to Steinaker diversion			2B		3B				4
Ashley Creek and tributaries, from Steinaker diversion to headwaters	1C		2B	3A					4
Big Brush Creek and tributaries from confluence with Green River to Tyzack (Red Fleet) Dam			2B		3B				4
Big Brush Creek and tributaries, from Tyzack (Red Fleet) Dam to headwaters	1C		2B	3A					4
Jones Hole Creek and tributaries from confluence with Green River to headwaters			2B	3A					
Diamond Gulch Creek and tributaries, from confluence with Green River to headwaters			2B	3A					4
Pot Creek and tributaries, from Crouse Reservoir to headwaters			2B	3A					4
Green River and tributaries, from Utah-Colorado state line to Flaming Gorge Dam, except as listed below:		2A		3A					4
Sears Creek and tributaries, Daggett County			2B	3A					

Tolivers Creek and tributaries, Daggett County	2B	3A		
Red Creek and tributaries, from confluence with Green River to state line	2B		3C	4
Jackson Creek and tributaries, Daggett County	2B	3A		
Davenport Creek and tributaries, Daggett County	2B	3A		
Goslin Creek and tributaries, Daggett County	2B	3A		
Gorge Creek and tributaries, Daggett County	2B	3A		
Beaver Creek and tributaries, Daggett County	2B	3A		
O-Wi-Yu-Kuts Creek and tributaries, Daggett County	2B	3A		
Tributaries to Flaming Gorge Reservoir, except as listed below	2B	3A		4
Birch Spring Draw and tributaries, from Flaming Gorge Reservoir to headwaters	2B		3C	4
Spring Creek and tributaries, from Flaming Gorge Reservoir to headwaters	2B	3A		
All tributaries of Flaming Gorge Reservoir from Utah-Wyoming state line to headwaters	2B	3A		4

(*) Site-specific criteria are associated with this use.

13.2 Lower Colorado River Basin

a. Virgin River Drainage

TABLE

Beaver Dam Wash and tributaries, from Motoqua to headwaters			2B		3B		4
Virgin River and tributaries, from state line to Quail Creek diversion, except as listed below:			2B		3B		4
Virgin River from the Utah-Arizona border to Pah Tempe Springs			2B		3B		4*
Virgin River from the Utah-Arizona border to Pah Tempe Springs			2B		3B		4*
Santa Clara River from confluence with Virgin River to Gunlock Reservoir	1C		2B		3B		4
Santa Clara River and tributaries, from Gunlock Reservoir to headwaters			2B	3A			4
Leeds Creek from confluence with Quail Creek to headwaters			2B	3A			4
Quail Creek from Quail Creek Reservoir to headwaters	1C		2B	3A			4
Ash Creek and tributaries, from confluence with Virgin River to Ash Creek Reservoir			2B	3A			4
Ash Creek and tributaries, from Ash Creek Reservoir to headwaters			2B	3A			4
Virgin River and tributaries, from the Quail Creek diversion to headwaters, except as listed below:	1C		2B			3C	4
North Creek, from the confluence with Virgin River to headwaters	1C		2B			3C	4*
North Fork Virgin River and tributaries	1C	2A		3A			4

Kolob Creek, from confluence with Virgin River to headwaters	2B	3A		4
East Fork Virgin River, from town of Glendale to headwaters	2B	3A		4

(*) Site-specific criteria are associated with this use.

b. Kanab Creek Drainage

TABLE

Kanab Creek and tributaries, from state line to irrigation diversion at confluence with Reservoir Canyon	2B		3C	4
Kanab Creek and tributaries, from irrigation diversion at confluence with Reservoir Canyon to headwaters	2B	3A		4
Johnson Wash and tributaries, from state line to confluence with Skutumpah Canyon	2B		3C	4
Johnson Wash and tributaries, from confluence with Skutumpah Canyon to headwaters	2B	3A		4

13.3 Bear River Basin
a. Bear River Drainage

TABLE

Bear River and tributaries, from Great Salt Lake to Utah-Idaho border, except as listed below:	2B	3B		3D	4
Perry Canyon Creek from U.S. Forest boundary to headwaters	2B	3A			4
Box Elder Creek from confluence with Black Slough to Brigham City Reservoir (Mayor's Pond)	2B		3C		4

Box Elder Creek, from Brigham City Reservoir (Mayor's Pond) to headwaters		2B	3A				4
Salt Creek from confluence with Bear River to Crystal Hot Springs		2B		3B		3D	
Malad River and tributaries, from confluence with Bear River to state line		2B			3C		
Little Bear River and tributaries, from Cutler Reservoir to headwaters, except as listed below:		2B	3A			3D	4
South Fork Spring Creek from confluence with Pelican Pond Slough Stream to U.S. Highway 89		2B	3A			3D	4*
Logan River and tributaries, from Cutler Reservoir to headwaters		2B	3A			3D	4
Blacksmith Fork and tributaries, from confluence with Logan River to headwaters, except as listed below[——————————]		2B	3A				4
Sheep Creek and tributaries from Confluence with Blacksmith Fork River to headwaters.	1C	2B	3A				4
Newton Creek and tributaries, from Cutler Reservoir to Newton Reservoir		2B	3A				4
Clarkston Creek and tributaries, from Newton Reservoir to headwaters		2B	3A				4
Birch Creek and tributaries, from confluence with Clarkston Creek to headwaters		2B	3A				4
Summit Creek and tributaries, from confluence with Bear River							

to headwaters		2B	3A				4
Cub River and tributaries, from confluence with Bear River to state line, except as listed below:		2B		3B			4
High Creek and tributaries from confluence with Cub River to headwaters		2B	3A				4
All tributaries to Bear Lake from Bear Lake to headwaters, except as listed below		2B	3A				4
Swan Springs tributary to Swan Creek	1C	2B	3A				
Bear River and tributaries in Rich County		2B	3A				4
Bear River and tributaries, from Utah-Wyoming state line to headwaters (Summit County)		2B	3A				4
Mill Creek and tributaries, from state line to headwaters (Summit County)		2B	3A				4

(*) Site-specific criteria are associated with this use.

13.4 Weber River Basin
a. Weber River Drainage

TABLE

Willard Creek, from Willard Bay Reservoir to headwaters		2B	3A				4
Weber River, from Great Salt Lake to Slaterville diversion, except as listed below:		2B			3C	3D	4
Four Mile Creek from Interstate 15 to headwaters		2B	3A				4

Weber River and tributaries, from Slaterville diversion to Stoddard diversion, except as listed below		2B	3A	4
Ogden River and tributaries, from confluence with Weber River to Pineview Dam, except as listed below:		2A	3A	4
Wheeler Creek from confluence with Ogden River to headwaters	1C	2B	3A	4
All tributaries to Pineview Reservoir	1C	2B	3A	4
Strongs Canyon Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A	4
Burch Creek and tributaries, from Harrison Boulevard in Ogden to Headwaters	1C	2B	3A	
Spring Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A	4
Weber River and tributaries, from Stoddard diversion to headwaters, except as listed below	1C	2B	3A	4
Silver Creek and tributaries, From the confluence with Weber River to below the confluence with Tollgate Creek	1C	2B	3A	4
Silver Creek and tributaries, from confluence with Tollgate Creek to Headwaters	1C	2B	3A	4*

13.5 Utah Lake-Jordan River Basin

a. Jordan River Drainage

TABLE

Jordan River, from Farmington Bay to

North Temple Street, Salt Lake City		2B		3B*	3D	4
State Canal, from Farmington Bay to confluence with the Jordan River		2B		3B*	3D	4
Jordan River, from North Temple Street in Salt Lake City to confluence with Little Cottonwood Creek		2B		3B*		4
Surplus Canal from Great Salt Lake to the diversion from the Jordan River		2B		3B*	3D	4
Jordan River from confluence with Little Cottonwood Creek to Narrows Diversion		2B	3A			4
Jordan River, from Narrows Diversion to Utah Lake	1C	2B		3B		4
City Creek, from Memory Park in Salt Lake City to City Creek Water Treatment Plant		2B	3A			
City Creek, from City Creek Water Treatment Plant to headwaters	1C	2B	3A			
Red Butte Creek and tributaries, from Liberty Park pond inlet to Red Butte Reservoir		2B	3A			4
Red Butte Creek and tributaries, from Red Butte Reservoir to headwaters	1C	2B	3A			
Emigration Creek and tributaries, from 1100 East in Salt Lake City to headwaters		2B	3A			4
Parleys Creek and tributaries, from 1300 East in Salt Lake City to Mountain Dell Reservoir	1C	2B	3A			
Parleys Creek and tributaries, from Mountain Dell Reservoir to headwaters	1C	2B	3A			
Mill Creek (Salt Lake County) from						

confluence with Jordan River to Interstate 15 4		2B	3C*[—]	
Mill Creek (Salt Lake County) and tributaries, from Interstate 15 to headwaters		2B	3A	4
Big Cottonwood Creek and tributaries, from confluence with Jordan River to Big Cottonwood Water Treatment Plant		2B	3A	4
Big Cottonwood Creek and tributaries from Big Cottonwood Water Treatment Plant to headwaters	1C	2B	3A	
Deaf Smith Canyon Creek and tributaries	1C	2B	3A	4
Little Cottonwood Creek and tributaries, from confluence with Jordan River to Metropolitan Water Treatment Plant		2B	3A	4
Little Cottonwood Creek and tributaries, from Metropolitan Water Treatment Plant to headwaters	1C	2B	3A	
Bells Canyon Creek and tributaries, from Lower Bells Canyon Reservoir to headwaters	1C	2B	3A	
Little Willow Creek and tributaries, from Draper Irrigation Company diversion to headwaters	1C	2B	3A	
Big Willow Creek and tributaries, from Draper Irrigation Company diversion to headwaters	1C	2B	3A	
South Fork of Dry Creek and tributaries, from Draper Irrigation Company diversion to headwaters	1C	2B	3A	

All permanent streams on east slope of Oquirrh Mountains (Coon, Barneys, Bingham, Butterfield, and Rose Creeks)		2B			3D	4
Kersey Creek from confluence of C-7 Ditch to headwaters		2B			3D	

(*) Site-specific criteria are associated with this use.

b. Provo River Drainage

TABLE

Provo River and tributaries, from Utah Lake to Murdock Diversion		2B	3A			4
Provo River and tributaries, from Murdock Diversion to headwaters, except as listed below:	1C	2B	3A			4
Upper Falls drainage above Provo City diversion	1C	2B	3A			
Bridal Veil Falls drainage above Provo City diversion	1C	2B	3A			
Lost Creek and tributaries above Provo City diversion	1C	2B	3A			

c. Utah Lake Drainage

TABLE

Dry Creek and tributaries (above Alpine), from U.S. National Forest boundary to headwaters		2B	3A			4
American Fork Creek and tributaries, from diversion at mouth of American Fork Canyon to headwaters		2B	3A			4
Spring Creek and tributaries, from Utah Lake near Lehi to headwaters		2B	3A			4
Lindon Hollow Creek and tributaries, from Utah Lake to headwaters		2B		3B		4

Grove Creek from Murdock Diversion to headwaters	1C	2B	3A				
Battle Creek from Murdock Diversion to Headwaters	1C	2B	3A				
Rock Canyon Creek and tributaries (East of Provo), from U.S. National Forest boundary to headwaters	1C	2B	3A				4
Mill Race (except from Interstate 15 to the Provo City WWTP discharge) and tributaries, from Utah Lake to headwaters		2B		3B			4
Mill Race from Interstate 15 to the Provo City wastewater treatment plant discharge		2B		3B			4
Spring Creek and tributaries, from Utah Lake (Provo Bay) to 50 feet upstream from the east boundary of the Industrial Parkway Road Right-of-way		2B		3B			4
Tributary to Spring Creek (Utah County) which receives the Springville City WWTP effluent from confluence with Spring Creek to headwaters		2B				3D	4
Spring Creek and tributaries from 50 feet upstream from the east boundary of the Industrial Parkway Road right-of-way to the headwaters		2B	3A				4
Ironton Canal from Utah Lake (Provo Bay) to the east boundary of the Denver and Rio Grande Western Railroad right-of-way		2B			3C		4
Ironton Canal from the east boundary of the Denver and Rio Grande Western Railroad right-of-way to the point							

of diversion from Spring Creek	2B	3A					4
Hobble Creek and tributaries, from Utah Lake to headwaters	2B	3A					4
Dry Creek and tributaries, from Utah Lake (Provo Bay) to U.S. Highway 89	2B					3E	4
Dry Creek and tributaries, from U.S. Highway 89 to headwaters	2B	3A					4
Spanish Fork River and tributaries, from Utah Lake to diversion at Moark Junction	2B		3B		3D		4
Spanish Fork River and tributaries, from diversion at Moark Junction to headwaters	2B	3A					4
Benjamin Slough and tributaries, from Utah Lake to headwaters, except as listed below	2B		3B				4
Beer Creek (Utah County) from 4850 West (in NE1/4NE1/4 sec. 36, T.8.S., R.1.E.) to headwaters	2B			3C			4
Salt Creek from Nephi diversion to headwaters	2B	3A					4
Currant Creek from mouth of Goshen Canyon to Mona Reservoir	2B	3A					4
Currant Creek from Mona Reservoir to headwaters	2B	3A					4
Peteetneet Creek and tributaries, from irrigation diversion above Maple Dell to headwaters	2B	3A					4
Summit Creek and tributaries (above Santaquin), from U.S. National Forest boundary to headwaters	2B	3A					4

All other permanent streams entering Utah Lake	2B		3B		4

13.6 Sevier River Basin

a. Sevier River Drainage

TABLE

Sevier River and tributaries, from Sevier Lake to Gunnison Bend Reservoir to U.S. National Forest boundary, except as listed below:	2B			3C	4
Sevier River from Gunnison Bend Reservoir to Clear Lake	2B			3C	4*
Beaver River and tributaries, from Minersville City to headwaters	2B	3A			4
Little Creek and tributaries, from irrigation diversion to headwaters	2B	3A			4
Pinto Creek and tributaries, from Newcastle Reservoir to headwaters	2B	3A			4
Coal Creek and tributaries	2B	3A			4
Summit Creek and tributaries	2B	3A			4
Parowan Creek and tributaries	2B	3A			4
Tributaries to Sevier River from Sevier Lake to Gunnison Bend Reservoir from U.S. National Forest boundary to headwaters, including:	2B	3A			4
Pioneer Creek and tributaries, Millard County	2B	3A			4
Chalk Creek and tributaries, Millard County	2B	3A			4
Meadow Creek and tributaries, Millard County	2B	3A			4

Corn Creek and tributaries, Millard County	2B	3A					4
Sevier River and tributaries, below U.S. National Forest boundary from Gunnison Bend Reservoir to Annabella Diversion, except as listed below	2B		3B				4
Sevier River between Gunnison Bend Reservoir and DMAD Reservoir	2B		3B				4*
Oak Creek and tributaries Millard County	2B	3A					4
Round Valley Creek and tributaries, Millard County	2B	3A					4
Judd Creek and tributaries, Juab County	2B	3A					4
Meadow Creek and tributaries, Juab County	2B	3A					4
Cherry Creek and tributaries, Juab County	2B	3A					4
Tanner Creek and tributaries, Juab County	2B					3E	4
Baker Hot Springs, Juab County	2B				3D		4
Chicken Creek and tributaries, Juab County	2B	3A					4
San Pitch River and tributaries, from confluence with Sevier River to Highway U-132 crossing, except as listed below:	2B			3C	3D		4
San Pitch River from below Gunnison Reservoir to the Sevier River	2B			3C	3D		4*
Twelve Mile Creek (South Creek)							

and tributaries, from U.S. National Forest boundary to headwaters	2B 3A		4
Six Mile Creek and tributaries, Sanpete County	2B 3A		4
Manti Creek (South Creek) and tributaries, from U.S. National Forest boundary to headwaters	2B 3A		4
Ephraim Creek (Cottonwood Creek) and tributaries, from U.S. National Forest to headwaters	2B 3A		4
Oak Creek and tributaries, from U.S. National Forest boundary near Spring City to headwaters	2B 3A		4
Fountain Green Creek and tributaries, from U.S. National Forest boundary to headwaters	2B 3A		4
San Pitch River and tributaries, from Highway U-132 crossing to headwaters	2B 3A		4
Lost Creek from the confluence with Sevier River to U.S. National Forest boundary	2B	3C 3D	4*
Brine Creek-Petersen Creek from the confluence with the Sevier River to Highway U-119 Crossing	2B	3C 3D	4*
Tributaries to Sevier River from Gunnison Bend Reservoir to Annabella diversion from U.S. National Forest boundary to headwaters	2B 3A		4
Sevier River and tributaries, from Annabella diversion to headwaters	2B 3A		4
Monroe Creek and tributaries, from diversion to headwaters	2B 3A		4

Little Creek and tributaries, from irrigation diversion to headwaters		2B	3A	4
Pinto Creek and tributaries, from Newcastle Reservoir to headwaters		2B	3A	4
Coal Creek and tributaries		2B	3A	4
Summit Creek and tributaries		2B	3A	4
Parowan Creek and tributaries		2B	3A	4
Duck Creek and tributaries	1C	2B	3A	4

(*) Site-specific criteria are associated with this use.

13.7 Great Salt Lake Basin
a. Western Great Salt Lake Drainage

TABLE

Grouse Creek and tributaries, Box Elder County	2B	3A	4
Muddy Creek and tributaries, Box Elder County	2B	3A	4
Dove Creek and tributaries, Box Elder County	2B	3A	4
Pine Creek and tributaries, Box Elder County	2B	3A	4
Rock Creek and tributaries, Box Elder County	2B	3A	4
Fisher Creek and tributaries, Box Elder County	2B	3A	4
Dunn Creek and tributaries, Box Elder County	2B	3A	4
Indian Creek and tributaries, Box Elder County	2B	3A	4

Tenmile Creek and tributaries, Box Elder County		2B	3A			4
Curlew (Deep) Creek, Box Elder County		2B	3A			4
Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir		2B			3D	4*
Blue Creek and tributaries from Blue Creek Reservoir to headwaters		2B		3B		4*
All perennial streams on the east slope of the Pilot Mountain Range	1C	2B	3A			4
Donner Creek and tributaries, from irrigation diverion to Utah-Nevada state line		2B	3A			4
Bettridge Creek and tributaries, from irrigation diverion to Utah-Nevada state line		2B	3A			4
North Willow Creek and tributaries, Tooele County		2B	3A			4
South Willow Creek and tributaries, Tooele County		2B	3A			4
Hickman Creek and tributaries, Tooele County		2B	3A			4
Barlow Creek and tributaries, Tooele County		2B	3A			4
Clover Creek and tributaries, Tooele County		2B	3A			4
Faust Creek and tributaries, Tooele County		2B	3A			4
Vernon Creek and tributaries, Tooele County		2B	3A			4
Ophir Creek and tributaries,						

Tooele County		2B	3A			4
Soldier Creek and tributaries, from the Drinking Water Treamtent Facility to headwaters, Tooele County	1C	2B	3A			4
Settlement Canyon Creek and tributaries, Tooele County		2B	3A			4
Middle Canyon Creek and tributaries, Tooele County		2B	3A			4
Tank Wash and tributaries, Tooele County		2B	3A			4
Basin Creek and tributaries, Juab and Tooele Counties		2B	3A			4
Thomas Creek and tributaries, Juab County		2B	3A			4
Indian Farm Creek and tributaries, Juab County		2B	3A			4
Cottonwood Creek and tributaries, Juab County		2B	3A			4
Red Cedar Creek and tributaries, Juab County		2B	3A			4
Granite Creek and tributaries, Juab County		2B	3A			4
Trout Creek and tributaries, Juab County		2B	3A			4
Birch Creek and tributaries, Juab County		2B	3A			4
Deep Creek and tributaries, from Rock Spring Creek to headwaters, Juab and Tooele Counties		2B	3A			4
Cold Spring, Juab County		2B		3C	3D	

Cane Spring, Juab County	2B			3C	3D		
Lake Creek, from Garrison (Pruess) Reservoir to Nevada state line	2B	3A					4
Snake Creek and tributaries, Millard County	2B		3B				4
Salt Marsh Spring Complex, Millard County	2B	3A					
Twin Springs, Millard County	2B		3B				
Tule Spring, Millard County	2B			3C	3D		
Coyote Spring Complex, Millard County	2B			3C	3D		
Hamblin Valley Wash and tributaries, from Nevada state line to headwaters (Beaver and Iron Counties)	2B				3D		4
Indian Creek and tributaries, Beaver County, from Indian Creek Reservoir to headwaters	2B	3A					4
Shoal Creek and tributaries, Iron County	2B	3A					4

(*) Site-specific criteria are associated with this use.

b. Farmington Bay Drainage

TABLE

Corbett Creek and tributaries, from Highway to headwaters	2B	3A					4
Kays Creek and tributaries, from Farmington Bay to U.S. National Forest boundary	2B		3B				4
North Fork Kays Creek and tributaries, from U.S. National Forest boundary to headwaters	2B	3A					4

Middle Fork Kays Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A			4
South Fork Kays Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A			4
Snow Creek and tributaries		2B			3C	4
Holmes Creek and tributaries, from Farmington Bay to U.S. National Forest boundary		2B		3B		4
Holmes Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A			4
Baer Creek and tributaries, from Farmington Bay to Interstate 15		2B		3B		4
Baer Creek and tributaries, from Interstate 15 to U.S. Highway 89		2B		3B		4
Baer Creek and tributaries, from U.S. Highway 89 to headwaters	1C	2B	3A			4
Shepard Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A			4
Farmington Creek and tributaries, from Farmington Bay Waterfowl Management Area to U.S. National Forest boundary		2B		3B		4
Farmington Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A			4
Rudd Creek and tributaries, from Davis aqueduct to headwaters		2B	3A			4
Steed Creek and tributaries, from U.S. National Forest boundary						

to headwaters	1C	2B	3A		4
Davis Creek and tributaries, from U.S. Highway 89 to headwaters		2B	3A		4
Lone Pine Creek and tributaries, from U.S. Highway 89 to headwaters		2B	3A		4
Ricks Creek and tributaries, from Highway Interstate 15 to headwaters	1C	2B	3A		4
Barnard Creek and tributaries, from U.S. Highway 89 to headwaters		2B	3A		4
Parrish Creek and tributaries, from Davis Aqueduct to headwaters		2B	3A		4
Deuel Creek and tributaries, (Centerville Canyon) from Davis Aqueduct to headwaters		2B	3A		4
Stone Creek and tributaries, from Farmington Bay Waterfowl Management Area to U.S. National Forest Boundary		2B	3A		4
Stone Creek and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A		4
Barton Creek and tributaries, from U.S. National Forest boundary to headwaters		2B	3A		4
Mill Creek (Davis County) and tributaries, from confluence with State Canal to U.S. National Forest boundary		2B		3B	4
Mill Creek (Davis County) and tributaries, from U.S. National Forest boundary to headwaters	1C	2B	3A		4
North Canyon Creek and tributaries from U.S. National Forest boundary to headwaters		2B	3A		4

Howard Slough		2B		3C	4
Hooper Slough		2B		3C	4
Willard Slough		2B		3C	4
Willard Creek to Headwaters	1C	2B	3A		4
Chicken Creek to Headwaters	1C	2B	3A		4
Cold Water Creek to Headwaters	1C	2B	3A		4
One House Creek to Headwaters	1C	2B	3A		4
Garner Creek to Headwaters	1C	2B	3A		4

13.8 Snake River Basin
a. Raft River Drainage (Box Elder County)

TABLE

Raft River and tributaries	2B	3A	4
Clear Creek and tributaries, from Utah-Idaho state line to headwaters	2B	3A	4
Onemile Creek and tributaries, from Utah-Idaho state line to headwaters	2B	3A	4
George Creek and tributaries, from Utah-Idaho state line to headwaters	2B	3A	4
Johnson Creek and tributaries, from Utah-Idaho state line to headwaters	2B	3A	4
Birch Creek and tributaries, from state line to headwaters	2B	3A	4
Pole Creek and tributaries, from state line to headwaters	2B	3A	4
Goose Creek and tributaries	2B	3A	4
Hardesty Creek and tributaries, from			

state line to headwaters	2B	3A				4
Meadow Creek and tributaries, from state line to headwaters	2B	3A				4

13.9 All irrigation canals and ditches statewide, except as otherwise designated: 2B, 3E, 4

13.10 All drainage canals and ditches statewide, except as otherwise designated: 2B, 3E

13.11 National Wildlife Refuges and State Waterfowl Management Areas, and other Areas Associated with the Great Salt Lake

TABLE

Bear River National Wildlife Refuge, Box Elder County	2B		3B		3D	
Bear River Bay						
Open Water below approximately 4,208 ft.						5C
Transitional Waters approximately 4,208 ft. to Open Water						5E
Open Water above approximately 4,208 ft.	2B		3B		3D	
Browns Park Waterfowl Management Area, Daggett County	2B	3A			3D	
Clear Lake Waterfowl Management Area, Millard County	2B			3C	3D	
Desert Lake Waterfowl Management Area, Emery County	2B			3C	3D	
Farmington Bay WaterfowlManagement Area, Davis and Salt Lake Counties	2B			3C	3D	
Farmington Bay						
Open Water below approximately 4,208 ft.						5D
Transitional Waters approximately 4,208 ft. to Open Water						5E

Open Water above approximately 4,208 ft.	2B	3B		3D	
Fish Springs National Wildlife Refuge, Juab County	2B		3C	3D	
Harold Crane Waterfowl Management Area, Box Elder County	2B		3C	3D	
Gilbert Bay					
Open Water below approximately 4,208 ft.					5A
Transitional Waters approximately 4,208 ft. to Open Water					5E
Open Water above approximately 4,208 ft.	2B	3B		3D	
Gunnison Bay					
Open Water below approximately 4,208 ft.					5B
Transitional Waters approximately 4,208 ft. to Open Water					5E
Open Water above approximately 4,208 ft.	2B	3B		3D	
Howard Slough Waterfowl Management Area, Weber County	2B		3C	3D	
Locomotive Springs Waterfowl Management Area, Box Elder County	2B	3B		3D	
Ogden Bay Waterfowl Management Area, Weber County	2B		3C	3D	
Ouray National Wildlife Refuge, Uintah County	2B	3B		3D	
Powell Slough Waterfowl Management Area, Utah County	2B		3C	3D	
Public Shooting Grounds Waterfowl Management Area, Box Elder County	2B		3C	3D	

Salt Creek Waterfowl Management Area, Box Elder County			2B			3C	3D	
Stewart Lake Waterfowl Management Area, Uintah County			2B		3B		3D	
Timpie Springs Waterfowl Management Area, Tooele County			2B		3B		3D	

13.12 Lakes and Reservoirs. All lakes and any reservoirs greater than 10 acres not listed in 13.12 are assigned by default to the classification of the stream with which they are associated.

a. Beaver County

TABLE

Anderson Meadow Reservoir			2B	3A				4
Manderfield Reservoir			2B	3A				4
LaBaron Reservoir			2B	3A				4
Kents Lake			2B	3A				4
Minersville Reservoir			2B	3A			3D	4
Puffer Lake			2B	3A				
Three Creeks Reservoir			2B	3A				4

b. Box Elder County

TABLE

Cutler Reservoir (including portion in Cache County)			2B		3B		3D	4
Etna Reservoir			2B	3A				4
Lynn Reservoir			2B	3A				4
Mantua Reservoir			2B	3A				4
Willard Bay Reservoir	1C	2A			3B		3D	4

c. Cache County

TABLE

Hyrum Reservoir		2A		3A					4
Newton Reservoir			2B	3A					4
Porcupine Reservoir			2B	3A					4
Pelican Pond			2B		3B				4
Tony Grove Lake			2B	3A					4

d. Carbon County

TABLE

Grassy Trail Creek Reservoir	1C		2B	3A					4
Olsen Pond			2B		3B				4
Scofield Reservoir	1C		2B	3A					4

e. Daggett County

TABLE

Browne Reservoir			2B	3A					4
Daggett Lake			2B	3A					4
Flaming Gorge Reservoir (Utah portion)	1C	2A		3A					4
Long Park Reservoir	1C		2B	3A					4
Sheep Creek Reservoir			2B	3A					4
Spirit Lake			2B	3A					4
Upper Potter Lake			2B	3A					4

f. Davis County

TABLE

Farmington Ponds		2B	3A		4
Kaysville Highway Ponds		2B	3A		4
Holmes Creek Reservoir		2B		3B	4

g. Duchesne County

TABLE

Allred Lake		2B	3A		4
Atwine Lake		2B	3A		4
Atwood Lake		2B	3A		4
Betsy Lake		2B	3A		4
Big Sandwash Reservoir	1C	2B	3A		4
Bluebell Lake		2B	3A		4
Brown Duck Reservoir		2B	3A		4
Butterfly Lake		2B	3A		4
Cedarview Reservoir		2B	3A		4
Chain Lake #1		2B	3A		4
Chepeta Lake		2B	3A		4
Clements Reservoir		2B	3A		4
Cleveland Lake		2B	3A		4
Cliff Lake		2B	3A		4
Continent Lake		2B	3A		4
Crater Lake		2B	3A		4
Crescent Lake		2B	3A		4

Daynes Lake	2B	3A		4
Dean Lake	2B	3A		4
Doll Lake	2B	3A		4
Drift Lake	2B	3A		4
Elbow Lake	2B	3A		4
Farmers Lake	2B	3A		4
Fern Lake	2B	3A		4
Fish Hatchery Lake	2B	3A		4
Five Point Reservoir	2B	3A		4
Fox Lake Reservoir	2B	3A		4
Governors Lake	2B	3A		4
Granddaddy Lake	2B	3A		4
Hoover Lake	2B	3A		4
Island Lake	2B	3A		4
Jean Lake	2B	3A		4
Jordan Lake	2B	3A		4
Kidney Lake	2B	3A		4
Kidney Lake West	2B	3A		4
Lily Lake	2B	3A		4
Midview Reservoir (Lake Boreham)	2B		3B	4
Milk Reservoir	2B	3A		4
Mirror Lake	2B	3A		4
Mohawk Lake	2B	3A		4

Moon Lake	1C	2A		3A	4
North Star Lake			2B	3A	4
Palisade Lake			2B	3A	4
Pine Island Lake			2B	3A	4
Pinto Lake			2B	3A	4
Pole Creek Lake			2B	3A	4
Potters Lake			2B	3A	4
Powell Lake			2B	3A	4
Pyramid Lake		2A		3A	4
Queant Lake			2B	3A	4
Rainbow Lake			2B	3A	4
Red Creek Reservoir			2B	3A	4
Rudolph Lake			2B	3A	4
Scout Lake		2A		3A	4
Spider Lake			2B	3A	4
Spirit Lake			2B	3A	4
Starvation Reservoir	1C	2A		3A	4
Superior Lake			2B	3A	4
Swasey Hole Reservoir			2B	3A	4
Taylor Lake			2B	3A	4
Thompson Lake			2B	3A	4
Timothy Reservoir #1			2B	3A	4

Timothy Reservoir #6			2B	3A				4
Timothy Reservoir #7			2B	3A				4
Twin Pots Reservoir	1C		2B	3A				4
Upper Stillwater Reservoir	1C		2B	3A				4
X - 24 Lake			2B	3A				4

h. Emery County

TABLE

Cleveland Reservoir			2B	3A				4
Electric Lake			2B	3A				4
Huntington Reservoir			2B	3A				4
Huntington North Reservoir		2A			3B			4
Joes Valley Reservoir		2A		3A				4
Millsite Reservoir	1C	2A		3A				4

i. Garfield County

TABLE

Barney Lake			2B	3A				4
Cyclone Lake			2B	3A				4
Deer Lake			2B	3A				4
Jacobs Valley Reservoir			2B			3C	3D	4
Lower Bowns Reservoir			2B	3A				4
North Creek Reservoir			2B	3A				4
Panguitch Lake			2B	3A				4
Pine Lake			2B	3A				4

Oak Creek Reservoir (Upper Bowns)		2B	3A				4
Pleasant Lake		2B	3A				4
Posey Lake		2B	3A				4
Purple Lake		2B	3A				4
Raft Lake		2B	3A				4
Row Lake #3		2B	3A				4
Row Lake #7		2B	3A				4
Spectacle Reservoir		2B	3A				4
Tropic Reservoir		2B	3A				4
West Deer Lake		2B	3A				4
Wide Hollow Reservoir		2B	3A				4

j. Iron County

TABLE

Newcastle Reservoir		2B	3A				4
Red Creek Reservoir		2B	3A				4
Yankee Meadow Reservoir		2B	3A				4

k. Juab County

TABLE

Chicken Creek Reservoir		2B			3C	3D	4
Mona Reservoir		2B		3B			4
Sevier Bridge (Yuba) Reservoir	2A			3B			4

l. Kane County

TABLE

Navajo Lake			2B	3A				4

m. Millard County

TABLE

DMAD Reservoir			2B		3B			4
Fools Creek Reservoir			2B			3C	3D	4
Garrison Reservoir (Pruess Lake)			2B		3B			4
Gunnison Bend Reservoir			2B		3B			4

n. Morgan County

TABLE

East Canyon Reservoir	1C	2A		3A				4
Lost Creek Reservoir	1C		2B	3A				4

o. Piute County

TABLE

Barney Reservoir			2B	3A				4
Lower Boxcreek Reservoir			2B	3A				4
Manning Meadow Reservoir			2B	3A				4
Otter Creek Reservoir			2B	3A				4
Piute Reservoir			2B	3A				4
Upper Boxcreek Reservoir			2B	3A				4

p. Rich County

TABLE

Bear Lake (Utah portion)		2A		3A				4

Birch Creek Reservoir			2B	3A					4
Little Creek Reservoir			2B	3A					4
Woodruff Creek Reservoir			2B	3A					4

q. Salt Lake County

TABLE

Decker Lake			2B		3B		3D		4
Lake Mary	1C		2B	3A					
Little Dell Reservoir	1C		2B	3A					
Mountain Dell Reservoir	1C		2B	3A					

r. San Juan County

TABLE

Blanding Reservoir #4	1C		2B	3A					4
Dark Canyon Lake	1C		2B	3A					4
Kens Lake			2B	3A*					4
Lake Powell (Utah portion)	1C	2A			3B				4
Lloyds Lake	1C		2B	3A					4
Monticello Lake			2B	3A					4
Recapture Reservoir			2B	3A					4

(*) Site-specific criteria are associated with this use.

s. Sanpete County

TABLE

Duck Fork Reservoir			2B	3A					4

Fairview Lakes	1C		2B	3A			4
Ferron Reservoir			2B	3A			4
Lower Gooseberry Reservoir	1C		2B	3A			4
Gunnison Reservoir			2B			3C	4
Island Lake			2B	3A			4
Miller Flat Reservoir			2B	3A			4
Ninemile Reservoir			2B	3A			4
Palisade Reservoir		2A		3A			4
Rolfson Reservoir			2B			3C	4
Twin Lakes			2B	3A			4
Willow Lake			2B	3A			4

t. Sevier County

TABLE

Annabella Reservoir	2B	3A			4
Big Lake	2B	3A			4
Farnsworth Lake	2B	3A			4
Fish Lake	2B	3A			4
Forsythe Reservoir	2B	3A			4
Johnson Valley Reservoir	2B	3A			4
Koosharem Reservoir	2B	3A			4
Lost Creek Reservoir	2B	3A			4
Redmond Lake	2B		3B		4
Rex Reservoir	2B	3A			4

Salina Reservoir		2B 3A	4
Sheep Valley Reservoir		2B 3A	4

u. Summit County

TABLE

Abes Lake		2B 3A	4
Alexander Lake		2B 3A	4
Amethyst Lake		2B 3A	4
Beaver Lake		2B 3A	4
Beaver Meadow Reservoir		2B 3A	4
Big Elk Reservoir		2B 3A	4
Blanchard Lake		2B 3A	4
Bridger Lake		2B 3A	4
China Lake		2B 3A	4
Cliff Lake		2B 3A	4
Clyde Lake		2B 3A	4
Coffin Lake		2B 3A	4
Cuberant Lake		2B 3A	4
East Red Castle Lake		2B 3A	4
Echo Reservoir	1C 2A	3A	4
Fish Lake		2B 3A	4
Fish Reservoir		2B 3A	4
Haystack Reservoir #1		2B 3A	4
Henrys Fork Reservoir		2B 3A	4

Hoop Lake			2B	3A	4
Island Lake			2B	3A	4
Island Reservoir			2B	3A	4
Jesson Lake			2B	3A	4
Kamas Lake			2B	3A	4
Lily Lake			2B	3A	4
Lost Reservoir			2B	3A	4
Lower Red Castle Lake			2B	3A	4
Lyman Lake		2A		3A	4
Marsh Lake			2B	3A	4
Marshall Lake			2B	3A	4
McPheters Lake			2B	3A	4
Meadow Reservoir			2B	3A	4
Meeks Cabin Reservoir			2B	3A	4
Notch Mountain Reservoir			2B	3A	4
Red Castle Lake			2B	3A	4
Rockport Reservoir	1C	2A		3A	4
Ryder Lake			2B	3A	4
Sand Reservoir			2B	3A	4
Scow Lake			2B	3A	4
Smith Moorehouse Reservoir	1C		2B	3A	4
Star Lake			2B	3A	4

Stateline Reservoir		2B	3A		4
Tamarack Lake		2B	3A		4
Trial Lake	1C	2B	3A		4
Upper Lyman Lake		2B	3A		4
Upper Red Castle		2B	3A		4
Wall Lake Reservoir		2B	3A		4
Washington Reservoir		2B	3A		4
Whitney Reservoir		2B	3A		4

v. Tooele County

TABLE

Blue Lake		2B		3B	4
Clear Lake		2B		3B	4
Grantsville Reservoir		2B	3A		4
Horseshoe Lake		2B		3B	4
Kanaka Lake		2B		3B	4
Rush Lake		2B		3B	
Settlement Canyon Reservoir		2B	3A		4
Stansbury Lake		2B		3B	4
Vernon Reservoir		2B	3A		4

w. Uintah County

TABLE

Ashley Twin Lakes (Ashley Creek)	1C	2B	3A		4
Bottle Hollow Reservoir		2B	3A		4

Brough Reservoir			2B	3A			4
Calder Reservoir			2B	3A			4
Crouse Reservoir			2B	3A			4
East Park Reservoir			2B	3A			4
Fish Lake			2B	3A			4
Goose Lake #2			2B	3A			4
Matt Warner Reservoir			2B	3A			4
Oaks Park Reservoir			2B	3A			4
Paradise Park Reservoir			2B	3A			4
Pelican Lake			2B		3B		4
Red Fleet Reservoir	1C	2A		3A			4
Steinaker Reservoir	1C	2A		3A			4
Towave Reservoir			2B	3A			4
Weaver Reservoir			2B	3A			4
Whiterocks Lake			2B	3A			4
Workman Lake			2B	3A			4

x. Utah County

TABLE

Big East Lake		2B	3A			4
Salem Pond	2A		3A			4
Silver Flat Lake Reservoir		2B	3A			4
Tibble Fork Resevoir		2B	3A			4
Utah Lake	2A			3B	3D	4

y. Wasatch County

TABLE

Currant Creek Reservoir	1C		2B	3A		4
Deer Creek Reservoir	1C	2A		3A		4
Jordanelle Reservoir	1C	2A		3A		4
Mill Hollow Reservoir			2B	3A		4
Strawberry Reservoir	1C		2B	3A		4

z. Washington County

TABLE

Baker Dam Reservoir			2B	3A		4
Gunlock Reservoir	1C	2A			3B	4
Ivins Reservoir			2B		3B	4
Kolob Reservoir			2B	3A		4
Lower Enterprise Reservoir			2B	3A		4
Quail Creek Reservoir	1C	2A			3B	4
Sand Hollow Reservoir	1C	2A			3B	4
Upper Enterprise Reservoir			2B	3A		4

aa. Wayne County

TABLE

Blind Lake			2B	3A		4
Cook Lake			2B	3A		4
Donkey Reservoir			2B	3A		4

Fish Creek Reservoir			2B	3A	4
Mill Meadow Reservoir			2B	3A	4
Raft Lake			2B	3A	4

bb. Weber County

TABLE

Causey Reservoir			2B	3A	4
Pineview Reservoir	1C	2A		3A	4

13.13 Unclassified Waters

All waters not specifically classified are presumptively classified: 2B, 3D

R317-2-14. Numeric Criteria.

TABLE 2.14.1
NUMERIC CRITERIA FOR DOMESTIC,
RECREATION, AND AGRICULTURAL USES

Parameter	Domestic Source 1C(1)	Recreation and Aesthetics 2A	2B	Agri-culture 4
BACTERIOLOGICAL (30-DAY GEOMETRIC MEAN) (NO.)/100 ML) (7)				
E. coli	206	126	206	
MAXIMUM (NO.)/100 ML) (7)				
E. coli	668	409	668	
PHYSICAL				
pH (RANGE)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)		10	10	
METALS (DISSOLVED, MAXIMUM MG/L) (2)				
Arsenic	0.01			0.1

Barium	1.0		
Beryllium	<0.004		
Cadmium	0.01		0.01
Chromium	0.05		0.10
Copper			0.2
Lead	0.015		0.1
Mercury	0.002		
Selenium	0.05		0.05
Silver	0.05		
INORGANICS (MAXIMUM MG/L)			
Bromate	0.01		
Boron			0.75
Chlorite	<1.0		
Fluoride	4.0		
Nitrates as N	10		
Total Dissolved Solids (4)			1200
	RADIOLOGICAL		
(MAXIMUM pCi/L)			
Gross Alpha	15		15
Gross Beta	4 mrem/yr	Radium 226, 228	
(Combined)	5		
Strontium 90	8		
Tritium	20000		
Uranium	30		
ORGANICS (MAXIMUM UG/L)			
2,4-D 94-75-7	70		
2,4,5-TP 93-72-1	10		
Alachlor 15972-60-8	2		
Atrazine 1912-24-9	3		
Carbofuran 1563-66-2	40		
Dichloroethylene (cis-1,2) 156-59-2	70		
Dalapon 75-99-0	200		
Di(2ethylhexl)adipate 103-23-1	400		
Dibromochloropropane 96-12-8	0.2		
Dinoseb 88-85-7	7		

Diquat 85-00-7	20			
Endothall 145-73-3	100			
Ethylene Dibromide 106-93-4	0.05			
Glyphosate 1071-83-6	700			
POLLUTION INDICATORS (5)				
BOD (MG/L)	5	5	5	
Nitrate as N (MG/L)	4	4		
Total Phosphorus as P (MG/L)(6)	0.05	0.05		

FOOTNOTES:

(1) See also numeric criteria for water and organism in Table 2.14.6.

(2) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by approved laboratory methods for the required detection levels.

(3) Reserved

(4) SITE SPECIFIC STANDARDS FOR TOTAL DISSOLVED SOLIDS (TDS)

Blue Creek and tributaries, Box Elder County, from Bear River Bay, Great Salt Lake to Blue Creek Reservoir:
March through October daily maximum 4,900 mg/l and an average of 3,800 mg/l; November through February daily maximum 6,300 mg/l and an average of 4,700 mg/l. Assessments will be based on TDS concentrations measured at the location of STORET 4960740.

Blue Creek Reservoir and tributaries, Box Elder County, daily maximum 2,100 mg/l;

Castle Creek from confluence with the Colorado River to Seventh Day Adventist Diversion: 1,800 mg/l;

Cottonwood Creek from the confluence with Huntington Creek to Highway U-57: 3,500 mg/l;

Ferron Creek from the confluence with San Rafael River to Highway U-10: 3,500 mg/l;

Huntington Creek and tributaries from the confluence with Cottonwood Creek to Highway U-10: 4,800 mg/l;

Ivie Creek and its tributaries from the confluence with Muddy Creek to the confluence with Quitchupah Creek: 3,800 mg/l provided that total sulfate not exceed 2,000 mg/l to protect the livestock watering agricultural existing use;

Ivie Creek and its tributaries from the confluence withQuitchupah Creek to Highway U-10: 2,600 mg/l;

Lost Creek from the confluence with Sevier River to U.S. National Forest boundary: 4,600 mg/l;

Muddy Creek and tributaries from the confluence with Ivie Creek to Highway U-10: 2,600 mg/l;

Muddy Creek from confluence with Fremont River to confluence with Ivie Creek: 5,800 mg/l;

North Creek from the confluence with Virgin River to headwaters: 2,035 mg/l;

Onion Creek from the confluence with Colorado River to road crossing above Stinking Springs: 3000 mg/l;

Brine Creek-Petersen Creek, from the confluence with the Sevier River to Highway U-119 Crossing: 9,700 mg/l;

Price River and tributaries from confluence with Green River to confluence with Soldier Creek: 3,000 mg/l;

Price River and tributaries from the confluence with Soldier Creek to Carbon Canal Diversion: 1,700 mg/l;

Quitchupah Creek and tributaries from the confluence with Ivie Creek to Highway U-10: 3,800 mg/l provided that total sulfate not exceed 2,000 mg/l to protect the livestock watering agricultural existing use;

Rock Canyon Creek from the confluence with Cottonwood Creek to headwaters: 3,500 mg/l;

San Pitch River from below Gunnison Reservoir to the Sevier River: 2,400 mg/l;

San Rafael River from the confluence with the Green River to

Buckhorn Crossing: 4,100 mg/l;

San Rafael River from the Buckhorn Crossing to the confluence with Huntington Creek and Cottonwood Creek: 3,500 mg/l;

Sevier River between Gunnison Bend Reservoir and DMAD Reservoir: 1,725 mg/l;

Sevier River from Gunnison Bend Reservoir to Crafts Lake: 3,370 mg/l;

Silver Creek and tributaries, Summit County, from confluence with Tollgate Creek to headwaters: maximum 1,900 mg/L.

South Fork Spring Creek from confluence with Pelican Pond Slough Stream to U.S. Highway 89	1,450 mg/l (Apr.-Sept.)
	1,950 mg/l (Oct.-March)

Virgin River from the Utah/Arizona border to Pah Tempe Springs: 2,360 mg/l

(5) Investigations should be conducted to develop more information where these pollution indicator levels are exceeded.

(6) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(7) Where the criteria are exceeded and there is a reasonable basis for concluding that the indicator bacteria E. coli are primarily from natural sources (wildlife), e.g., in National Wildlife Refuges and State Waterfowl Management Areas, the criteria may be considered attained provided the density attributable to non-wildlife sources is less than the criteria. Exceedences of E. coli from nonhuman nonpoint sources will generally be addressed through appropriate Federal, State, and local nonpoint source programs.

Measurement of E. coli using the "Quanti-Tray 2000" procedure is approved as a field analysis. Other EPA approved methods may also be used.

For water quality assessment purposes, up to 10% of representative samples may exceed the 668 per 100 ml criterion (for 1C and 2B waters) and 409 per 100 ml (for 2A waters). For small datasets, where exceedences of these criteria are observed, follow-up ambient monitoring should be conducted to better characterize water quality.

TABLE 2.14.2
NUMERIC CRITERIA FOR AQUATIC WILDLIFE(8)

Parameter	Aquatic Wildlife 3A	3B	3C	3D	5
PHYSICAL					
Total Dissolved Gases	(1)	(1)			
Minimum Dissolved Oxygen (MG/L) (2)(2a)					
30 Day Average	6.5	5.5	5.0	5.0	
7 Day Average	9.5/5.0	6.0/4.0			
Minimum	8.0/4.0	5.0/3.0	3.0	3.0	
Max. Temperature(C)(3)	20	27	27		
Max. Temperature Change (C)(3)	2	4	4		
pH (Range)(2a)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0	
Turbidity Increase (NTU)	10	10	15	15	
METALS (4) (DISSOLVED, UG/L)(5)					
Aluminum					
4 Day Average (6)	87	87	87	87	
1 Hour Average	750	750	750	750	
Arsenic (Trivalent)					
4 Day Average	150	150	150	150	
1 Hour Average	340	340	340	340	
Cadmium (7)					
4 Day Average	0.72	0.72	0.72	0.72	
1 Hour Average	1.8	1.8	1.8	1.8	
Chromium (Hexavalent)					
4 Day Average	11	11	11	11	
1 Hour Average	16	16	16	16	
Chromium					

(Trivalent) (7)				
4 Day Average	74	74	74	74
1 Hour Average	570	570	570	570
Copper (7)				
4 Day Average	9	9	9	9
1 Hour Average	13	13	13	13
Cyanide (Free)				
4 Day Average	5.2	5.2	5.2	
1 Hour Average	22	22	22	22
Iron (Maximum)	1000	1000	1000	1000
Lead (7)				
4 Day Average	2.5	2.5	2.5	2.5
1 Hour Average	65	65	65	65
Mercury				
4 Day Average	0.012	0.012	0.012	0.012
Nickel (7)				
4 Day Average	52	52	52	52
1 Hour Average	468	468	468	468
Selenium				
4 Day Average	4.6	4.6	4.6	4.6
1 Hour Average	18.4	18.4	18.4	18.4
Selenium (14) Gilbert Bay (Class 5A) Great Salt Lake Geometric Mean over Nesting Season (mg/kg dry wt)				12.5
Silver				
1 Hour Average (7)	3.2	3.2	3.2	3.2
Tributyltin				
4 Day Average	0.072	0.072	0.072	0.072
1 Hour Average	0.46	0.46	0.46	0.46
Zinc (7)				
4 Day Average	120	120	120	120
1 Hour Average	120	120	120	120

INORGANICS (MG/L) (4)				
Total Ammonia as N (9)				
30 Day Average	(9a)	(9a)	(9a)	(9a)
1 Hour Average	(9b)	(9b)	(9b)	(9b)
Chlorine (Total Residual)				
4 Day Average	0.011	0.011	0.011	0.011
1 Hour Average	0.019	0.019	0.019	0.019
Hydrogen Sulfide (Undissociated, Max. UG/L)	2.0	2.0	2.0	2.0
Phenol(Maximum)	0.01	0.01	0.01	0.01
RADIOLOGICAL (MAXIMUM pCi/L)				
ORGANICS (UG/L) (4)				
Acrolein				
4 Day Average	3.0	3.0	3.0	3.0
1 Hour Average	3.0	3.0	3.0	3.0
Aldrin				
1 Hour Average	1.5	1.5	1.5	1.5
Carbaryl				
4 Day Average	2.1	2.1	2.1	2.1
1 Hour Average	2.1	2.1	2.1	2.1
Chlordane				
4 Day Average	0.0043	0.0043	0.0043	0.0043
1 Hour Average	1.2	1.2	1.2	1.2
Chlorpyrifos				
4 Day Average	0.041	0.041	0.041	0.041
1 Hour Average	0.083	0.083	0.083	0.083
4,4' -DDT				
4 Day Average	0.0010	0.0010	0.0010	0.0010
1 Hour Average	0.55	0.55	0.55	0.55
Diazinon				
4 Day Average	0.17	0.17	0.17	0.17

1 Hour Average	0.17	0.17	0.17	0.17
Dieldrin				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.24	0.24	0.24	0.24
Alpha-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.11	0.11	0.11	0.11
beta-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Day Average	0.11	0.11	0.11	0.11
Endrin				
4 Day Average	0.036	0.036	0.036	0.036
1 Hour Average	0.086	0.086	0.086	0.086
Heptachlor				
4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Heptachlor epoxide				
4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Hexachlorocyclohexane (Lindane)				
4 Day Average	0.08	0.08	0.08	0.08
1 Hour Average	1.0	1.0	1.0	1.0
Methoxychlor (Maximum)	0.03	0.03	0.03	0.03
Mirex (Maximum)	0.001	0.001	0.001	0.001
Nonylphenol				
4 Day Average	6.6	6.6	6.6	6.6
1 Hour Average	28.0	28.0	28.0	28.0
Parathion				
4 Day Average	0.013	0.013	0.013	0.013
1 Hour Average	0.066	0.066	0.066	0.066
PCBs				
4 Day Average	0.014	0.014	0.014	0.014

Pentachlorophenol (11)				
4 Day Average	15	15	15	15
1 Hour Average	19	19	19	19
Toxaphene				
4 Day Average	0.0002	0.0002	0.0002	0.0002
1 Hour Average	0.73	0.73	0.73	0.73
POLLUTION INDICATORS (10)				
Gross Alpha (pCi/L)	15	15	15	15
Gross Beta (pCi/L)	50	50	50	50
BOD (MG/L)	5	5	5	5
Nitrate as N (MG/L)	4	4	4	
Total Phosphorus as P(MG/L) (12)	0.05	0.05		

FOOTNOTES:

(1) Not to exceed 110% of saturation.

(2) These limits are not applicable to lower water levels in deep impoundments. First number in column is for when early life stages are present, second number is for when all other life stages present.

(2a) These criteria are not applicable to Great Salt Lake impounded wetlands. Surface water in these wetlands shall be protected from changes in pH and dissolved oxygen that create significant adverse impacts to the existing beneficial uses. To ensure protection of uses, the Director shall develop reasonable protocols and guidelines that quantify the physical, chemical, and biological integrity of these waters. These protocols and guidelines will include input from local governments, the regulated community, and the general public. The Director will inform the Water Quality Board of any protocols or guidelines that are developed.

(3) Site Specific Standards for Temperature
Kens Lake: From June 1st - September 20th, 27 degrees C.

(4) Where criteria are listed as 4-day average and 1-hour average concentrations, these concentrations should not be exceeded more often than once every three years on the average.

(5) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by EPA approved laboratory methods for the required detection levels.

(6) The criterion for aluminum will be implemented as follows:

Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaC03 in the receiving water after mixing, the 87 ug/1 chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/1 acute aluminum criterion (expressed as total recoverable).

(7) Hardness dependent criteria. 100 mg/l used. Conversion factors for ratio of total recoverable metals to dissolved metals must also be applied. In waters with a hardness greater than 400 mg/l as CaC03, calculations will assume a hardness of 400 mg/l as CaC03. See Table 2.14.3 for complete equations for hardness and conversion factors.

(8) See also numeric criteria for organism only in Table 2.14.6.

(9) The following equations are used to calculate Ammonia criteria concentrations:

(9a) The thirty-day average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average, the chronic criterion calculated using the following equations.

Fish Early Life Stages are Present:

mg/l as N (Chronic) = $((0.0577/(1+10^{7.688-pH})) + (2.487/(1+10^{pH-7.688}))) * MIN(2.85, 1.45*10^{0.028*(25-T)})$ Fish Early Life Stages are Absent:

mg/1 as N (Chronic) = $((0.0577/(1+10^{7.688-pH})) + (2.487/(1+10^{pH-7.688}))) * 1.45*10^{0.028*(25-MAX(T,7))})$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, Fish Early Life Stages are Present:

mg/l as N (Chronic) = $0.9405 * ((0.0278/(1+10^{7.688-pH})) + ((1.1994/(1+10^{pH-7.6888}))) * MIN(6.920,(7.547*10^{0.028*(20-T)})))$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, Fish Early Life Stages are Absent:

mg/L as N (chronic) = $09.405 * (((0.0278/(1+10^{7.688-pH}))+(1.1994/(1+10^{pH-7.688}))) * (7.547*10^{0.028*(20-MAX(T,7))})$

(9b) The one-hour average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average the acute criterion calculated using the following equations.

Class 3A:

mg/l as N (Acute) = $(0.275/(1+10^{7.204-pH})) + (39.0/1+10^{pH-7.204}))$

Class 3B, 3C, 3D:

mg/l as N (Acute) = $0.411/(1+10^{7.204-pH})) + (58.4/(1+10^{pH-7.204}))$

Mill Creek (Salt Lake County) from confluence with Jordan River to Interstate 15, Jordan River from 900 South Street to confluence with Mill Creek, Surplus Canal from 900 South Street to diversion from the Jordan River:

mg/l as N (Acute) = $0.729 * (((0.0114/(1+10^{7.204-pH}))+(1.6181/(1+10^{pH-7.204}))) * MIN(51.93,(62.15*10^{0.036*(20-T)}))$

In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion. The "Fish Early Life Stages are Present" 30-day average total ammonia criterion will be applied by default unless it is determined by the Director, on a site-specific basis, that it is appropriate to apply the "Fish Early Life Stages are Absent" 30-day average criterion for all or some portion of the year. At a minimum, the "Fish Early Life Stages are Present" criterion will apply from the beginning of spawning through the end of the early life stages. Early life stages include the pre-hatch embryonic stage, the post-hatch free embryo or yolk-sac fry stage, and the larval stage for the species of fish expected to occur at the site. The Director will consult with the Division of Wildlife Resources in making such determinations. The Division will maintain information regarding the waterbodies and time periods where application of the "Early Life Stages are Absent" criterion is determined to be appropriate.

(10) Investigation should be conducted to develop more information where these levels are exceeded.

(11) pH dependent criteria. pH 7.8 used in table. See Table 2.14.4 for equation.

(12) Total Phosphorus as P (mg/l) as a pollution indicator for lakes and reservoirs shall be 0.025.

(13) Reserved

(14) The selenium water quality standard of 12.5 (mg/kg dry weight) for Gilbert Bay is a tissue based standard using the complete egg/embryo of aquatic dependent birds using Gilbert Bay based upon a minimum of five samples over the nesting season. Assessment procedures are incorporated as a part of this standard as follows:

Egg Concentration Triggers: DWQ Responses

Below 5.0 mg/kg: Routine monitoring with sufficient intensity to determine if selenium concentrations within the Great Salt Lake ecosystem are increasing.

5.0 mg/kg: Increased monitoring to address data gaps, loadings, and areas of uncertainty identified from initial Great Salt Lake selenium studies.

6.4 mg/kg: Initiation of a Level II Antidegradation review by the State for all discharge permit renewals or new discharge permits to Great Salt Lake. The Level II Antidegradation review may include an analysis of loading reductions.

9.8 mg/kg: Initiation of preliminary TMDL studies to evaluate selenium loading sources.

12.5 mg/kg and above: Declare impairment. Formalize and implement TMDL.

Antidegradation

Level II Review procedures associated with this standard are referenced at R317-2-3.5.C.

TABLE
1-HOUR AVERAGE (ACUTE) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/L)

pH	Class 3A	Class 3B, 3C, 3D
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72

8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.89	1.32

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Present
Temperature, C

pH	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.90
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.88	0.77
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.97	0.86	0.75	0.66
8.3	1.52	1.52	1.39	1.22	1.07	0.94	0.83	0.73	0.64	0.56
8.4	1.29	1.29	1.17	1.03	0.91	0.80	0.70	0.62	0.54	0.48
8.5	1.09	1.09	0.99	0.87	0.76	0.67	0.59	0.52	0.46	0.40
8.6	0.92	0.92	0.84	0.73	0.65	0.57	0.50	0.44	0.39	0.34
8.7	0.78	0.78	0.71	0.62	0.55	0.48	0.42	0.37	0.33	0.29
8.8	0.66	0.66	0.60	0.53	0.46	0.41	0.36	0.32	0.28	0.24
8.9	0.56	0.56	0.51	0.45	0.40	0.35	0.31	0.27	0.24	0.21
9.0	0.49	0.49	0.44	0.39	0.34	0.30	0.26	0.23	0.20	0.18

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Absent
Temperature, C

pH	0-7	8	9	10	11	12	13	14	16
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.36	6.89	6.06
6.6	10.7	9.99	9.37	8.79	8.24	7.72	7.24	6.79	5.97
6.7	10.5	9.81	9.20	8.62	8.08	7.58	7.11	6.66	5.86
6.8	10.2	9.58	8.98	8.42	7.90	7.40	6.94	6.51	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.601
8.9	0.917	0.860	0.806	0.758	0.709	0.664	0.623	0.584	0.513
9.0	0.790	0.740	0.694	0.651	0.610	0.572	0.536	0.503	0.442

pH	18	20	22	24	26	28	30
6.5	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	4.41	3.78	3.33	2.92	2.57	2.26	1.99
7.3	4.06	3.57	3.13	2.76	2.42	2.13	1.87

7.4	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	1.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	1.68	1.47	1.29	1.14	1.00	0.879	0.733
8.2	1.43	1.26	1.11	1.073	0.855	0.752	0.661
8.3	1.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	1.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.735	0.646	0.568	0.499	0.439	0.396	0.339
8.7	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.389	0.342	0.300	0.264	0.232	0.204	0.179

TABLE 2.14.3a
EQUATIONS TO CONVERT TOTAL RECOVERABLE METALS STANDARD
WITH HARDNESS (1) DEPENDENCE TO DISSOLVED METALS STANDARD
BY APPLICATION OF A CONVERSION FACTOR (CF).

Parameter	4-Day Average (Chronic) Concentration (UG/L)
CADMIUM	$CF * e^{(0.7977*\ln(hardness)-3.909)}$ $CF = 1.101672 - \ln(hardness)\ (0.041838)$
CHROMIUM III	$CF * e^{(0.8190(\ln(hardness)) + 0.6848}$ $CF = 0.860$
COPPER	$CF * e^{(0.8545(\ln(hardness)) -1.702)}$ $CF = 0.960$
LEAD	$CF * e^{(1.273(\ln(hardness))-4.705)}$ $CF = 1.46203 - \ln(hardness)(0.145712)$
NICKEL	$CF * e^{(0.8460(\ln(hardness))+0.0584)}$ $CF = 0.997$
SILVER	N/A

ZINC	$Cf * e^{(0.8473(\ln(hardness))+0.884)}$ CF = 0.986

TABLE 2.14.3b
EQUATIONS TO CONVERT TOTAL RECOVERABLE METALS STANDARD
WITH HARDNESS (1) DEPENDENCE TO DISSOLVED METALS STANDARD
BY APPLICATION OF A CONVERSION FACTOR (CF).

Parameter	1-Hour Average (Acute) Concentration (UG/L)
CADMIUM	$CF * e^{(0.9789*\ln(hardness)-3.866)}$ CF = 1.136672 - ln(hardness)(0.041838)
CHROMIUM (III)	$CF * e^{(0.8190(\ln(hardness)) +3.7256)}$ CF = 0.316
COPPER	$CF * e^{(0.9422(\ln(hardness))- 1.700)}$ CF = 0.960
LEAD	$CF * e^{(1.273(\ln(hardness))-1.460)}$ CF = 1.46203 - ln(hardness)(0.145712)
NICKEL	$CF * e^{(0.8460(\ln(hardness)) +2.255)}$ CF= 0.998
SILVER	$CF * e^{(1.72(\ln(hardness))- 6.59)}$ CF = 0.85
ZINC	$CF * e^{(0.8473(\ln(hardness)) +0.884)}$ CF = 0.978

FOOTNOTE:
(1) Hardness as mg/l $CaCO_3$.

TABLE 2.14.4
EQUATIONS FOR PENTACHLOROPHENOL
(pH DEPENDENT)

4-Day Average (Chronic) Concentration (UG/L)	1-Hour Average (Acute) Concentration (UG/L)
$e^{(1.005(pH))-5.134}$	$e^{(1.005(pH))-4.869}$

TABLE 2.14.5
SITE SPECIFIC CRITERIA FOR DISSOLVED OXYGEN FOR JORDAN RIVER, SURPLUS CANAL, AND STATE CANAL
(SEE SECTION 2.13)

DISSOLVED OXYGEN:	
May-July	
7-day average	5.5 mg/l
30-day average	5.5 mg/l
Instantaneous minimum	4.5 mg/l
August-April	
30-day average	5.5 mg/l
Instantaneous minimum	4.0 mg/l

TABLE 2.14.6
LIST OF HUMAN HEALTH CRITERIA (CONSUMPTION)

Chemical Parameter and CAS #	Water and Organism (ug/L)	Organism Only (ug/L)
	Class 1C	Class 3A,3B,3C,3D
Antimony 7440-36-0	5.6	640
Arsenic 7440-38-2	A	A
Beryllium 7440-41-7	C	C
Chromium III 16065-83-1	C	C
Chromium VI 18540-29-9	C	C
Copper 7440-50-8	1,300	
Mercury 7439-97-6	A	A
Nickel 7440-02-0	610	4,600
Selenium 7782-49-2	170	4,200
Thallium 7440-28-0	0.24	0.47
Zinc 7440-66-6	7,400	26,000
Free Cyanide 57-12-5	[~~140~~] 4	[~~140~~]400
Asbestos 1332-21-4	7 million Fibers/L	
2,3,7,8-TCDD Dioxin 1746-01-6	5.0 E -9 B	5.1 E-9 B
Acrolein 107-02-8	3[~~.0~~]	400
Acrylonitrile 107-13-1	0.061	7.0
[~~Atrazine 1912-24-9~~	~~3.0~~	
]Benzene 71-43-2	2.1 B	51 B
Bromoform 75-25-2	7.0 B	120 B

Carbon Tetrachloride 56-23-5	0.4 B	5 B
Chlorobenzene [~~57-12-5~~]108-90-7	100 MCL	1,600
Chlorodibromomethane 124-48-1	[~~0.40~~]0.80 B	[~~13~~]21 B
Chloroform 67-66-3	[~~5.7~~]60 B	470 B
[~~Dalapon 75-99-0~~	~~200~~	
]Dichlorobromomethane 75-27-4	[~~0.55~~]0.95 B	[~~17~~]27 B
1,2-Dichloroethane 107-06-2	9.9 B	[~~650~~]2,000 B
1,1-Dichloroethylene 75-35-4	300 MCL	20,000
[~~Dichloroethylene (cis-1,2) 156-59-2~~	~~70~~	
~~Diquat 231-36-7~~	~~20~~	
]1,2-Dichloropropane 78-87-5	0.90 B	31 B
1,3-Dichloropropene 542-75-6	0.27	12
Ethylbenzene 100-41-4	68	130
[~~Glyphosate 1071-83-6~~	~~700~~	
]Methyl Bromide 74-83-9	[~~47~~]100	10,000
Methylene Chloride 75-09-2	20 B	1,000 B
1,1,2,2-Tetrachloroethane 79-34-5	0.2 B	3 B
Tetrachloroethylene 127-18-4	10 B	29 B
Toluene 108-88-3	57	520
1,2 -Trans-Dichloroethylene 156-60-5	100 MCL	4,000
1,1,1-Trichloroethane 71-55-6	10,000 MCL	200,000
1,1,2-Trichloroethane 79-00-5	0.55 B	8.9 B
Trichloroethylene 79-01-6	0.6 B	7 B
Vinyl Chloride 75-01-4	0.022	1.6
[~~Xylenes 1330-20-7~~	~~10,000~~	
]2-Chlorophenol 95-57-8	30	800
2,4-Dichlorophenol 120-83-2	10	60
2,4-Dimethylphenol 105-67-9	100	3,000
2-Methyl-4,6-Dinitrophenol 534-52-1	2	30
2,4-Dinitrophenol 51-28-5	10	300
3-Methyl-4-Chlorophenol 59-50-7	500	2,000
Pentachlorophenol 87-86-5	0.03 B	0.04 B
Phenol 108-95-2	4,000	300,000
2,4,5-Trichlorophenol 95-95-4	300	600
2,4,6-Trichlorophenol 88-06-2	1.5 B	2.8 B
Acenaphthene 83-32-9	70	90
Anthracene 120-12-7	300	400
Benzidine 92-87-5	0.00014 B	0.011 B
BenzoaAnthracene 56-55-3	0.0012 B	0.0013 B
BenzoaPyrene 50-32-8	0.00012 B	0.00013 B

BenzobFluoranthene 205-99-2 0.0012 B [~~0.018~~]0.0013 B
BenzokFluoranthene 207-08-9 0.012 B 0.013 B
Bis2-Chloro1methylether
542-88-1 0.00015 0.017
Bis2-Chloro1methylethylether
108-60-1 200 B 4000
Bis2-ChloroethylEther
111-44-4[~~0~~]_ 0.030 B 2.2 B
[~~Bis2-Chloro1methylether~~
~~542-88-1 0.00015 0.017~~
~~Bis2-Chloro1methylethylether~~
~~108-60-1 200 B 4000~~
]Bis2-Chloroisopropy1Ether
39638-32-9 1,400 65,000
Bis2-EthylhexylPhthalate
117-81-7 0.32 B 0.[~~0~~]37 B
Butylbenzyl Phthalate
85-68-7 0.10[—] 0.10
2-Chloronaphthalene 91-58-7 800 1,000
Chrysene 218-01-9 0.0038 B 0.018 B
Dibenzoa,hAnthracene 53-70-3 [~~0.0038~~]0.00012 B[———]
[~~0.018~~]0.00013 B
1,2-Dichlorobenzene 95-50-1 1,000 3,000
1,3-Dichlorobenzene 541-73-1 7 10
1,4-Dichlorobenzene 106-46-7 300 900
3,3-Dichlorobenzidine
91-94-1 0.049 B[—] 0.15 B
Diethyl Phthalate 84[~~64~~]-66-2 600 600
Dimethyl Phthalate 131-11-3 2,000 2,000
Di-n-Butyl Phthalate 84-74-2 20 30
2,4-Dinitrotoluene 121-14-2 0.049 B[—] 1.7 B
Dinitrophenols 25550-58-7 10 1,000
1,2-Diphenylhydrazine
122-66-7 [~~0.036~~]0.03 B
[~~0.20~~]0.2 B
Fluoranthene 206-44-0 20 20
Fluorene 86-73-7 50 70
Hexachlorobenzene 118-74-1 0.000079 B 0.000079 B
Hexachlorobutadiene 87-68-3 0.01 B 0.01 B
Hexachloroethane 67-72-1 [~~1.4~~]0.1 B [~~3.3~~]0.1 B
Hexachlorocyclopentadiene
77-47-4 4 4
Ideno 1,2,3-cdPyrene
193-39-5 0.0012 B 0.0013 B
Isophorone 78-59-1 34 B 1,800 B

Nitrobenzene 98-95-3	10	600
N-Nitrosodiethylamine 55-18-5	0.0008 B	1.24 B
N-Nitrosodimethylamine 62-75-9	0.00069 B	3.0 B
N-Nitrosodi-n-Propylamine 621-64-7	0.0050 B[–]	0.51 B
N-Nitrosodiphenylamine 86-30-6	3.3 B	6.0 B
N-Nitrosopyrrolidine 930-55-2	0.016 B	34 B
Pentachlorobenzene 608-93-5	0.1	0.1
Pyrene 129-00-0	20	30
1,2,4-Trichlorobenzene 120-82-1	0.071 MCL[–]	0.076
Aldrin 309-00-2	0.00000077 B	0.00000077 B
alpha-BHC 319-84-6	0.00036 B	[~~0.000050~~]0.00039 B
beta-BHC 319-85-7	0.0080 B[–]	0.014 B
gamma-BHC (Lindane) 58-89-9	4.2 MCL	4.4
Hexachlorocyclohexane (HCH) Technical 608-73-1	0.0066	0.010
Chlordane 57-74-9	[~~0.00030~~]0.00031 B	0.00032 B
4,4-DDT 50-29-3	[~~0.000032~~]0.000030 B	0.000030 B
4,4-DDE 72-55-9	0.000018 B	0.000018 B
4,4-DDD 72-54-8	0.00012 B	0.00012 B
Dieldrin 60-57-1	0.0000012 B	0.0000012 B
alpha-Endosulfan 959-98-8	20	30
beta-Endosulfan 33213-65-9	20	40
Endosulfan Sulfate 1031-07-8	20	40
Endrin 72-20-8	0.03	[~~0.060~~]0.03
Endrin Aldehyde 7421-93-4	1	1
Heptachlor 76-44-8	0.0000059 B	0.0000059 B
Heptachlor Epoxide 1024-57-3	0.000032 B	0.000032 B
Methoxychlor 72-43-5	0.02 [~~MCL~~]___	0.02
Polychlorinated Biphenyls (PCBs) 1336-36-3	0.000064 B,D	0.000064 B,D
Toxaphene 8001-35-2	0.00070 B[–]	0.00071 B

Footnotes:

A. See Table 2.14.2

B. Based on carcinogenicity of 10-6 risk.

C. EPA has not calculated a human criterion for this contaminant. However, permit authorities should address this contaminant in NPDES permit actions using the State's existing narrative criteria for toxics

D. This standard applies to total PCBs.

KEY: water pollution, water quality standards
Date of Enactment or Last Substantive Amendment: July 2, 2018
Notice of Continuation: September 26, 2017-1317, 1329
Authorizing, and Implemented or Interpreted Law: 19-5; FWPCA 33 USC 1251, 1311

State of Utah

GARY R. HERBERT
Governor

SPENCER J. COX
Lieutenant Governor

Department of
Environmental Quality

Alan Matheson
Executive Director

DIVISION OF WATER QUALITY
Erica Brown Gaddis, PhD
Director

MEMORANDUM

TO: Water Quality Board

THROUGH: Erica Brown Gaddis, PhD

FROM: Sandy Wingert
Watershed Protection Section

DATE: January 23, 2019

SUBJECT: Preliminary Briefing of Total Maximum Daily Load Study for Spring Creek (Heber) Watershed

The Division of Water Quality is developing a Total Maximum Daily Load (TMDL) Study for the Spring Creek (Heber) watershed. This study is being conducted to address *E. coli* exceedances which resulted in the 303(d) listing of this waterbody in 2010. Staff will present an overview of the TMDL development strategy, analyses completed to date, and a timeline for completion to the Water Quality Board during the meeting scheduled for December 3, 2018.

Watershed Location

The Spring Creek watershed (Figure 1) is located within the Provo River drainage in Wasatch County. The Provo River watershed is a significant source of drinking water for the most populated areas within Utah. The Spring Creek watershed encompasses 20 mi^2 and is bordered by the Wasatch Mountains to the west and Uinta Mountains to the northeast. Spring Creek originates from several wet meadow springs located in Heber Valley area. Its flow is augmented by numerous stormwater and irrigation conveyance ditches and canals along with irrigation return flow. The natural Spring Creek channel flows back into Provo River, just upstream of Deer Creek Reservoir. However, this lower reach has been hydrologically modified to convey water for downstream users ultimately entering into Deer Creek Reservoir via Daniels Creek. Spring Creek watershed is predominantly private (99%) and irrigation practices compromise 61% of all the water-related land uses in the watershed.

Impairment

Spring Creek (UT16020203-027), from the confluence of the Provo River to headwaters, and all its tributaries are listed on Utah's 2010 Section 303(d) list of impaired waters for elevated concentrations of *E. coli* and not being protective of its beneficial uses of drinking water (1C) and infrequent primary contact recreation (2B). Total Phosphorous (TP) concentrations within Spring Creek are higher than the approved Deer Creek Reservoir TMDL TP target (0.03 mg/L). Spring Creek's implementation strategy will include efforts to reduce both *E. coli* and TP loading into the system.

Approach

Per requirements of Section 303(d) of the Clean Water Act (CWA) states assess water quality and identify impaired waters. The purpose of developing TMDLs for these impaired waters is to restore, protect, and maintain the quality of waters of the state for their designated beneficial uses. It is the Division of Water Quality's policy to develop plans and strategies through a locally led, collaborative process with the Provo River Watershed Council and other invested stakeholders.

TMDLs include a thorough assessment of defined beneficial uses and their associated water quality standards, a determination of the pollutant loading capacity of impaired waters, excess pollutant loads, significant sources of pollutant loading, and an allocation of pollutant loads to those sources. The pollutant loading evaluation includes both point and nonpoint sources in addition to defining a margin of safety to account for the analytical uncertainty associated with the development of the TMDL. Currently, there are no permitted point source discharges into Spring Creek however Jordanelle Special Service District (JSSD) will begin treating wastewater soon and will likely be issued a wasteload allocation (WLA). Heber City also discharges their unpermitted stormwater into Spring Creek.

E. coli, unlike other pollutants, are living organisms and can multiply and persist in soil and water environments. Use of watershed models for estimating relative loads would be difficult and generally uncertain given the intensive hydrological modifications within the drainage. Staff will use a simpler weight of evidence approach to determine likely sources of *E. coli* and relative loading. Such approaches are listed in Table 1. This data can then be used to determine appropriate pollutant loads and reductions necessary to protect Spring Creek's beneficial uses.

Following the analysis of water quality data a project implementation plan will be prepared that outlines strategies to decrease pollutants where feasible, attain water quality standards, and restore the river to full support status. The project implementation plan will also include an evaluation of existing best management practices and completed implementation projects in the watershed. The implementation plan will satisfy requirements for obtaining federal 319 funding and provide reasonable assurance that the non-point source load reductions identified in the TMDL will be achieved.

Table 1. Technical Approaches for Source Assessments

Source Assessment	Approach
General	Conduct intensive water quality monitoring
Humans/Animals	Conduct Microbial Source Tracking (MST)
Onsite Systems	Summarize nitrogen data
	Conduct optical brighteners testing
	Obtain onsite systems data & overlay data to impaired monitoring sites using ArcGIS
Background/Natural	Obtain wildlife density counts
	Monitor reference reaches
Livestock	Obtain livestock data
Urban stormwater runoff	Gather information about Heber City stormwater outfalls and management plan
	Monitor stormwater outfall during wet weather

Table 2. Technical Approaches for Wasteload and Load Allocations.

Source Allocation	Approach
General Bulk Allocations: determine when and where water quality violations occur	Conduct intensive water quality and flow monitoring
	Mass Balance Equations
	Load Duration Curves
NPS: Background/Natural	Summarize 90% *E. coli* loading from nearby reference reaches
	Compile wildlife densities & associated production rates to determine relative *E. coli* production/day (UDWR)
NPS: Livestock	Compile feedstock data & use production rates to determine relative *E. coli* production/day (NASS 2012)
NPS: Onsite Systems	Estimate *E. coli* loads based upon average number failing septic tanks and human E. coli production rates/day (EPA BIT Tool)
PS: Heber City Stormwater	Estimate *E. coli* loads based upon implemented BMPs
PS: JSSD Wastewater Treatment Facility	Incorporate *E. coli* standards from UPDES permit (Secondary Treatment Standards)

Schedule

UDWQ Staff and cooperators have collected water quality data throughout the Provo River watershed to support these studies for the past several years. Since 2017, staff has met with key local landowners and stakeholders to determine possible sources and direct future monitoring efforts including the Provo River Watershed Council which meets quarterly to discuss these efforts. The first official kick-off meeting was held in February 2018 where staff presented data summaries validating the listing and explained next steps including characterization of the watershed's hydrology and land uses and additional monitoring efforts.

January 2020 is goal date for submission to EPA for final approval.

February 5, 2018	Kickoff Stakeholder Meeting (PRWC)
December 3, 2018	Water Quality Board Introduction
May 30, 2019	Stakeholder meeting & Stakeholder Draft Due
June 13, 2019	Stakeholder comments due to DWQ
June 2019	Address stakeholder comments
July 2019	Stakeholder Meeting & begin 30-day public comment period
August 2019	End public comment period
September 18, 2019	Water Quality Board for preliminary approval & initiate rule-making
October 15 - Nov 15, 2019	30 day rulemaking process
December 2019	Water Quality Board for request for Formal Adoption into Rule
January 2020	Send to EPA for final approval

Figure 1. Spring Creek above Confluence Provo River at U113 Crossing.

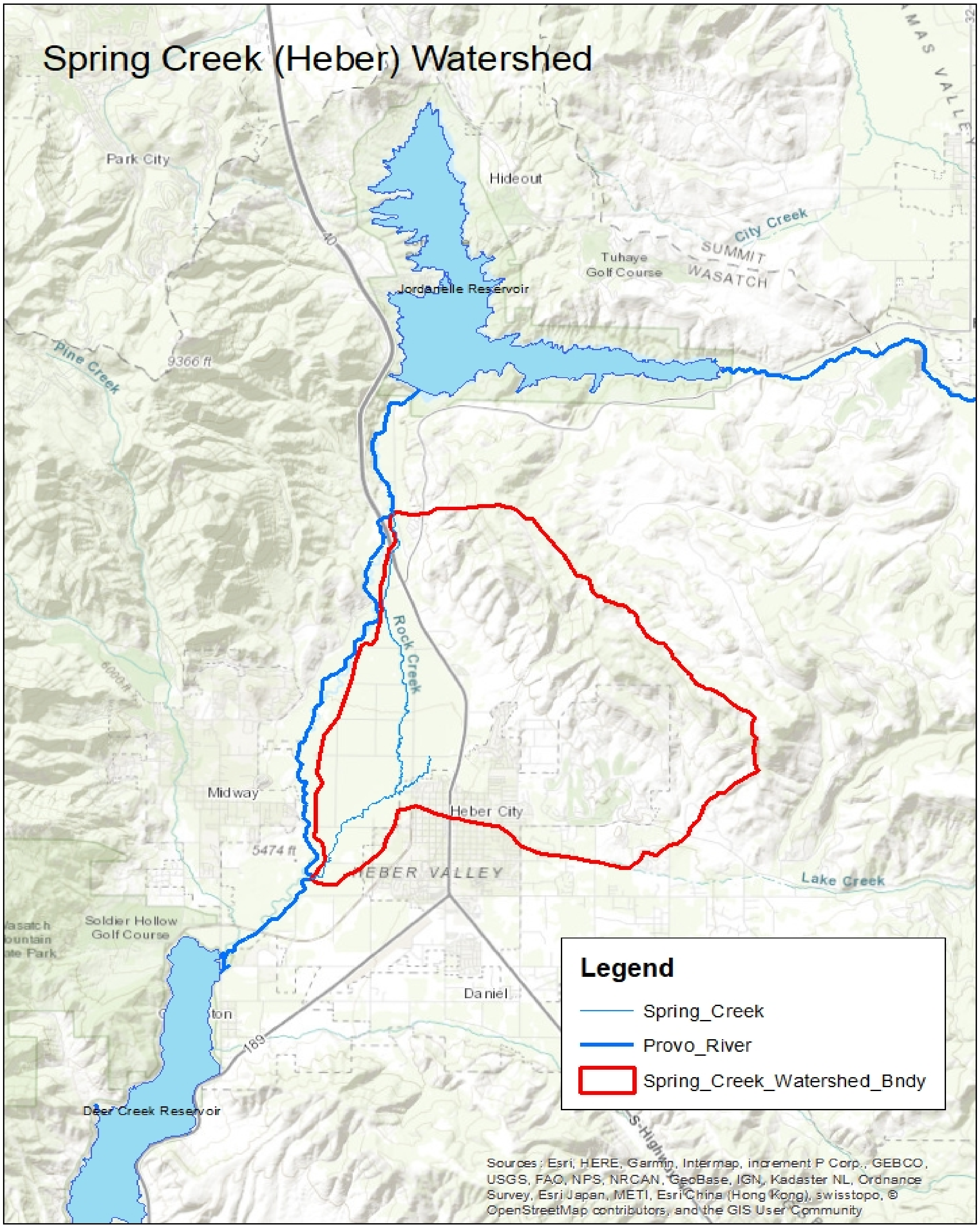


Figure 2. Location of Spring Creek (Heber) Watershed.

M E M O R A N D U M

TO: Utah Water Quality Board

FROM: Judy Etherington, DWQ, Wastewater Certification Program Coordinator

THROUGH: Erica Brown Gaddis, PhD, Director
John Mackey, P.E., Engineering Section Manager
Lenora Sullivan, Data and Information Services Section Manager

DATE: January 23, 2019

SUBJECT: Recommendations for Appointment to the Utah Wastewater Operator Certification Council for February 1, 2019 through January 31, 2022

As of January 31, 2019, the terms of three members of the Utah Wastewater Operator Certification Council expire. The members with expiring terms are Kerry Eppich, representing wastewater management; Gordon Evans, representing certified wastewater collection operators; and Giles Demke, representing certified wastewater treatment operators. Other current members of the Council include Paul Fulgham, Phil Harold, Brent Justensen, and Dr. Jennifer Weidhaas.

Recommendations for appointment to these positions were solicited from individuals and organizations in the wastewater sector and educational institutions. Individuals are appointed for a three-year term. Council members may be reappointed, but they do not automatically succeed themselves. The names recommended to the Board at this time are selected from written recommendations received by the Division of Water Quality prior to January 14, 2019.

At this time, it is recommended that ***Brian Lamar,*** who currently works at North Davis Sewer District and holds both Wastewater Treatment Grade IV and Collections Grade IV certifications, be appointed to fill a vacant position as a representative of "certified wastewater treatment operators." It is also recommended that ***Blaine Shipley***, currently employed by Price River Water Improvement District and holding both Wastewater Treatment Grade IV and Collections Grade IV certifications, be appointed to fill a vacant position representing "certified wastewater collection operators." It is recommended that ***Giles Demke***, manager of the Orem Water Reclamation Facility, certified as Wastewater Treatment Grade IV, who has recently served one term on the Council as a representative of wastewater treatment operators, be re-appointed to serve as representative of "municipal wastewater management."

DWQ-2019-000624