State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WATER QUALITY
John K. Mackey, P.E.
Director

Utah Water Quality Board Meeting
MASOB
195 North 1950 West
Board Room 1015 & Via Zoom
Salt Lake City, UT 84116

September 28, 2022
Board Meeting Begins at 8:30 am

AGENDA

Water Quality Board Meeting – Roll Call

A. Minutes:
Approval of Minutes for August 24, 2022 Water Quality Board Meeting ....WQ Board Member

B. Executive Secretary's Report .... John Mackey

C. Funding:
1. Financial Report .... Krystol Carfaro
2. Kanab City – Planning Advance .... Ken Hoffman & Beth Wondimu

D. Rulemaking
1. Request to Initiate Rulemaking: Proposed Amendments to Standards of Water Quality for the State, UAC R317-2 .. ..Jake VanderLaan & Ben Holcomb

E. Other
1. Nonpoint Source Program Annual Report & FY23 Nonpoint Source Projects...........................Paul Burnett

F. Public Comment Period

G. Meeting Adjournment

Next Meeting
October 26, 2022 at 8:30 am

DEQ Board Room 1015 & Via Zoom
195 North 1950 West
Salt Lake City, UT 84116

Revised 9/22/2022
DWQ-2022-027932

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.

Department of
Environmental Quality
Kimberly D. Shelley
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Director

MINUTES

UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
UTAH WATER QUALITY BOARD
MASOB
and
Via Zoom

August 24, 2022
8:30 am Meeting

UTAH WATER QUALITY BOARD MEMBERS PRESENT

Carly Castle	Joe Havasi
Steven Earley	Trevor Heaton
Brandon Gordon	Mike Luers
Michela Harris	

Excused: Kim Shelley, James Webb

DIVISION OF WATER QUALITY STAFF MEMBERS PRESENT

Kara Bard	Brenda Johnson
Paul Burnett	Glen Lischeske
Emily Cantón	Leanna Littler-Woolf
Krystol Carfaro	John Mackey
Eric Castrejon	George Meados
Skyler Davies	Dave Pierson
Amy Dickey	Jeanne Riley
Judy Etherington	Danny Ryan
Jodi Gardberg	Lonnie Shull
Dan Griffin	Jeff Studenka
Samantha Heusser	Jake VanderLaan
Elise Hinman	Sandy Wingert
Ken Hoffman	Beth Wondimu

OTHERS PRESENT

Soren Simonson	Jordan River Commission
Nando Melley	Town of Stockton
Ted Michelson	Jones & DeMille Engineering
Lynn Hardy	Elwood Town
Shane Taggart	Elwood Town
Trevor Brooksby	Dutch John Treatment Facility

OTHERS PRESENT (continued)

Jack Lytle	Daggett County
Aaron Averett	Sunrise Engineering
Bryan Meier	Sunrise Engineering
JD Maxwell	Long Valley SID
Thomas Griffin	Long Valley SID
James Saunders	Long Valley SID (Consulting Engineer)
Jeff Hall	Lewiston
Gary Vance	Lewiston (Consulting Engineer)
Brinlee Hall	Lewiston
Lisa Wells	Hanksville
Jeffren Pei	Hanksville
Daniel Hawley	Jones & DeMille Engineering
Barbara Bruno	Springdale
Rob Totten	Springdale
Rick Wixom	Springdale
Blaine Worrell	Sunrise Engineering
Justin Atkinson	Sunrise Engineering
Lyndsay Peterson	North Logan
Alan Luce	North Logan
Alex Buxton	North Logan
Jordan Oldham	North Logan
Zac Root	North Logan
Lance Anderson	North Logan (Consulting Engineer)
John Niles	Delta City
Kiley Chase	Delta City
Dent Kirkland	Delta City
Robert Worley	Sunrise Engineering
Phil Heck	Central Valley
Justin Zollinger	Central Valley
Haley Sousa	AG's Office
Justine Marshall	Vineyard
Marian Rice	SLC Department of Public Utilities
Beau Stander	Big West Oil
Devan Shields	Sunrise Engineering
James Saunders	Jones & DeMille Engineering
Michael Petersen	
Thomas (Paul) Griffiths	

Mr. Earley called the Meeting to order at 9:30 AM.

ROLL CALL

Mr. Earley took roll call for the members of the Board.

APPROVAL OF MINUTES OF JUNE 22, 2022 BOARD MEETING
Motion: Mr. Luers moved to approve the minutes of the June 22, 2022 Board meeting.

Mr. Havasi seconded the motion. The motion passed unanimously.

EXECUTIVE SECRETARY REPORT
Mr. Mackey addressed the Board regarding the following.

Regional
- 50th Anniversary of the Clean Water Act

Water Quality Division
- Water Quality American Rescue Plan Act (ARPA)
- Jordan River TMDL Rulemaking
- Format Change for Financial Status Report

Water Quality Board
- Brandon Gordon Resignation
- Calvin K. Sudweeks Award Nomination Announcement

FUNDING REQUESTS
Financial Report: Ms. Carfaro updated the Water Quality Board on the Loan Funds and Hardship Grant Funds as indicated in the packet.

Initiate Rulemaking for the Jordan River Watershed *E. coli* Total Maximum Daily Load (TMDL): Ms. Wingert presented the board with a Request to Initiate Rulemaking to adopt TMDL by reference into R317-1-7.

Motion: Mr. Heaton moved to approve the Request to Initiate Rulemaking to adopt TMDL by reference into R317-1-7.

Mr. Havasi seconded the motion. The motion passed unanimously.

Town of Stockton Planning Advance: Mr. Pompeo presented the Water Quality Board with a request for a Hardship Planning Advance in the amount of $20,000 to pay for a Capital Facilities Plan which will review the existing sewer collection and treatment facilities and the impact of future growth on these facilities.

Motion: Ms. Harris moved to approve the amended request to authorize a Hardship Planning *Grant* of $20,000 to the Town of Stockton with the following special conditions:

1. **The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.**
2. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
3. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**
4. **Impact Fee Analysis.**

Mr. Heaton seconded the motion. The motion passed unanimously.

Town of Elwood Planning Advance: Mr. Hoffman presented the Board with a request to authorize a Hardship Planning Advance in the amount of $18,200 to evaluate expanding the sewer system to provide service to the part of town on the south side of Interstate 15.

Motion: Mr. Luers moved to approve the staff recommendation to authorize a Hardship Planning Grant of $18,200 to the Town of Elwood with the following special conditions:

1. **The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.**
2. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
3. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**

Ms. Castle seconded the motion. The motion passed unanimously.

Dutch John (Daggett County) Planning Advance and Project Funding: Mr. Lischeske presented the Board with a request to authorize a Hardship Planning Grant of $95,000 and a Short-Term Loan in the amount of $60,000 at an interest rate of 0% repayable over 5 years.

Motion 1: Mr. Luers moved to approve the staff recommendation to authorize a Hardship Planning Grant of $95,000 to Daggett County with the following special conditions:

1. **The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.**
2. **Dutch John shall develop an asset management plan and implement appropriate planning and rates based on that plan.**
3. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
4. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**
5. **Impact Fee Analysis.**

Mr. Heaton seconded the motion. The motion passed unanimously.

Motion 2: Mr. Heaton moved to approve the request to authorize a short-term loan in the amount of $60,000 at an interest rate of 0% repayable over 5 years to Daggett County with the following special conditions:

1. **The loan will be repaid in five annual installments beginning one year from the date the loan is fully disbursed or the project is otherwise completed.**
2. **Daggett County shall commit to adopt a capital asset management plan.**
3. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
4. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**

Mr. Gordon seconded the motion. The motion passed unanimously.

Long Valley Sewer Improvement District (SID): Mr. Pompeo presented the Board with a request to authorize a Hardship Design Advance in the amount of $84,300 to Long Valley SID.

Motion: Mr. Havasi moved to approve the staff recommendation to authorize a Hardship Design Advance in the amount of $84,300 to Long Valley SID with the following special conditions:

1. **The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.**
2. **The Design Advance must be expeditiously repaid to the Board once long-term project financing has been secured.**
3. **Long Valley must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
4. **As part of the facility planning, Long Valley must complete a Water Conservation and Management Plan.**

Ms. Harris seconded the motion. The motion passed unanimously.

Lewiston City Additional Project Funding Introduction: Mr. Hoffman introduced a request for additional funding of $2,144,000 to pay for cost growth on their construction project. This will bring the total financing for the project to $5.3 million. Staff recommendations will be provided at the request for funding authorization at a future Board meeting.

Town of Hanksville Design Advance and Project Funding: Mr. Meados presented the Board with a request to authorize a Hardship Design Advance in the amount $162,000.

Motion: Mr. Luers moved to approve the staff recommendation to authorize a Hardship Design Advance in the amount of $162,000 to the Town of Hanksville with the following special conditions:

1. **The Division of Water Quality must approve the engineering agreement and plan of study before the advance will be executed.**
2. **The Design Advance must be expeditiously repaid to the Board once long-term project financing has been secured.**
3. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
4. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**

Mr. Heaton seconded the motion. The motion passed unanimously.

Town of Springdale Project Funding Introduction: Mr. Hoffman introduced a request for financial assistance in the amount of a $3,978,000 for lagoon treatment system improvement of a wastewater lagoon treatment facility plant. Staff recommendations will be provided at the request for funding authorization at a future Board meeting.

North Logan City Project Funding Introduction: Mr. Lischeske introduced a request for funding in the amount of $10,550,000 for the construction of a new gravity sewer trunk line leading to Logan City. This is an introduction and a recommendation will not be made at this time and will be provided at the request for funding authorization at a future Board meeting.

Delta City Planning and Design Advance and Project Funding: Mr. Meados introduced a funding request in the amount of $16,852,000 to upgrade a sewer lift station and piping by slip line and open cut installation. In addition, Delta City is requesting a design advance in the amount of $400,000.

Motion: **Mr. Heaton moved to approve the staff recommendation to authorize a Hardship Design Grant in the amount $200,000 and a Short-Term Loan in the amount of $200,000 at an interest rate of 0% repayable over 5 years to Delta City with the following special conditions:**

1. **The Division of Water Quality must approve the engineering agreement and plan of design before the advance will be executed.**
2. **The loan will be repaid in five annual installments beginning one year from the date the loan is fully disbursed or the project is otherwise completed.**
3. **The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).**
4. **As part of the facility planning, the City must complete a Water Conservation and Management Plan.**

Mr. Havasi seconded the motion. The motion passed unanimously.

Central Valley Water Reclamation Facility Additional Project Funding Introduction: Mr. Davies presented the Board with a request for additional financial assistance in the amount of a $33,200,000 loan for the upgrade of its Water Reclamation Facility. Staff recommendations will be provided at the request for funding authorization at a future Board meeting.

PUBLIC COMMENTS

There were no public comments.

MEETING ADJOURNMENT

Motion: **Mr. Gordon moved to adjourn the meeting.**

Ms. Harris seconded the motion. The motion passed unanimously.

To view the full recording of the Water Quality Board meeting.
https://deq.utah.gov/boards/utah-water-quality-board-meetings

Next Meeting –September 28, 2022
Meeting begins at 8:30 am

In-Person
MASOB
195 North 1950 West
Board Room 1015
Salt Lake City, UT 84116

Via Zoom
https://us02web.zoom.us/j/7074990271

Steven Earley, Chair
Utah Water Quality Board

DWQ-2022-026894

LOAN FUNDS FINANCIAL STATUS REPORT SEPTEMBER 2022

STATE REVOLVING FUND (SRF)	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025	State Fiscal Year 2026	State Fiscal Year 2027	State Fiscal Year 2028
CAP Grant Base Program						
Capitalization Grants Awards (FY22)	$ 6,096,000					
Future Capitalization Grant (estimated)		$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000	$ 6,000,000
State Cap Grant Match (FY22)	$ 1,219,200	$ -	$ -	$ -	$ -	
Future State Cap Grant Match (estimated)		$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000	$ 1,200,000
CAP Grant General Supplemental						
General Supplemental Grants	$ 9,378,000					
Future General Supplemental Grant (estimated)		$ 10,294,350	$ 11,234,025	$ 12,169,025	$ 12,169,025	
State General Supplemental Grants Match	$ 937,800					
Future State Gen. Sup Grants Match (estimated)		$ 1,029,435	$ 2,246,805	$ 2,433,805	$ 2,433,805	
SRF - 2nd Round						
Account Balance	$ 39,411,663	$ (5,262,231)	$ (2,501,078)	$ 17,318,674	$ 52,025,962	$ 85,816,124.96
Interest Earnings at 0.4676%	$ 139,649	$ (22,375)	$ (10,635)	$ 73,639	$ 221,214	$ 364,890
Loan Repayments (5255)	$ 10,060,741	$ 20,400,749	$ 20,164,590	$ 20,165,402	$ 18,728,941	$ 22,461,849
Total Funds Available	$ 67,243,053	$ 33,639,927	$ 38,333,707	$ 59,360,545	$ 92,778,947	$ 115,842,864
CWSRF Program Obligations						
Admin Expenses 4% of all CAP Grant Awards	$ (638,680)	$ (696,774)	$ (734,361)	$ (771,761)	$ (400,000)	$ (400,000)
Cap Grant Principal Forgiveness (PF) (FY18-22)	$ (13,534,600)					
Future Cap Grant (PF portion)		$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)	$ (600,000)
General Supplemental Grants (PF portion)	$ (4,595,220)					
Future General Supplemental Grants (PF portion)		$ (5,044,232)	$ (5,504,672)	$ (5,962,822)	$ (5,962,822)	
OSG Cost Share Balances (FY20-21)	$ (80,784)					
Project Obligations						
Central Valley Water Reclamation Facility	$ (12,100,000)	$ -	$ -	$ -	$ -	$ -
Moab City	$ (80,000)	$ -	$ -	$ -	$ -	$ -
Provo City	$ (27,045,000)	$ (16,800,000)	$ -	$ -	$ -	$ -
South Salt Lake City (A)	$ (524,000)	$ -	$ -	$ -	$ -	$ -
Millville City Loan	$ (5,146,000)	$ -	$ -	$ -	$ -	$ -
Mountain Green	$ (5,500,000)	$ (1,500,000)	$ -	$ -	$ -	$ -
Payson City	$ (2,000,000)	$ (11,500,000)	$ -	$ -	$ -	$ -
Loan Authorizations						
South Davis Sewer District (with NPS)			$ (14,176,000)	$ -	$ -	$ -
Millville Refinance Loan	$ (1,261,000)	$ -	$ -	$ -	$ -	$ -
Planned Projects						
Long Valley		$ -	$ -	$ -	$ -	$ -
North Logan		$ -	$ -	$ -	$ -	$ -
		$ -	$ -	$ -	$ -	$ -
CWSRF Obligations	$ (72,505,284.00)	$ (36,141,005.50)	$ (21,015,033.25)	$ (7,334,583.25)	$ (6,962,822.25)	$ (1,000,000.00)
CWSRF Remaining Loan Balance	$ (5,262,231.31)	$ (2,501,078.20)	$ 17,318,673.93	$ 52,025,961.90	$ 85,816,124.96	$ 114,842,864.12

*WQB Agenda Items

LOAN FUNDS FINANCIAL STATUS REPORT SEPTEMBER 2022

Add. Sub. - Principal Forgiveness						
PF Balances (max for FY18-22)	$ 13,534,600	$ 3,015,820	$ 4,660,052	$ 10,764,724	$ 17,327,546	$ 23,890,368.25
Future Cap Grant (PF portion)	$ -	$ 600,000	$ 600,000	$ 600,000	$ 600,000	$ 600,000
General Supplemental Balances (PF portion)	$ 4,595,220					
Future General Supplemental Grants (PF portion)		$ 5,044,232	$ 5,504,672	$ 5,962,822	$ 5,962,822	
Project Obligations						
South Salt Lake City (A)	$ (2,000,000)					
Millville City	$ (3,604,000)					
Provo City	$ (4,000,000)	$ (3,000,000)				
Payson City		$ (1,000,000)				
Add. Sub. Authorizations						
Millville City Refinance	$ (3,750,000)					
South Salt Lake Increase	$ (1,760,000)					
Planned Projects						
Lewiston						
Hanksville						
Principal Forgiveness Remaining Balance	$ 3,015,820.00	$ 4,660,051.50	$ 10,764,723.75	$ 17,327,546.00	$ 23,890,368.25	$ 24,490,368.25

UTAH WASTEWATER LOAN FUND (UWLF)	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025	State Fiscal Year 2026	State Fiscal Year 2027	State Fiscal Year 2028
Funds Available						
UWLF	$ 26,611,697	$ 15,602,351	$ 17,367,207	$ 18,249,137	$ 18,791,185	$ 18,948,221
Sales Tax Revenue	$ 1,468,266	$ 3,587,500	$ 3,587,500	$ 3,587,500	$ 3,587,500	$ 3,587,500
Loan Repayments (5260)	$ 2,000,988	$ 2,473,791	$ 2,808,235	$ 2,655,353	$ 2,270,341	$ 2,298,785
Total Funds Available	$ 30,080,951	$ 21,663,642	$ 23,762,942	$ 24,491,990	$ 24,649,026	$ 24,834,506
General Obligations						
State Match Transfers Base Cap Grant	$ (1,219,200)	$ (1,200,000)	$ (1,200,000)	$ (1,200,000)	$ (1,200,000)	$ (1,200,000)
State Match Transfers Gen. Supplemental Grant	$ (937,800)	$ -	$ -	$ -	$ -	
State Match Transfers Gen. Supplemental Grant (est)		$ (1,029,435)	$ (2,246,805)	$ (2,433,805)	$ (2,433,805)	
State Match Reserve for Historic Cap Grant Values		$ (368,400)	$ (368,400)	$ (368,400)	$ (368,400)	$ (368,400)
DWQ Administrative Expenses	$ (1,698,600)	$ (1,698,600)	$ (1,698,600)	$ (1,698,600)	$ (1,698,600)	$ (1,698,600)
Project Obligations						
South Salt Lake City (B)	$ (4,891,000)	$ -	$ -	$ -	$ -	$ -
Loan Authorizations						
Spanish Fork	$ (4,500,000)	$ -	$ -	$ -	$ -	$ -
South Salt Lake City	$ (1,032,000)	$ -	$ -	$ -	$ -	$ -
Delta	$ (200,000)					
Planned Projects						
Hanksville		$ -	$ -	$ -	$ -	$ -
Long Valley						
Springdale						
Lewiston						
Total Obligations	$ (14,478,600)	$ (4,296,435)	$ (5,513,805)	$ (5,700,805)	$ (5,700,805)	$ (3,267,000)
UWLF Remaining Loan Balance	$ 15,602,351	$ 17,367,207	$ 18,249,137	$ 18,791,185	$ 18,948,221	$ 21,567,506

*WQB Agenda Items

LOAN FUNDS FINANCIAL STATUS REPORT SEPTEMBER 2022

TOTAL LOAN FUND BALANCE	$ 13,355,940	$ 19,526,180	$ 46,332,534	$ 88,144,693	$ 128,654,715	$ 160,900,739
PROJECT RESERVE		$ (5,000,000)	$ (10,000,000)	$ (15,000,000)	$ (20,000,000)	$ (25,000,000)
TOTAL AVAILABLE LOAN FUNDS	$ 13,355,940	$ 14,526,180	$ 36,332,534	$ 73,144,693	$ 108,654,715	$ 135,900,739

*WQB Agenda Items

HARDSHIP GRANT FUNDS FINANCIAL STATUS REPORT SEPTEMBER 2022

HARDSHIP GRANT FUNDS (HGF)	State Fiscal Year 2023	State Fiscal Year 2024	State Fiscal Year 2025	State Fiscal Year 2026	State Fiscal Year 2027	State Fiscal Year 2028
Funds Available						
Beginning Balance		$ 1,206,105.41	$ 1,550,731.91	$ 1,806,774.17	$ 1,971,035.06	$ 2,039,707.58
Federal HGF Beginning Balance (5250)	$ 3,735,743.47	$ -	$ -	$ -	$ -	$ -
State HGF Beginning Balance (5265)	$ 2,837,932.12	$ -	$ -	$ -	$ -	$ -
Interest Earnings at 0.4676%	$ 25,615.42	$ 5,128.36	$ 6,593.71	$ 7,682.40	$ 8,380.84	$ 8,672.84
UWLF Interest Earnings at 0.4676%	$ 103,696.91	$ 72,956.59	$ 81,209.06	$ 85,332.96	$ 87,867.58	$ 88,601.88
Hardship Grant Assessments (5255)	$ 358,256.46	$ 969,300.26	$ 892,768.58	$ 817,302.44	$ 739,827.47	$ 684,801.94
Interest Payments - (5260)	$ 215,414.08	$ 297,241.29	$ 275,470.91	$ 253,943.08	$ 232,596.63	$ 216,154.35
Advance Repayments	$ -	$ -	$ -	$ -	$ -	$ -
Total Funds Available	$ 7,276,658.47	$ 2,550,731.91	$ 2,806,774.17	$ 2,971,035.06	$ 3,039,707.58	$ 3,037,938.59
Financial Assistance Project Obligations						
Big Water Planning Grant	$ (52,500.00)					
Delta Design-Grant	$ (200,000.00)					
Dutch John-Planning	$ (95,000.00)					
Dutch John-HGF Loan	$ (60,000.00)					
Eagle Mountain City - Construction Grant	$ (510,000.00)	$ -	$ -	$ -	$ -	$ -
Elwood-Planning	$ (18,200.00)					
Hanksville-Design	$ (162,000.00)					
Hinckley Hardship Planning Grant	$ (15,000.00)	$ -	$ -	$ -	$ -	$ -
Lewiston City - Design and Construction	$ (274,000.00)	$ -	$ -	$ -	$ -	$ -
Long Valley-Design	$ (103,700.00)					
Millville City - Design and Construction	$ (1,000,000.00)	$ -	$ -	$ -	$ -	$ -
Mount Pleasant Planning Advance	$ (50,000.00)	$ -	$ -	$ -	$ -	$ -
Spanish Fork - Hardship Grant	$ (500,000.00)	$ -	$ -	$ -	$ -	$ -
Stockton-Planning	$ (20,000.00)					
Non-Point Source/Hardship Grant Obligations						
McKees ARDL interest-rate buy down	$ (55,261.00)	$ -	$ -	$ -	$ -	$ -
Munk Dairy ARDL interest-rate buy down	$ (16,017.00)	$ -	$ -	$ -	$ -	$ -
(FY12) Utah Department of Agriculture	$ (172,269.95)	$ -	$ -	$ -	$ -	$ -
(FY15) DEQ - Ammonia Criteria Study	$ (27,242.43)	$ -	$ -	$ -	$ -	$ -
(FY17) DEQ - Utah Lake Water Quality Study	$ (348,300.75)	$ -	$ -	$ -	$ -	$ -
(FY23) DEQ Davis County Health Department	$ (105,313.00)	$ -	$ -	$ -	$ -	$ -
USU - Historic Trophic State/Nutrient Concentrations Paleo	$ (77,867.75)	$ -	$ -	$ -	$ -	$ -
FY 2018 - Remaining Payments	$ (7,100.00)	$ -	$ -	$ -	$ -	$ -
FY 2019 - Remaining Payments	$ (88,688.36)	$ -	$ -	$ -	$ -	$ -
FY 2020 - Remaining Payments	$ (230,867.22)	$ -	$ -	$ -	$ -	$ -
FY 2021 - Remaining Payments	$ (147,078.69)	$ -	$ -	$ -	$ -	$ -
FY 2022 - Remaining Payments	$ (707,543.20)	$ -	$ -	$ -	$ -	$ -
FY2023 - Remaining Payments	$ (996,803.71)					
Future NPS Annual Allocations		$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)
Planned Projects						
Kanab City Planning Advance	$ (29,800.00)					
Total Obligations	$ (6,070,553.06)	$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)	$ (1,000,000.00)
HGF Unobligated Funds	$ 1,206,105.41	$ 1,550,731.91	$ 1,806,774.17	$ 1,971,035.06	$ 2,039,707.58	$ 2,037,938.59

*WQB Agenda Items

State of Utah
Wastewater Project Assistance Program
Project Priority List

As of August 10, 2022

Rank	Project Name	Funding Authorized	Total Points	Point Categories			
				Project Need	Potential Improvement	Population Affected	Special Consideration
1	South Salt Lake City (CVWRF)	X	143	50	23	10	60
	Central Valley (CVWRF)	R	143	50	23	10	60
2	South Davis Sewer District	X	138	50	18	10	60
3	Springdale		119	40	18	1	60
4	Spanish Fork Water Reclamation Facility	X	117	50	19	8	40
5	North Logan		86	25	14	7	40
6	Hanksville		76	50	5	1	20
7	Lewiston City	R	66	10	14	2	40
8	Dutch John (Dagget County)		28	10	17	1	0
9	Delta		24	0	0	4	20
10	Long Valley SID		11	10	0	1	0

X - funding authorized; R - Additional Funding Requested; 0 - Funding Not Yet Authorized

State of Utah
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Department of
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DIVISION OF WATER QUALITY
John K. Mackey, P.E.
Director

WATER QUALITY BOARD
REQUEST FOR HARDSHIP PLANNING ADVANCE FOR WASTEWATER CAPITAL FACILITIES PLAN

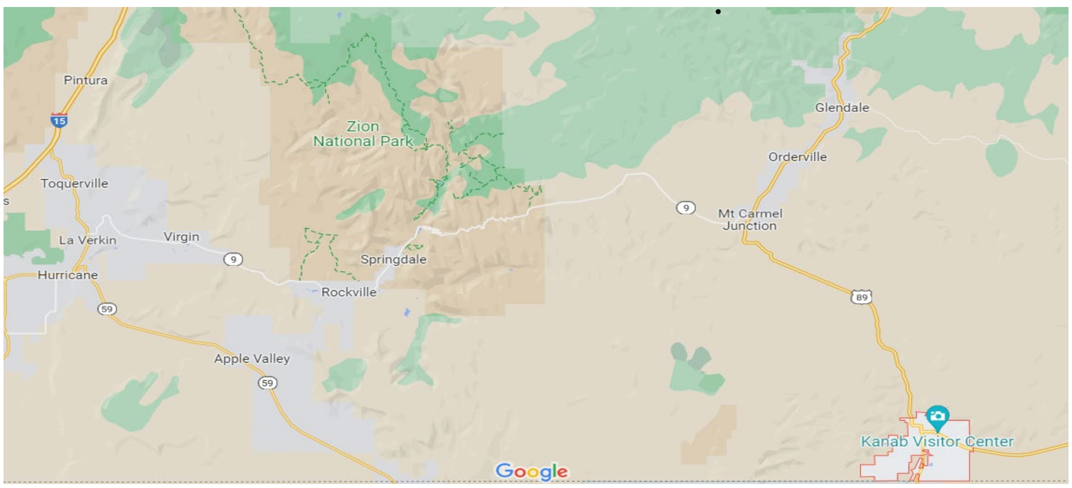
APPLICANT:	Kanab City 26 North 100 East Kanab Utah 84741 Phone: (435)-644-2534
PRESIDING OFFICIAL	Kyler Ludwig, City Manager 26 North 100 East Kanab Utah 84741 Phone: (435)-644-2534
CONTACT:	Kyler Ludwig, City Manager 26 North 100 East Kanab Utah 84741 Phone: (435)-644-2534
TREASURER:	Katherine Ohlwiler, City Treasurer 118 Lion 26 26 North 100 East Kanab Utah 84741 Phone: (435)-644-2534
CONSULTING ENGINEER:	Kelvin C. Smith, P.E., Project Engineer Civil Science Infrastructure Address: 1453 S Dixie Drive Suite 150 St George Utah 84770 Phone: (435)-986-0100
BOND COUNSEL:	Mark Anderson, Vice President Zions Public Finance One South Main Street 18th Floor Salt Lake City Utah 84133 Phone: (801)-844-7377

APPLICANT'S REQUEST

Kanab City is requesting a hardship planning advance in the amount of $29,800 to prepare a feasibility study that will allow them to evaluate the wastewater collection alternatives to handle the Ranchos neighborhood, west of Kanab Creek.

APPLICANT'S LOCATION

Kanab City is located in Kane County, Utah on Highway 89 south of Mt. Carmel Junction.



PROJECT NEED

Kanab City is divided into east and west areas by Kanab Creek. There are three road crossings, and two sewer pipe crossings of Kanab Creek. The neighborhood on the west side is known as Kanab Creek Ranchos Subdivision. There are two sewer mains in the Ranchos: one for the new Creekside Subdivision and the other for the still-under-construction Kanab Elementary school. All other residences are served by septic systems. About 80% of the residences are on properties that are smaller than half an acre, usually 10,000 sf. Septic systems may not be feasible for future residential development on the typically smaller lots. A new gravity sewer collection system will mitigate some of the public health concerns with existing lot sizes.

The current population is estimated at approximately 1,021 persons or approximately 807 homes in the Ranchos neighborhood. The city intends to construct the system at Ranchos in multiple phases and analyze feasible designs for the entity system. The Kanab Wastewater Impact Fee Facilities Plan & Analysis was completed in April 2018.

PROJECT DESCRIPTION:

A Preliminary Engineering Report (PER) is needed for the Kanab West area (Ranchos neighborhood) so the best option for a gravity sewer system is designed. There are topographic features that make simply following the existing roadways difficult for a gravity sewer system. Alternatives for gravity sewer routes and pressurized sewer need to be modeled to verify the best design option for the proposed system. The proposed pipe sizes will need to be analyzed further so any future development will have sufficient capacity in the proposed system. Once these different sewer system options are modeled, they will be evaluated based on effectiveness, costs, maintenance, scheduling, etc. and a preferred option will be expanded to include a preliminary sewer pipe system design in CAD to verify slopes and potential utility conflicts.

IMPLEMENTATION SCHEDULE

The estimated completion of the study is December 31, 2022**.**

COST ESTIMATE

The estimated cost for the capital improvement plan is $29,800. These includes:

- Project Management - Setup, Invoicing, Tracking, Reporting, etc.$600
- Sewer Model Data Update $300
- Proposed Sewer Model and pipe sizing $2,400
- Financial Analysis $2,200
- Create Alternatives and descriptions $3,000
- Preliminary Project Design $2,800
- Project Alternative Figures $2,600
- Cost Analysis $3,300
- Write PER $10,400
- Address Comments $2,200

STAFF COMMENTS

The planning advance would allow the City to study and evaluate wastewater collection system alternatives in the unsewered Ranchos neighborhood area. Staff strongly supports projects to address unsewered urban areas. Staff further understands this is challenging as the project will not benefit Kanab City's current utility customers. Finally, the City is concerned this unsewered area now poses an increased risk to public health.

This planning advance could be authorized as a short-term loan to be repaid over 5 years, a planning advance to be repaid expeditiously once long-term project financing has been secured, or a planning grant. Staff recommends the board authorize this project as an advance to be repaid but with provision to convert the advanced amount under the conditions of Special Condition #3 below.

STAFF RECOMMENDATION

Staff recommends the Board authorize a hardship planning advance of $29,800 to the Kanab City under the following special conditions:

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

2. The Planning Advance must be expeditiously repaid to the Board once long-term project

financing has been secured from the Board.

3. If the City does not return to the Board for project funding, the Planning Advance may be forgiven by staff as a grant if any of the following conditions are met:
   a. The project is fully funded by another agency, fully funded privately, or fully funded from a combination of another agency and private funding.
   b. If no project is funded after five years.

4. The City must agree to participate annually in the Municipal Wastewater Planning Program (MWPP).

5. As part of the facility planning, the City must complete a Water Conservation and Management Plan.

DWQ-2022-027594

State of Utah

SPENCER J. COX
Governor

DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality

Kimberly D. Shelley
Executive Director

DIVISION OF WATER QUALITY
John K. Mackey, P.E.
Director

MEMORANDUM

TO: Utah Water Quality Board

FROM: Jake Vander Laan

DATE: September 28, 2022

SUBJECT: 1. Request to initiate rulemaking: Proposed amendments to standards of water quality for the state, UAC R317-2.
2. Invitation for board member to serve as hearing officer for rulemaking.

Background

By statute, the Board has the authority to amend Utah's water quality standards through the rulemaking process. Staff is requesting Board approval to initiate the rulemaking process to make five updates to Utah's water quality standards:

1. Compliance schedule authorization
2. Extension of 1C drinking water use on the Provo River
3. Jordan River site-specific dissolved oxygen criteria clarification
4. Aluminum criteria update
5. Site-specific ammonia criteria for lower Jordan River and State Canal, Salt Lake and Davis County

Upon Board approval, staff will file the proposed amendments with the Division of Administrative Rules, notify the public and government officials, schedule a hearing, incorporate comments from the public and other interested parties, and finally, return to the Board with recommendations for adoption.

The public hearing is tentatively scheduled for Thursday, December 15, 2022 from 6:00 until at least 7:00 P.M at the DEQ Board room. Arrangements will be made to simultaneously provide the hearing virtually. A Board member is invited to volunteer to serve as hearing officer. Staff will be present to provide administrative support and guidance for the hearing. Alternatively, the Board may designate staff to serve as the hearing officer. In either case, the Board will be apprised of all comments received.

Anticipated Finalization Timeline:

September 28, 2022: Petition Water Quality Board to initiate rulemaking for changes to R317-2

November 1-December 15, 2022: Public notice, comment period, and hearing

January 25, 2023: Petition Water Quality Board for formal adoption of standards into R317-2

Proposed amendments

Compliance schedule authorization

Under current permitting processes, the Division of Water Quality issues Utah Pollution Discharge Elimination System (UDPES) permits with compliance schedules as authorized in R317-8. This proposed change adds a provision to R317-2-7.1 that clarifies the Director's authority to issue compliance schedules for permitted discharges. Below are the proposed additions shown in green underlined font.

R317-2-7 changes

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 or as authorized by schedules of compliance. The Director has authority to issue schedules of compliance for dischargers to meet UPDES water quality-based effluent limits.

Extension of 1C drinking water use on the Provo River

The Utah Division of Drinking Water and Provo City have requested the addition of a 1C drinking water designated use to a segment of the Provo River to support a drinking water diversion. The proposed diversion is located at a latitude and longitude of approximately 40.263817°, -111.66385°, north of where 2230 North St crosses the Provo River. The diversion is expected to be used for potable water through either the construction of a new drinking water treatment facility or after pumping and storage in a drinking water aquifer. Existing data in the waterbody collected by DWQ and Provo City indicate that the source is suitable for a drinking water intake.

This proposed change to Utah's water quality standards extends the existing 1C drinking water use on the Provo River's upper portions to a lower portion of the Provo River and its tributaries from the proposed diversion (2230 North St) upstream to the headwaters. DWQ agrees with the proposal and the revised rule follows with the deletions shown in red strikeout font and the proposed additions shown in green underlined font.

R317-2-7 changes

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

13.5 Utah Lake-Jordan River Basin
b. Provo River Drainage

b. Provo River Drainage

TABLE

Provo River and tributaries, from Utah Lake to ~~Murdock Diversion~~ Provo City Diversion (2230 North St)	2B 3A	4
Provo River and tributaries, from Provo City Diversion (2230 North St) ~~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	

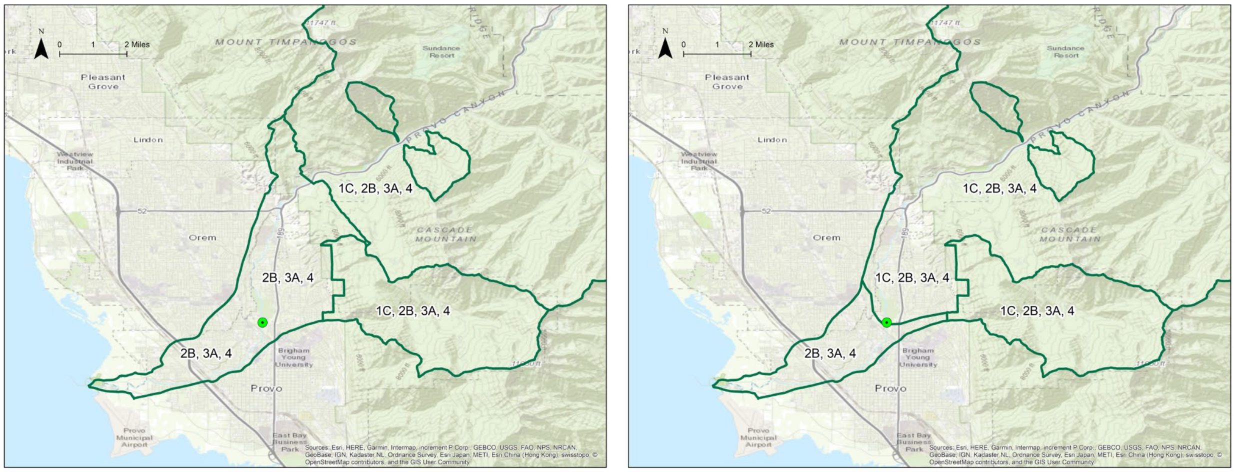


Figure 1. Existing beneficial use designations (left) and proposed extension of 1C drinking water use on the Provo River (right). The green circle marker indicates the location of the proposed drinking water diversion.

Jordan River site-specific dissolved oxygen criteria clarification

The Jordan River has site-specific dissolved oxygen criteria to protect the aquatic life uses. Pre-2018, the specific segments were identified with a table note in R317-2-13.5.a that referred to the criteria in Table 2.14.5. The site-specific dissolved oxygen criteria apply to the following segments of the Jordan River:

- Jordan River, from Farmington Bay to North Temple Street, Salt Lake City;
- Jordan River, from North Temple Street in Salt Lake City to confluence with Little Cottonwood Creek;

In a 2018 rule change adopted by the Water Quality Board, additional asterisks were added to R317-2-13 to identify all segments with site-specific criteria. As part of these changes, the table note specifically identifying the dissolved oxygen criteria in Table 2.14.5 was deleted and replaced with a generic note that "site-specific criteria are associated with this use" (see highlighted text in excerpt from March 1, 2018 Utah Bulletin below).

To clearly identify the specific segments of the Jordan River where the site-specific dissolved oxygen criteria apply, the underlined description will be added to Table 2.14.5 as shown in the following. The reference to Section 2.13 is not needed and will be deleted.

TABLE 2.14.5
SITE SPECIFIC CRITERIA FOR DISSOLVED OXYGEN
FOR JORDAN RIVER FROM FARMINGTON BAY TO CONFLUENCE WITH LITTLE COTTONWOOD CREEK, 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

Aluminum criteria update

In 2018, the EPA issued updated criteria for aluminum for the protection of aquatic life (epa.gov/wqc/2018-final-aquatic-life-criteria-aluminum-freshwater). The Utah Division of Water Quality (DWQ) recommends that the Utah Water Quality Board update Utah's standards consistent with the EPA recommendations. The recommended updated criteria are implemented as total recoverable aluminum, the same as Utah's existing criteria. Similar to Utah's current criteria, pH and water hardness affect the updated recommended criteria and a new parameter, dissolved organic carbon, also affects the recommended criteria. The new model for calculating aluminum toxicity is much more accurate than Utah's current criteria for predicting when aluminum will be toxic.

The recommended criteria are generally anticipated to be less stringent than Utah's existing criteria because of the typical pH, hardness, and anticipated dissolved organic carbon concentrations of most of Utah's surface waters. In the absence of measured dissolved organic carbon concentrations, DWQ is proposing to estimate dissolved organic carbon with the 10th percentile of the EPA ecoregion concentrations for application in discharge permits. For approximately 85% of the UPDES (Utah Pollution Discharge Elimination System) permits, the new criteria are anticipated to be less stringent than the existing criteria. The recommended criteria may be more stringent for 15% of UPDES permits. The current maximum anticipated change in the criteria are from 750 µg/l to 640 µg/l. This change is not expected to trigger new effluent limits. Dischargers may opt to measure the dissolved organic carbon concentrations in their receiving waters to replace the 10th percentile assumption and collect additional data to characterize the available assimilative capacity in the receiving waters. Site-specific dissolved organic carbon measurements are anticipated to support less stringent criteria.

Under the recommended rule change, the updated criteria will supersede the existing criteria 3 years after the Water Quality Board adopts the updated criteria. The 3 year adoption delay is intended to allow permitted dischargers to collect data and prepare for potential impacts of this rule change.

R317-2-7 changes

Table 2.14.2

METALS				
(TOTAL RECOVERABLE, UG/L)				
Aluminum (4) (5)				
4 Day Average	87	87	87	87
1 Hour Average	750	750	750	750
METALS, METALLOIDS AND SUBSTANCES (4) (DISSOLVED, UG/L) (6)				
[~~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

-----------------------BREAK---------------------------------

(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:

Until (insert date 3 years after adoption of rule), w[~~W~~]here the pH is equal [-]to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaCO_3$ 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).

On and after [insert DATE at least 3 years from Board adoption date], the one-hour and four-day aluminum criteria are incorporated by reference from Appendix K, Recommended Criteria for Various Water Chemistry Conditions, Final Ambient Water Quality Criteria for Aluminum 2018, EPA-822-R-18-001.

(5a) For water chemistry conditions not specifically listed in Appendix K, the criteria are the more stringent of the criteria bracketed by the two most similar water chemistry conditions or may be interpolated using the same equations used to create the Appendix K tables.

(5b) Criteria based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.

(5c) For characterizing ambient waters, total recoverable analytical methods may be used or different scientifically appropriate analytical methods that measure the bioavailable fraction of aluminum that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays.

(6) 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.

Site specific ammonia criteria

Introduction and site investigations.

In 2019, the Utah Water Quality Board adopted site-specific ammonia water quality criteria for the protection of aquatic life for the Jordan River, Salt Lake County, from 900 South to the confluence with Mill Creek. The basis for the criteria was that unionid mussels were not aquatic life residents. A critical first step when evaluating if unionid mussels are residents is establishing that they are not currently present.

In 2019, the Wasatch Front Water Quality Council conducted additional unionid mussel surveys on the Jordan River downstream of 700 North Street and in the State Canal. In 2021, surveys were conducted on the Jordan River between 700 North Street and 900 South Street. Combined with the surveys conducted in 2017 on the Jordan River between Mill Creek and Little Cottonwood Creek, the Jordan River has been surveyed from Little Cottonwood Creek to Farmington Bay, Great Salt Lake. Figure 1 provides an overview of the study area. The surveys are documented in the following reports:

- *Native Unionoida Surveys, Distribution, and Metapopulation Dynamics in the Jordan River-Utah Lake Drainage, UT*, Oreohelix Ecological, May 26, 2017
- *Lower Jordan River Mollusk Survey as it Relates to South Davis Sewer District South Plant Effluent*, January 2, 2020, Oreohelix Ecological (DWQ-2020-007383);
- *State Canal Mollusk Survey as it relates to South Davis Sewer District South Plant Effluent*, January 3, 2020, Oreohelix Ecological (DWQ-2020-012604);
- *Jordan River Native Mussel Surveys*, April 9, 2021, Oreohelix Ecological (DWQ-2021-010122).

In summary, the surveys were conducted by excavating the substrate with a shovel in wadable sections and hand-operated dredges in deeper water. The substrate samples were then sieved and examined for the presence of mollusks. The specific locations surveyed are shown on Figures 2 through 5. Aside from a few *Anodonta* shell fragments, no evidence of unionid mussels was observed.

The affected assessment units and their water quality support status can be mapped at https://deq.utah.gov/water-quality/2022-integrated-report. The lower Jordan River portion includes Jordan River-1, Jordan River-2, and a small segment of Jordan River-3 from North Temple to 900 South. The segment between Mill Creek and Little Cottonwood Creek is part of Jordan River-4 Assessment Unit. Water quality impairments include:

- Jordan River-1: dissolved oxygen and benthic macroinvertebrates;
- Jordan River-2: dissolved oxygen, benthic macroinvertebrates, and E. coli;
- Jordan River-3: dissolved oxygen, benthic macroinvertebrates, total phosphorus, and E. coli;
- Jordan River-4: benthic macroinvertebrates, E. coli, and total dissolved solids.
- State Canal: ammonia, dissolved oxygen, and total dissolved solids.

Note that the lower Jordan River and State Canal have site-specific criteria for dissolved oxygen in Table 2.14.5, R317-2-14, but still do not meet the needs for aquatic life use.

Are unionid mussels residents?

Numeric criteria protect the designated uses. The criteria are derived to protect the aquatic life residents. In 2013, the U.S. Environmental Protection Agency (EPA) updated the recommendations for ammonia criteria to better protect mollusks, in particular, unionid mussels. However, these criteria are less stringent if unionid mussels are not residents. Per the EPA, defining residents:

- Are usually present at the site.
- Are present at the site only seasonally due to migration;
- Are present at the site intermittently because they periodically return to or extend their ranges into the site;
- Were present at the site in the past, are not currently present at the site due to degraded conditions, but are expected to return to the site when conditions improve;
- Are present in nearby bodies of water, are not currently present at the site due to degraded conditions, but are expected to be present at the site when conditions improve.

Residents don't include organisms that were once present at the site, but cannot exist at the site now due to permanent (physical) alterations of the habitat or other conditions that are not likely to change within reasonable planning horizons.

These resident definitions with regard to unionid mussels were evaluated in detail to support the 2019 site-specific criteria (see 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 (DWQ-2018-013091)). The conclusions from this evaluation were:

1. Unionid mussels historically were present upstream in the Jordan and Utah Lake, tributaries to the 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.

These same conclusions are also applicable to:

- The Jordan River, from Farmington Bay to 900 South;
- The State Canal, from Farmington Bay to the confluence with the Jordan River, and;
- The Jordan River, from the confluence of Mill Creek to Little Cottonwood Creek.

DWQ recommends that the existing site-specific criteria in Footnote 9, Table 2.14.2 in R317-2-14 be modified to include the lower Jordan River, the Jordan River from Mill Creek upstream to the confluence with Little Cottonwood Creek, and the State Canal. The proposed revised rule follows with the deletions shown in red strikeout font and the proposed additions shown in green underlined font. Note that a typographical error in the current rule (09.405 to 0.9405) is also corrected.

Proposed rule language

TABLE 2.14.2
NUMERIC CRITERIA FOR AQUATIC WILDLIFE(8)

FOOTNOTES:

(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/l 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 Farmington Bay ~~900 South Street~~ to confluence with ~~Mill Creek~~ Little Cottonwood Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, State Canal, Fish Early Life Stages are Present:

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

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

mg/L as N (chronic) = 0.9405 ~~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 Farmington Bay ~~900 South Street~~ to confluence with ~~Mill Creek~~ Little Cottonwood Creek, Surplus Canal from 900 South Street to diversion from the Jordan River, State Canal:

mg/l as N (Acute) = $0.7249 *$ ~~(~~$((0.0114/(1+10^{7.204-pH}))+(1.6181/(1+10^{pH-7.204}))) * MIN(51.93,(62.15*10^{0.036*(20-T)}))$

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.

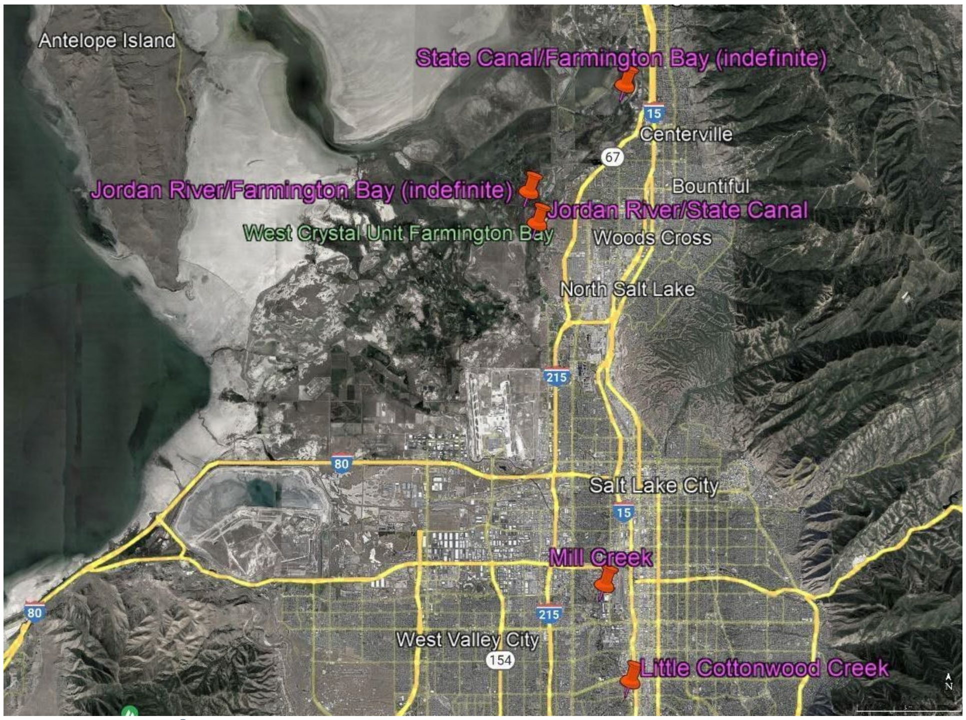


Figure 1. Overview Google Earth® map of site. From the top and moving south, red pins show the approximate boundary of State Canal and Farmington Bay, approximate boundary of Jordan River and Farmington Bay, confluence of Jordan River and Little Cottonwood Creek, and confluence of Jordan River and State Canal.

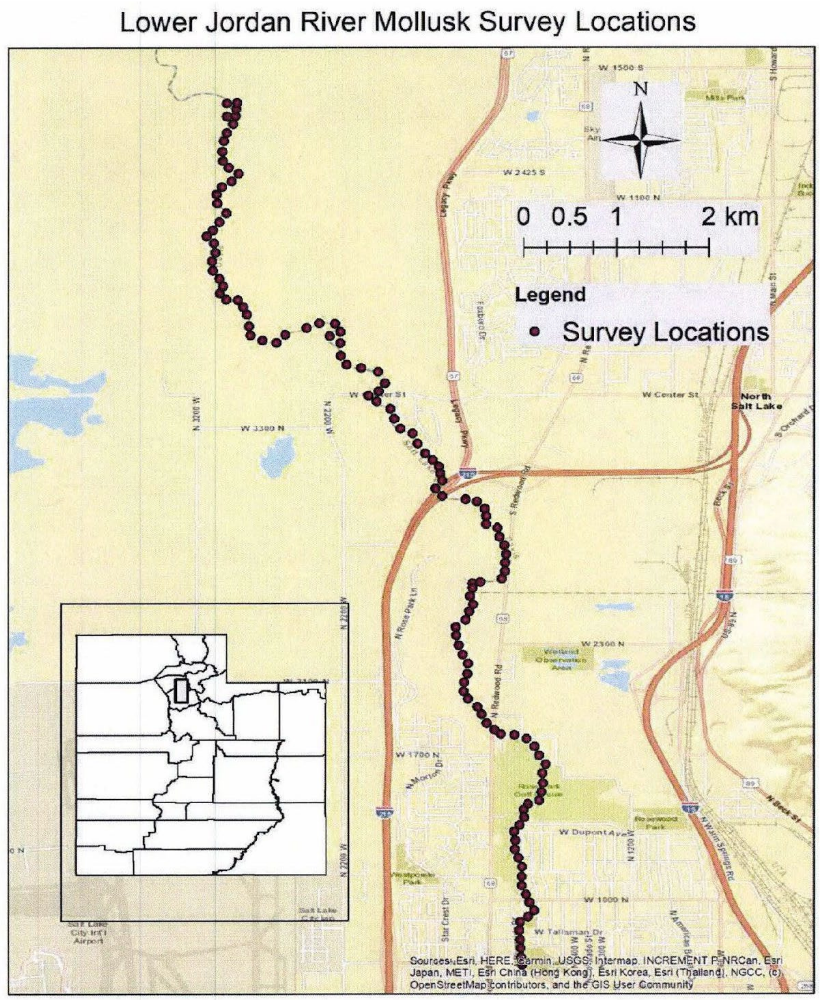


Figure 1. Mollusk survey locations in lower Jordan River 2019. Red circles are transect locations. South Davis Sewer District South Plant is located at just north of W. Center St river crossing. N = 127 transects, nine dredge samples collected at each transect.

Figure 2. Mollusk survey locations for Assessment Units Jordan River-1 and Jordan River-2. Source: *Lower Jordan River Mollusk Survey as it Relates to South Davis Sewer District South Plant Effluent,* January 2, 2020, Oreohelix Ecological (DWQ-2020-007383)

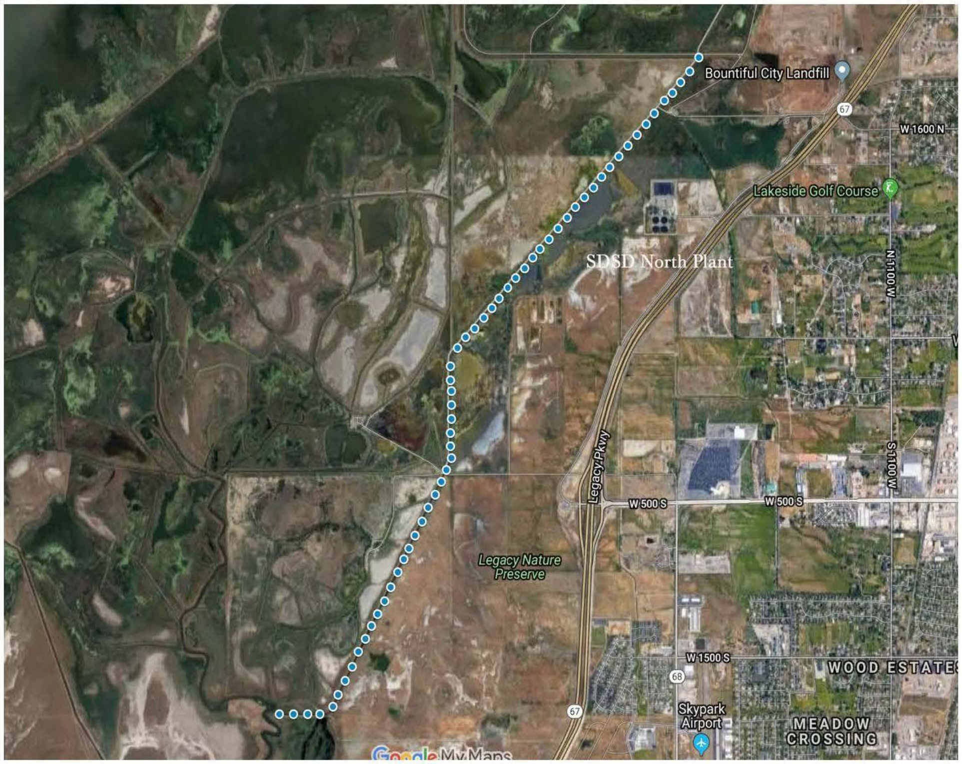


Figure 1. Mollusk survey locations in State Canal 2019. Blue circles are transect locations. N = 162 transects, nine dredge samples collected at each transect.

Figure 3. Mollusk survey locations for State Canal. Source*: State Canal Mollusk Survey as it relates to South Davis Sewer District South Plant Effluent,* January 3, 2020, Oreohelix Ecological (DWQ-2020-012604)

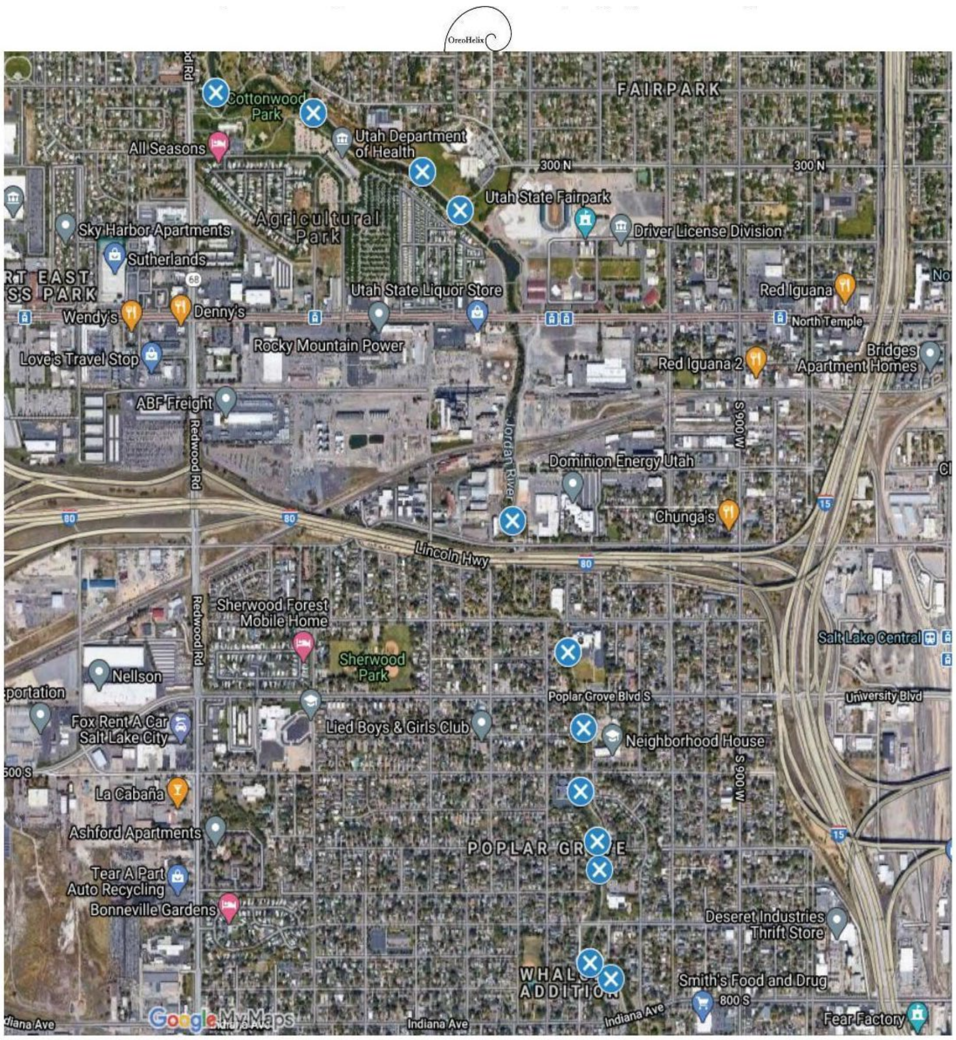


Figure 1. Lower Jordan River native mussel survey locations between 800S and 700N. Surveyed March 2nd through 5th, 2021.

Figure 4. Mollusk survey locations in Assessment Units Jordan River-2 and Jordan River-3. Source: *Jordan River Native Mussel Surveys*, April 9, 2021 Oreohelix Ecological (DWQ-2021-010122)

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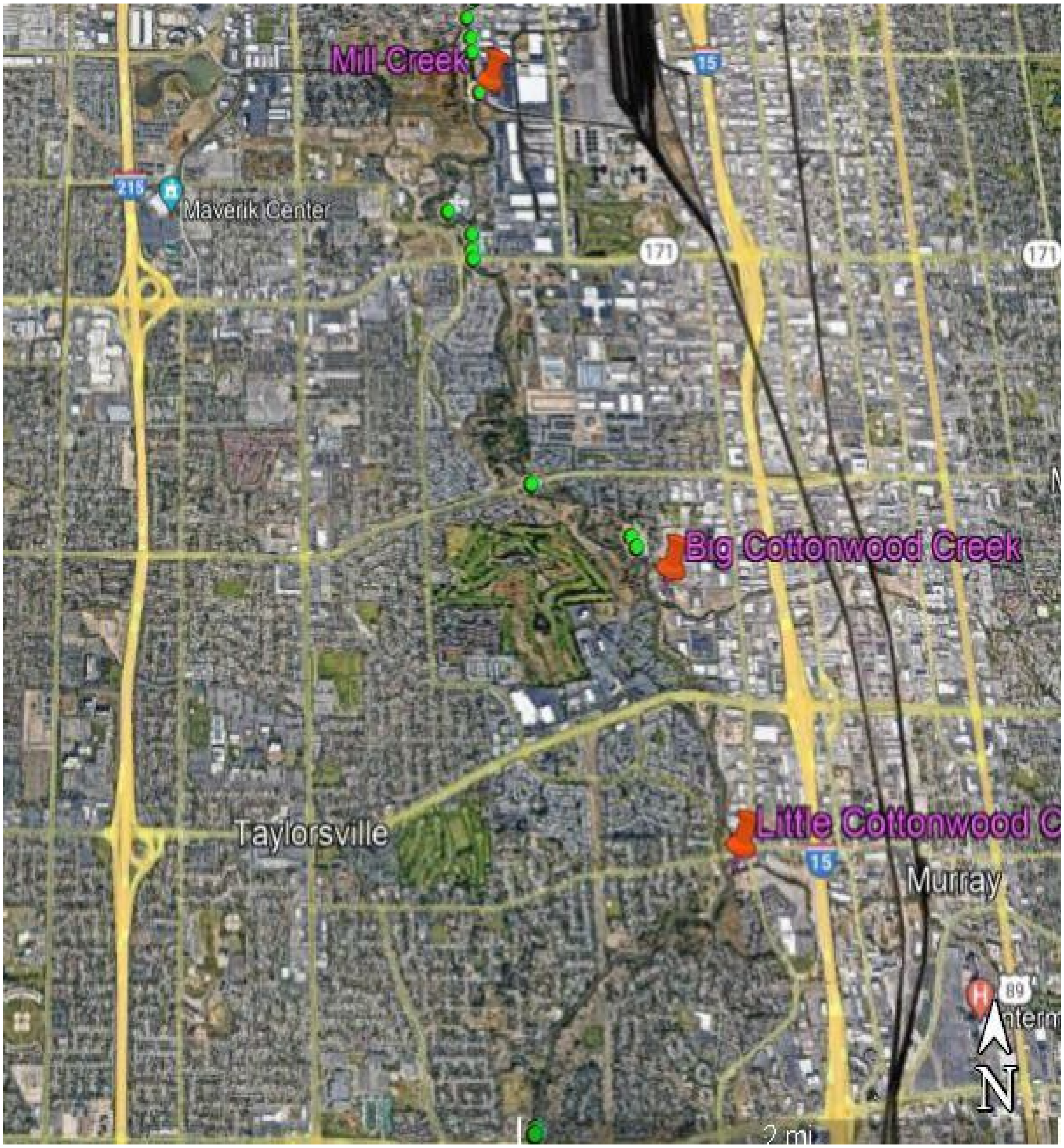


Figure 5. Mollusk survey locations (green circles) in Jordan River-4. (data from *Native Unionoida Surveys, Distribution, and Metapopulation Dynamics in the Jordan River-Utah Lake Drainage, UT*, Oreohelix Ecological, *May 26,* 2017)

PROVO PUBLIC WORKS
WATER RESOURCES

TEL 801 852 6780

1377 SOUTH 350 EAST
P.O. BOX 1849
PROVO, UT 84603

Utah Department of Environmental Quality
Utah Division of Water Quality
Attn: John Mackey, Assistant Director
Multi Agency
State Office Building
195 North 1950 West
Salt Lake City, Utah
84116

Re: Provo River Reclassification Request

Dear John:

Provo City (City) is in the process of designing a new drinking water treatment plant (WTP) using Provo River as the source of water. The City will be diverting water from their existing diversion point near 2230 North Street known as Upper Dam and Mill Race Canal to be treated in the WTP.

Tables 1 through 4 provide water quality data from 2018 data from Olmsted diversion, data from the current Pilot Study work (2022), and the two reports conducted by Chemtech-Ford Labs (2019).

Table 1. Inorganic Contaminants Water Quality Data (2018 – 2022)

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Antimony (mg/L)	ND (< 0.0005)	ND (< 0.0005)	ND (< 0.0005)	0.006
Arsenic (mg/L)	0.0018	0.0012	0.0022	0.010
Barium (mg/L)	0.068	0.057	0.089	2
Beryllium (mg/L)	ND (< 0.001)	ND (< 0.001)	ND (< 0.001)	0.004
Cadmium (mg/L)	ND (< 0.0002)	ND (< 0.0002)	ND (< 0.0002)	0.005
Chromium (mg/L)	0.0029	0.0007	ND (< 0.005)	0.1
Cyanide (mg/L)	NR	NR	NR	0.2
Fluoride (mg/L)	0.2	0.2	0.2	4.0
Mercury (mg/L)	ND (< 0.0002)	ND (< 0.0002)	ND (< 0.0002)	0.002
Nickel (mg/L)	ND (< 0.005)	ND (< 0.005)	ND (< 0.005)	-
Nitrate (mg/L)	0.85	0.2	1.5	10

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Nitrite (mg/L)	ND (< 0.1)	ND (< 0.1)	ND (< 0.1)	1
Total Nitrate and Nitrate (mg/L)	0.35	ND < 0.1	1.5	10
Selenium (mg/L)	0.0009	ND (< 0.0005)	0.0018	0.05
Sodium (mg/L)	14.2	9.9	24.7	-
Sulfate (mg/L)	44.1	34	72.0	1000
Thallium (mg/L)	ND (< 0.0002)	ND (< 0.0002)	ND (< 0.0002)	0.002
Total Dissolved Solids (mg/L)	257	164	448	2,000
Lead (mg/L)	ND (< 0.005)	ND (< 0.005)	ND (< 0.005)	0.015
Copper (mg/L)	ND < 0.0010	ND < 0.0010	0.0012	1.3
Ammonia as N (mg/L)	ND (< 0.2)	ND (< 0.2)	ND (< 0.2)	-
Boron (mg/L)	ND (< 0.05)	ND (< 0.05)	0.06	-
Calcium (mg/L)	54.0	42.4	85.6	-
Magnesium (mg/L)	14.0	10.3	19.3	-
Potassium (mg/L)	2.26	1.6	3.5	-
Phosphorous (mg/L)	0.03	0.01	0.07	-
Ortho Phosphorus as P (mg/L)	0.02	ND (< 0.01)	0.07	-
Silica, Dissolved (mg/L)	7.22	6.1	10.4	-
Surfactant, MBAS (mg/L)	ND (< 0.08)	ND (< 0.08)	ND (< 0.08)	0.5

[1] ND = Non-detected. Reporting limits are displayed.

[2] NR = Not reported.

[3] Maximum contaminant level in drinking water to comply with the Utah Drinking Water Standards.

Source: AECOM, 2022; HAL, 2019; Chemtech-Ford Laboratories, 2019; UDEQ, 2019

Table 2. Pesticide/PCB/SOC Contaminants Water Quality Data (2019)

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Alachlor (ug/L)	ND (< 0. 44)	ND (< 0. 44)	ND (< 0. 44)	2
Aldicarb (ug/L)	ND (< 1)	ND (< 1)	ND (< 1)	-
Aldicarb Sulfoxide (ug/L)	ND (< 1)	ND (< 1)	ND (< 1)	-
Aldicarb Sulfone (ug/L)	ND (< 1)	ND (< 1)	ND (< 1)	-
Atrazine (ug/L)	ND (< 0.22)	ND (< 0.22)	ND (< 0.22)	3
Carbofuran (ug/L)	ND (< 1)	ND (< 1)	ND (< 1)	40
Chlordane (ug/L)	ND (< 0.44)	ND (< 0.44)	ND (< 0.44)	2
2, 4-D (ug/L)	ND (< 0.220)	ND (< 0.220)	ND (< 0.220)	70
Heptachlor (ug/L)	ND (< 0.088)	ND (< 0.088)	ND (< 0.088)	0. 4
Heptachlor Epoxide (ug/L)	ND (< 0.044)	ND (< 0.044	ND (< 0.044	0.2

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Lindane (ug/L)	ND (< 0.044	ND (< 0.044	ND (< 0.044	0.2
Methoxychlor (ug/L)	ND (< 0.22)	ND (< 0.22)	ND (< 0.22)	40
Polychlorinated Biphenyls (ug/L)	ND (< 0.50)	ND (< 0.50)	ND (< 0.50)	0.50
Pentachlorophenol (ug/L)	ND (< 0.088)	ND (< 0.088)	ND (< 0.088)	1
Toxaphene (mg/L)	ND (< 2.2)	ND (< 2.2)	ND (< 2.2)	3
2,4,5-TP (Silvex) (ug/L)	ND (< 0.440)	ND (< 0.440)	ND (< 0.440)	50
Benzo (a) pyrene (ug/L)	(ND < 0.04)	(ND < 0.04)	(ND < 0.04)	0.2
Dalapon (ug/L)	ND (< 2.20)	ND (< 2.20)	ND (< 2.20)	200
Di (2-ethylhexyl) Adipate (ug/L)	ND (< 1.30)	ND (< 1.30)	ND (< 1.30)	400
Di (2-ethylhexyl) Phthalate (ug/L)	ND (< 1.30)	ND (< 1.30)	ND (< 1.30)	6
Dinoseb (ug/L)	ND (< 0.440)	ND (< 0.440)	ND (< 0.440)	7
Endrin (ug/L)	ND (< 0.022)	ND (< 0.022)	ND (< 0.022)	2
Hexachlorobenzene (ug/L)	ND (< 0.22)	ND (< 0.22)	ND (< 0.22)	1
Hexachlorocyclopentadiene (ug/L)	ND (< 0.22)	ND (< 0.22)	ND (< 0.22)	50
Oxamyl (Vydate) (ug/L)	ND (< 1)	ND (< 1)	ND (< 1)	200
Picloram (ug/L)	ND (< 0.220)	ND < 0.220	ND < 0.220	500
Simazine (ug/L)	ND (< 0.15)	ND (< 0.15)	ND (< 0.15)	4

[1] ND = Non-detected. Reporting limits are displayed.

[2] NR = Not reported.

[3] Maximum contaminant level in drinking water to comply with the Utah Drinking Water Standards.

Source: Chemtech-Ford Laboratories, 2019; UDEQ, 2019

Table 3. Volatile Organic Contaminants Water Quality Data (2019)

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Vinyl Chloride (ug/L)	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	2
Benzene (ug/L)	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	5
Carbon Tetrachloride (ug/L)	ND (< 1.0)	ND (< 1.0)	ND (< 1.0)	5
1,2-Dichloroethane (ug/L)	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	5
Trichloroethylene (ug/L)	NR	NR	NR	5
para-Dichlorobenzene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	75
1,1-Dichloroethylene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	7
1,1,1-Trichloroethane	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	200
Cis-1,2-Dichloroethylene	NR	NR	NR	70
1,2-Dichloropropane	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	5
Ethylbenzene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	700

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Monochlorobenzene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	100
o-Dichlorobenzene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	600
Styrene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	100
Tetrachloroethylene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	5
Toluene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	1000
Trans-1,2-Dichloroethylene	NR	NR	NR	100
Xylenes (total)	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	10000
Dichloromethane	NR	NR	NR	5
1,2,4-Trichlorobenzene	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	70
1,1,2-Trichloroethane	ND (< 0.5)	ND (< 0.5)	ND (< 0.5)	5

[1] ND = Non-detected. Reporting limits are displayed.

[2] NR = Not reported.

[3] Maximum contaminant level in drinking water to comply with the Utah Drinking Water Standards.

Source: Chemtech-Ford Laboratories, 2019; UDEQ, 2019

Table 4. Physical Parameters Water Quality Data (2018 – 2022)

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Turbidity (NTU)	2.4	1.2	4.3	0.3
Specific Conductivity (umho/cm)	441	358	734	-
Bicarbonate (mg/L)	144	146	246	-
Carbon Dioxide[4] (mg/L)	129	117	138	-
Carbonate (mg/L)	7.6	ND (< 1.0)	16.7	-
Hydroxide (mg/L)	ND (< 1.0)	ND (< 1.0)	ND (< 1.0)	-
Total Hardness as $CaCO_3$ (mg/L)	193	148	293	-
Alkalinity as $CaCO_3$ (mg/L)	154	121	246	-

[1] ND = Non-detected. Reporting limits are displayed.

[2] NR = Not reported.

[3] Maximum contaminant level in drinking water to comply with the Utah Drinking Water Standards.

[3] Data taken from 2015 and 2016 as data from 2018 – 2022 was unavailable.

Source: AECOM, 2022; HAL, 2019; Chemtech-Ford Laboratories, 2019; UDEQ, 2019

Table 5. Radiologic Chemicals Water Quality Data (2019)

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Radium-226 and -228 (pCi/L)	0.61	0.61	0.61	5
Gross Alpha Particle Activity (pCi/L)	2	2	2	15
Gros Beta and Photon Particle Activity (mrem/yr)	2.5	2.5	2.5	4

Parameter	Avg.	Min.	Max.	Max. Contaminant Level[3]
Uranium (ug/L)	1.5	1.5	1.5	30
Tritium (pCi/L)	NR	NR	NR	20,000
Strontium-90 (pCi/L)	NR	NR	NR	8

[1] ND = Non-detected. Reporting limits are displayed.

[2] NR = Not reported.

[3] Maximum contaminant level in drinking water to comply with the Utah Drinking Water Standards.

Source: Chemtech-Ford Laboratories, 2019; UDEQ, 2019

We request a use change to "1C" of the Provo River from the Murdock Diversion (approximately Latitude 40.3143 N, Longitude -111.6567 W) to the City Upper Dam Diversion at approximately Latitude 40.2638 N, Longitude -111.66385 W. This request should include the Provo River and its tributaries in the requested segment.

Please let us know if there is any additional information needed to process this request.

Sincerely,

Shane Jones, PE

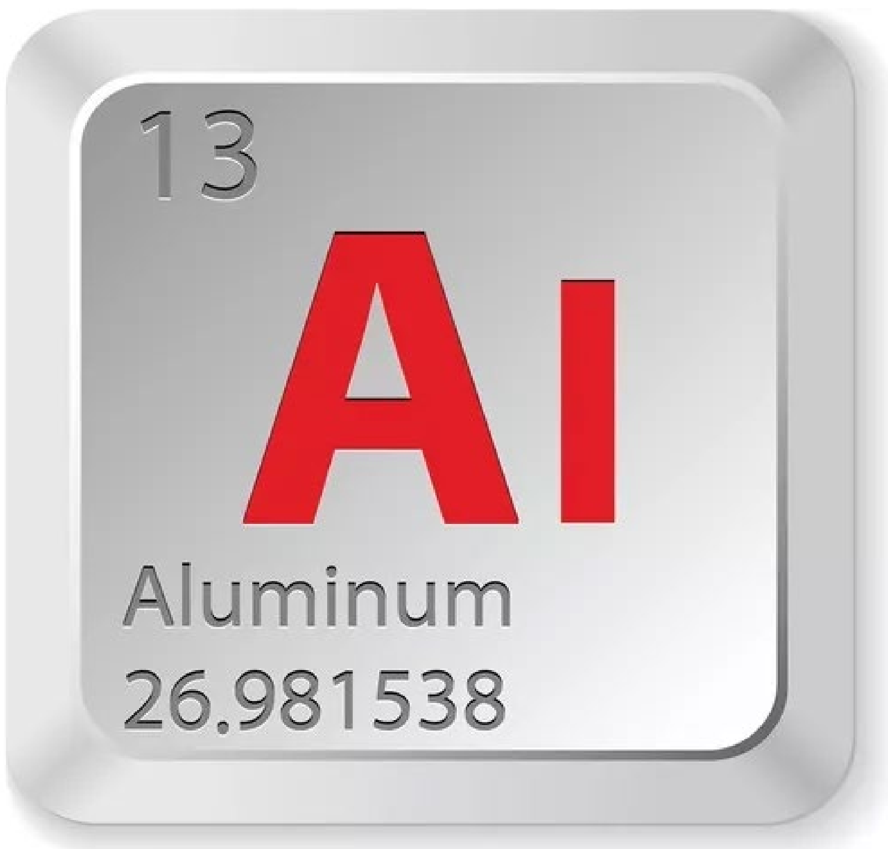
Principal Engineer, Provo City Water Resources Division

CC: Benjamin Holcomb

Jake Vander Laan

UTAH DEPARTMENT of ENVIRONMENTAL QUALITY
WATER QUALITY

Aluminum Criteria for the Protection of Aquatic Life



(Image credit: Andrei Marincas | Shutterstock)

Criteria Support Document

Review Draft v. 1.0, December 8, 2021

UTAH DIVISION OF WATER QUALITY

Executive Summary

Aluminum is the most abundant metallic element in the earth's crust (Cardelli, 2008) and can be toxic to aquatic life under certain conditions. In 2018, the EPA issued updated criteria for aluminum for the protection of aquatic life. The Utah Division of Water Quality (DWQ) recommends that the Utah Water Quality Board update Utah's standards consistent with the EPA recommendations. The recommended updated criteria are implemented as total recoverable aluminum, the same as Utah's existing criteria. Similar to Utah's current criteria, pH and water hardness affect the updated recommended criteria and a new parameter, dissolved organic carbon, also affects the recommended criteria. The new model for calculating aluminum toxicity is much more accurate than the Utah's current criteria for predicting when aluminum will be toxic.

The recommended criteria are generally anticipated to be less stringent than Utah's existing criteria because of the typical pH, hardness, and anticipated dissolved organic carbon concentrations of most of Utah's surface waters. In the absence of measured dissolved organic carbon concentrations, DWQ is proposing to estimate dissolved organic carbon with the 10th percentile of the EPA ecoregion concentrations for application in discharge permits. For approximately 85% of the UPDES (Utah Pollution Discharge Elimination System) permits, the new criteria are anticipated to be less stringent than the existing criteria. The recommended criteria may be more stringent for 15 UPDES permits. The current maximum anticipated change in the criteria are from 750 µg/l to 640 µg/l. This change is not expected to trigger new effluent limits. Dischargers may opt to measure the dissolved organic carbon concentrations in their receiving waters to replace the 10th percentile assumption and collect additional data to characterize the available assimilative capacity in the receiving waters. Site-specific dissolved organic carbon measurements are anticipated to support less stringent criteria.

DWQ is proposing to delay implementation of the recommended criteria for 3 years to provide an opportunity for dischargers to investigate dissolved organic carbon in their receiving waters and for DWQ to potentially revise assessment methods.

Contents

Figures

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Introduction

Scope

In the earth's crust, aluminum is most abundant metallic element (Cardelli, 2008). Aluminum generally has low toxicity but can be toxic to aquatic life under specific environmental conditions. In 2018, the U.S. Environmental Protection Agency (EPA) published updated water quality criteria for aluminum for the protection of aquatic life under Section 304(a) of the Clean Water Act (EPA, 2018). Under federal regulations, Utah is obligated to review these updated recommendations and revise Utah's aluminum criteria as appropriate. EPA (2019) has also published a draft Technical Support Document for implementing the criteria.

This DWQ Criteria Support Document contains this review and includes recommendations for updating Utah's statewide aluminum criteria. These criteria for Utah's Class 3 aquatic life uses (UAC R317-2-6), if adopted, may be further modified based on site-specific conditions. Only the Utah Water Quality Board has the authority to change Utah's water quality standards. The Board revises Utah's water quality standards through Utah's rulemaking process. The rulemaking process includes publication in the Utah Bulletin and public participation.

Utah's Current Aluminum Criteria

As specified in UAC R317-2-14, Table 2.14.2, Utah's acute (one-hour) criterion is 750 µg/l and the chronic (four-day) criterion is 87 µg/l. Unlike the criteria for most other criteria for metals and metalloids, the aluminum criteria are expressed as total recoverable aluminum instead of dissolved. Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaCO_3$ in the receiving water after mixing, the 87 ug/l chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/l acute aluminum criterion (expressed as total recoverable). For most of Utah's surface waters the acute criterion applies because the pH is usually greater than 7.0 and the hardness commonly exceeds 50 mg/l $CaCO_3$.

EPA (2018) Aluminum Criteria

The EPA (2018) aluminum criteria are adjusted for different water chemistries and are more accurate for predicting when aluminum will be toxic to aquatic life. The EPA (2018) criteria are based on a multiple linear regression model that includes hardness, pH and dissolved organic carbon (DOC). Table 1 shows the possible ranges for these parameters. EPA (2018) has provided a Microsoft Excel spreadsheet, R code, or tables for the acute and chronic criteria. Values outside of the ranges shown in Table 1 do not affect the magnitude of the criteria.

Table 1. Parameter limits of EPA (2018) multiple linear regression model for aluminum criteria

	pH	Hardness	DOC (mg/l)
Range	5.0 - 10.5	0.01 - 430	0.08 - 12

Within the pH range for Utah standards of 6.5 to 9, the EPA (2018) acute criteria exhibit an expansive range of 51 to 4,700 µg/l. For Utah surface waters (pH>7, hardness > 100 mg/l CaCO3, DOC > 0.5 mg/l), the EPA (2018) acute criteria are expected to be less stringent than Utah's current acute criterion of 750 µg/l. The averaging period is one hour, the same as Utah's current criterion.

EPA (2018) chronic criteria range from 33 to 3,200 µg/l and are anticipated to be less stringent for the majority of Utah waters than Utah's current chronic criterion of 87 µg/l. However, for most Utah waters only the current acute criterion of 750 µg/l applies. When Utah's chronic criterion does not apply (pH less than 7 and hardness greater than 50 ppm), the EPA (2018) chronic criterion is often more stringent than the currently applicable acute criterion of 750 µg/l. Note that the averaging period for Utah's 750 µg/l criterion is one hour whereas the EPA (2018) chronic criterion averaging period is four days.

The effects of water chemistry on aluminum toxicity can be complex. The criteria are more sensitive to pH and DOC concentrations than hardness. In general, the criteria are the least stringent at about pH 8 (Figures 1 and 2). The criteria typically are less stringent with increasing DOC concentrations but at higher DOC concentrations, the chronic criteria no longer become more stringent with pH values greater than 8 (Figure 2). As shown on Figures 3 and 4, the criteria are less sensitive to hardness and can be more stringent at higher hardness values.

The EPA (2018) exceedance frequency, the same as the current Utah criteria, is no more than once every three years.

Analytical methods for aluminum

EPA (2018) recommends that the aluminum criteria be implemented based on total recoverable aluminum which is the same as Utah's current criteria. For permits, analytical methods for total recoverable aluminum are specified in 40 CFR Part 136. However, these methods may overestimate the concentrations of bioavailable aluminum, and consequently, the toxicity of aluminum, in ambient waters. EPA discusses these issues in the context of promulgating aluminum criteria for Oregon in the March 19, 2021 Federal Register, 86 FR 14834:

> Over the last three decades, the scientific consensus has been that the total recoverable method for aluminum potentially overestimates the biologically available fraction and that a method that better addresses concerns with including aluminum bound to particulate matter would be useful (e.g., He and Ziemkiewics 2016; Ryan et al. 2019).[6]...
>
> ...EPA expects that an analytical method that uses a less aggressive initial acid digestion that liberates bioavailable forms of aluminum (including amorphous aluminum hydroxide), yet minimizes dissolution of mineralized forms of aluminum such as aluminosilicates associated with suspended sediment particles and

clays (referred to as a bioavailable analytical method), will better estimate the bioavailable fraction of aluminum in ambient waters.

In the criteria promulgated for Oregon, EPA includes a footnote that "a less aggressive initial acid digestion, such as to a pH of approximately 4 or lower, that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays."

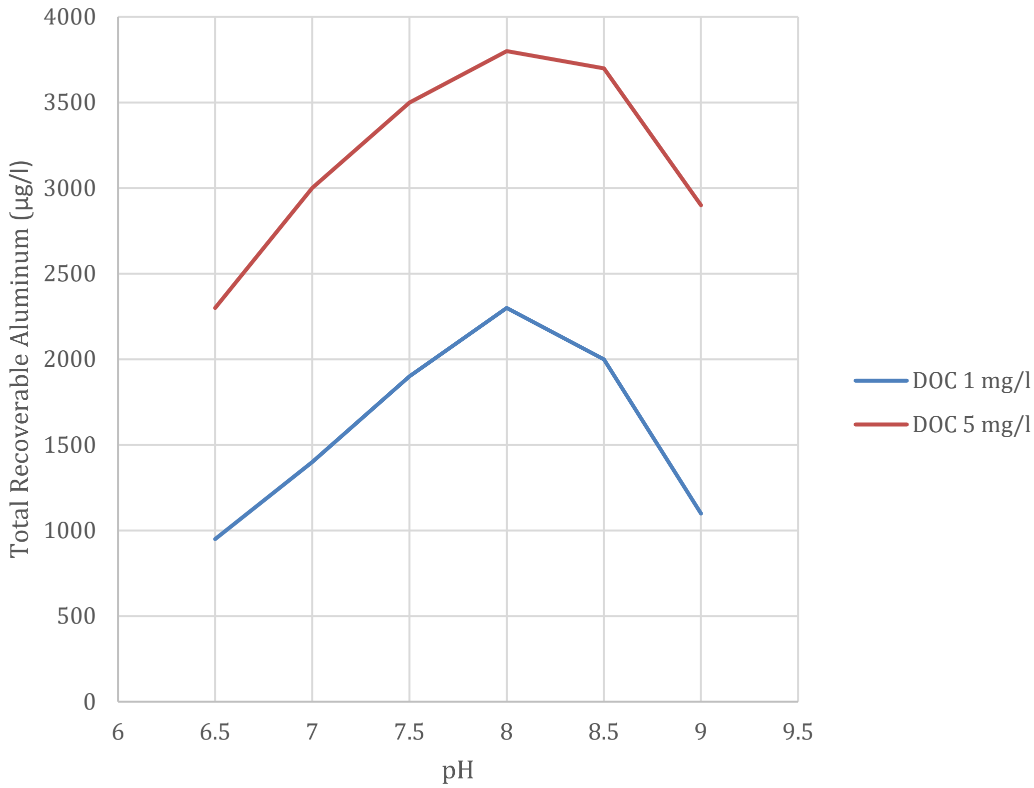

Figure 1. EPA (2018) acute criteria at 300 mg/l hardness and 1 or 5 mg/l dissolved organic carbon (DOC) as pH varies.

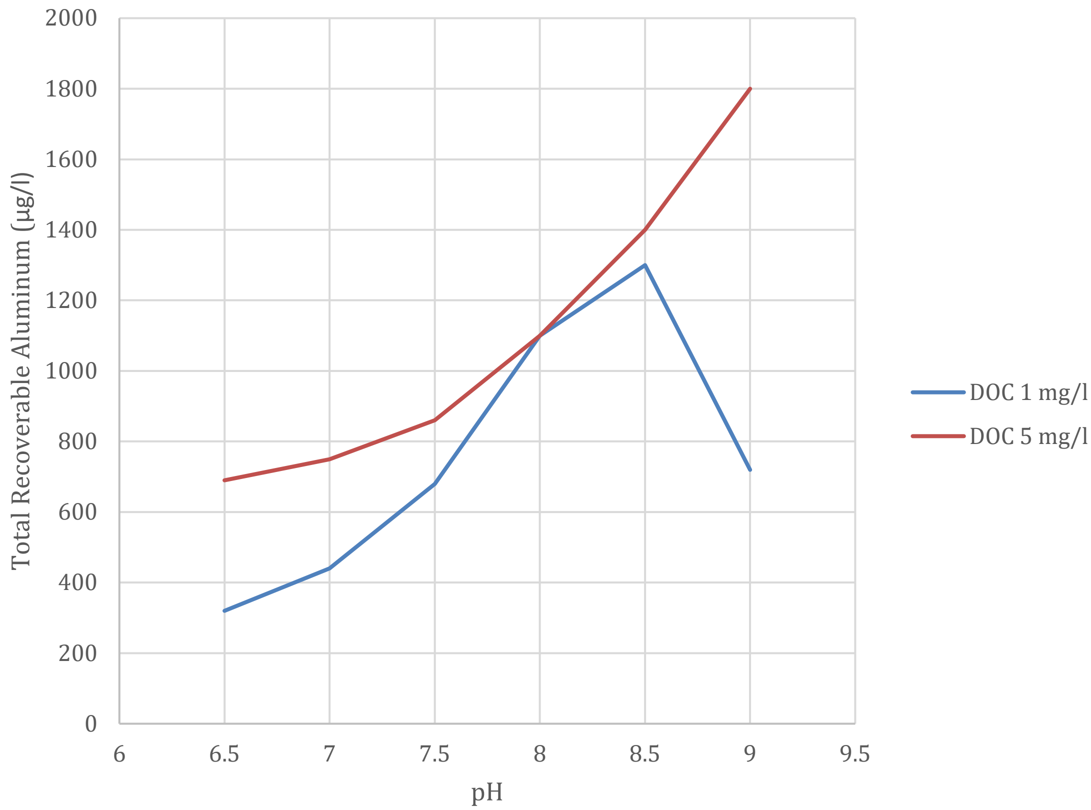

Figure 2. EPA (2018) chronic criteria at 300 mg/l hardness and 1 or 5 mg/l dissolved organic carbon (DOC) as pH varies.

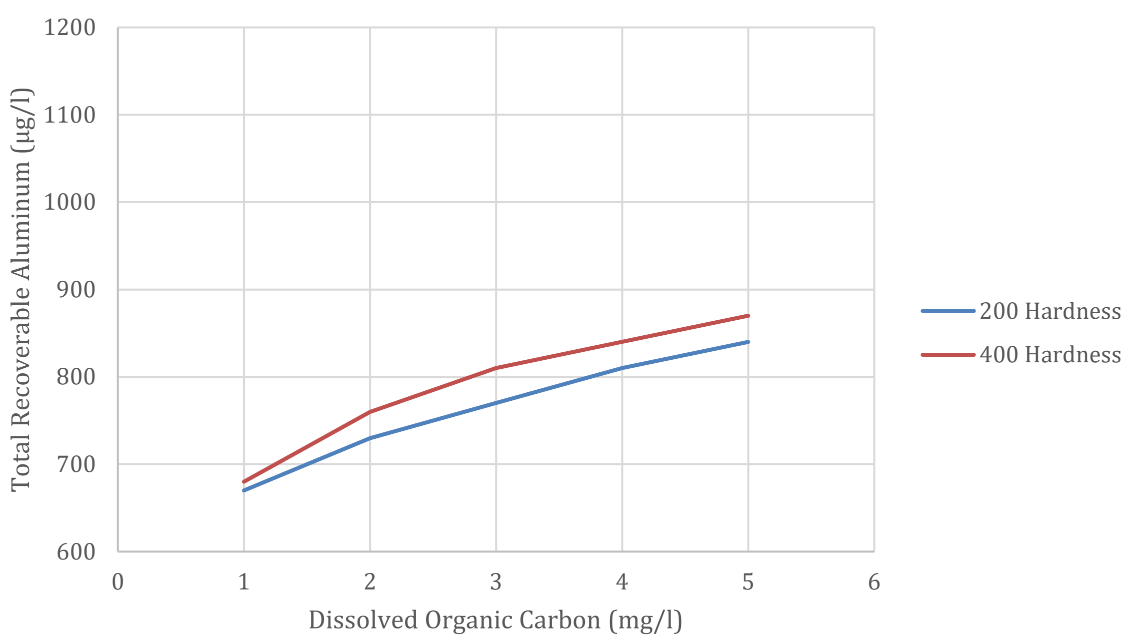

Figure 3. EPA (2018) chronic criteria at pH 7.5 and 200 or 400 mg/l hardness as dissolved organic carbon concentrations vary.

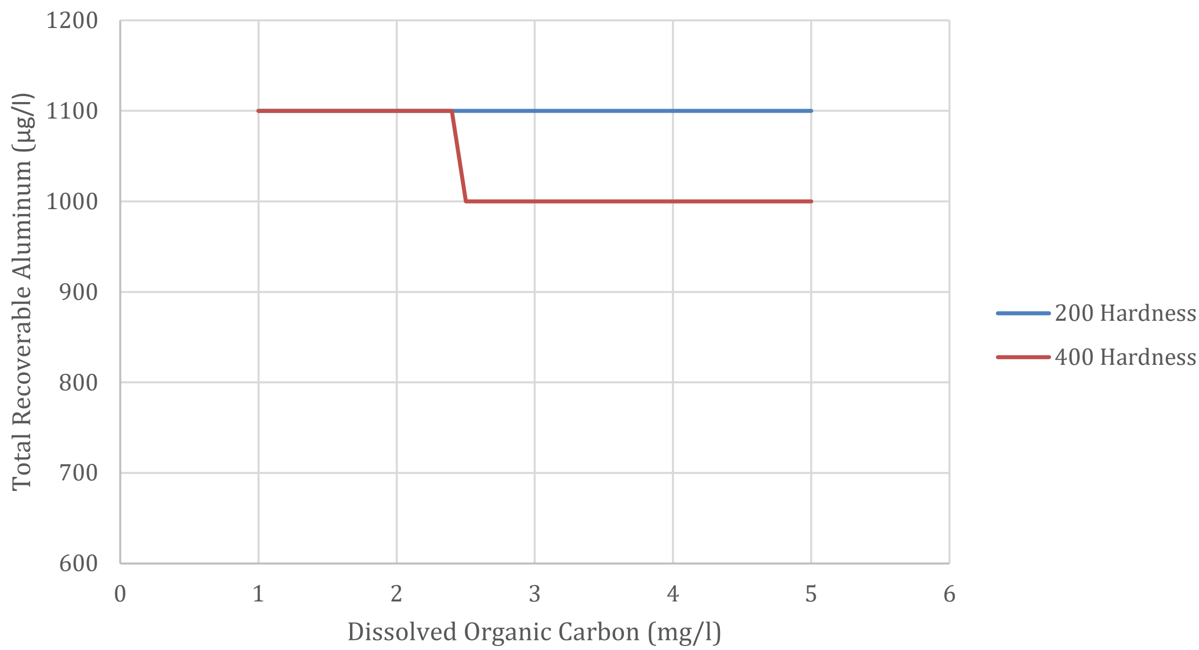

Figure 4. EPA (2018) chronic criteria at pH 8 and 200 or 400 mg/l hardness as dissolved organic carbon concentrations vary.

Recommendations for Utah

The EPA (2018) criteria better predict the toxicity and DWQ recommends updating Utah's criteria. DWQ does not currently routinely analyze for total recoverable aluminum or dissolved organic carbon. The following sections discuss implementation of the new criteria in permits and assessments and the proposed rule language.

Implementation Considerations for Discharge Permits

When compared to Utah's current aluminum criteria, the EPA (2018) criteria requires DOC concentrations for the receiving waters after mixing. For existing discharges, these site-specific data can be collected by the discharger. For new discharges, or when data are not available for existing discharges, DOC concentrations will be estimated (EPA, 2019). EPA (2016) compiled the available DOC data for each state by ecoregion (Figure 1). These data, along with site-specific pH and hardness data, can be used to estimate the EPA (2018) aluminum criteria. Consistent with DWQ's waste load analyses procedures, the criteria should be derived to be protective based on the observed variability for pH, DOC, and hardness.

Table 2 compares Utah's existing aluminum criterion to the EPA (2018) chronic criteria for common Utah water quality conditions of pH 7.5 or pH 8 and hardnesses of 200 or 400 mg/l $CaCO_3$. The DOC concentrations are based on the 10th percentile for the ecoregion (EPA, 2016). For most Utah water quality situations, application of the EPA (2018) criteria based on the 10th percentile DOC concentrations are not anticipated to change existing reasonable potential determinations.

Tables 3 and 4 summarize the current waste load allocations pH and hardness and the EPA ecoregion for existing UPDES permits potentially affected by revised aluminum criteria. Only one permit, UT0024805 has a water quality-based effluent limit for aluminum. If the EPA (2018) criteria are applied using the ecoregion DOC from Table 2, the applicable criteria will be less stringent for 84% of the permits including the permit with a water quality-based effluent limit (Table 3).

For 15 permits, the EPA (2018) criterion will be more stringent by magnitude but the averaging period of 4 days is less stringent than the existing one-hour averaging period (Table 4). The maximum expected change to the criterion is 15%, or a criterion of 640 µg/l instead of 750 µg/l. While these minor changes to the criteria are not expected to affect reasonable determinations, dischargers have the option to measure site-specific DOC concentrations and site-specific total recoverable aluminum in the receiving waters. Site-specific DOC concentrations are expected to be higher than the 10^{th} percentile ecoregion concentrations. If DOC concentrations are higher, less stringent criteria can be supported. If the data are not already available, dischargers can also opt to provide total recoverable aluminum data for the alternative analytical methods discussed in the following section. These methods better reflect the bioavailable aluminum in the receiving waters. If a discharger opts to measure site-specific DOC or total recoverable aluminum in their receiving waters, DWQ should be consulted prior to data collection to ensure that the seasonal and other sources of variability are adequately characterized so that the data can be useable for the waste load allocation.

As previously discussed, effluent monitoring must rely on an approved analytical method for total recoverable aluminum. The receiving water concentrations may be based on the same total recoverable method as the effluent or alternative methods that better characterize the bioavailable fraction of aluminum.

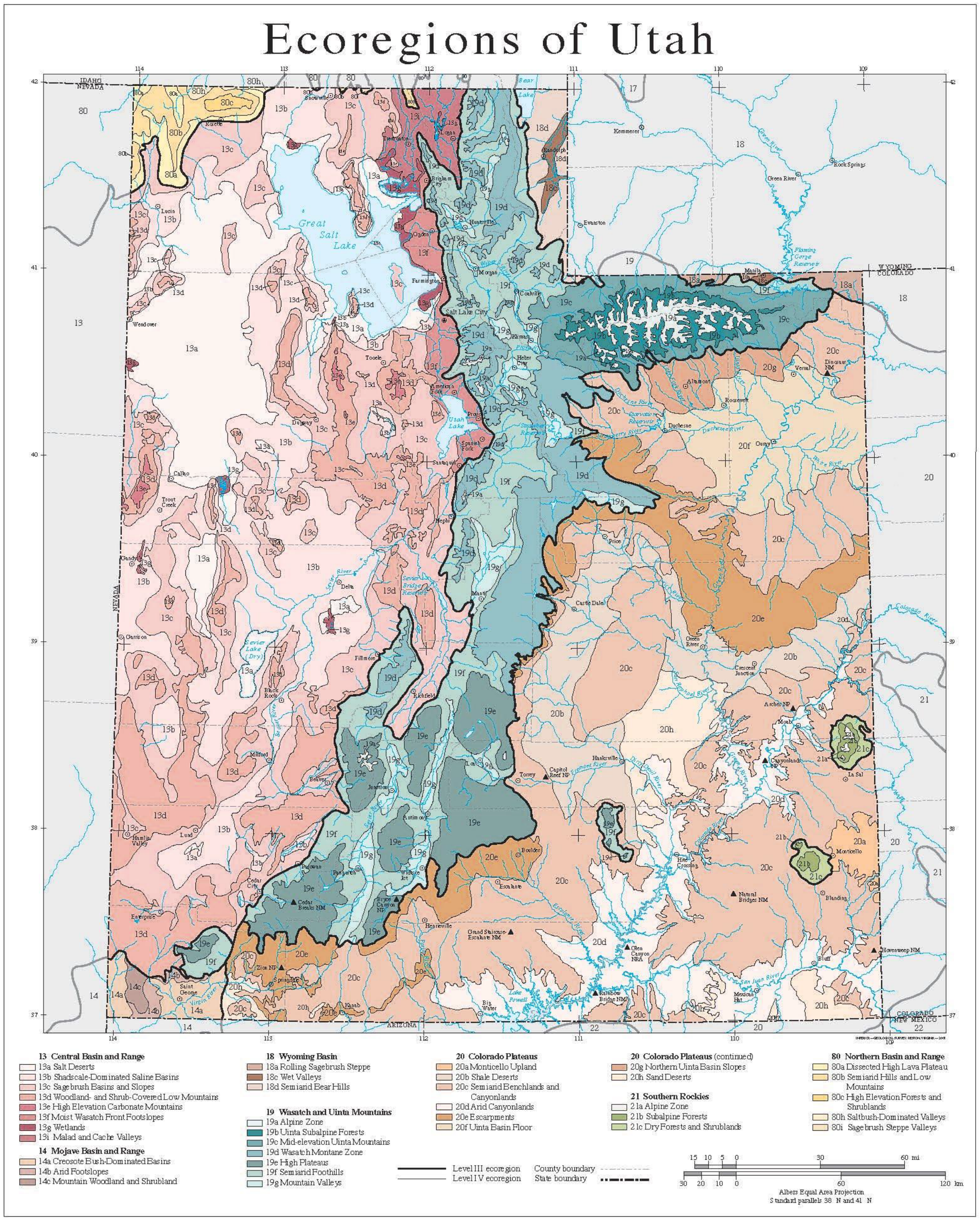

Figure 5. Utah Ecoregions

Table 2. Aluminum Criteria Based on EPA Eco Regional Dissolved Organic Carbon Concentrations

Utah EPA Eco Region	10th percentile DOC	Existing Utah Criteria[1]	EPA (2018)[2]	EPA (2018)[3]	EPA (2018)[4]	EPA (2018)[5]
13	1.5	750	700	1,100	720	1,100
18	4.31	750	820	1,100	850	1,000
19	1.8	750	720	1,100	740	1,000
20	3.0	750	770	1,100	810	1,000
80	1.81	750	720	1,100	740	1,100

Notes

DOC – dissolved organic carbon, mg/l

Criteria are µg/l total recoverable

[1]Hardness >50 mg/l and pH>7.0; one hour

[2]Hardness 200 mg/l and pH 7.5; 4 day

[3]Hardness 200 mg/l and pH 8; 4 day

[4]Hardness 400 mg/l and pH 7.5; 4 day

[5]Hardness 400 mg/l and pH 8; 4 day

Table 3. UPDES Permits that EPA (2018) criteria would be less stringent than Utah's current criteria

Permit No.	Hardness	pH	Ecoregion
UT0024210	207	8.0-8.1	13
UT0025992	400	8.2	20
UT0000361	400	8.4	13
UT0000035	400	8.1-8.3	20
UT0025348	400	8.1-8.3	20
UT0024805	400	7.7-7.9	13
UT0020311	400	8.2-8.6	13
UT0025763	168	8.3-8.5	19

Permit No.	Hardness	pH	Ecoregion
UT0022365	200	8.4	13
UT0022616	400	7.5-7.6	20
UT0022918	400	8.2-8.3	19/20
UT0025789	250	8.5	20
UT0025526	202	7.9-8.1	13
UT0023663	400	8	20
UT0021296	400	8-8.1	20
UT0025704	226	8-8.2	13
UT0021911	250	7.7-7.9	13
UT0020931	319	8.2-8.4	13
UT0025828	335	8.1-8.5	20
UT0020095	195	8.2-8.5	20
UT0025801	218	8.2	20
UT0026018	400	8	20
UT0023922	400	8.2	20
UT0025712	400	8.4	20
UT0025283	263	8.1-8.5	13
UT0025984	400	8.1	19
UT0025542	350	8.2-8.7	19
UT0020052	400	7.9-8.4	20
UT00237l8	400	8-8.2	21
UT0026034	400	8.1	13
UT0021130	300	8.5	13
UT0025771	259	8.3-8.4	20
UT0026123	236	8.1-8.3	13

Permit No.	Hardness	pH	Ecoregion
UT0020192	280	8.1-8.5	19
UT0023094	400	8-8.1	20
UT0023205	298	8-8.4	13
UT0025852	380	8.1-8.4	13
UT0022403	300	8	19
UT0025747	390	7.8-7.9	19
UT0020966	176	7.9-8.4	19
UT0020214	217	8.2-8.5	13
UT0025569	400	8.0	13
UT0021920	250	7.8-8.1	13
UT0021440	200	7.8-8	13
UT0026026	400	8.2	19
UT0020419	335	8.5-9	20
UT0000612	300	7.7-7.8	13
UT0025950	200	8	13
UT0024503	300	8-8.2	20
UT0020893	252	8.2-8.5	19
UT0024732	232	7.9-8.5	19
UT0023001	400	8	20
UT0023850	400	7.8-8.3	13
UT0020061	164	7.8-8.2	19
UT0020915	244	7.8	13
UT0025577	300	8.1-8.2	13
UT0023604	243	8.3-8.5	20
UT0000116	400	7.6	13

Permit No.	Hardness	pH	Ecoregion
UT0025623	389	8.1-8.5	13
UT0022896	400	7.5	20
UT0026158	271	8.6	13
UT0020427	390	7.8-8.3	13
UT0020222	309	7.8	13
UT0021814	400	7.4	20
UT0026166	400	7.8-8.0	20
UT0020907	218	8.0-8.2	13
UT0026085	300	8.2	13
UT0020001	340	7.9-8.2	19
UT0024384	350	8-8.4	13
UT0020109	338	7.8-8.1	13
UT0025224	306	8.1-8.3	20
UT0020934	250	8.0-8.3	13
UT0024686	400	7.9	14
UT0024759	400	8.4	20
UT0000281	400	8.2-8.3	13
UT0023639	349	8.6	13
UT0025810	70	7.7-8.3	20
UT0024767	398	7.8-7.9	13
UT0020371	280	7.9-8.3	13
UT0024368	204	8.7	19

Table 4, UPDES Permits that EPA (2018) criteria would be more stringent than the Utah's current criteria

Permit No.	Hardness	pH	Ecoregion
UT0024392	290	7.5-7.8	13
UT0025976	392	7.2-7.9	19
UT0023752	300	7.3-8	19
UT0025429	200	7.5	13
UT0026140	400	7.5	19
UT0025097	300	7.5-7.6	13
UT0025461	400	7.5	19
UT0025518	390	7.5-7.6	13
UT0025097	300	7.5-7.6	13
UT0021717	259	7.2	13
UT0024414	400	7.1-7.2	19
UT0021636	350	7.5-8	13
UT0021628	350	7.5-8	13
UT0025241	400	7.5-7.6	13
UT0020303	250	7.4-7.7	13

Implementation Considerations for Assessments

For assessments, total aluminum concentrations, pH, hardness, and DOC concentrations that are measured at the same time and place will provide the most accurate data for assessments (EPA, 2018). The total aluminum concentrations may be based on an approved EPA analytical method for total recoverable aluminum or a method that better measures the bioavailable fraction of aluminum (EPA, 2019). If an alternative analytical method is to be implemented, the data quality indicators such as precision, accuracy, representativeness, comparability, and completeness should be evaluated consistent with DWQ's *Quality Assurance Program Plan for Environmental Data Operations*.

The determination of whether to estimate the values for missing parameters to support assessments is dependent on the specific goals and purposes of the assessment. Estimated parameters factor values are not currently used in Utah's Integrated Report when measured values are unavailable. These decisions are documented in the assessment methods document.

Recommended Rule Changes

The following strikeout and underlining formats show the proposed changes to Table 2.14.2 in UAC R317-2-14, footnotes (5) and (6). Existing footnote (5) will be changed to (6) to maintain the order of the footnotes in Table 2.14.2. Aluminum will be separated from the existing DISSOLVED criteria and specified as TOTAL RECOVERABLE. Not all of the substances listed under the METALS heading are metals, so the headings METALLOIDS (e.g., arsenic) and DISSOLVED SUBSTANCES (e.g., cyanide) are added. Footnote (4) is unchanged.

The updated criteria will supersede the existing criteria 3 years after the Water Quality Board adopts the updated criteria. The 3-year delay in implementation of the aluminum criteria is intended to provide time for DWQ or dischargers to implement changes in assessment methods and monitoring to support the EPA (2018) aluminum criteria. Unlike other regression-based criteria, the EPA (2018) did not publish the actual equation. EPA (2018) recommends that states adopt the spreadsheet calculator or the tables in Appendix K. DWQ is recommending that the Appendix K tables be incorporated by reference along with a provision that is intended to allow the use of the criteria calculator for water chemistries that are not explicitly included in the tables. Analytical methods are expected to continue to evolve and footnote 6(d) is intended to provide flexibility to select the most appropriate current analytical method for assessments. UPDES permits remain required to the use the specific EPA-approved methods from 40 CFR Part 136 for measuring total recoverable aluminum in effluents.

METALS
(TOTAL RECOVERABLE,
UG/L)

Aluminum (4) (5)				
4 Day Average	87	87	87	87
1 Hour Average	750	750	750	750

METALS, METALLOIDS
AND SUBSTANCES (4)
(DISSOLVED, UG/L) (6)
[UG/L)(5)

Aluminum				
4 Day Average (6)	87	87	87	87
1 Hour Average	750	750	750	750

]

-----------------------BREAK---------------------------------

(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:

Until (insert date 3 years after adoption of rule), w[W]here the pH is equal [-]to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as CaCo3 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).

On and after [insert DATE at least 3 years from Board adoption date], the one-hour and four-day aluminum criteria are incorporated by reference from Appendix K, Recommended Criteria for Various Water Chemistry Conditions, Final Ambient Water Quality Criteria for Aluminum 2018, EPA-822-R-18-001.

(5a) For water chemistry conditions not specifically listed in Appendix K, the criteria are the more stringent of the criteria bracketed by the two most similar water chemistry conditions or may be interpolated using the same equations used to create the Appendix K tables.

(5b) Criteria based on ambient water chemistry conditions must protect the water body over the full range of water chemistry conditions, including during conditions when aluminum is most toxic.

(5c) For characterizing ambient waters, total recoverable analytical methods may be used or different scientifically appropriate analytical methods that measure the bioavailable fraction of aluminum that includes the measurement of amorphous aluminum hydroxide yet minimizes the measurement of mineralized forms of aluminum such as aluminum silicates associated with suspended sediment particles or clays.

(6) 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.

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DWQ-2021-016924

UTAH DEPARTMENT *of* ENVIRONMENTAL QUALITY

WATER QUALITY

Criteria Support Document:

Site-specific ammonia water quality criteria for the Jordan River from Farmington Bay to Little Cottonwood Creek, the State Canal, the Surplus Canal from 900 South to the Jordan River, and a segment of Mill Creek, Salt Lake and Davis Counties, Utah

August 16, 2022

Executive Summary

The Jordan River from Farmington Bay to the confluence of Little Cottonwood Creek, the State Canal, the Surplus Canal from 900 South St. to the confluence with the Jordan River, and Mill Creek from the confluence with the Jordan River to Interstate 15 (the Site) were evaluated to determine the appropriate water quality criteria for ammonia. The principal objective was to determine if mussels belonging to the Superfamily Unionoidea (unionid mussels) are residents as defined by the U.S. Environmental Protection Agency (USEPA). 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. Therefore, unionid mussels are not residents.

5. The ammonia criteria do not need to include protection for unionid mussels. Recalculated ammonia water quality criteria from Appendix N of USEPA (2013) are recommended.

Preface

This document contains recommendations for changing Utah's water quality standards, UAC R317-2. Only the Utah Water Quality Board can change the standards through the administrative procedures rulemaking process.

Contents

1.0 Introduction

The United States Environmental Protection Agency (USEPA) published updated Clean Water Act Section 304(a) water quality criteria for ammonia in 2013. The Utah Division of Water Quality (DWQ, 2017) published Implementation Guidance describing how the USEPA (2013a) recommendations will be implemented for Utah. Utah's criteria have not been updated as recommended by the Implementation Guidance. DWQ expects to update the recommendations for updating Utah's ammonia criteria statewide in 2023.

The USEPA (2013a) 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 mussel species were among the most sensitive species tested, and when present, the USEPA (2013a) ammonia criteria are 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 10th most sensitive taxa for acute toxicity and 5th most sensitive for chronic toxicity (Tables 3 and 4, USEPA, 2013a). If unionid mussels don't require protection, the ammonia criteria can be recalculated (see Appendix N, USEPA, 2013a) and are less stringent.

From 2014 through 2021, OreoHelix Consulting conducted physical surveys to determine what mollusks were present in the Jordan River and adjacent waterbodies on behalf of the publicly-owned treatment works (POTWs) discharging to the Jordan River. The results of these surveys are documented in a series of reports discussed in more detail later in this document.

In 2019, the results of the early mollusk surveys were used to support site-specific ammonia criteria for a limited segment of the Jordan River. The Utah Water Quality Board[1] adopted site-specific ammonia water quality criteria based on an absence of unionid mussels for:

- the Jordan River from 900 South to the confluence with Mill Creek;
- the Surplus Canal from 900 South to the Jordan River;
- and Mill Creek from the Jordan River to the I-15 overpass.

Additional mollusk surveys were completed in adjacent segments of the Jordan River and the State Canal. The existing site-specific criteria should be expanded upstream in the Jordan River to Little Cottonwood Creek, downstream in the Jordan River to the Great Salt Lake, and the State Canal as discussed in this document. For clarity and completeness, the discussions will combine the data used to support the existing site-specific criteria and the new data that supports the proposed extension.

1.1 Site Description

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 by urban influences.

The Jordan River flows from Utah Lake to Great Salt Lake (Figure 1). Like many urban waterways, the Jordan River has many causes of degradation and continues to be the focus of extensive water quality studies. Table 1 shows the designated uses and water quality impairments for the Jordan River, Surplus Canal, and State Canal. The specific segments that are the focus of this document, **the Site**, are shown on Figure 2 and identified in Table 1 with shading.

The entire Jordan River is impacted by flow alterations and some locations are routinely dredged. The elevation of Utah Lake, the headwaters for the Jordan, is managed. Large secondary water diversions are located at the Turner and Narrows diversions. A large portion of the flow is diverted from the lower Jordan River at the Surplus Canal downstream of Mill Creek. Close to the terminus of the Jordan River, the State Canal diverts a large portion of the remaining water. All of the segments of the Jordan River have water quality impairments (Table 1).

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[1] See DWQ (2018).

The Jordan River, from the Surplus Canal downstream to Great Salt Lake (the Site) has an approved 2013 Total Maximum Daily Load (TMDL) for dissolved oxygen that limits organic carbon loads. The Jordan River from Little Cottonwood Creek to Great Salt Lake (the Site) also has site-specific dissolved oxygen criteria in (Table 2.14.5, UAC R317-2-14). Despite the implementation of the TMDL and the adoption of site-specific dissolved oxygen criteria, this segment of the Jordan River remains hypoxic.

Upstream of the Little Cottonwood Creek confluence, the Jordan River meets the dissolved oxygen criteria. Dissolved oxygen concentrations even meet the more rigorous Class 3A criteria between Little Cottonwood Creek and the Narrows Diversion. In 2020, the aquatic life use was changed from cold water (Class 3A) to warm water (Class 3B) for this segment. This Use Attainability Analysis focused on water temperature because the segment continued to meet the more stringent cold water dissolved oxygen criteria.

Table 1. Designated Uses and water quality impairments for the Jordan River, Surplus Canal, and State Canal

Segment[1]	Designated Uses	2022 Impairments[2]
Jordan River, from Farmington Bay to North Temple Street, Salt Lake City	**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. **3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **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. **4** Protected for agricultural uses including irrigation of crops and stock watering.	E. coli; Dissolved Oxygen; Benthic macroinvertebrates.
State Canal, from Farmington Bay to confluence with the Jordan River	**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. **3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **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. **4** Protected for agricultural uses including irrigation of crops and stock watering.	Ammonia; Dissolved Oxygen; Total Dissolved Solids.
Jordan River, from North Temple Street in Salt Lake City to confluence with Little Cottonwood Creek	**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.	Benthic macroinvertebrates; Dissolved Oxygen; Total Phosphorus; Total Dissolved Solids.

	3B Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **4** Protected for agricultural uses including irrigation of crops and stock watering.	
Surplus Canal from Great Salt Lake to the diversion from the Jordan River	**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. **3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **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. **4** Protected for agricultural uses including irrigation of crops and stock watering.	Not assessed
Mill Creek from confluence with Jordan River to Interstate 15	**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. **3C** Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain. **4** Protected for agricultural uses including irrigation of crops and stock watering.	E. coli; Benthic macroinvertebrates
Jordan River from confluence with Little Cottonwood Creek to Narrows Diversion	**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. **3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **4** Protected for agricultural uses including irrigation of crops and stock watering.	E. coli; Benthic macroinvertebrates; Total Dissolved Solids.
Jordan River, from Narrows Diversion to Utah Lake	**1C** Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water **2B** Protected for infrequent primary contact recreation. Also protected for secondary contact recreation where there is a low likelihood of	Arsenic; Total Dissolved Solids.

	ingestion of water or a low degree of bodily contact with the water. Examples include, but are not limited to, wading, hunting, and fishing. **3B** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain. **4** Protected for agricultural uses including irrigation of crops and stock watering.	
[1] Shaded segments are part of the Site and the focus of this document. [2] The Jordan River has 4 segments in R317-2-13 but is divided into 8 assessment units for water quality assessments. Assessment unit		

1.2 Data Needs to Support Recalculated Criteria

The Utah Implementation Guidance for the 2013(a) USEPA Ammonia Criteria for the Protection of Aquatic Life (DWQ, 2017) describes the process and data needs to determine the if the ammonia criteria must include protection of unionid mussels. The process can be summarized as three steps:

1. Determination of historical presence of unionid mussels.
2. Determination of current presence of unionid mussels.
3. Evaluation if unionid mussels are "residents" for criteria determination.

The USEPA (2013c) defines "residents" as taxon that:

a. are usually present at the site,
b. are present at the site only seasonally due to migration,
c. are present at the site intermittently because they periodically return to or extend their ranges into the site,
d. were present at the site in the past, are not currently present at the site due to degraded conditions, but are expected to return to the site when conditions improve, or
e. are present in nearby bodies of water, are not currently present at the site due to degraded conditions, but are expected to be present at the site when conditions improve.

The terms "resident" or "occur at the site" do not include life stages and species that:

a. were once present at the site but cannot exist at the site now due to permanent alterations of the habitat or other conditions that are not likely to change within reasonable planning horizons, or
b. are still-water life stages or species that are found in a flowing-water site solely and exclusively because they are washed through the site by stream flow from a still-water site.

2.0 Methods

2.1 Historical Presence of Mussels

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). Note that the records report the occurrence of both *Anodonta nuttalliana* and *Anodonta californiensis*. Recent DNA analyses has determined that these are one species (Rogers et al., 2020) and will be combined as *Anodonta nuttalliana* in this report.

2.2 Current Presence of Mussels

Oreohelix implemented a variety of sampling methods depending on the specific objective and physical conditions. For the qualitative surveys (USEPA, 2013b), the substrates in wadable sections were sampled with a shovel. In deeper waters, substrate samples were obtained with suction dredges or hand-operated dredges. The substrate samples were then sieved and examined for the presence of mollusks by trained surveyors. Sample locations are reported as GPS coordinates, general transect locations, or descriptively. The sample locations for the site are shown on Figures 3 and 4. Other locations sampled are shown on Figure 5.

Sample locations were selected using random designs, systematically random designs, systematic, or by other methods. For some of the locations, the methods were preapproved by DWQ and DWQ provided oversight. For other locations, Oreohelix independently designed and implemented the surveys. DWQ supports that the rigor of the surveys at the Site are sufficient to conclude unionid mussels are absent if they are not found. Until DWQ completes the reviews for the other sites, the data is interpreted as reconnaissance-level. Reconnaissance-level surveys are not conclusive for demonstrating an absence of unionid mussels (USEPA, 2013b).

The mollusk survey methods and results are documented in the following reports:

- *Freshwater Mollusk Survey, Jordan River, UT, Part 1: Unionid Mussels and Non-Pulmonate Snails Version 2.1*: Oreohelix Ecological, November 5, 2014
- *Unionoida Mussel and Non-Pulmonate Snail Survey and Status in the Jordan River, UT, 2014, Final Report*, Oreohelix Ecological, May 20, 2015
- *Jordan River Watershed Mollusk Surveys: "Last of the Anodonta."* 2016 Report. Oreohelix Consulting. September 19, 2016
- *Lower Mill Creek and Mid- Jordan River Native Mussel Survey 2017 As it Relates to the Central Valley Water Reclamation Facility Discharge*. December 21, 2017
- *Defining Presence-Absence of Native Mussels in the lower Mill Creek mid-Jordan River Survey Area Supplementary Information to Richards 2017*. Oreohelix Ecological
- *Lower Mill Creek and Jordan River Native Mussel Surveys Continued. Scope of Work*. Oreohelix Ecological April 24, 2017
- *Native Unionoida Surveys, Distribution, and Metapopulation Dynamics in the Jordan River-Utah Lake Drainage, UT*, Oreohelix Ecological, May 26, 2017
- *Lower Jordan River Mollusk Survey as it Relates to South Davis Sewer District South Plant Effluent*, January 2, 2020, Oreohelix Ecological (DWQ-2020-007383);
- *State Canal Mollusk Survey as it relates to South Davis Sewer District South Plant Effluent*, January 3, 2020, Oreohelix Ecological (DWQ-2020-012604);
- *Jordan River Native Mussel Surveys*, April 9, 2021, Oreohelix Ecological (DWQ-2021-010122).

Oreohelix also compiled the mollusk survey results into a spreadsheet available as DWQ-2021-010126. The summary spreadsheet entries don't currently reference the specific source of the results, i.e., the specific report where the survey results were initially reported. DWQ has requested that Oreohelix update the spreadsheet with reference to the specific reports.

3.0 Results

3.1 Results for Historical Presence of Mussels

Two species of indigenous unionid mussels potentially occur in Utah: *Anodonta nuttalliana* 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 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 (Richards and Miller, 2015; USU, 2017). 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).

3.2 Results for Current Presence of Mussels

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

1. No live mussels or whole shells were found at the Site. A shell fragment from *A. nuttalliana* was found at the Surplus Canal diversion to the Jordan River (Figures 3 and 4) and shell fragments were found in a Mill Creek bank-cut stratum near the confluence with the Jordan River (Figure 6). Large numbers of *Corbicula*, both living and shells were found at during the surveys (Figure 7).

2. No live mussels were found in the Jordan River upstream of the Site nor in tributaries to the Jordan River. The tributaries to the Jordan River have not been completely surveyed. No live unionid mussels or shells were found at the locations surveyed in Bingham, City, Mill, Big Cottonwood, and Little Cottonwood Creeks. No surveys were conducted in Red Butte or Parleys creeks (Figure 5).

Shell fragments were found at several locations in the Jordan River downstream of Utah Lake and around Utah Lake (Figure 5).

3. The closest locations to the Site where unionids mussels or whole shells were currently (after 1978) found are Salt Creek (Great Salt Lake tributary), Beaver Creek (Weber River tributary), Burraston Ponds, Currant Creek (Utah Lake tributary), Mill Pond on (Spring Creek, Lehi) (Figure 8) and Beer Creek (Figure 9) (Utah Lake tributaries).

Live specimens *of A. nuttalliana* were found in Salt Creek. The hydraulic connectivity between Salt Creek and the Jordan River is through hypersaline portions of Great Salt Lake that would be 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. The Provo River is the major tributary to Utah Lake.

A. nuttalliana was reported to be present recently in the Burraston Ponds, (Mock 2004; Mock et al, 2010;), Currant Creek (Mock et al., 2010; Richards 2016c) and Spring Creek (Mock et al., 2010). Unionid mussels were not found in a follow up survey by Oreohelix (2016c).

4. 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.

5. 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 6.

4.0 Discussion and Recommendations

As discussed in Section 1.2, the USEPA (2013c) resident' test is used to determine if ammonia criteria must include protection for unionid mussels and non-pulmonate snails. In this section the past and current presence status are discussed in context of the resident's test in Section 4.1. Section 4.2 summarizes the conclusions from the discussions in Section 4.1 and Section 4.3 presents the proposed rule changes.

4.1 USEPA (2013c) "Resident's" Tests

4.1.1 Are usually present at the site.

No unionid mussels were found during the Site surveys by Oreohelix. The surveys generally followed the recommendations of DWQ (2017) and were sufficiently rigorous to conclude that *A. nuttalliana and M. falcata* are unlikely to be 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).

4.1.2 Are present at the site only seasonally due to migration.

This test is not relevant to unionid mussels or snails. The unionid mussels do not migrate seasonally although their obligate fish hosts may migrate.

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

No unionid mussels were observed during the surveys. Adult mussels are sessile, and if present, would not be intermittently present. 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.

4.1.4 Other Resident's tests.

- Were present at the site in the past, are not currently present at the site due to degraded conditions, but are expected to return to the site when conditions improve;
- Are present in nearby bodies of water, are not currently present at the site due to degraded conditions, but are expected to be present at the site when conditions improve.
- Were once present at the site, but cannot exist at the site now due to permanent (physical) alterations of the habitat or other conditions, that are not likely to change within reasonable planning horizons.

4.1.4.1 Past and current presence at the Site

Historical records document that unionid mussels were previously present in the Jordan River, the Jordan River watershed in Big Cottonwood Creek and upstream in Utah Lake. No records were found for unionid mussels in Surplus or State Canals. No specific records document past presence of unionid mussels at the Site but their occurrence is inferred from their presence upstream and nearby waters. Indirect evidence of their historical presence consists of unionid shells observed in a cut-bank stratum in Mill Creek near the confluence with the Jordan River and shell fragments at several locations in the Jordan River downstream of Utah Lake (Figure 5). The specific origins or age of these shells is unknown. The surveys conducted by Oreohelix support that unionid mussels are not currently present at the Site.

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

4.1.4.2 Presence in nearby waters

The closest documented live unionid mussels to the Jordan River are located in Beer Creek shown in Figure 9 and Currant Creek (*A. nuttalliana*), tributaries to Utah Lake; and Beaver Creek (*M. falcata*), a tributary to the Weber River that discharges to Great Salt Lake and the Provo River via a diversion. Oreohelix found *A. nuttalliana* shells in the Jordan River upstream of the Site (Figure 5). (Mock et al., (2010; 2014) recently found live *A. nuttalliana* in Currant and Spring Creeks (tributaries to Utah Lake). Qualitative historical records indicate that unionid mussels were once common in Utah Lake.

Limited reconnaissance level surveys were conducted on some of the tributaries to the Jordan River and upstream in Utah Lake and its tributaries. No evidence of unionid mussels was observed but these results are interpreted as reconnaissance-level surveys.

4.1.4.3 Cannot exist at the site now due to permanent (physical) alterations of the habitat or other conditions, that are not likely to change within reasonable planning horizons

The Jordan River is degraded physically, biologically and chemically and all have likely contributed to the extirpation of unionid mussels.

Several water quality impairments have been identified for the Site (Table 1). The dissolved oxygen impairments likely adversely affect the ability of mussels to inhabit the Site but cannot be concluded to be an exclusive cause of their absence. 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 obligate fish hosts for unionid mussels would also be impacted by the dissolved oxygen impairments.

The causes for the dissolved oxygen impairments include organic loading, nutrient loading, and flow alterations (see e.g., Cirrus, 2020). In addition to the observed sediment anoxia (Oreohelix, 2017b), the contributions of sediment oxygen demand to the water column hypoxia is a topic of research for the TMDL. The ongoing investigations of these impairments for the Jordan River suggest that sediment oxygen demand coupled with reduced flushing because of reduced flows associated with flood management are primary contributors to the dissolved oxygen impairments (Cirrus, 2017). The lower flows exacerbate the natural physical conditions of lower gradients as the Jordan River approaches Great Salt Lake. A less stringent, site-specific dissolved oxygen criteria for the Jordan River at the Site were previously established to adjust for these conditions. However, the river remains impaired for dissolved oxygen.

,

The Site is affected by other forms of degradation including regular dredging, channelization, and hardening for flood control. Flow regimes have been altered by upstream dams, diversions, and water transfers. The substrate in non-depositional reaches is hardpan (Oreohelix, 2020).

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 efforts are unlikely to ever fully restore the physical and biological integrity of the lower 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 the Site were restored, reestablishment of unionid mussels at the Site would require one of three mechanisms: 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. Neither of these scenarios appear likely within the next 30 years.

2. Alternatively, an infected fish host could reintroduce unionid mussels to the Site. The fish host species for *A. nuttalliana* have not been fully characterized. *A. nuttalliana* is a suspected generalist with regards to their fish hosts. This is one of the topics for additional research identified by the Utah Division of Wildlife Resources Native Mollusk program. Xerces reports that green sunfish are suitable hosts (http://xerces.org/california-and-winged-floaters/).

   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). With the exception of the green sunfish, the suitability of these species to serve as hosts for unionid mussels, are unconfirmed. However, there are no identified nearby locations of unionid mussels upstream and fish densities are speculated to be too low (Richards and Miller, 2019).

3. Unionid mussels could be intentionally reintroduced by the Utah Division of Wildlife Resources. The Utah Division of Wildlife Resources Native Mollusk program is currently identifying the locations of existing unionid mussels. They are also identifying the information needed to select locations suitable for reintroduction. These plans do not include the Jordan River for the foreseeable future because of the degraded habitat and competition with invasive species. Other higher quality habitat and ensuring protection of extant unionid mussel populations are the focus of the initial recovery efforts.

Historical and qualitative records support that unionid mussels were present in portions of the Jordan River and the Big Cottonwood Creek tributary. Unionid mussels were likely present at the Site and in other tributaries 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, notably dissolved oxygen impairments, and physical habitat alterations. The identified impairments cannot be directly linked to the absence of unionid mussels because other (invasive) bivalves are present. While restoration efforts for both the physical and chemical degradation are ongoing, 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 of implementation before resulting in substantive improvements.

4.2 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. Unionid mussels are not residents.

Ammonia criteria protective of the aquatic life uses at the Site does not need to be protective of unionid mussels during this planning horizon. Non-pulmonate snails are present and the ammonia criteria are required to be protective of these taxa. The criteria should be calculated consistent with the recommendations of Appendix N, USEPA (2013c). The underlying assumptions and conclusions supporting these recommendations should be periodically reviewed as progress is made on restoring the Jordan River.

4.3 Recommended Ammonia Criteria and Rule Revisions.

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:

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

In spreadsheet formula format

CMC=0.7249*(0.0114/(1+10^(7.204-pH))+1.6181/(1+10^(pH-7.204)))*MIN(51.93,62.15*10^(0.036*(20-T)))

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:

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

In spreadsheet formula format

CCC=0.9405*(0.0278/(1+10^(7.688-pH))+1.1994/(1+10^(pH-7.688)))*MIN(6.92,7.547*10^(0.028*(20-T)))

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:

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

In spreadsheet formula format

CCC=0.9405*(0.0278/(1+10^(7.688-pH))+1.1994/(1+10^(pH-7.688)))*(7.547*10^(0.028*(20-MAX(T,7))))

Proposed revisions to R317-2-14, Table 2.14.2 Footnote 9. Additions are shown in underlined green font and deletions are shown in strikeout red font.

(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:

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

Fish Early Life Stages are Absent:

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

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

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

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

$mg/L \text{ as } N \text{ (chronic)} =$ 0.9405 ~~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:

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

Class 3B, 3C, 3D:

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

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

$mg/l \text{ as } N \text{ (Acute)} = 0.7249 *$ ~~(~~$((0.0114/(1+10^{7.204-pH}))+(1.6181/(1+10^{pH-7.204}))) * MIN(51.93,(62.15*10^{0.036*(20-T)}))$

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.

Figures

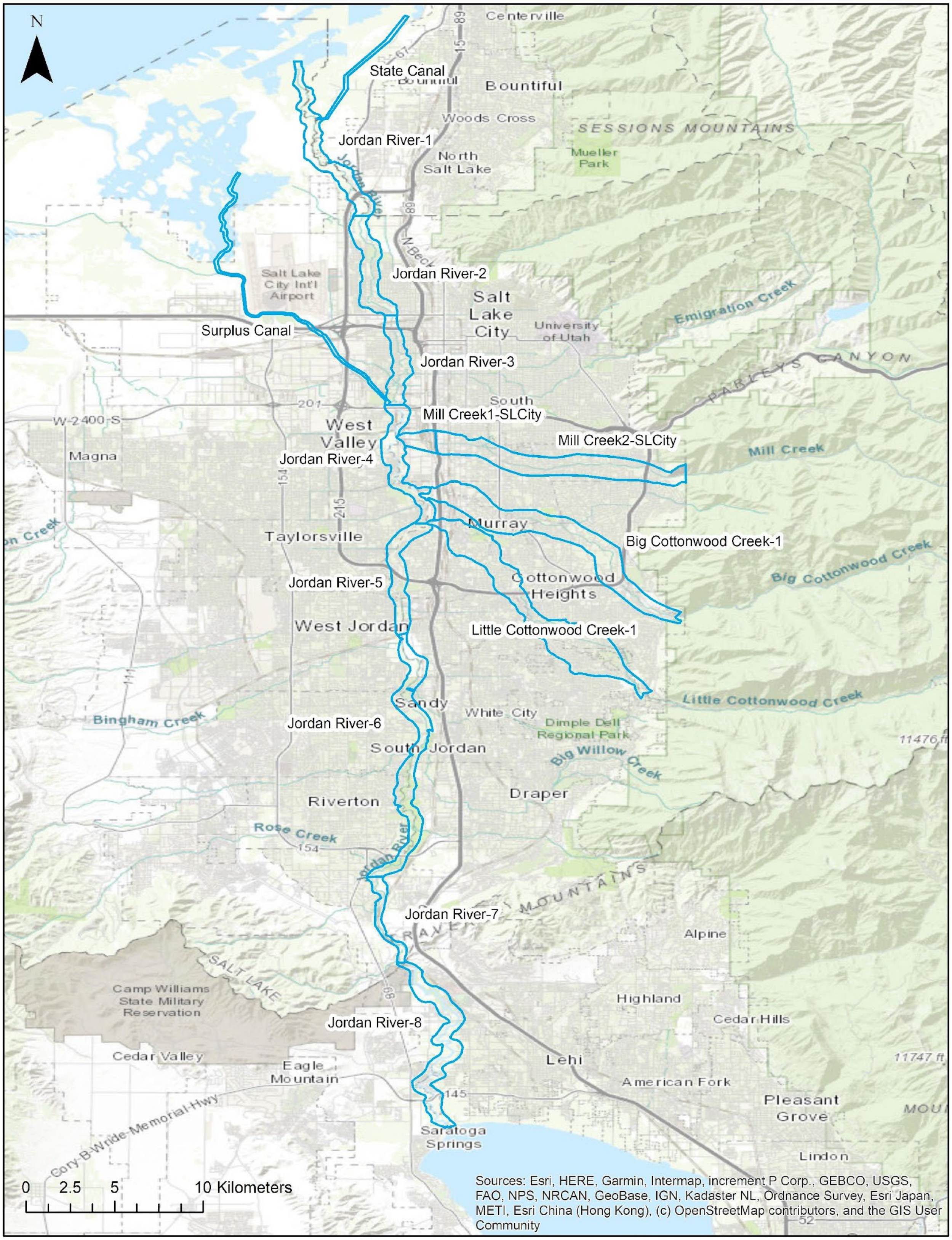

Figure 1. Overview of Jordan River and tributaries assessment unit segmentations.

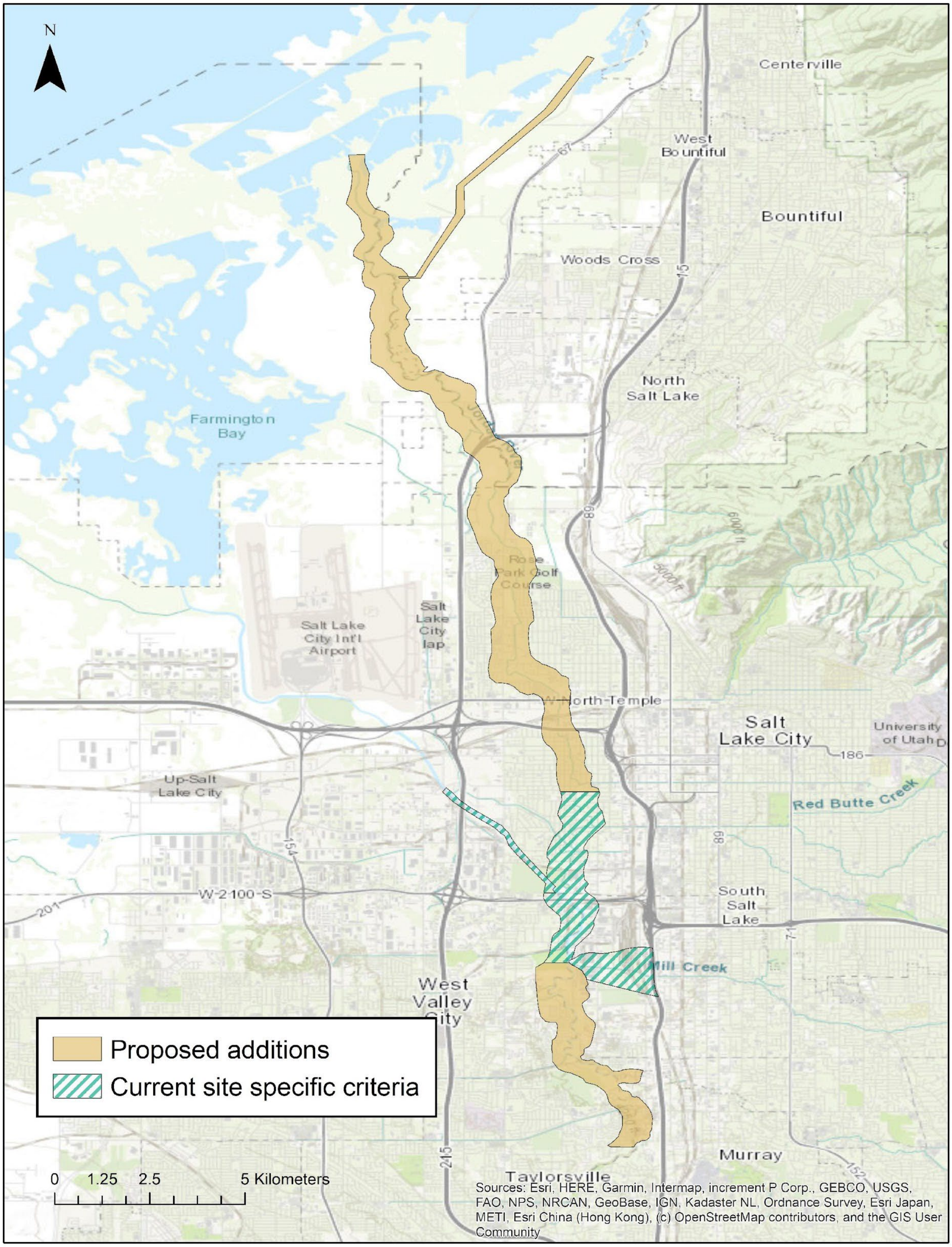

Figure 2. The Site where the proposed site-specific ammonia criteria will apply

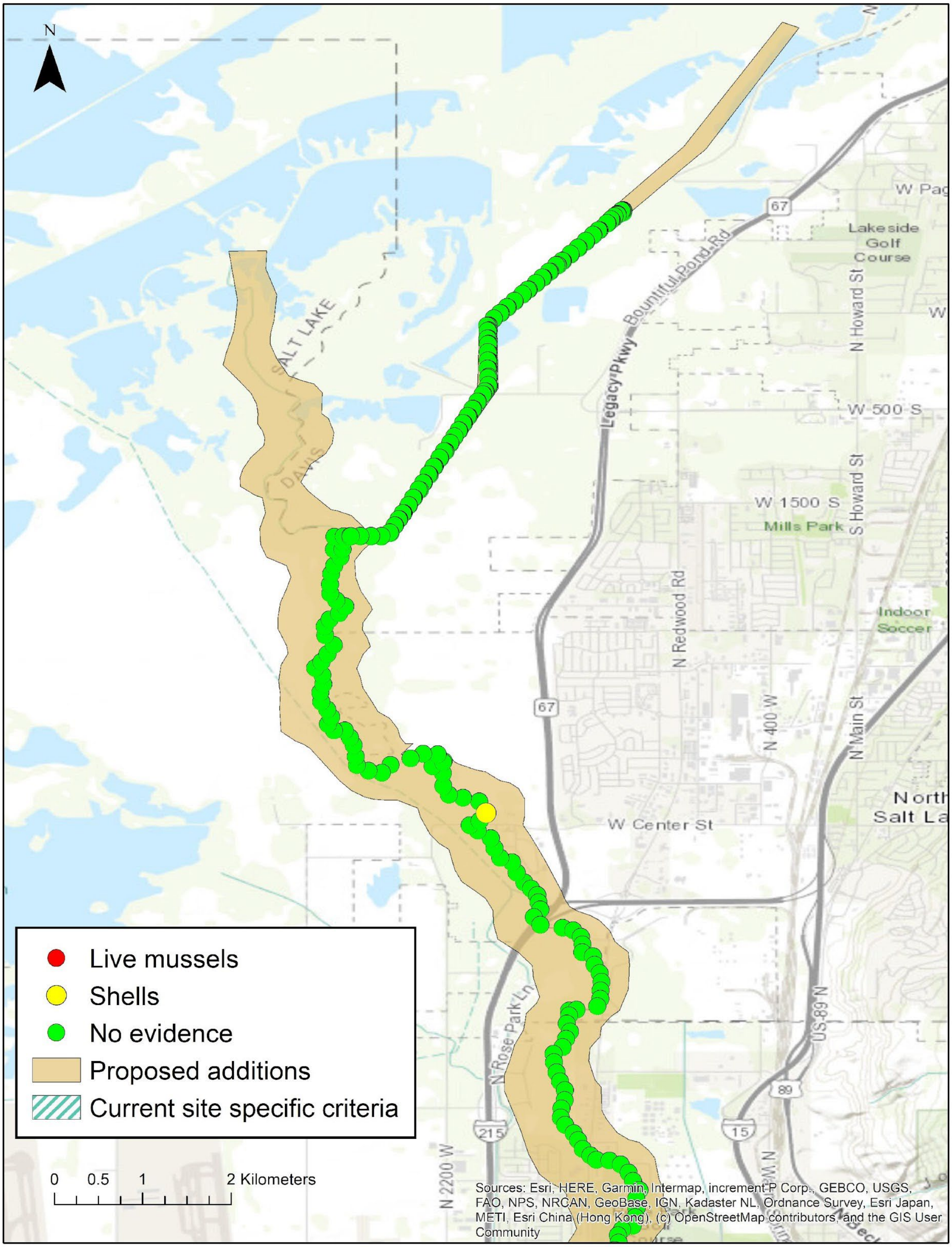

Figure 3. Mussel survey locations at the Site, northern half.

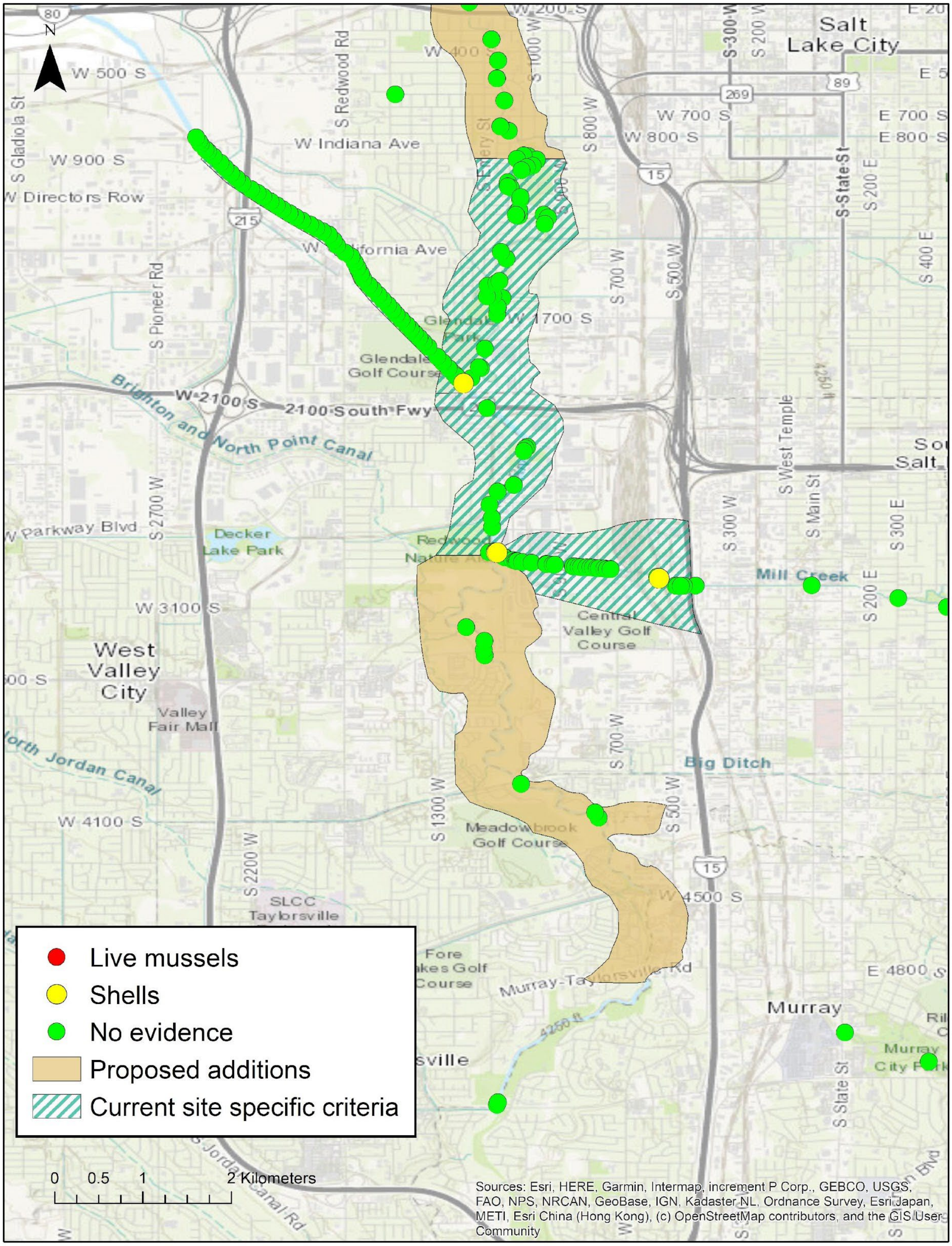

Figure 4. Mussel survey locations at the Site, southern half.

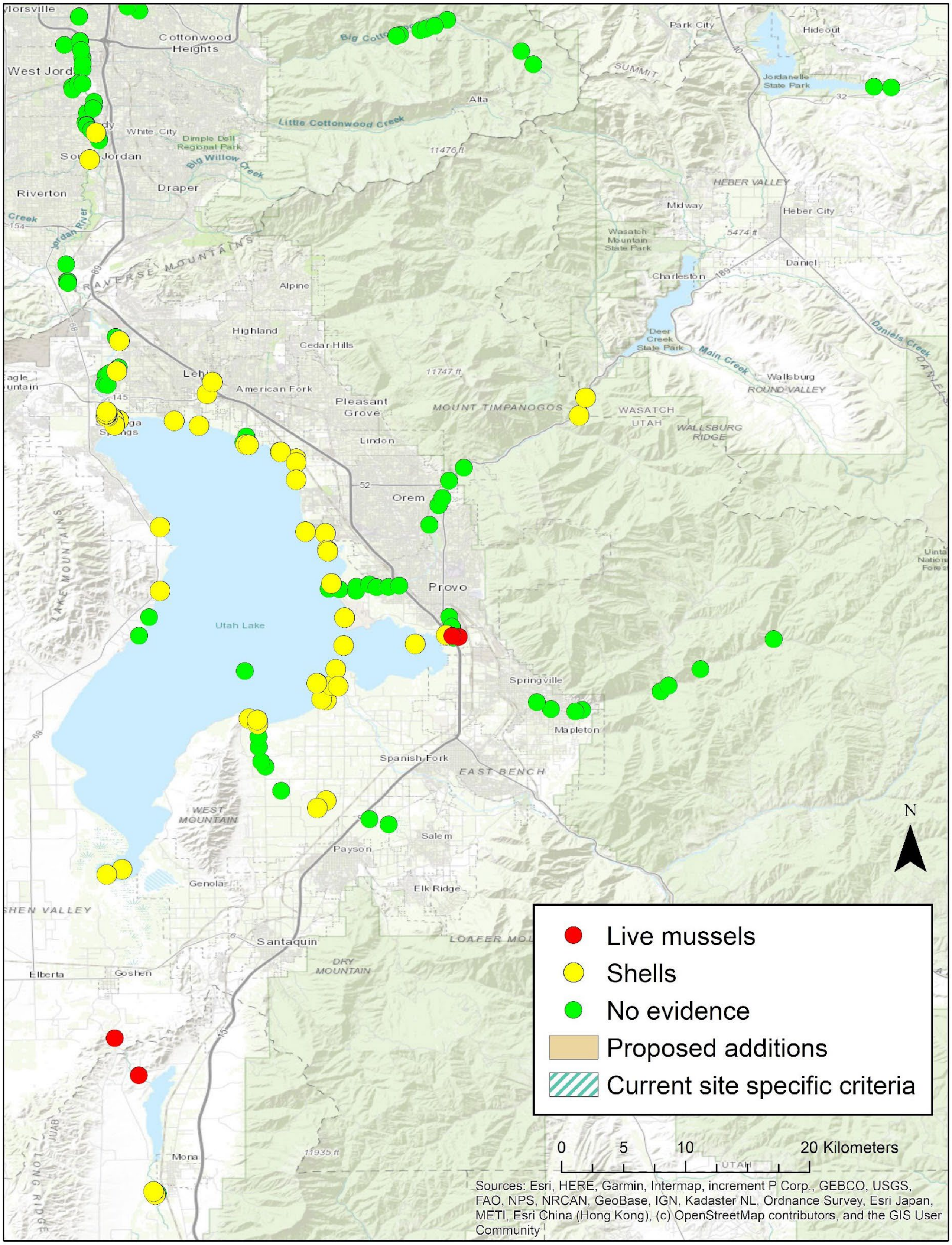

Figure 5. Mussel survey locations in the Jordan River and tributaries upstream of the Site.

Figure 6. 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 conditions

Figure 7. 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)

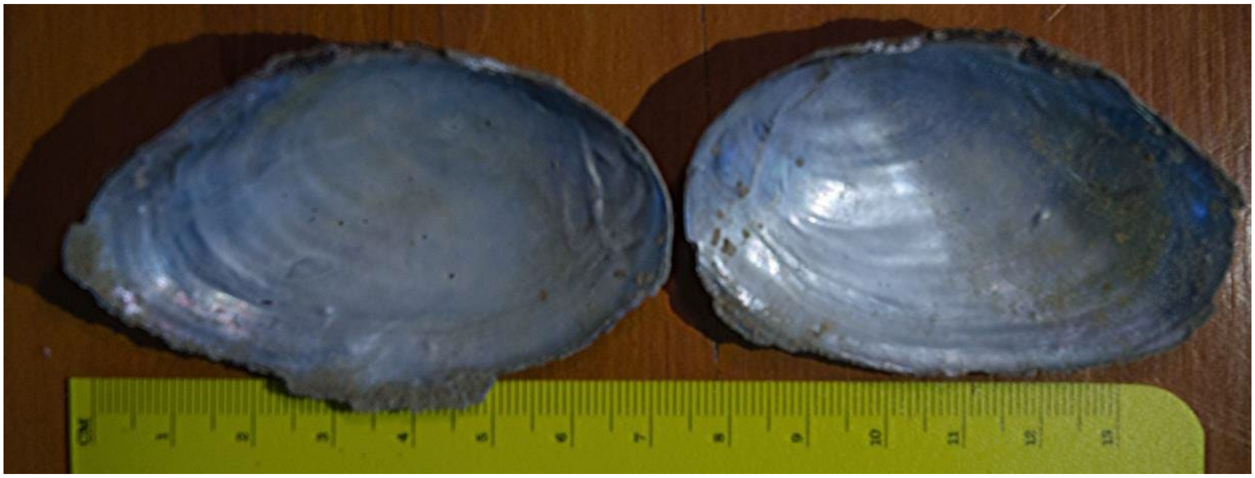

Figure 8. Complete Anodonta sp. shell from Mill Pond, Utah County, April 2014. No body tissue was present and the time since death is unknown. (Figure 27, Oreohelix, 2014)

Figure 9. Location of Beer Creek, the closest known population of Anodonta nuttalliana/nuttalliana to Mill Creek evaluation site and CVWRF (adapted from Oreohelix, 2016c)

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DEIDRE HENDERSON
Lieutenant Governor

Department of
Environmental Quality
Kimberly D. Shelley
Executive Director
DIVISION OF WATER QUALITY
John K. Mackey, P.E.
Director

M E M O R A N D U M

TO: Water Quality Board

THROUGH: John Mackey, Director

FROM: Paul Burnett, Nonpoint Source Program Lead

DATE: September 28, 2022

SUBJECT: State Nonpoint Source Program Annual Report for Fiscal Year (FY) 2021 and FY 22 Projects Overview

The Utah Division of Water Quality receives grant funds to implement nonpoint source pollution control projects throughout the state. These grants include Section 319(h) funds from the Environmental Protection Agency (EPA) and State Nonpoint Source funds authorized by the Water Quality Board. Every year an annual report is submitted to EPA on the accomplishments of the State's Nonpoint Source Program. Paul Burnett will present a summary of this report to the Water Quality Board during the September 28, 2022 meeting. In addition, Mr. Burnett will present an overview of the projects selected for FY 22.

DWQ-2022-027992