

JORDAN RIVER WATERSHED *E. COLI* TMDL

2026 Addendum and Appendices

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Utah Water Quality Board Approved: TBD

EPA Approved: TBD



UTAH DEPARTMENT of
ENVIRONMENTAL QUALITY
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Executive Summary

This document serves as an Addendum to the 2023 U.S. Environmental Protection Agency (EPA) approved Jordan River Watershed *Escherichia coli* (*E. coli*) Total Maximum Daily Load (TMDL) Main Document. Its primary purpose is to address the *E. coli* impairment in two additional Assessment Units (AUs): City Creek-1 (UT16020204-009_00) and Bingham Creek (UT16020204-023_00). The 2023 Main Document (DWQ, 2023) established *E. coli* TMDLs for 14 waterbodies in the Jordan River Watershed, and provided the framework for additional assessment units to be added within the study area.

Section 303(d) of the federal Clean Water Act (CWA) requires states to develop TMDLs for waters that do not meet water quality standards. The TMDL process establishes allowable loadings of pollutants or other quantifiable parameters for a waterbody. The 2023 Main Document and Appendices used a concentration-based approach, with allowable levels of bacteria set as a concentration expressed in bacteria counts/100 mL of water. The goal is that all discharges to surface waters (point and nonpoint source) meet the water quality criteria to ensure standards are met throughout the waterbody.

This approach was a shift from previously completed *E. coli* TMDLs that were based upon necessary load reductions to meet instream water quality standards. Several states have had success with this concentration-based approach. The Utah Division of Water Quality (DWQ) believed this approach had the following benefits for the impaired AUs in the Jordan River watershed: 1) a concentration limit was easier for stakeholders to understand and implement compared to a load-based limit and 2) this approach was also equitable for all Utah Pollutant Discharge Elimination System (UPDES) permittees within the impaired AUs, as all are held to the same limit and permit requirements related to best management practice (BMP) implementation regardless of area of responsibility.

This Addendum includes an overview of the impairments as well as appendices for *E. coli* TMDLs in two AUs: City Creek-1 and Bingham Creek. The addendum references the 2023 Main Document in sections where the information and/or approach has not changed and provides updates where changes have been made. The two appendices include information specific to the impaired AUs on hydrology, land use, data analysis, and potential sources of *E. coli* in the area.

DWQ believes *E. coli* loading will be reduced and beneficial uses restored and protected through implementation of this Jordan River Watershed *E. coli* TMDL and Addendum.

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List of Acronyms

AU	Assessment Unit
BLM	Bureau of Land Management
BMP	Best Management Practice
CAAPFs	Concentrated Aquatic Animal Production Facilities
CAFO	Concentrated Animal Feeding Operation
CFS	Cubic Feet per Second
CWA	Clean Water Act
DWQ	Utah Division of Water Quality
DWRi	Utah Division of Water Rights
<i>E. coli</i>	<i>Escherichia coli</i>
EPA	U. S. Environmental Protection Agency
LA	Load Allocation
LDC	Load Duration Curve
LID	Low Impact Development
mL	Milliliter
MOS	Margin of Safety
MPN	Most Probable Number
MS4	Municipal Separate Storm Sewer System
MSD	Greater Salt Lake Municipal Services District
NLCD	National Land Cover Dataset
NPDES	National Pollutant Discharge Elimination System
POTW	Publicly Owned Treatment Works
RA	Reasonable Assurance
SAP	Sampling and Analysis Plan
SLCo	Salt Lake County
SITLA	Utah School and Institutional Trust Lands Administration
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
UAC	Utah Administrative Code
UPDES	Utah Pollutant Discharge Elimination System
USFS	United States Forest Service
WLA	Wasteload Allocation
WY	Water Year

Chapter 1. Review of 2023 Main Document

In 2023, EPA approved the Jordan River Watershed *E. coli* TMDL that included TMDLs for *E. coli* in 14 AUs within the Jordan River Watershed (Figure 1) (DWQ, 2023). Since completion of those *E. coli* TMDLs, data collection has continued, resulting in new *E. coli* impairments in the watershed. This Addendum aims to address two *E. coli* impairments within the framework of the 2023 Main Document. Changes or updates to the decision making process, water quality criteria, data analysis, and results are captured within this Addendum. Where no changes have been made, all work approved in the 2023 Main Document still applies. Table 1 acts as a reference guide to the work completed in the 2023 Main Document that is still relevant to this Addendum and was not updated. Chapter 2 contains information that was updated from the 2023 Main Document. A list of all AUs addressed in the 2023 Main Document in addition to the two AUs covered in this Addendum can be found in Table 2.

Jordan River Watershed E. coli TMDLs

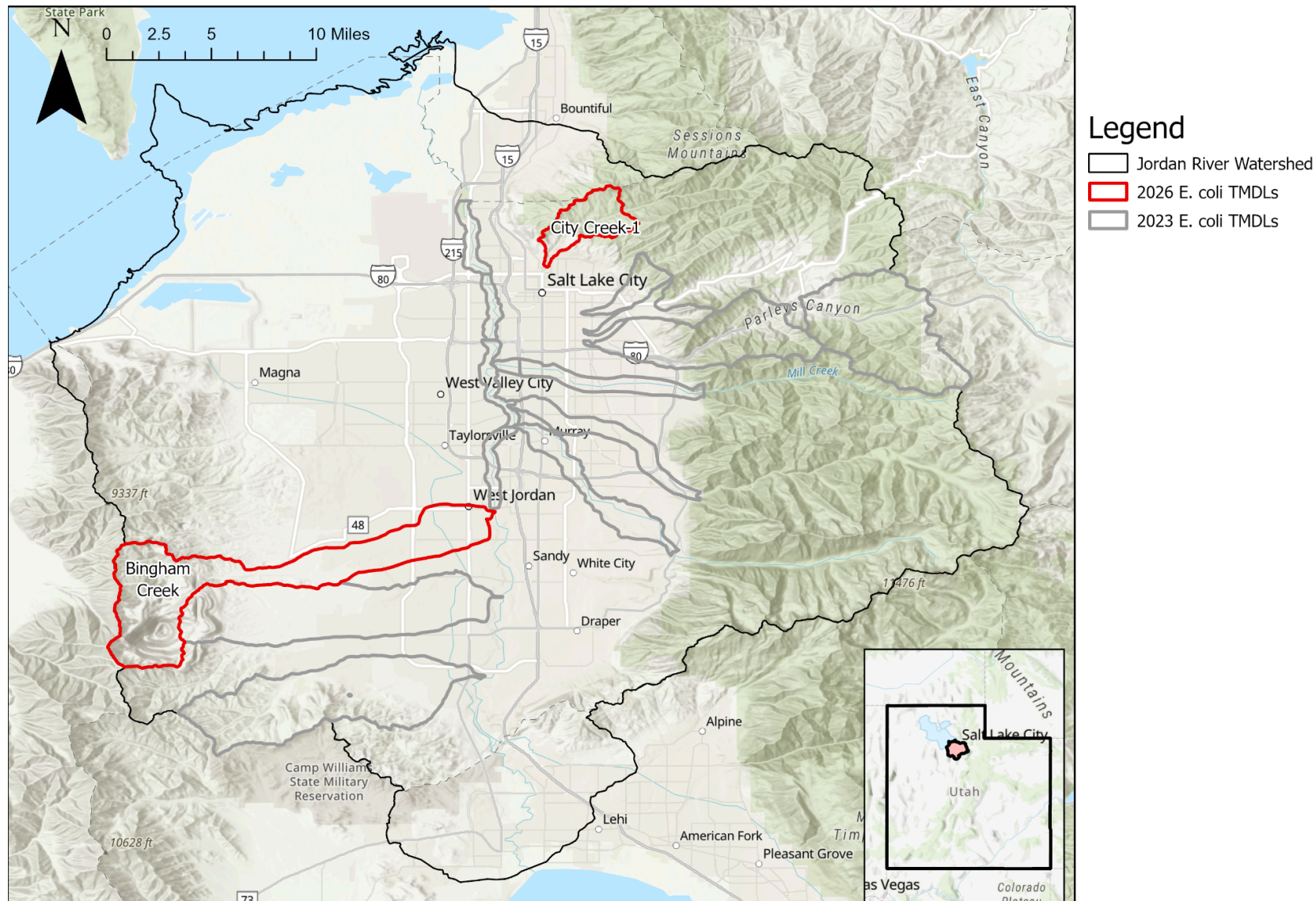


Figure 1. Assessment Units with *E. coli* TMDLs in the Jordan River Watershed.

Table 1. Information from 2023 Main Document document that has not changed.

Subject	Description / Location within 2023 Document
TMDL Overview	-Purpose of TMDL / Chapter 1 -Background on Utah's Integrated Report / Chapter 1
Bacteria Pollution Overview	-<i>E. coli</i> background / Chapter 2 -Point and Nonpoint source background / Chapter 2 -Bacteria Transportation / Chapter 2
Water Quality Standards	-Designated Beneficial Uses / Chapter 3 - Section 3.1 -Applicable Water Quality Standards / Chapter 3 - Section 3.2
TMDL	-Concentration-based TMDL background (Numeric Water Quality Target) / Chapter 4 - Section 4.1 -Wasteload Allocation (WLA) rationale / Chapter 4 - Section 4.2 -Load Allocation (LA) rationale / Chapter 4 - Section 4.3 -Margin of Safety (MOS) rationale / Chapter 4 - Section 4.4 -Seasonality rationale / Chapter 4 - Section 4.5 -Percent Reduction background / Chapter 4 - Section 4.6 -Reasonable Assurance (RA) background / Chapter 4 - Section 4.7 -Concentration to load conversion / Chapter 4 - Section 4.8
Sources	-Point Source (PS) background / Chapter 5 - Section 5.1 -UPDES (PS) / Chapter 5 - Section 5.1.1 -Stormwater* (PS) / Chapter 5 - Section 5.1.1 -Construction and Industrial / Chapter 5 - Section 5.1.1 -Discharges (PS) -Sanitary Sewer Overflows (PS) / Chapter 5 - Section 5.1.2 -Animal Feeding Operations (PS) / Chapter 5 - Section 5.1.3 -Nonpoint Source (NPS) / Chapter 5 - Section 5.2 background -Onsite Septic Systems (NPS) / Chapter 5 - Section 5.2.1 -Agriculture (NPS) / Chapter 5 - Section 5.2.2 -Domestic Pets (NPS) / Chapter 5 - Section 5.2.3 -Wildlife (NPS) / Chapter 5 - Section 5.2.4 -Recreation (NPS) / Chapter 5 - Section 5.2.5 -Unhoused Population (NPS) / Chapter 5 - Section 5.2.6 -Source Assessment Approach / Chapter 5 - Section 5.3 -Land Cover / Chapter 5 - Section 5.3.1 -Load Duration Curves / Chapter 5 - Section 5.3.2 and Table 7
Implementation Strategy	-Nonpoint Source Strategy / Chapter 7 - Section 7.1 -Onsite Systems / Chapter 7 - Section 7.1.1 -Wildlife / Chapter 7 - Section 7.1.2 -Pets / Chapter 7 - Section 7.1.3 -Agriculture / Chapter 7 - Section 7.1.4 -Stormwater / Chapter 7 - Section 7.1.4 -Recreation and Unhoused Population / Chapter 7 - Section 7.1.5 -BMP guide for nonpoint sources / Chapter 7 - Table 8 -Stormwater Structural BMPs / Chapter 7.2 - Section 7.2 and Table 7.2.2 -Implementation funding sources / Chapter 7 - Section 7.3 -9-Element Plan background / Chapter 7 - Section 7.4 -Information and education strategy / Chapter 7 - Section 7.5
*Stormwater program information remained the same, however UPDES and (Municipal Separate Storm Sewer System (MS4) Discharge information has been updated and can be found in Chapter 2, Section 2.3 of this Addendum.	

Table 2. Jordan River Watershed *E. coli*/TMDLs in the 2023 Main Document and 2026 Addendum.

Assessment Unit Name / ID	Description	Year First Listed	Year Approved	Percent Reduction / Month	Appendix Name/ Location
Big Cottonwood-1 UT16020204-019_00	Big Cottonwood Creek and tributaries from Jordan River to Big Cottonwood WTP	2014	2023	83% August	A -2023 Appendices
Little Cottonwood -1 UT16020204-021_00	Little Cottonwood Creek and tributaries from Jordan River confluence to Metropolitan WTP	2014	2023	74% August	B -2023 Appendices
Mill Creek1-SLCity UT16020204-026_00	Mill Creek from confluence with Jordan River to Interstate 15 crossing	2014	2023	83% August	C -2023 Appendices
Mill Creek2-SLCity UT16020204-017_00	Mill Creek and tributaries from Interstate 15 to USFS Boundary	2002	2023	83% September	C -2023 Appendices
Parleys Canyon Creek-1 UT16020204-025_00	Parleys Canyon Creek and tributaries from 1300 East to Mountain Dell Reservoir	2010	2023	24% August	D -2023 Appendices
Parleys Canyon Creek-2 UT16020204-013_00	Parleys Canyon Creek and tributaries from Mountain Dell Reservoir to headwaters	2022	2023	52% October	D -2023 Appendices
Emigration Creek Lower UT16020204-033_00	Emigration Creek and tributaries from 1100 East (below Westminster College) to stream gauge at Rotary Glen Park (40 44 58.49N, 111 48 36.29W) above Hogle Zoo	2014	2023	78% July	E -2023 Appendices
Red Butte Creek Lower UT16020204-035_00	Red Butte Creek and tributaries from 1100 East to Red Butte Reservoir	2022	2023	80% August	F -2023 Appendices
Midas Creek UT16020204-024_01	Midas Creek and tributaries from confluence with Jordan River to headwaters	2014	2023	88% September	G -2023 Appendices
Rose Creek UT16020204-029_00	Rose Creek and tributaries from confluence with Jordan River to headwaters	2014	2023	83% September	H -2023 Appendices
Jordan River-2 UT16020204-002_00	Jordan River from Davis County line upstream to North Temple Street	2006	2023	69% July	I -2023 Appendices
Jordan River-3 UT16020204-003_00	Jordan River from North Temple to 2100 South	2006	2023	76% July	I -2023 Appendices
Jordan River-4 UT16020204-004_00	Jordan River from 2100 South to the confluence with Little Cottonwood Creek	2014	2023	75% August	I -2023 Appendices
Jordan River-5 UT16020204-005_00	Jordan River from the confluence with Little Cottonwood Creek to 7800 South	2006	2023	73% August	I -2023 Appendices
City Creek-1 UT16020204-009_00	City Creek and tributaries from Memory Park to SLC WTP	2024	2026 (Pending)	49% October	J -2026 Addendum
Bingham Creek UT16020204-023_00	Bingham Creek and tributaries from confluence with Jordan River to headwaters	2024	2026 (Pending)	76% September	K - 2026 Addendum

Chapter 2. Updates for 2026 Addendum

2.1 Utah's Prioritization 2.0

In 2023, EPA launched a 2022 Vision for the CWA Section 303(d) program as a second iteration for states to prioritize TMDL development. The 2022 Vision includes goals related to planning and prioritization, restoration, protection, data and analysis, and partnerships.

For this second iteration, DWQ took the opportunity to use Prioritization 2.0 as a ten-year (2024-2034) road map for water quality restoration and protection planning in the state. In addition to TMDLs, other complementary planning tools can be used to achieve water quality restoration and protection goals. DWQ strongly believes that long-term water quality restoration and protection planning will help facilitate robust and efficient monitoring, more effective partnerships, watershed group development, strategic implementation, and clarity in protecting and restoring Utah's waters.

Utah's Prioritization 2.0 was received by EPA in 2025. Updates from Prioritization 2.0 are included in this Addendum and reflected in the 2026 Integrated Report. Among these updates is a change in the prioritization ranking for *E. coli* impairments in City Creek-1 and Bingham Creek from "Low" to "High" priority. The Butterfield Creek AU was originally included in Utah's two-year commitment to complete a TMDL; however, new data shows the AU as fully supporting beneficial uses for *E. coli* in the 2026 Integrated Report.

2.2 Identification of Impaired Waterbodies

This Addendum addresses *E. coli* impairment in two AUs (City Creek-1 and Bingham Creek) within the Jordan River watershed which were included on Utah's 2024 303(d) list for *E. coli* exceedances (see Figure 1/Table 2). Table 3 includes AU descriptions, cause of impairment, impaired beneficial use, first year listed in the Integrated Report, and prioritization ranking. Table 4 includes information relevant to *E. coli* reductions for each AU. An appendix for each AU accompanies this Addendum (Appendices J and K) and includes detailed data analysis, monitoring location statistics, *E. coli* concentrations through time, and monthly geomeans for each impaired AU.

Table 3. Impairment summary of Bingham Creek and City Creek-1.

Assessment Unit Name / ID	Description	Cause of Impairment	Impaired Beneficial Use	Year First Listed	2024 Integrated Report Priority Ranking
City Creek-1 UT16020204-009_00	City Creek and tributaries from Memory Park to SLC WTP	<i>E. coli</i>	Infrequent primary contact recreation (2B)	2024	Low*
Bingham Creek UT16020204-023_00	Bingham Creek and tributaries from confluence with Jordan River to headwaters	<i>E. coli</i>	Infrequent primary contact recreation (2B)	2024	Low*
		Total Dissolved Solids (TDS) [†]	Agriculture (4)	2014	Low
*Priority ranking changed to “High” in the 2026 Integrated Report. [†] TDS impairment is not addressed in this addendum.					

Table 4. Pollutant reduction per impaired AU.

Assessment Unit Name / ID	Monitoring Location ID	Month	Geometric Mean (MPN*/100mL)	Percent Reduction (%)
City Creek-1 UT16020204-009_00	4991938	October	403	49%
Bingham Creek UT16020204-023_00	4994190	September	845	76%
MPN = Most Probable Number				

2.3 Utah Pollutant Discharge Elimination System (UPDES)

UPDES permittees within the Jordan River watershed are covered under various individual and general permits. Individual permits are site-specific permits issued to a single discharger. Examples include process or wastewater from an industrial or municipal publicly owned treatment works (POTW) facility or stormwater from a Municipal Separate Storm Sewer System (MS4). General permits are permits authorizing a category of discharges. There are general permits associated with stormwater (construction, industrial, and municipal), pesticide application, construction dewatering and hydrostatic testing, concentrated animal feeding operations (CAFOs), concentrated aquatic animal production facilities (CAAPFs), coal mine operations, treated groundwater and surface water, and drinking water treatment plants that discharge to waters of the state.

Based on the known makeup of each of these types of discharges, it is not likely that industrial stormwater, pesticide, construction dewatering and hydrostatic testing, coal

mines, treated groundwater and surface water, or drinking water treatment plants contribute notably to *E. coli* loading in waterways.

MS4 Discharges

An MS4 is a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains, that is 1) owned by a state, city, town, county, district, association, or other public body that discharges to waters of the state; 2) designed to collect and convey stormwater; 3) not a combined sewer; and 4) not a part of a POTW. Stormwater runoff in MS4s often flows into the conveyance system directly from roads and parking lots, leading to discharges of untreated water into local waterbodies that can be a potential source of *E. coli* loading. MS4 operators in areas meeting the U.S. Census Bureau's definition of an urbanized area or otherwise designated MS4s are required to obtain a UPDES MS4 permit and develop a stormwater management program that implements a set of measurable goals, actions, and activities designed to reduce the discharge of pollutants from the MS4 to the maximum extent practicable.

MS4s are further delineated as either Individual or General, where Individual permits are for medium and large municipalities serving over 100,000 people, and General permits are for smaller municipalities and non-traditional MS4s (e.g., universities, hospitals, or prisons) that serve less than 100,000 people. Both Individual and General permittees are required through their permit to address six minimum control measures: 1) public education and outreach on stormwater impacts; 2) public involvement/participation; 3) illicit-discharge detection and elimination; 4) construction site stormwater runoff control; 5) long-term stormwater management in new development and redevelopment; and 6) pollution prevention and good housekeeping for municipal operations (DWQ, 2025). Individual permittees are required to develop a wet-weather monitoring program that includes a sampling plan that commits to a minimum sampling frequency of twice per year (fall and spring). All regulated MS4s are required to conduct dry-weather screening inspections (monitoring done in the absence of storm events) at all outfalls at least once during the five-year permit term. Dry-weather screenings are used to identify illicit connections and improper disposal of wastes.

The 2023 Main Document stated that municipalities with an MS4 permit had 180 days to compile a TMDL Compliance Plan after the TMDLs were approved. MS4s are required to report annually on their TMDL compliance by submitting a TMDL compliance report form with their annual report. The reporting includes identification of problem areas for which source control BMPs have been developed, the cost, and the anticipated pollutant

reduction. After approval of this Addendum, new MS4 permittees will have 180 days to develop a TMDL compliance plan.

Within the City Creek-1 and Bingham Creek AUs, there are three Individual MS4 Permittees (Salt Lake County, Salt Lake City, and the Utah Department of Transportation (UDOT)) and three MS4s permitted under the Small MS4 General Permit (South Jordan City, City of West Jordan, and the Greater Salt Lake Municipal Services District (MSD)). See Appendices J and K for details.

2.4 Monitoring

Follow-up monitoring is necessary to document whether implementation efforts result in attainment of the water quality standards. DWQ, in collaboration with stakeholders as part of the cooperative monitoring program, will continue to collect *E. coli* samples when and where appropriate to evaluate the effectiveness of pollution-control efforts. Current water quality trends will be analyzed on a routine basis to determine TMDL attainment.

DWQ and Salt Lake County will routinely monitor *E. coli* at impaired locations in the Jordan River watershed until full-support status is attained for all AUs and they are delisted for *E. coli* as part of the Integrated Report process. Monitoring efforts are documented in a sampling and analysis plan (SAP) that will be updated on an annual basis.

DWQ will continue its intensive, three-year basin monitoring effort, with the next Jordan River intensive monitoring scheduled for water year (WY) 2028. Monitoring locations will be selected prior to October 1 each water year, and will reflect the needs of the TMDL and evaluate implementation practices.

In addition to these more general monitoring efforts, specific recommendations for follow-up monitoring include:

- Additional monitoring along Bingham Creek upstream of MLID 4994190.
- Additional monitoring along City Creek-1 downstream of MLID 4991938.
- BMP effectiveness monitoring, particularly for stormwater, where applicable.

Chapter 3. Public Participation

Stakeholder participation for the Jordan River Watershed *E.coli* TMDL was achieved through meetings and site visits with governmental agency representatives and local landowners. See Table 5 for a timeline of events.

Stakeholders include:

- Utah Division of Water Quality
- Utah Department of Agriculture and Food
- Utah Department of Transportation
- Salt Lake County Health Department
- Salt Lake County Watershed Planning and Restoration
- Salt Lake Conservation District
- Salt Lake County Stormwater Coalition
- Local municipalities
- Jordan River Commission and Technical Advisory Council
- Jordan Valley Water Conservation District
- Natural Resource Conservation Service
- Bureau of Land Management
- Private landowners
- Camp Williams
- Rio Tinto (Kennecott)
- Local Cattle Associations
- U. S. Environmental Protection Agency

Table 5. Public participation timeline

YEAR	ACTIVITY
2023	February 13 - EPA Approval of the Jordan River Watershed <i>E. coli</i> TMDLs: Main Report and Appendices. January 1 - Established ongoing monitoring with SLCo - Collected high-resolution data at several locations to establish the 2026 concentration-based baselines. This effort is ongoing and extends beyond 2023.
2024	August 1 - JRC - presented on the Prioritization and tools as well as upcoming TMDLs

2025

August 26 - SLCO Healthy Waters - TMDL 101 (Lower JR DO, 2023 *E. coli*, and upcoming ones)

September 22 - JRC & GSL Collaborative tour - taking invited media around the main stem JR talking about WQ problems, plans, and solutions

October 1 - DWQ City Creek site visit

October 6 - City Creek TMDL intro with DWQ and SLC

October 14 - DWQ Bingham Creek site visit

October 15 - SLCO Stormwater Coalition - reminded them of the 2023 TMDLs and presented on the upcoming ones

October 28 - City Creek site visit with Salt Lake City (Public Utilities, Parks, and Trails Programs)

November 6 - Discussed TMDLs with Salt Lake County Integrated Watershed planning meeting

November 25 - SLCO Healthy Waters Meeting (Salt Lake County Watershed, Salt Lake City Public Utilities, and DWQ)

2026

January 13 - Local NRCS Working Group - briefly updated local working group on the TMDLs

January 21 - Bingham Creek *E. coli* (landowner discussion) with UDAF

January 22 - presented TMDLs at the ACWA Watersheds (national call) - primarily focused on 2023 ones but did mention the process of addendum and new ones to we are implementing

February 4 - Bingham Creek *E. coli* TMDL meeting with Kennecott

February 19 - City Creek TMDL - report review with SLC

March 3 - City Creek TMDL - ordinances review with SLC

March 4 - Bingham Creek TMDL review and implementation discussion with UDAF

March 5 - City Creek TMDL - quick review and discussion on outreach and education with SLC and their PIOs

March 12 - Bingham Creek TMDL with SLCD

March 16 - Stakeholder Draft of TMDL available for 30-day comment period

March 18 - Stakeholder kickoff comment period & presentation at SLCo Stormwater Coalition

April 3 - Review signage and implementation for City Creek with PIOs (DWQ and SLC)

April 22 - Request to initiate rulemaking on TMDLs to Water Quality Board

DRAFT

Chapter 4: TMDL Public Comment & DWQ Response

Table 6. Public comments, report location, and DWQ response to comments

Organization	Report	Page #	Comment	Response

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DRAFT

Appendix J: City Creek-1 Assessment

Unit *E. coli* TMDL

Waterbody Name	City Creek-1
Waterbody / Assessment Unit	UT16020204-009_00
Assessment Unit Description	City Creek and tributaries from Memory Park to SLC WTP
Impaired Beneficial Uses	Infrequent primary contact recreation (2B)
Applicable Season	May through October
Defined Endpoint/Water Quality Standard	• 30-day geometric mean of 206 MPN/100 mL • Recreation season geomean of 206 MPN/100 mL • Daily maximum of 668 MPN/100 mL
Percent Reduction Needed	49%, based on a geometric mean of 403 MPN/100 mL calculated for 4991938 (CC_02.62) City Creek at Memory Grove in the month of October.
Sources	Stormwater, Illicit Discharge, Recreationists, Pets, Wildlife

J-1. Assessment Unit Description

The City Creek-1 Assessment Unit (AU; UT16020204-009_00) is located in Salt Lake County (SLCo) and covers 3,787 acres (5.9 mi²). The AU is defined as “City Creek and tributaries from Memory Park to SLC WTP” and contains 4.2 miles of river according to the Clean Water Act (CWA) 303(d) list (Figure J-1).

The AU lies entirely within Salt Lake City municipal boundaries. Land ownership is approximately 87% private and 13% federal, owned by the United States Forest Service (USFS). Salt Lake City manages the watershed for drinking water protection and recreation, while jurisdiction over federal lands remains with the USFS. Management efforts by Salt Lake City and USFS aim to protect drinking water sources in the City Creek Watershed.

The City Creek-1 AU was listed as impaired in Utah’s 2024 Integrated Report for not supporting the Class 2B (infrequent primary contact recreation) beneficial use due to elevated levels of *Escherichia coli* (*E. coli*) (Table J-1). The AU was first listed as impaired in the 2024 Integrated Report. The upstream AU, City Creek-2 (UT16020204-010_00), extends from the City Creek Water Treatment Plant (CCWTP) to the headwaters and is not impaired for *E. coli* according to the 2024 Integrated Report.

Table J-1. Impairment summary of the City Creek-1 Assessment Unit.

Assessment Unit	Cause of Impairment	Impaired Beneficial Use	Years 303(d) Listed	2024 Integrated Report Priority Ranking
City Creek-1 UT16020204-009_00	<i>E. coli</i>	Infrequent primary contact recreation (2B)	2024	Low*
*Priority ranking changed to “High” in the 2026 Integrated Report.				

Monitoring Locations in City Creek-1 Assessment Unit

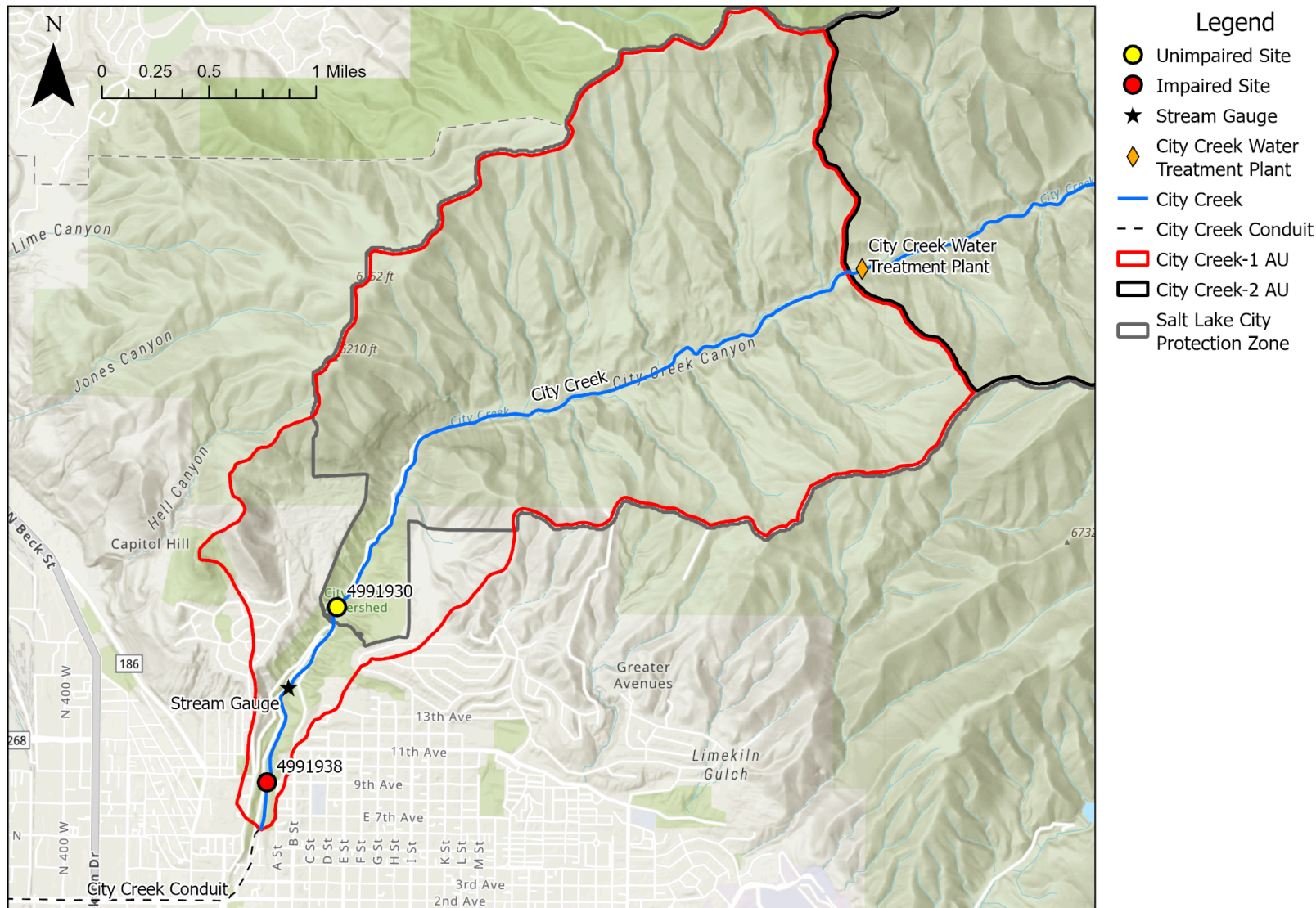


Figure J-1. Monitoring Locations and Hydrology in the City Creek-1 Assessment Unit.

J-2. Hydrology

City Creek is a perennial, snowmelt-driven stream originating from natural springs near Grandview and Lookout Peaks in the Wasatch Mountains. The main channel flows approximately 12 miles through steep forested terrain and urban landscapes before entering a 2.4-mile underground conduit that discharges into the Jordan River west of the Utah State Fairpark (Figure J-1).

The watershed drains 19.2 square miles, with primarily forested lands in the upper watershed transitioning to urban development in the lower canyon and city core. Streamflow is sustained year-round by groundwater and tributary inflows, including North Fork City Creek and Cottonwood Gulch. A continuous stream gauge operated by SLCo at Memory Grove (Gauge #820, DWQ MLID 4991938) provides daily flow records for the lower portion of the watershed.

Flow records from Water Years 2014 through 2024 show a mean daily discharge of 6.4 cubic feet per second (cfs), with a maximum daily mean flow of 141 cfs, and a minimum daily mean flow of 0.1 cfs (Table J-2). These data illustrate consistent seasonal patterns, with snowmelt-driven peaks in May and early June (Figure J-2). Monthly mean flows reach their highest levels in May, followed by a sharp decline in summer and sustained low baseflows through fall and winter (Figure J-3).

Hydrologic modifications within the watershed include a municipal diversion at the CCWTP, which withdraws an average of 4.6 cfs for drinking water treatment. Additionally, approximately 64% of the stream within the lower watershed is culverted, with 37% of segments classified as engineered (SLCo, 2009). These modifications, combined with an extensive urban stormwater conveyance network and sediment basins, alter natural flow patterns, increase flashiness, and influence the transport and fate of *E. coli*.

Table J-2. Summary statistics for City Creek, Gauge #820 (4991938) for Water Years 2014-2024.

Gauge Name	SLCO Gauge Number/DWQ MLID	Drainage Area (mi ²)	Mean Flow (cfs)	Maximum Flow (cfs)	Minimum Flow (cfs)
City Creek @ Memory Grove	820 / 4991938	19.2	6.4	141	0.1

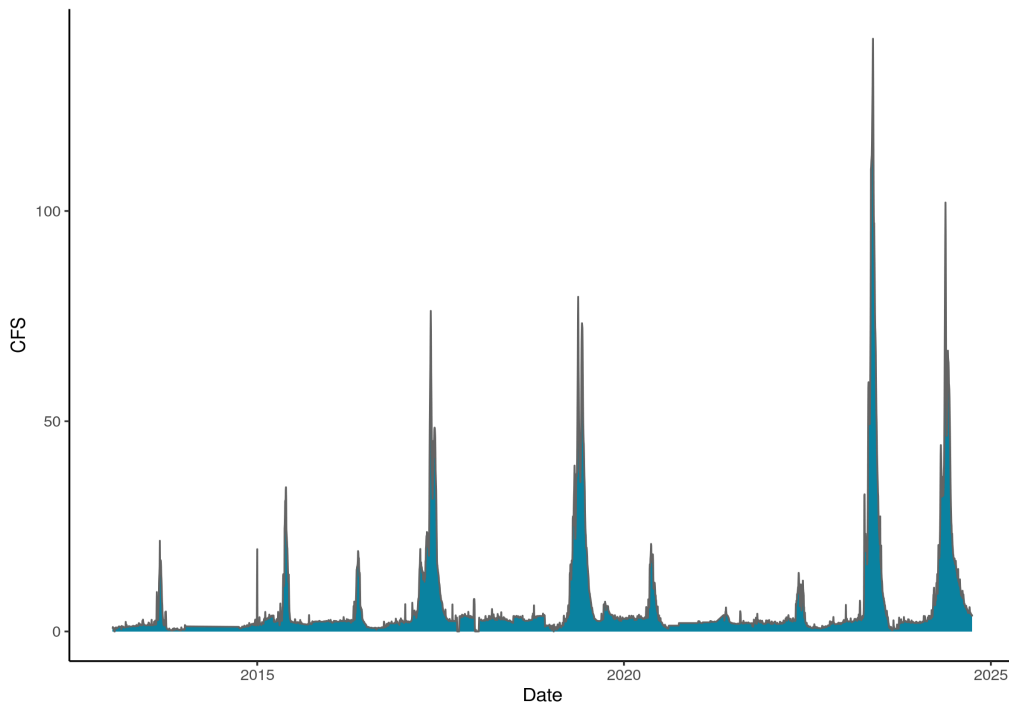


Figure J-2. Daily mean flows at Salt Lake County Gauge #820, City Creek at Memory Grove (4991938) for Water Years 2014-2024.

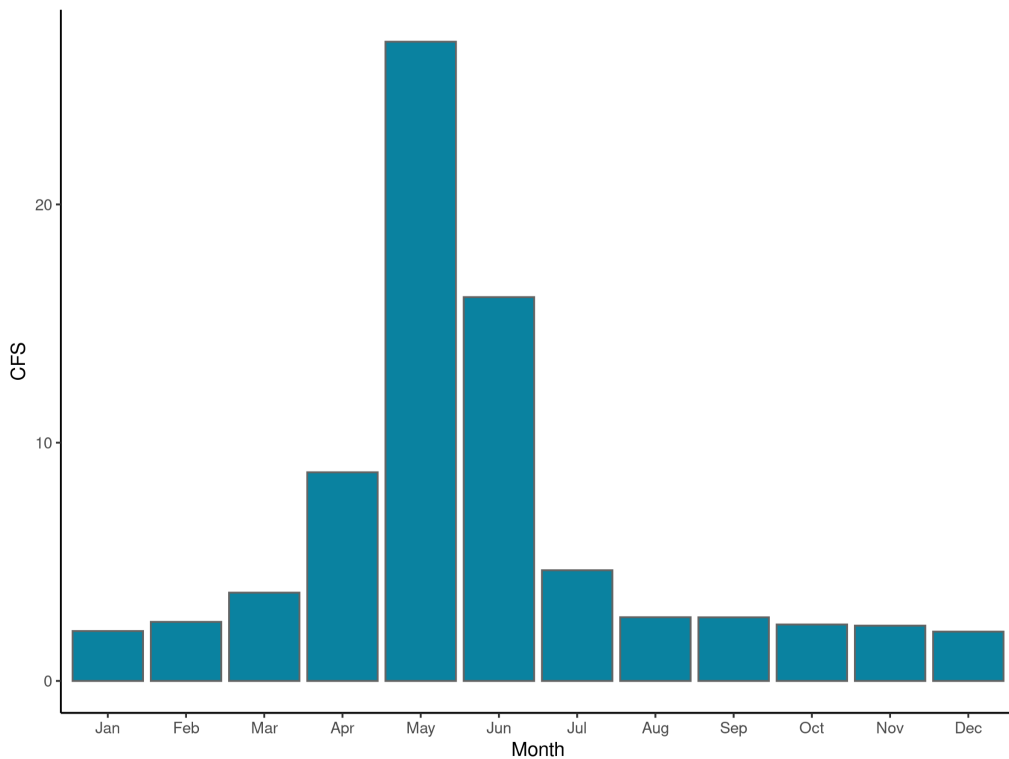


Figure J-3. Monthly mean flows (cfs) at Salt Lake County Gauge #820, City Creek at Memory Grove (4991938) for Water Years 2014-2024.

J-3. Land Use

According to the 2024 National Land Cover Dataset (NLCD), 92.4% of the City Creek-1 AU is natural land cover (forest, shrubland, grassland, wetlands, and barren), 7.5% is developed, and 0.1% is classified as agricultural (pasture and crops) (Figure J-4). Natural cover dominates the upper watershed, while developed land, primarily comprised of open space and residential areas, is concentrated in the lower AU near Memory Grove Park.

Although land cover (NLCD, 2024) identifies 0.1% of the AU as agricultural land, this category reflects grassy park areas, irrigated lawns, or other maintained turf in the lower watershed rather than traditional farming. No active agricultural operations or livestock are present in the AU.

Within the Salt Lake City Protection Zone (Figure J-1), Salt Lake City Ordinance 1708 and 1704 are enforced (American Legal Publishing, 2026) to protect drinking water sources. Ordinance 1708 is specific to protections within City Creek and sets limits on camping, fires, use of picnic areas, vehicle access to the canyon, and references Ordinance 1704 regarding animals. Ordinance 1704 sets permit guidelines for dog activity and prohibits the presence of dogs and livestock in specific areas.

Salt Lake City Public Utilities prohibits all dogs in the upper watershed (City Creek-2 AU). The area between the City Creek Water Treatment Plant and Bonneville Boulevard allows dogs, but on-leash rules are strictly enforced. Within the City Creek-1 AU, downstream of Bonneville Boulevard there are multiple heavily used parks. The Salt Lake City Trails and Natural Lands Program manages these parks and supports watershed health via education and outreach, waste management, trail improvement, and leash/access restrictions in many areas.

Trails and off-leash dog areas contribute localized sources of *E. coli* from pet waste and unfettered stream access. The developed land areas contain an average of 29% impervious surface, which increases runoff and pollutant loading during storm events. The population in the AU is projected to grow by 15% by 2040 (SLCo, 2017), potentially expanding impervious surfaces and increasing stress on water quality.

Land Cover in City Creek-1 Assessment Unit

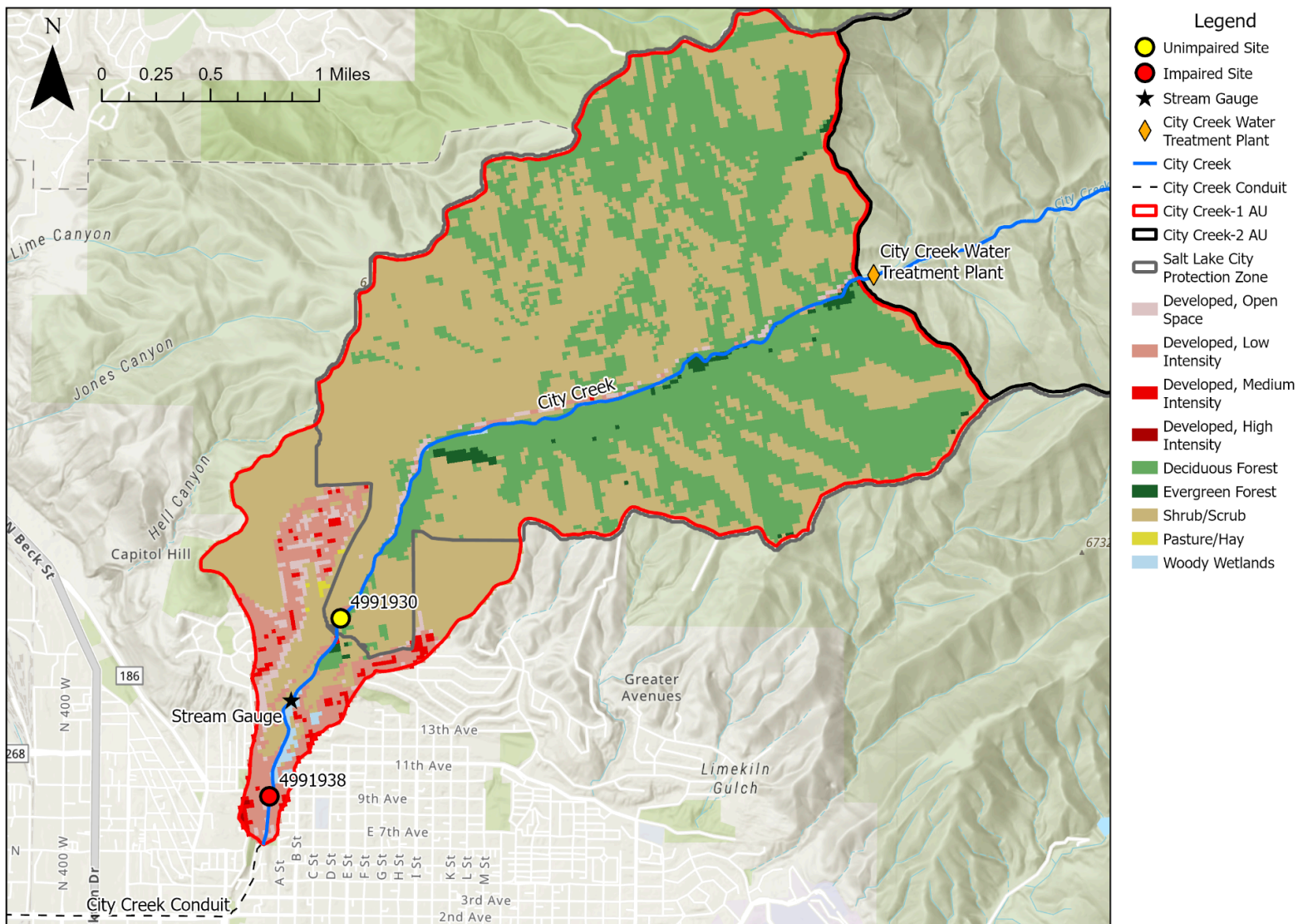


Figure J-4. Land cover (NLCD, 2024) in City Creek-1 Assessment Unit.

J-4. *E. coli* Data Summary

Routine monitoring data from two long-term sites within the City Creek-1 AU (Figure J-1) were evaluated to assess spatial and seasonal patterns of *E. coli* from 2014 to 2024 (Table J-3). Flow records are reported by Water Year, while bacteria assessments focus on recreation-season samples (May–October) paired with flow conditions. Site 4991930 (City Creek near the Entrance Gate to the Canyon) represents upstream, forested conditions, while site 4991938 (City Creek at Memory Grove) is located within a developed urban park, influenced by increased recreation and higher impervious cover.

The downstream site (4991938) triggered the impairment in the 2024 Integrated Report. This site had a recreation season geometric mean of 128 Most Probable Number (MPN)/100 mL and exceeded the 206 MPN/100 mL recreation season criterion in 44% of samples and 14.5% exceeding the 668 MPN/100 mL daily max criterion. In contrast, the upstream site (4991930) had a recreation season geometric mean of 18 MPN/100 mL, with 6% of samples exceeding 206 MPN/100 mL and none exceeding 668 MPN/100 mL.

Downstream *E. coli* concentrations were seven times greater than those observed upstream at the canyon entrance (Figure J-5). Figure J-6 specifically illustrates the elevation of concentrations at the downstream site throughout the entire monitoring period. Monthly data reveal peaks of *E. coli* concentrations late in the recreation season (May through October), with the highest concentrations at the impaired site (4991938) occurring in September and October (Figure J-7). This seasonal pattern likely reflects cumulative recreational impacts and reduced stream flows that concentrate bacterial contamination.

Based on these monitoring results from the recreation season, the percent reduction was calculated from the October geometric mean concentration of 403 MPN/100 mL at site 4991938, which represents the highest monthly geometric mean observed. A 49% reduction is needed to meet the applicable 30-day geometric mean criterion of 206 MPN/100 mL.

E. coli concentration data confirm that localized sources between the two sites contribute to the impairment, likely including urban runoff, recreational activities, and wildlife. Implementation efforts should prioritize the lower, urbanized reach of the AU below site 4991930.

Table J-3. *E. coli* summary statistics for City Creek-1 Assessment Unit.

Site ID (DWQ / SLCo)	Name	2024 IR Assessm ent	Date Range	Sam ple Size	<i>E. coli</i> Min	Overall Geom ean	Rec* Geom ean	<i>E. coli</i> Max	Rec* % Exceeding 206 MPN	Rec* % Exceeding 668 MPN
4991938 / CC_02.62	City Creek @ Memory Grove	Not Meeting Criteria	2014-01-28 to 2024-09-11	110 (55*)	2	111	128	2420 [‡]	44%	14.5%
4991930 / CC_03.65	City Creek Near Entrance Gate to Canyon	Fully Supporting	2014-01-28 to 2024-09-11	111 (55*)	0.5	13	18	488	6%	0%
[‡] 2420 value exceeded the upper limit of quantification for the <i>E. coli</i> test method (Colilert). [*] Rec = Recreation Season (May - October) Rows highlighted in are impaired in the 2024 Integrated Report.										

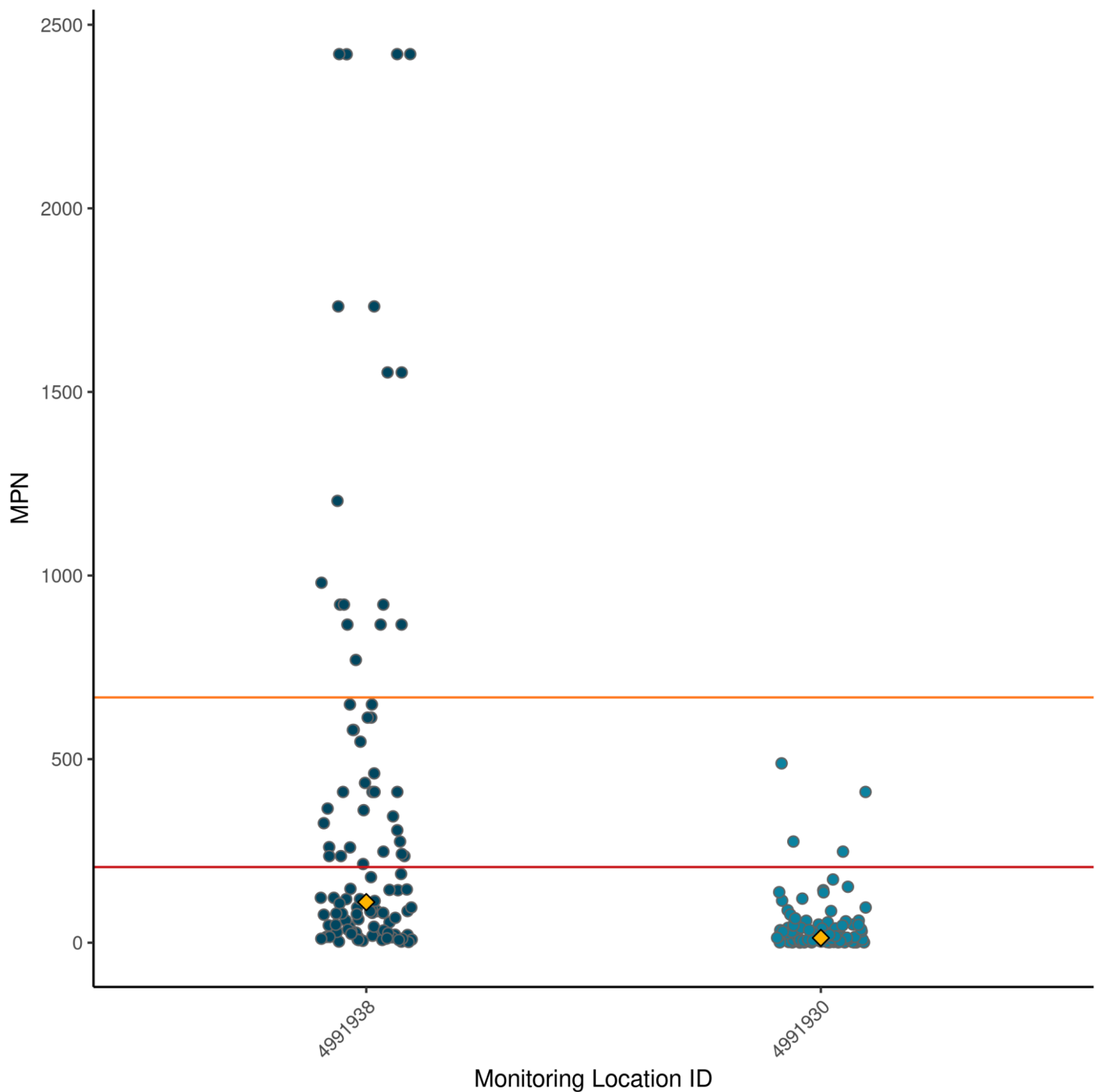


Figure J-5. Year round *E. coli* concentrations at each routine monitoring location, organized from downstream (left) to upstream (right) in City Creek-1 Assessment Unit. Yellow diamonds indicate the overall geometric mean for each site and blue circles are individual samples. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria.

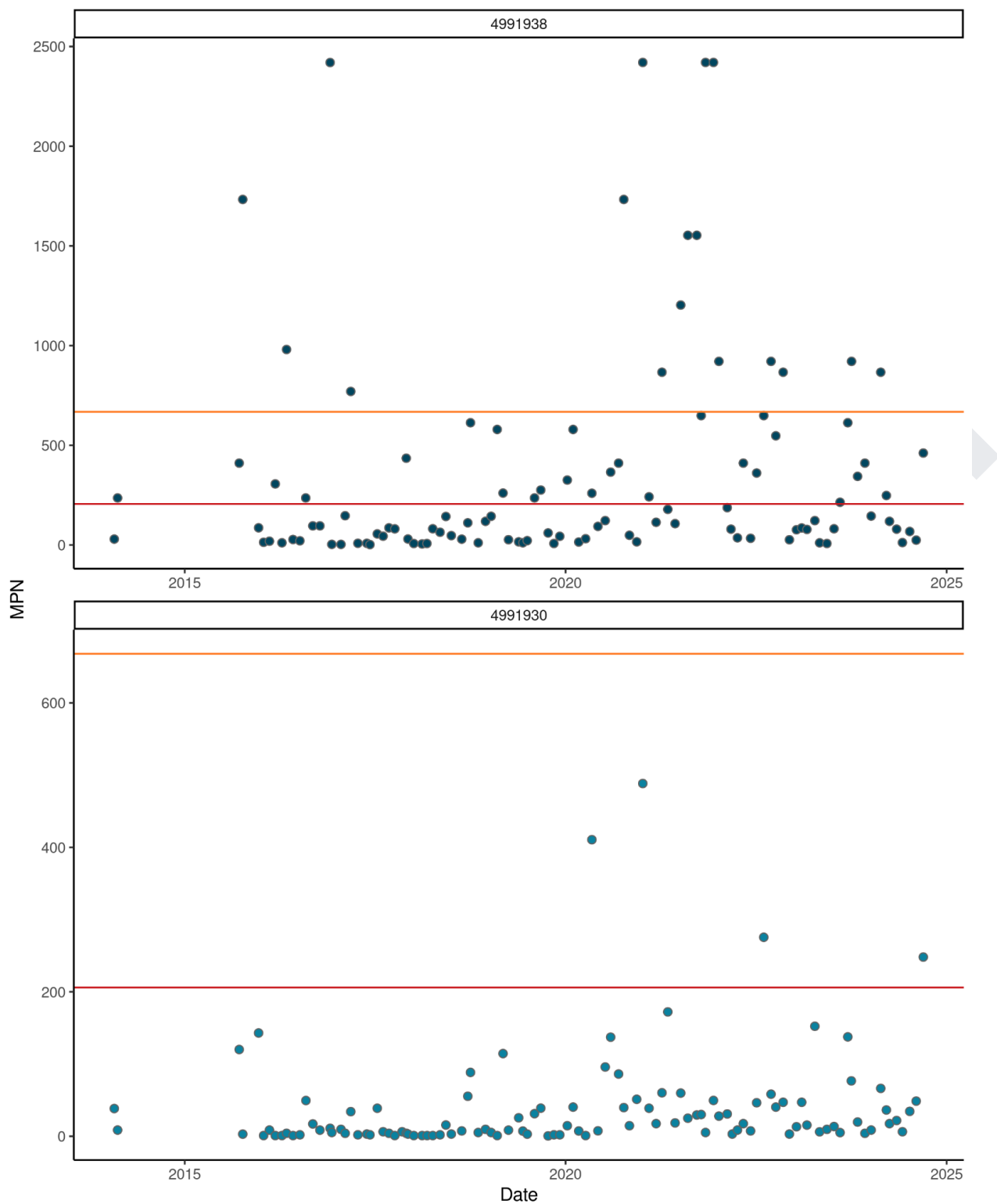


Figure J-6. Year round *E. coli* concentrations at each routine monitoring location through time within the City Creek-1 Assessment Unit. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria. Sites are ordered downstream (top) to upstream (bottom).

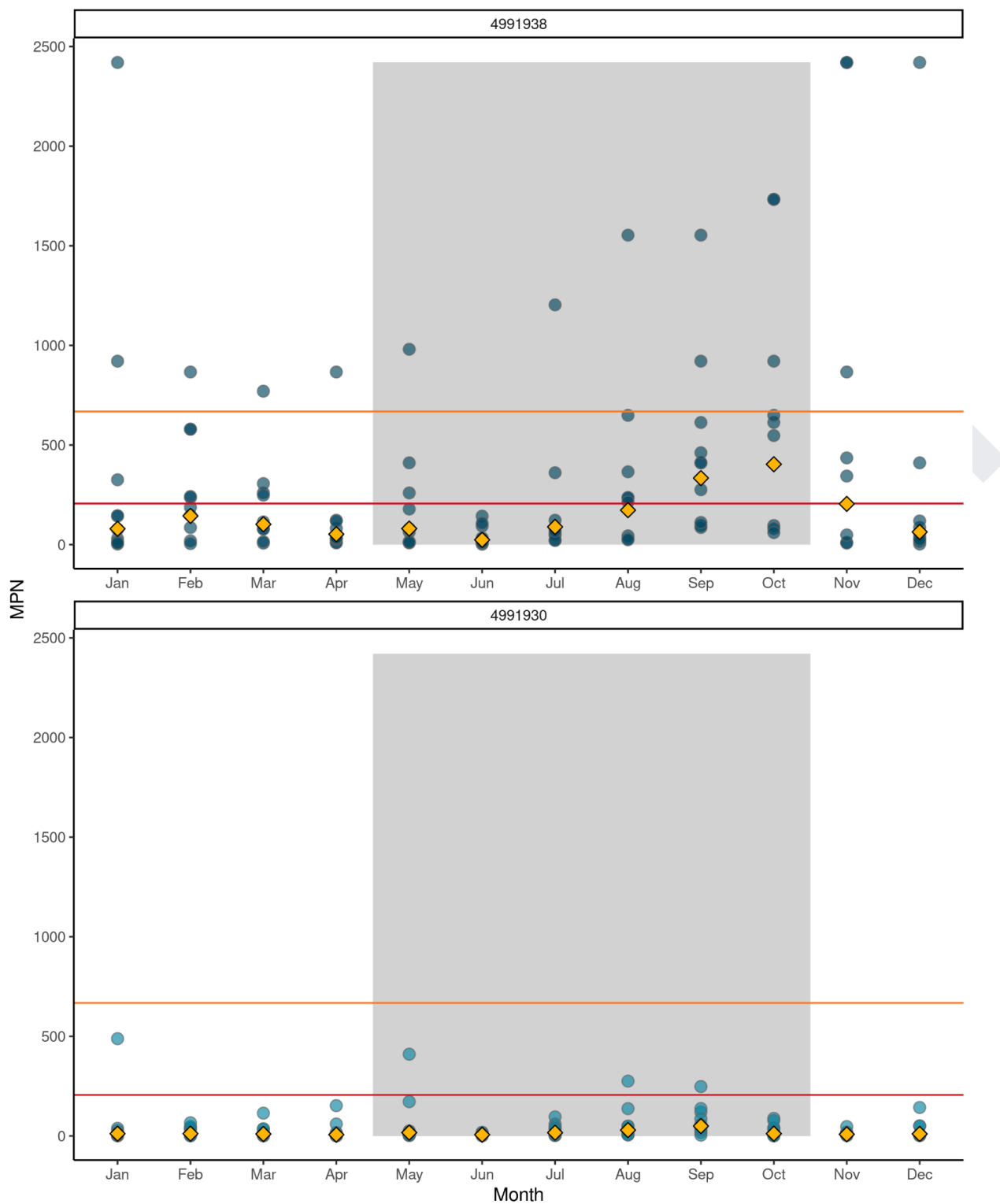


Figure J-7. Monthly *E. coli* concentrations at each routine monitoring location within the City Creek-1 Assessment Unit. Yellow diamonds indicate the monthly geometric means and blue circles are individual samples. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria. The gray shading indicates the recreation season. Sites are ordered downstream (top) to upstream (bottom).

J-5. Potential Sources

Potential sources of *E. coli* impairment in the City Creek-1 AU were evaluated using multiple lines of evidence including Load Duration Curves (LDCs), land use analysis, and hydrologic context. These tools indicate that stormwater runoff, domestic pets, and human recreation are the most probable contributors to elevated *E. coli* levels. Wildlife may also contribute to background bacterial loads, particularly in the upper watershed.

5.1 Load Duration Curves

LDCs are diagnostic tools used to evaluate how *E. coli* concentrations vary with flow and to help identify likely sources of pollution. Although this TMDL employs a concentration-based approach, LDCs offer valuable insights into the hydrologic conditions under which exceedances occur, differentiating between wet-weather sources (e.g., stormwater) and dry-weather sources (e.g., baseflow, groundwater, or direct deposition).

The City Creek-1 AU contains a continuous flow gauge operated by SLCo (Gauge #820) near the downstream end of the AU in Memory Grove. Flow records and *E. coli* samples from Water Years 2014 through 2024 were used to develop the LDC (Figure J-8). Hydrologic categories (high, moist, mid-range, dry, and low flow) were defined using EPA's flow exceedance percentiles (EPA, 2007). The percentage of *E. coli* loading measurements exceeding the TMDL target are shown beneath each flow regime label in Figure J-8, illustrating where exceedances are most frequent.

Exceedances occurred across all flow regimes, except for high flows, with the highest percentage (62%) observed during low flows. This pattern suggests multiple bacterial source pathways are contributing to the impairment in City Creek-1:

- **Moist & Mid-Range Flows:** Likely associated with urban stormwater runoff and pet waste mobilized from impervious surfaces during precipitation events.
- **Dry & Low Flows:** Reflects baseflow-related contamination with potential direct deposition from recreation, domestic pets, and wildlife, or aging infrastructure (e.g., leaking sewers or stormwater outfalls).

These findings support previous conclusions that the lower segment of City Creek, particularly downstream of site 4991930, contains chronic localized inputs of *E. coli* such as direct pet deposition, human recreation, and wildlife activity near the stream channel.

Implementation efforts should focus on this urbanized reach to address both wet and dry-weather bacteria loading.

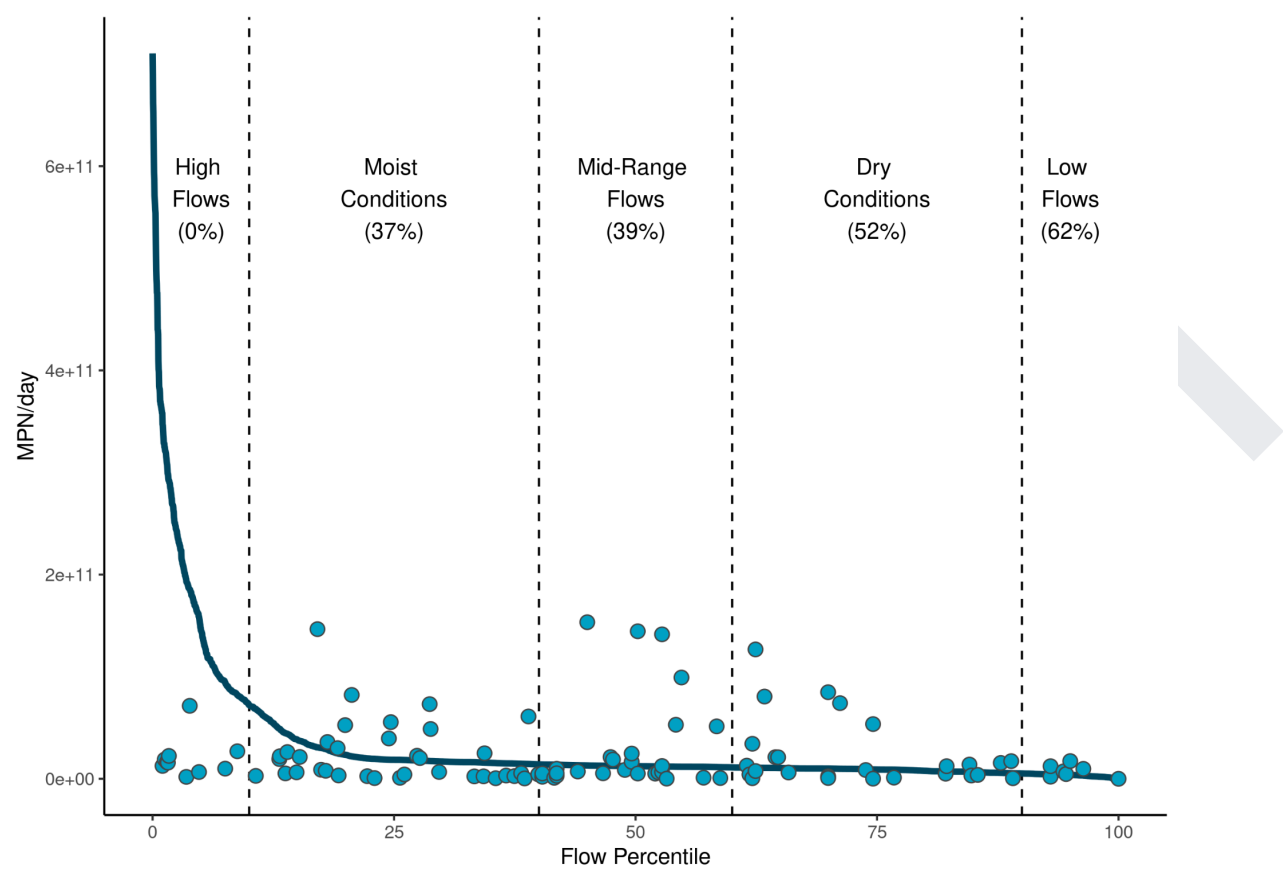


Figure J-8. Load Duration Curve at Salt Lake County Gauge #820, City Creek at Memory Grove (4991938), based on flow records from Water Years 2014-2024 and paired *E. coli* samples.

J-6. Source Assessment

The probable sources of *E. coli* in the City Creek-1 AU originate from both point and nonpoint sources. This determination is supported by multiple lines of evidence, including LDC analysis, spatial and temporal *E. coli* monitoring data, land-use characteristics, and hydrologic context.

Based on the source inventory and assessment findings, likely point and nonpoint sources of *E. coli* contributing to the impairments in the AU are provided in Table J-4. Domestic pets and recreation have been determined as the primary sources contributing to *E. coli* in the Creek. The differences between the upper and lower portions of the AU illustrate the impact of urbanization on water quality. The upper watershed remains largely forested, with natural stream channels that contribute minimal *E. coli* loading from wildlife. In contrast, the lower watershed is more developed, with engineered channels, impervious

surfaces, off leash dog areas and increased recreational access. These modifications reduce natural filtration and increase pollutant transport to the stream, particularly during storm events and periods of high recreational use.

Management efforts within the Salt Lake City Protection Zone (Figure J-1) appear to be effective in protecting water quality and beneficial uses to City Creek. This is most clearly seen in the different *E. coli* values (Table J-3) between sample sites 4991930 and 4991938. Sample site 4991930 is within the Salt Lake City Protection Zone and has no evidence of *E. coli* impairment. Downstream of the protection zone, sample site 4991938 has a geometric mean seven times greater than the upstream sample site.

Monitoring data show a clear spatial gradient in *E. coli* concentrations, with higher values observed downstream of the canyon entrance (Figure J-5). LDC analysis (Figure J-8) indicates exceedances of water quality criteria across multiple flow regimes, with the highest frequency during moist, mid-range, dry, and low flows. These results suggest contributions from both chronic (pet waste and recreation) and acute sources (stormwater mobilization).

The seasonal peak in concentrations during September and October (late recreation season) suggests a combination of factors may contribute to the observed impairment, including diminished baseflows that concentrate bacteria and cumulative effects from recreation earlier in the season (Figure J-7).

Table J-4. Potential sources of *E. coli* contamination in City Creek-1 Assessment Unit (as of July 24, 2025).

Category	Type	Present in AU	Potential Source of <i>E. coli</i>	UPDES Permit #	BMP Guidance*
Point Source	Construction Dewatering	Yes	No	UTG071949 Bonneville Water Pipe Liner	N/A
	Industrial Stormwater	No	No		N/A
	Construction Stormwater	Yes	No	UTRC09119 UTRC07884 UTRC05671	N/A
	Drinking Water Treatment Facility	Yes	No	UTG640018 City Creek Water Treatment Plant (CCWTP)	N/A
	Municipal (MS4) Stormwater	Yes	Yes	UTS000002 Salt Lake City	Section 7.2.2* of 2023 Main Document
Nonpoint Source	Onsite Wastewater Systems	No	No	N/A	Section 7.1.1* of 2023 Main Document
	Agricultural: Livestock	No	No	N/A	Section 7.1.4* of 2023 Main Document
	Agricultural: Canals	No	No	N/A	Section 7.1.4* of 2023 Main Document
	Domestic Pets	Yes	Yes	N/A	Section 7.1.3* of 2023 Main Document

	Wildlife / Nuisance Species	Yes	Yes	N/A	Section 7.1.2* of 2023 Main Document
	Recreationists / Unhoused	Yes	Yes	N/A	Section 7.1.5* of 2023 Main Document
*Best Management Practice (BMP) Guidance can be found in the Main Document of the 2023 Jordan River Watershed <i>E. coli</i> TMDLs (DWQ, 2023)					

6.1 Point Sources

In the City Creek-1 AU, municipal stormwater is a potential point source contributor of *E. coli* to the City Creek-1 AU (Table J-4, Figure J-9). Based on the LDC analysis (Figure J-8) and an evaluation of Utah Pollutant Discharge Elimination System (UPDES) permits, the LDC revealed water quality violations across nearly all flow conditions. Moist and mid-range flow exceedances suggest stormwater runoff sources, while dry and low-flow exceedances point toward potential illicit connections. While other UPDES permits exist in the AU, the short-term nature of these sources (e.g., construction stormwater and dewatering) are unlikely a source.

Possible Point Sources of *E. coli* Pollution

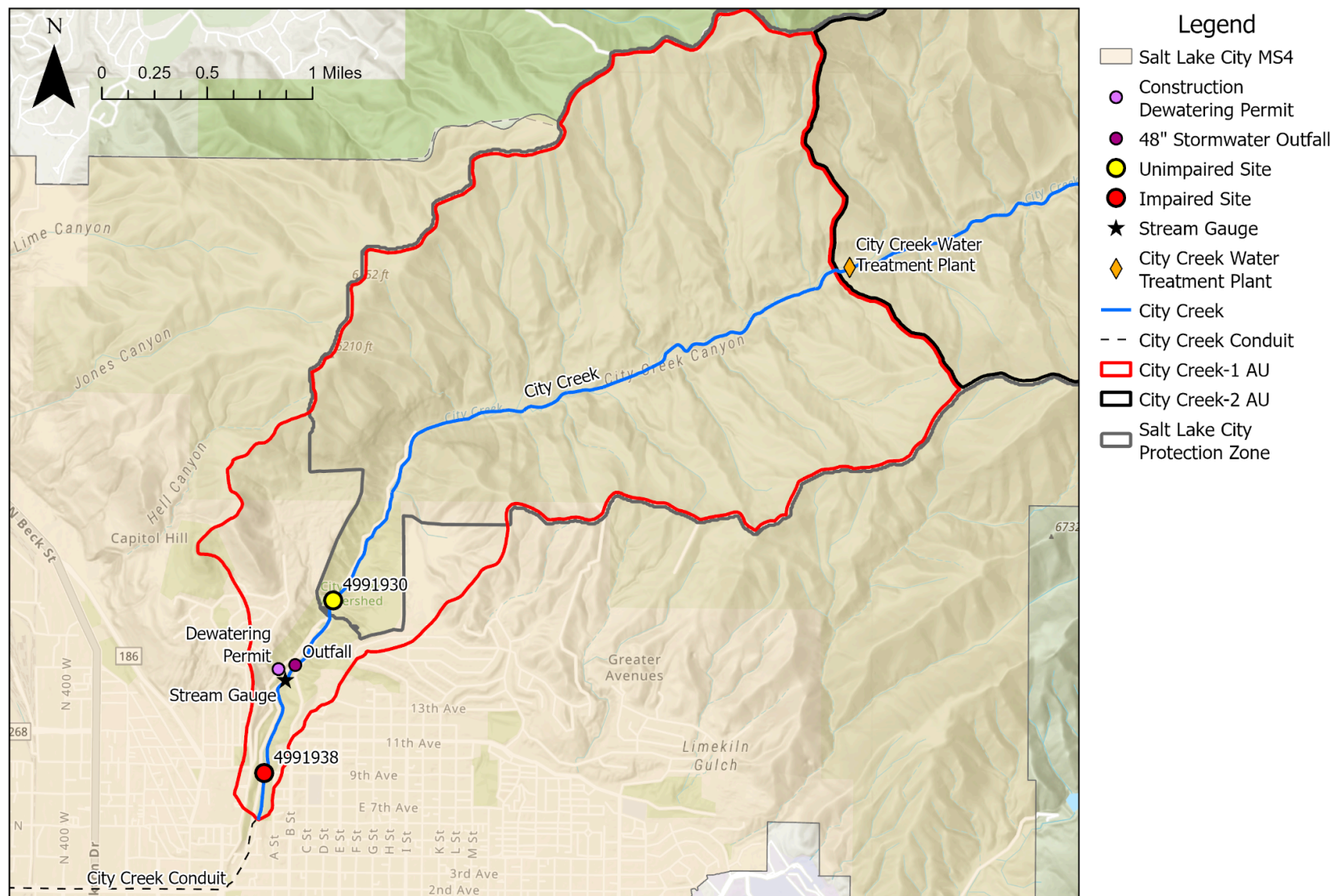


Figure J-9. Possible point sources of *E. coli* in the City Creek-1 Assessment Unit.

6.1.1 Municipal Separate Storm Sewer Systems (MS4s)

Multiple lines of evidence suggest that municipal stormwater is a potential point source of *E. coli* contamination in the City Creek-1 AU. The LDC (Figure J-8) shows exceedances across all flow regimes except high flows. This suggests that moist, mid-range, dry, and base-flow inputs may be tied to the MS4 system, including possible illicit connections, groundwater infiltration, or over-irrigation runoff. While Salt Lake City has not identified known sewer cross-connections within the watershed, aging infrastructure and shallow groundwater conditions may intermittently contribute bacteria-laden flows to the storm drain system. Additionally, stormwater infrastructure provides a conduit for other non-permitted sources, including pet waste, recreational use, and waste from unhoused individuals, to enter the creek during dry weather.

Salt Lake City holds permit coverage under a UPDES MS4 individual permit and operates stormwater outfalls within the AU. Under the 2023 Main Document (DWQ, 2023), MS4 permittees are required to go above and beyond the six minimum control measures by:

- Identifying and prioritizing TMDL-relevant Best Management Practices (BMPs) in a TMDL Compliance Plan, and
- Demonstrating TMDL load reduction progress in an annual TMDL Compliance Report.

6.1.2 Regulated Discharges (Non-MS4)

UPDES-regulated activities in the AU, excluding MS4s, are unlikely to be significant contributors. As of August 2025, one active construction dewatering permit (UTG071949, Bonneville Water Pipe Liner Project) is currently in effect. The permittee has complied with requirements, and no violations have been recorded. There are no active industrial stormwater permits within the AU. There are three active construction stormwater permits within the AU (UTRC09119, UTRC07884, and UTRC05671), but they are short-lived and change over time. The CCWTP (UPDES Permit UTG640018) discharges low-risk process wastewater (e.g., filter backwash), but it is located upstream in the unimpaired City Creek-2 AU and is not considered a source of *E. coli* in City Creek-1.

6.2 Nonpoint Sources

Within the City Creek-1 AU, nonpoint source *E. coli* contamination is primarily from nonpoint sources. Those sources include recreational use and domestic pets, with localized contributions from the unhoused community (Table J-4, Figure J-10). Wildlife is not a major contributor in the lower watershed as compared to human and dog activity, but may contribute background loading in the more forested upper watershed. These sources are not regulated under discharge permits but contribute significantly to the observed impairment.

Possible Nonpoint Sources of E. coli Pollution

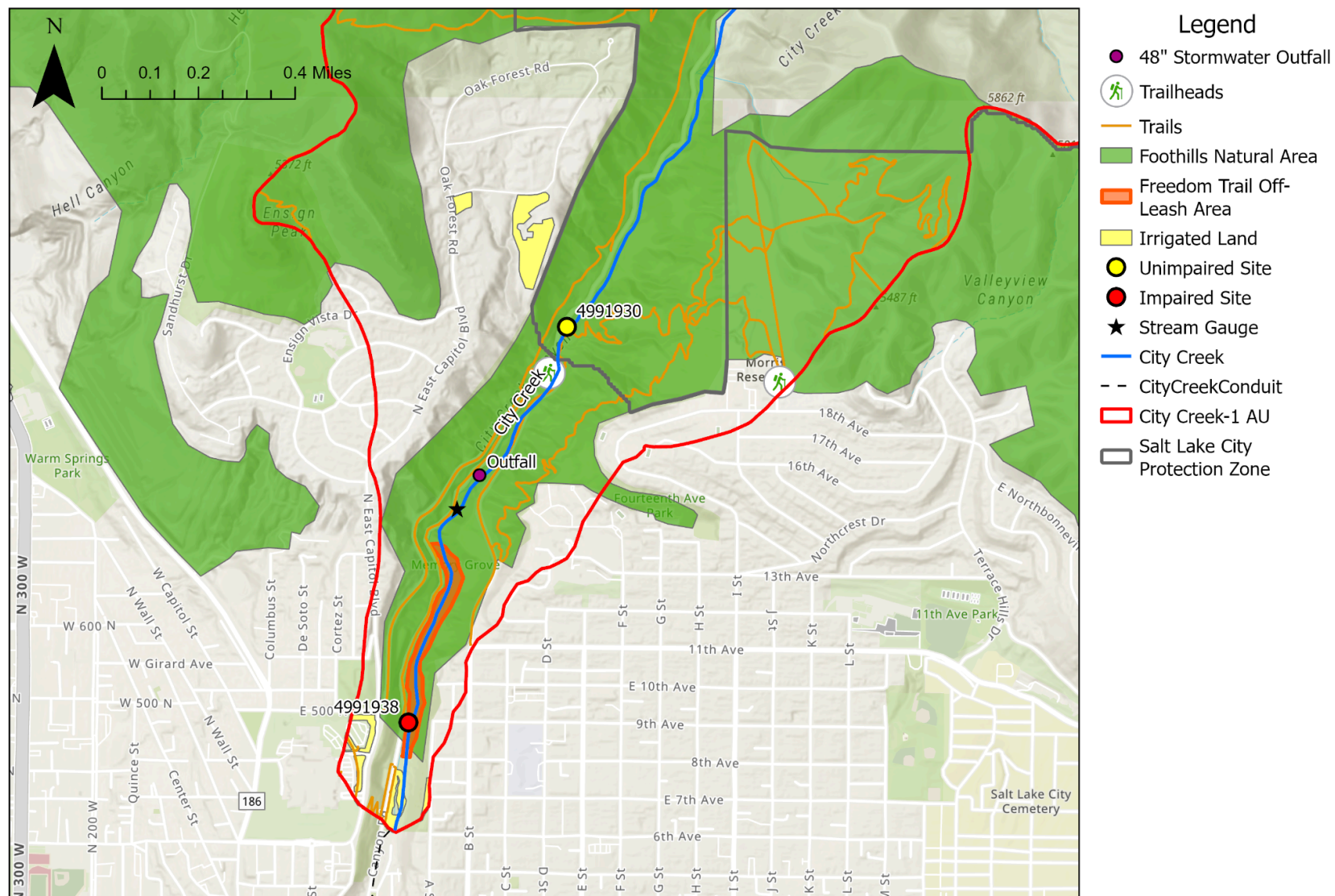


Figure J-10. Possible nonpoint sources of *E. coli* contamination within City Creek-1 Assessment Unit.

6.2.1 Onsite Wastewater Systems

According to Salt Lake County Health Department data received on 10/2/25, there are no parcels with active septic systems in the AU. If septic systems are installed in the future, ongoing system maintenance is important to keep waste systems separate from surface waters. Salt Lake County Health Department is responsible for managing regulation surrounding septic systems in this AU.

6.2.2 Agricultural Activities

There is no active agricultural activity within the City Creek-1 AU. Although the land cover data classifies 0.1% of the AU as “agriculture,” this category reflects grassy park areas, irrigated lawns, or other maintained turf rather than traditional farming. Dominant land uses include urban parks, government buildings, institutional campuses, and an extensive road network. While landscape irrigation is common in these settings, it does not represent a primary transport mechanism for *E. coli*. Nonetheless, dry-weather runoff caused by over-irrigation may mobilize pet waste and other pollutants from lawns, sidewalks, or medians into the storm drain system, contributing to chronic low-flow contamination.

6.2.3 Domestic Pets

Recreational activities, particularly dog walking, are a significant contributor to *E. coli* loading in the City Creek-1 AU. The Freedom Trail Off-Leash Area receives heavy daily use, increasing the likelihood of pet waste being deposited along trails, grassy zones, and within riparian corridors. Upstream, the City Creek Canyon trail system also experiences year-round recreation, further contributing to bacterial inputs from both pets and humans. Storm events can mobilize this waste from urban surfaces into the creek. The seasonal peak in *E. coli* concentrations during September and October aligns with late-season recreational activity and cumulative waste accumulation, underscoring the influence of these sources on water quality.

Spatial data indicates the upstream sample site (4991390) has a geometric mean seven times lower than the downstream sampling site (4991938), which is within the Freedom Trail Off-Leash dog area (figure J-10). This is also supported by the LDC (Figure J-8) with the highest frequency of exceedances (62%) occurring during low flow conditions, which is typically linked to direct deposition of waste. Watershed protections upstream of Bonneville Boulevard appear to protect water quality and support beneficial uses. Salt Lake City Trails and Natural Lands program is working to improve conditions within the Freedom Trail Off-Leash dog area during the development of this TMDL.

6.2.4 Wildlife / Nuisance Species

Urban-adapted species such as pigeons, raccoons, squirrels, and waterfowl are common in City Creek parks and greenways. While their contributions to *E. coli* levels are typically considered minor compared to human and pet sources, congregations of nuisance waterfowl in ponds or along streambanks may lead to localized bacterial hotspots. These areas may benefit from targeted BMPs such as habitat modification, exclusion fencing, or vegetative buffers.

Stormwater infrastructure, located just below site 4991930, includes sediment and debris detention basins designed to store overflow during storm events. These can attract nuisance species, such as waterfowl, increasing the potential for incidental *E. coli* loading. Targeted wildlife management in and around these areas may help reduce bacterial inputs and support improved water quality.

6.2.5 Recreationists / Unhoused

Recreational use is high within the City Creek-1 AU due to an extensive network of parks and trails. It is likely that a small percentage of those who recreate do not properly dispose of human waste. While it is a challenge to quantify this behavior, improper disposal of human waste was not observed during field visit on October 1st, 2025. People recreating in the AU are considered a minimal source of *E. coli* contamination. However, proper management of human waste should be encouraged at all parks and trailheads.

The AU's urban location near shelters and social service centers has historically supported transient encampments and unsheltered individuals along the creek corridor. While active enforcement and outreach have reduced the size and frequency of these encampments, human waste from informal camping, especially in areas lacking restroom access, may still contribute episodic contamination, particularly during low-flow periods when dilution is limited.

High use recreational areas, including trailheads and parks (e.g. Memory Grove), utilize vault toilets or permanent restroom facilities to manage human waste. Unlike septic systems, vault toilets store waste in sealed containers that must be pumped and removed. These facilities represent a potential point of failure rather than a diffuse groundwater source. If not properly maintained, or during periods of heavy recreational use exceeding capacity, these units can overflow or leak. Furthermore, structural failure of the sealed vault could result in direct discharge to the surrounding environment. Implementation strategies should focus on signage, inspection, maintenance frequency, and structural integrity of these specific municipal facilities.

J-7. TMDL

Chapter 4 of the 2023 Main Document details the rationale and methodology for concentration-based *E. coli* TMDLs. All sources, both point and nonpoint, within the City Creek-1 AU must meet the following water quality criteria:

- 206 MPN/100 mL as a 30-day geometric mean,
- 206 MPN/100 mL as a recreational season geometric mean, and
- 668 MPN/100 mL as a daily maximum during the recreational season

Appendix K: Bingham Creek

Assessment Unit *E. coli* TMDL

Waterbody Name	Bingham Creek
Waterbody / Assessment Unit	UT16020204-023_00
Assessment Unit Description	Bingham Creek and tributaries from confluence with Jordan River to headwaters
Impaired Beneficial Uses	Infrequent primary contact recreation (2B)
Applicable Season	May through October
Defined Endpoint/Water Quality Standard	• 30-day geometric mean of 206 MPN/100 mL • Recreation season geomean of 206 MPN/100 mL • Daily maximum of 668 MPN/100 mL
Percent Reduction Needed	76%, based on a geometric mean of 845 MPN/100 mL calculated for 4994190 (BG_00.22) Bingham Ck @1300W in the month of September.
Sources	Stormwater, Agricultural Activities, Recreation, Pets, Wildlife

K-1. Assessment Unit Description

The Bingham Creek Assessment Unit (AU; UT16020204-023_00) is located in southwestern Salt Lake County (SLCo) and encompasses approximately 19,816 acres (30.96 mi²). The AU is defined as “Bingham Creek and tributaries from the confluence with the Jordan River to the headwaters” and contains 4.37 miles of river according to Utah’s Clean Water Act (CWA) 303(d) listing (Figure K-1).

Bingham Creek has been substantially altered over time. The historic headwaters, now located within the Kennecott Copper Mine footprint, are no longer hydrologically connected to the active stream channel. Rather than contributing flow to Bingham Creek, water from the upper watershed is captured in the Bingham Creek Reservoir and circulated within a closed-loop system managed by Rio Tinto. Under current conditions, the creek originates as an ephemeral channel at approximately 5,300 feet in elevation and travels eastward through unincorporated SLCo and the cities of South Jordan and West Jordan before discharging to the Jordan River.

Land ownership within the AU is primarily private (98.7%) with minor federal ownership managed by the Bureau of Land Management (BLM; 0.54%) and state ownership managed by the Utah School and Institutional Trust Lands Administration (SITLA; 0.75%).

The Bingham Creek AU was listed as impaired in Utah’s 2024 Integrated Report for not supporting the Class 2B (infrequent primary contact recreation) beneficial use due to elevated *Escherichia coli* (*E. coli*) concentrations (Table K-1). The AU is also listed as impaired due to elevated Total Dissolved Solids (TDS); however, this Total Maximum Daily Load (TMDL) addresses only the *E. coli* impairment.

Table K-1. Impairment summary of the Bingham Creek Assessment Unit.

Assessment Unit	Cause of Impairment	Impaired Beneficial Use	Years 303(d) Listed	2024 Integrated Report Priority Ranking
Bingham Creek UT16020204-023_00	<i>E. coli</i>	Infrequent primary contact recreation (2B)	2024	Low*
	Total Dissolved Solids (TDS) [†]	Agriculture (4)	2014	Low
*Priority ranking changed to “High” in the 2026 Integrated Report. [†] TDS impairment is not addressed in this addendum.				

Monitoring Locations in Bingham Creek Assessment Unit

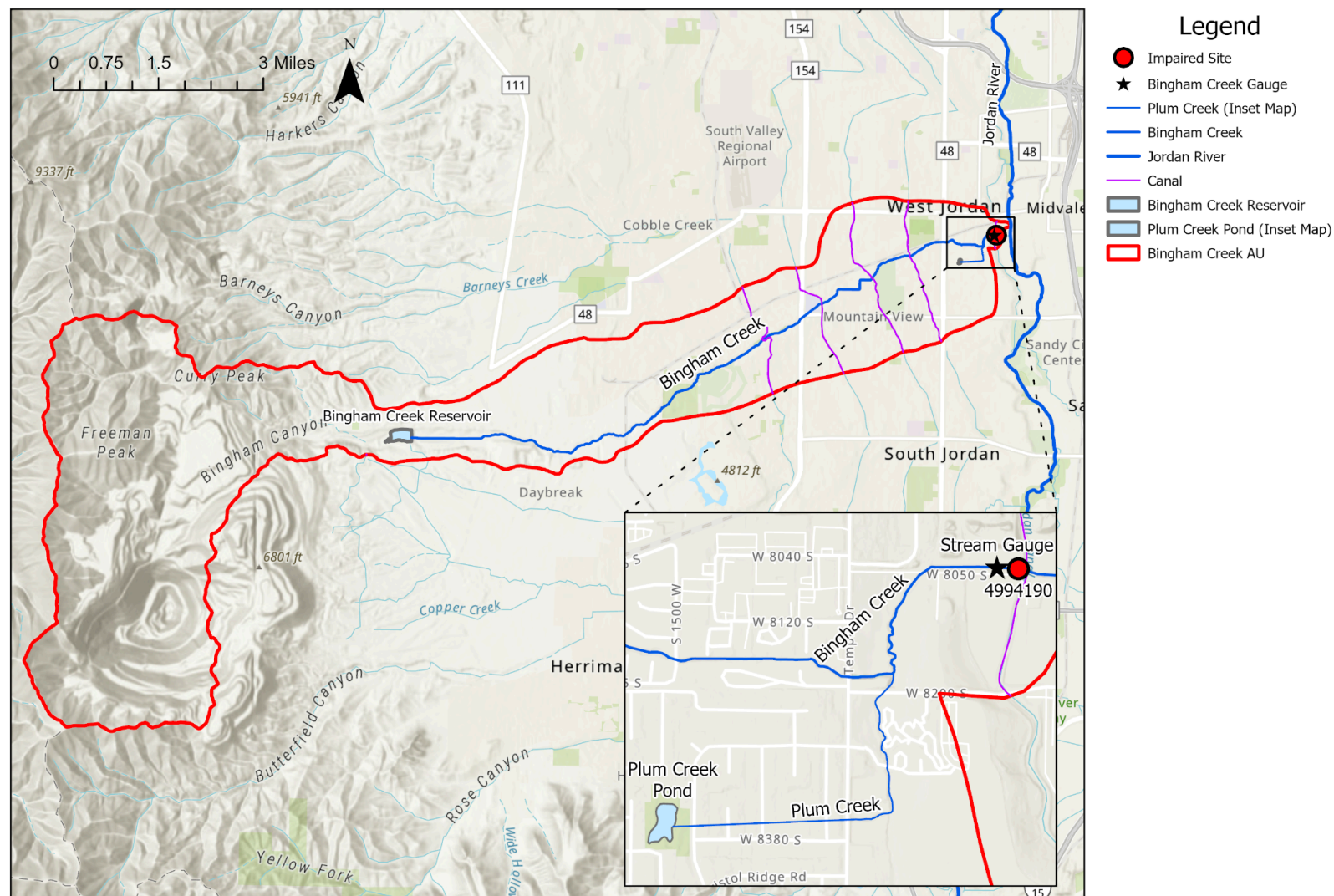


Figure K-1. Monitoring Locations and Hydrology in the Bingham Creek Assessment Unit.

K-2. Hydrology

Bingham Creek functions as a highly managed and hydrologically altered system. Perennial flow is limited to the lowest reaches and is sustained primarily by canal return flows and spring inputs. The upper watershed lies partly on land owned and managed by the Kennecott Copper Mine, where mining operations have substantially altered natural drainage patterns. Rather than contributing flow to Bingham Creek, water from the upper watershed is captured by the cut-off wall and alluvial extraction wells upstream of the Bingham Creek Reservoir (Large Bingham Reservoir System) and circulated within a closed-loop system managed by Rio Tinto. Therefore, the upstream streamflow and shallow groundwater - which consists of alluvial flow, along with stormwater, have been completely captured and recycled within the system (conversation with Erka Naran, environmental staff with Kennecott Copper, 2/11/2026).

Further downstream of the reservoir, Bingham Creek begins its defined channel and travels eastward until it meets the Jordan River. Along this reach, multiple independently managed diversions augment flow through irrigation releases, stormwater discharges, and spring returns. Some of these inputs are privately managed and are not shown on Figure K-1.

Within the Bingham Creek AU, there are 45 approved and perfected water rights, 32 of which list Bingham Creek as their source. The majority of these water rights are associated with mining operations at the Bingham Creek Reservoir (DWRi, 2025). However, because all mine-related water is reused on site within a closed-loop system, it does not enter the Bingham Creek channel downstream of the reservoir. The remaining water rights within the AU support irrigation, stock watering, and municipal or domestic uses.

As Bingham Creek flows downstream, it intersects five mapped canals: the Provo Reservoir Canal, Utah Lake Distributing Canal, Utah and Salt Lake Canal, South Jordan Canal, and North Jordan Canal. Each canal crossing presents an opportunity to divert or discharge water to fulfill water rights or to protect infrastructure during high-flow conditions. Other inputs include Plum Creek tributary and other minor canals and ditches that likely exist within the AU. Pollutant-generating activities along these canal corridors should be considered as part of water quality restoration and implementation efforts.

Flow records from Water Years 2016 through 2024 confirm that Bingham Creek is a highly managed waterbody. The mean daily discharge measured at the Bingham Creek gauge near the Jordan River (SLCO Gauge #105, DWQ MLID 4994190) was 7.0 cubic feet per second (cfs), with a maximum daily mean flow of 95.2 cfs, and a minimum daily mean flow of 0.04 cfs (Table K-2). High-flow events in the watershed are short in duration and occur primarily during summer and fall monsoonal storm events (Figure K-2). Monthly mean

flows increase from May through October, corresponding to the irrigation season (Figure K-3).

Bingham Creek has been substantially altered from historical conditions and now functions as a predominantly ephemeral system, with perennial flow limited to the lowest reaches fed by diversion returns and spring flows. The upper watershed has been transformed into an open pit mining complex along with its mine-contact water collection system, meaning that the upgradient area of Bingham Creek Reservoir no longer contributes surface water or shallow alluvial aquifer flow to Bingham Creek.

Downstream of the Large Bingham Reservoir System, the channel functions primarily as a hydrologically modified conveyance for stormwater. Current watershed management is characterized by traditional stormwater infrastructure, extensive water diversions, and coordination among multiple jurisdictions and private landowners.

Table K-2. Summary statistics for Bingham Creek above Jordan River, Gauge #105 (4994190) for Water Years 2016-2024.

Gauge Name	SLCO Gauge Number / DWQ MLID	Drainage Area (mi ²)	Mean Flow (cfs)	Maximum Flow (cfs)	Minimum Flow (cfs)
Bingham Creek above Jordan River	105 / 4994190	30.9	7.0	95.2	0.04

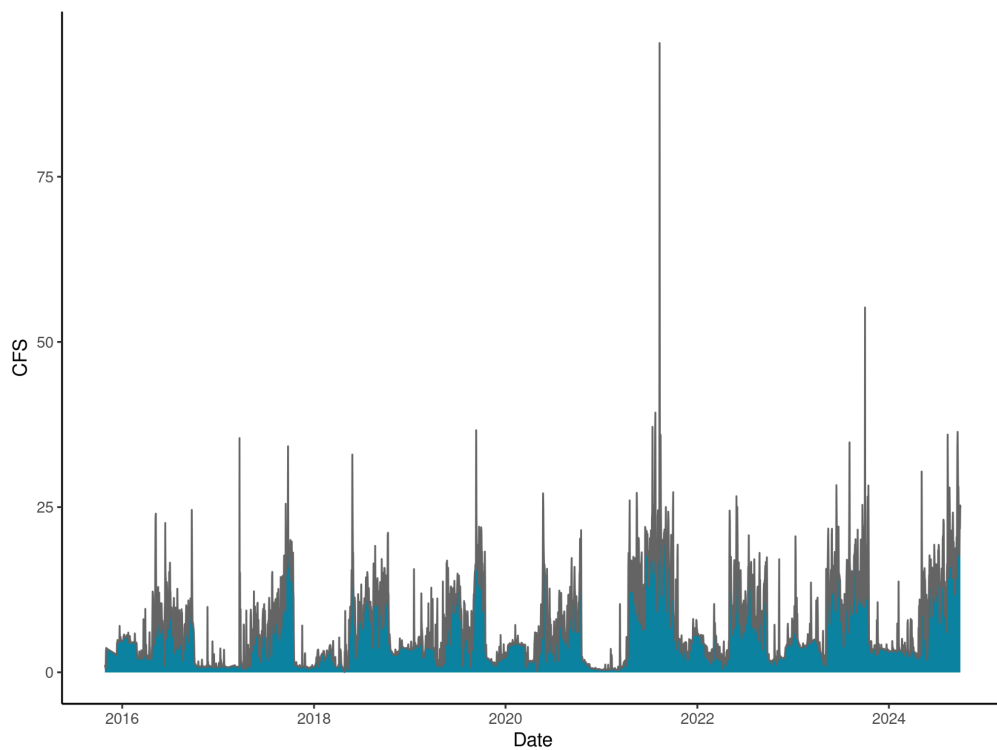


Figure K-2. Daily mean flows at Bingham Creek above Jordan River (SLC0 gauge #105) for Water Years 2016-2024.

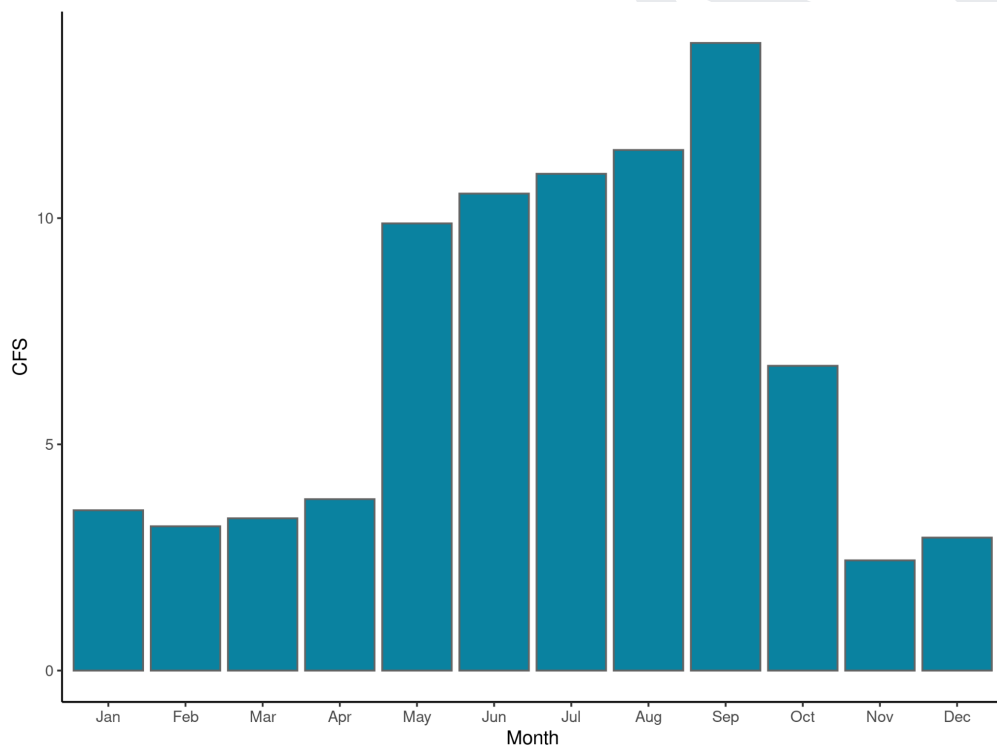


Figure K-3. Monthly mean flows (cfs) for Bingham Creek above Jordan River (SLC0 gauge #105) for Water Years 2016-2024.

K-3. Land Use

According to the 2024 National Land Cover Dataset (NLCD), land cover within the Bingham Creek AU consists of 39.4% developed land, 35.5% natural land cover (forest, shrubland, grassland, and wetlands), 23.7% barren land, 1.3% agricultural land (pasture and crops), and 0.1% open water (Figure K-4). The barren land category primarily reflects areas disturbed by the Kennecott Copper Mine. Natural and barren land cover dominate the upper watershed, while developed land is concentrated in the lower portion of the AU.

An analysis of land cover change between the 2004 and 2024 (NLCD, 2024) datasets indicates a 6% increase in developed land and a corresponding 6% decrease in agricultural land. In addition, barren land increased by approximately 1.5%, coinciding with a 1.7% decrease in natural land cover. While barren land is often grouped with natural land cover in watershed assessments, in the Bingham Creek AU this category is closely associated with mining-related disturbance from the Kennecott Copper Mine.

Impervious cover within the AU was estimated at 17% in 2024, representing an increase of approximately 4% since 2004. Nearly all impervious surfaces are located in the lower watershed, where land cover is predominantly developed. Watersheds with impervious cover exceeding approximately 10% commonly experience measurable declines in water quality due to increased stormwater runoff, reduced infiltration, altered hydrology, and enhanced pollutant delivery to receiving waters (EPA, 2025). The population within the AU is projected to increase by approximately 15% by 2040 (SLCo, 2017), which may further expand impervious surfaces and increase stress on water quality.

Land Cover in Bingham Creek Assessment Unit

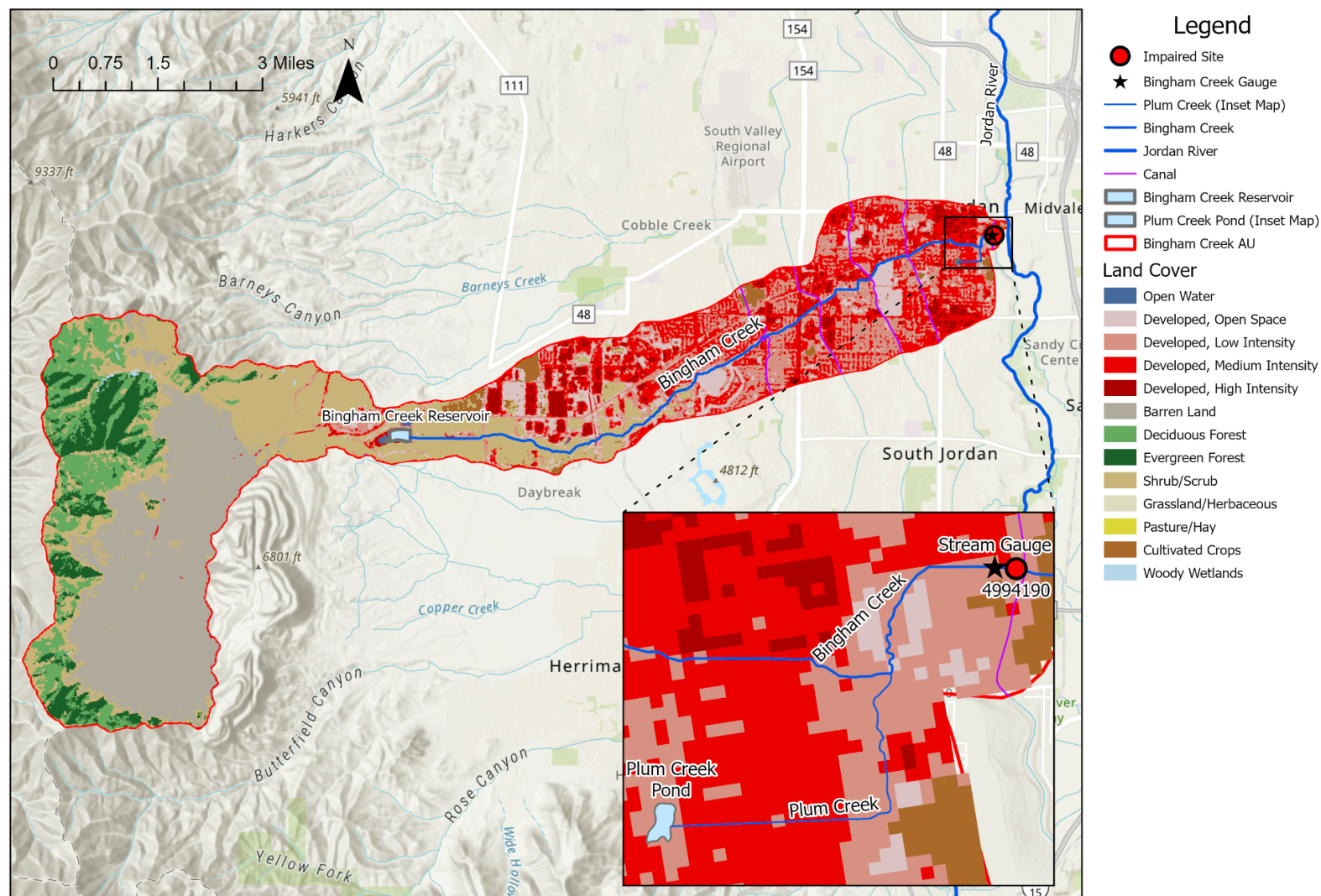


Figure K-4. Land cover (NLCD, 2024) in Bingham Creek Assessment Unit.

K-4. *E. coli* Data Summary

Monitoring results from one long-term location within the Bingham Creek AU (Figure K-1) were evaluated to assess seasonal patterns of *E. coli* from 2014 to 2024 (Table K-3 and Table K-4). Flow records are reported by Water Year, while bacteria assessments focus on recreation-season samples (May-October) paired with flow conditions. Site 4994190 (Bingham Ck @1300W) is located in the lower reaches of the AU near the confluence with the Jordan River and is impaired for *E. coli*. Due to the disrupted flow patterns in Bingham Creek, no upstream *E. coli* monitoring locations are present within the AU.

Site 4994190 triggered the *E. coli* impairment in the 2024 Integrated Report. This site had a year round geometric mean of 523 Most Probable Number (MPN)/100mL, with a recreation season geometric mean of 506 MPN/100mL. During the recreation season, exceedances of the 206 MPN/100mL geometric mean criterion occurred in 86% of the samples, and 37% of the samples also exceeded the 668 MPN/100 mL daily maximum criterion (Figure K-5).

Temporal evaluation of *E. coli* concentrations (Figure K-6) indicates an increasing frequency of exceedances of both the 206 and 668 MPN/100 mL criteria in recent years. Although *E. coli* impairments are assessed based on recreation-season conditions, monthly average concentrations (Figure K-7) show the highest *E. coli* levels during December and January. These winter concentrations, while outside the recreation-season assessment period, indicate the presence of year-round *E. coli* sources within the watershed and would require an approximate 80.6% reduction to meet applicable water quality criteria.

Based on monitoring results from the recreation season, the percent reduction was calculated from the September geometric mean concentration of 845 MPN/100 mL at site 4994190, which represents the highest monthly geometric mean observed. A 76% reduction is required to meet the applicable 30-day geometric mean criterion of 206 MPN/100 mL.

Table K-3. Year round *E. coli* summary statistics for Bingham Creek Assessment Unit.

Site ID (DWQ / SLCO)	Name	2024 IR Assessment	Date Range	Sample Size	<i>E. coli</i> Min	Geo mean	<i>E. coli</i> Max	% Exceeding 206 MPN	% Exceeding 668 MPN
4994190 / BG_00.22	Bingham Ck @1300W	Not Meeting Criteria	2013-10-15 to 2024-10-19	120	34.5	523.5	2420‡	82.5%	41.6%
‡2420 value exceeded the upper limit of quantification for the <i>E. coli</i> test method (Colilert). Rows highlighted in are impaired in the 2024 Integrated Report.									

Table K-4. Recreation Season (May-October) *E. coli* summary statistics for Bingham Creek Assessment Unit.

Site ID (DWQ / SLCO)	Name	2024 IR Assessment	Date Range	Sample Size	<i>E. coli</i> Min	Rec* Geomean	<i>E. coli</i> Max	% Exceeding 206 MPN	% Exceeding 668 MPN
4994190 / BG_00.22	Bingham Ck @1300W	Not Meeting Criteria	2013-10-15 to 2024-10-19 *Rec	63 *Rec	64.9 *Rec	506.3 *Rec	2420‡ *Rec	85.7% *Rec	36.5% *Rec
*Rec = Recreation Season (May - October) ‡2420 value exceeded the upper limit of quantification for the <i>E. coli</i> test method (Colilert). Rows highlighted in are impaired in the 2024 Integrated Report.									

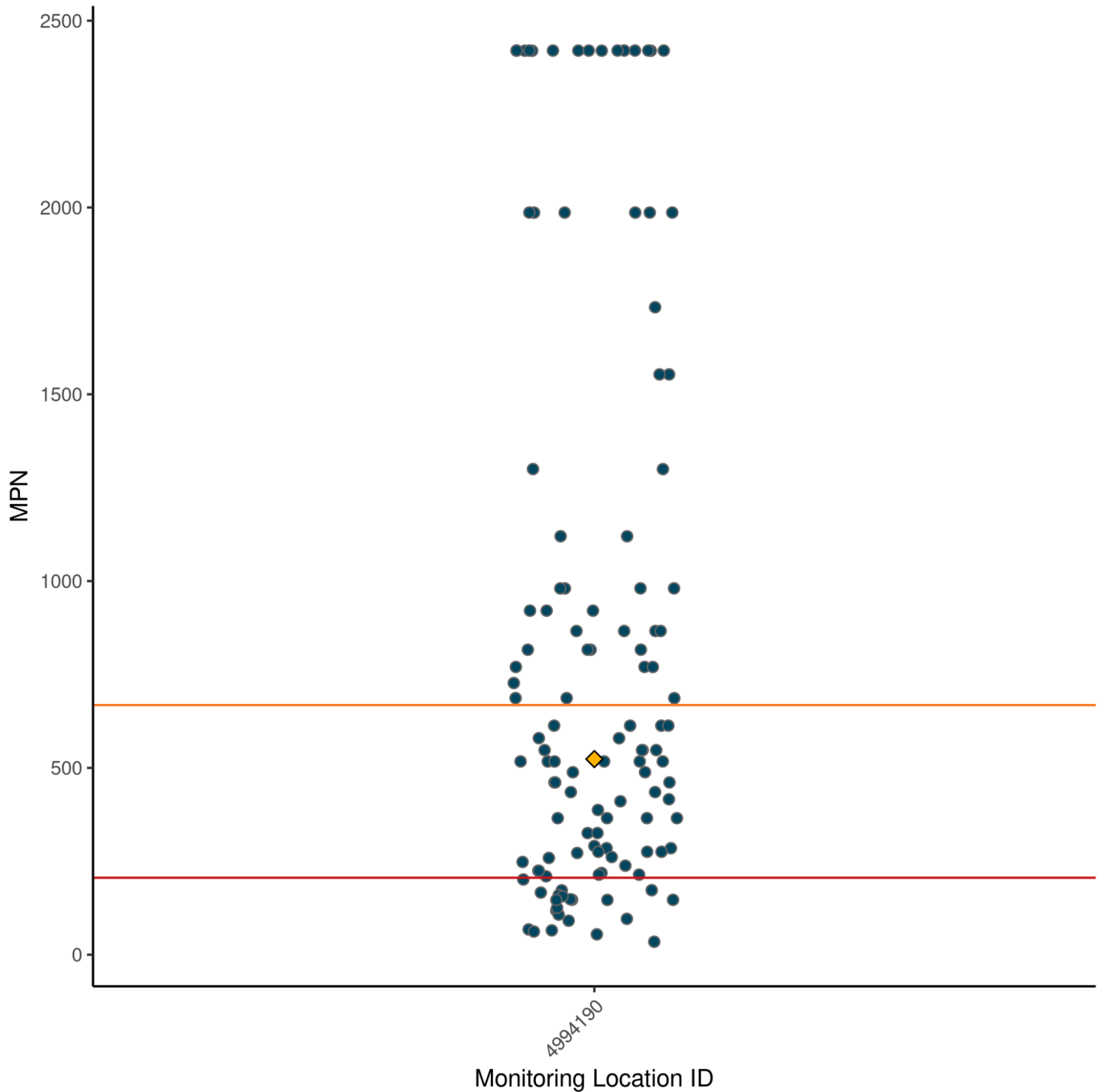


Figure K-5. Year round *E. coli* concentrations in the Bingham Creek Assessment Unit. Yellow diamonds indicate the overall geometric mean for each site and blue circles are individual samples. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria.

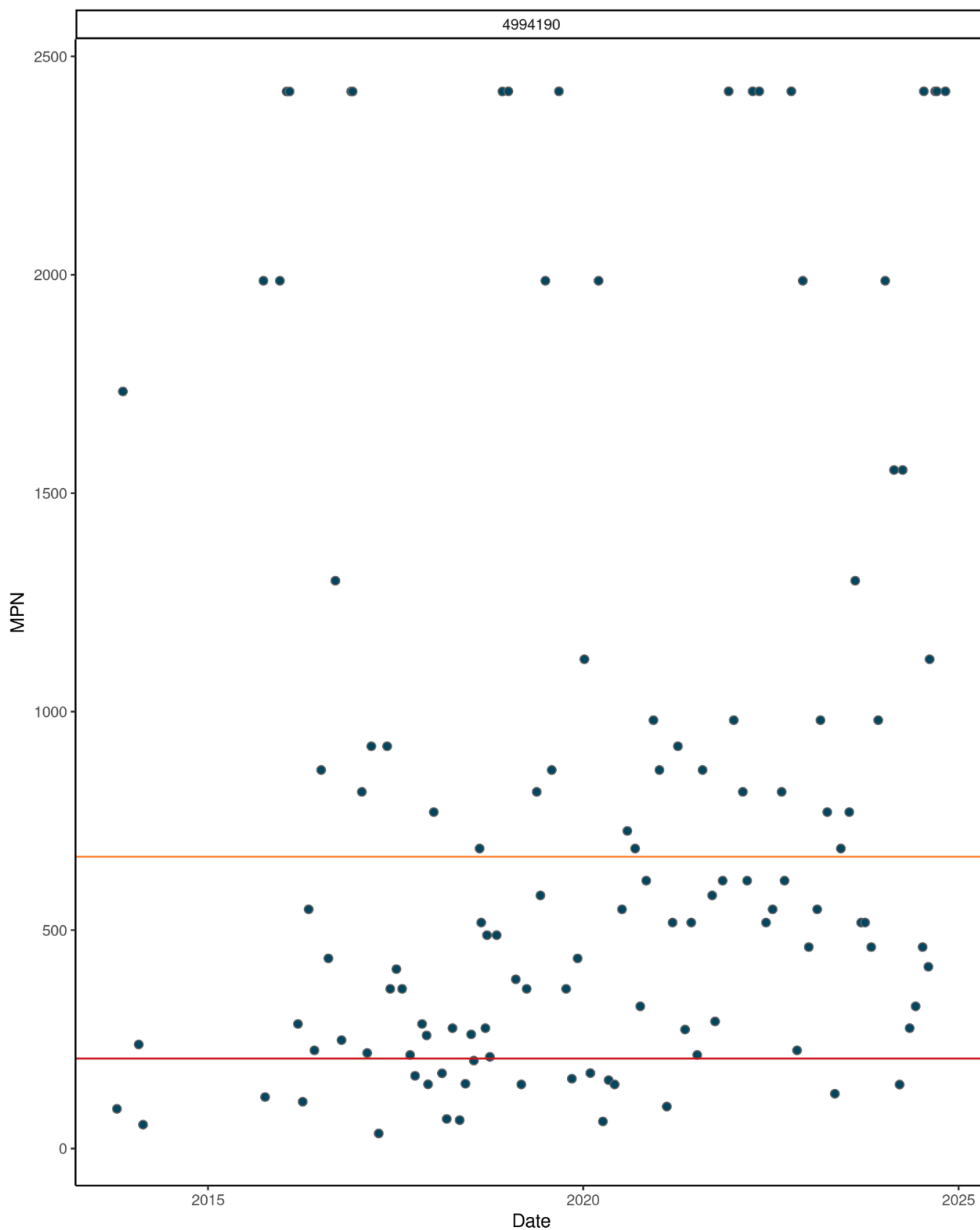


Figure K-6. Year round *E. coli* concentrations through time within the Bingham Creek Assessment Unit. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria.

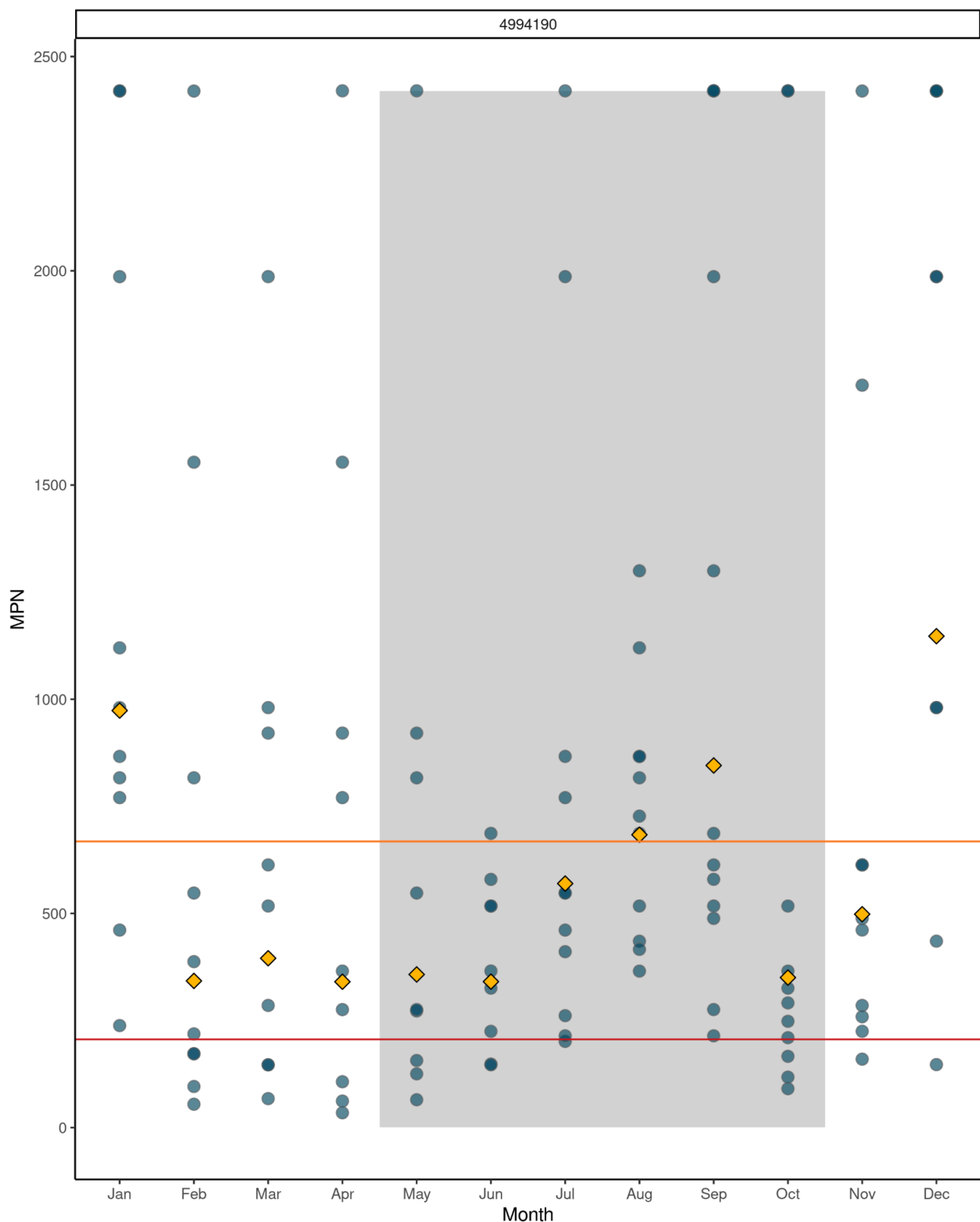


Figure K-7. Monthly *E. coli* concentrations within the Bingham Creek Assessment Unit. Yellow diamonds indicate the monthly geometric means and blue circles are individual samples. The red and yellow lines denote the 206 MPN/100mL and 668 MPN/100mL DWQ Assessment Criteria. The gray shading indicates the recreation season.

K-5. Potential Sources

Potential sources of *E. coli* impairment in the Bingham Creek AU were evaluated using multiple lines of evidence including hydrologic context, land use analysis, and Load Duration Curves (LDCs). These tools indicate that municipal stormwater and agricultural activities are the most probable contributors to elevated *E. coli* levels.

5.1 Load Duration Curves

LDCs are diagnostic tools used to evaluate how *E. coli* concentrations vary with flow and to help identify likely sources of pollution. Although this TMDL employs a concentration-based approach, LDCs offer valuable insights into the hydrologic conditions under which exceedances occur, differentiating between wet-weather sources (e.g., stormwater) and dry-weather sources (e.g., baseflow, groundwater, or direct deposition).

The Bingham Creek AU contains a continuous flow gauge operated by SLCo (Gauge #105) in the downstream end of the AU near the Jordan River. Flow records and *E. coli* samples from Water Years 2016 through 2024 were used to develop the LDC (Figure K-8). Hydrologic categories (high, moist, mid-range, dry, and low flow) were defined using EPA's flow exceedance percentiles (EPA, 2007). The percentage of *E. coli* loading measurements exceeding the TMDL target are shown beneath each flow regime label in Figure K-8, illustrating where exceedances are most frequent.

Exceedances occurred across all flow regimes with the highest percentage (100%) observed during high flows. Exceedances were still high in the remaining flow regimes with 89% in moist conditions, 92% in mid-range flows, 74% in dry conditions and 67% in low flows. This pattern suggests that bank erosion, stormwater, and riparian area pathways are contributing to the impairment in Bingham Creek.

- **High, Moist, & Mid-Range Flows:** Likely associated with urban stormwater runoff, bank erosion, and activity from riparian areas.
- **Dry & Low Flows:** Reflects baseflow-related contamination, potentially from wildlife, recreation, or aging infrastructure (e.g., leaking sewers or stormwater outfalls).

These findings support previous conclusions that the lower segment of Bingham Creek contains persistent sources of *E. coli*. Implementation efforts should focus on perennial and ephemeral stream segments to address both wet and dry-weather bacteria loading.

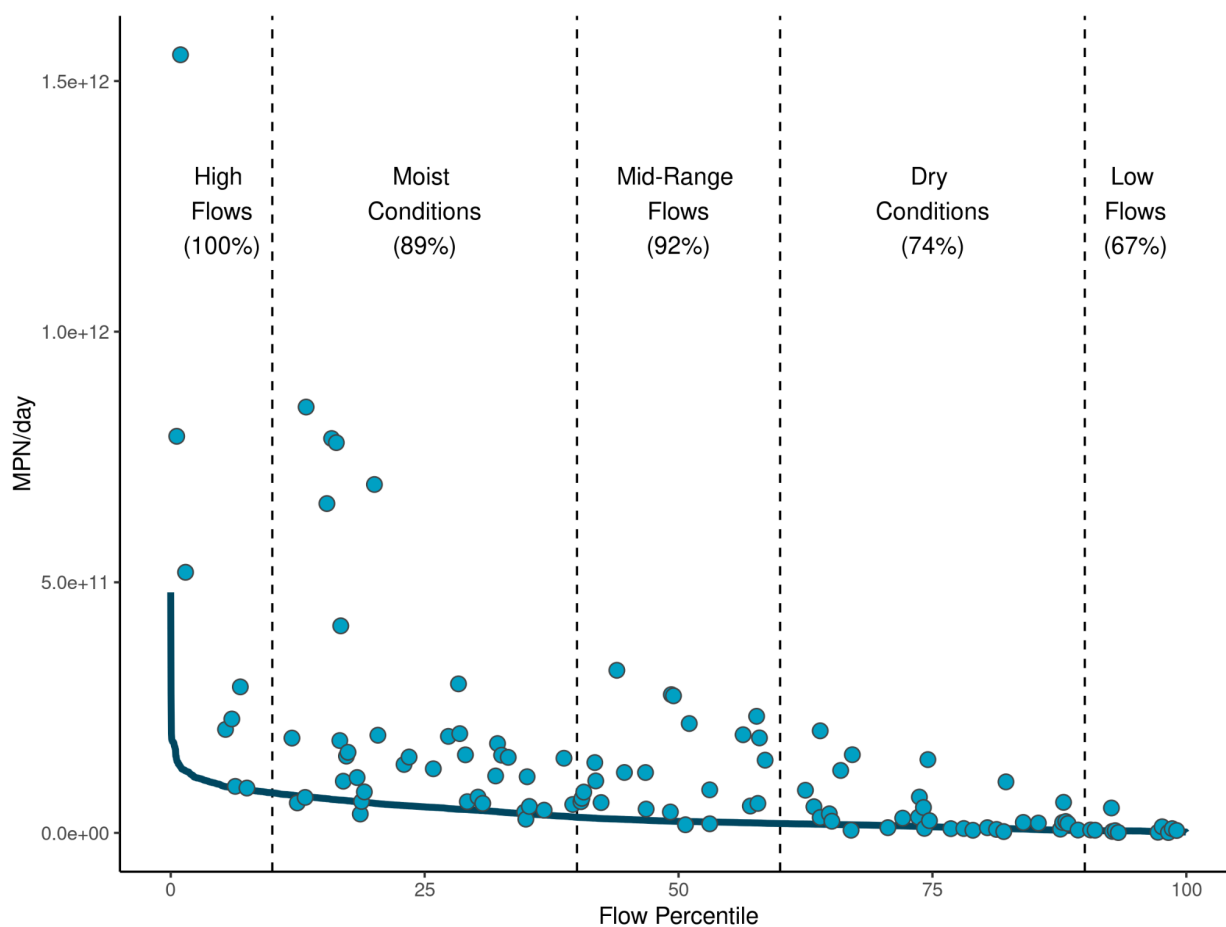


Figure K-8. Load Duration Curve at Salt Lake County Gauge #105, Bingham Creek above Jordan River (4994190), based on flow records from Water Years 2016-2024 and paired *E. coli* samples.

K-6. Source Assessment

The probable sources of *E. coli* in the Bingham Creek AU originate from both point and nonpoint sources. This determination is supported by multiple lines of evidence, LDC analysis, *E. coli* monitoring data, land-use characteristics, and hydrologic context.

Based on the source inventory and assessment findings, likely point and nonpoint sources of *E. coli* contributing to the impairments in the AU are provided in Table K-5.

- Municipal stormwater runoff: Conveyed through stormwater infrastructure, runoff mobilizes *E. coli*-laden materials from impervious surfaces (e.g., streets, sidewalks, and parks) in the lower watershed.
- Agricultural activities that include both livestock and land management, with canals acting as a transport for these sources to Bingham Creek.

Table K-5. Potential sources of *E. coli* contamination in Bingham Creek Assessment Unit (as of December 22, 2025).

Category	Type	Present in AU	Potential Source of <i>E. coli</i>	UPDES Permit #	BMP Guidance*
Point Source	Groundwater Discharge	Yes	No	See Table K-6	N/A
	Industrial Stormwater	Yes	No	See Table K-6	N/A
	Construction Stormwater	Yes	No	See Table K-6	N/A
	Large Underground Wastewater Systems (LUWDS)	Yes	Yes	See Table K-6	Section 6.1.3
	Municipal (MS4) Stormwater	Yes	Yes	UTS000001 Salt Lake County	Section 7.2.2* of 2023 Main Document
		Yes	Yes	UTS000003 UDOT	Section 7.2.2* of 2023 Main Document
		Yes	Yes	UTR090114 South Jordan City	Section 7.2.2* of 2023 Main Document
		Yes	Yes	UTR090104 City of West Jordan	Section 7.2.2* of 2023 Main Document
		Yes	Yes	UTR090101 Greater Salt Lake Municipal Services District (MSD)	Section 7.2.2* of 2023 Main Document
Nonpoint Source	Onsite Wastewater Systems	Yes	Yes	N/A	Section 7.1.1* of 2023 Main Document
	Agricultural: Livestock	Yes	Yes	N/A	Section 7.1.4* of 2023 Main Document
	Agricultural: Canals	Yes	Yes	N/A	Section 7.1.4* of 2023 Main Document
	Domestic Pets	Yes	Yes	N/A	Section 7.1.3* of 2023 Main Document
	Wildlife / Nuisance Species	Yes	Yes	N/A	Section 7.1.2* of 2023 Main Document
	Recreationists / Unhoused	Yes	Yes	N/A	Section 7.1.5* of 2023 Main Document

*Best Management Practice (BMP) Guidance can be found in the Main Document of the 2023 Jordan River Watershed *E. coli* TMDLs (DWQ, 2023)

6.1 Point Sources

MS4 discharges are the most likely source of *E. coli* point source pollution in the Bingham Creek AU (Table K-5, Figure K-9). This conclusion is based on multiple lines of evidence including the LDC that indicated exceedances at all flow regimes, urbanized land uses and increased impervious surfaces in the lower AU, and the low likelihood of *E. coli* contributions from other point sources. There is one Utah Pollutant Discharge Elimination System (UPDES) permitted industrial discharge in addition to five Municipal Separate Storm Sewer System (MS4) permits within the Bingham Creek AU. The UPDES permit for industrial discharge (UT0025836) is not likely associated with *E. coli* pollution and discharges into the Jordan River.

Potential Point Sources of E. coli Pollution

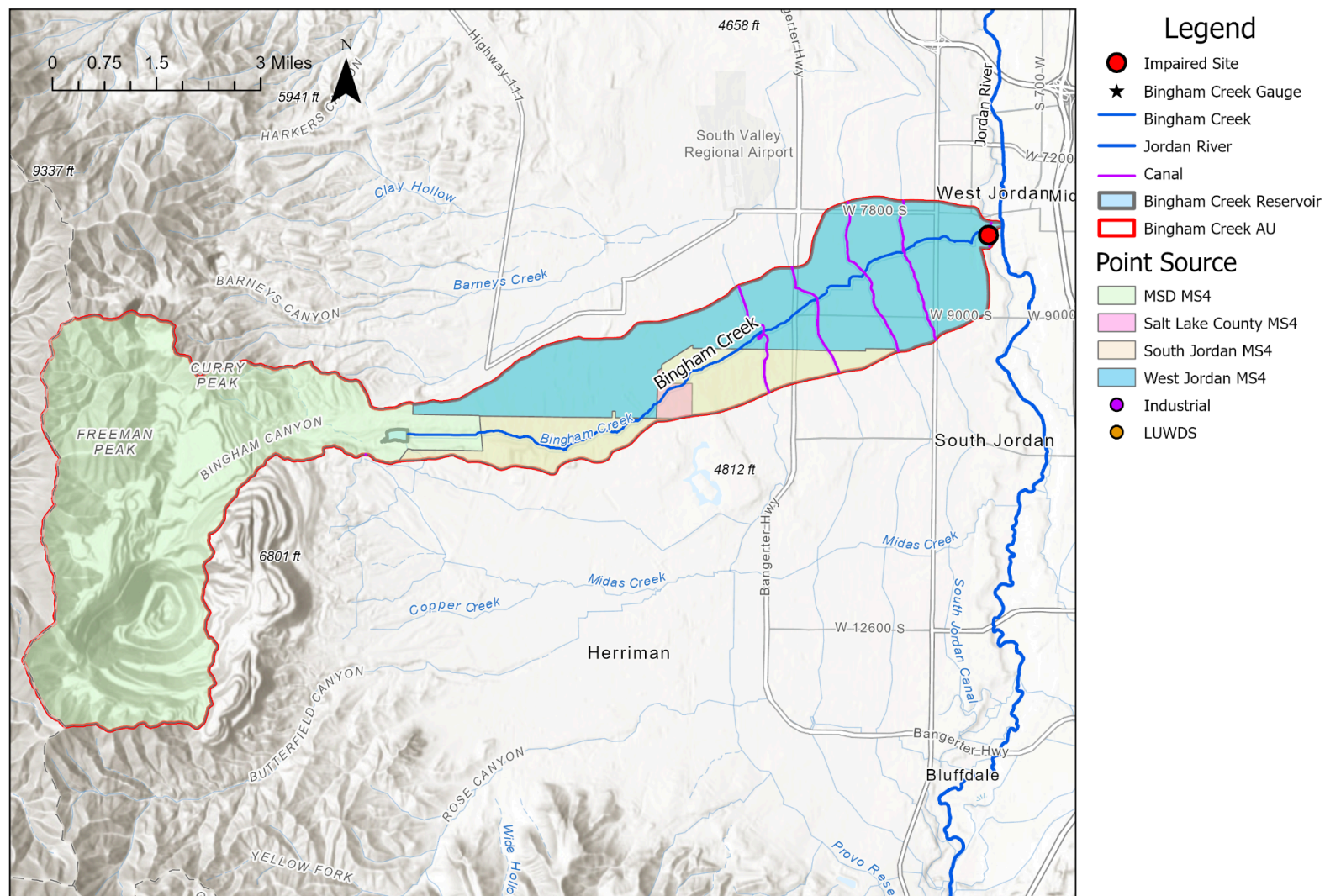


Figure K-9. Possible point sources of *E. coli* in the Bingham Creek Assessment Unit.

6.1.1 Groundwater Discharge

Kennecott Utah Copper LLC holds two groundwater discharge permits within the Bingham Creek AU. The Bingham Canyon Mine and Water Collection System (UGW350010) permit regulates the upper Bingham drainage dewatering program, which includes dewatering of the alluvial groundwater system, operation of the cut-off wall to capture shallow groundwater, and collection of any surface water or stormwater flows within the drainage. The Large Bingham Reservoir System (UGW350006) permit regulates the mine-contact water reservoirs and their associated leak-collection systems.

E. coli is not expected to originate from deep groundwater sources absent a demonstrated fecal contamination pathway, and available monitoring data do not indicate elevated *E. coli* concentrations attributable to Kennecott's groundwater discharges. Based on the nature of the permitted activity, the absence of a plausible transport mechanism, and the lack of supporting water quality evidence; Kennecott's groundwater permits are not identified as a contributing source of *E. coli* to Bingham Creek. Inclusion of Kennecott in this review reflects a comprehensive watershed-wide evaluation rather than an assignment of pollutant load or concentration.

6.1.2 Construction and Industrial Stormwater

As of December 22, 2025 there were 29 construction stormwater permits and 17 industrial stormwater permits in the Bingham Creek AU. All permits have been reviewed and are not likely to contribute to *E. coli* pollution. It should be noted that construction stormwater permits are short-lived and change over time.

6.1.3 LUWDS

DWQ issues basic operating permits for Large Underground Wastewater Disposal Systems (LUWDS). These large systems typically consist of a building sewer, a septic tank, and a subsurface disposal system, with daily flows ranging from 5,000 to 15,000 gallons or more. LUWDS are effective when properly operated and regularly maintained. These facilities collect wastewater and discharge treated effluent to subsurface soils via underground leach fields rather than directly to surface waters. Each LUWDS is regulated under a UPDES permit and must comply with effluent discharge standards established in Utah Administrative Code (UAC) R317-5 and R317-8.

One LUWDS (Kennecott - 6190 Copperfield) operates within the Bingham Creek AU (correspondence with Robert Beers, DWQ Onsite Program Manager, 1/26/26). The permittee managing this system is required to conduct a minimum of two annual

inspections and submit an annual report to DWQ. There are no violations on record for LUWDS within the Bingham Creek AU. Best Management Practices (BMPs) to reduce risk associated with LUWDS are best managed by following operating permit guidelines.

6.1.4 Municipal Separate Storm Sewer Systems (MS4s)

DWQ addresses municipal stormwater within the Bingham Creek AU by issuing MS4 permits to the corresponding municipalities whose stormwater discharges into Bingham Creek. There are five MS4 permits applicable in this AU; Salt Lake County, Utah Department of Transportation (UDOT), Greater Salt Lake Municipal Services District (MSD), South Jordan City, and the City of West Jordan.

Multiple lines of evidence indicate that municipal stormwater is the primary point source of *E. coli* contamination in the Bingham Creek AU. The LDC (Figure K-8) shows exceedances across all flow regimes, especially high flow, moist conditions, and mid-range flows. This suggests stormwater inflows potentially tied to MS4 discharges are a source. The increase in impervious cover in the urbanized lower watershed further supports stormwater as a key pathway for bacterial transport during both dry weather and storm events.

Under the *E. coli* TMDL, MS4 permittees are required to go beyond the six minimum control measures by:

- Identifying and prioritizing TMDL-relevant BMPs in a TMDL Compliance Plan, and
- Demonstrating TMDL load reduction progress in an annual TMDL Compliance Report.

Table K-6. Active and Admin Continued* permitted point source facilities within the Bingham Creek Assessment Unit (as of December 22, 2025).

Permit Type	Permit #	Description	WLA Needed?	WLA Rationale
Municipal Stormwater	UTS000001	Salt Lake County MS4	Yes	Concentration based TMDL, <i>E. coli</i> established at numeric criteria
	UTS000003	Utah Department of Transportation MS4	Yes	Concentration based TMDL, <i>E. coli</i> established at numeric criteria
	UTR090101	Greater Salt Lake County Municipal Service District (MSD) MS4	Yes	Concentration based TMDL, <i>E. coli</i> established at numeric criteria
	UTR090114	South Jordan City MS4	Yes	Concentration based TMDL, <i>E. coli</i> established at numeric criteria
	UTR090104	City of West Jordan MS4	Yes	Concentration based TMDL, <i>E. coli</i> established at numeric criteria
Industrial Stormwater	UTR274173	ASPHALT MATERIALS INC.	No	Industrial stormwater permit, no <i>E. coli</i> discharge
	UTR260217	BFS GROUP, LLC - WEST JORDAN UT RF/PN/YD	No	Industrial stormwater permit, no <i>E. coli</i> discharge

	UTR001037	INDUSTRIAL RUBBER PRODUCTS UTAH INC	No	Industrial stormwater permit, no E. coli discharge
	UTR001069	INTERSTATE BRICK	No	Industrial stormwater permit, no E. coli discharge
	UTR001053	OSI GROUP	No	Industrial stormwater permit, no E. coli discharge
	UTR000555	QUALITY STEEL CORP OF MS	No	Industrial stormwater permit, no E. coli discharge
	UTR270877	SYSCO INTERMOUNTAIN INC.	No	Industrial stormwater permit, no E. coli discharge
	UTR000047	WASTE MANAGEMENT OF UTAH - SLC	No	Industrial stormwater permit, no E. coli discharge
	UTR260271	WEST JORDAN BATCH PLANT	No	Industrial stormwater permit, no E. coli discharge
	UTRI00057	ACE DISPOSAL WEST JORDAN	No	Industrial stormwater permit, no E. coli discharge
	UTRI00032	AMAZON.COM SERVICES LLC - SLC2	No	Industrial stormwater permit, no E. coli discharge
	UTRI00304	WEST JORDAN DC	No	Industrial stormwater permit, no E. coli discharge
Industrial Stormwater No Exposure	UTNX00586	DUNFORD BAKERS	No	Industrial stormwater permit, no E. coli discharge
	UTNX00566	FASHION CABINET	No	Industrial stormwater permit, no E. coli discharge
	UTNX00668	GRAHAM PACKAGING COMPANY	No	Industrial stormwater permit, no E. coli discharge
	UTNX00549	TREBOR INTERNATIONAL	No	Industrial stormwater permit, no E. coli discharge
	UTNX00550	THE BOEING COMPANY - WEST JORDAN	No	Industrial stormwater permit, no E. coli discharge
Construction Stormwater	See additional documentation for details	The Construction Stormwater permit universe changes frequently. There were 29 Active permits on 12/22/25.	No	Industrial stormwater permit, no E. coli discharge
Ground Water Discharge Permit	UGW350006	KENNECOTT COPPER LLC (LARGE BINGHAM RESERVOIR SYSTEM)	No	Groundwater discharge permit, no E. coli discharge
	UGS350010	KENNECOTT COPPER LLC (BINGHAM CANYON MINE AND WATER COLLECTION SYSTEM)	No	Groundwater discharge permit, no E. coli discharge
(Large Underground Wastewater System) LUWDS	DWQ-2024-005638	KENNECOTT - 6190 COPPERFIELD	No	LUWDS operating permit, no E. coli discharge
Industrial Discharge	UT0025836	JORDAN VALLEY SOUTHWEST GROUNDWATER TREATMENT PLANT	No	Industrial discharge permit, no E. coli discharge
*Admin Continued permits are still active. They have likely reached the permit expiration date and have been extended by DWQ staff.				

6.2 Nonpoint Sources

Potential contributors of *E. coli* pollution within the Bingham Creek AU include restrooms, agricultural activities, pets, wildlife, and recreation/unhoused activities (Table K-5, Figure K-10). Recent *E. coli* monitoring, land use analysis, and hydrologic connectivity suggest that the main contribution of nonpoint source pollution is from agricultural activities, specifically related to transportation of *E. coli* along canals and ditches. These sources are not regulated but contribute to the observed impairment.

Potential Nonpoint Sources of E. coli Pollution

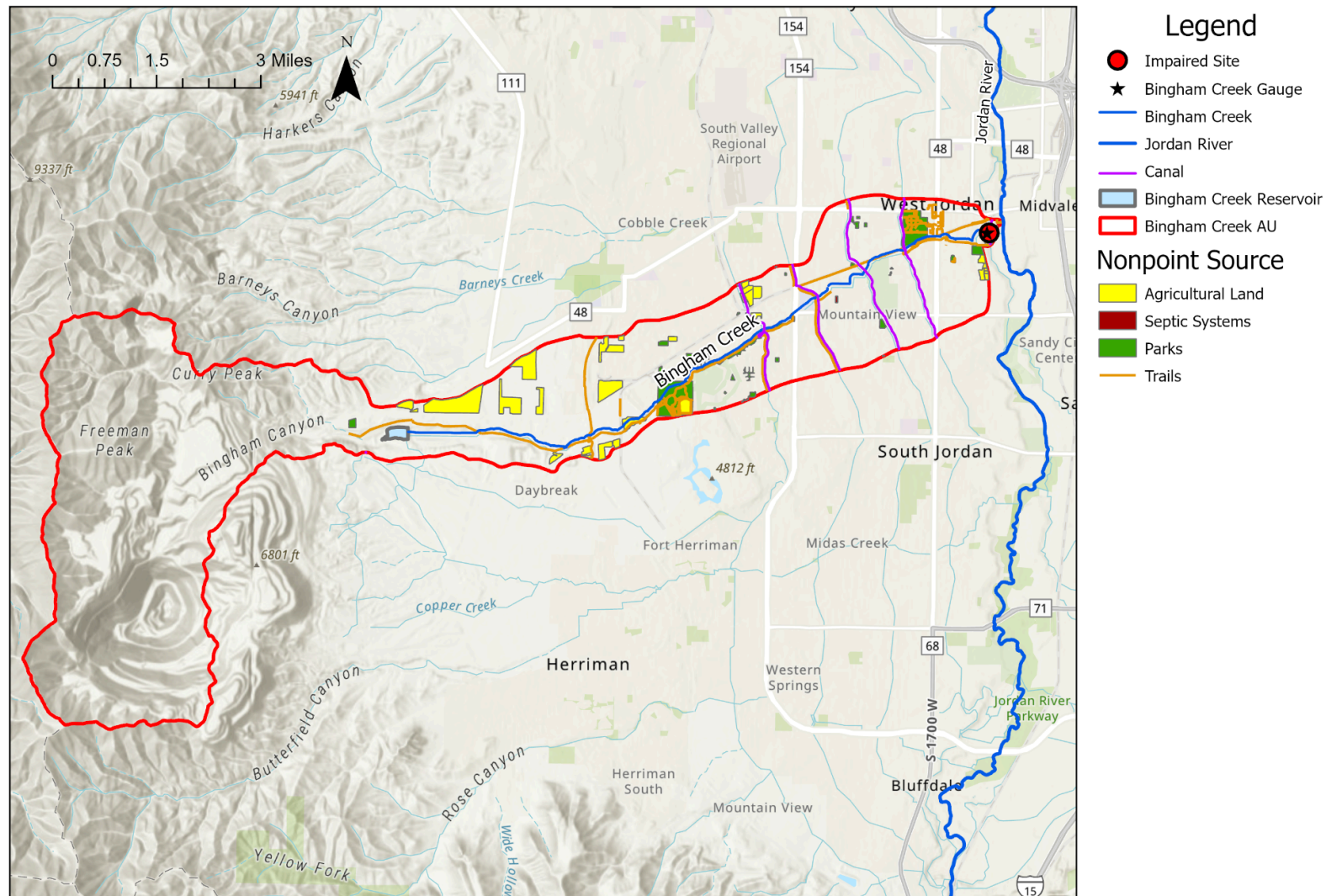


Figure K-10. Possible nonpoint sources of *E. coli* in the Bingham Creek Assessment Unit.

6.2.1 Onsite Wastewater Systems

According to Salt Lake County Health Department data received on 10/2/25, there is one parcel with an active septic system in the AU. It is not likely that septic systems are a large contribution to *E. coli* pollution in Bingham Creek, but ongoing system maintenance is important to keep waste systems separate from surface waters. Salt Lake County Health Department is responsible for managing regulation surrounding septic systems in this AU.

6.2.2 Agricultural Activities

Agricultural land makes up 1.4% of the total land cover within the Bingham Creek AU. In addition to the agricultural land in the AU, there are five mapped canals that can discharge into Bingham Creek with water from bordering AUs. Agricultural activities include crops, pasture, livestock, and irrigation. There are no permitted concentrated animal feeding operations (CAFOs) within this AU (email communication between Don Hall, DWQ CAFO Program Manager, and Samuel Taylor, 11/3/25).

E. coli may enter Bingham Creek and the canals discharging into it from lands where livestock have direct access to surface waters. There may also be instances where livestock grazing occurs on flood-irrigated pastures with return flows that enter surface waters. Landowners are not required to report the number of animals on their property, so an exact livestock count for this AU is unknown. County statistics on livestock numbers are not comparable for this AU since most of SLCo is developed. Proper grazing and irrigation management should be implemented to limit runoff from these fields.

Bingham Creek intersects five major canals (Figure K-10) that can import water with elevated *E. coli* concentrations from outside the AU and discharge into Bingham Creek. These canals are utilized for irrigation and stormwater conveyance. Land use in the AU shows agricultural lands actively transitioning into urban lands at a rapid rate.

6.2.3 Domestic Pets

Improper management of domestic pet waste is another potential source of *E. coli* contamination in waterbodies. Dog waste in the immediate vicinity of a waterway can contribute to local water quality impairment. While there are no designated off-leash dog parks currently within the Bingham Creek AU boundary, there are multiple parks and trails in close proximity to surface water that allow dogs. Dog waste management campaigns should be employed to ensure proper pet-waste management.

6.2.4 Wildlife / Nuisance Species

Wildlife are also a potential source of *E. coli* loading in this AU. Transport of animal waste to surface waters is dependent on animal habitat and proximity to these waters. Waterfowl and wildlife often deposit waste directly into streams, while other wildlife deposit waste in the floodplain where it can be transported to surface waters by runoff during precipitation events. Animal waste deposited in upland areas can also be transported to waterways. According to the Utah Division of Wildlife Resources, there is habitat for elk and mule deer in the upper portions of the AU.

Nuisance wildlife species should be considered as a potential source of *E. coli* in this AU. Common nuisance species include, but are not limited to, deer, waterfowl and small mammals such as beaver and muskrats. MS4 permits must address nuisance wildlife species due to certain stormwater control structures (basins and ponds) that can attract nuisance wildlife and subsequently degrade water quality. These areas include parks, golf courses, and detention basins such as Plum Creek Pond. Preventing waterfowl from congregating and limiting public feeding opportunities will reduce avian-based contamination.

6.2.5 Recreationists / Unhoused

Recreational use in the Bingham Creek AU is primarily found in local and regional parks through the urban areas of the watershed. There are local ordinances in place to properly manage waste but it is likely that a small percentage of those who recreate do not properly dispose of human waste. It is a challenge to quantify this behavior and improper disposal of human waste was not observed during field visit on October 15th, 2025. People recreating in the AU are considered an unlikely source of significant *E. coli* contamination for purposes of this TMDL. However, proper management of human waste should be encouraged at all parks and trailheads.

The AU's urban location near shelters and social service centers has historically supported transient encampments and unsheltered individuals along the creek corridor. While active enforcement and outreach have reduced the size and frequency of these encampments, human waste from informal camping, especially in areas lacking restroom access, may still contribute episodic contamination, particularly during low-flow periods when dilution is limited.

High use recreational areas, including trailheads and parks (e.g. Bingham Regional Park), utilize vault toilets or permanent restroom facilities to manage human waste. Unlike septic systems, vault toilets store waste in sealed containers that must be pumped and removed.

These facilities represent a potential point of failure rather than a diffuse groundwater source. If not properly maintained, or during periods of heavy recreational use exceeding capacity, these units can overflow or leak. Furthermore, structural failure of the sealed vault could result in direct discharge to the surrounding environment. Implementation strategies should focus on signage, inspection, maintenance frequency, and structural integrity of these specific municipal facilities.

K-7. TMDL

Chapter 4 of the 2023 Main Document details the rationale and methodology for concentration-based *E. coli* TMDLs. All sources, both point and nonpoint, within the Bingham Creek AU must meet the following water quality criteria:

- 206 MPN/100 mL as a 30-day geometric mean,
- 206 MPN/100 mL as a recreational season geometric mean, and
- 668 MPN/100 mL as a daily maximum during the recreational season