SALT LAKE COUNTY WATERSHED

2025 Salt Lake County Integrated Watershed Plan

JANUARY 2026

PREPARED FOR
Salt Lake County

PREPARED BY
SWCA Environmental Consultants

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ACKNOWLEDGMENTS

Water quality and watershed issues are complex, multi-faceted, and at times contradictory. Establishing and maintaining effective stewardship requires cooperation between local municipal governments, stakeholder groups, and various management and regulatory agencies. It is only with continued cooperation that we will collectively improve water quality and watershed health in Salt Lake County.

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Salt Lake County

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Key Stakeholders and Advisory Groups

Jordan River Watershed Council, Jordan River Commission, local nongovernmental organizations, publicly owned treatment works, Salt Lake County Stormwater Coalition, Utah Association of Conservation Districts, University of Utah, Utah Lake Commission, Wasatch Front Regional Council

2025 SALT LAKE COUNTY
INTEGRATED WATERSHED PLAN

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Abbreviations

ug/L	microgram per liter
ACEP	Agricultural Conservation Easement Program
AMA	agricultural management assistance
AU	assessment unit
BIBI	Benthic Index of Bio Integrity
BMP	best management practice
BOD	biochemical oxygen demand
CNMP	comprehensive nutrient management plan
CWA	Clean Water Act
DO	dissolved organic
DOM	dissolved organic matter
EPA	U.S. Environmental Protection Agency
FFSL	Utah Division of Forestry, Fire & State Lands
FPOM	fine particulate organic matter
GIS	geographic information system
HAB	harmful algal bloom
HUC	hydrologic unit code
IWP	integrated watershed plan
JVWCD	Jordan Valley Water Conservancy District
LA	load allocation
LID	low-impact development
LUWDS	large underground wastewater disposal system
mg/L	milligrams/liter
mL	milliliters
MOS	margin of safety
MON	monitoring
MOU	memorandum of understanding
MPN	most probable number
MS4	municipal separate storm sewer system
NGO	nongovernmental organization
NHD	National Hydrography Dataset
NST	nonstructural best management practice
NRCS	Natural Resources Conservation Service

NWQI	National Water Quality Initiative
NWI	National Wetlands Inventory
OM	organic matter
PHWA	Preliminary Healthy Watersheds Assessments
PLN	planning
POTW	publicly owned treatment works
RIVPACS	River Invertebrate Prediction and Classification System
RPI	restoration and protection integrated
RPS	recovery potential screening
SGCN	species of greatest conservation need
SOD	sediment oxygen demand
STR	structural best management practice
TDS	total dissolved solids
TMDL	total maximum daily load
UAC	Utah Administrative Code
UDAF	Utah Department of Agriculture and Food
UDEQ	Utah Department of Environmental Quality
UDNR	Utah Department of Natural Resources
UDOT	Utah Department of Transportation
UDWQ	Utah Division of Water Quality
UDWR	Utah Division of Wildlife Resources
UDWRi	Utah Division of Water Rights
UOL	Utah Open Lands
UPDES	Utah Pollutant Discharge Elimination System
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WCAT	Water Commissioner Allocation Tool
WLA	wasteload allocation
WRF	water reclamation facility
WRI	Watershed Restoration Initiative

1 INTRODUCTION

As part of an ongoing commitment to protect natural resources, Salt Lake County has developed the *2025 Salt Lake County Integrated Watershed Plan* (IWP) (2025 IWP). The 2025 IWP was developed using the U.S. Environmental Protection Agency (EPA) nine-element watershed planning process and includes input and involvement from watershed partners and local, state, and federal agencies operating within Salt Lake County. The overall goals of the 2025 IWP are to build partnerships, assess waterbody and watershed conditions, develop a framework to prioritize implementable recommendations and management actions to address water quality concerns in the watershed, and identify milestones and indicators to measure progress as projects are implemented.

1.1 Plan Background and Overview

Since the late 1970s, Salt Lake County has led planning and implementation activities to improve and protect watershed health and the water quality of surface waters within the county. Following the 1978 *Area-wide Water Quality Management Plan* (Salt Lake County 1978), Salt Lake County developed the 2009 *Salt Lake Salt Lake County Water Quality Stewardship Plan* (2009 Plan) to reflect more current watershed conditions (Salt Lake County 2009). The 2009 Plan was developed over 3 years through a collaborative effort across several organizations while incorporating elements from the newly developed, at the time, *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (EPA 2008). The 2009 Plan focused efforts on four critical watershed functions:

- Water quality
- Habitat (aquatic and terrestrial)
- Hydrology (flood conveyance and stream stability)
- Social and recreational services

Input from internal and external stakeholders guided the development of the 2009 Plan's strategic goals, which focused on the following seven targets:

1. Reduce pollutant loads to receiving waters.
2. Develop regional wastewater planning procedures.
3. Evaluate the effects of Utah Lake source water and irrigation diversions and return flows on the watershed functions.
4. Protect and improve wetlands and stream channels to prevent erosion and sediment loss.
5. Increase stream corridor areas to improve watershed functions.
6. Evaluate instream flows required to support watershed functions.
7. Identify funding sources and mechanisms for implementation support.

A general watershed characterization, information about implementation, and a monitoring approach were also included within the 2009 Plan along with recommendations for Salt Lake County to review water quality planning efforts every 6 years to update the previous plan. As a result, the review of the 2009 Plan led to the development and implementation of the 2015 *Salt Lake County Integrated Watershed Plan* (2015 IWP) (Salt Lake County 2015).

The 2015 IWP continued the area-wide water quality planning process and acted as an update to the 2009 Plan. The 2015 IWP continued to focus on improving watershed functions and protecting surface water quality, integrating the 2009 Plan with updated data and information to better address ongoing area-wide water quality and watershed planning. Continuing the efforts of the 2009 Plan and 2015 IWP, this 2025 IWP aims to advance the initiatives of the 2015 IWP under the EPA's nine-element watershed planning process. The EPA's *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* outlines six steps for the watershed planning process (Figure 1-1).

Figure 1-1. Steps in the watershed planning process.

Watershed planning is an iterative and adaptive process. The development of this 2025 IWP included multiple phases, each critical to the success of this plan. Development of this plan was initiated by engaging with stakeholders from across the watershed. Stakeholder engagement is vital to watershed planning as it provides a deeper understanding of the water quality and watershed health issues most important to stakeholders, provides a deeper understanding of management challenges faced within the watershed, and identifies stakeholders who will be instrumental in the implementation of this plan. Following stakeholder engagement, the greater watershed area was characterized through a comprehensive review process to better understand how population, climate, land use, soils, geology, hydrology, and regulated and unregulated pollutant sources impact water quality and watershed health. With a deeper understanding of the watershed's functioning and areas of concern, a comprehensive and actionable implementation plan was developed for Salt Lake County outlining short-term, midterm, and long-term goals that will support the necessary actions to address water quality impairments identified as part of the watershed characterization.

1.2 U.S. Environmental Protection Agency Nine-Element Watershed Planning

A watershed plan is developed through a consensus-based, nonregulatory planning process by which natural resource owners, managers, land users, and related interests work together as a team to formulate and implement a plan to manage all significant sources of pollution and stressors on surface water systems within a specific area (EPA 2008). The EPA's nine-element watershed plans provide a standardized, analytical framework for managing efforts to restore water quality in degraded areas and protect overall watershed health. Watershed plans help local communities, watershed organizations, and agencies within a watershed develop a road map for addressing water quality impairments and meet the criteria to secure Clean Water Act (CWA) Section 319 funding. The minimum nine elements are listed in Table 1-1, along with the associated sections of this plan that address each element.

Table 1-1. EPA Nine Elements and Associated IWP Report Section

EPA Element	Description	Associated 2025 IWP Section
a	Identify causes and sources of pollution	Section 4.3
b	Estimate pollutant loading in the watershed and expected load reductions	Sections 4.4.1.1, 4.4.2.2, and 4.4.4.1
c	Describe implementation activities to achieve load reductions and target critical areas	Section 5.1
d	Estimate amounts of technical and financial assistance and the relevant authorities needed to implement the watershed plan	Sections 5.1 and 5.2
e	Develop an information and education component	Section 5.3
f	Develop a project schedule	Section 5.4
g	Describe the interim, measurable milestones	Section 5.5
h	Identify indicators to measure progress	Section 5.6
i	Develop a monitoring component	Section 5.7

1.3 Planning Area

The planning area (Salt Lake County) is located within the 3,805-square-mile Jordan River basin (Figure 1-2). The Jordan River drains the Jordan River basin in north-central Utah and meanders for 51 miles, flowing north from the outlet of Utah Lake into Great Salt Lake. Salt Lake County lies entirely within the lower Jordan River subbasin (i.e., the Jordan River watershed) and is bounded on the east by the Wasatch Range and on the west by the Oquirrh Mountains. Seven major tributary streams (Little Cottonwood Creek, Big Cottonwood Creek, Mill Creek, Parleys Creek, Emigration Creek, Red Butte Creek, and City Creek) feed into the Jordan River from the Wasatch Range. From the Oquirrh Mountains, the four main streams that feed into the Jordan River are Bingham Creek, Rose Creek, Midas Creek, and Butterfield Creek. The subwatersheds of the Jordan River's 11 major tributaries are all in Salt Lake County. Utah Lake is drained by the Jordan River and is approximately 6 miles south of the Salt Lake County boundary.

To assess water quality in the Jordan River, the Utah Division of Water Quality (UDWQ) has broken the Jordan River into eight segments, 1 through 8, beginning at Utah Lake and terminating at Great Salt Lake (see Figure 1-2). These segments correspond to UDWQ's assessment units (AUs), which are used for water quality management.

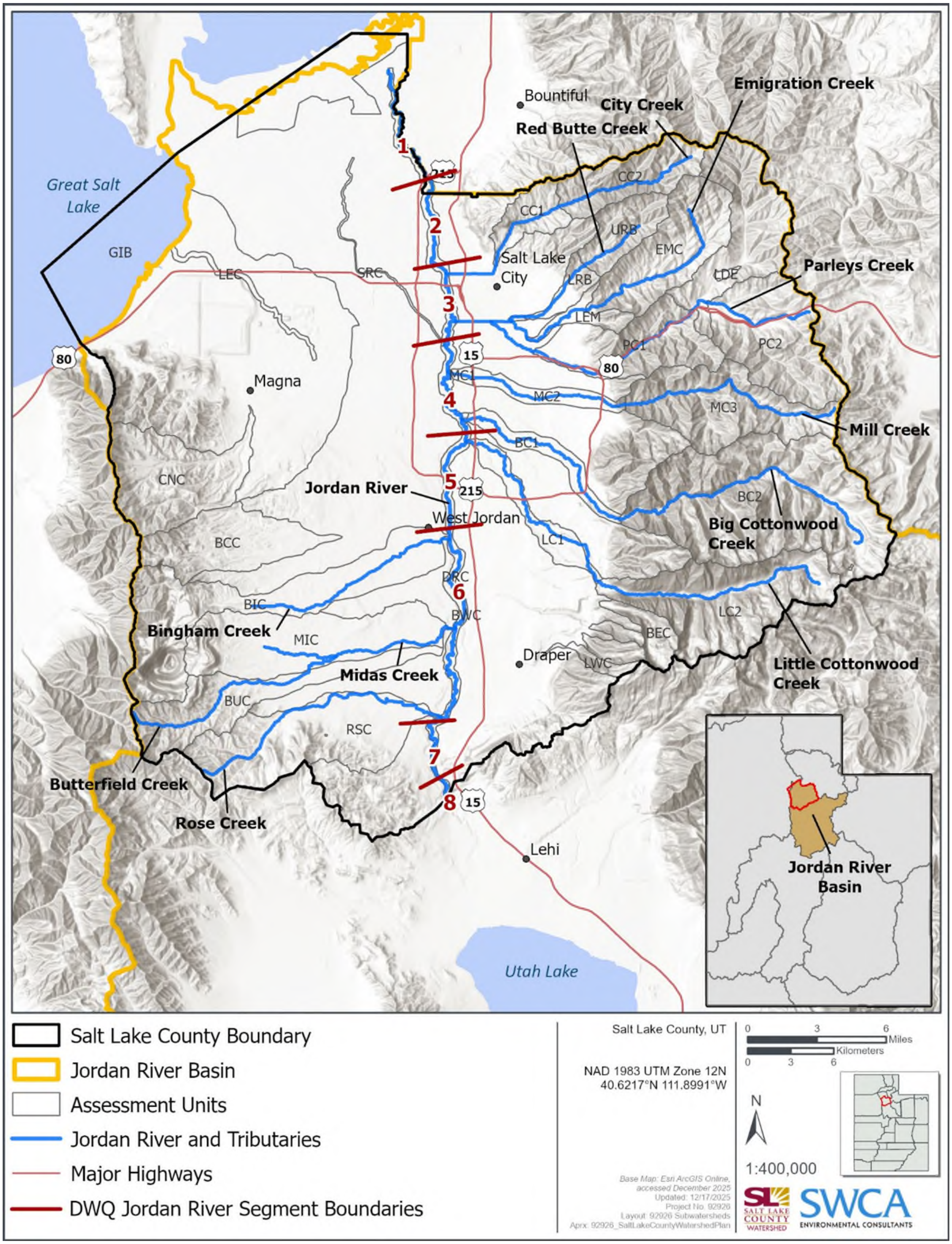

Figure 1-2. Planning area (Salt Lake County).

To more appropriately address the concerns related to watershed health, water quality, and the needs of stakeholders, the 2025 IWP focuses on the entire county. However, to address more region-specific water quality issues, the county has been broken into three watershed regions (Figure 1-3):

- **Northeast Region:** This region encompasses the northeastern portion of the Wasatch Range within Salt Lake County and includes City Creek, Red Butte Creek, Emigration Creek, Parleys Creek, and Jordan River segments 1 through 3.
- **Tri-Canyons Region:** This region encompasses the southeastern portion of the county and includes Mill Creek, Big and Little Cottonwood Creeks, and Jordan River segment 4.
- **Southwest Region:** This region encompasses southern and western portions of the county and includes Rose Creek, Butterfield Creek, Midas Creek, Bingham Creek, and Jordan River segments 5 through 8.

To help guide the 2025 IWP, each region had its own stakeholder group to provide on-the-ground knowledge of regional watershed issues (see Section 1.4). Dividing the county into three watershed regions helped garner more resolute information about the specific watershed issues within each subwatershed and provide more specific and applicable feedback related to the implementation activities (see Section 5).

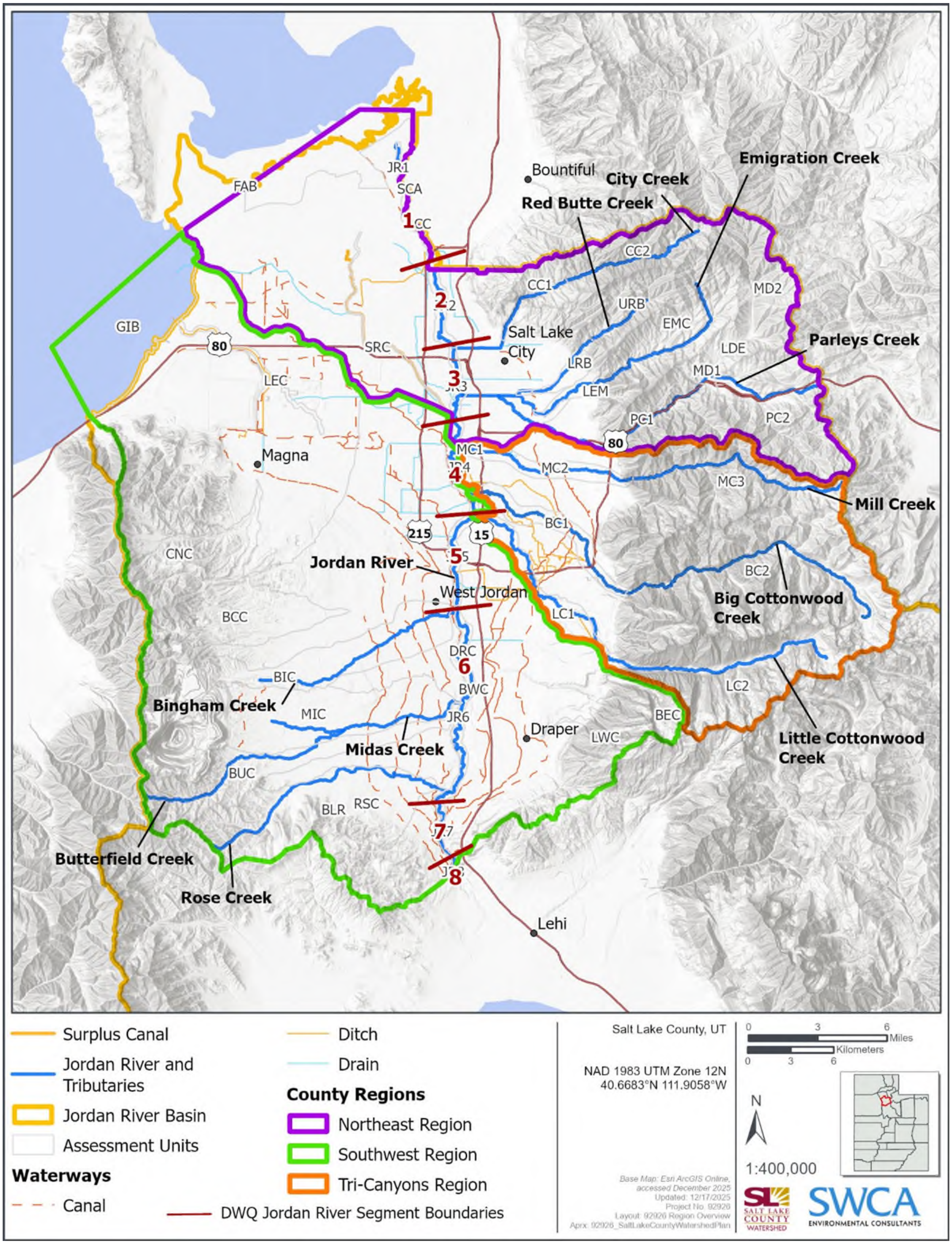

Figure 1-3. Watershed regions within Salt Lake County.

1.4 Stakeholder Engagement

Recognizing the importance of soliciting stakeholder input from the start, the 2025 IWP was developed with input from multiple stakeholder groups that are involved in the numerous subwatersheds within Salt Lake County. Stakeholders included members of local councils; nongovernmental organizations (NGOs); water and sewer districts; and agency representatives from the city, county, state, and federal levels.

Four stakeholder groups were organized to help develop the 2025 IWP (Table 1-2):

- **Three regional stakeholder groups:** Each watershed region had a stakeholder group (Northeast, Tri-Canyons, and Southwest) (see Section 1.3); these groups were established to provide on-the-ground knowledge of local subwatershed issues.
- **One regional group**: This group comprised state and federal agency representatives responsible for county-wide initiatives and oversight.

Table 1-2. Stakeholder Committee Membership

Stakeholder Group	Affiliations
Regional	Central Wasatch Commission, Jordan River Commission, Jordan River Foundation, Jordan Valley Water Conservancy District, Natural Resources Conservation Service, Salt Lake City Department of Public Utilities, Salt Lake County Health Department, Trout Unlimited, U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Geological Survey, Utah Department of Agriculture and Food, Utah Department of Transportation, Utah Division of Drinking Water, Utah Division of Emergency Management, Utah Division of Water Quality, Utah Division of Water Resources, Utah Division of Water Rights, Utah Division of Wildlife Resources, Utah Division of Forestry, Fire & State Lands, Utah Geological Survey, Utah Transit Authority, Wasatch Front Water Quality Council, Salt Lake County Parks & Recreation
Northeast	Central Wasatch Commission, Red Butte Garden, Salt Lake City, Salt Lake City Water Reclamation Facility, South Davis Sewer District, Tracy Aviary
Southwest	Bluffdale City, Central Wasatch Commission, Draper City, Herriman City, Jordan Basin Improvement District, Riverton City, Salt Lake Conservation District, Sandy City, Sandy Suburban Improvement District, South Jordan City, South Valley Sewer District, Taylorsville City, Taylorsville-Bennion Improvement District, West Jordan City, West Valley City, West Valley Public Works Department
Tri-Canyons	Central Valley Water Reclamation Facility, Central Wasatch Commission, Cottonwood Heights, Cottonwood Improvement District, Holladay City, Midvale City, Mill Creek, Metropolitan Water District of Salt Lake & Sandy, Murray City, South Salt Lake City, Town of Alta

Three stakeholder meetings took place during the development of the 2025 IWP. Table 1-3 outlines each stakeholder meeting and key outcomes from each meeting. In addition to stakeholder meetings, online surveys and workshop style sessions were used to gather critical information and feedback from the stakeholders that informed the goals, objectives, and implementation plan outlined in this document.

Table 1-3. Summary of the Stakeholder Meetings

Meeting Name	Meeting Date	Meeting Structure	Meeting Goals	Outcomes
Kickoff meeting	March 14, 2025	Virtual meeting with all four stakeholder groups. The first 40 minutes consisted of a presentation of the EPA's nine-element watershed planning process, an overview of Salt Lake County efforts, and the goals and purpose of the 2025 IWP update. Following the presentation, attendees met in breakout sessions assigned by county regions to identify stressors, sources of stressors, and potential implementation activities to address identified stressors.	Identify key concerns and potential stressors and sources of pollution within Salt Lake County. Refine draft vision and goals.	Each regional stakeholder group identified key stressors associated with water quality impairments across their associated subwatersheds, whereas the regional stakeholder group focused on identifying county-wide pollution sources and stressors. Stakeholder input was then used to guide source identification and link sources of pollution to specific impacts to and impairments within the watershed.
Implementation meeting	July 22, 2025	Virtual meeting with all four stakeholder groups where the participants reviewed the final vision and goals for the plan. Additionally, two breakout sessions were conducted: one focused on identifying sources of pollution and the other discussed region-specific implementation activities.	Identify potential implementation activities to address sources of impairments. This included linking sources to appropriate best management practices, education and outreach activities, and research and monitoring specific to each region (Tri-Canyons, Northeast, and Southwest) in Salt Lake County.	Pollutant sources associated with water quality impairments were identified across several categories, including urban, agricultural, stormwater, erosion, and hydromodification. Potential implementation activities to address these pollutants of concern were identified during breakout sessions, and discussions took place on what types of activities would be most feasible. Additionally, project partnerships were discussed where applicable.
Final plan meeting	November 7, 2025	Virtual meeting with all four stakeholder groups. An overview of the contents of the 2025 IWP was presented to the stakeholders, followed by a workshop to review the implementation activities and get buy-in and feedback from the stakeholder groups.	Review the 2025 IWP and address questions from stakeholders regarding the draft plan. Receive feedback and buy-in on final implementation activities.	Edits and feedback on implementation activities, suggested project partners, and indicators to measure progress.

1.5 Watershed Plan Goals and Objectives

Through online surveys and stakeholder meetings, stakeholders identified and agreed upon crucial watershed stressors related to water quality and pollution sources. Water quality impairments identified as priority concerns were as follows:

- *Escherichia coli (E. coli)*
- Dissolved oxygen (DO) and organic matter (OM)
- Temperature
- Metals
- Benthic invertebrate assessment
- Total phosphorus
- Total dissolved solids (TDS)

Discussions with the stakeholder groups also identified other concerns in the watershed that ultimately helped shape the development of the 2025 IWP:

- Hydrologic modification
- Stream stability
- Presence of trash, litter, and debris affecting water quality and habitat

The 2025 IWP goals and objectives listed in Table 1-4 highlight the collaborative input and strategic insights from stakeholders that informed each decision. Each goal is presented along with the rationale behind its selection and an overview of its integration throughout the entire 2025 IWP planning and implementation process (Table 1-4).

Table 1-4. Watershed Plan Goals

Goal	Rationale	2025 IWP Integration
Reduce pollution from point and nonpoint sources such as stormwater runoff, agriculture, septic systems, and stream erosion to meet water quality standards.	Monitoring data show that pollutants from both point and nonpoint sources are likely contributing to impaired designated uses of waterbodies in Salt Lake County. This is supported by stakeholder feedback that helped to confirm areas and sources of concern. Meeting water quality criteria requires coordinated load reductions across sectors. Focusing on the identified sources and practices will deliver measurable improvements efficiently.	Section 4.3 of this 2025 IWP addresses the goal of reducing point and nonpoint pollutants. Several of the implementation activities detailed in Section 5.1 are designed to reduce both point and nonpoint source pollution to ensure water quality meets established criteria.
Develop a list of reasonably affordable strategies to reduce point and nonpoint source loading and protect the physical, chemical, and biological condition of Salt Lake County waterways.	Routine monitoring data and stakeholder feedback indicate that waterbodies in Salt Lake County streams continue to receive pollutant loads from both permitted discharges and diffuse urban sources, stressing their physical, chemical, and biological condition. With already allocated public budgets and growing development pressures, the county needs a vetted menu of reasonably affordable actions that deliver measurable load reductions and habitat protection.	Section 4.3 outlines pollutants of concern across the watershed that are or have the potential to impact watershed functioning. Section 5.1 outlines potential implementation activities that may address these concerns, whereas Section 5.2 outlines specific funding sources available for implementation activities. Together, these sections provide the framework for developing a list of reasonably affordable management strategies.
Continue to work with watershed stakeholders to hold education events to inform them of the water quality problems that exist, potential solutions, and entities that can provide technical and financial assistance.	This goal reflects stakeholder requests for practical actionable information on local water quality problems, workable solutions, and where to get support when pursuing implementation activities. It aligns with the EPA *Handbook for Developing Watershed Plans to Restore and Protect Our Waters* (EPA 2008), which calls for sustained education and outreach as a core implementation strategy. Turnover among agency staff and volunteers, new regulatory and funding opportunities, and evolving best practices create persistent knowledge gaps, which this goal aims to reduce.	Increasing outreach and education efforts to improve public knowledge of watershed health concerns align with Element d (Table 1-1) of the EPA's nine-element watershed plan process. The specific outreach and education activities outlined in Section 5.3 are designed to improve public knowledge of water resource concerns within the watershed.
Foster an understanding of the health of wetlands, stream channels, and vegetated infiltration features. Where appropriate or necessary, improve habitat and filtration functions while preventing excess erosion loss and thereby reducing excess sediment loading to waters.	Wetlands, stream channels, and vegetated infiltration features (e.g., bioretention, swales) are critical for watershed functions. Increasing impervious cover and intense storms mobilize sediment that carries nutrients and metals. Building a shared understanding of watershed conditions and the means of restoring function where needed will reduce sediment loading, improve habitat, and support water quality criteria.	Sections 3.1 and 3.3 discuss the conditions of natural features such as wetlands and stream channels, and Section 4.3.2 identifies sources of nonpoint pollution related to sediment and erosion. The education and outreach activities outlined in Section 5.4 aim to increase public knowledge of the importance of wetlands, riparian zones/stream channels, and manufactured infiltration features.
Work with relevant regulatory agencies to develop and implement strategies that ensure adequate instream flows to Great Salt Lake while maintaining the necessary flood-control and stormwater infrastructure and objectives.	Sustained low inflows to Great Salt Lake have stressed habitat, air quality, and regional economies. Concurrently, Salt Lake County must maintain flood-control capacity and public safety. Coordinating with regulatory agencies to define and implement strategies for adequate instream flows while preserving flood-control and stormwater objectives creates a path to keep water moving to the Great Salt Lake in wet and dry years. This goal is in response to stakeholder concerns about declining lake levels and watershed-wide flood and stormwater management.	Factors such as climate, land use, and various water resources that impact Great Salt Lake inflow quantity are discussed in Sections 3.1, 3.2, and 3.3, respectively. Several implementation activities identified in Section 5.1 are aimed at quantifying water resource use, limiting diversions within the watershed, and implementing stormwater-control activities to ensure sufficient quantities of water reached Great Salt Lake.

Goal	Rationale	2025 IWP Integration
Conduct a thorough assessment of the current watershed conditions and the successes achieved over the past decade and ensure the watershed plan is updated to meet the necessary criteria for securing EPA 319 funding.	This plan was developed to formalize an assessment of the success of watershed management activities over the past 10 years in Salt Lake County. Watershed planning must be an iterative process, with an understanding of what is successful and feasible for each individual watershed. A thorough update to the watershed characterization will produce a targeted implementation plan with clear costs, milestones, and partnering organizations to compete for EPA 319 funds.	Section 2 reviews implementation activities from the previous 10-year period to monitor and measure the success of planning efforts. Similarly, implementation activities outlined in Section 5.1 will be reviewed to ensure that implementation activities continue to meet funding requirements outlined in Table 5-1, most critically, funding source UDWQ-02 (see Table 5-4 in Section 5.2).

2 WATERSHED REVIEW (2015–2025)

2.1 Priority Implementation Activities from the 2015 Plan

The priority implementation activities in Table 2-1 reflect a continuation of activities established in the 2009 Plan alongside new initiatives informed by the work completed between the 2009 Plan and the drafting of the 2015 IWP. Over the past decade, 14 key activities from the 2015 IWP provided a framework for action with the goal of improving watershed functions and providing high-quality surface waters that support national CWA goals. Although guided by the 14 implementation activities in Table 2-1, Salt Lake County also evaluated and addressed emerging opportunities to preserve and enhance watershed functions that extended beyond the priority activities detailed in the 2015 IWP.

Table 2-1. Salt Lake County Implementation Activities from 2015 to 2025

Implementation Activity	Implementation Summary
Encourage the adoption of land development and resource management strategies that focus on low-impact development criteria, the use of green infrastructure, and the use of energy and water resource conservation technologies.	The *Jordan River Watershed* E. coli *TMDL* [total maximum daily load] *MS4 Implementation Guidance* (2023b) was drafted and inserted into the *Salt Lake County Stormwater Management Plan* (Salt Lake County 2025a) providing guidance for addressing pollutant reduction requirements of the TMDL.
Continue to maintain and update this IWP to evaluate proposed point and nonpoint source discharges, regulatory requirements, and watershed planning elements as necessary.	The 2015 IWP was updated according to its 10-year schedule with this 2025 IWP.
Participate in the state water quality criteria, beneficial use, and impaired waterbody rule-making processes to preserve and enhance watershed and area-wide water quality.	During review periods, Salt Lake County actively engaged in state water quality rule-making processes by conducting numerous reviews and providing feedback on proposed criteria and rules.
Continue to implement the Public and Stakeholder Involvement Plan component of the 2015 IWP for vesting partners and the public in water quality management practices and improvement projects.	Salt Lake County enhanced public engagement and watershed stewardship by installing interpretive signage and crowdsourced photo-monitoring stations, launching online maps and data dashboards, hosting the annual Watershed Symposium, publishing the Watershed Watch newsletter, supporting the Rain Harvest program, and leading (through 2019) the Jordan River Watershed Council meetings. These efforts collectively improved education, collaboration, and data accessibility for watershed management.
Expand water quality and stream flow data collection and make the data available, via website, to interested parties.	Salt Lake County significantly expanded water quality and stream flow data collection by implementing comprehensive monitoring programs, upgrading data management systems, and enhancing public access to reliable environmental data through online platforms. These efforts included routine sampling of water quality and habitat conditions, specialized studies such as aquatic macroinvertebrate sampling and microbial source tracking, stream stability assessments, improvements to streamflow and precipitation gaging, and the integration of data into a public OpenData Portal, ensuring that stakeholders have access to accurate and up-to-date watershed information.
Maintain and update Stream Function Index with the collection of riparian, stream channel, flood conveyance, stream stability, social amenities (trails and nodes), and aesthetic parameters.	Salt Lake County stopped updating the Stream Function Index in 2019 but still regularly monitors water quality, habitat conditions, and stream channel stability, as well as integrates advanced data collection methods and technologies as descripted in the column above.
Prepare subwatershed planning and implementation strategies in coordination with municipal and agency partners to support preserving, restoring, and enhancing water quality and watershed functions.	Salt Lake County worked collaboratively with partners such as Salt Lake County Parks & Recreation, Salt Lake City Public Lands Department, the Sugarhouse Park Authority, and University of Utah departments to support watershed planning and implementation efforts. These partnerships leveraged diverse expertise and resources to enhance water quality and watershed functions across the region.

Implementation Activity	Implementation Summary
Provide assistance, coordination, facilitation, and/or oversight for capacity building and water quality improvement project planning and implementation.	Salt Lake County provided assistance, coordination, and oversight for capacity building and water quality improvement projects by partnering with agencies such as Salt Lake County Parks & Recreation, Salt Lake City Public Lands Department, the Sugarhouse Park Authority, and University of Utah departments. These collaborative efforts supported effective project planning and implementation, strengthening regional capacity to improve watershed health.
Evaluate areas along the Jordan River and other Salt Lake County streams for stream restoration; bank stabilization; and water quality, riparian, and aquatic habitat-improvement projects.	Salt Lake County evaluated and implemented stream restoration, bank stabilization, and habitat-improvement projects along the Jordan River and other county streams by partnering with local agencies to address invasive species, revegetate riparian and upland areas, stabilize streambanks, and enhance water quality and habitat for native wildlife. These efforts included installing exclusionary fencing, constructing active floodplains, and adding native plantings and large woody debris, resulting in improved ecological function and resilience across multiple sites.
Consider opportunities to reduce water and energy demands through ecosystem and water resource management, watershed protection, and restoration investments. These opportunities should focus on minimizing treatment costs, providing flood control, and maximizing recreational opportunities.	Salt Lake County actively participates in the Salt Lake County Drought Action Team.
Consider potential vulnerabilities of watershed preservation and water quality restoration, enhancement, and maintenance projects as a result of changes in temperature, precipitation, and runoff anticipated from climate change.	Salt Lake County addressed potential climate change vulnerabilities affecting watershed preservation and water quality projects by participating in the Salt Lake County Drought Action Team. This involvement enables the county to proactively assess and respond to risks related to changing temperature, precipitation, and runoff patterns, supporting long-term resilience in watershed management.
Evaluate opportunities to provide continuous instream flows for stream segments that experience reduced or interrupted flow regimes in order to restore and enhance aquatic and riparian habitat, water quality, and hydrologic conveyance functions.	Salt Lake County was unable to complete this in the last 10 years, but this continues to be a priority, and Salt Lake County will continue to work to achieve this during this next planning cycle.
Evaluate funding and partnering opportunities to construct and maintain a debris basin retrofit pilot project in Spencer's Pond in order to remove OM from low-flow conditions, an activity that will facilitate implementing the Jordan River DO TMDL. Evaluate other debris basin ponds for similar low-flow pollutant-removal retrofit opportunities.	Salt Lake County was unable to complete this in the last 10 years, but this continues to be a priority, and Salt Lake County will continue to work to achieve this during this next planning cycle.
Provide monitoring and maintenance of implemented strategies and projects.	Salt Lake County ensured ongoing monitoring and maintenance of watershed restoration projects by implementing invasive weed mitigation, regular revegetation, exclusionary fencing, installation of informational signage, photo-monitoring, and habitat improvements across multiple stream and river sites. These proactive efforts helped sustain ecological benefits, water quality, and bank stability, while supporting long-term project success.

2.2 Implementation Activities

Since the finalization of the 2015 IWP, Salt Lake County has implemented 25 activities, partnering with private, local, state and federal partners, and NGOs, to improve watershed functions and provide high-quality surface waters that support national CWA goals. Activities were centered around improving one or more watershed functions (e.g., water quality, habitat, hydrology, and social) with the aim of improving watershed health. Efforts were centered on the Jordan River corridor and its priority tributaries, with complementary work in headwaters and urban reaches to improve riparian condition, channel stability, and runoff management. Table 2-2 outlines the activities Salt Lake County participated in to address these watershed functions and the timeframe under which they have or will occur.

Table 2-2. Implementation Activities implemented by Salt Lake County from 2015 to 2025

Activity	Watershed Functions Addressed				Year Completed
	Water Quality	Habitat	Hydrology	Social	
Installed interpretive signage series and crowdsource photo-monitoring stations at Jordan River restoration projects.*		✓		✓	2016–2017
Installed interpretive sign at new Hidden Hollow stream gage.[†]				✓	2019
Implement online maps and data dashboards on website.				✓	2020–ongoing
Host annual Salt Lake County Watershed Planning & Restoration Program symposium.	✓	✓	✓	✓	Ongoing
Publish bi-annual Watershed Watch newsletter.				✓	Ongoing
Partner with Utah Rivers Council annual RainHarvest rain barrel program.	✓		✓	✓	Ongoing
Led Jordan River Watershed Council quarterly meetings (through 2019).	✓	✓	✓	✓	2015–2019
Conduct routine stream water quality sampling and physical habitat monitoring.	✓	✓	✓		Ongoing
Conducted aquatic macroinvertebrate sampling.[‡]	✓	✓			2017–2019 2022–2024
Conduct stream channel stability surveys.		✓	✓		Ongoing
Perform microbial source tracking studies.	✓				2017–ongoing
Transitioned water quality data to geographic information system (GIS) database, implemented digital field data collection tools, and provided public OpenData Portal.	✓	✓	✓	✓	2017–2018
Monitor snowpack in upper Big and Little Cottonwood Canyons.	✓		✓		2017–ongoing
Make improvements to streamflow and precipitation gaging program: hardware, software, protocols, etc., to provide more reliable and accurate data.	✓		✓		2015–ongoing
Installed three new streamflow gages in lower watershed.			✓		2018
Butterfield Creek—Butterfield Trailhead Park (Herriman) Invasive weed mitigation and revegetation in conjunction with Salt Lake County Parks & Recreation. Revegetation efforts include upland and riparian seeding and live staking of willow and dogwood to stabilize banks and filter pollutants originating from adjacent parking areas.	✓	✓	✓	✓	2025–ongoing
Emigration Creek—Rotary Glen Park (Salt Lake City) <u>Dog Park area</u>: Exclusionary fencing installed below dedicated dog park zone to eliminate dog traffic and trampling. Upland seed revegetation to slow overland flow from dog park down into creek; informational signage.	✓	✓	✓	✓	2022–2025
<u>Debris basin</u>: Basin seeded with native wetland and upland species to improve habitat and improve water quality.	✓	✓			2022–2025

Activity	Watershed Functions Addressed				Year Completed
	Water Quality	Habitat	Hydrology	Social	
County stream gage: Exclusionary fencing to reduce recreational traffic. Revegetation efforts including upland and riparian seeding, potted plant installation, and live staking of willow and dogwood to stabilize banks and filter pollutants originating from adjacent social and parking areas. Informational signage installed.	✓	✓	✓	✓	2024–ongoing
Jordan River—Jordan River Murray/Taylorsville Ecosystem Restoration Project Phases 1–3 (4800–5100 South) Improved riparian habitat for native fish, bird, and invertebrate populations through re-establishment of native flora, construction of active floodplains, use of large woody debris to stabilize eroding streambanks, weed mitigation. Improved over 3,100 linear feet of riverbank.	✓	✓	✓		2015–2020
Kennecott Nature Center of Murray—Jordan River Murray/Taylorsville Phase 4 (Murray) Improved riparian habitat for native fish, bird, and invertebrate populations through re-establishment of native flora, construction of active floodplains, use of large woody debris to stabilize eroding streambanks, and invasive weed mitigation. Improved over 350 linear feet of riverbank.	✓	✓	✓		2021
Jordan River—4500 South (Murray) Installed navigable boat passage, recontoured river channel, installed two rock cross vanes, restored riparian zone and rebuilt active floodplain, weed mitigation, native plant revegetation.	✓	✓	✓	✓	2020–2025
Jordan River—Winchester Street Installed four rock cross vanes.	✓	✓	✓	✓	2016–2017
Little Cottonwood Creek—Wheeler Historic Farm Park (Murray) Riparian buffer revegetation, invasive weed mitigation, exclusionary fencing, informational signage.	✓	✓	✓	✓	2024–2025
Debris Basin: Invasive weed mitigation, seeded with native wetland and upland species to improve habitat and water quality.	✓	✓		✓	2024
Rose Creek Tributaries—Rose and Yellow Fork Canyon Recreation Area (Unincorporated) Exclusionary fencing to reduce recreation traffic from hikers, equestrians, and cyclists. Invasive weed mitigation, riparian and upland revegetation on Yellow Fork to stabilize banks and filter pollutants originating from adjacent recreational trails.	✓	✓	✓	✓	2024–ongoing

* Funded by joint Jordan River Council and Utah Division of Forestry, Fire & State Lands Grant FC160001; seven signs installed at five project sites.

† Completed in partnership with Salt Lake City Trails and Natural Lands Division.

‡ Sampling occurs 3 out of every 5 years.

2.3 Other Watershed Planning Efforts

Over the past 10 years, additional watershed planning efforts have taken place within the Jordan River watershed, including the *Jordan River Comprehensive Management Plan* (SWCA Environmental Consultants [SWCA] et al. 2017), *Blueprint Jordan River* (Jordan River Commission 2022), and the *Watershed Management Plan* (Salt Lake City Department of Public Utilities 2025). There are also three EPA-approved total maximum daily loads (TMDLs) reports developed for numerous AUs within Salt Lake County (see Sections 4.2 and 4.4 for additional details). UDWQ is currently developing TMDLs for three AUs and two watershed plans within Salt Lake County, which are expected to be published in 2026. Additionally, the Utah Division of Water Resources is developing the *Great Salt Lake Basin Integrated Plan*, which is expected to be published in 2026 (Utah Division of Water Resources n.d. [2026]). Table 2-3 describes these plans and their goals.

In developing the 2025 IWP, considering these existing plans is essential because many of their goals align directly or indirectly with goals outlined in this IWP. There is also opportunity for collaboration in implementation activities, which can leverage the strengths and insights from each plan to enhance overall effectiveness.

Table 2-3. Other Planning Efforts in the Jordan River Watershed

Plan Title	Plan Description	Plan Goals	Author	Year Published
Jordan River Watershed E. coli TMDL	In 2023, the EPA approved this TMDL, which aims to address *E. coli* impairments in 14 AUs within the Jordan River watershed (UDWQ 2023a). These AUs were deemed a high priority for TMDL development due to their high recreational and culinary use, presence of waterborne pathogen pollutants, and a combination of both point and nonpoint sources of pollution.	The study was designed to assess and restore the drinking water and recreational beneficial uses of these *E. coli*–impaired waters by accomplishing the following: • Identify pollutant sources: Differentiate point and nonpoint sources, map critical source areas, and prioritize by risk and feasibility. • Calculate loads and reductions: Establish concentration water quality criteria that must be met across necessary AUs. • Implement, monitor, and adapt: Deploy prioritized best management practices (BMPs) on a phased schedule with milestones; track effectiveness through monitoring and adjust actions as needed.	UDWQ	2023
Jordan River Total Maximum Daily Load Water Quality Study – Phase 1	The 2013 TMDL study for the lower Jordan River identifies OM as the primary pollutant contributing to DO impairment, with additional sources from both point and nonpoint contributors (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). The study used QUAL2Kw modeling to establish OM load limits to maintain DO levels above 5.5 milligrams/liter during critical late-summer conditions, despite the river's beneficial reaeration conditions being outpaced by biological and chemical oxygen demands. Due to uncertainties in OM source contributions, a phased TMDL approach was initiated, with ongoing investigations to better understand DO responses and OM budgeting, although the Phase 2 TMDL report remains incomplete.	The study was designed to assess and restore water quality to meet criteria for beneficial use 3B, warm water aquatic species, by accomplishing the following: • Identify pollutant sources: Differentiate point and nonpoint sources of OM, map critical source areas, and prioritize by risk and feasibility. • Calculate loads and reductions: Quantify existing loads, establish wasteload allocations (WLAs)/load allocations (LAs) (with margin of safety and seasonal variation), and determine the reductions needed to meet criteria. • Implement, monitor, and adapt: Deploy prioritized BMPs on a phased schedule with milestones; track effectiveness through monitoring and adjust actions as needed.	UDWQ	2013
Total Maximum Daily Load for Dissolved Zinc in Little Cottonwood Creek	In 2002, a TMDL study for Little Cottonwood Creek from its headwaters to the confluence with Red Pine Fork was prepared to address dissolved zinc impairments for cold water fisheries beneficial use (Shepherd Miller 2002).	The study was designed to assess and restore water quality to meet criteria for beneficial use 3a (cold water aquatic life) by accomplishing the following: • Identify pollutant sources: Differentiate point and nonpoint sources of dissolved zinc, map critical source areas, and prioritize by risk and feasibility. • Calculate loads and reductions: Quantify existing loads, establish WLAs/LAs (with margin of safety and seasonal variation), and determine the reductions needed to meet criteria. • Implement, monitor, and adapt: Deploy prioritized BMPs on a phased schedule with milestones; track effectiveness through monitoring and adjust actions as needed.	UDWQ	2002
*TMDL for Escherichia coli (*E. coli*) in the Upper Emigration Creek Watershed*	This document establishes a TMDL of *E. coli* in the Upper Emigration Creek AU to address ongoing water quality impairments. The study evaluates watershed conditions; sets water quality goals; and proposes strategies to restore recreational uses such as wading and fishing, which are impacted by elevated *E. coli* levels, especially during summer months. All required pollution reductions are assigned to nonpoint sources as there are no permitted point sources in the watershed. Likely contributors include residential waste, animal fecal contamination, stormwater runoff, and failing septic systems.	The study was designed to assess and restore the drinking water and recreational beneficial uses of these *E. coli*–impaired waters by accomplishing the following: • Identify pollutant sources: Differentiate point and nonpoint sources, map critical source areas, and prioritize by risk and feasibility. • Calculate loads and reductions: Establish concentration water quality criteria that must be met across necessary AUs. • Implement, monitor, and adapt: Deploy prioritized BMPs on a phased schedule with milestones; track effectiveness through monitoring and adjust actions as needed.	UDWQ	2011
Jordan River Comprehensive Management Plan	Developed by the Utah Department of Natural Resources Division of Forestry, Fire & State Lands, this plan prescribes sovereign land management goals and objectives from the Jordan River to ensure that all uses on, beneath, or above the bed of the Jordan River are regulated to protect navigation, fish and wildlife habitat, aquatic beauty, public recreation, and water quality.	• Maintain clear and consistent guidance for Utah Division of Forestry, Fire & State Lands' management of Jordan River resources. Specific objectives are as follows: • Ensure sovereign lands management remains consistent with Public Trust obligation. • Incorporate principles of multiple use while conserving natural and cultural resources. • Integrate existing information, data, and scientific research that have been developed on the Jordan River into clear and consistent management practices. • Coordination with state and local government regarding management, permitting, maintenance, planning, and research on the Jordan River.	SWCA et al.	2017

Plan Title	Plan Description	Plan Goals	Author	Year Published
Blueprint Jordan River	This document outlines the efforts the Jordan River Commission and partners are leading to improve natural wildlife habitat, water quality, enhanced instream flows and natural river functions with expanded outdoor recreation opportunities, public safety, and responsible river-oriented development.	• Protect and preserve natural open spaces. • Optimize habitats and natural ecosystems. • Use a coordinated watershed approach to improve water quality. • Manage river flows for natural river function. • Enhance the hydrological function of the river. • Make the Jordan River Parkway a welcoming place for visitors of all abilities, backgrounds, and circumstances. • Provide consistent and comprehensive maintenance, trash removal, and cleaning. • Mitigate homelessness in the Jordan River Parkway. • Enhance opportunities for recreation uses and active transportation throughout the Jordan River Parkway. • Improve safety and security while fostering a comfortable environment for recreation and leisure. • Manage wildfire risk and prepare for response and recovery. • Improve access to the Jordan River Parkway and enhance the parkway's role as a regional transportation corridor. • Ensure that development highlights the Jordan River and enhances the Jordan River Parkway. • Promote harmony between infrastructure and river functions. • Use communications and messaging to improve visitor experience, wayfinding, point of interest identification, and education. • Provide experiential learning opportunities. • Support art, placemaking, and community engagement.	Jordan River Commission	2022
Salt Lake City Public Utilities Watershed Management Plan	The Salt Lake City Department of Public Utilities is required by the Safe Drinking Water Act to create and implement a plan that documents how source waters are protected.	Provide high-quality, safe drinking water to growing communities in the Salt Lake Valley.	Salt Lake City Department of Public Utilities	In progress, expected publish date TBD
Other source protection plans	Source protection plans are required by all drinking water providers in the county. These are private plans.	Protect source drinking water.	Drinking water utilities	N/A
Emigration Creek Watershed Plan	This document is in advanced draft form, with the watershed characterization, source assessment, and implementation strategy completed. Remaining tasks include final formatting, graphic development, and review. The plan emphasizes septic-related risks and stormwater-driven contributions, with formal review expected later in 2025 and finalization anticipated in early 2026.	Address pollutant issues specific to the Emigration Creek Watershed. Develop an implementation plan to address the sources of pollution.	UDWQ	In progress, expected early 2026
Rose Creek Watershed Plan	This document is nearing completion of its watershed characterization, which separates upper and lower Rose Creek due to differences in land use, hydrology, and targeted implementation strategies. The plan aims to identify impairment patterns and develop specific implementation strategies and projects for each section. A completed draft is targeted for early February 2026, with ongoing efforts to ensure consistency in narrative and tone with related plans.	Address pollutant issues specific to the Rose Creek Watershed. Develop an implementation plan to address the sources of pollution.	UDWQ	In progress, expected February 2026
City Creek-1, Bingham Creek, Butterfield Creek E. coli TMDLs	TMDLs for City Creek-1, Bingham Creek, and Butterfield Creek are being developed as a unified watershed document, with individual appendices for each AU. These concentration-based TMDLs aim to achieve protective *E. coli* targets rather than focus on load reductions. Drafts for all three are in progress, with stakeholder review drafts expected by early 2026 and finalization anticipated in September 2026, pending public input. For City Creek-1, draft development is nearly complete, with a required 49% reduction in *E. coli* concentrations to meet the target, and ongoing coordination with local agencies for implementation. Bingham Creek's impairment is primarily linked to lower watershed conditions near the Jordan River, whereas Butterfield Creek shows elevated *E. coli* at all monitored sites, with the upstream location driving its listing. Draft summaries and coordinated stakeholder engagement for all three systems are planned for early 2026.	The TMDLs are designed to assess and restore the drinking water and recreational beneficial uses of these *E. coli*–impaired waters by accomplishing the following: • Identify pollutant sources: Differentiate point and nonpoint sources, map critical source areas, and prioritize by risk and feasibility. • Calculate loads and reductions: Establish concentration water quality criteria that must be met across necessary AUs. • Implement, monitor, and adapt: Deploy prioritized BMPs on a phased schedule with milestones; track effectiveness through monitoring and adjust actions as needed.	UDWQ	In progress, expected September 2026
Great Salt Lake Basin Integrated Plan	This plan is currently under development with expected completion in 2026. The plan aims to combine and enhance water resource management tools across the entire Great Salt Lake Basin to better understand supply and demand and to collaboratively explore options to address water supply imbalances, increase supply reliability, and avoid degradation of the Great Salt Lake ecosystem.	This plan will coordinate projects, work, data, models, tools, and ideas at an unprecedented scale. Water users and policymakers at all levels will gain a comprehensive foundation to make decisions and understand their roles within the watershed. The plan will do the following: • Develop a water budget for the basin • Assess and forecast water availability and quality for varied human and environmental uses • Conduct a tradeoff analysis to understand how water users throughout the basin are impacted and to avoid deterioration of agriculture, industry, and ecosystems • Investigate best water management practices and recommend actionable strategies to manage water resources holistically	Utah Division of Water Resources	In progress, expected 2026

2.4 Data Inventory and Data Gaps

An important step in the watershed planning process is the review of existing water quality and flow monitoring data. Examination of these data assists in characterizing the impairments that the watershed plan will address and provides a basis for future implementation activities by identifying potential sources through spatial and temporal pattern analysis. Table 2-4 outlines the data used for the 2025 IWP. Data gaps identified during the watershed planning effort are provided in Table 2-5.

Table 2-4. Data Inventory

Data Type	Data Source	Data Use
Water quality	EPA Water Quality Portal (includes data from Salt Lake County, UDWQ, and Wasatch Front Water Quality Council)	Assessing *E. coli*, metals, total phosphorus, and TDS trends in the county
Stream flow	U.S. Geological Survey, Salt Lake County	Assessing Surplus Canal Diversion. Pairing with precipitation data to produce hydraulic periods (spring runoff, storm runoff, and baseflow) for the water quality data
Stream stability data	Salt Lake County	Summary of stream stability data collected throughout the major stream reaches in Salt Lake County
Precipitation	Salt Lake County	Pairing with stream flow data to produce hydraulic periods (spring runoff, storm runoff, and baseflow) for water quality data
Water quality assessment data	UDWQ	Summary of monitoring locations and percent exceedances for DO and temperature
Benthic macroinvertebrate data	Salt Lake County	Summary of benthic macroinvertebrate data using the Karr BIBI method
Benthic macroinvertebrate data	UDWQ	Summary of O/E scores for benthic macroinvertebrate data
Spatial data	Salt Lake County, Wasatch Front Regional Council, UDWQ	Land use, landownership, population density, soils, urban water infrastructure, and impervious surface data are used to identify potential sources of pollution

Table 2-5. Data Gaps

Data Gap	Discussion and Recommendation
Population projections by city in a single database	Although there are population projection data available for Salt Lake County as a whole, most cities have their own population projection estimates that would be beneficial to have in one central database for analysis.
Limited metals data	There are limited spatial and temporal metal data in impaired reaches, specifically in Big Cottonwood Canyon and Parleys Canyon. Additional metals data are needed in Little and Big Cottonwood Creeks and Parleys Creek and tributaries to better assess metal impairments and to determine the impairment source.
Storm loading water quality data	Permittees with Phase 1 municipal separate storm sewer systems (MS4s) are required to complete wet weather monitoring and report stormwater quality results to UDWQ; however, these data are not reported in the Ambient Water Quality Monitoring System database, and therefore no comprehensive analysis on stormwater quality data from these entities has been completed. These data need to be compiled for future analysis. Additionally, small municipal separate storm sewer systems that are covered under the general permit are not required to do any type of storm monitoring, and therefore stormwater from these sites is not characterized.

Data Gap	Discussion and Recommendation
E. coli percent reductions for AUs added to the 303(d) impaired list after the TMDL completion	Since the Jordan River *E. coli* TMDL was established, six new AUs have been listed as impaired for *E. coli*, and percent reductions have not yet been calculated for them.
OM data*	Although there is a general understanding of sources of OM, data are limited on contribution of OM from individual sources and how OM contributes to sediment oxygen demand. A method to allocate OM contributions between sources should be identified (Cirrus Ecological Solutions 2020).
Water quantity data	Although Salt Lake County has numerous flow gauges throughout the planning area, understanding water quantity remains a pressing issue, and there are several areas where water quantity is not well understood. Areas of highest importance include ungauged tributaries of the Jordan River and diversions and stream reaches below detention basins.

* For more information on data gaps related to OM in the Jordan River, see Section 5.5 of the 2020 Jordan River DO TMDL Research Synthesis (Cirrus Ecological Solutions 2020).

3 WATERSHED CHARACTERIZATION

Watershed characterization involves identifying and gathering available data, conducting a data review, and analyzing the data to characterize the watershed. This step in the 2025 IWP planning process is critical in understanding the location and timing of impairments and identifying potential sources and areas for quantifying loading (EPA 2008). Understanding what is happening in the watershed informs the implementation plan and implementation activities. Based on the synthesis of existing data and independent analyses, this IWP characterizes the watersheds within Salt Lake County in terms of natural features (Section 3.1), social and human features (Section 3.2), and water resources (Section 3.3).

3.1 Natural Features

3.1.1 Climate

Salt Lake County experiences a semi-arid climate characterized by four distinct seasons, with hot, dry summers and cold, snowy winters. The region's climate is influenced by its elevation and proximity to the Wasatch Range and the Oquirrh Mountains, which create significant variations in precipitation and temperature between the valley floor and higher elevations. These climatic conditions play a crucial role in shaping water resources in Salt Lake County.

3.1.1.1 PRECIPITATION AND TEMPERATURE

With an average annual precipitation of approximately 17 inches, the valley areas of the county receive significantly less moisture compared to the surrounding Wasatch Range and Oquirrh Mountains, which can exceed 40 inches annually (Figure 3-1) (Esri Living Atlas of the World 2024). Most of the precipitation in these mountains comes in the form of snow, with a snow water equivalent ranging from approximately 20 to 70 inches per year (Figure 3-2). The snow in the Wasatch Range is crucial as the primary water supply zone, with most runoff generated by spring snowmelt. Additionally, Salt Lake County is unique in that is adjacent to Great Salt Lake, and the lake effect and evaporation from Great Salt Lake increase annual snowfall in nearby mountains by 5% to 10% (Abbot et al. 2023).

Precipitation (in the form of rain and snow) in the county is typically concentrated between October and April, highlighting the importance of mountain snowpack in sustaining surface water flows and groundwater recharge during the drier summer months (Esri Living Atlas of the World 2024; National Climatic Data Center 2024). The highest monthly precipitation in the valley occurs in winter months from December through March (see Figure 3-1) (average of 1.83 inches per month). The driest months are the summer months of June and July with average monthly precipitation values of 0.87 inch and 0.76 inch, respectively (Esri Living Atlas of the World 2024). In general, mountain precipitation is approximately 220% greater than precipitation in the valley.

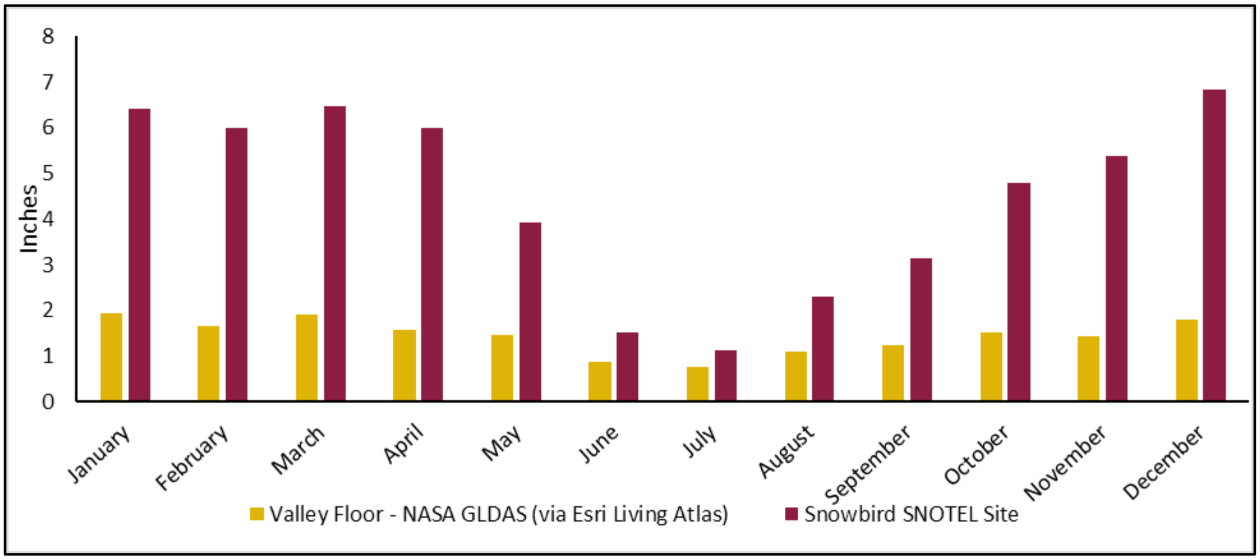

Figure 3-1. 2000–2024 average monthly precipitation (inches) for a mountain Snowpack Telemetry site and a valley floor Esri Living Atlas of the World site.

Note: Valley Floor monthly climate data were obtained from the Esri Living Atlas of the World water balance app, which uses National Aeronautics and Space Administration's GLDAS-2.1 model to estimate hydrologic variables at a resolution of approximately 30 km from 2000 to present.

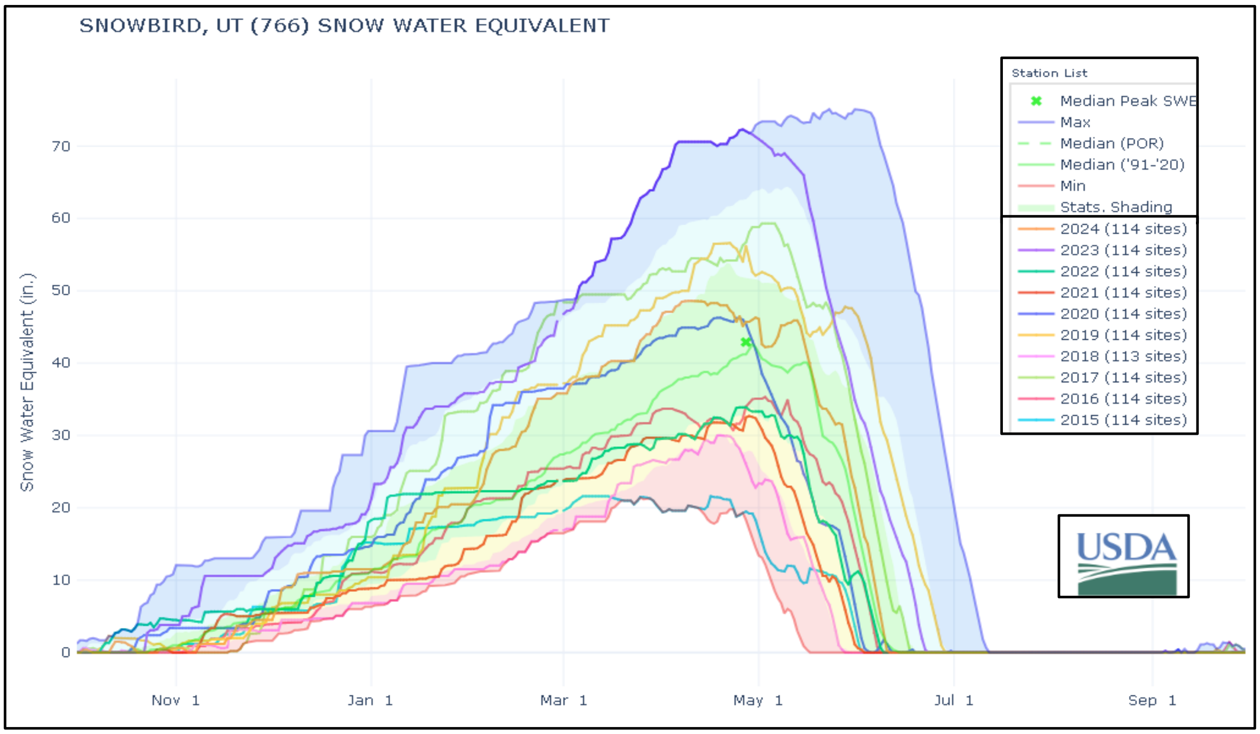

Figure 3-2. Average snow water equivalent (2015–2024) for Site 766 (Snowbird).

Source: U.S. Department of Agriculture, Natural Resources Conservation Service (2024).

Salt Lake County experiences a well-defined seasonal temperature cycle (Figure 3-3). Mean daily temperatures range from 21.56 degrees Fahrenheit (°F) in January to 92.66°F in August, with an annual average of 52.72°F (World Meteorological Organization 2024). A prolonged hot period from June through September, with average temperatures above 73°F, contributes to elevated water demand and urban heat stress. This warm season also aligns with low precipitation and depleted soil moisture, intensifying watershed vulnerability during the summer months.

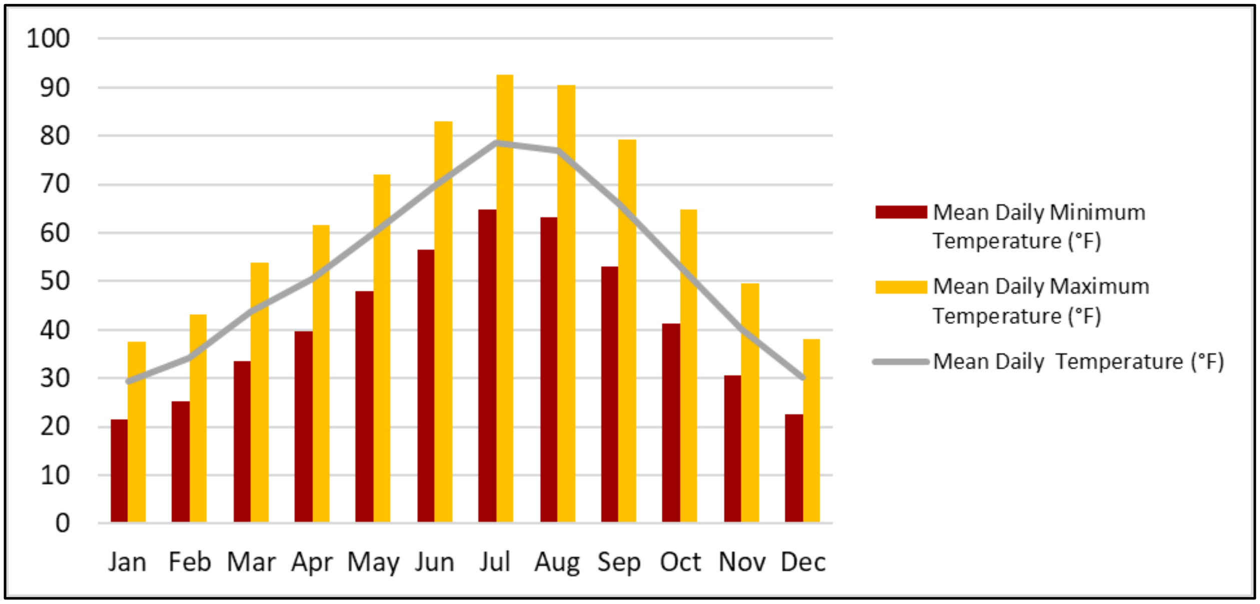

Figure 3-3. Average temperature (degrees Fahrenheit) in Salt Lake County.

Note: Temperature data presented reflect monthly averages for the Salt Lake Valley floor.

Source: World Meteorological Organization (2024).

3.1.1.2 WIND EVENTS AND DUST TRANSPORT

Wind events play a significant role in watershed conditions around Great Salt Lake and therefore Salt Lake County. These wind events are important because they carry dust from the exposed lakebed of Great Salt Lake into surrounding communities in as little as 1 hour (Figure 3-4). Over 800 square miles of lakebed has been exposed as Great Salt Lake has shrunk, particularly in Farmington Bay and Bear River Bay, where fine sediments are easily picked up by wind. Although approximately 76% of the lakebed is naturally protected by a thin crust, that crust is fragile and can be broken by wind or human activity (Williams 2023).

Dust storms typically occur when wind speeds exceed 25 miles per hour. Coarse particles (i.e., particulate matter with particles 10 micrometers and smaller) settle relatively quickly, but fine particles (particulate matter with particles 2.5 micrometers and smaller) can remain airborne for up to 2 weeks, traveling long distances (Utah Division of Water Resources 2025).

These dust storms carry heavy metals such as arsenic, lead, and mercury, which can affect air quality and public health, and can enter surface waters through atmospheric deposition. Dust also darkens snow surfaces in the mountains and can accelerate snowmelt timing and alter runoff dynamics across the watershed (Utah Division of Water Resources 2025).

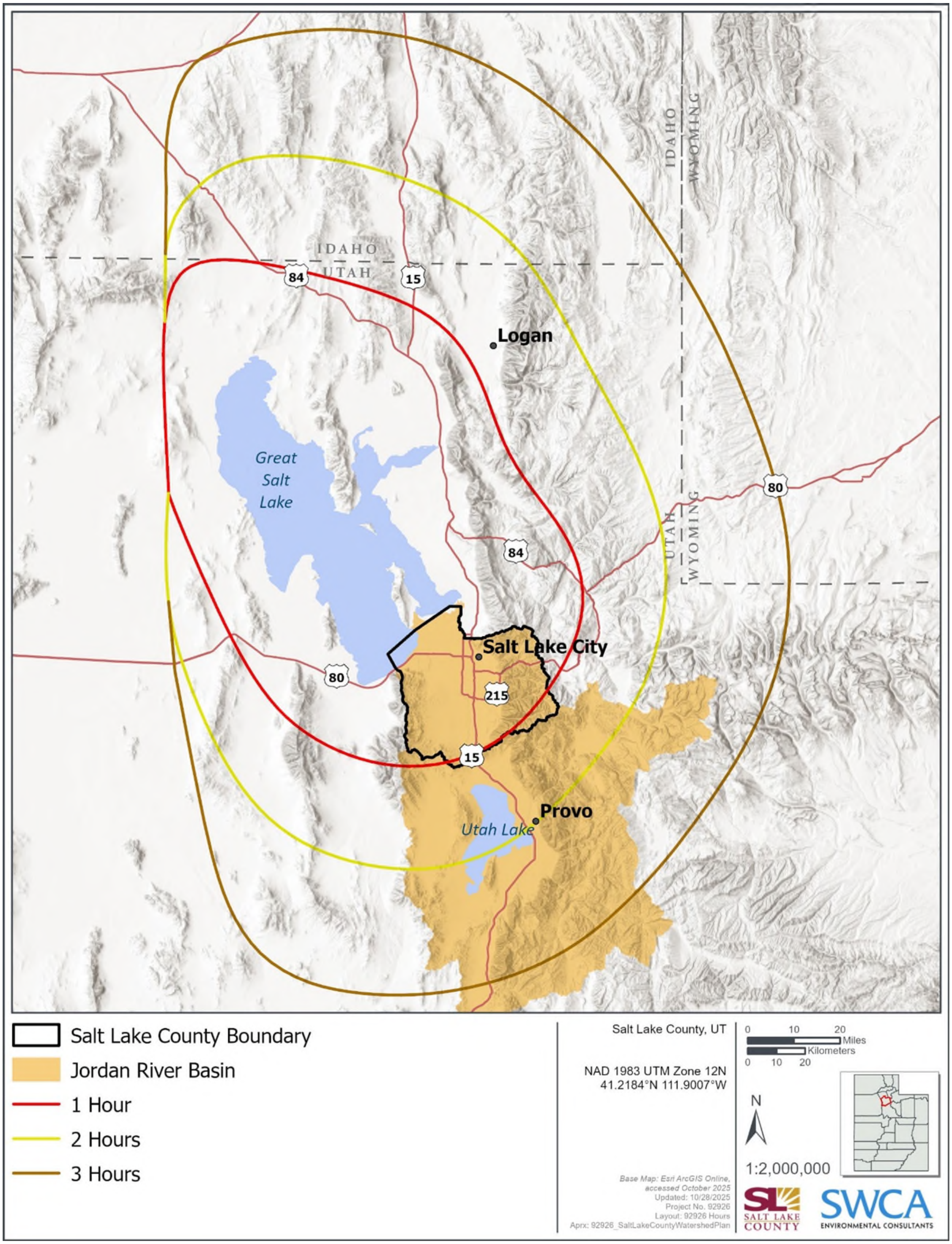

Figure 3-4. Great Salt Lake dust transport zones by travel time.

Source: Perry et al. (2024).

3.1.1.3 CLIMATE CHANGE CONSIDERATIONS

Climate change is projected to substantially impact watershed functions in the county in both the mountains and the urbanized Jordan River Valley. Modeling conducted by Khatri et al. (2019) using the Hydrological Simulation Program—FORTRAN and downscaled RCP6.0 climate projections assessed changes for mid-century (2040s) and late-century (2090s) periods. The results indicate that warming temperatures and shifts in precipitation timing and form will alter both the magnitude and timing of streamflow and sediment delivery.

For Big Cottonwood Creek, mean annual streamflow is projected to increase by 11.2% in the 2040s and 6.8% in the 2090s compared to the 2000s. More striking is the shift in runoff timing: the median (50th percentile) date of annual peak flow is expected to occur approximately 4 weeks earlier by the 2040s (April 25) and up to 8 weeks earlier by the 2090s (March 18), compared to the 2000s (May 28). These changes result from earlier snowmelt due to rising winter temperatures. Similar shifts are projected for the Jordan River watershed, where mean annual streamflow is expected to increase by 14.5% in the 2040s and 15.3% in the 2090s compared to the 2000s. The peak runoff is projected to shift from May 11 in the 2000s to April 10 in the 2040s and March 3 in the 2090s. These results suggest increasing hydrologic flashiness and a narrowing window of spring water availability (Khatri et al. 2019).

Sediment transport is also projected to intensify, particularly in steep-mountain watersheds. In Big Cottonwood Creek, mean daily sediment loads are expected to rise from 1.3 tons per day in the 2000s to 1.4 tons per day in the 2040s and to 1.8 tons per day in the 2090s. This represents a 6.7% increase by mid-century and a substantial 39.7% increase by the late century. The median timing of sediment delivery is also projected to shift earlier, from May 31 in the 2000s to April 23 in the 2040s and to March 20 in the 2090s. For the Jordan River watershed, sediment loads are projected to rise by 7.4% in the 2040s and 14.2% in the 2090s, with peak sediment delivery advancing by 5 to 6 weeks. These changes are attributed to increased rainfall intensity, reduced snow cover duration, and more frequent rain-on-snow events, which enhance erosion and sediment transport, particularly in steep or urbanized areas.

The modeling also examined the relative influence of climate versus land use change on these watershed responses. Although future land use scenarios showed only minor effects on streamflow and sediment yield (generally less than 3% change), climate change was the dominant factor driving hydrologic changes.

Projected climate conditions for Salt Lake County are expected to lead to earlier and more intense runoff, higher sediment yields, and increased hydrologic variability. These trends have significant implications for flood control, water supply reliability, stormwater infrastructure, and water quality management. Adaptation strategies will need to address both the seasonal shifts in water availability and the heightened risk of erosion and sedimentation in response to climate-driven changes in snowpack and precipitation patterns.

Wildfire frequency and severity are expected to increase in Utah, with critical areas throughout the Wasatch Range, which supplies most of Salt Lake County's drinking water. Burn scar hydrology is characterized by altered runoff, reduced infiltration, and increased erosion, which can worsen sediment loading and water quality issues and complicate flood and water supply management (EPA 2016). Effective fire management strategies are needed to help prevent these impacts and are incorporated into the implementation plan (Section 5).

3.1.2 Soils

Salt Lake County's diverse range of soils and geological features significantly influence surface water dynamics, erosion potential, and groundwater recharge processes. Soils in the county are categorized by the Natural Resources Conservation Service (NRCS) into hydrologic soil groups A, B, C, and D, as follows, based on their infiltration capacity and potential for surface runoff (Figure 3-5):

- **Group A soils**, which have the highest infiltration rates and lowest runoff potential, are well drained and composed primarily of sand or gravel. These soils are limited in distribution, accounting for 92,240 acres of land across Salt Lake County and found primarily in isolated pockets in the southern portion of the county, particularly near Draper and along some stream corridors (NRCS 2025a).
- **Groups B and C soils,** with moderate to slow infiltration rates, are the most common in transitional foothill and upland zones and account for a combined 545,098 acres of land across Salt Lake County (NRCS 2025a). These soils often occur in the central and eastern parts of the county, where slopes begin to rise and where soil texture includes finer particles such as loams and silts (NRCS 2025a).
- **Group D soils,** which have high runoff potential and low infiltration, are the most extensive across Salt Lake County, accounting for 283,550 acres (NRCS 2025a). These soils dominate the western valley floor, particularly around Magna, West Valley City, and the northwest Salt Lake City area (NRCS 2025a). Group D soils typically consist of clayey textures or soils with shallow water tables or hardpans that impede infiltration.

These groups are key for modeling watershed response, assessing infiltration potential, and informing stormwater management strategies. Although the groups are static, infiltration rates can degrade over time under urban compaction.

The prevalence of Group D soils across urbanized and agricultural areas increases the risk of surface runoff, increases localized flooding, and limits opportunities for groundwater recharge. The dominance of Group D soils has direct implications for watershed function as it reduces the landscape's ability to absorb and slowly release precipitation. As a result, surface runoff tends to increase, especially during storm events or snowmelt, contributing to more rapid streamflow fluctuations and heightened erosion potential in nearby waterways. Because these soils limit infiltration, nutrients, sediments, and other contaminants like *E. coli* are more readily carried by overland flows into waterways, leading to the degradation of water quality and aquatic and riparian habitats. Group D soils also present natural resource managers with unique challenges related to stormwater management systems as heavy precipitation can inundate stormwater management systems with high-velocity, high-volume flows. Soil type determines the feasibility of low-impact development (LID) practices that can be used for implementation (Utah Department of Environmental Quality [UDEQ] 2018). Group A soils are generally suitable for bioretention and infiltration best management practices (BMPs), Group B soils are marginal, and Groups C and D soils have limited capacity for these practices (UDEQ 2018).

The distribution of Group D soils across Salt Lake County emphasizes the importance of site-specific stormwater mitigation. For these areas where LID approaches are not generally acceptable (UDWQ 2018), flood conveyance systems become critical for managing stormwater. Proper design, operation, and maintenance of these conveyance systems are essential to ensure they function effectively during heavy precipitation events, preventing inundation and mitigating flood risks. Soil moisture in Salt Lake County generally follows a seasonal cycle, with higher levels in late winter and early spring due to snowmelt recharge and gradual depletion through the summer growing season. The lowest moisture levels typically occur in mid to late summer when evapotranspiration is highest and when precipitation is limited. The soil type also impacts soil moisture as high runoff soils, such as Group D soils, limit infiltration and soil moisture retention.

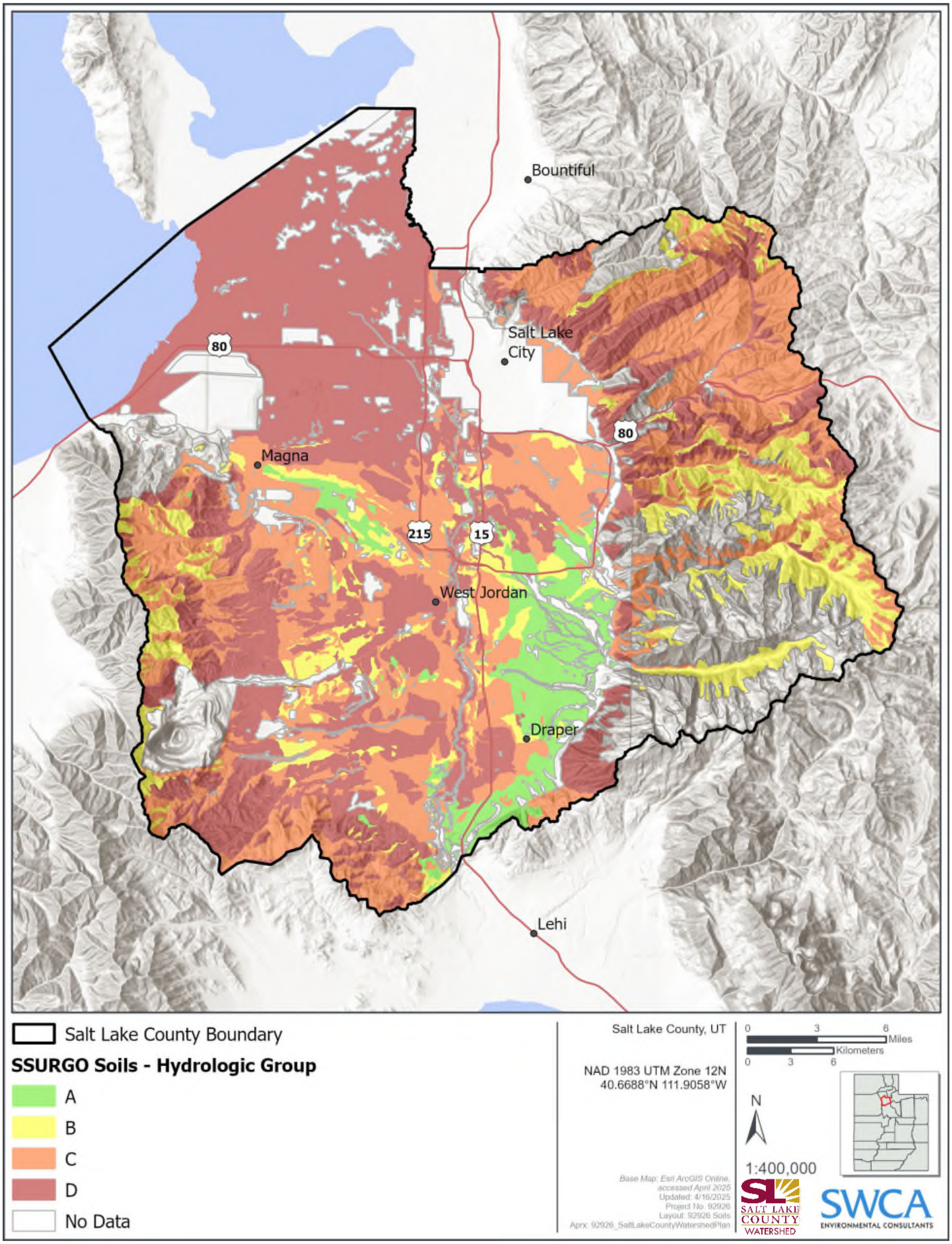

Figure 3-5. Salt Lake County soils by hydrologic group.

3.1.3 Aquatic Life

Watersheds in Salt Lake County encompass a variety of aquatic habitats, including riparian corridors, wetlands, and lakes/reservoirs, that support a wide range of aquatic wildlife species. These habitats are essential for wildlife species and are influenced by elevation, hydrology, and proximity to the Great Salt Lake ecosystem. Table 3-1 provides a representative list of aquatic and semiaquatic wildlife species known or expected to occur within the county along with their native status and whether they are designated as species of greatest conservation need (SGCN) under the *Utah Wildlife Action Plan* (Utah Division of Wildlife Resources [UDWR] 2025).

Table 3-1. Native and Nonnative Aquatic and Semiaquatic Wildlife Species in Salt Lake County

Common Name	Scientific Name	Native Status	SGCN
Western toad	*Anaxyrus boreas*	Native	Yes
Northern leopard frog	*Lithobates pipiens*	Native	Yes
Columbia spotted frog	*Rana luteiventris*	Native	Yes
Red-eared slider turtle	*Trachemys scripta elegans*	Nonnative	No
North American beaver	*Castor canadensis*	Native	No
Muskrat	*Ondatra zibethicus*	Native	No
Bluehead sucker	*Catostomus discobolus*	Native	Yes
Common carp	*Cyprinus carpio*	Nonnative	No
Bonneville cutthroat trout	*Oncorhynchus clarkii utah*	Native	Yes
Bald eagle	*Haliaeetus leucocephalus*	Native	Yes
American white pelican	*Pelecanus erythrorhynchos*	Native	Yes
White-faced Ibis	*Plegadis chihi*	Native	Yes

Source: UDWR (2024a).

Note: This table provides a representative list of aquatic species observed or expected within the county. For a comprehensive list of species, refer to the UDWR complete list and other resources provided through wildlife.utah.gov. A full list of Salt Lake County SGCN can be found in the official report *Utah's Species of Greatest Conservation Need Species by County* (UDWR 2025).

The Jordan River watershed hosts diverse fish communities influenced by stream elevation, flow, and temperature. Cold water streams like Mill Creek and Big and Little Cottonwood Creeks support native species such as Bonneville cutthroat trout (*Oncorhynchus clarkii utah*) and mottled sculpin (*Cottus bairdii*). Restoration and restocking efforts, especially in Mill Creek, aid native trout populations (National Forest Foundation 2022; Trout Unlimited 2021). The Jordan River and its canals support warm water fish, including both native and nonnative species like black bullhead catfish (*Ameiurus melas*), bluegill (*Lepomis macrochirus*), and common carp (*Cyprinus carpio*) (UDWR 2024a, 2024b). These species thrive in warmer, nutrient-rich waters typical of the Jordan River. The invasive common carp disrupts ecosystems by increasing turbidity and degrading habitats, particularly in slow-moving river sections. Carp also affect Great Salt Lake wetlands by disturbing sediments, which impacts native vegetation. Management within the Jordan River basin focuses on carp removal, vegetation restoration, and channel stabilization to protect native species and water quality (June Sucker Recovery Implementation Program 2024; Tracy Aviary 2025; UDWR 2024a, 2024b).

3.2 Social and Human Features

3.2.1 Land Use

The distribution of various land uses and land management practices across the county plays an instrumental role in shaping watershed health and function. The land use in the three watershed regions varies significantly and is important to note as implementation activities are heavily shaped by land use (Table 3-2; Figure 3-6).

Different land use categories in Salt Lake County contribute distinct pollutants to local waterways and are often influenced by impervious surface trends. Residential, commercial, and parking areas, which typically have high impervious surface coverage, generate stormwater runoff containing nutrients, heavy metals, hydrocarbons, and pathogens from fertilizers, pet waste, vehicle fluids, and pavement. Industrial and private industrial reserve zones are sources of heavy metals, solvents, and other hazardous chemicals, whereas roads and utilities contribute sediment, road salts, oils, and trace metals due to vehicle traffic and maintenance activities. Agricultural areas are associated with nutrient and pesticide runoff, sediment, and pathogens. Parks and open space generally have lower impervious surfaces but can contribute nutrients and sediment from landscape maintenance. Government and institutional properties may generate similar pollutants as residential and commercial areas, depending on their activities and land management practices. Vacant and other non-developable lands typically have minimal impervious surfaces and pollutant contributions but can still be sources of sediment during periods of disturbance. As impervious surfaces expand across developed land uses, the volume and velocity of runoff as well as the transport of associated pollutants increase, amplifying water quality challenges throughout Salt Lake County.

Projections from 2011 to 2040 estimate significant open space loss in the five subwatersheds within the county, with a projected 25% reduction in open space coinciding with population growth and increased impervious surfaces (Wasatch Front Regional Council 2015). As Salt Lake County continues to grow, land use planning is essential for maintaining water quality because it guides development in ways that minimize pollution and runoff. As more land is converted for housing, industry, and commercial businesses, the risks of water contamination increase and the threats depend on the changes in land use. For example, thoughtful planning and zoning can protect sensitive areas like wetlands and floodplains, promote green infrastructure to manage stormwater, and ensure that growth does not overwhelm water treatment systems. By controlling where and how development occurs, land use planning helps balance community needs with the protection of water resources, supporting both environmental health and sustainable growth. Additional discussions of land use planning and zoning can be found in Section 5.1.3.

Table 3-2. Land Use in the Three Watershed Regions within Salt Lake County

Watershed Region	Land Use Type	Percentage of Land Use Area per Region (%)
Northeast Region	Parks and open space	54.6%
	Government and institution	11.7%
	Residential	8%
	Other non-developable	6.3%
	Vacant	6.3%
	Industrial	3.2%
	Roads and utilities	2%
	Commercial	1.9%
	Agriculture	0.9%
	Parking	0.3%
	Private industrial reserve	0%
Tri-Canyons Region	Parks and open space	70.3%
	Residential	16%
	Government and institution	2.9%
	Commercial	2.7%
	Roads and utilities	2.4%
	Vacant	1.5%
	Industrial	0.8%
	Parking	0.2%
	Agriculture	0.1%
	Other non-developable	0%
	Private industrial reserve	0%
Southwest Region	Private industrial reserve	22%
	Residential	20%
	Vacant	10.7%
	Government and institution	10%
	Parks and open space	9.3%
	Industrial	7.8%
	Other non-developable	6.4%
	Roads and utilities	6.2%
	Commercial	2.9%
	Agriculture	2.4%
	Parking	0.3%

Source: Wasatch Front Regional Council (2023).

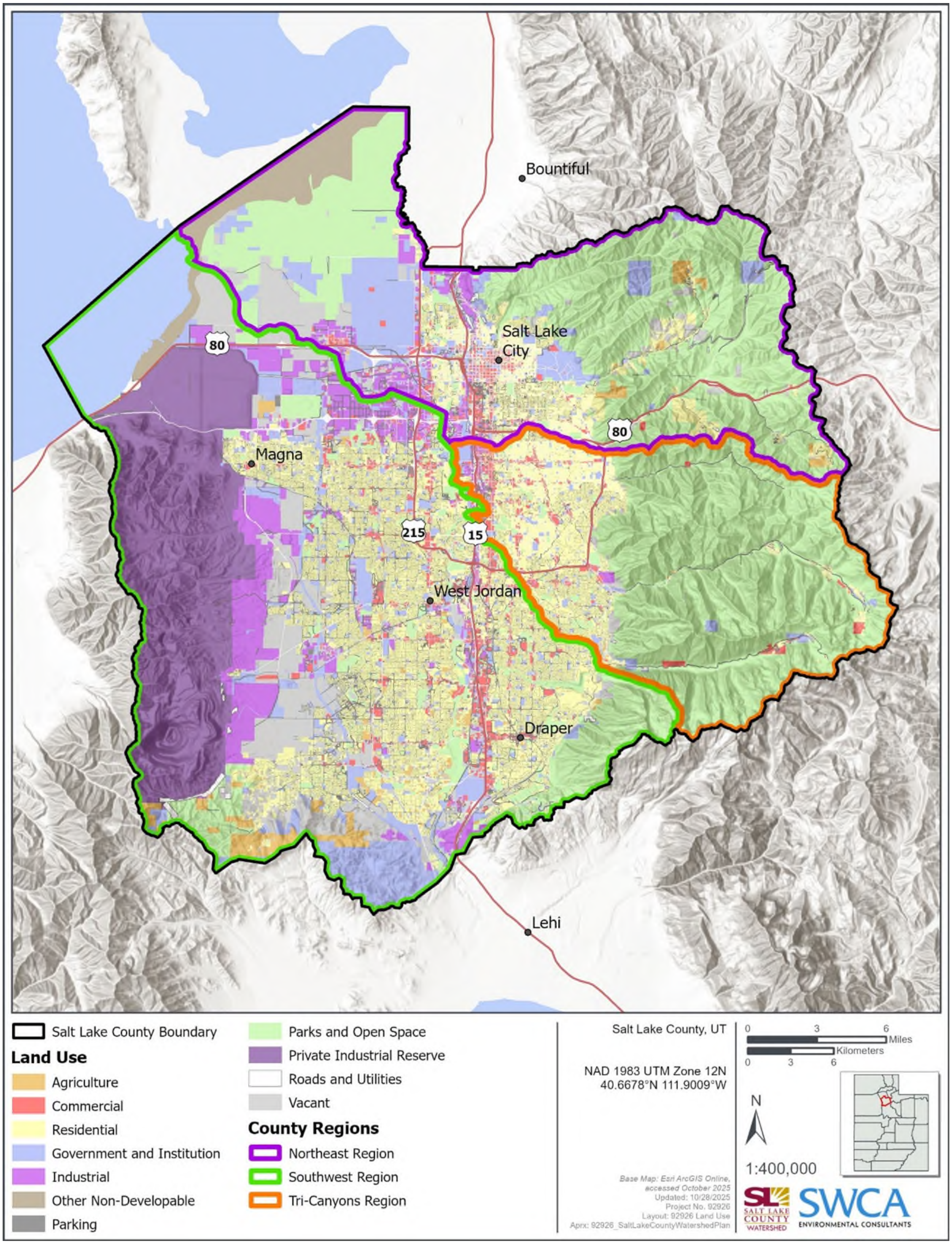

Figure 3-6. Distribution of land uses in Salt Lake County.

Source: Wasatch Front Regional Council (2023).

3.2.2 Landownership

Landownership is an important consideration for watershed planning because it helps identify who would need to authorize or lead implementation activities in various parts of the watershed. Across all three watershed regions, the dominate landownership is private, with the Southwest Region having the highest percentage at 85.6%, followed by the Northeast Region at 73.1% and the Tri-Canyons Region at 38.1%. The Tri-Canyons Region has significant portions of land designated as National Forest (30.5%) and National Wilderness Area (31.3%). In contrast, the Northeast and Southwest Regions have minimal land under federal management, with the Northeast Region having 18.6% as National Forest and the Southwest Region having 2.7% under Military Reservations and U.S. Army Corps of Engineers (Table 3-3; Figure 3-7) (Utah Geospatial Resource Center 2025).

Salt Lake County comprises 16 incorporated cities (municipal governments) and unincorporated county areas that are governed solely by Salt Lake County. The unincorporated areas have been defined into six townships and other unincorporated areas (Figure 3-8).

Table 3-3. Landownership in the Three Watershed Regions within Salt Lake County

Watershed Region	Landownership	Percentage of Landownership Area per Region (%)
Northeast Region	Private	73.1%
	National forest	18.6%
	State wildlife reserve/management area	1.4%
	State parks and recreation	0.4%
	State trust lands	0.3%
	Bureau of Land Management	0.1%
	Military reservations and U.S. Army Corps of Engineers	0%
	National wilderness area	0%
	Other state	0%
Tri-Canyons Region	Private	38.1%
	National wilderness area	31.3%
	National forest	30.5%
	Bureau of Land Management	0%
	Military reservations and U.S. Army Corps of Engineers	0%
	Other state	0%
	State parks and recreation	0%
	State trust lands	0%
	State wildlife reserve/management area	0%

Watershed Region	Landownership	Percentage of Landownership Area per Region (%)
Southwest	Private	85.6%
	Military reservations and U.S. Army Corps of Engineers	2.7%
	National wilderness area	1.8%
	National forest	1.5%
	Bureau of Land Management	0.6%
	Other state	0.4%
	State wildlife reserve/management area	0.4%
	State trust lands	0.2%
	State parks and recreation	0%

Source: Utah Geospatial Resource Center (2025).

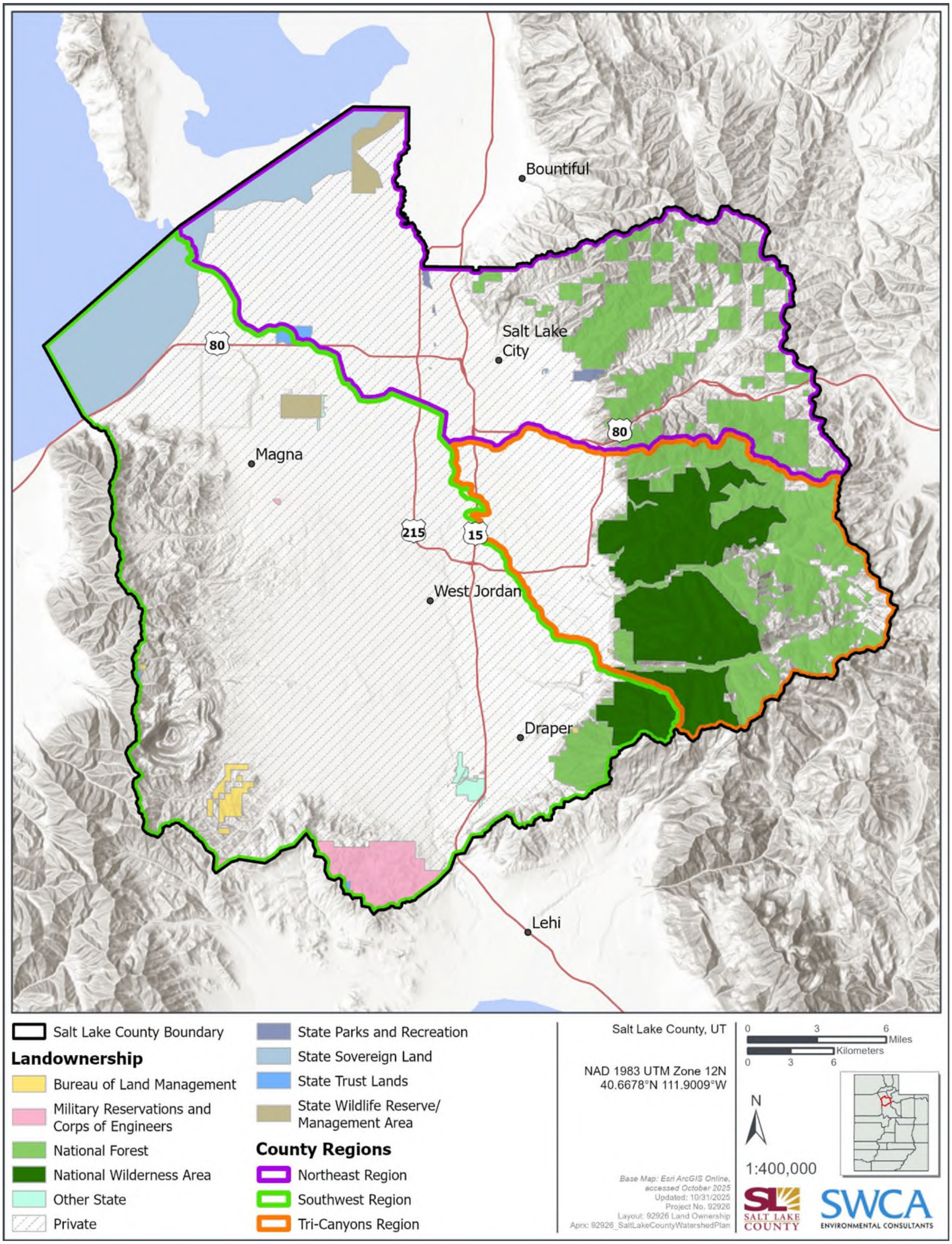

Figure 3-7. Landownership across Salt Lake County.

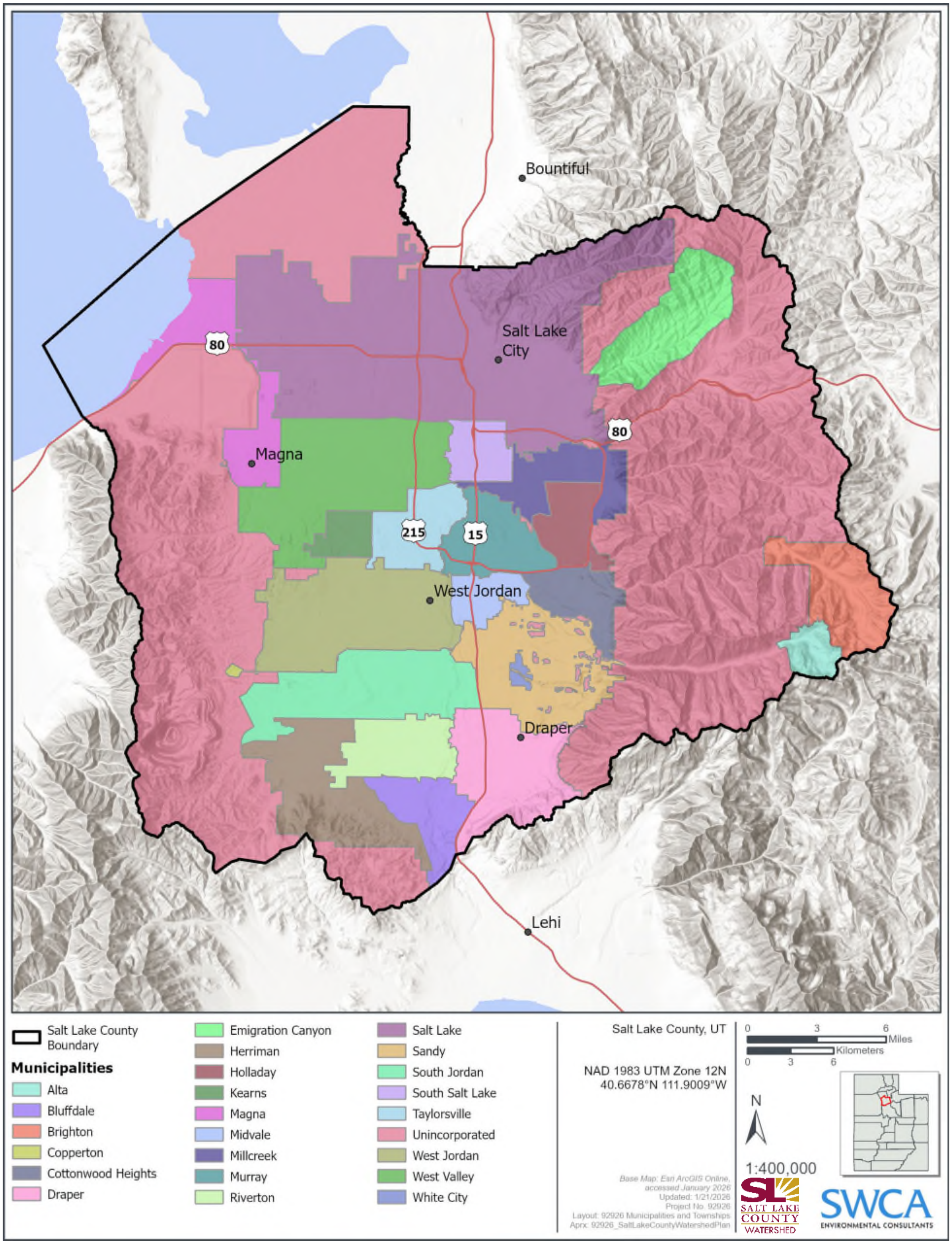

Figure 3-8. Municipality boundaries in Salt Lake County.

Multiple federal, state, and local agencies have jurisdiction over watershed health and/or water quality in Salt Lake County. These agencies are regulatory agencies, water management and land management agencies, and municipal governments, as summarized in Table 3-4.

Table 3-4. Jurisdictions and Land and Water Management Agencies

Category	Agency	Role/Responsibility
Federal regulatory agencies	U.S. Army Corps of Engineers	Permits activities affecting U.S. waters under CWA Section 404.
	U.S. Federal Emergency Management Agency	Manages flood hazard areas.
	EPA	Oversees activities under the CWA and Safe Drinking Water Act.
State regulatory agencies	UDWQ	Permits discharges and establishes water quality criteria.
	Utah Division of Water Rights	Oversees water rights and stream alteration permitting.
	Utah Division of Water Resources	Evaluates and protects water resources.
	Utah Division of Wildlife Resources	Protects wildlife in the watershed.
	Utah Department of Agriculture and Food	Manages agricultural nonpoint source programs and grazing activities.
Water management and land management agencies	U.S. Forest Service	Manages a portion of the Uinta-Wasatch-Cache National Forest.
	Bureau of Land Management	Manages specific lands in agreement with the U.S. Forest Service.
	Utah Division of Forestry, Fire & State Lands	Manages sovereign lands for public trust.
	Utah Division of Parks and Recreation	Manages state parks within the county.
	Utah Division of Water Rights	Manages water diversions in the Jordan River.
	Jordan River Commission	Facilitates regional coordination and development along the Jordan River.
County and municipal government agencies	Salt Lake City and Sandy City	Jurisdiction over drinking water source headwaters and watershed protection.
	Municipalities and Salt Lake County	Manage land use and stormwater discharges.
	Special service districts	Provide water and wastewater utilities and manage water rights.
	Salt Lake County Flood Control	Manages flood control through water-control structures on streams in Salt Lake County.
	Salt Lake County Health Department	Enforces water quality criteria for spills and discharges.

3.2.3 Population

Salt Lake County, the most populous county in Utah, had an estimated 1,216,274 residents as of 2024, marking a 2.6% increase since 2020 and accounting for approximately one-third of the state's population (U.S. Census Bureau 2025a, 2025b). The population is projected to grow to 1,672,102 by 2060, a 37% increase from the total 2024 population (Kem C. Gardner Policy Institute 2020; Utah Economic Council 2022). This growth places additional pressure on the Salt Lake County waterbodies (specifically the Jordan River and its tributaries), as demand for residential development, infrastructure, and recreational spaces increases. It is estimated that approximately 223,000 people live within 1 mile of the Jordan River (Jordan River Commission 2022). The highest density of population is centered around Salt Lake City in the northern part of the county, and the highest change in population density is expected to occur in the central-western part of the county near West Valley and South Jordan (Figure 3-9). The area also faces challenges related to the unhoused population, which has grown along the Jordan River and other waterways within Salt Lake County. This situation presents complex social and environmental issues as encampments along waterways can impact water quality and access to recreational areas.

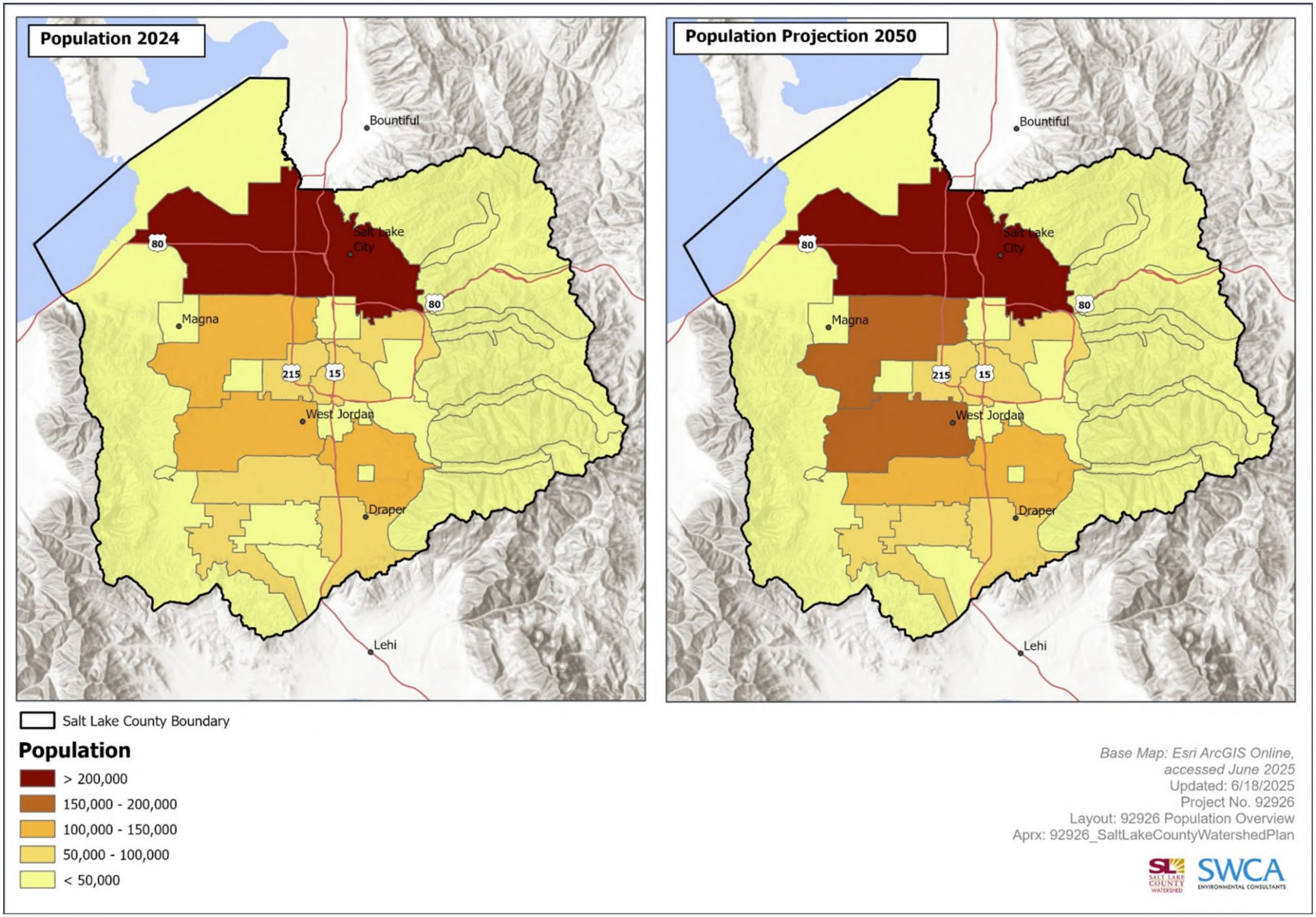

Figure 3-9. Current and future population density in Salt Lake County.

Source: Wasatch Front Regional Council (2023).

3.2.4 Economics

The economy in Salt Lake County is closely intertwined with the quality of life of its residents, which is significantly influenced by water quality, water resources, and recreational opportunities. Over the past decade, Utah has experienced strong economic performance, rebounding effectively from the 2020 global pandemic. By 2023, the state boasted the highest labor force participation rates since 2010, reflecting its resilient economic recovery (Utah Economic Council 2024). Utah's renowned outdoor recreation sector, which significantly contributes to the economy, broke records in 2023 by adding $9.5 billion in value, accounting for 3.4% of the state's gross domestic product and supporting more than 70,000 jobs (UDNR 2024). Much of this recreation is centered in Salt Lake County, particularly during the winter months, with ski recreation thriving in Little and Big Cottonwood Canyons.

A robust economy often relies on industries such as agriculture, manufacturing, and technology, all of which require substantial water resources. Adequate and clean water supplies are essential for these industries to thrive, supporting job creation and economic stability. Salt Lake County's industrial activities further bolster its economy, with Rio Tinto investing $1.5 billion to expand its Kennecott mining operations through 2032 (Deseret News 2019). Additionally, Rio Tinto has been instrumental in the development of Daybreak, one of the county's fastest-growing areas, adding up to 11,450 new dwellings by 2023 (Rio Tinto 2023).

Great Salt Lake, which the Jordan River watershed feeds, is a vital driver of Utah’s economy, supporting industries such as mineral extraction, brine shrimp harvesting, recreation, and tourism, and contributing approximately $1.9 billion annually to the state’s economic output (Null and Wurtsbaug 2020). One of the greatest threats to Great Salt Lake is water diversion through canals, which reduces the natural inflow to the lake. These diversions harm the lake’s ecological health and undermine economic activities that depend on it. Addressing this issue requires a review of historic water adjudication practices and the development of economic incentives to restore natural water flows to the lake.

Access to clean and reliable water resources directly impacts the quality of life for residents by affecting public health, recreational opportunities, and overall livability. High-quality water resources contribute to healthier communities and can attract new residents and businesses. Water resources in Salt Lake County support a range of recreational activities, such as fishing, boating, and hiking near waterbodies, which not only enhance the quality of life for residents but also attract tourists, contributing to the local economy. Recreation-related businesses, such as outdoor equipment retailers and tour operators, benefit from healthy water ecosystems.

Sustainable management of water resources ensures long-term ecological health, which is crucial for protecting and improving water quality within Salt Lake County. This practice will also continue to support tourism and outdoor recreation, both important sectors of the local economy. Investments in water infrastructure, such as treatment plants and distribution systems, are necessary to maintain water quality and availability, leading to improved public services and increased property values, enhancing the overall economic landscape.

3.2.5 Recreation

Salt Lake County offers abundant recreational opportunities, with activities ranging from fishing and boating to wading in the county's watersheds and waterways. Engaging with these natural resources is a significant part of life for many residents, as evidenced by UDWQ’s 2023 water quality survey, which found that 64% of residents within the Jordan River watershed engage in water-based recreation at least once a month (UDWQ 2024). According to the survey, 147 out of 200 residents emphasized the importance of maintaining water quality to ensure safe recreational activities (UDWQ 2024). This aligns with findings from the 2015 IWP where 59% to 64% of residents reported that outdoor activities were vital to their quality of life (Salt Lake County 2015). Additionally, approximately 79% of survey respondents noted that water quality issues have impacted their recreational activities, with nearly half considering water quality when planning such activities.

Recreational access varies across Salt Lake County, with the Northeast and Tri-Canyons Regions offering more public land access, largely due to the abundance of U.S. Forest Service (USFS) land in the eastern part of the Jordan River watershed (see Table 3-2 and Figure 3-6). Recreational activities differ across the watershed, with skiing dominating the colder seasons and camping and leisure being popular in the summer, particularly in Little Cottonwood, Big Cottonwood, and Mill Creek Canyons. Recreationalists reportedly visit these canyons between 44.9 and 58.7 times per year (Smith 2023).

Along the Jordan River, recreational activities are gaining momentum, with a growing interest in developing a blue trail for kayaking enthusiasts. This initiative, supported by the Jordan River Commission, aims to enhance the river's accessibility and recreational appeal, providing residents and tourists with a unique way to explore the natural beauty of the area. In addition to kayaking, the Jordan River offers opportunities for walking, biking, and bird-watching along its scenic trails and parks. However, challenges such as *E. coli* and harmful algal blooms (HABs) pose significant threats to this vision, affecting both user safety and the river's ecological integrity.

Overall, the strong public interest in outdoor recreation and open space management in Salt Lake County indicate that recreational activities will continue to impact watershed health and function, especially as the county's population grows.

3.3 Water Resources

3.3.1 Rivers, Streams, and Canals

The Jordan River watershed encompasses 18 named watersheds and 32 subwatersheds. Major streams in the Wasatch Range include Big and Little Cottonwood Creeks, Mill Creek, Red Butte Creek, Emigration Creek, City Creek, and Parleys Creek. From the Oquirrh Mountains, the main streams include Rose Creek, Butterfield Creek, Midas Creeks and Bingham Creek. These streams provide vital hydrologic and ecological services, particularly during spring and early summer runoff periods driven by snowmelt. Numerous intermittent and ephemeral creeks feed into these major creeks throughout the Wasatch Range and Oquirrh Mountains (Figure 3-10).

In total, Salt Lake County’s surface water network includes over 900 miles of Salt Lake County–mapped waterways (e.g., natural streams and rivers) (Table 3-5) as well as hundreds of miles of constructed canals, ditches, and drains that support municipal, agricultural, and flood-control functions (see Figure 3-10).

Table 3-5. Waterways in Salt Lake County

Type	Length (miles)
Stream	912.60
Canal	248.44
Ditch	48.45
Drain	69.85

Source: Salt Lake County (2025b).

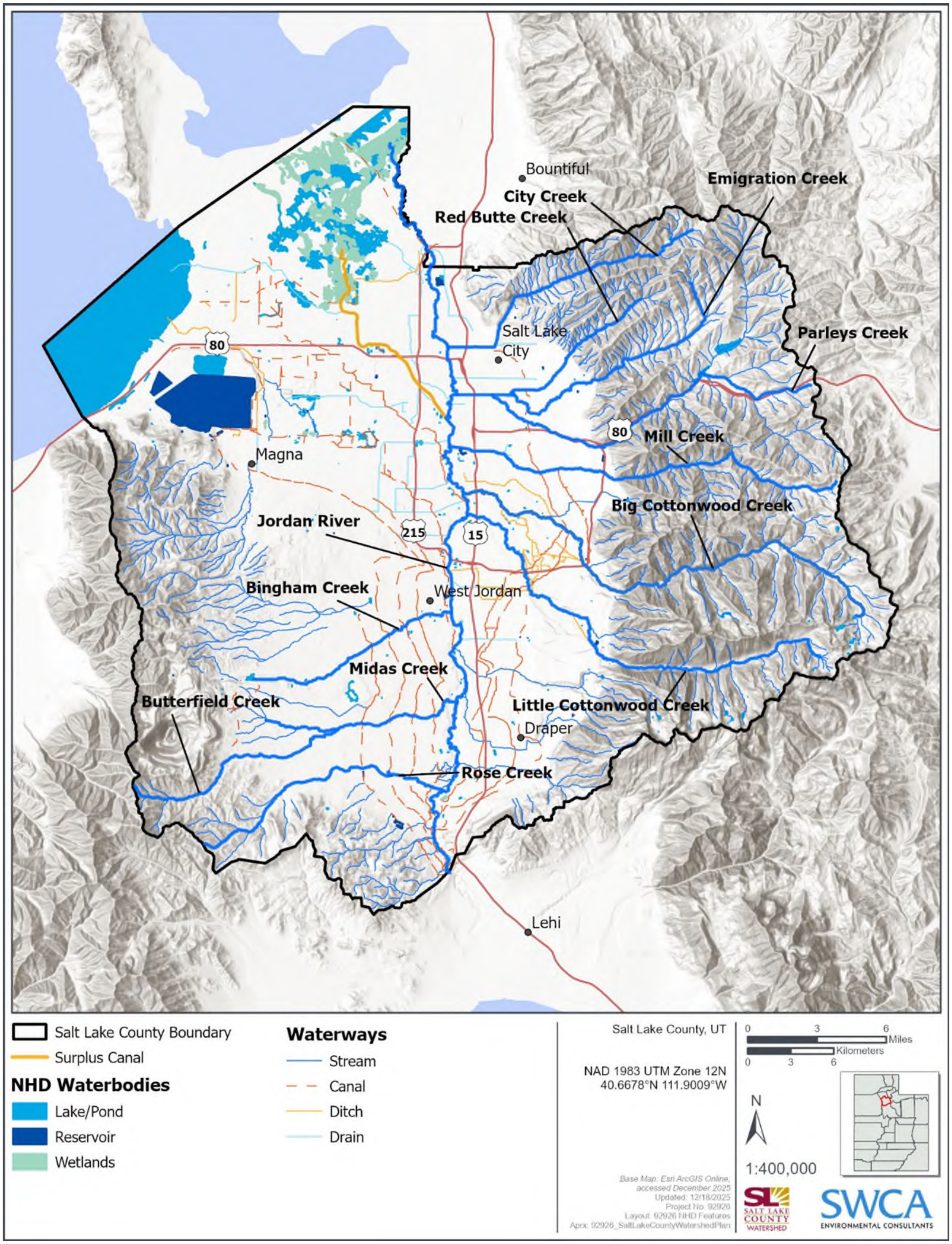

Figure 3-10. Surface water features in Salt Lake County based on Salt Lake County's delineated Waterways Dataset and National Hydrography Dataset waterbodies.

The Jordan River functions primarily as a managed irrigation system rather than a natural river, except during high snowmelt runoff periods when it receives snowmelt from the Wasatch Range and the Oquirrh Mountains and behaves more naturally. Its current state is shaped by both natural landscape features and human activities, including regulated releases from Utah Lake, irrigation diversions and returns, controlled tributary flows, flood-control measures, and development along the river and its floodplain (SWCA et al. 2017). The flow regime across Salt Lake County is heavily managed, with multiple diversions, canals, and pump stations regulating flow and routing water across the valley (Figure 3-11). These engineered features alter the natural flow regime but are essential for water delivery, flood control, and stormwater management. The Utah Division of Water Rights (UDWRi) plays a crucial role in managing diversions by overseeing the allocation and distribution of water rights and balancing the needs of various users. See Section 4.3.2.4 for more information on major water diversions and structures in the county.

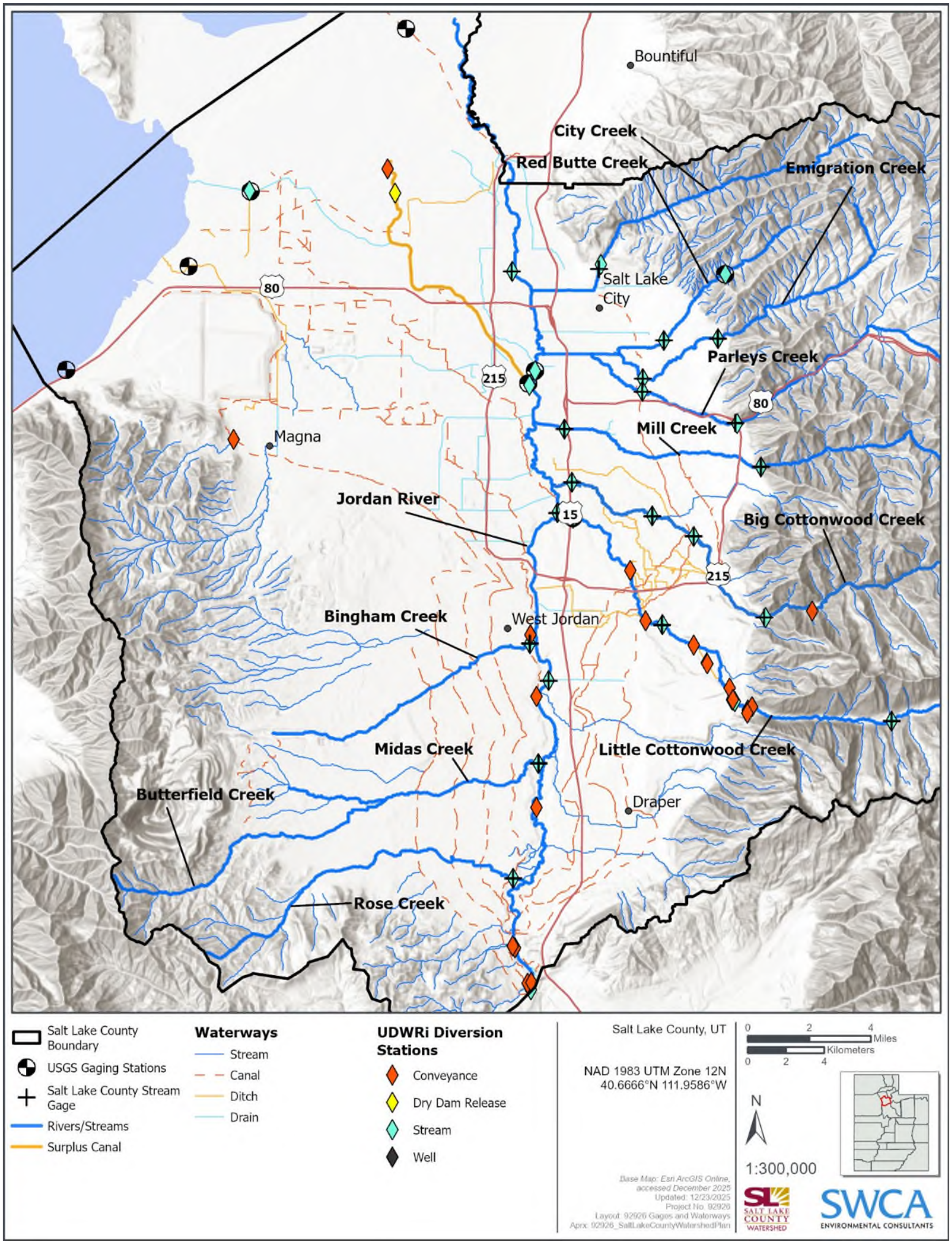

Figure 3-11. Locations of streams, canals, gaging stations, and UDWRi diversions within Salt Lake County.

3.3.2 Lakes and Reservoirs

Although Utah Lake lies outside the boundaries of Salt Lake County, it serves as the primary source of water to the Jordan River through managed releases. Within the county boundaries, there is just over 28,000 acres of NHD-mapped waterbodies (Table 3-6; see Figure 3-10) with important storage structures, including Mountain Dell Reservoir, Little Dell Reservoir, and smaller urban waterbodies such as Liberty Park Pond and Decker Lake. There are also numerous alpine lakes throughout the Wasatch Range.

Table 3-6. NHD Waterbodies in Salt Lake County

Type	Area (acres)
Lake/Pond	22,482.65
Reservoir	5,683.08

Source: U.S. Geological Survey (2024).

3.3.3 Wetlands

Wetland and riparian areas play a critical role in Salt Lake County's watershed health by supporting biodiversity, regulating hydrologic flows, improving water quality, and providing flood attenuation. Many of the wetlands within Salt Lake County are on the fringe of Great Salt Lake and serve an important role in dust suppression (see Section 3.1.1.2 for additional details) and Great Salt Lake hydrology. Within the county boundaries, there are a two wetland types totaling just under 15,000 acres, according to the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) data (Table 3-7).

Table 3-7. NWI Wetland Features in Salt Lake County

Type	Area (acres)
Freshwater Emergent Wetland	13,612.81
Freshwater Forested/Shrub Wetland	532.51

Source: U.S. Fish and Wildlife Service (2024).

These NWI features overlap the NHD Lake/Pond and Wetland features highlighted in Figure 3-10. Most wetland features are in the northwestern portion of the county near Great Salt Lake, and riparian corridors are present along key tributaries draining the Wasatch Range and the Oquirrh Mountains. Together, the NWI and NHD datasets illustrate that Salt Lake County contains over 40,000 acres of mapped aquatic and wetland features. These areas are important for maintaining ecological integrity and hydrologic balance across the watershed.

3.3.4 Groundwater

Groundwater is a critical component of Salt Lake County's water supply portfolio, supporting municipal, industrial, and agricultural needs. Salt Lake County is underlain by the principal aquifer of the Salt Lake Valley, a structural basin filled with unconsolidated basin-fill sediments deposited by ancient Lake Bonneville and mountain alluvial processes (U.S. Geological Survey [USGS] 1964; Wallace and Lowe 2009). These interbedded sands, gravels, silts, and clays form a complex groundwater system, broadly divided into an unconfined aquifer near the valley margins and a deeper, confined principal aquifer beneath the central basin. Groundwater flow is generally directed from the basin margins toward the valley floor and ultimately discharges into the Jordan River (Wallace and Lowe 2009).

Recharge to the aquifers occurs through multiple pathways:

- Mountain-front recharge, where precipitation and snowmelt infiltrate at the base of the Wasatch Range and the Oquirrh Mountains (Lambert 1995)
- Stream and canal seepage, especially from perennial creeks and the Jordan River (Lambert 1995)
- Irrigation return flows from agricultural lands (Lambert 1995)
- Subsurface inflow from adjacent consolidated rock units (Lambert 1995)

Groundwater flows laterally from the valley margins toward the central axis of the basin and discharges to the Jordan River, shallow wells, or natural springs. Vertical gradients in the confined aquifer tend to direct groundwater upward through the presence of fine-grained confine layers, which inhibit rapid vertical mixing (Lambert 1995).

Municipal groundwater production relies heavily on this basin-fill system. The principal aquifer of the Salt Lake Valley supports dozens of municipal and private wells, with production focused in areas where the confined aquifer is pressurized and transmissive. Well yields vary across the county, depending on local sediment texture, aquifer thickness, and proximity to recharge zones (USGS 1964). Implementation activities such as stormwater infiltration BMPs and source protection zones are essential for protecting groundwater resources and maintaining water quality.

3.3.4.1 GROUNDWATER QUALITY

Groundwater quality in Salt Lake County varies by location, depth, and land use influences. In general, Salt Lake County's principal confined aquifer contains higher quality water suitable for municipal supply, whereas the shallow unconfined aquifer is more susceptible to surface contamination and salinity buildup.

According to the Utah Geological Survey's Groundwater Quality Classification (OFR-560, 2023), most groundwater in the county falls into the Class IA and II ranges, indicating TDS concentrations under 3,000 milligrams/liter [mg/L]), and is suitable for potable use with minimal treatment (Utah Geological Survey 2025). However, localized areas exceed secondary drinking water standards due to legacy contamination, urban runoff, and agricultural inputs.

Specific groundwater quality concerns are as follows:

- Elevated nitrate levels in areas with shallow groundwater and historic agricultural activity (Almasri and Kaluarachchi 2004)
- Chloride and TDS accumulation in urban areas, often linked to road salt application and aging infrastructure (USGS 2019a)
- Metal and sulfate contamination associated with historic mining activities in the western valley, particularly near the Kennecott Copper Mine (Ugulu et al. 2025; Natali et al. 2025)

The Jordan Valley Water Conservancy District (JVWCD) performs extensive ongoing water quality monitoring to ensure compliance with EPA and state drinking water standards. In 2023, JVWCD tested for a wide range of regulated and unregulated contaminants, including nitrates, sulfate, chloride, TDS, heavy metals, and microbial indicators (JVWCD 2023). All reported values remained within acceptable limits outlined in Utah Administrative Code (UAC) R317-6-2.1 (JVWCD 2023). The district also maintains state-approved groundwater protection programs designed to prevent contamination at the source and safeguard long-term drinking water quality (JVWCD 2023).

Ongoing protection of recharge zones and land use regulation near sensitive areas are essential to maintaining long-term water quality in both the confined and unconfined aquifer systems.

3.3.4.2 GROUNDWATER-SURFACE WATER INTERACTIONS

In Salt Lake County, groundwater and surface water are closely connected, particularly within the Jordan River corridor (Lambert 1995). Shallow aquifers along the east and west sides of the Salt Lake Valley are naturally recharged by snowmelt infiltration, stream seepage, and irrigation return flows (Lambert 1995). These aquifers gradually discharge to surface water systems, most notably the Jordan River, helping to sustain streamflow during dry periods (Lambert 1995).

The valley itself is a structural basin filled with thick unconsolidated sediments, creating significant groundwater storage potential. On the west side, the deep water table and broad alluvial fans represent a large potential reservoir that can be recharged through wells or infiltration basins (Utah Division of Water Resources 2005).

A key example of managed groundwater interaction is the JVWCD's Aquifer Storage and Recovery project, which injects surplus winter water (from sources like the Salt Lake Aqueduct) into the Salt Lake Valley principal aquifer and extracts it in the summer. Because the aquifer is hydraulically open to the Jordan River, this stored water slowly migrates toward the river, influencing baseflow and regional water availability (Utah Division of Water Resources 2005).

Groundwater quality and recharge efforts are also influenced by historical contamination areas, including sites near the Kennecott Copper Mine. As the region's population and development continue to grow, effective conjunctive management, balancing groundwater and surface water resources, will be essential to maintaining long-term water supply reliability and watershed health (Utah Division of Water Resources 2005).

3.3.5 Urban Water Infrastructure

Within Salt Lake County there is a complex network of water infrastructure systems designed to manage the water supply, water distribution, and treatment of water. Drinking water is delivered to residents through a variety of mechanisms, including reservoirs, pipelines, pumping stations, and treatment facilities. Wastewater infrastructure, consisting of sewer systems and treatment plants, plays a critical role in collecting and treating sewage and industrial waste before safely releasing it into the environment. Stormwater infrastructure, such as drains, detention basins, and green infrastructure solutions, is essential for managing runoff from precipitation, preventing flooding, and reducing pollution in natural waterways. Stormwater is managed and regulated through municipal separate storm sewer systems (MS4s), which are designed to collect and convey stormwater runoff, preventing flooding and reducing pollutants entering natural waterbodies.

Figure 3-12 shows the current MS4 boundaries within Salt Lake County, surface drinking water source protection zones, and the location of publicly owned treatment works (POTW). Additional information on wastewater and stormwater sources in Salt Lake County is included in Section 4.3.1.

Culinary water in Salt Lake County is supplied by multiple providers, including the Salt Lake City Department of Public Utilities, the Metropolitan Water District of Salt Lake and Sandy, the JVWCD, and other municipal water providers. These entities treat groundwater, surface water diverted from tributaries, and water imported from outside the Jordan River watershed. Streams from the Wasatch Range supply 60% of the potable water used by Salt Lake City and other municipalities (Salt Lake County 2009).

Currently, nine water treatment plants are responsible for processing and supplying drinking water, with eight treating surface water and one also treating groundwater.

The demand for potable water in Salt Lake County is projected to increase by 67% from 2005 to 2100 (Bowen Collins 2003), underscoring the need to maintain and develop high levels of water quality within the Jordan River watershed. Strategies to meet future potable water demand include the continued development of groundwater resources, increased use of Wasatch Range stream sources, water importation, the reuse of treated wastewater for landscape irrigation, and conservation efforts (Salt Lake County 2009).

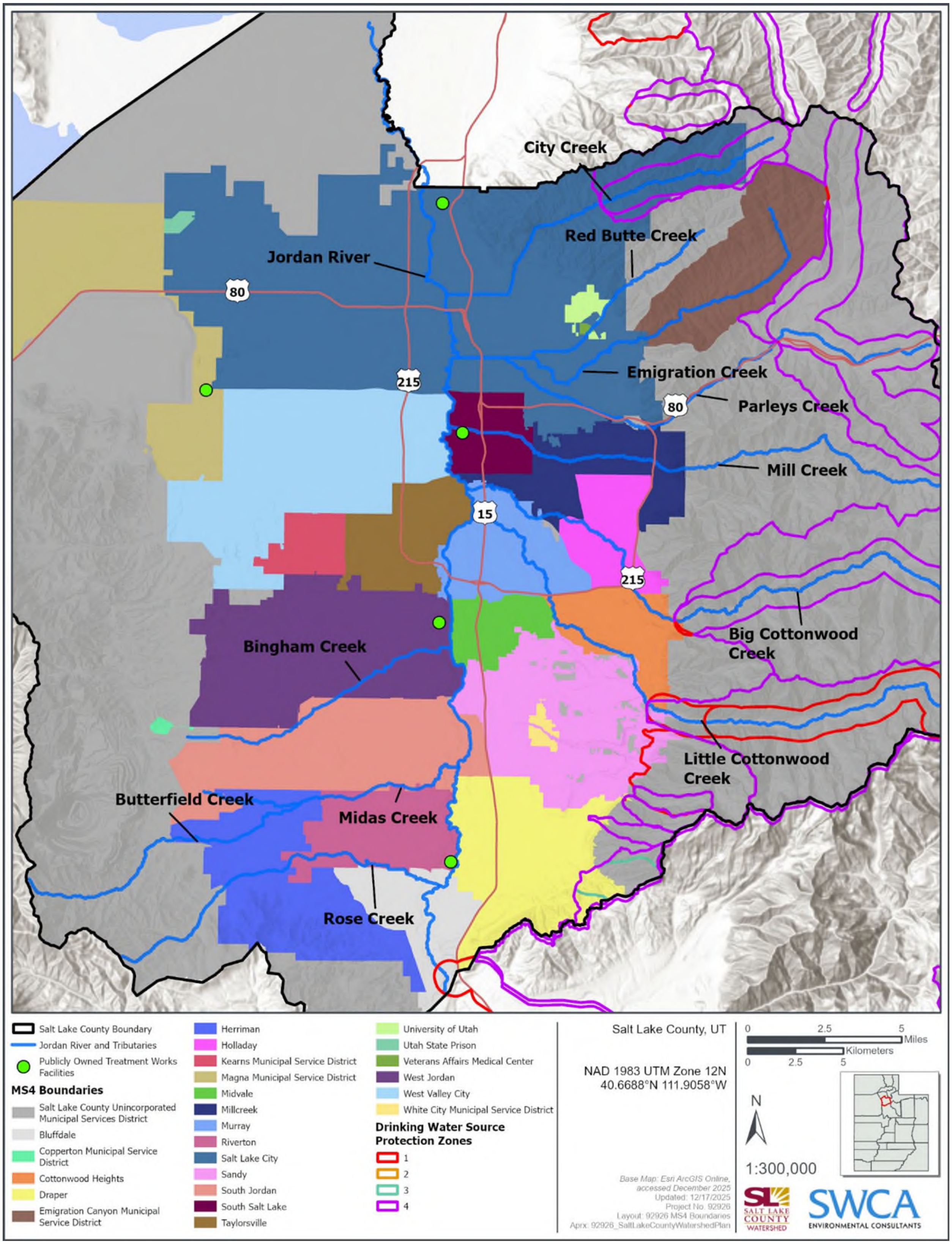

Figure 3-12. Municipal separate storm sewer systems, POTWs, and drinking water source protection zones in Salt Lake County.

4 WATER QUALITY AND POLLUTION SOURCES

This section provides a comprehensive overview of water quality issues in Salt Lake County by doing the following:

- Evaluating water quality impairments affecting Salt Lake County waterbodies (Section 4.1)
- Summarizing existing TMDLs within Salt Lake County (Section 4.2)
- Discussing the causes and sources of pollution (Section 4.3).
- Analyzing spatial and temporal trends using available water quality data (Section 4.4)
- Providing estimates of pollutant loads from existing TMDLs and necessary load reductions to restore the Jordan River watershed and protect its beneficial uses (Sections 4.4.1.1, 4.4.2.2, and 4.4.4.1)

This analysis is based solely on a review of existing information; no new water quality data were collected for the 2025 IWP.

4.1 Water Quality Impairments

UDWQ implements most CWA programs in Utah and reports on the condition of surface waters every 2 years in a document known as the Integrated Report. Rules and regulations of the CWA require states to assess the condition of surface waters, establish designated beneficial uses, and develop and adopt water quality numeric and narrative criteria to protect human and environmental health. Surface waters are assessed and assigned an assessment category (1 through 5) by comparing pollutant concentrations in the water to state numeric and narrative thresholds for each designated beneficial use, as written in UAC R317-2. UDWQ also assigns beneficial uses for each AU in Utah. Beneficial uses include drinking water, fish and aquatic life, wildlife, agricultural, industrial, and recreation uses. AUs are discrete subwatershed units delineated by UDWQ using USGS fifth- and sixth-level hydrologic unit codes (UDWQ 2024).

Numeric and narrative criteria for individual pollutants are found in UAC R317-2. Surface waters failing to meet water quality criteria for designated beneficial use are listed on Utah’s 303(d) list of impaired waterbodies (category 5 waters). UDWQ prioritizes category 5 waters for further in-depth analysis (including a pollutant source assessment and a remediation action plan to restore water quality) based on the threat of impairment to human and environmental health.

Surface waters within Salt Lake County have been designated as having one or more of the following designated beneficial uses (UDWQ 2024):

- **Domestic Source (1C):** Protected for domestic purposes with prior treatment by treatment processes as required by the Utah Division of Drinking Water.
- **Infrequent Primary Contact Recreation (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.
- **Aquatic Wildlife-Cold Water (3A):** Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.
- **Aquatic Wildlife-Warm Water (3B):** Protected for warm water species of game fish and other warm water aquatic life, including the necessary aquatic organisms in their food chain.

- **Nongame Fish and other Aquatic Life (3C):** Protected for nongame fish and other aquatic life, including the necessary aquatic organisms in their food chain.
- **Waterfowl, Shorebirds, and other Water-Oriented Wildlife (3D):** Protected for waterfowl, shorebirds, and other water-oriented wildlife not included in Classes 3A, 3B, or 3C, including the necessary aquatic organisms in their food chain.
- **Agriculture (4):** Protected for agricultural uses, including irrigation of crops and stock watering.

UDWQ assesses and reports on the condition of surface waters in Utah every 2 years in the Integrated Report using the following five EPA-defined categories:

- Fully Supporting (1): All beneficial uses assigned to a waterbody are evaluated against one or more numeric criteria, and each use is found to meet applicable water quality standards.
- No Evidence of Impairment (2): Some, but not all, beneficial uses assigned to a waterbody are evaluated against one or more numeric criteria, and each assessed use is found to meet applicable water quality standards.
- Insufficient Data (3): There are insufficient data and information to conclude support or nonsupport of a beneficial use.
- TMDL-Approved (4A): Waterbodies impaired by a pollutant with a TMDL(s) developed and approved by EPA.
- Not Supporting (5): The concentration of a pollutant or several pollutants exceeds numeric water quality criteria, or beneficial uses are non-supporting based on violation of the narrative water quality standards.

Impaired AUs within Salt Lake County and their 2024 assessment results are listed in Table 4-1, and all UDWQ assessments results are shown in Figure 4-1. AUs within Salt Lake County are impaired due to exceedances of various water quality criteria that are discussed in Section 4.4.

Table 4-1. Impaired AUs within Salt Lake County

AU Name and Code	Domestic Source (1C)	Infrequent Primary Contact Recreation (2B)	Aquatic Wildlife-Cold Water (3A)	Aquatic Wildlife-Warm Water (3B)	Nongame Fish and other Aquatic Life (3C)	Waterfowl, Shorebirds and other Water-Oriented Wildlife (3D)	Agriculture (4)
Big Cottonwood Creek-1 (BC1)	N/A	*E. coli**	Benthic invertebrates Temperature	N/A	N/A	N/A	Fully Supporting
Big Cottonwood Creek-2 (BC2)	*E. coli*	*E. coli*	Cadmium Copper	N/A	N/A	N/A	N/A
Big Willow Creek† (BWC)	N/A	Fully Supporting	N/A	N/A	N/A	Benthic invertebrates DO	N/A
Bingham Creek (BIC)	N/A	*E. coli*	N/A	N/A	N/A	Fully Supporting	TDS
Blackridge Reservoir† (BLR)	N/A	Harmful algal blooms	N/A	N/A	N/A	Fully Supporting	N/A
Butterfield Creek (BUC)	N/A	*E. coli*	N/A	N/A	N/A	Fully Supporting	TDS
City Creek-1 (CC1)	N/A	*E. coli*	Fully Supporting	N/A	N/A	N/A	N/A
Dry Creek† (DRC)	N/A	Fully Supporting	N/A	N/A	N/A	Benthic invertebrates	N/A
Emigration Creek (EMC)	N/A	*E. coli**	Fully Supporting	N/A	N/A	N/A	Fully Supporting
Emigration Creek Lower (LEM)	N/A	*E. coli**	Fully Supporting	N/A	N/A	N/A	Fully Supporting
Jordan River-1 (JR1)	N/A	Fully Supporting	N/A	Benthic invertebrate DO*	N/A	Benthic invertebrate DO*	Fully Supporting
Jordan River-2 (JR2)	N/A	*E. coli**	N/A	Benthic invertebrates DO*	N/A	DO*	Fully Supporting
Jordan River-3 (JR3)	N/A	*E. coli**	N/A	Benthic invertebrates Phosphorus^ DO*	N/A	N/A	TDS
Jordan River-4 (JR4)	N/A	*E. coli**	N/A	Benthic invertebrates	N/A	N/A	TDS
Jordan River-5 (JR5)	N/A	*E. coli**	N/A	Fully Supporting	N/A	N/A	TDS
Jordan River-6 (JR6)	N/A	*E. coli*	N/A	Benthic invertebrates	N/A	N/A	TDS
Jordan River-7 (JR7)	N/A	Fully Supporting	N/A	Benthic invertebrate	N/A	N/A	TDS
Jordan River-8 (JR8)	Arsenic	Fully Supporting	N/A	Fully Supporting	N/A	N/A	TDS

AU Name and Code	Domestic Source (1C)	Infrequent Primary Contact Recreation (2B)	Aquatic Wildlife-Cold Water (3A)	Aquatic Wildlife-Warm Water (3B)	Nongame Fish and other Aquatic Life (3C)	Waterfowl, Shorebirds and other Water-Oriented Wildlife (3D)	Agriculture (4)
Little Cottonwood Creek-1 (LC1)	N/A	pH Benthic invertebrates *E. coli**	Cadmium pH Temperature Benthic invertebrates	N/A	N/A	N/A	pH TDS Benthic invertebrates
Little Cottonwood Creek-2 (LC2)	pH	pH	Cadmium Copper pH Zinc*	N/A	N/A	N/A	N/A
Midas Creek (MIC)	N/A	*E. coli**	N/A	N/A	N/A	Selenium	TDS
Mill Creek1-SLCity (MC1)	N/A	*E. coli**	N/A	N/A	Benthic invertebrates	N/A	Fully Supporting
Mill Creek2-SLCity (MC2)	N/A	*E. coli**	Benthic invertebrates	N/A	N/A	N/A	Fully Supporting
North Canyon Creek† (NCC)	N/A	Fully Supporting	N/A	N/A	N/A	Benthic invertebrates Copper	N/A
Parleys Canyon Creek-1 (PC1)	*E. coli**	*E. coli**	Benthic invertebrates DO	N/A	N/A	N/A	N/A
Parleys Canyon Creek-2 (PC2)	*E. coli**	*E. coli**	Cadmium	N/A	N/A	N/A	N/A
Red Butte Creek Lower (LRB)	N/A	*E. coli**	Benthic invertebrates	N/A	N/A	N/A	Fully Supporting
Rose Creek (RSC)	N/A	*E. coli**	N/A	N/A	N/A	Fully Supporting	Fully Supporting

Source: UDWQ (2024).

N/A = Not applicable.

* A TMDL has been developed and approved for this impairment.

^ Pollution indicator; there is no water quality standard for total phosphorus.

† UDWQ has not classified this AU's beneficial uses. Per UAC R317-2, this AU is classified as 2B and 3D by default

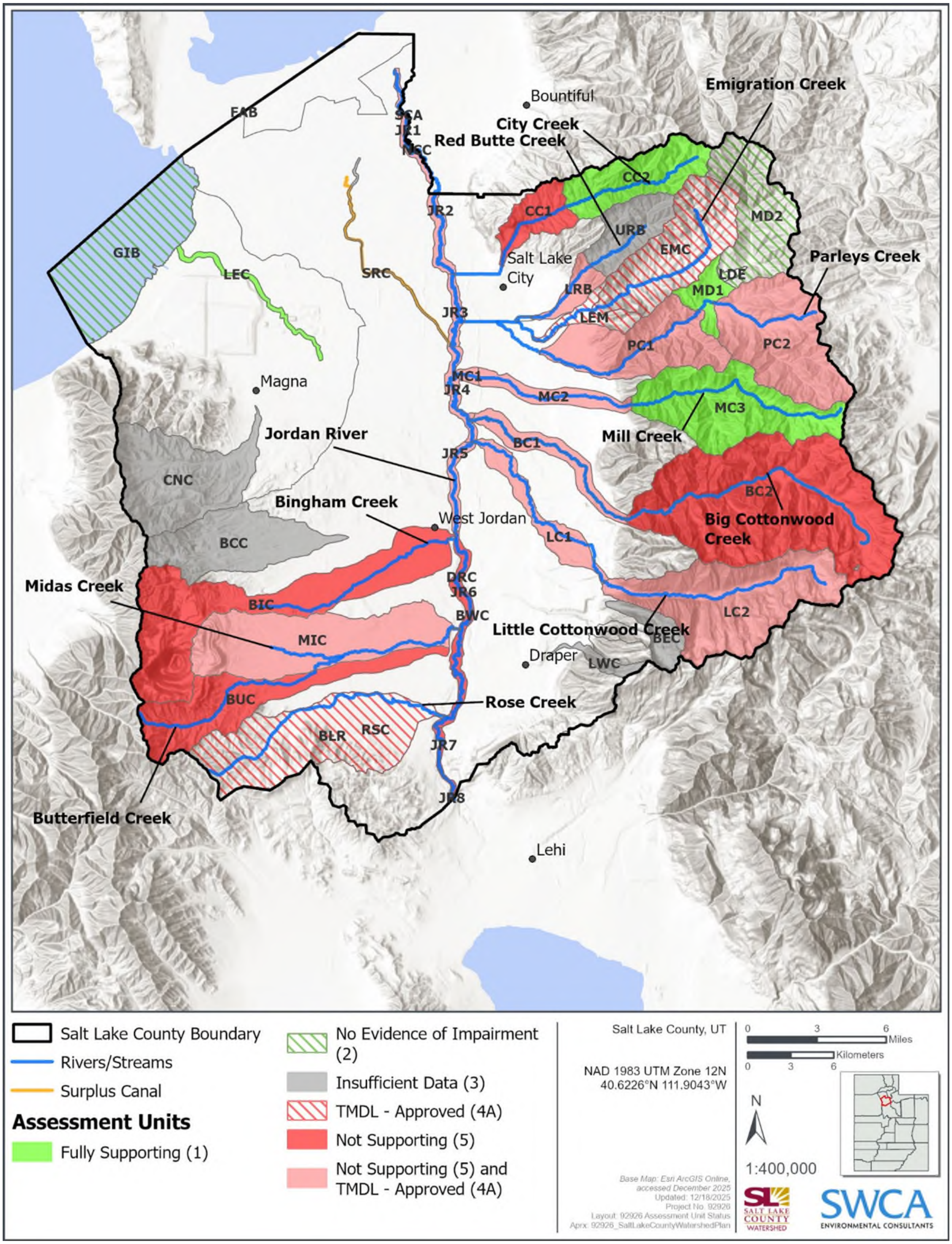

Figure 4-1. Assessment status of AUs in Salt Lake County based on the 2024 Integrated Report.

4.2 Total Maximum Daily Loads

The 2025 IWP does not calculate any new pollutant loads or load reductions; instead, it relies on the TMDLs outlined in Section 2.3 to set and summarize the necessary pollutant loading and load reduction targets for identified point and nonpoint sources in the watershed (see Sections 4.4.11, 4.4.2.2, and 4.4.4.1).

Typically, a TMDL is mass-based, involving the calculation of the maximum amount of a pollutant that a waterbody can receive daily while still adhering to water quality criteria. This concept is synonymous with the term "loading capacity," which the EPA defines as "the greatest amount of loading that a waterbody can receive without violating water quality standards" (EPA 2025a). A TMDL represents the sum of individual wasteload allocations (WLAs) from point sources, load allocations (LAs) from nonpoint sources, and natural background (NB) levels. It includes a margin of safety (MOS), either implicitly or explicitly defined, to account for uncertainties in the relationship between pollutant loads and the quality of the receiving waterbody. This sum is calculated using the following equation:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{NB} + \text{MOS} \quad \textit{(Equation 1)}$$

In certain cases, particularly when addressing *E. coli* impairments, a concentration-based TMDL, such as the *Jordan River Watershed E. coli TMDL* (Jordan River *E. coli* TMDL) (UDWQ 2023a), may be more suitable. This approach uses water quality numeric criteria as the daily TMDL target, ensuring that all sources meet the water quality criteria at the point of discharge. By doing so, it eliminates reliance on dilution and other instream processes, such as bacteria die-off, to achieve the TMDL. Using an implicitly defined MOS, it assumes that if all sources are at or below the water quality criteria, the receiving water will meet water quality criteria. For concentration-based TMDLs, the equation is revised as follows:

$$\text{TMDL} = \text{Loading Capacity} = \text{Water Quality Criteria} \quad \textit{(Equation 2)}$$

There are many benefits of a concentration-based TMDL approach, including a TMDL target that is easy to understand and communicate to stakeholders, does not require robust flow data or complex modeling, and is equitable in terms of assigning responsibility to reduce instream concentrations.

4.3 Causes and Sources of Pollution

a

EPA ELEMENT

Specify the pollutants of concern and identify the significant source categories (point and nonpoint) by location/season, as needed, to target management actions effectively.

Pollution in aquatic environments results from a combination of natural processes and human activities that introduce pollutants into waterbodies. Common sources of pollution include nonpoint sources, such as runoff from agricultural lands, urban areas, and construction sites, which can carry nutrients, sediments, and contaminants into rivers and lakes. Additional nonpoint sources include failing septic systems and natural inputs like erosion or wildfire ash. Point sources, like POTWs or industrial discharges, contribute pollutants more directly through defined outfalls.

In Utah, point sources of pollution are regulated under the Utah Pollutant Discharge Elimination System (UPDES), which operates as the state's version of the federal National Pollutant Discharge Elimination System. Nonpoint sources are not regulated under the UPDES and are instead managed through voluntary, incentive-based, and grant-supported programs such as the Utah 319 Non-Point Source Program, Utah Department of Agriculture and Food (UDAF) initiatives, and Salt Lake County watershed programs.

Table 4-2 lists out identified point and nonpoint sources of pollution in the Jordan River watershed and how they are linked to existing water quality impairments.

4.3.1 Point Sources

Within Salt Lake County, the main sources of point source pollution are stormwater and wastewater. These sources contribute to pollutant loads in waterbodies across the county. In Utah, point source discharges are regulated by UDWQ, which operates under authority delegated by the EPA through the CWA (Figure 4-2).

Table 4-2. Summary of Causes and Sources of Pollution

Source	Impairments								
	E. coli			**DO/OM**		**Temperature**	**Metals**	**Nutrients**	**TDS**
Septic systems	Failing systems			Failing systems				Septic system effluent that contains nutrients	
Abandoned mines							Abandoned mineral lands and abandoned mine drainage in Big and Little Cottonwood Creeks		
Stormwater	Pet waste	Unhoused populations	Organic debris from runoff	Impervious surfaces	Organic debris (leaf litter and yard waste) from runoff	Impervious surfaces	Impervious surfaces	Fertilizer practices	Road salts
Agricultural	Livestock and irrigation			Manure				Irrigation	
Stream erosion				Stream instability leading to soil erosion and plant debris loading resulting in sediment oxygen demand (SOD)					
POTWs				BOD effluent concentration				Effluent that contains nutrients	Minimal TDS effluent concentrations
Recreation	Pet waste	Human waste							
Natural Background							Soil erosion	Soil erosion	
Wildlife	Wildlife waste								
Hydromodification (irrigation and canal systems)	Canal return flows			Low flow leading to SOD due to reduction of mixing	Organic matter accumulation.	Channelization, loss of riparian shading	Canal return flows	Canal return flows	Canal return flows
Utah Lake				Algal bloom decomposition			Arsenic in Jordan River Segment 8		TDS to Jordan River

Note: Red cells = primary causes, yellow cells = minor causes.

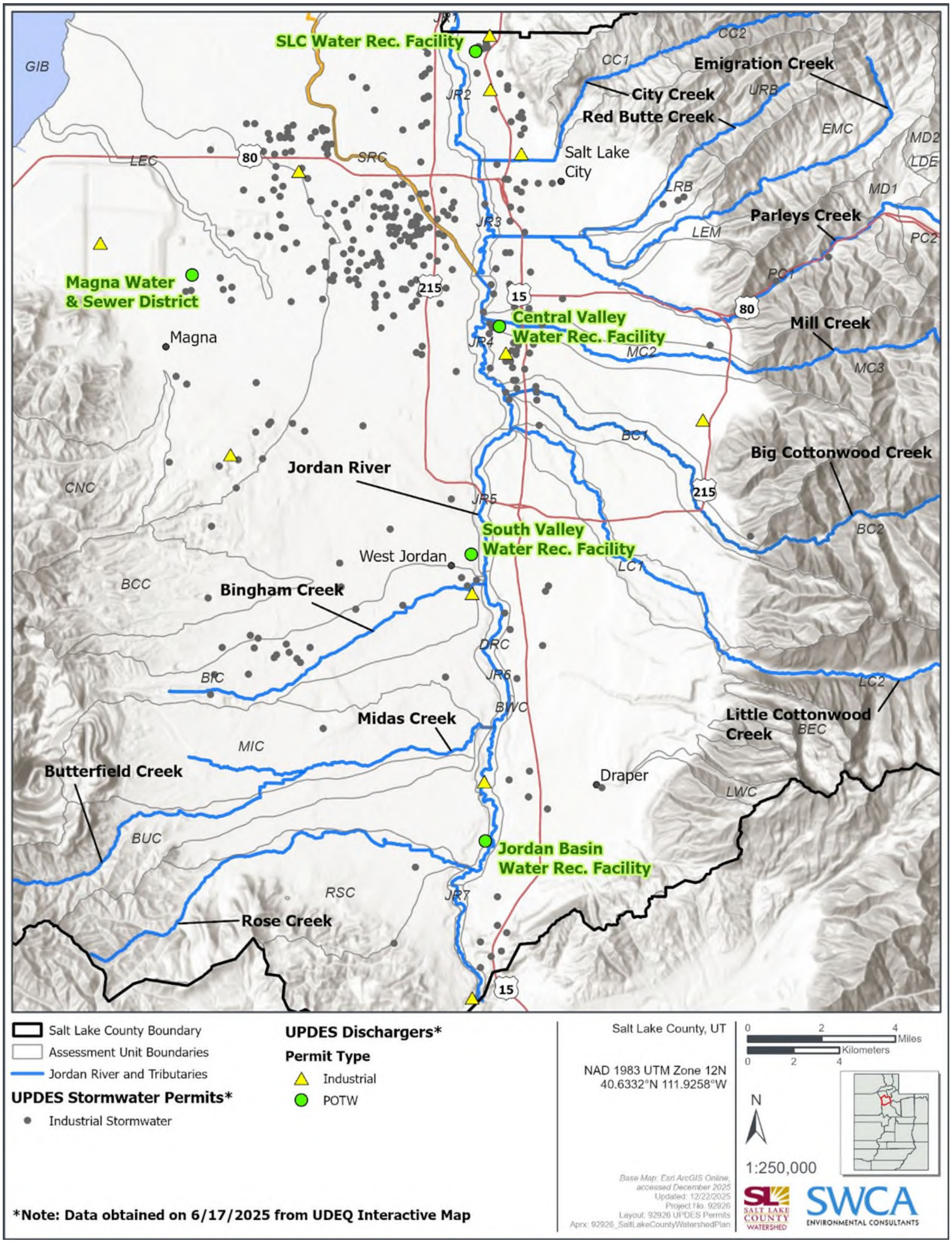

Figure 4-2. UPDES permits.

Note: Data were obtained from the UDEQ Environmental Interactive Map on June 17, 2025 (UDEQ 2025a), and therefore reflect only a snapshot in time. The intent of the data shown in this figure is to show a general overview of the types of permits present within Salt Lake County. For the most up-to-date list of active UPDES permits, refer to the EPA's Enforcement and Compliance History Only database.

UDWQ oversees stormwater management by regulating permitted stormwater discharges from three primary sources: MS4s, construction activities, and industrial activities. Within Salt Lake County, stormwater comes from all three of these regulated sources as well as through unregulated diffuse runoff. Regulated and non-regulated stormwater enters the Jordan River and its tributaries through diffuse runoff discharge to direct tributaries to the Jordan River, discharge to drains or canals with direct flow to the Jordan River, or through return flows from irrigation (Table 4-3) (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013).

Table 4-3. Sources and Impacts of Stormwater on Pollutants of Concern

Pollutant	Pollutant Source Transported by Stormwater Flows	Impact on Water Quality*
E. coli	Pet waste, wildlife, failing septic systems, sanitary sewer overflows	Elevated bacterial levels, health risks, recreational use impairment
DO	OM loading from streets, gutters, and vegetation; irrigation return flow, which contributes oxygen-demanding material to waterbodies	Increased microbial respiration reduces DO causing stress or death to aquatic life
OM	Leaves, debris, biological material washed off surfaces and through canals/ponds	Contributes to both acute and chronic DO depletion; affects microbial activity
Temperature	Runoff from heated impervious surfaces (e.g., roads, rooftops)	Raises stream temperatures; decreases DO solubility; stresses aquatic ecosystems
Metals	Vehicle wear (brakes, tires), roofing materials, industrial areas	Toxic to aquatic life even at low concentrations; bioaccumulation concerns
Nutrients	Fertilizers, pet waste, wildlife, human waste, atmospheric deposition, decaying organic material	Eutrophication; algal blooms; further oxygen depletion
TDS	Road salts, soil particles, dissolved chemicals from urban surfaces	Alters water clarity and conductivity; affects aquatic habitat quality and drinking water treatment processes

* Not all pollutant sources are present across the entire watershed. Pollutant sources are subwatershed specific. See Section 4.4 for more information on water quality in each individual subwatershed.

4.3.1.1 INDUSTRIAL AND CONSTRUCTION STORMWATER

Industrial stormwater and construction stormwater originate from industrial facilities and active construction sites, respectively, and are regulated because runoff from these activities can carry pollutants such as sediments, metals, oils, and chemicals into receiving waters. Regulated stormwater is subject to permitting and management requirements (such as MS4 or industrial stormwater permits) to control pollutant discharges, whereas non-regulated stormwater runoff is not covered by these permits and typically originates from diffuse sources like residential areas, roads, and open land.

Stormwater runoff serves as a significant transport mechanism for various pollutants, particularly in urbanized environments like Salt Lake County (see Table 4-3). As precipitation falls on impervious surfaces such as roads, rooftops, and parking lots, it mobilizes accumulated contaminants including nutrients (e.g., nitrogen and phosphorus), metals, hydrocarbons, sediments, and pathogens. This runoff may also collect OM and other debris from both natural and built environments, especially during initial storm events following dry periods, an event referred to as the "first flush." Once entrained, these pollutants are conveyed through storm drains and discharged into receiving waterbodies, where they can contribute to oxygen demand, eutrophication, and other forms of water quality impairments. In Salt Lake County, there are approximately 1,352 UPDES stormwater permits (1,023 construction stormwater and 329 industrial stormwater).[1] Pollutant contributions from both industrial and construction stormwater vary by subwatershed. See Section 4.4 for subwatershed-specific water quality data.

[1] Data on permit counts were obtained from the UDWQ Environmental Interactive Map on June 17, 2025 (UDEQ 2025a).

Construction projects that disturb 1 acre or more, or smaller projects within a larger common development, must obtain coverage under the Utah Construction General Permit. Although construction sites are generally not major sources of *E. coli*, potential risks include contamination from on-site portable toilets or improper sewer line work. These projects may also contribute to elevated levels of TDS through sediment-laden runoff, particularly if erosion controls are inadequate. Furthermore, stormwater from disturbed soils and exposed materials may carry OM such as debris, vegetation, or construction waste, which can decompose in receiving waters and contribute to DO depletion. Adherence to sediment and erosion control measures help mitigate these risks. Permittees are required to develop and implement a stormwater pollution prevention plan, detailing personnel roles, site layout, control practices, and inspection and maintenance procedures. See Section 4.3.2.1 for more information on nonpoint sources of stormwater.

Industrial stormwater discharges are regulated through the Multi-Sector General Permit, which applies to facilities in 29 designated industrial sectors such as manufacturing, mining, landfills, transportation hubs, and large POTWs. These facilities may contribute pollutants including TDS from chemical residues, process water, and exposed materials. Accumulated debris, waste, and organic residues from industrial activities may also increase OM loading, especially if not properly managed, leading to DO impacts in receiving waters. Although *E. coli* is generally not a primary pollutant from industrial facilities, potential sources may include nuisance wildlife in open water areas or improper sanitary practices. Like construction sites, industrial facilities must develop stormwater pollution prevention plans to describe pollutant sources, stormwater-control measures, and procedures to ensure compliance and minimize pollutant discharge.

4.3.1.2 MS4 STORMWATER

MS4s are regulated through the state's Phase I and Phase II MS4 permits, which are issued by UDWQ. Phase I permits apply to MS4 areas with populations exceeding 100,000 (such as Salt Lake City) and the Utah Department of Transportation (UDOT), whereas Phase II permits apply to smaller municipalities (populations under 100,000).

MS4s are designed to collect and convey stormwater, which is discharged untreated into local waterbodies through permitted outfalls. Sediment in stormwater runoff typically originates from construction sites and roadways. When discharged into a watershed, excess sediment can clog waterways, reduce water clarity, smother aquatic habitats, and disrupt fish spawning grounds. Nutrients such as nitrogen and phosphorus are commonly introduced through lawn fertilizers, yard waste, and pet waste. These nutrients can lead to algal blooms, which deplete oxygen levels in the water and cause fish kills or create dead zones. Metals, including lead, copper, and zinc, often come from vehicles (e.g., brake pad wear), roofing materials, and industrial areas. Illicit discharges, unpermitted and illegal dumping, or discharge of contaminants into stormwater conveyances are additional pathways for pollutants such as pet waste, oil and grease, or sediment to enter waterbodies.

Both Phase 1 and Phase 2 permittees are required through their permit to address six minimum control measures:

- Public education and outreach on stormwater impacts
- Public involvement/participation
- Illicit-discharge detection and elimination
- Construction site stormwater runoff control
- Long-term stormwater management in new development and redevelopment
- Pollution prevention and good housekeeping for municipal operations

Additionally, as part of the Jordan River *E. coli* TMDL, UDWQ, in collaboration with local MS4 permittees, developed an MS4 implementation guidance document. As part of this guidance document, UDWQ requires that MS4s discharging to *E. coli*–impaired waters update their stormwater management program to include a TMDL compliance plan. This plan should address pollutant reduction requirements and incorporate BMPs to reduce *E. coli* discharges (UDWQ 2023b). No load target was given to MS4s as part of the TMDL analysis.

Figure 4-3 displays the different MS4 catchment areas within Salt Lake County, as delineated as part of the Jordan River DO TMDL (UDWQ 2023a).

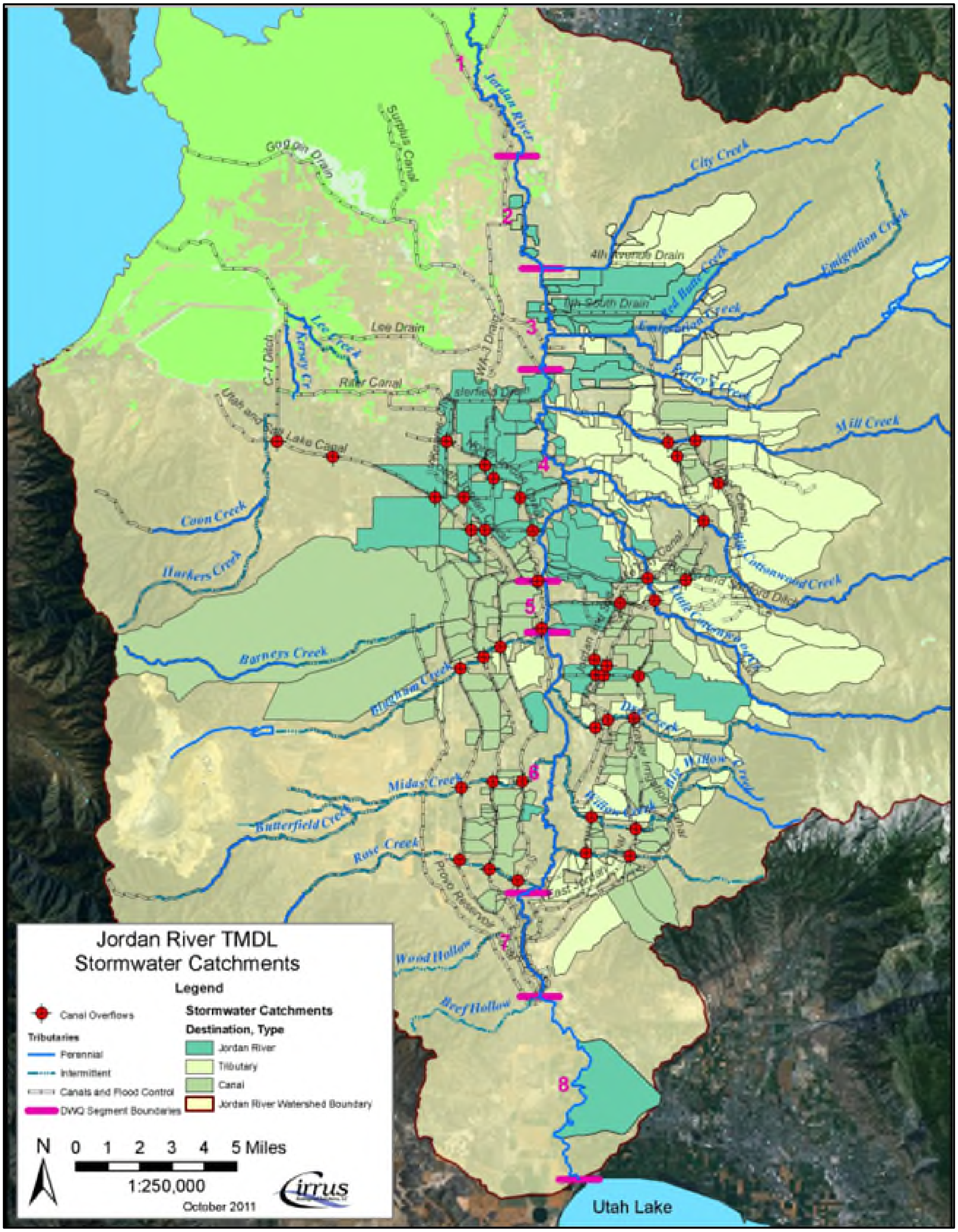

Figure 4-3. Jordan River DO TMDL stormwater catchment areas in Salt Lake County.
Source: (Cirrus Ecological Solutions [2011], as cited in Cirrus Ecological Solutions and Stantec Consulting Inc. [2013]).

4.3.1.3 PUBLICLY OWNED TREATMENT WORKS

Wastewater containing multiple types of water quality pollutants (Table 4-4) originates from residential and commercial sources in Salt Lake County and is conveyed to POTWs, which treat the pollutants prior to discharging treated effluent to the Jordan River system in compliance with UPDES permits. Four POTWs discharge treated effluent to the Jordan River: the Salt Lake City water reclamation facility (WRF), Central Valley WRF, Jordan Basin WRF, and South Valley WRF (see Figure 3-12 in Section 3.3.5). The South Davis POTW also discharges to the Jordan River but is just outside of the Salt Lake County boundary. These facilities discharge water that meets the permitted UPDES limits and TMDL WLAs.

Common sources and impacts of wastewater to surface waters are summarized in Table 4-4.

Table 4-4. Sources and Impacts of Wastewater on Pollutants of Concern

Pollutant	Pollutant Sources	Impact on Water Quality
E. coli	Human waste from sanitary sewer overflows, leaking infrastructure, and treatment bypasses	Elevated bacterial levels, health risks, recreational use impairment
DO	OM and BOD from untreated or partially treated sewage	Increased microbial respiration reduces DO causing stress or death to aquatic life
OM	Human waste, food waste, kitchen discharges, and biological material in wastewater effluent	Contributes to both acute and chronic DO depletion; affects microbial activity and SOD
Temperature	Effluent discharges from treatment plants (especially during warm seasons)	Raises stream temperatures; decreases DO solubility; stresses aquatic ecosystems
Metals	Industrial wastewater, corroded pipes, and plumbing fixtures	Toxic to aquatic life even at low concentrations; bioaccumulation concerns
Nutrients	Nitrogen and phosphorus from human waste, detergents, and industrial discharges	Eutrophication; algal blooms; further oxygen depletion
TDS	Salts, minerals, and chemicals from household and industrial wastewater, including softeners and cleaners	Alters water clarity and conductivity; affects aquatic habitat quality and drinking water treatment processes

Note: All POTWs operate under UPDES permits that outline pollutant limits for effluent water. These facilities meet limits set in UPDES permits and TMDL WLAs.

For the four POTWs in Salt Lake County, *E. coli* limits are included in their individual UPDES permits and are set at 126 most probable number (MPN)/100 mL as a maximum monthly average and 157 MPN/100 mL as a weekly maximum average, which is below the *E. coli* water quality criteria for the Jordan River and tributaries (UDWQ 2023a). These POTWs during the fall season dominate the flow in the Jordan River, representing approximately 69% of the total flows (Cirrus Ecological Solutions 2020).

4.3.1.4 UNPERMITTED POINT SOURCES

Unpermitted point sources in a watershed refer to identifiable sources of pollution that discharge contaminants directly into waterbodies without the required regulatory approval or oversight, often in violation of environmental laws. These sources can include illegal pipe discharges from industrial facilities, unauthorized wastewater outflows from residential or commercial properties, or accidental spills from construction sites or storage tanks. These unpermitted point sources can introduce harmful substances such as heavy metals, nutrients, pathogens, or chemicals into rivers, streams, and lakes, degrading water quality and harming aquatic ecosystems. Unpermitted discharges to waters of the state are episodic and addressed on a case-by-case basis through spill response and enforcement. Unpermitted discharges can be reported to the UDWQ Spills Line, where they will be addressed as best as possible by UDWQ staff and partners. It is important to note that accidental spills from construction sites or storage tanks occasionally occur within permitted facilities. These are managed under stormwater or hazardous materials programs and not as unpermitted routine discharges.

To effectively address the risks posed by unpermitted point source discharges and accidental spills, regulatory frameworks and local ordinances play a crucial role in protecting water resources. To safeguard local groundwater resources, Salt Lake City implemented the Groundwater Source Protection Zoning Ordinance (21A.34.060), whereas Salt Lake County enacted its own ordinance (9.25) to extend protections beyond city limits. These regulations are designed to minimize the risk of contamination from chemical spills or pollutant discharges that could infiltrate the soil and compromise drinking water supplies. The ordinances emphasize pollution prevention, containment strategies, and the use of BMPs. Businesses operating within designated source protection areas are regulated if they handle specific chemicals in quantities that pose a potential risk to groundwater quality (Salt Lake City 2025).

4.3.2 Nonpoint Sources

Nonpoint source pollution comes from diffuse sources in the watershed rather than a single source. Nonpoint source pollution enters waterbodies through surface water runoff such as rainfall or snowmelt or is deposited directly into streams.

4.3.2.1 URBAN

Impervious Surfaces

Impervious surfaces, such as roads, parking lots, and buildings, can significantly impact water quality. These surfaces prevent water from naturally infiltrating into the ground, leading to increased runoff. This runoff carries pollutants into waterbodies, degrading water quality. Additionally, the increased volume and speed of runoff can contribute to erosion and sedimentation in waterways, further impacting aquatic ecosystems.

In Salt Lake County, 71% of the land falls into the < 1% impervious category, meaning these areas have very low levels of development and predominantly natural land cover (Table 4-5, Figure 4-4). Conversely, the highest percentage of impervious surfaces (> 50%), accounting for 15% of the county, is primarily in the middle of the county, adjacent to major highways such as I-15 and I-215 and the Jordan River. The high density of impervious surfaces surrounding the Jordan River and its tributaries just before they converge with the Jordan River increases the likelihood of runoff degrading and polluting waterbodies.

Table 4-5. Impervious Surfaces in Salt Lake County

Percent Impervious	Impervious Area (acres)	Percentage of Salt Lake County (%)
< 1%	365,475	71%
1%–19%	21,038	4%
20%–49%	48,415	9%
50%–79%	54,001	10%
80%–100%	26,381	5%

Source: National Land Cover Database (2025).

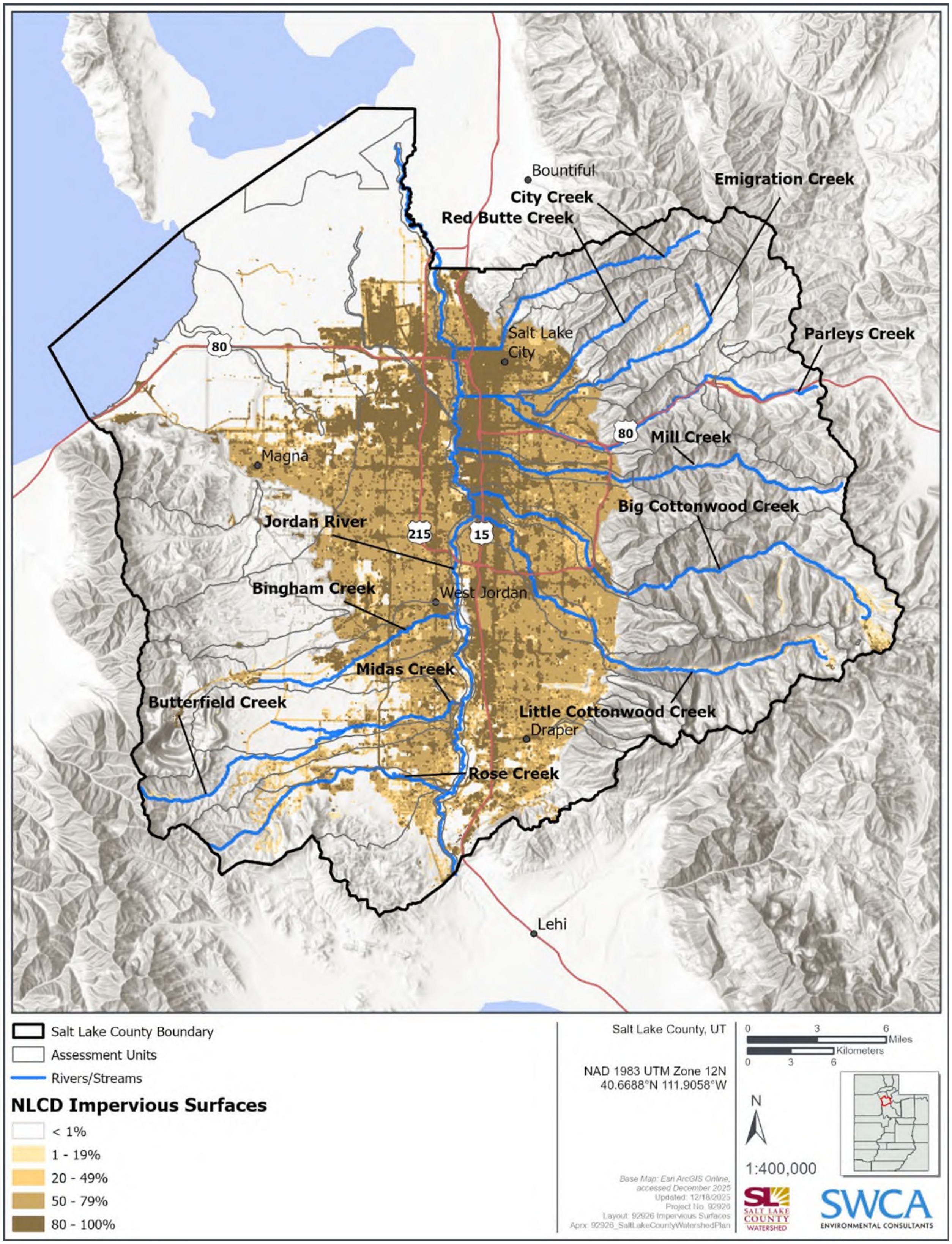

Figure 4-4. Impervious surfaces in Salt Lake County.

Road Salts

In the county, road salts, specifically sodium chloride (NaCl), are commonly used for deicing roads and parking lots during the winter. Road salts dissolve into snowmelt and stormwater runoff, eventually entering waterways like rivers, streams, and lakes (EPA 2024). This leads to elevated TDS and chloride concentrations in both surface water and groundwater. Elevated TDS and chloride concentrations can be harmful to freshwater organisms, impacting growth, reproduction, and overall biodiversity. When road salt runoff infiltrates into groundwater, it can contaminate groundwater drinking water sources. The application of road salts is predominantly on impervious surfaces, as indicated in the Figure 4-4. Higher concentrations are typically applied in the valley, covering residential, commercial, and industrial areas, as well as roadways and highways. During winter, road salts are also heavily used in the Wasatch Range, including in Emigration Canyon, Parleys Canyon, to the winter gate in Mill Creek Canyon (approximately 5 miles up the canyon), and Little and Big Cottonwood Canyons.

Fertilizer Use

Fertilizers used in urban settings, which contain nitrogen and phosphorus, are prone to being carried in runoff into nearby rivers and lakes during rain events, contributing to nutrient pollution (EPA 2024). This runoff can trigger eutrophication, a process leading to excessive algae growth in waterbodies. Such overgrowth can result in HABs that deplete oxygen levels in the water, negatively impacting fish and other aquatic life while creating potentially hazardous conditions for pets and recreators. Moreover, the high concentration of nutrients from fertilizers can contaminate drinking water sources, posing health risks to humans and animals. Although local levels remain generally low relative to drinking water standards, nitrate contamination can be particularly concerning as it can cause methemoglobinemia, or "blue baby syndrome," in infants (EPA 2024). Urban landscapes, characterized by impervious surfaces such as roads and pavements, further exacerbate the problem by increasing the rate and volume of runoff, facilitating the transport of fertilizers into waterbodies. Residential, commercial, and institutional properties with grass and other vegetation using fertilizers are predominantly located in the valley surrounding the Jordan River and its tributaries after they exit their associated canyons (see Figure 3-6 in Section 3.2.1). Additionally, low-density residential areas in Emigration Canyon and Little and Big Cottonwood Canyon could contribute to fertilizer runoff; however, fertilizer use in these areas is limited compared to valley urban lawns and commercial landscapes. Fertilizer use from agriculture is discussed in Section 4.3.2.2.

Fertilizer runoff is regulated in part through individual MS4 permits. The Salt Lake County MS4 permit requires that standard operating procedures address the proper application, storage, and disposal of fertilizer, pesticides, and herbicides to protect water quality. The Salt Lake County MS4 permit also outlines potential education and outreach topics, one of which being fertilizer use (UDWQ 2025a).

Pet Waste

Pet waste in urban settings can significantly impact water quality through various mechanisms. Like fertilizers, pet waste contains nutrients such as nitrogen and phosphorus, which, when transported into waterbodies via stormwater runoff, contribute to nutrient pollution (Salt Lake County Stormwater Coalition 2025). This can lead to eutrophication and HABs, which deplete oxygen levels in the water, harming aquatic life. Additionally, pet waste is a source of pathogens, including bacteria like *E. coli* (UDWQ 2023a). As pet waste decomposes, it consumes oxygen, further reducing the levels available for aquatic organisms and exacerbating the effects of nutrient pollution. The OM in pet waste can also increase water turbidity, reducing light penetration and affecting photosynthesis in aquatic plants, reducing DO. Due to the risks to watershed and human health that pet waste presents across Salt Lake County, pets are prohibited from entering the protected watersheds of Bell, Big Cottonwood, and Little

Cottonwood Canyons and portions of City Creek and Parleys Canyons in an effort to reduce bacteriological and nutrient pollution contribution to these waterbodies.

Urban Recreation

The Jordan River Trail is a 45-mile multiple-use trail that parallels the Jordan River through much of the Salt Lake Valley (Jordan River Commission 2022). This trail links urban fishing ponds, playgrounds, picnic areas, shopping areas, and neighborhoods, attracting substantial walking and biking traffic, as well as horse traffic on segments that allow for it. Additionally, trail networks and parks are established along some of the tributaries to the Jordan River in the valley, further extending recreational use.

Recreational activities along these trails can lead to pollution from litter and waste, as users may leave behind plastic bottles, food wrappers, and other debris, degrading water quality. Improper disposal of human waste can result in nutrient (nitrogen and phosphorus), *E. coli*, and OM loading, potentially causing algal blooms that deplete oxygen levels and harm aquatic life. Erosion and sedimentation may result from nearby trails and recreation access to the streams, as activities like wading and fishing and vegetation trampling from pets and humans can disturb the soil and increase sedimentation in the river.

Unhoused Populations

Over the past decade, there has been a significant increase in the number of homeless camps along areas of the Jordan River and its tributaries (Jordan River Commission 2022). Besides being illegal in most locations, camping along the river has negative impacts on water quality. Human waste is often left behind or dumped directly into the river, contributing to nutrient and OM loading and potentially causing algal blooms that deplete oxygen levels. Moreover, the presence of human waste can lead to increased levels of pathogens, such as *E. coli*, posing significant health risks to both humans and wildlife (UDWQ 2023a).

It is challenging to quantify the number of unhoused individuals living along the river because that number is continuously changing and dependent on the season (Jordan River Commission 2022). The time of year with the highest numbers of unhoused along the waterways coincides with the recreation season months when the *E. coli* standard applies, so it is likely that there is some human contribution to the *E. coli* loading (UDWQ 2023a). Additionally, the presence of these camps can lead to increased litter and debris, further degrading water quality. Erosion and sedimentation may also be exacerbated by the establishment of makeshift shelters and paths, which disturb the soil and contribute to sedimentation in the river.

4.3.2.2 AGRICULTURAL

Agricultural activities, including dairy farming, livestock and poultry raising, and crop production, can contribute various pollutants to waterways (EPA 2025c). These pollutants include *E. coli*, OM, TDS, metals, and nutrients such as nitrogen and phosphorus. They enter waterways through several pathways: direct deposition of fecal matter from farm animals standing or swimming in surface waters, the use of fertilizers, and runoff from farm-animal waste in pastures and corrals adjacent to surface waters. Given the limited agricultural lands in Salt Lake County (approximately 5.5% of land area), TDS and metal contributions from agriculture are limited across the county, with TDS contributions being linked to irrigation return flows rather than farm/animal operations. Pesticides that can contain pollutants such as copper are a major pollutant in agricultural runoff; however, monitoring data do not indicate that agricultural operations are a significant source of metal pollution in Salt Lake County. Fertilizer runoff, which contains nitrates and phosphates, can lead to eutrophication, causing excessive algae growth and low oxygen levels, which can be toxic to fish and other aquatic life (EPA 2025c).

Agricultural discharges are classified as nonpoint sources unless regulated under the Concentrated Animal Feeding Operations program (UDWQ 2023a). In Utah, applying manure to land is a common practice that, when done correctly and at the right time, provides a cost-effective fertilizer for producers. However, if fields are frozen, improperly sloped, saturated, or if manure is applied before rainfall, *E. coli*, TDS, and nutrients can enter surface waters and degrade water quality. In the Jordan River watershed, there are no permitted animal feeding operations or concentrated animal feeding operations, and according to the UDAF, manure land application is not occurring in Salt Lake County (UDWQ 2023a). Although agriculture represents a smaller portion of total land use in the county (5.5%), it may still contribute to nonpoint source pollution, including nutrient loading and bacterial contamination such as *E. coli*, particularly where livestock are present. An overview of the spatial distribution of land uses in Salt Lake County can be found in Figure 3-6 in Section 3.2.1. Row crops are mainly found in the south and west sides of the Jordan River watershed, with small patches of pasture/hay scattered throughout the valley.

4.3.2.3 UPPER WATERSHED AND CANYONS

Abandoned Mines

Some watersheds within Salt Lake County, such as Big and Little Cottonwood Canyons, have a rich history of mining activities dating back to the late 1800s; mining operations in Big and Little Cottonwood Canyons ceased in 1961 and 1930, respectively (Glauser n.d. [2018]; Shepherd Miller 2002; Unified Police Greater Salt Lake 2025). This legacy has resulted in more than 1,000 historic mine features across the region (Salt Lake County 2024), with most centralized in the middle of Big Cottonwood Canyon (between Mineral and Butler Forks) and upper Little Cottonwood Canyon near Alta Ski Resort (Salt Lake County 2024). Extraction and processing of minerals such as gold, silver, copper, zinc, and lead have left behind contaminated sites and waste rock or overburden piles, which remain the primary source of metal pollution to Big and Little Cottonwood Creeks.

Metal impairments are localized to Parleys and Big and Little Cottonwood Canyons (see Section 4.4.4). Surface runoff and erosion from abandoned mine sites and waste rock or overburden piles can transport metals, including arsenic, cadmium, copper, lead, selenium, and zinc, into waterbodies, affecting water quality and aquatic ecosystems. However, not all of these metals reach impairment-level concentrations in each canyon. Historic mine sites and areas of acid mine drainage are significant contributors to ongoing metal pollution. Acid mine drainage occurs when sulfide minerals in exposed rock react with water and oxygen to produce sulfuric acid, which mobilizes metals and carries them into streams. This process can occur where water flows through legacy mine adits (Figure 4-5). Management efforts should prioritize areas with active runoff and exposed tailings as these locations are most likely to contribute to elevated metal concentrations and observed impairments detailed in the 2024 Integrated Report.

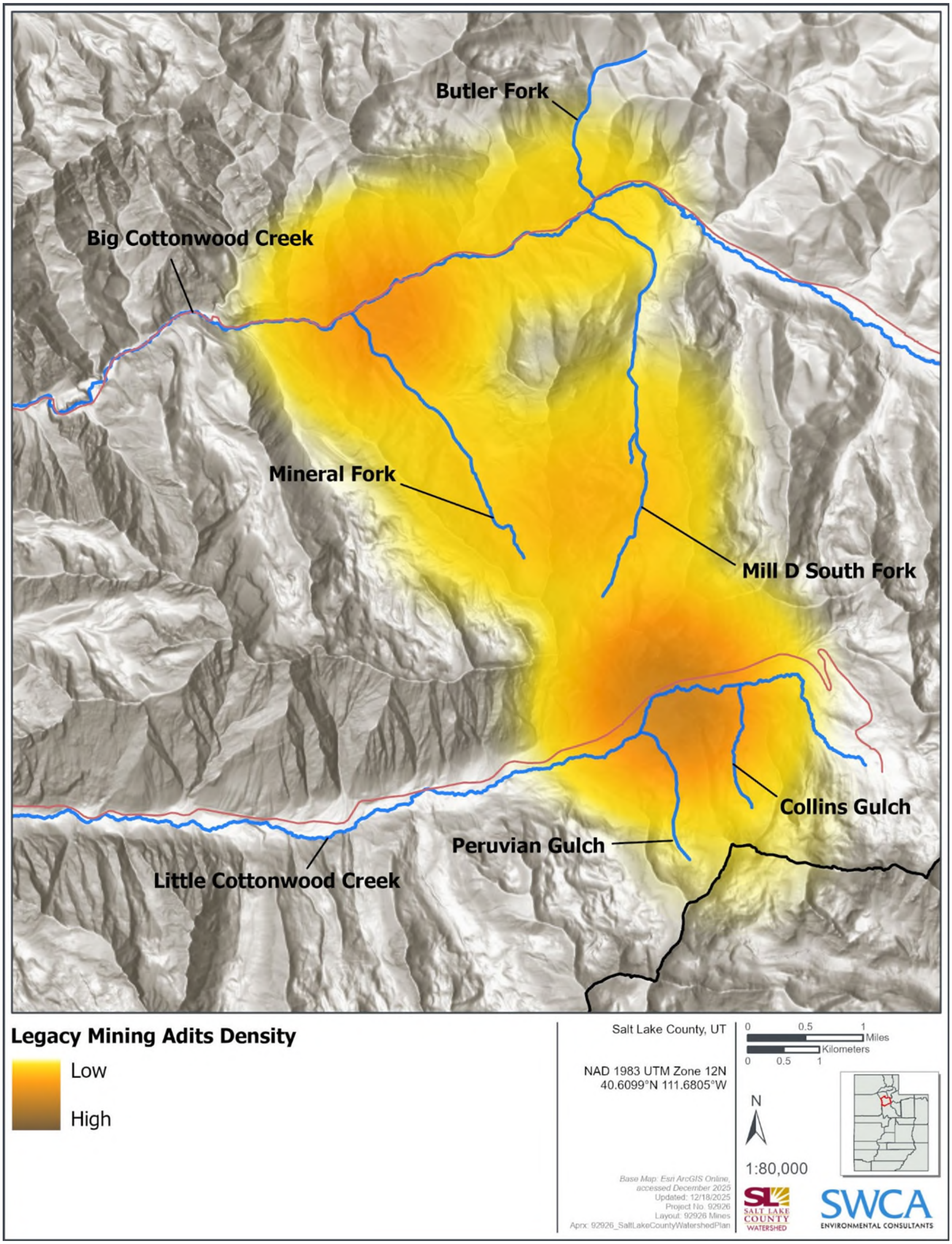

Figure 4-5. Density of mine adits within Big and Little Cottonwood Canyons.

Recreation

The Wasatch Range, which runs along the east side of Salt Lake County, serves as a popular recreational area year-round, offering skiing, hiking, camping, and biking opportunities (Salt Lake County 2025c). This range features trails, ski resorts, campgrounds, and parking lots situated along and/or near streams and mountain lakes, attracting visitors who enjoy the natural beauty and outdoor activities (see Section 3.2.5 for more details). Restroom facilities are located at many of the trailheads, but a percentage of the recreators are likely leaving solid human waste along the trail adjacent to creeks. Some of these restrooms are also only open during the recreation season (May through October), even though many of these areas are used year-round. According to Salt Lake County (2025e), four out of ten households with dogs report that individuals in their household do not pick up pet waste while recreating in the Wasatch Range. This suggests that approximately 40% of people recreating are not properly disposing of human and pet waste, which can lead to *E. coli*, nutrient, and OM loading to nearby streams (Salt Lake County 2025e).

Septic Systems

Failing or improperly managed septic systems can introduce bacteria (*E. coli*) and nutrients (nitrogen and phosphorus) into waterways. As part of the Jordan River *E. coli* TMDL, UDWQ analyzed on-site septic systems within the watershed in 2023, which is used for analysis in this watershed plan (UDWQ 2023a). Salt Lake County Assessor's office records indicate 2,296 parcels with on-site septic systems, representing 0.6% of all parcels in the county. Most (97%) are connected to sewers, delivering wastewater to treatment facilities before discharge into state waters. Table 4-6 lists the number of on-site septic systems within each impaired AU. Among impaired AUs, Parleys Canyon Creek-2 has the highest percentage (42%) of parcels with on-site septic systems. Ideally, accurate data on all on-site septic system locations would be available, but Salt Lake County records do not capture transitions from septic to sewer systems, likely leading to an overestimate in Table 4-6 (UDWQ 2023a).

Table 4-6. Parcel On-site Septic System Numbers for the Jordan River Watershed Impaired AUs

AU	Total Parcels	On-Site Systems	Percent
Big Cottonwood Creek-1	7,334	29	0.40%
Little Cottonwood Creek-1	9,200	3	0.03%
Rose Creek	12,979	260	2.00%
Midas Creek	22,540	1	0.01%
Jordan River-2	1,965	0	0%
Jordan River-3	2,223	0	0%
Jordan River-4	928	8	0.86%
Jordan River-5	2,168	1	0.05%
Parleys Canyon Creek-1	6,155	102	1.66%
Parleys Canyon Creek-2	346	146	42.20%
Mill Creek 1-SLCity	83	0	0%
Mill Creek 2-SLCity	8,223	13	0.16%
Emigration Creek Lower	2,144	12	0.60%
Red Butte Creek Lower	1,419	0	0%

Source: UDWQ (2023a).

Note: These number are based on the best data available, which are likely an overestimation.

The Salt Lake County Health Department has the authority to establish health and wellness measures for county residents. Before issuing building permits, the health department requires soil exploration tests, percolation tests, plot plans, and other items, granting approval only when Salt Lake County Health Department determines no negative impact on public health or the environment. UAC R-317-4 outlines requirements for proper system function, including setback distances between septic systems and critical water resources. UDWQ issues basic operating permits for large underground wastewater disposal systems (LUWDS), which typically include a building sewer, septic tank, and subsurface disposal system, with daily flows of 5,000 to 15,000 gallons or more. LUWDS function effectively when maintained and not overused. Four LUWDS were identified in the Jordan River watershed (UDWQ 2023a): three in Herriman City associated with Rio Tinto Kennecott Copper and one for treatment in the Emigration Oaks subdivision in Emigration Canyon. All LUWDS are required to conduct at least one annual inspection and submit results to UDWQ.

4.3.2.4 WATER MANAGEMENT AND HYDROLOGIC MODIFICATION

Hydrologic modifications (like those caused by dams, diversions, and urban development) can significantly impact water quality by altering natural flow regimes. This can result in reduced summer baseflows, increased flashy runoff during precipitation, and prolonged low-velocity conditions, which can increase sediment, metals, *E. coli*, and nutrient loads and change water temperatures. The Jordan River DO TMDL also identifies SOD, reduced reaeration, and changes to channel geometry as key drivers of DO sag, which can be exacerbated by the altering of natural flow regimes. These changes can harm aquatic life, reduce drinking water quality, and affect overall ecosystem health. Water use in Salt Lake County, and the Jordan River watershed, is governed by a complex and historic network of diversions and water rights, many of which date back over a century. The UDWRi is responsible for administering these rights and overseeing associated infrastructure, including canals, diversion structures, and return flow systems. Diversion structures in Salt Lake County include the following:

- **Parleys Tunnel and Aqueduct**: This infrastructure conveys water from the Provo River system into the Salt Lake Valley, playing a crucial role in supplying municipal water.
- **Big and Little Cottonwood conduits**: These conduits transport water from Big and Little Cottonwood Creeks to Salt Lake City, serving the city's drinking water supply system.
- **Surplus Canal**: Constructed to divert excess water from the Jordan River, this canal was designed to prevent flooding in Salt Lake City by channeling surplus flows away from the main river.
- A network of irrigation canals (e.g., **North Jordan, East Jordan, South Jordan Canals**) and return flow systems that support agriculture and help manage stormwater and treated effluent.

Water rights exchange agreements exist between Salt Lake City and the agricultural community such that high-quality water is diverted from tributaries at the valley edge for culinary use and replaced with lower quality water from Utah Lake. These exchange flows are delivered to canals providing water to irrigation shareholders and not to the stream itself, so many of the perennial streams are dewatered during the irrigation season. Chronic severe dewatering of the Jordan River channel at the 2100 South diversion to the Surplus Canal vastly reduces stream velocity and allows for the settling of small sand, silt, and clays as well as substantial quantities of coarse particulate organic material.

These systems are integrated into a broader regional supply network that includes reservoirs, drinking water treatment plants, and groundwater recharge infrastructure. Together, they enable flexible water delivery for municipal, industrial, and agricultural users.

Information on diversion points, canal alignments, and flow allocations is publicly accessible through UDWRi's online platforms. Given the density and interconnectivity of diversions within the county, tools such as the Water Commissioner Allocation Tool (WCAT) are critical for visualizing and managing allocation patterns, infrastructure components, and compliance with adjudicated water rights.

The Upper Jordan River Schematic, developed by the UDWRi and accessible via the WCAT, provides a comprehensive visualization of inflows, outflows, and infrastructure along the Jordan River corridor. As shown in Figure 4-6, the schematic maps tributary streams (e.g., Mill Creek, Big and Little Cottonwood Creeks, Bingham Creek, Midas Creek, and Rose Creek), along with major above-ground and below-ground diversions, return flow locations, and pump stations such as the Daybreak Pump and Saratoga Springs Pump Station. The map illustrates how water enters the Jordan River from Utah Lake, is diverted through multiple canals (e.g., North Jordan, South Jordan, Utah and Salt Lake Canal), and is reintroduced via return flows or infrastructure like the South Valley Jordan Reclamation Facility. This managed network demonstrates the high level of hydrologic manipulation within the watershed and emphasizes the importance of coordinated water allocation and reuse.

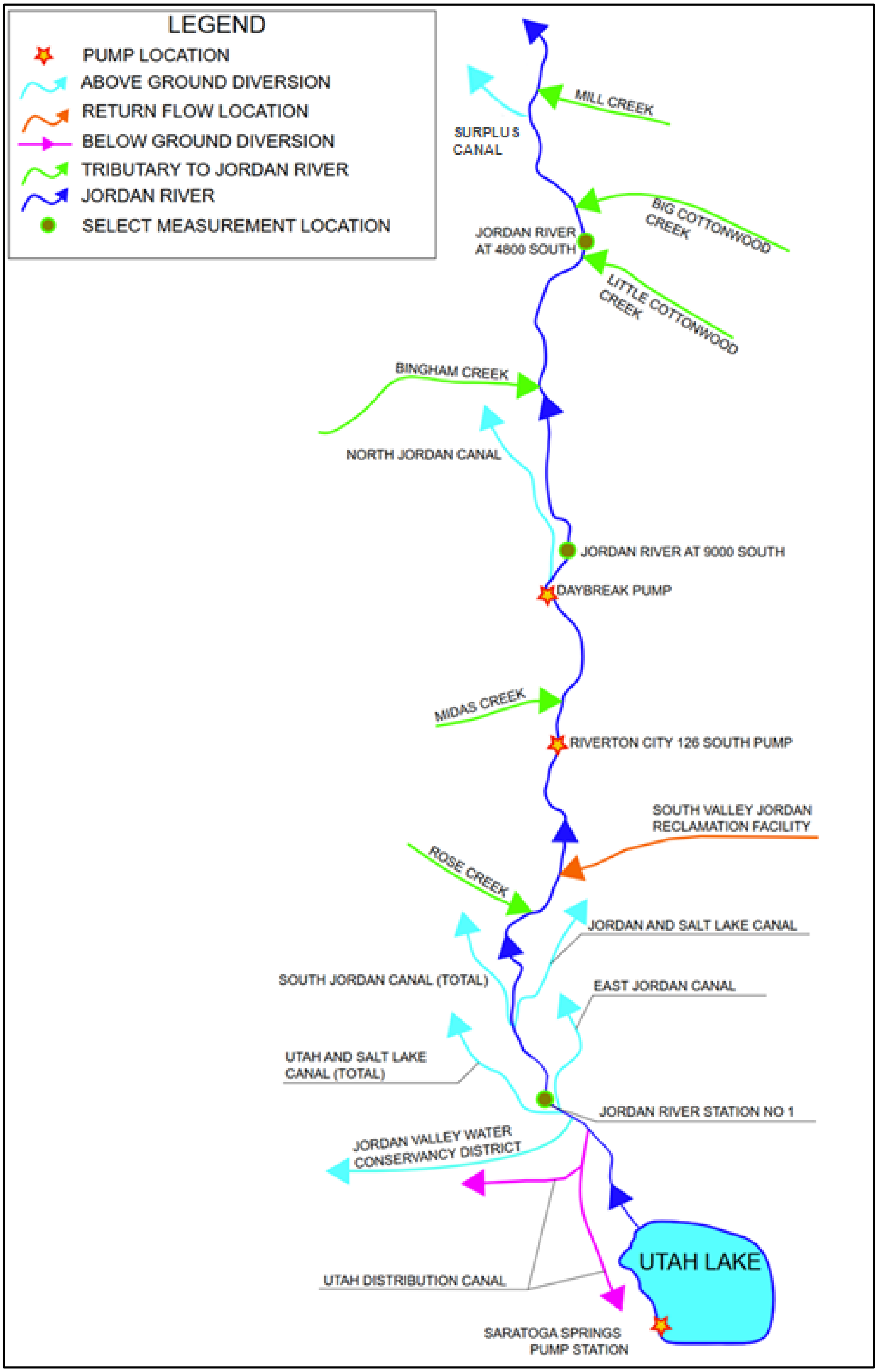

Figure 4-6. Diversions and inputs along the Jordan River from Utah Lake to Great Salt Lake. Modified from the WCAT to add the Surplus Canal.

Irrigation and Canal Systems

The sources of flow from irrigation and canal systems vary seasonally, with canal return flows typically increasing during the irrigation season. In the summer and fall, effluent from wastewater treatment plants typically dominates flow, and releases from Utah Lake influence the river at other times. Flows from these different sources affect pollutant patterns and therefore implementation focus areas within Salt Lake County.

One driver of higher concentrations of *E. coli* during the recreation season (May through October) could be lower instream flows and higher temperatures (see Section 4.4.1). The recreation season coincides with the irrigation season. During the irrigation season, water is diverted from the stream channels to canals and ditches, where water is used for flood irrigation. Water travels back to the streams through canals in the form of stormwater runoff and irrigation return flows (UDWQ 2023a). As water travels to the stream, it can transport *E. coli* and other contaminants such as sediment (TDS), nutrients, herbicides, and pesticides into the receiving stream. Low-flow conditions and long residence time associated with irrigation return flows lead to increased evaporation rates, in turn increasing pollutant concentrations in irrigation return flows. Unlike MS4s, irrigation return flows are unregulated and unpermitted and, as a result, the extent of their contributions of various pollutants is more difficult to determine than permitted sources such as stormwater effluent.

A follow-up study to the Jordan River DO TMDL used a Bayesian Simple Linear Mixing model to analyze the contributions of various water sources, Utah Lake, groundwater, tributaries, effluent, and canal return flow, to different reaches of the Jordan River (Cirrus Ecological Solutions 2020). The model revealed spatial and temporal variations in water source contributions over an annual cycle. For this model analysis, the Jordan River was subdivided into nine reaches between Utah Lake and Redwood Road. Reach boundaries were generally established within approximately 1 kilometer (km) upstream or downstream of major water regulation features, with additional breaks placed at Willow Park, located approximately 5 km below Utah Lake, and at the 2100 South diversion. The final reach extends from the 2100 diversion to Redwood Road (Cirrus Ecological Solutions 2020). Upstream to downstream, these reaches and associated river km are as follows: Reach 1 (river km 0–5), Reach 2 (river km 5–21), Reach 3 (river km 21–23), Reach 4 (river km 23–36), Reach 5 (river km 36–38), Reach 6 (river km 38–49), Reach 7 (river km 49–51), Reach 8 (river km 51), and Reach 9 (river km 51–64) (Cirrus Ecological Solutions 2020).

Key findings are displayed in Figure 4-7 and include the following:

- **Spring season**: Utah Lake was the primary contributor (> 65%) upstream of river km 21 but decreased to 3% to 12% after river km 38 (Reach 6). Groundwater contributed 21% to 35% upstream of river km 21, increasing downstream with tributary inputs.
- **Summer season**: Utah Lake remained the dominant source (49%–74%) upstream of river km 36, but effluent became the main contributor (49%) below river km 38. Canal inputs accounted for up to half of the flow from river km 49 downstream.
- **Fall season**: Utah Lake's contribution dropped to 5% to 12% upstream of river km 38. Groundwater and tributaries became the largest contributors (> 60%) through river km 36 and downstream. Effluent dominated flow in river km 38 through 53 (50%–69%).

The follow-up study also found that water quality varied with significant spatial variability in DO saturation, particularly in the summer. DO saturation decreased downstream of the Surplus Canal, coinciding with decreased Utah Lake contributions and increased groundwater inputs. Elevated summer water temperatures were linked to effluent, canal, and tributary inputs, with effluent being a major nutrient source. The study also found that changes in flow reduced instream DO (Cirrus Ecological Solutions 2020).

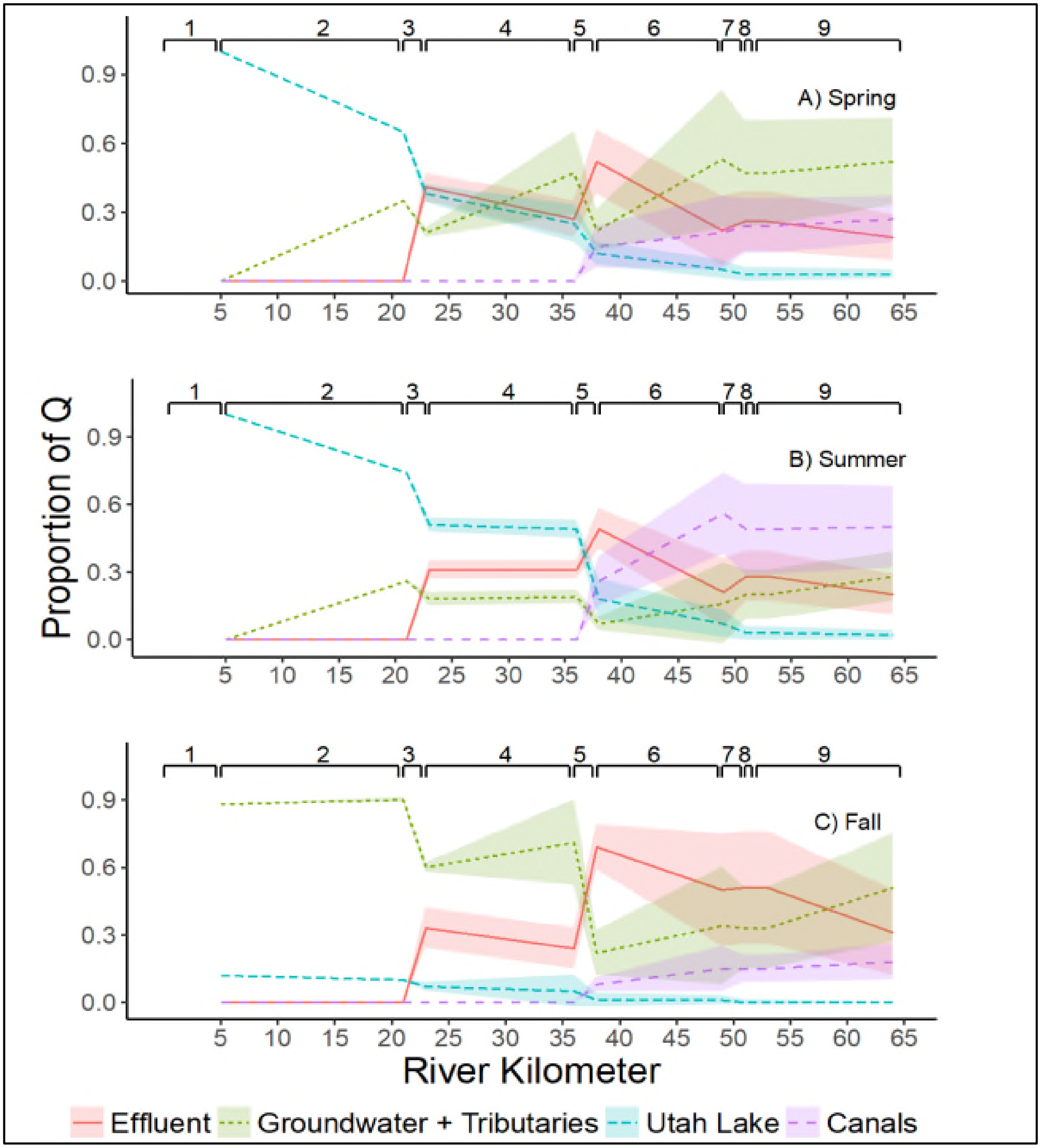

Figure 4-7. Proportion of river water attributed to different water sources along the Jordan River from downstream (Reach 1) to upstream (Reach 9).

Note: Q = total river water volume. Shading indicates the standard deviation of estimated proportion for each water source.

Source: Follstad Shah, Jameel, et al. (2019).

Surplus Canal

Data presented in Table 4-7 and Figure 4-8 highlight the considerable impact of the Surplus Canal as a diversion point on the Jordan River's flow dynamics. The canal's role in diverting water is evident in the significant reduction in average discharge observed below it, particularly during the spring months. For instance, March and May exhibit relative percent differences exceeding 100%, highlighting the substantial loss of flow to the Jordan River downstream of the canal. This diversion not only affects the quantity of water but also has broader implications for water quality downstream.

The reduced flow on the Jordan River downstream of the Surplus Canal can exacerbate water quality impairments, as lower water volumes may concentrate pollutants and reduce the river's ability to dilute contaminants. This situation can lead to increased levels of nutrients, sediments, and other pollutants, contributing to water quality issues such as eutrophication and habitat degradation. The data emphasize the need for careful management of the Surplus Canal's operations to balance water diversion with maintaining adequate flow levels to support ecological health and water quality in the Jordan River downstream.

Table 4-7. Monthly Average Discharge and Relative Percent Difference for Sites Above and Below the Surplus Canal on the Jordan River

Month	Average Discharge (cfs) above Surplus Canal*	Average Discharge (cfs) below Surplus Canal	Relative Percent Difference (%)
January	152.3	124.8	19.9%
February	273.3	132.3	69.5%
March	360.0	64.6	139.1%
April	360.9	98.1	114.5%
May	444.5	91.6	131.6%
June	493.4	123.23	120.5%
July	182.3	146.7	21.6%
August	178.14	146.1	19.7%
September	181.4	151.0	18.3%
October	166.7	132.67	22.8%
November	144.5	113.0	24.5%
December	142.4	114.9	21.3%

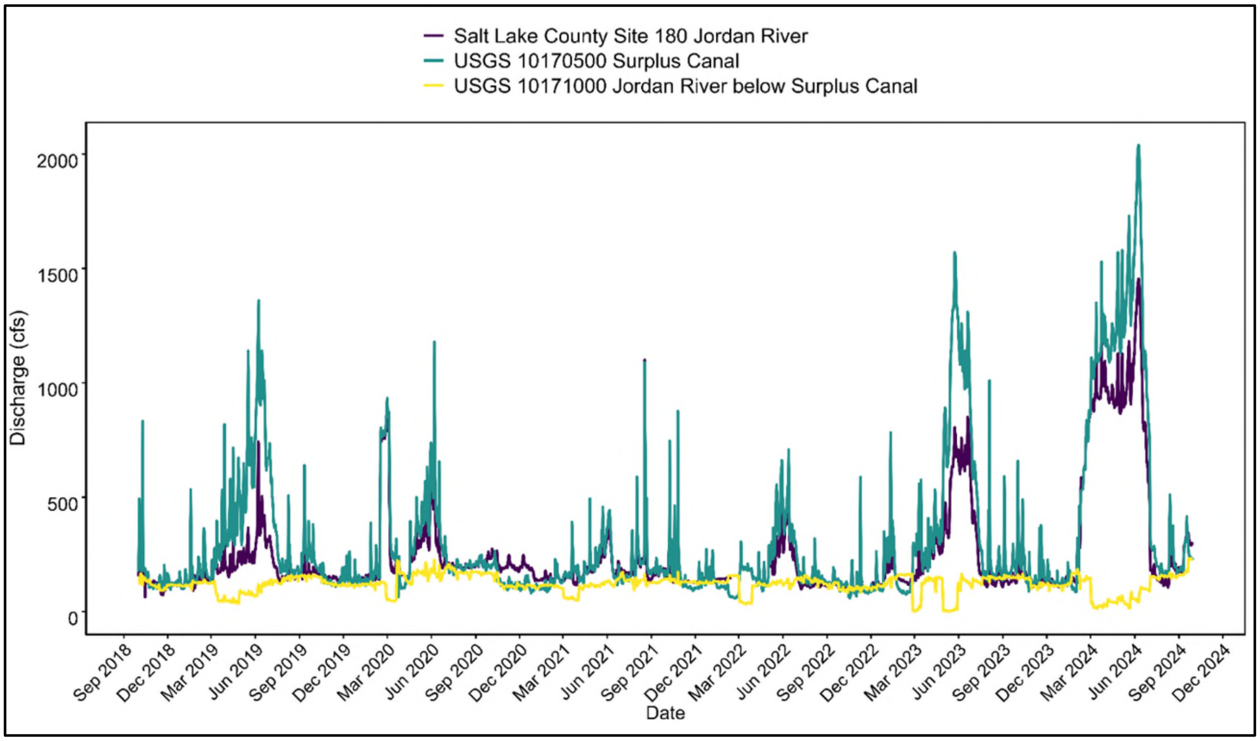

Figure 4-8. Flow from above and below Surplus Canal.

Note: Salt Lake County Site 180 Jordan River is above the Surplus Canal, just above the confluence of Big Cottonwood Creek.

Utah Lake

Utah Lake is a large, shallow freshwater lake located in Utah County and serves as a key hydrologic feature in the Utah Valley. It is the largest natural freshwater lake in the state and plays an important role in regional water supply, recreation, and ecological function. The lake receives inflows from several tributaries, including the Provo, Spanish Fork, and American Fork Rivers, and discharges to the Jordan River at its northern outlet.

During the spring and summer months, Utah Lake is the single largest source of flow to the Jordan River, representing more than 65% of the flows (Cirrus Ecological Solutions 2020). Because Utah Lake serves as the primary source of the Jordan River, its outflows significantly influence Jordan River water quality (Table 4-8). The lake's shallow depth and extensive surface area make it susceptible to nutrient accumulation, particularly phosphorus, which can lead to HABs.

Table 4-8. Utah Lake Sources of Pollutant

Pollutant	Source from Utah Lake
E. coli	Upstream loading from Utah Lake due to urban runoff, agricultural inputs, or recreation
DO	High OM and nutrient loads from Utah Lake outflow
OM	Detritus, algae, and decomposing plant material in Utah Lake water
Temperature	Warm water discharges from Utah Lake, particularly during summer months
Metals	Legacy contaminants in Utah Lake sediments or inputs from tributaries
Nutrients	Phosphorus and nitrogen from agricultural runoff and urban sources feeding Utah Lake and legacy contaminants in Utah Lake sediments
TDS	Mineral content and salts accumulated in Utah Lake water and sediments

The release of water from Utah Lake into the Jordan River is regulated to manage lake levels and prevent flooding. When Utah Lake reaches its "compromise elevation" of 4,489 feet, releases are initiated to maintain this level, resulting in increased flows in the Jordan River (Utah Lake Authority 2025). These releases can carry accumulated nutrients and OM into the Jordan River, specifically into the upper reaches, which may not settle out until after the Surplus Canal Diversion. See Section 4.4.2.2 for estimates of Utah Lake contributions of OM to the Jordan River.

4.3.2.5 STREAM EROSION AND STABILITY

As development and urbanization put stresses on stream ecosystems, streambank erosion can accelerate beyond the norm. Stream erosion impacts water quality by introducing sediment, nutrients, and other pollutants into waterways. Stable streambanks, often achieved through vegetation and engineered structures, reduce erosion and sediment input, leading to clearer water. Conversely, unstable streambanks with excessive erosion increase turbidity and transport pollutants, like nutrients and metals, from surrounding land into the stream, further degrading water quality. Excess sediment can also settle over the streambed, impacting the habitat for aquatic organism and reducing oxygen levels through increased sediment oxygen demand (SOD) and reduced hyporheic exchange.

Salt Lake County conducted a stream stability analysis of perennial streams between 2015 and 2018 using the Modified Pfankuch Stability method as adapted by Rosgen. The objective of this analysis was to evaluate lateral and vertical stability of perennial stream reaches across the county to support restoration planning and long-term watershed health tracking. The full methodology, site evaluations, and scoring criteria are detailed in the *Salt Lake County Stream Stability Analysis: 2015–2018* report (Salt Lake County 2018).

Salt Lake County conducted another stream stability assessment between 2019 and 2022 to classify reach conditions across the watershed as Good, Fair, or Poor (Figures 4-9 through 4-11) (Salt Lake County 2020). Figures 4-9 through 4-11 primarily use data from the 2019–2022 assessment. However, for certain reaches, such as those on the Jordan River where stream stability data were not collected during that period, data from 2015–2018 are presented instead. Stream reaches in upland and headwater areas, particularly along Big Cottonwood Creek, Little Cottonwood Creek, and upper Mill Creek, tend to exhibit Good stability conditions (green), corresponding to relatively intact hydrology and riparian vegetation (see Figure 4-10). In contrast, Fair (yellow) and Poor (red) conditions are concentrated in urban and transitional zones such as Taylorsville, West Valley City, and parts of West Jordan and South Jordan, where altered hydrology, infrastructure encroachment, and reduced vegetation are more common (Figure 4-11).

The 2019–2022 results are consistent with the 2015–2018 analysis, showing similar spatial patterns of instability in developed urban corridors and better conditions in less disturbed mountain reaches. This agreement reinforces the persistence of stream degradation in urban areas and highlights the following priority locations for targeted restoration and stormwater interventions:

- **Red Butte Creek and subwatershed:** The subwatershed displays higher instability overall. Stability scores are relatively Good in the upper headwaters but shift to Poor as the creek flows through the University of Utah area. Destabilization is attributed to increased impervious surfaces and residual impacts from the 2010 oil spill cleanup. G-type channels are widespread in lower segments, indicating upstream head-cut migration and altered stream profiles.
- **Emigration Creek:** Exhibits Poor stability conditions along nearly its entire length. It is the only stream in the study that is heavily developed from headwaters to outlet. Urban encroachment, yard alterations, and floodplain obstructions have contributed to sedimentation, vertical incision, and lateral erosion, resulting in degraded stream function.

- **Parleys Creek:** Shows a patchwork of conditions, with Good stability in select upper reaches but widespread Poor scores through its lower valley segments. The stream has been extensively channelized and impacted by debris transport and homeless encampments, leading to denuded banks, sediment-filled pools, and loss of riparian habitat.
- **Mill Creek, Big Cottonwood Creek, and Little Cottonwood Creek**: Upper reaches generally maintain Good stability scores. However, near developed areas, including campgrounds, trailheads, and residential zones, stream stability decreases. Contributing factors include hydrologic modification, vegetation loss, and streambank alterations. An added concern is water withdrawal, particularly in Big and Little Cottonwood Creeks, where dewatering has impaired riparian integrity and stability.
- **The Jordan River corridor**: Exhibits consistently Poor to Fair conditions, with minimal reaches classified as Good. The river has been extensively modified and channelized, with an impaired flow regime and sediment accumulation due to historical dredging and floodplain disconnection. Infrastructure built within the historic meander corridor restricts natural geomorphic processes, and prior restoration efforts have struggled to maintain stable channel profiles.
- **Bingham, Midas, Butterfield, and Rose Creeks**: Exhibit consistently Poor to Fair conditions, with minimal reaches classified as Good. This area has seen rapid development in the past 10 years with contributing factors including hydrologic modification, vegetation loss, and streambank alterations.

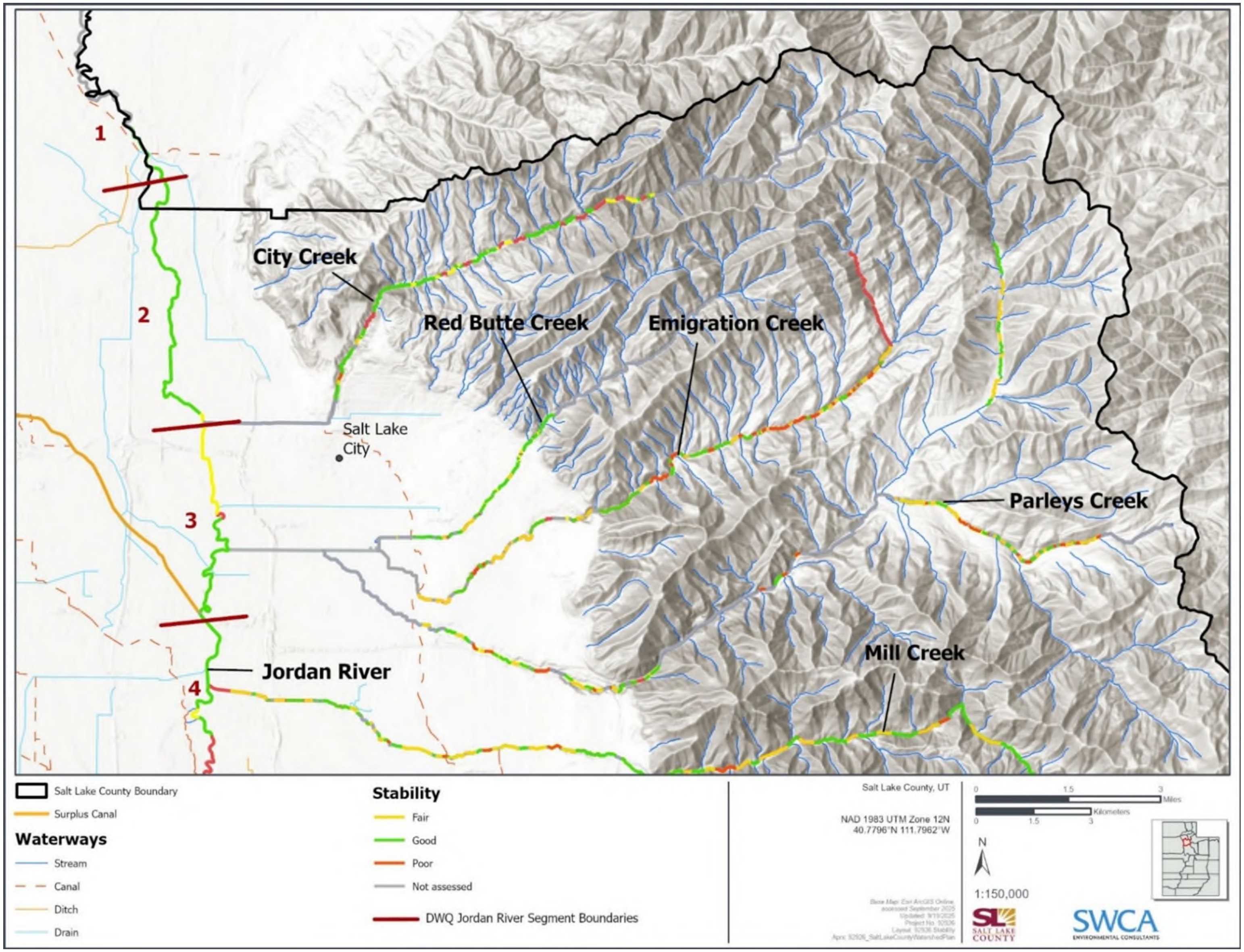

Figure 4-9. Stream stability in the Northeast Region.

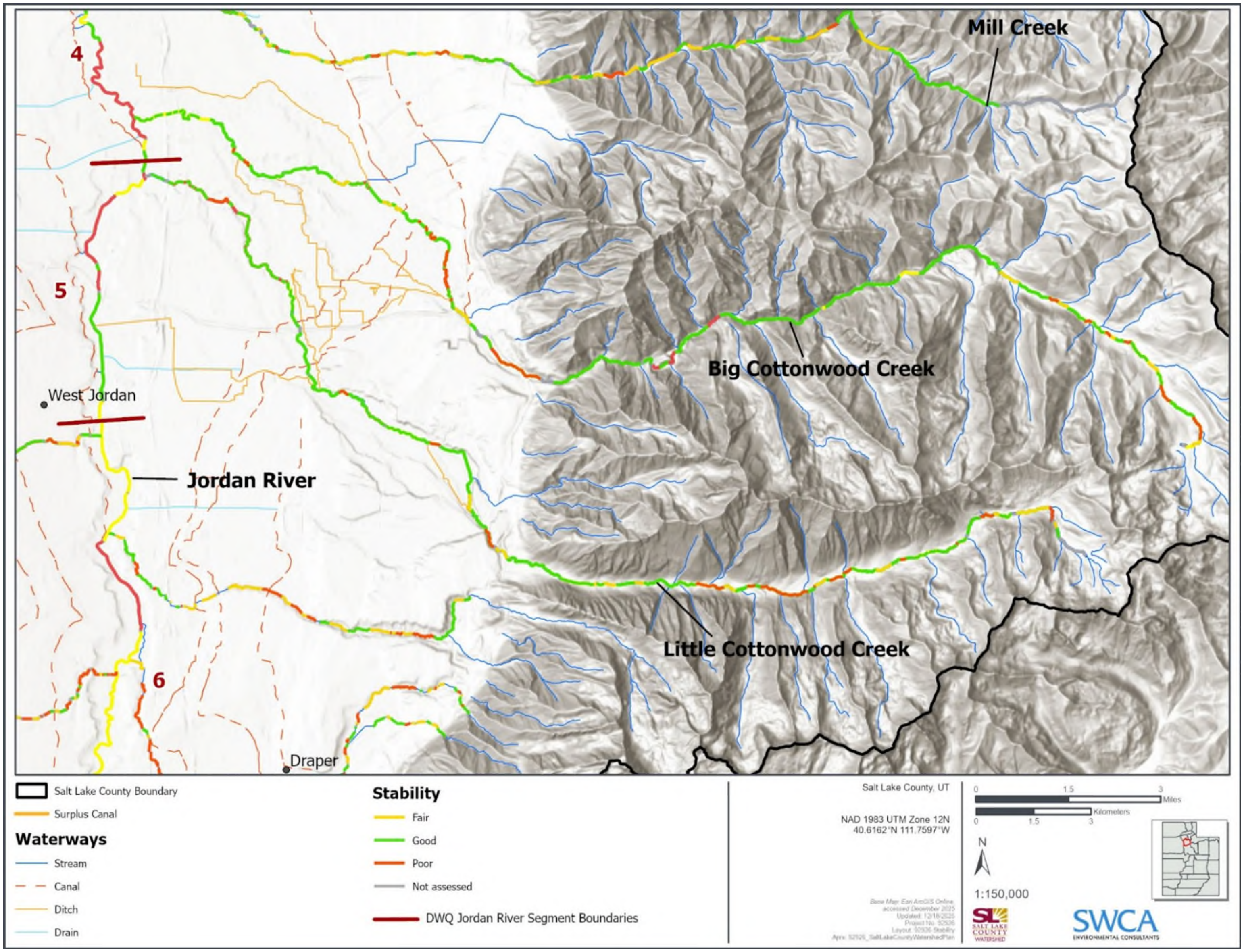

Figure 4-10. Stream stability in the Tri-Canyons Region.

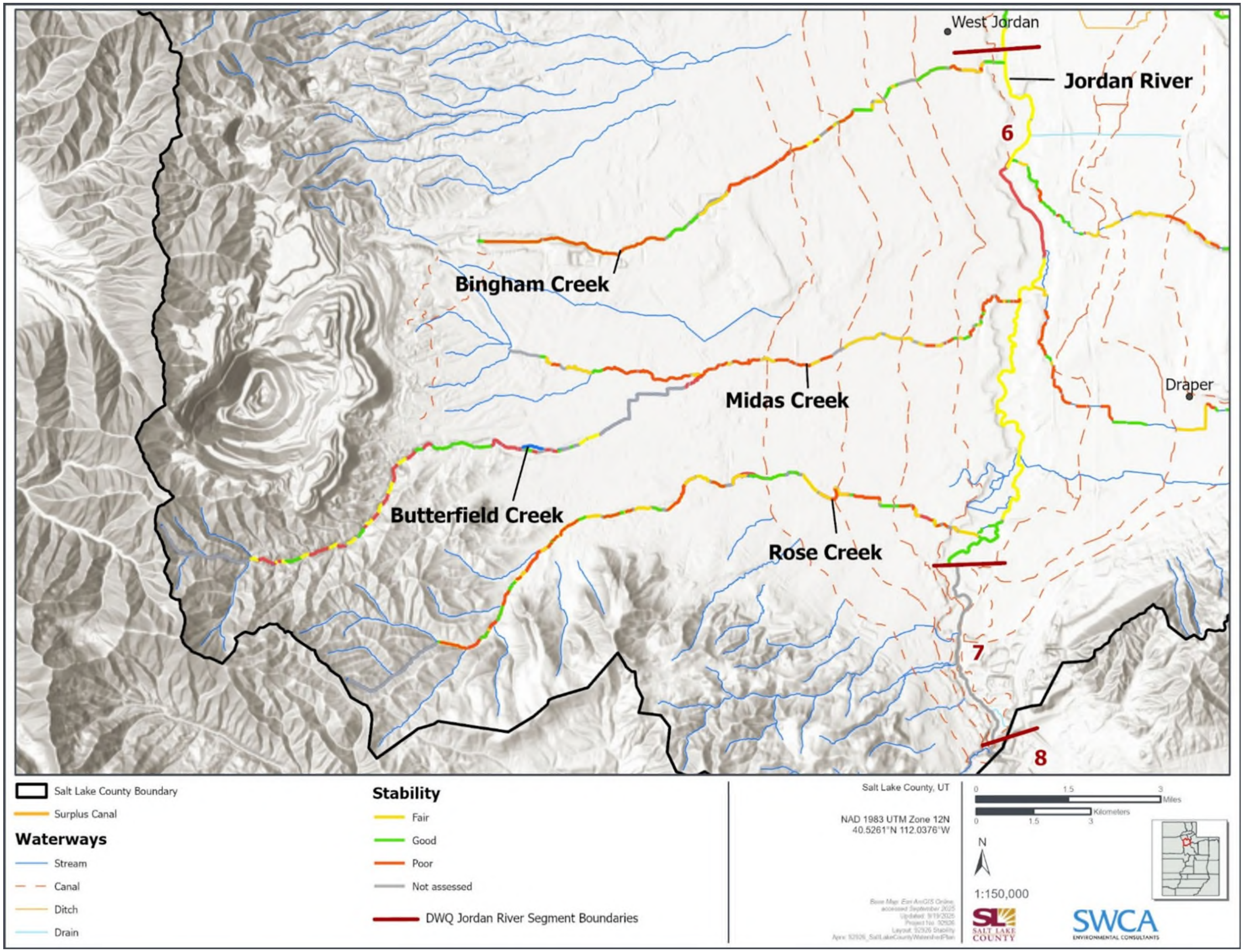

Figure 4-11. Stream stability in the Southwest Region.

4.3.2.6 OTHER NONPOINT SOURCES

Natural Background

Natural background sources of pollutants play a significant role in shaping water quality in various ecosystems. These sources include geological formations, soil erosion, and natural biological processes that release substances into waterbodies (EPA 2023). Minerals from rocks and soils can dissolve into water, introducing elements such as arsenic, lead, and mercury, which may naturally occur at levels that affect water quality. Additionally, OM from decaying vegetation and animal waste can contribute nutrients like nitrogen and phosphorus to aquatic systems. Although these nutrients are essential for aquatic life, their excess can lead to eutrophication, causing algal blooms and subsequent oxygen depletion in waterbodies. Controlling for excess concentrations from natural background sources can be difficult because actions taken to manage water quality are typically aimed at anthropogenic sources of watershed and water quality degradation; therefore, understanding the impact of natural background sources is crucial for distinguishing between anthropogenic pollution and natural contributions to water quality issues.

Additionally, climatic and environmental factors can influence the extent and impact of natural background pollutants. Seasonal variations, such as increased rainfall or snowmelt, can enhance the mobilization and transport of these pollutants into waterbodies, leading to temporary spikes in their concentrations. Similarly, natural events like wildfires can introduce significant amounts of ash and minerals into nearby water systems, affecting their chemical composition and quality.

Wildlife

Wildlife was identified as a major source of *E. coli* loading to surface waters in the Jordan River *E. coli* TMDL (UDWQ 2023a). Transport of animal waste to surface waters is dependent on animal habitat and proximity to surface waters. Contributions from high-density congregations of wildlife, such as waterfowl and wildlife, often deposit waste directly into streams or in the adjacent floodplain where it can be transported to surface waters by runoff during precipitation events. Waterfowl commonly congregate at specific park ponds or backwaters, and contributions from these high-density congregations often have greater relevance to an impairment within a specific AU than diffuse sources of *E. coli*. Diffuse landscape-level wildlife inputs from animal waste deposited in upland areas can be transported to canals, streams, and rivers, but due to the distance from uplands to surface streams, only larger precipitation events can sustain enough runoff to transport upland animal waste to surface waters.

It is estimated that there are 3,000 deer, 800 elk, and 200 moose in the Wasatch Mountains West Wildlife Management Unit, which overlaps the Jordan River watershed (UDNR 2019). Although the wildlife management unit extends well beyond the Salt Lake County boundary, and big-game species preferred habitat is forested high-elevation locations, it is probable that all of the *E. coli*–impaired AUs contain wildlife of some sort that contribute to the *E. coli* loading. Deer are plentiful in many areas in the valley bottom near the Jordan River. Waterfowl, including ducks and geese, are known to congregate in areas along the Jordan River and tributaries. The Jordan River and creeks throughout Salt Lake County provide a connected wildlife corridor in an otherwise fragmented landscape. Although wildlife is a natural source of contaminants such as *E. coli*, anthropogenic changes to wildlife habitats play a role in shaping wildlife contributions to pollutant loads. For example, established green lawns along waterways at parks allows for the congregation of waterfowl, which may contribute to localized increases in *E. coli* concentrations. Although controlling for all wildlife inputs in a watershed may not be feasible, understanding how anthropogenic activity influences wildlife activity in the watershed provides opportunities for comprehensive management of wildlife-related sources of pollution.

4.3.2.7 FUTURE SOURCES

Future water quality changes in Salt Lake County will be shaped by several key stressors, including continued urbanization, climate-driven hydrologic shifts, expanding recreation in canyon areas, and changes in irrigation return flows. For example, ongoing urban development is expected to increase impervious surfaces, resulting in greater stormwater runoff and elevated levels of nutrients, metals, and *E. coli* in local streams, potentially exacerbating existing impairments in urban waterways. Climate change may lead to altered runoff timing, reduced snowpack, and more frequent extreme events such as droughts and floods, which can intensify sediment and nutrient loading and further challenge DO levels and temperature in sensitive reaches. Increased recreation in canyon areas may contribute to localized spikes in *E. coli* and sediment, whereas changes in irrigation practices and return flows could affect nutrient and TDS concentrations downstream. By identifying these specific future stressors and their likely pollutant impacts, implementation activities (Section 5.1) can better target priority areas to address both current and emerging water quality concerns, as described in Section 4.4.

4.4 Water Quality Trends and Pollutant Loading

This section assesses the spatial and temporal trends of water quality parameters of concern within Salt Lake County. Loads and load reductions are provided for parameters with existing TMDLs, *E. coli* (Section 4.4.1.1), OM (Section 4.4.2.2), and dissolved zinc (Section 4.4.4.1).

4.4.1 Escherichia coli

Surface waters in Salt Lake County are monitored as part of Utah's waterborne pathogen program for microorganisms that originate from fecal pollution from human and animal waste. It is not feasible to monitor all pathogens in water, but by analyzing for certain indicator organisms, it is possible to assess potential health risks. Utah samples for *E. coli* concentrations in surface waters using EPA guidelines (EPA 2012). The World Health Organization and the EPA have endorsed the use of indicator organisms to assess the presence of pathogens in surface waters (World Health Organization 2001). Among these organisms, *E. coli* is the most prevalent coliform bacterium found in the intestines of humans and animals. Its presence is primarily linked to fecal contamination, serving as an indicator of recent water contamination. Common sources of waterborne pathogens, such as *E. coli*, include failing septic systems, leaking sewer lines, grazed pastures, confined feedlots, wildlife, unhoused populations, and dog parks (Benham 2006). Pathogenic bacteria can be introduced into surface waters through stormwater runoff (from rainfall or snowmelt), or direct deposition, posing a threat to human health through incidental ingestion.

In 2011, the EPA approved the TMDL for *E. coli* in the Upper Emigration Creek watershed, which aimed to address *E. coli* impairments in the Upper Emigration Creek AU. UDWQ is currently updating the Upper Emigration Creek TMDL, and it is expected to be published in early 2026 (see Section 2.3 for additional details) (UDWQ 2011). In 2023, the EPA approved the Jordan River *E. coli* TMDL, which addressed *E. coli* impairments in 14 AUs within the Jordan River watershed (Figure 4-12). Since the development of the TMDL, the 2024 Integrated Report was released, identifying five additional AUs impaired for *E. coli*, bringing the total to 20 impaired AUs within Salt Lake County (UDWQ 2024) (Table 4-1; Figure 4-12).

The Jordan River *E. coli* TMDL outlines pollutant reduction targets for *E. coli* in impaired AUs and identifies primary sources and pathways contributing to bacterial contamination across the watershed. *E. coli* impairments are typically associated with stormwater runoff, pet and livestock waste, failing septic systems, unhoused populations, and wildlife. These contributors are particularly significant during periods of high-water flow, highlighting the importance of nonpoint source pollution. The Jordan River *E. coli* TMDL used a concentration-based approach (see *Equation 2* in Section 4.2), with allowable levels of bacteria set as a concentration expressed in bacteria counts per 100 milliliters (mL) of water. The goal is that all discharges to surface waters (point and nonpoint source) meet the water quality criteria, so standards are met throughout the waterbody (see Table 4-9). This approach is a shift from previously completed *E. coli* TMDLs that were based on necessary load reductions to meet instream water quality criteria. UDWQ believes this approach has several benefits for the impaired AUs in the Jordan River watershed, as a concentration limit is easier for stakeholders to understand and implement compared to a load-based limit (UDWQ 2023a).

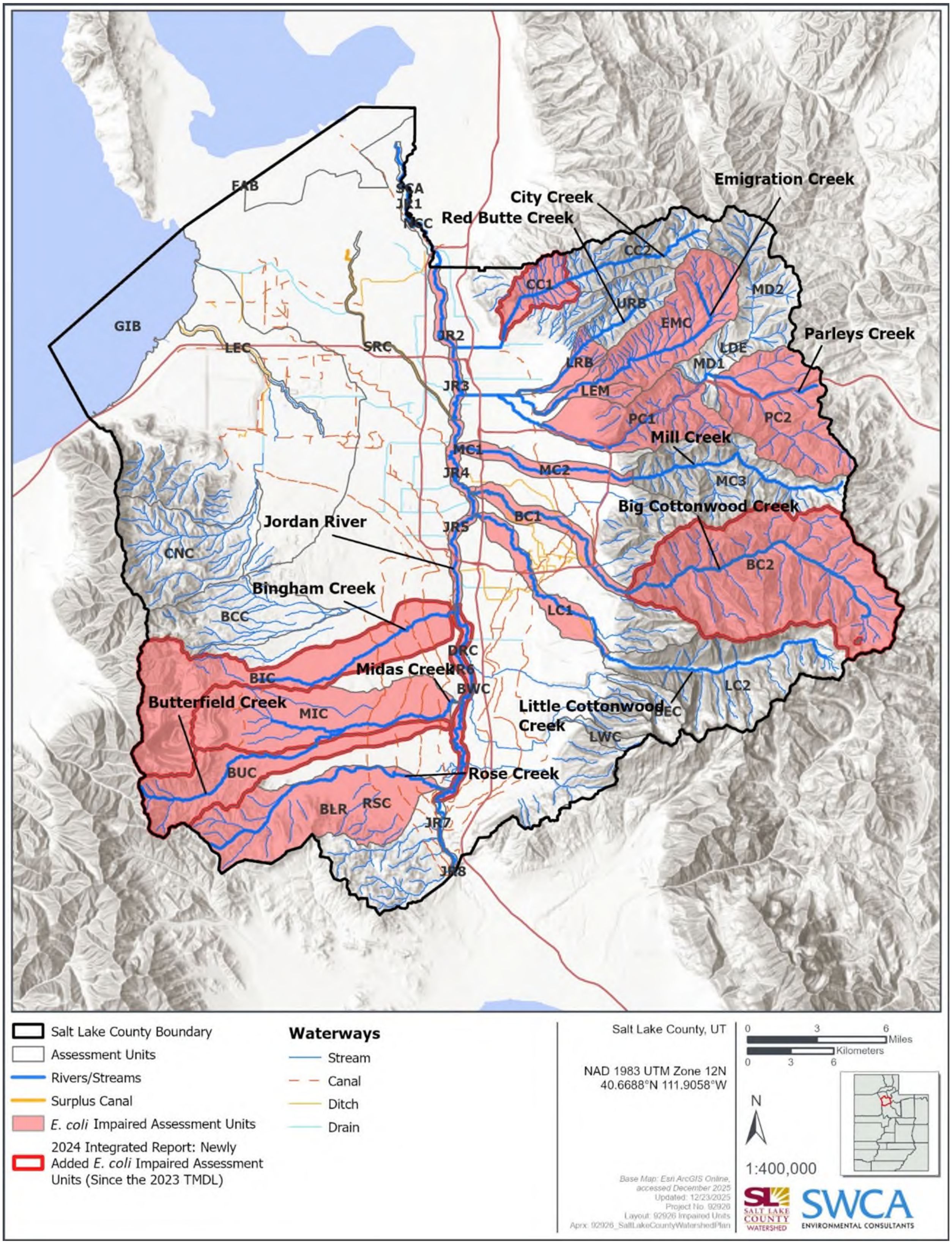

Figure 4-12. ***E. coli*–impaired AUs within the Jordan River watershed.**

Table 4-9 summarizes the *E. coli* water quality criteria that apply to the 303(d) impaired AUs within the Jordan River watershed. These are the criteria that served as the water quality endpoints for the *E. coli* TMDL. The *E. coli* numeric criteria for designated beneficial use Class 1C (domestic source) and 2B (infrequent primary contact recreation) waters state that sample concentrations may not exceed 206 MPN per 100 mL as a 30-day and recreation season geometric mean, or a maximum of 668 MPN per 100 mL in more than 10% of samples collected during the recreation season. The 30-day geometric mean is based on no fewer than five samples collected more than 48 hours apart within 30 days.

Table 4-9. Applicable *E. coli* Water Quality Criteria for Impaired AUs in the Jordan River Watershed

Beneficial Use	Description	*E. coli* Geometric Mean (MPN/100 mL*)	*E. coli* Not to Exceed (MPN/100 mL*)
1C	Domestic source	206	668
2B	Infrequent primary contact recreation	206	668

Source: UAC R317-2-6.

* MPN/100 mL = most probable number [of colonies] per 100 mL of water.

As part of the Jordan River *E. coli* TMDL, three target endpoints were assigned to *E. coli* concentrations for the recreation season (May through October) based on the *E. coli* criteria listed in UAC R317-2:

1. For years with ≥ five collection events no less than 48 hours apart in any recreation season (May 1 through October 30), no more than 10% of samples collected from May 1 through October 30 should exceed 668 MPN/100 mL.
2. For recreation seasons with ≥ five collection events no less than 48 hours apart, no 30-day interval geometric mean should exceed 206 MPN/100 mL.
3. For recreation seasons with ≥ 10 collection events, the geometric mean of all samples should not exceed 206 MPN/100 mL.

Between 2015 and 2024, Salt Lake County, UDWQ, and the Wasatch Front Water Quality Council collected monthly water quality samples at more than 100 monitoring locations. The *E. coli* results are summarized in Table 4-10, which identifies locations where more than 10% of samples exceeded 668 MPN/100 mL of *E. coli* during the recreation season across various years. Notable exceedances were observed in multiple locations, such as Midas Creek, where 100% of samples exceeded the criteria in 2016, 2017, and 2018, and Jordan River-4, which had 80% exceedance in 2024. Other locations, including Big Cottonwood Creek and Emigration Creek, showed varying percentages of exceedance ranging from 12.5% to 60% across different years, indicating fluctuating levels of *E. coli* contamination during the recreation season.

Overall, *E. coli* concentration data analyzed for this watershed plan show that approximately 90% of river/stream monitoring locations have higher average concentrations during the recreation season (Figure 4-13). The opposite trend is seen from monitoring locations along the Surplus Canal, which had over two times the average concentration of *E. coli* during the non-recreation season compared to the recreation season.

Table 4-10. Locations Where More Than 10% of Sample Exceeded 668 MPN/100 mL of *E. coli* in the Recreation Season in 1 or More Years

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Big Cottonwood Creek-1	BC_00.37	2018	2018	5	40.0%
	BC_00.70	2017–2024	2017	8	12.5%
			2018	6	33.3%
			2020	6	50.0%
			2021	6	16.7%
			2022	8	75.0%
			2023	6	50.0%
			2024	5	60.0%
	BC_04.73	2015–2024	2017	6	33.3%
			2018	6	33.3%
			2020	6	50.0%
			2021	6	50.0%
			2022	6	50.0%
			2023	6	33.3%
	BC_06.23	2022–2024	2024	5	20.0%
Big Cottonwood Creek-2	BC_25.97	2015–2024	2018	5	20.0%
			2020	5	20.0%
			2023	5	20.0%
Bingham Creek	BG_00.22	2015–2024	2016	6	33.3%
			2017	6	16.7%
			2018	9	11.1%
			2019	6	66.7%
			2020	6	33.3%
			2021	6	16.7%
			2022	6	50.0%
			2023	6	50.0%
			2024	8	50.0%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Butterfield Creek	BU_05.29	2016–2024	2018	6	16.7%
			2022	6	16.7%
			2024	8	12.5%
City Creek-1	CC_02.62	2015–2024	2016	6	16.7%
			2020	6	16.7%
			2021	6	50.0%
			2022	6	16.7%
			2023	6	16.7%
	CC_02.76	2015–2024	2016	6	16.7%
Emigration Creek Lower	EM_01.62	2015–2024	2016	7	28.6%
			2017	6	16.7%
			2018	7	57.1%
			2019	6	16.7%
			2020	6	33.3%
			2021	6	83.3%
			2022	6	66.7%
			2023	6	16.7%
			2024	9	55.6%
	EM_02.54	2015–2024	2016	6	16.7%
			2018	7	28.6%
			2020	6	16.7%
			2021	6	33.3%
			2022	6	16.7%
		2015–2024	2016	6	16.7%
			2018	7	28.6%
			2020	6	50.0%
			2021	6	33.3%
			2022	6	16.7%
			2024	8	25.0%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Emigration Creek	KL_00.21	2015–2024	2020	6	16.7%
			2022	6	16.7%
			2023	6	16.7%
	BR_14.44	2015–2024	2016	6	16.7%
			2019	6	16.7%
			2021	6	16.7%
	EM_05.17	2015–2024	2022	6	16.7%
			2024	8	12.5%
	EM_06.39	2017	2017	6	50.0%
	EM_07.01	2017	2017	5	40.0%
	EM_07.20	2015–2018	2016	7	14.3%
	EM_07.30	2015–2024	2016	7	14.3%
			2017	10	30.0%
			2020	6	16.7%
			2022	6	16.7%
			2024	8	25.0%
	EM_07.79	2015–2024	2016	6	50.0%
			2017	14	35.7%
			2021	6	66.7%
			2022	6	16.7%
			2023	6	16.7%
			2024	8	25.0%
	EM_08.50	2015–2024	2018	8	12.5%
	EM_08.93	2015–2024	2016	19	15.8%
			2020	6	50.0%
			2021	6	50.0%
			2022	6	16.7%
			2024	8	50.0%
	EM_11.87	2015–2024	2022	6	16.7%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Jordan River-2	JR_08.77	2015–2024	2021	6	16.7%
			2022	6	16.7%
	JR_09.16	2018	2018	5	20%
Jordan River-3	JR_14.38	2018–2024	2024	5	40%
Jordan River-4	JR_16.85	2018–2024	2018	5	20%
			2024	5	80%
	JR_18.23	2018–2024	2024	5	40%
	JR_20.09	2023–2024	2024	5	40%
Jordan River-5	JR_21.58	2018–2024	2024	5	40%
	JR_23.34	2015–2024	2016	6	16.7%
			2017	6	16.7%
			2018	7	57.1%
			2022	6	50.0%
			2023	6	33.3%
			2024	5	20.0%
	JR_23.29	2015–2024	2016	6	16.7%
			2017	5	20%
			2018	11	36.4%
			2024	5	60%
	JR_24.85	2018–2024	2018	10	20%
			2024	9	11.1%
Jordan River-6	JR_25.45	2021–2024	2024	5	20%
	JR_26.76	2018–2024	2018	5	20%
			2021	8	25%
			2024	5	20%
	JR_32.35	2015–2024	2021	6	16.7%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Little Cottonwood Creek-1	LC_00.08	2018–2024	2024	5	40%
	LC_00.41	2017–2018	2018	6	16.7%
	LC_00.53	2017–2024	2018	6	16.7%
			2020	6	16.7%
			2021	6	16.7%
			2022	8	37.5%
			2023	6	16.7%
	LC_01.98	2015–2024	2018	5	40.0%
			2020	6	33.3%
			2021	6	16.7%
			2022	6	50.0%
			2023	6	33.3%
	LC_04.07	2023–2024	2024	5	20%
	LC_04.08	2023–2024	2024	5	20.0%
	LC_05.37	2023–2024	2024	5	40%
Midas Creek	MS_00.19	2015–2024	2016	6	100.0%
			2017	6	100.0%
			2018	9	100.0%
			2019	6	83.3
			2020	6	50.0%
			2021	6	50.0%
			2022	6	66.7%
			2023	6	50.0%
			2024	8	75.0%
	MS_00.12	2015–2024	2016	6	100.0%
			2017	5	100.0%
			2018	9	100.0%
			2024	9	66.7%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
	MS_01.19	2015–2024	2016	6	100.0%
			2017	6	100.0%
			2018	9	100.0%
			2024	5	80.0%
Mill Creek1-SLCity	MC_00.65	2018–2024	2018	5	40%
			2024	5	60%
	MC_01.08	2017–2014	2017	5	60.0%
			2018	8	50.0%
			2020	6	66.7%
			2021	6	33.3%
			2022	6	66.7%
			2023	6	83.3%
			2024	5	20.0%
Mill Creek2-SLCity	MC_02.50	2015–2024	2016	6	66.7%
			2018	9	77.8%
			2024	5	80.0%
	MC_02.56	2015–2024	2016	6	66.7%
			2017	6	50.0%
			2018	9	77.8%
			2020	6	50.0%
			2021	6	83.3%
			2022	6	83.3%
			2023	6	16.7%
			2024	5	80.0%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
	MC_04.56	2015–2024	2016	6	16.7%
			2017	6	16.7%
			2018	6	16.7%
			2021	6	33.3%
			2022	6	33.3%
			2023	6	16.7%
	MC_07.09	2015–2024	2021	6	16.7%
			2022	6	33.3%
	MC_08.49	2015–2024	2022	6	16.7%
	MC_12.41	2015–2024	2021	6	16.7%
Mill Creek3-SLCity	PF_00.04	2015–2024	2023	6	16.7%
Parleys Canyon Creek-1	SF_00.11	2015–2024	2020	6	33.3%
			2021	6	16.7%
	PC_02.06	2015–2024	2016	6	33.3%
			2017	6	50.0%
			2018	9	22.2%
			2020	6	33.3%
			2021	5	40.0%
			2022	6	33.3%
			2023	5	20.0%
			2024	5	40.0%
	PC_02.88	2015–2024	2016	6	50.0%
			2017	6	16.7%
			2018	8	37.5%
	PC_04.76	2015–2024	2016	8	12.5%
			2018	6	16.7%
			2021	6	16.7%
	PC_05.79	2015–2024	2022	7	14.3%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
Parleys Canyon Creek-2	PC_14.40	2015–2024	2016	6	50.0%
			2018	7	57.1%
			2021	5	20.0%
			2022	6	33.3%
			2023	5	20.0%
Red Butte Creek Lower	RB_01.65	2015–2014	2017	6	16.7%
			2018	11	27.3%
			2020	6	16.7%
			2022	6	83.3%
			2023	6	50.0%
			2024	5	40.0%
	RB_02.16	2018–2024	2020	6	50.0%
			2021	5	60.0%
			2022	6	50.0%
			2023	6	33.3%
	RB_04.21	2015–2024	2021	6	16.7%
Rose Creek	RC_00.41	2015–2024	2016	5	80.0%
			2017	7	42.9%
			2018	8	75.0%
			2020	6	100.0%
			2021	5	40.0%
			2023	6	33.3%
			2024	10	90.0%
	RC_10.58	2016–2019	2017	6	16.7%
			2018	5	60.0%
			2020	6	16.7%
			2021	6	16.7%
			2024	8	50.0%

AU	Monitoring Location ID	Sample Date Range	Years Where > 10% of Samples Exceeded 668 MPN/100 mL in the Recreation Season	Recreation Season Sample Count	Percentage of Samples that Exceeded 668 MPN/100 mL (%)
	RC_11.32	2016–2024	2016	5	20.0%
			2017	6	16.7%
			2018	5	40.0%
			2020	6	16.7%
			2021	6	50.0%
			2023	6	16.7%
			2024	8	12.5%

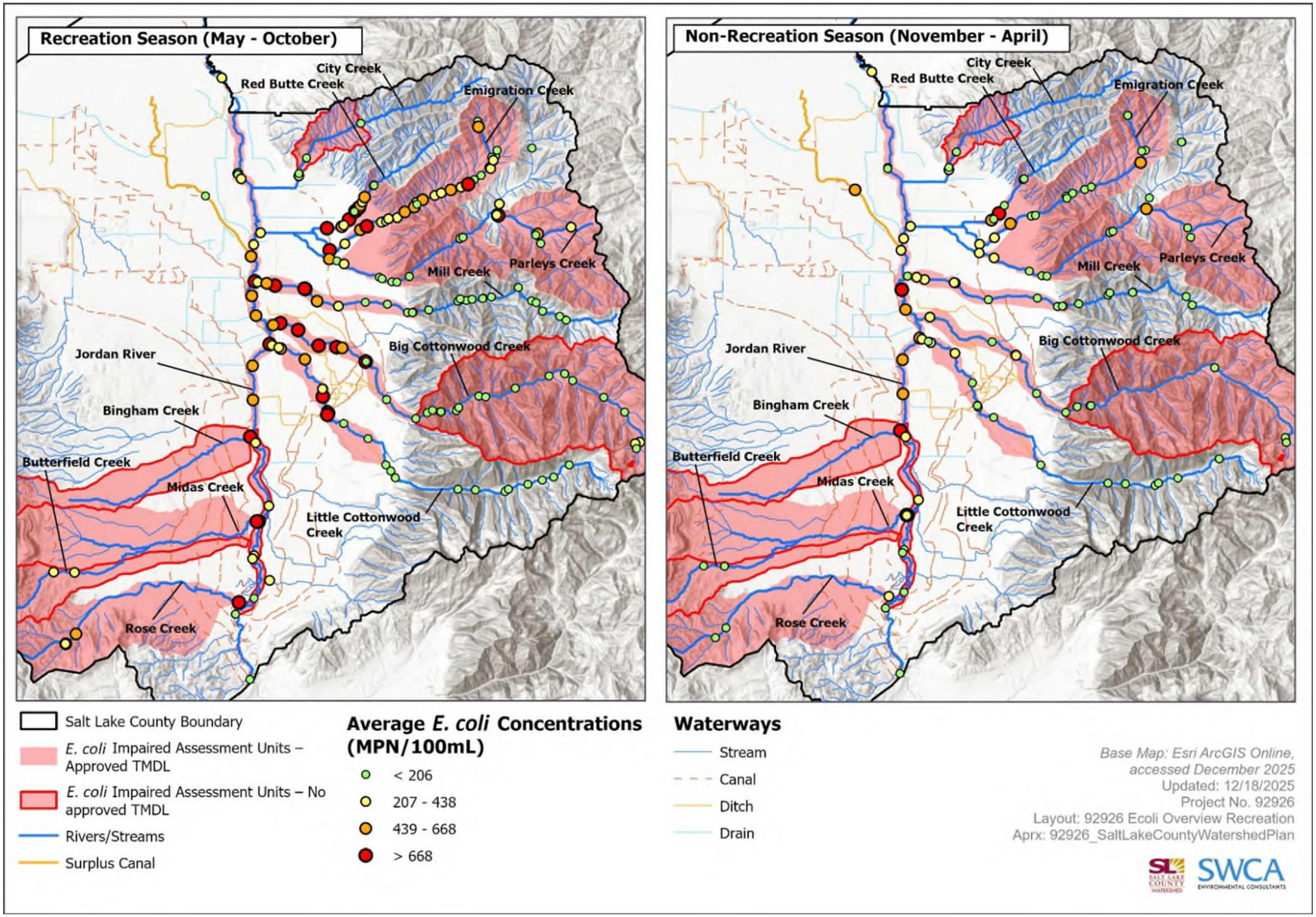

Figure 4-13. Comparison of average *E. coli* concentrations from 2015 to 2024 between the recreation season (May through October) and the non-recreation season (November to April).

The second target in the Jordan River *E. coli* TMDL, which sets a 30-day geometric mean limit of 206 MPN/100 mL for monitoring locations with more than five samples in a recreation season, was also assessed. The percentage of 30-day interval geometric means exceeding 206 MPN/100 mL has generally stayed steady over time, ranging from 31% to 45% exceedances of samples (n = 308 – 473) collected per year.

The Jordan River *E. coli* TMDL lists a third target goal of 206 MPN/100 mL for recreation seasons with greater than, or equal to, 10 collection events, which is the water quality criterion for *E. coli*. Out of 35 locations that had at least one recreation season with more than 10 sampling events, all locations (100%) had geometric means above 206 MPN/100 mL.

Figures 4-14 illustrates average *E. coli* concentrations from 2015 to 2024 across three hydrologic conditions—spring runoff, storm runoff, and baseflow—which were identified by correlating precipitation and flow data (see Section 2.4 for more details on methods). During baseflow, 47.6% of 189 monitoring locations exceeded 206 MPN/100 mL, with 11.1% surpassing 668 MPN/100 mL. In spring runoff, 25.9% of 174 locations exceeded 206 MPN/100 mL, and 5.1% surpassed 668 MPN/100 mL. Storm conditions exhibited the highest *E. coli* concentrations, with 51.8% of 170 locations exceeding 206 MPN/100 mL and 25.3% surpassing 668 MPN/100 mL. Most of the exceedances are observed in the following AUs: Mill Creek2-SLCity, Little Cottonwood Creek-1, Emigration Creek, Emigration Creek Lower, Jordan River-3, Jordan River-4, Jordan River-5, and Jordan River-6. The average *E. coli* concentrations observed during storm conditions suggest *E. coli* is being mobilized from valley-bottom source areas and conveyed downstream, resulting in the highest concentrations occurring in the valley-bottom reaches of tributaries. This aligns with typical MS4 urban runoff patterns (street and parking lot drainage, curb and gutter systems, storm drains, and outfalls) and indicates BMPs should focus on the valley in sub-catchments draining into higher intensity developments.

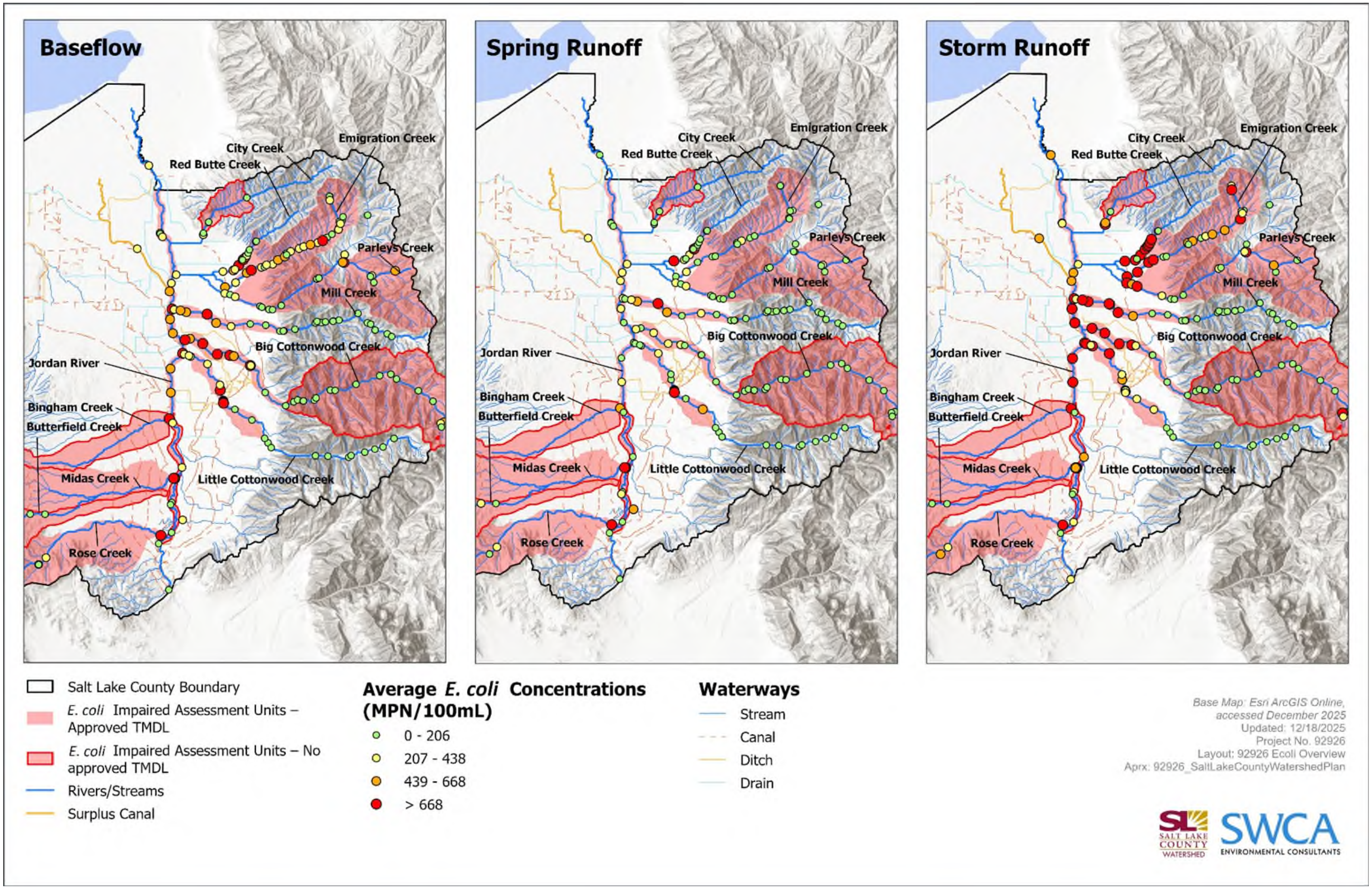

Figure 4-14. Average *E. coli* concentrations measured from 2015 to 2024 under varying hydrological conditions, including baseflow, spring runoff, and storm runoff.

4.4.1.1 ESTIMATED POLLUTANT LOADS AND REDUCTIONS NEEDED

b

EPA ELEMENT

Quantify current loads using monitoring/modeling to estimate necessary load reductions and how much each implementation action will reduce pollutant loads.

The Jordan River *E. coli* TMDL uses a concentration-based approach (see *Equation 2* in Section 4.2); therefore, the WLA and LA are equal to the water quality criteria; therefore, all sources, both point and nonpoint, within the impaired AUs must meet the following water quality criteria (UDWQ 2023a):

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

MS4 permittees are expected to address these criteria through iterative implementation of BMPs outlined in Chapter 7 of the Jordan River *E. coli* TMDL and their associated permits (UDWQ 2023a). Additionally, POTWs have *E. coli* limits in their UPDES permits, set at 126 MPN/100 mL for monthly averages and 157 MPN/100 mL for weekly averages, below the criteria for the Jordan River and tributaries. Use of the water quality criteria as the TMDL target is a more conservative approach than developing an explicit MOS and accounts for any uncertainty in the connection between water quality and pollutant loading.

UDWQ determined the percent reduction in *E. coli* needed to achieve the appropriate water quality criteria for the 14 impaired AUs (see Figure 4-12) using a geometric mean during the recreational season (May through October). This calculation uses the more stringent criterion of 206 MPN/100 mL to better protect beneficial uses. Although calculating necessary reductions is not mandatory for a concentration-based TMDL, it provides insight into the extent of impairment for each AU and helps prioritize areas for project implementation. The percent reduction for the Jordan River *E. coli* TMDL was calculated using the follow equation:

$$\text{Percent Reduction} = (\text{Geomean}_{\text{month}} - 206)/\text{Geomean}_{\text{month}}) * 100 \quad \textit{(Equation 3)}$$

Table 4-11 presents the percent reductions for each impaired AU as listed in the TMDL. Since the TMDL was established, six new AUs have been listed as impaired for *E. coli*, and percent reductions have not yet been calculated for them. Detailed data analysis for determining the percent reductions and monthly geometric means for each AU are available in the appendices of the Jordan River *E. coli* TMDL (UDWQ 2023a). Most of the perennial streams within the valley floor often exceeded the numeric criteria during the warmer months (late summer). The TMDL found that the *E. coli* concentrations must be reduced between 24% and 88% to meet water quality criteria during the recreation season throughout the watershed.

Table 4-11. *E. coli* Percent Reductions per impaired AU

AU	Percent Reduction (%)
Big Cottonwood Creek-1	83%
Big Cottonwood Creek-2*	–
Bingham Creek*	–

AU	Percent Reduction (%)
Butterfield Creek*	–
City Creek-1*	–
Emigration Creek*	–
Emigration Creek Lower	78%
Jordan River-2	69%
Jordan River-3	76%
Jordan River-4	75%
Jordan River-5	73%
Jordan River-6*	–
Little Cottonwood Creek-1	74%
Midas Creek	88%
Mill Creek1-SLCity	83%
Mill Creek2-SLCity	83%
Parley Canyon Creek-1	24%
Parleys Canyon Creek-2	52%
Red Butte Creek Lower	80%
Rose Creek	83%

Source: UDWQ (2023a).

* These AUs have been listed as impaired in the 2024 Integrated Report, after the Jordan River *E. coli* TMDL was developed; therefore, no load reductions have been calculated for these AUs.

4.4.2 Dissolved Oxygen

DO, a critical parameter in aquatic ecosystems, refers to the concentration of oxygen gas dissolved in water and is essential for the survival and growth of aerobic aquatic organisms. Originating from atmospheric diffusion, photosynthetic activity by aquatic plants and algae, and aeration processes, DO levels are influenced by factors such as temperature, salinity, and water movement. DO plays a vital role in maintaining the ecological balance, supporting metabolic processes in aquatic life, and influencing the solubility and availability of nutrients and pollutants. The concentration of DO is a key indicator of water quality, with levels varying across different waterbodies and depths.

The Jordan River has three AUs downstream of the Surplus Canal Diversion that are impaired for low DO. The 2013 TMDL study for the Jordan River evaluated DO impairment in the Jordan River 3B beneficial use and used QUAL2Kw modeling to quantify how different pollutant sources affect instream DO. The TMDL determined that excess OM is the primary pollutant driving DO depletion, and to meet water quality standards, OM reductions ranging from 27% to 50% are required across impaired AUs (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). Additional factors contributing to low DO include nutrient enrichment, SOD, reduced reaeration from channel modifications, and changes in flow. The pollutant pathways identified in the 2013 TMDL, including stormwater OM loads, tributary and Utah Lake contributions, and wastewater inputs, remain relevant today. This watershed plan builds on the TMDL by summarizing the sources contributing to DO impairment (Figure 4-15) and aligning recommended implementation strategies with the OM reduction requirements established in the 2013 DO TMDL.

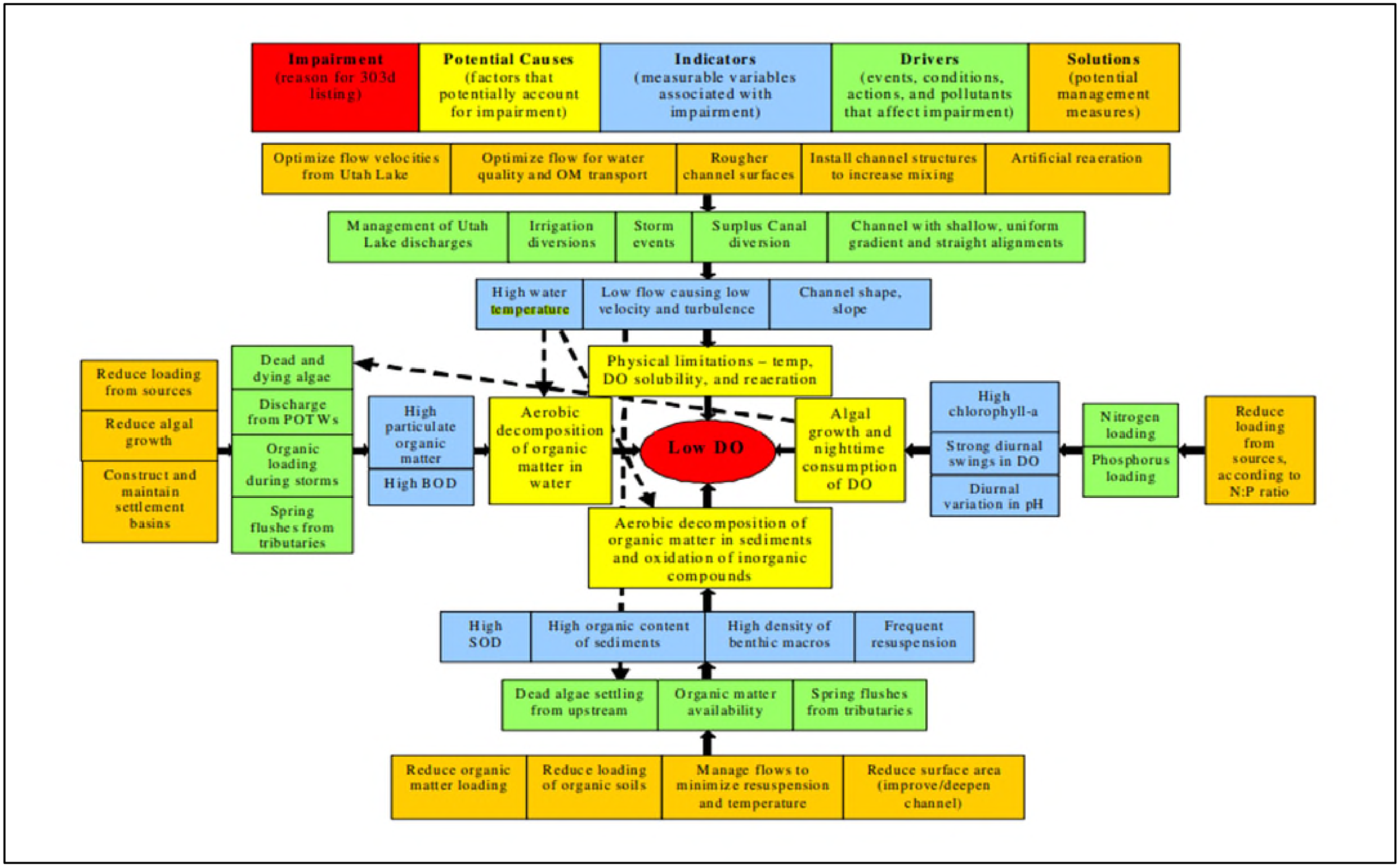

Figure 4-15. Factors affecting DO in the Jordan River (Jordan River TMDL).

Source: Cirrus Ecological Solutions and Stantec Consulting Inc. (2013).

The 2013 DO TMDL analysis indicates that DO impairment is not solely due to seasonal physical factors like elevated water temperatures but is driven year-round by biological and chemical oxygen demands (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). Key oxygen-consuming processes include biochemical oxygen demand (BOD) from OM in the water column; SOD from decomposition in bottom sediments; and algal activity, which causes large daily fluctuations in DO and contributes additional OM upon decay. Despite the Jordan River having beneficial reaeration conditions, where oxygen should naturally replenish, these processes consistently outpace oxygen inputs, leading to chronic low DO levels (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). It was noted that that average monthly DO levels reach their lowest point in August, with water quality criteria violations occurring most often in July or August, varying by location (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). The TMDL also found that critical DO shortages occur most severely during warm late-summer mornings, particularly in years when low Utah Lake outflows deliver warm, low-volume, and organic-rich water to the Jordan River.

A QUAL2Kw model was used to determine OM load limits for the lower Jordan River. The model was set to ensure DO levels stay above a target of 5.5 mg/L during the most critical conditions in late summer. This target includes the state's minimum DO criteria of 4.5 mg/L, plus a 1.0-mg/L MOS to account for natural variability and uncertainties.

OM load limits were then divided between point sources (like POTWs) and nonpoint sources (like stormwater runoff) based on their contributions to the river. Although the 5.5-mg/L target was not set as a new regulatory criteria, it was used in modeling to determine the OM levels needed to meet the existing DO criteria and protect aquatic life. This modeling using QUAL2Kw demonstrated that nutrient reductions alone will not solve the problem. Instead, effective management must focus on reducing both fine and coarse OM inputs to the river. To achieve the 5.5-mg/L target, a total annual load limit for OM was established (Table 4-12).

To assess the DO criteria, the 2024 Integrated Report states that for each monitoring location with 10 or more samples, a daily minimum and daily average are calculated for each complete day in a dataset. Moving 7- and 30-day averages are then calculated from the daily averages for each 7- or 30-day period within the dataset. These values are then compared to the applicable daily minimum, 7-day average, and 30-day average criteria to determine use impairment or support. A location does not meet the daily DO minimum criterion if the percentage of total daily minimum that falls below the applicable standard is greater than 10% within the period of record (UDWQ 2024).

Table 4-12. Summary of Recommended DO OM and Endpoints for the Jordan River

Parameter	Defined Targets/Endpoints
DO	**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
OM	Total OM load to lower Jordan River (kilograms/year): <= 1,373,630 kilograms/year

Phase 2

During the development of the initial DO TMDL, it was determined that it would be necessary to complete a phased TMDL approach because the cause of impairment, and necessary reductions to resolve the impairment, were known, but there was still significant uncertainty regarding the sources of OM loading to the Jordan River (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). Between Phase 1 and Phase 2 of the TMDL, investigations took place to improve the understanding of DO response to OM loading, identifying sinks of OM, and developing an OM budget for the Jordan River (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). A number of research reports conducted between 2010 and 2019 can be found on the *Jordan River DO TMDL: Watershed Management Program UDWQ Website* (UDWQ 2025a). As of the time of drafting this report, the Phase 2 TMDL report is still in progress and has not been finalized.

Based on the most recent 2024 303(d) list, there are five AUs within Salt Lake County that are impaired based on DO levels, including three AUs of the Jordan River. The impaired AUs are identified in Figure 4-16.

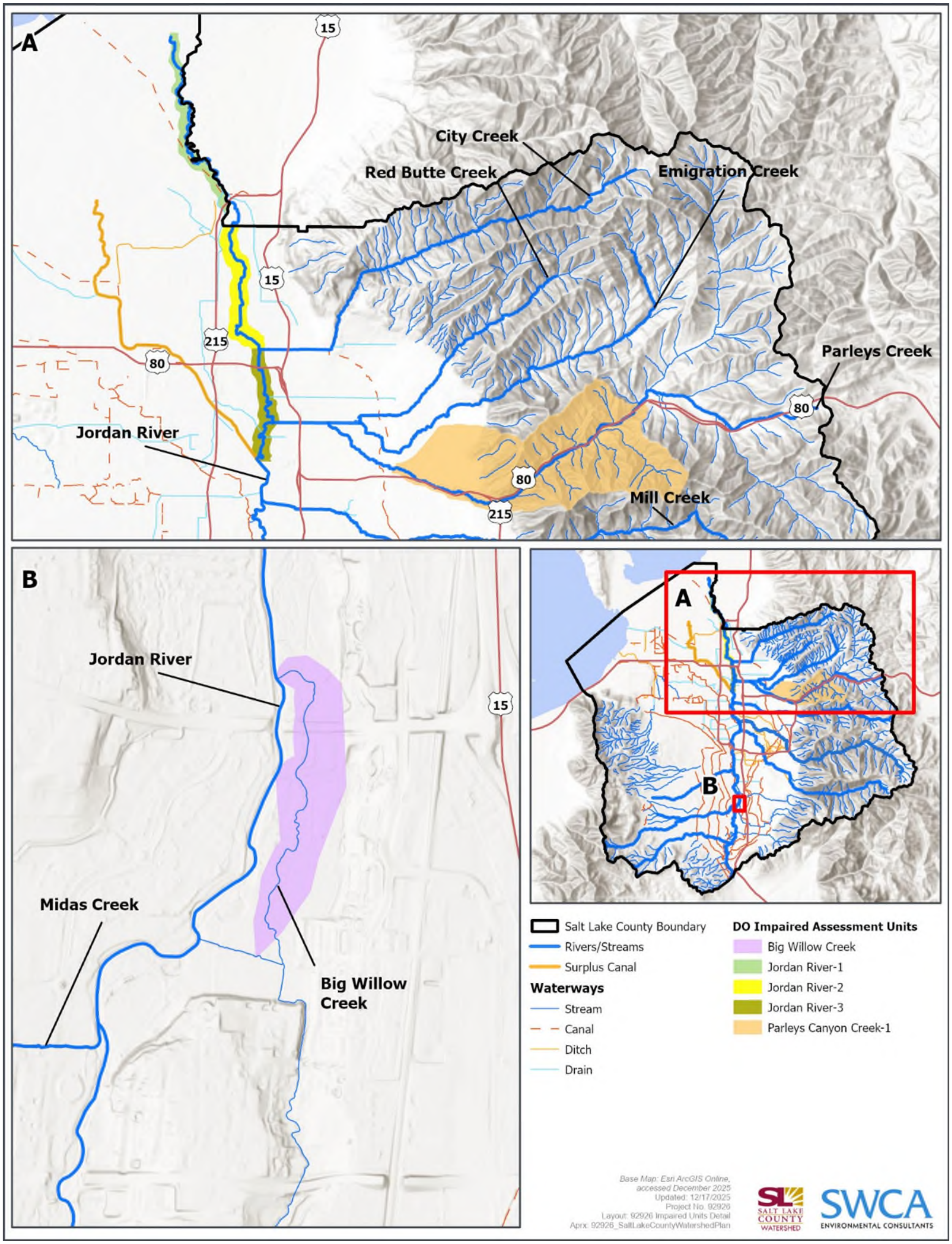

Figure 4-16. Impaired DO AUs.

Table 4-13 summarizes the DO water quality criteria that apply to the 303(d) impaired AUs within the Jordan River watershed, excluding Jordan River-1, Jordan River-2, and Jordan River-3, which have site-specific DO criteria that vary by season, as shown in Table 4-14.

Table 4-13. DO Criteria for 3D and 3A Beneficial Uses

Beneficial Use	30-Day Average (mg/L)	7-Day Average (mg/L)	Instantaneous Minimum (mg/L)
3D	5.0	–	3.0
3A	6.5	5.0	4.0

Table 4-14. Site-Specific DO Criteria for the Jordan River AUs

	May–July (mg/L)	August–April (mg/L)
30-day average	5.5	5.5
7-day average	5.5	N/A
Instantaneous minimum	4.5	4.0

Dissolved Oxygen Impairment Summary

Table 4-15 and Figure 4-17 summarize the monitoring points within each impaired AU, and the percent exceedances as evaluated in the most recent 2024 Integrated Report. Notable exceedances were observed on the Jordan River in the AUs just downstream of the Surplus Canal.

Table 4-15. DO Exceedances

AU	Monitoring Point ID	Standard Averaging Period	Sample Count	Exceedance Count	Percent Exceedance
Jordan River-1	JR_00.71	7	18	5	28%
	JR_00.71	30	86	14	16%
	JR_02.10	7	14	3	21%
	JR_05.15	7	22	8	36%
	JR_05.15	30	108	16	15%
	JR_02.25	7	11	4	36%
	JR_02.25	30	10	2	20%
Jordan River-2	JR_01.87	30	46	8	17%
	JR_01.87	7	11	3	27%
	JR_08.77	30	73	13	18%
	JR_08.77	7	18	4	22%
	JR_09.16	30	57	10	18%
	JR_09.16	7	14	4	29%

AU	Monitoring Point ID	Standard Averaging Period	Sample Count	Exceedance Count	Percent Exceedance
Jordan River-3	JR_13.56	7	11	2	18%
	JR_12.52	30	56	8	14%
	JR_12.52	7	14	4	29%
	JR_13.56	30	10	4	40%
	JR_10.71	7	11	3	27%
	JR_10.71	30	46	7	15%
Big Willow Creek	BWC_00.01	30	10	2	20%
Parleys Canyon Creek-1	PC_02.50	30	10	2	20%

In addition to assessments based on grab samples, UDWQ also completes high-frequency DO assessments that “capture complete days to ensure daily minima are captured and daily averages can be accurately calculated. UDWQ defines a complete day as a calendar day (i.e., 12:00 a.m.–11:59 p.m.) in which at least one measurement is made in each hour. Incomplete days will not be included in the high frequency DO assessment” (UDWQ 2024). Within Salt Lake County, high-frequency DO data are only collected on the Jordan River impaired AUs and are summarized in Table 4-16 and Figure 4-18.

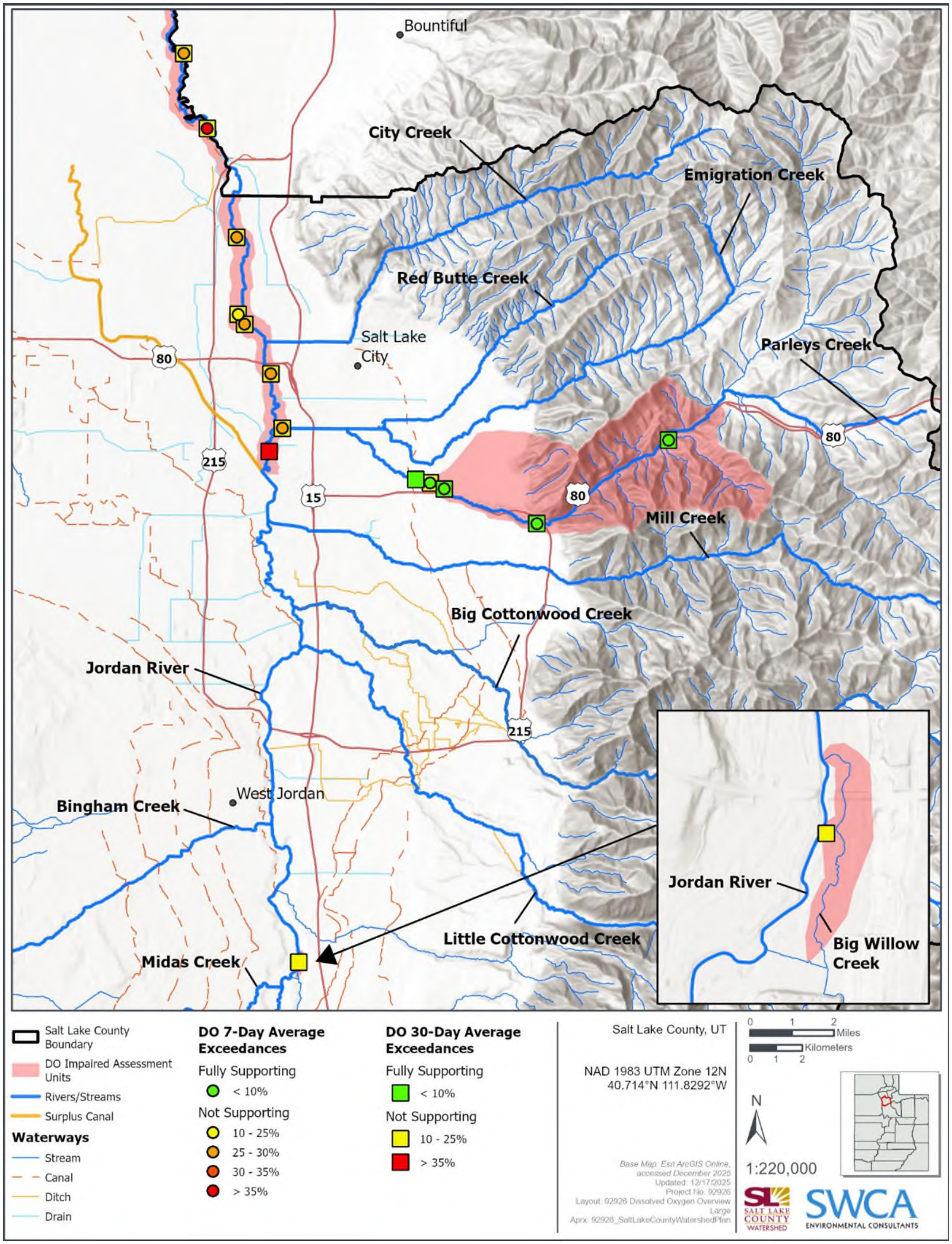

Figure 4-17. 7-day and 30-day DO exceedances.

Note: There are no monitoring points that have exceeded the instantaneous minimum standard by more than 10% of the period of record.

Table 4-16. High-Frequency DO Exceedances

AU	Monitoring Point ID	Numeric Criteria (mg/L)	Standard Averaging Period	Exceedance Count	Sample Count	Percent Exceedance	Date Range
Jordan River-1	JR_00.71	5.5	7-day average	135	449	30.07%	06/01/2017–07/31/2022
	JR_00.71	5.5	30-day average	243	1,519	16.00%	06/01/2017–09/30/2022
	JR_02.25	5.5	7-day average	67	354	18.93%	07/15/2017–07/31/2022
	JR_02.25	5.5	30-day average	176	1,265	13.91%	07/15/2017–09/30/2022
Jordan River-2	JR_09.16	5.5	7-day average	58	320	18.13%	06/01/2017–07/31/2022
	JR_09.16	5.5	30-day average	113	1,079	10.47%	06/01/2017–09/10/2022
Jordan River-3	JR_11.41	4	Instantaneous	167	584	28.60%	06/01/2017–02/26/2019
	JR_11.41	5.5	7-day average	26	95	27.37%	06/01/2017–07/31/2018
	JR_14.20	5	Instantaneous	125	1,179	10.60%	06/01/2018–09/30/2022

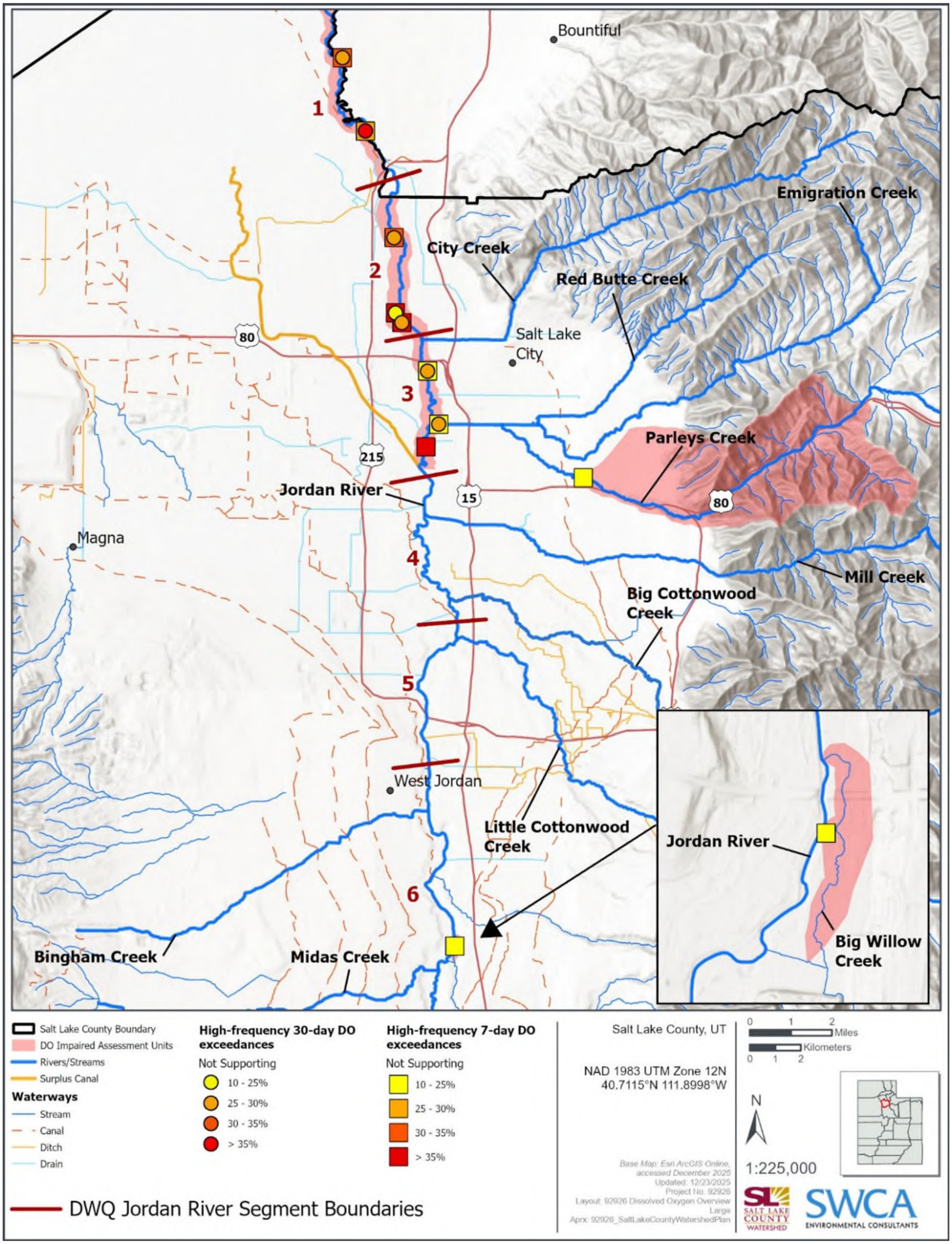

Figure 4-18. High-frequency 7-day and 30-day DO exceedances.

Note: Assessment results are the same for the 7-day and 30-day averaging periods for sites shown on this figure.

In 2013, the EPA approved the Jordan River DO TMDL (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). As a result of that TMDL, a DO target endpoint was set for > 4.5 mg/L for the Jordan River. Figure 4-19 shows instantaneous DO values at monitoring locations in the Jordan River-1, Jordan River-2, and Jordan River-3 AUs, shown from upstream (L) to downstream (R) of sites, with greater than 10 samples.

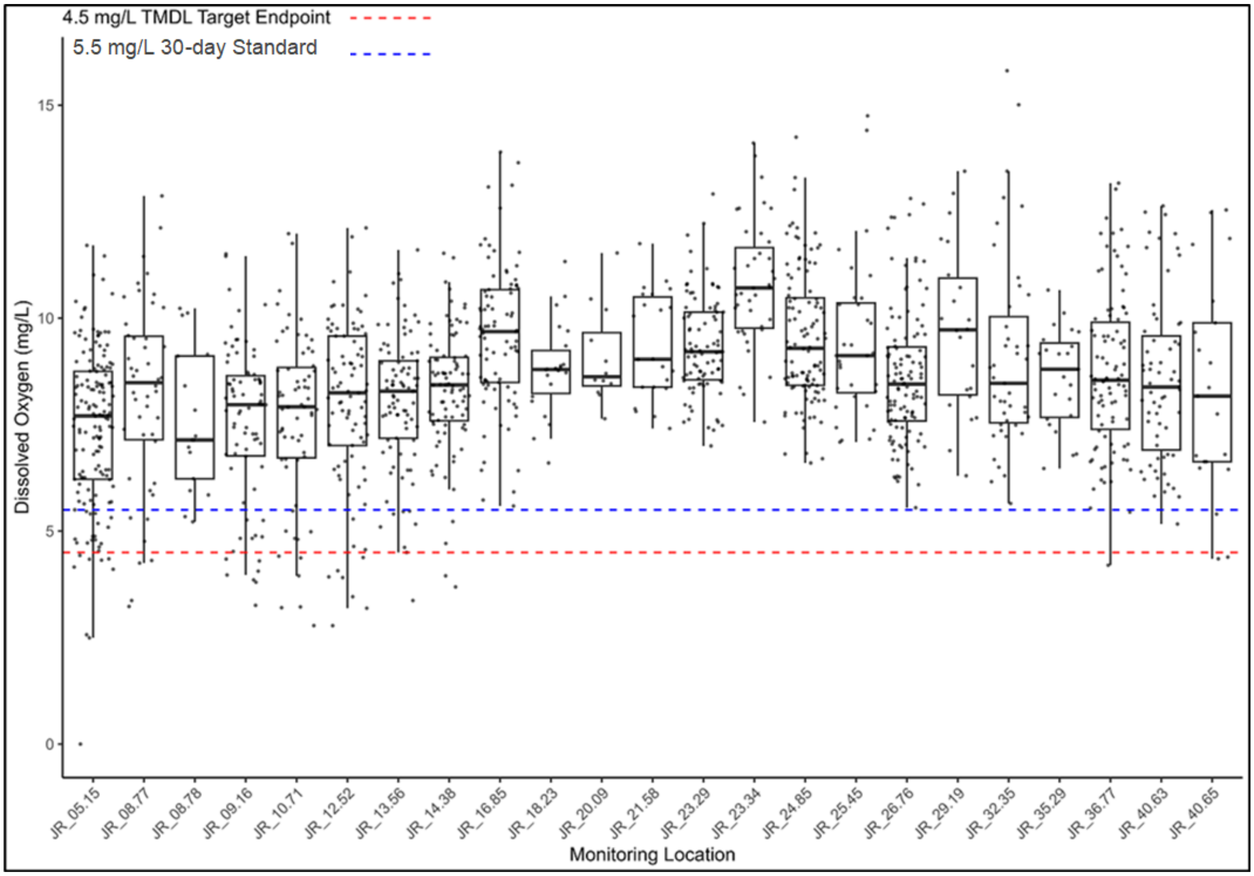

Figure 4-19. Instantaneous DO values at monitoring locations in the Jordan River-1, Jordan River-2, and Jordan River-3 AUs, shown from upstream (L) to downstream (R).

Note: Only locations with greater than 10 samples are shown in this figure.

Seasonal Patterns in Dissolved Oxygen Measurements

Average monthly DO concentrations from samples at locations in the lower Jordan River AUs (Jordan River-1, Jordan River-2, and Jordan River-3) are shown in Figure 4-20. The lowest DO concentrations are seen in the late summer, during which time water temperatures are the highest. Upstream of the Surplus Canal, DO concentrations are much higher and do not drop below the 5.5-mg/L 30-day standard, as shown in Figure 4-21.

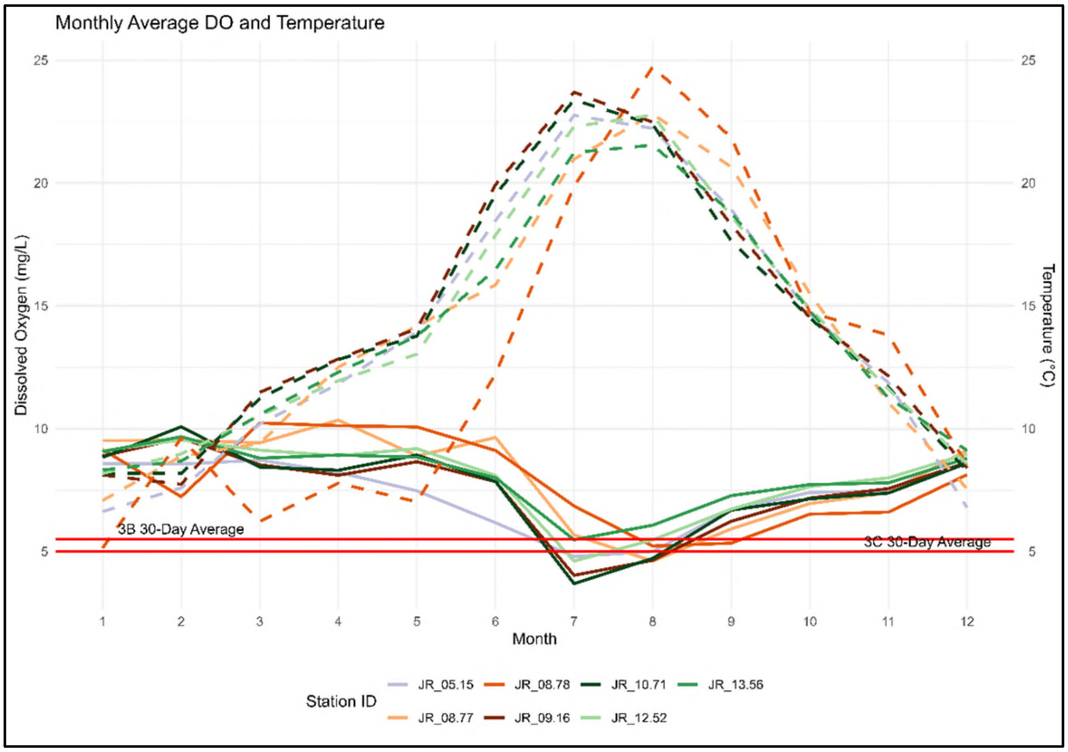

Figure 4-20. Monthly average water temperatures and DO concentrations in the lower Jordan River (AUs: Jordan River-1 [blues], Jordan River-2 [greens], and Jordan River-3 [oranges]).

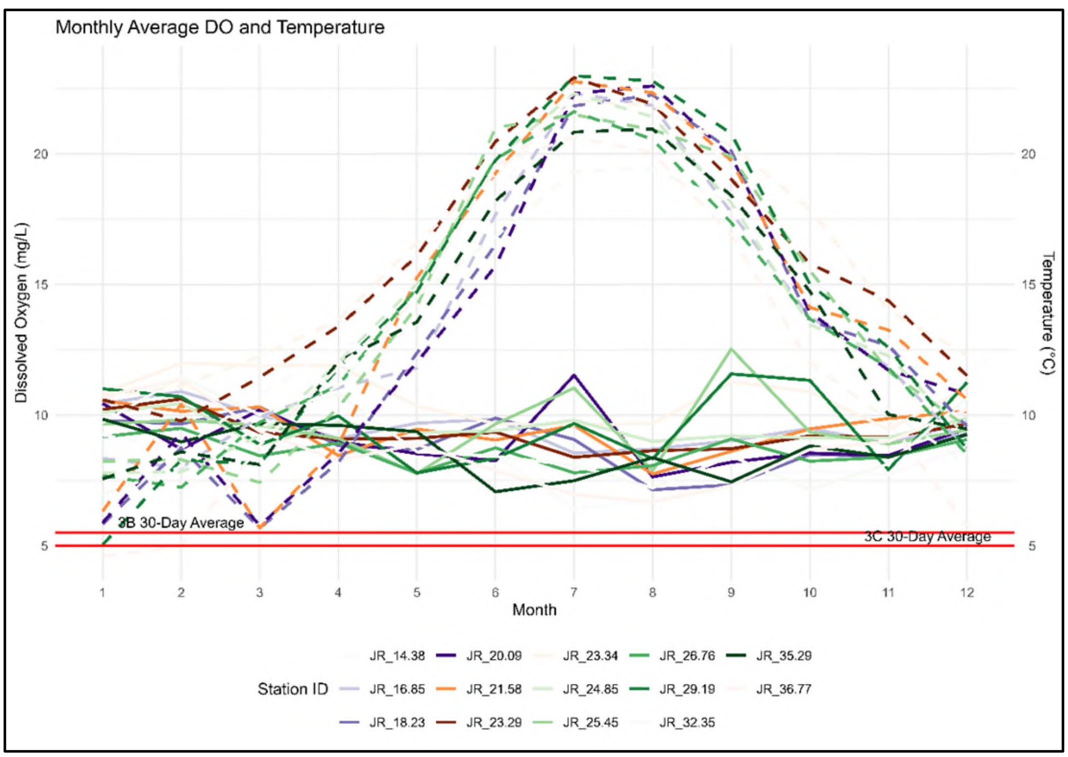

Figure 4-21. Monthly average water temperatures and DO concentrations in the upper Jordan River (AUs: Jordan River-4 [purples], Jordan River-5 [oranges], Jordan River-6 [greens], and Jordan River-7 [reds]).

Macrophyte and Algal Effect on Dissolved Oxygen

In the 2013 Jordan River DO TMDL, there were four main processes known to impact DO values in the Jordan River (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013).

1. Physical factors, including water temperature and channel characteristics that influence reaeration from the atmosphere.
2. Aerobic decomposition of OM and inorganic nitrification of ammonium in the water column (measurable as BOD).
3. Aerobic decomposition of OM and inorganic oxidation at the interface between the water column and bottom sediments (measurable as SOD).
4. Algal growth generating a net increase in DO during daylight hours and net consumption of DO associated with respiration during the night.

OM is discussed in more detail in Section 4.4.2.1.

Several biological processes in the Jordan River consume DO, including macrophytes that cause diurnal fluctuations up to 5 mg/L as a result of photosynthesis and nighttime respiration (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). The DO TMDL found that "the critical condition for DO in the lower Jordan River is early morning during the warm days of late summer, particularly during years when Utah Lake levels are low, resulting in discharges to the Jordan River that are late, low in volume, relatively warm, and carrying high OM loads" (see Section 4.4.2.2 for more information on OM loads from Utah Lake). As part of the 2013 Jordan River DO TMDL, hourly measurements of DO were taken in June, August, and October 2007 to better understand the effect of plant photosynthesis on DO levels.

As part of the diurnal measurements, the TMDL found that there are notable differences between upstream and downstream monitoring locations in the lower Jordan River AUs. In June, the diurnal cycles are similar across the locations; however, by August, the diurnal effect is most pronounced near the 2100 South monitoring location, with smaller effects observed further downstream at Cudahy Lane (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). The TMDL suggests that although this may be due in some part to higher total phosphorus concentrations near the Surplus Canal Diversion, that it is likely light attenuation caused by suspended OM that restricts periphyton growth in the lower river, contributing to the reduced diurnal fluctuations at the downstream monitoring location (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013).

To build on the 2006 diurnal analysis, additional daily DO cycles were measured in 2017 in both the upper and lower Jordan River, and it was found that although upper monitoring locations (monitoring locations upstream of the Surplus Canal) displayed typical diurnal DO cycles driven by algal photosynthesis with afternoon peaks, the lower river monitoring locations showed peak DO levels in the morning, when photosynthesis would typically just be increasing. This shift was not observed in winter, suggesting a seasonal influence. Analysis indicates that these patterns may be driven more by physical transport of DO from upstream, particularly from the 2100 South monitoring location, rather than local biological activity. This points to a system where upstream productivity and downstream decomposition of OM shape the observed DO dynamics during stable summer flow conditions (Cirrus Ecological Solutions 2020).

4.4.2.1 ORGANIC MATTER

OM is a fundamental component of both terrestrial and aquatic ecosystems. It originates from living organisms and their residues, encompassing a diverse array of materials such as plant debris, animal waste, and microbial biomass. Characterized primarily by its carbon and hydrogen content, OM also includes essential elements like oxygen, nitrogen, phosphorus, and sulfur, contributing to its complex composition. It plays a pivotal role in environmental processes, influencing nutrient cycling, carbon sequestration, and water quality. OM is categorized into various types, including coarse particulate OM, fine particulate OM (FPOM), and dissolved OM (DOM), each with distinct properties and ecological functions. Through decomposition, OM is transformed by microbial activity, facilitating nutrient recycling and energy flow within ecosystems. In the 2013 Jordan River DO TMDL, OM was identified as the primary pollutant driving DO impairments in the lower Jordan River. OM can enter surface water through multiple pathways:

- Wastewater effluent: Discharges from treatment facilities contain organic compounds that can exert oxygen demand.
- Stormwater runoff: Urban runoff carries organic debris, such as leaves and grass clippings, into the river system.
- Agricultural activities: Runoff from agricultural lands introduces organic materials, including manure and crop residues.
- Natural inputs: OM from natural vegetation and soil erosion contributes to the overall load.
- Utah Lake outflows: Water discharged from Utah Lake into the Jordan River carries natural OM including phytoplankton, zooplankton, and detritus.

In Salt Lake County, several research efforts have taken place to understand OM dynamics in the Jordan River. The previous DO TMDL (UDWQ 2015) findings highlighted that OM currently represents the most significant pollutant impacting DO levels in the lower Jordan River and identifies seven pollutant sources that contribute OM to the Jordan River. The TMDL modeling demonstrated that the largest contributors of oxygen-demanding material are POTWs, followed by urban stormwater runoff, instream algal production and decay, and leaf litter accumulation during late-summer low-flow periods (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). These OM inputs increase microbial respiration and SOD, reducing instream DO below criteria. The TMDL also established surrogate targets for OM-related parameters in the lower Jordan River, including 5-day carbonaceous BOD, nitrogenous BOD, algal biomass, and SOD, to guide implementation and track progress toward DO improvement (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013).

Additional studies have expanded the understanding of OM dynamics in the Jordan River. Key findings from these studies are summarized in Table 4-17. Additional information on sources that contribute OM to the watershed is included in Section 4.3.

Table 4-17. Key Findings from OM Research

Process/Issue/Concern	Key Finding
Stream metabolism	The lower Jordan River is net heterotrophic; the upper Jordan River is net autotrophic (Epstein et al. 2016; Hogsett 2015; UDWQ 2015).
	Primary production in the upper Jordan River drives DO peaks in the lower Jordan River (Cirrus Ecological Solutions 2017).
	DOM drives metabolic oxygen demand in the lower Jordan River (Follstad Shah, Weintraub et al. 2019).
Hydrology and reaeration	Reaeration is highest in the middle upper Jordan River and is lowest near Utah Lake and the lower Jordan River (Hogsett 2015).

Process/Issue/Concern	Key Finding
SOD and sediment processes	SOD causes 54% of ambient DO deficit in the lower Jordan River; methane drives 56% of SOD (Hogsett 2015).
	Macroinvertebrates and coarse particulate OM contribute to chronic DO demand (Richards 2018).
OM loads and composition	DOM is 91% of annual OM load; labile and quickly consumed.
	WRF effluent and algae produce protein-like reactive DOM.
OM sources	The upper Jordan River provides 55% of OM to the lower Jordan River due to eutrophication.
	FPOM is seasonal: terrestrial in fall, aquatic in summer.
Stormwater OM	Stormwater can cause > 100% of DO demand during small storms.
Climate change	Earlier peak flows and 15% to 40% increases in flow and sediment predicted.

Source: Cirrus Ecological Solutions (2020).

4.4.2.2 ESTIMATED POLLUTANT LOADS AND REDUCTIONS NEEDED

b

EPA ELEMENT

Quantify current loads using monitoring/modeling to estimate necessary load reductions and how much each implementation action will reduce pollutant loads.

As part of the 2013 Jordan River DO TMDL, FPOM loading to the Jordan River was modeled, and it was found that stormwater is the largest overall contributor of FPOM, accounting for 33% of the total annual load (approximately 2.8 million kilograms/year). Among individual sources, Utah Lake is the highest, contributing over 3.7 million kilograms/year (17%), followed by stormwater from Jordan River-4 (13%), Jordan River-3 and Jordan River-6 (5% each), and Big Cottonwood Creek (3%). Overall, natural tributary discharge without stormwater contributes 12%, whereas POTWs and irrigation return flows contribute 7% and 4%, respectively. Corner Canyon Creek contributes the least, with less than 1% of the total FPOM load (UDWQ 2015). For more information on the FPOM loading methodologies, refer to the 2015 Jordan River DO TMDL (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013).

A study completed in 2018 used a stable isotope mixing model in R package to estimate source contributions of FPOM and DOM by analyzing three isotope tracers (δ13C, δ15N, δ2H) (Kelso 2018). An isotope tracer is a specific form of a chemical element that has a unique number of neutrons that make it either stable or radioactive. These isotopes can be used to track biological, chemical, or physical processes in the environment. The findings of this study show that within the DOM sources, the highest contributor is Utah Lake, with POTWs as the second highest (Figure 4-22) (Kelso 2018).

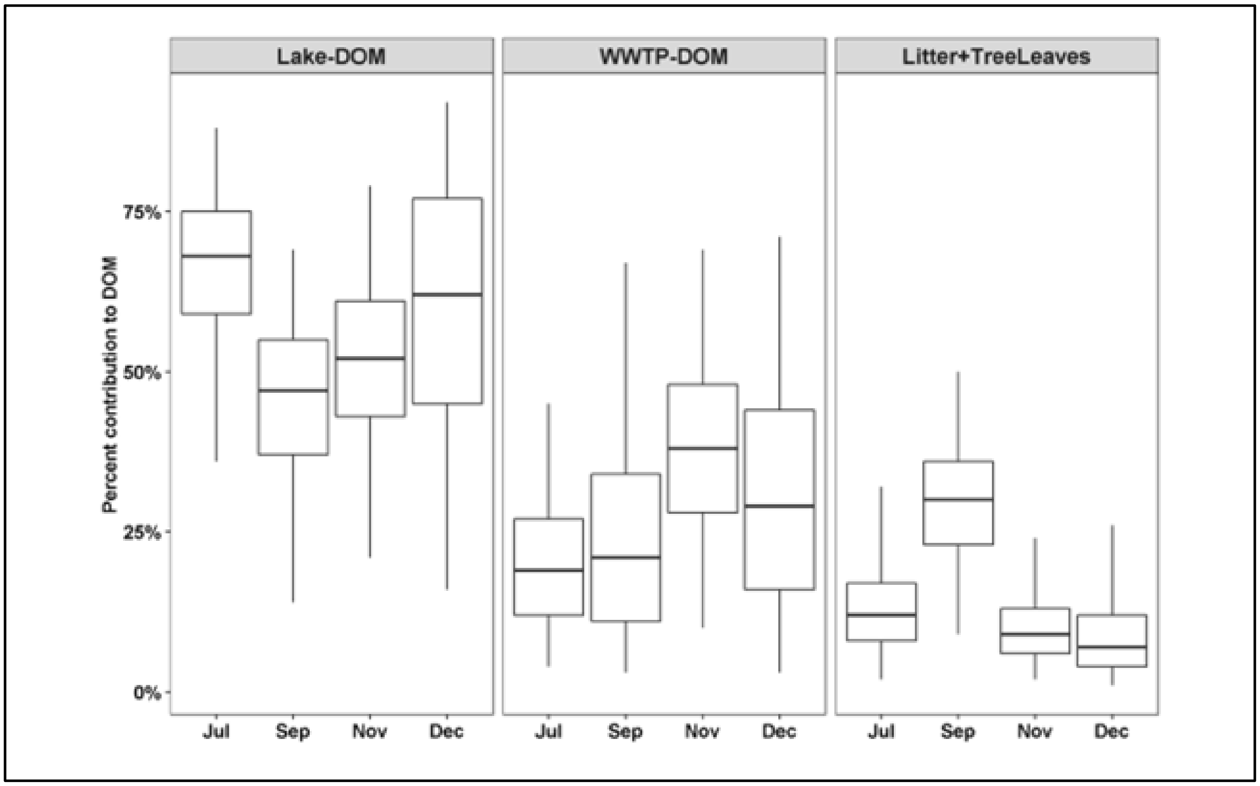

Figure 4-22. Percent feasible contributions to DOM from lake, POTWs, and litter and tree leaves.
Source: Kelso (2018:Figure 6).

As part of the Jordan River DO TMDL, a permissible load of OM was calculated based on a concentration of OM that could be plugged into the QUAL2Kw model and not violate a target DO concentration of 5.5 mg/L (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013). Bulk allocation and percent reductions of OM are summarized in Figure 4-23.

Source	Loads into Lower Jordan River	Contribution into Lower Jordan River (%)	Permissible Loads into Lower Jordan River	Daily Permissible Loads into Lower Jordan River (kg)	Percent Reduction into Lower Jordan River (%)
Point Sources Upstream of 2100 South	469,062	21%	283,185	776	40%
Point Sources Downstream of 2100 South	700,282	31%	405,858	1,112	42%
Nonpoint Sources Upstream of 2100 South	752,429	34%	545,532	1,495	27%
Nonpoint Sources Downstream of 2100 South	303,749	14%	139,055	381	54%
Total	**2,225,523**	**100%**	**1,373,630**	**3,763**	**38%**

Figure 4-23. Bulk allocations of existing total OM loads (kilograms/year) to meet DO water quality criteria in the lower Jordan River.
Source: UDWQ (2018).

4.4.3 Temperature

Water temperature is a fundamental parameter in aquatic ecosystems, influencing a wide range of physical, chemical, and biological processes. It directly affects the following:

- Solubility of oxygen: Warmer water holds less DO and can therefore influence oxygen availability for aquatic life.
- The breakdown of OM, nutrient cycling, and the metabolic rates of organisms, including bacteria and algae: Elevated temperatures can accelerate decomposition and increase the release of nutrients, potentially fueling algal growth.
- Biological community structure: Temperature can affect the distribution, abundance, and diversity of benthic macroinvertebrates and other aquatic species.
- pH: Warmer temperatures can lead to higher pH levels during periods of intense photosynthesis, or lower pH when microbial respiration dominates.

Based on the most recent 2024 303(d) list, four AUs within Salt Lake County are impaired based on temperature exceedances (Figure 4-24): Big Cottonwood Creek-1, Little Cottonwood Creek-1, Big Willow Creek, and Dry Creek. However, based on communications with UDWQ on June 19, 2025, the temperature impairments for Big Willow Creek and Dry Creek are incorrectly listed in the 2024 Integrated Report and the impairment is inaccurate (personal communication, email from Alan Ochoa Rodriguez, UDWQ, to Arianna Mason, Lead Water Resources Scientist, SWCA, June 19, 2025). These AUs were first reported on in the 2018/2020 Integrated Report and were split off from Jordan River-6, resulting in the temperature impairment being inaccurately carried over to both AUs (personal communication, email from Alan Ochoa Rodriguez, UDWQ, to Arianna Mason, Lead Water Resources Scientist, SWCA, June 19, 2025). These impairments will be updated as part of the 2026 Integrated Report that will be submitted by April 2026.

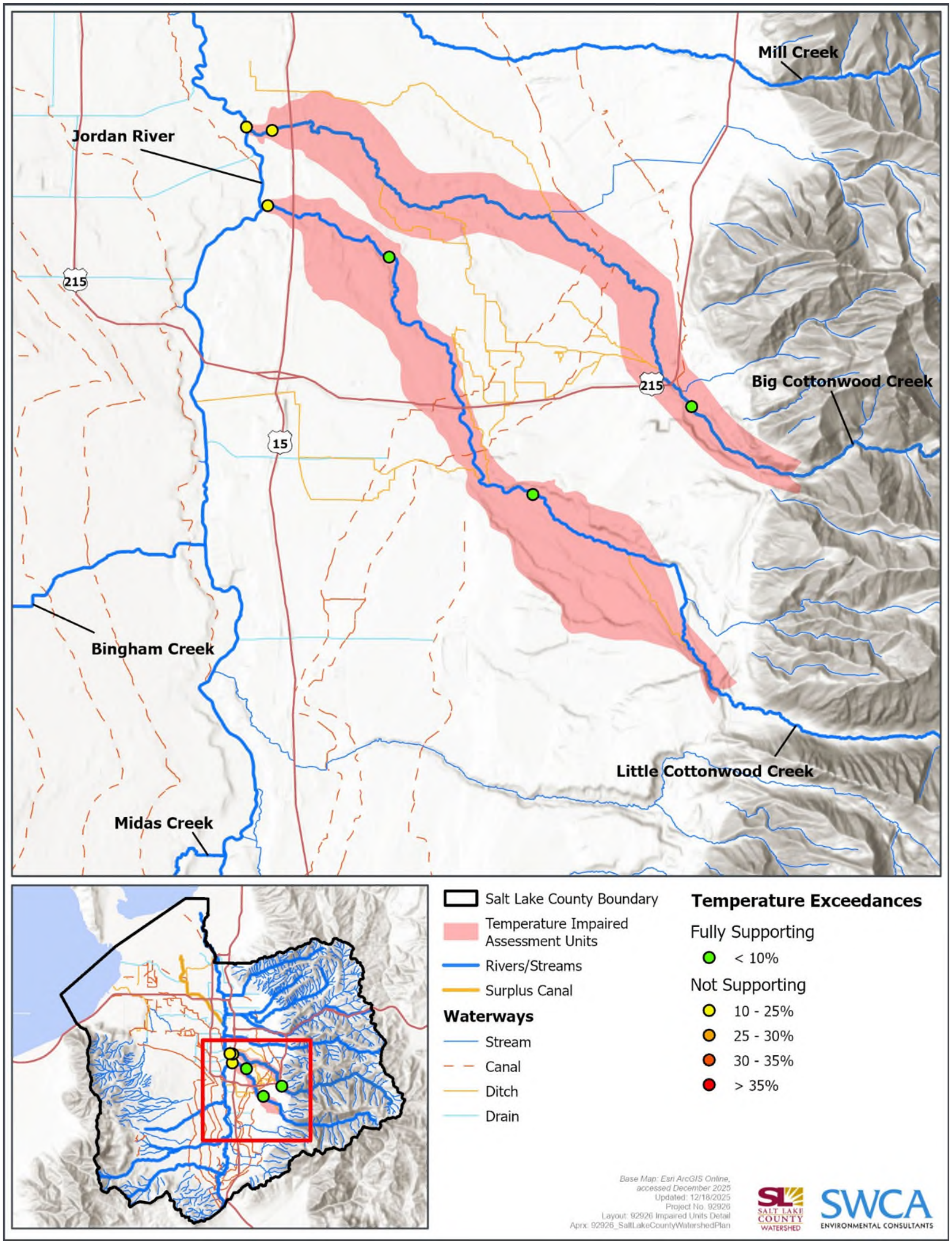

Figure 4-24. Impaired temperature AUs.

Table 4-18 summarizes the temperature water quality criteria that apply to the 303(d) impaired AUs within the Jordan River watershed that are impaired for Class 3A uses. A location does not meet the maximum temperature criterion if the percentage of representative samples that exceed the standard is greater than 10% within the period of record (UAC R317-2).

Table 4-18. Temperature Criteria for Class 3A and 3D Waters

Beneficial Use	Maximum Temperature (degrees Celsius)
3A	20

Temperature Impairment Summary

Table 4-19 summarizes the monitoring points within each impaired AU, and the percent exceedances as evaluated in the most recent 2024 Integrated Report.

Table 4-19. Maximum Temperature Exceedances in Big Cottonwood Creek-1 and Little Cottonwood Creek-1 AUs from the 2024 Integrated Report

AU	Monitoring Point ID	Sample Count	Exceedance Count	Percent Exceedance (%)
Big Cottonwood Creek-1	BC_00.70	117	16	14%
	BC_04.73	72	8	11%
	BC_00.37	10	2	20%
	BC_00.01	46	5	11%
Little Cottonwood Creek-1	LC_00.53	118	22	19%
	LC_00.08	56	8	14%

Source: UDWQ (2024).

As noted in Section 4.3.2.5, in Big and Little Cottonwood Creeks near developed areas, including campgrounds, trailheads, and residential zones, stream stability scores decrease. Contributing factors include hydrologic modification, vegetation loss, and streambank alterations. An added concern is water withdrawal where dewatering has impaired riparian integrity and stability. These exceedances and observations of stream stability suggest targeted opportunities for riparian shading, stormwater cooling, and hydrologic restoration on both Big and Little Cottonwood Creeks.

Seasonal Patterns in Temperature

Across Salt Lake County, temperatures are generally lowest in the winter months (December through February) and gradually increase through spring (March through May), peaking in summer (June through August). As the year progresses into fall (September through November), temperatures begin to decline again. This cycle results in a bell-shaped curve when average monthly temperatures are plotted, with a pronounced warm period in the middle of the year and colder conditions at the beginning and end.

Average monthly water temperature data from 2016 to 2025 were summarized for Big and Little Cottonwood Creeks. Average monthly water temperatures are highest during the months of July, August, and September (Figure 4-25). Additionally, specific monitoring location data show maximum temperatures above 20 degrees Celsius occurring in June, July, August, and September in both Big Cottonwood Creek and Little Cottonwood Creek AUs (Figure 4-26).

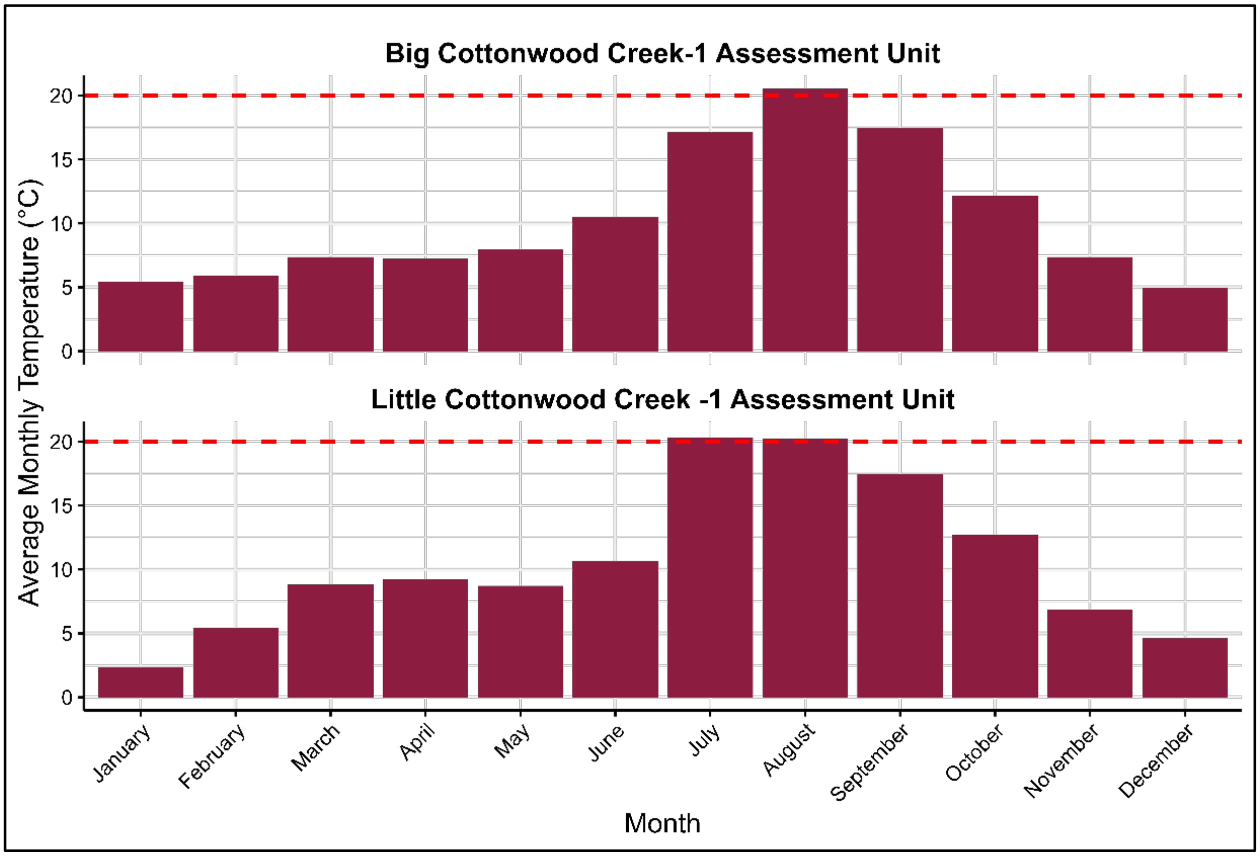

Figure 4-25. Average monthly water temperature in Big Cottonwood Creek-1 and Little Cottonwood Creek-1 AUs.

Note: Red dashed line indicates the 20-degree-Celsius maximum water temperature water quality standard for Class 3A waters as defined in UAC R317.

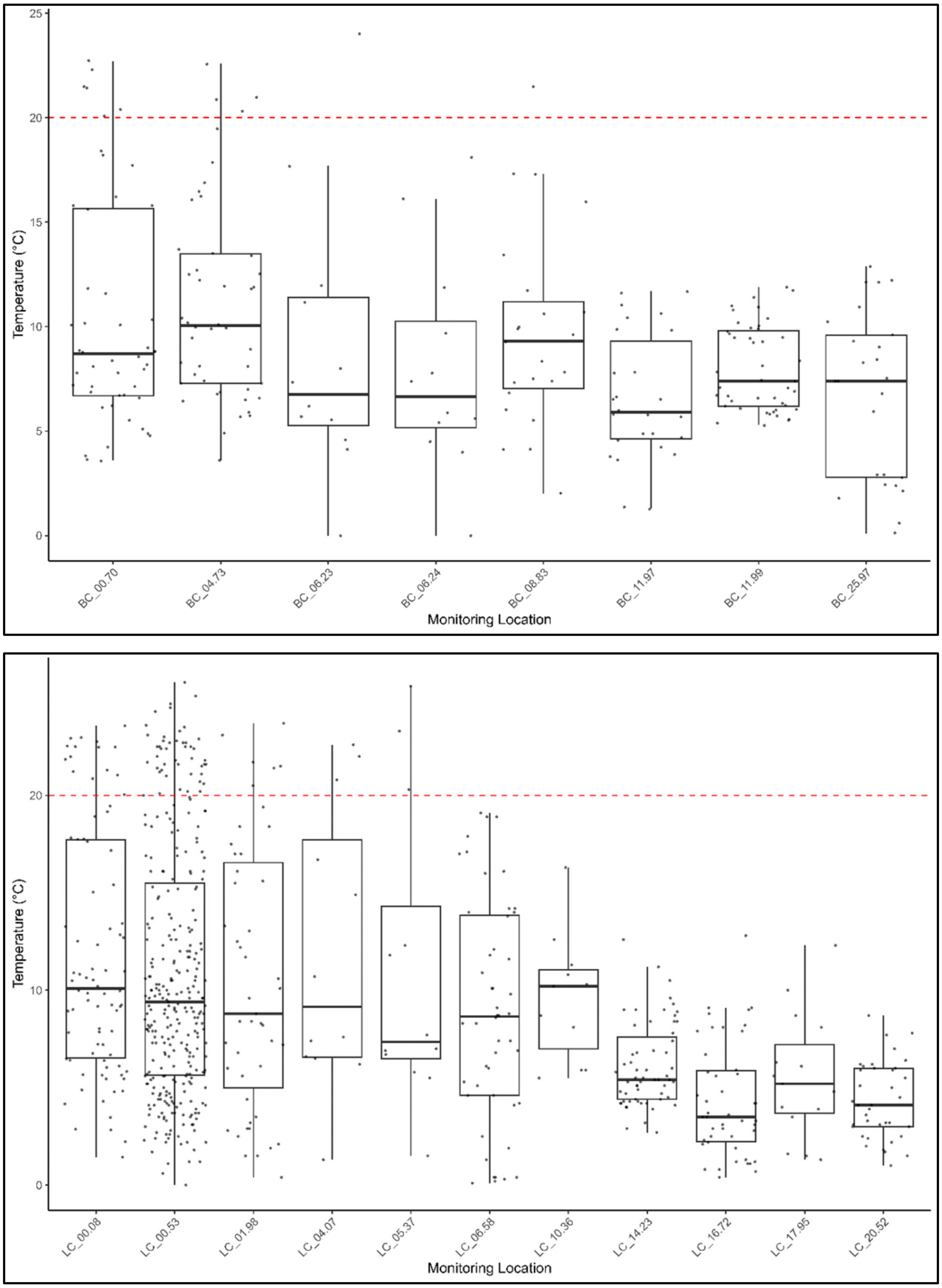

Figure 4-26. Instantaneous temperature values at monitoring locations in the Big Cottonwood Creek-1 (top) and Little Cottonwood Creek-1 (bottom) AUs, shown from upstream (L) to downstream (R).

Notes: Only locations with greater than 10 samples are shown in this figure.

Red dashed line indicates the 20-degree-Celsius maximum water temperature water quality standard for Class 3A waters as defined in UAC R317.

4.4.4 Metals

Understanding the fate and transport of metals in watersheds is essential for evaluating water quality impacts on human health and stream ecology. Metals, both natural and anthropogenic, enter watersheds through pathways like mine discharges, stormwater runoff, atmospheric deposition, and erosion of geologic formations. In aquatic systems, metals undergo complex processes affecting their distribution, concentration, and toxicity, which are crucial for predicting their movement and impact on ecosystems, human safety, and regulatory compliance. Metal bioavailability and toxicity in water are influenced by environmental factors like pH, temperature, and microbial activity, with free metal ions being highly toxic to aquatic organisms. Metals can degrade water quality by increasing toxicity levels, disrupting aquatic life, and posing health risks to humans who consume contaminated water.

Six AUs in Salt Lake County are impaired due to one or more types of metal for designated beneficial use Class 1C (domestic source) and 3A–D (aquatic wildlife) (Figure 4-27). Table 4-20 summarizes the arsenic, cadmium, copper, selenium, and zinc water quality criteria that apply to the 303(d) impaired AUs within the Jordan River watershed.

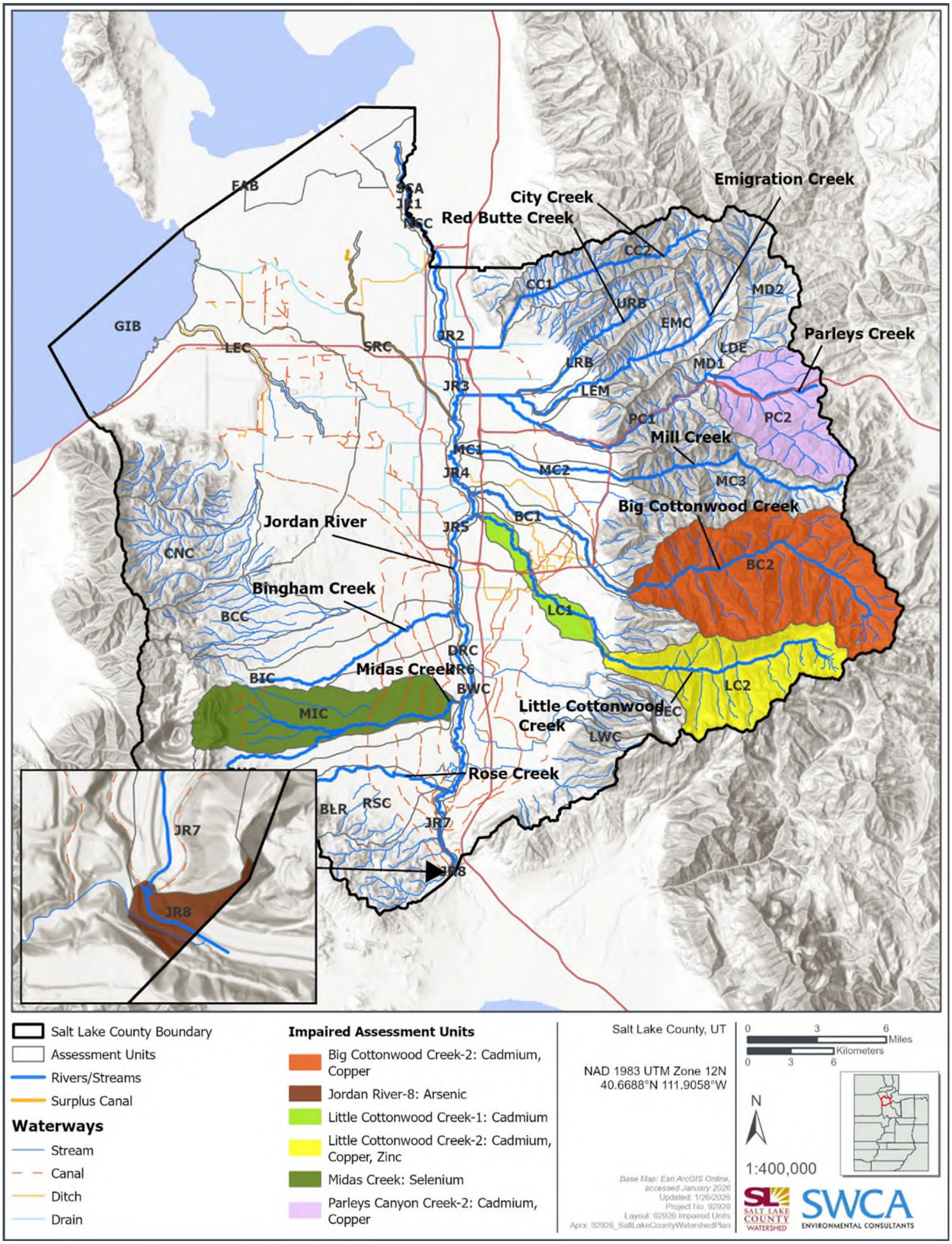

Figure 4-27. Impaired AUs for metals within Salt Lake County.

Table 4-20. Applicable Water Quality Criteria for Metals within Salt Lake County

Beneficial Use	Description	Dissolved Arsenic (ug/L)	Dissolved Cadmium (ug/L)	Dissolved Copper (ug/L)	Selenium (ug/L)	Dissolved Zinc (ug/L)
1C	Domestic source	0.05	N/A	N/A	N/A	N/A
3A, 3D	Aquatic wildlife-cold water and waterfowl, shorebirds, and other water-oriented wildlife (1-hour average)	N/A	0.72	9	4.6	120
3A, 3D	Aquatic wildlife-cold water and waterfowl, shorebirds, and other water-oriented wildlife (4-day average)	N/A	1.8	13	18.4	120

Source: UAC R317-2-6

N/A = Not applicable; ug/L = microgram per liter.

Note: Water quality criteria for metals data are hardness dependent; for this table, a 100-mg/L hardness value is assumed to be most protective.

Metal data within the impaired reaches of Salt Lake County are limited, with only a few locations and years available for each AU (Table 4-21). Per the Integrated Report methods, at least four samples per monitoring location are needed to assess whether the AU is supporting its beneficial uses, which leaves only one location on Big Cottonwood and Midas Creeks with sufficient samples, seven locations on Little Cottonwood Creek, and two locations on Parleys Creek.

Table 4-21. Summary of Metals Data within Impaired AUs

AU	Monitoring Location ID	Impaired Parameter	Fraction Type	Sample Date Range	Count	Minimum	Maximum	Average
Big Cottonwood Creek-2	BC_11.97	Cadmium	Dissolved	2023–2024	14	0.05	0.24	0.0
			Total	2023–2024	14	0.05	0.35	0.11
		Copper	Dissolved	2023–2024	14	0.33	1.28	0.95
			Total	2023–2024	14	1.4	**71.9**	**19.52**
Jordan River-8	JR_40.65	Arsenic	Dissolved	2017–2024	19	**4.96**	**23.8**	**12.44**
			Total	2017–2024	10	**6.51**	**17.7**	**11.32**
Little Cottonwood Creek-1	LC_05.37	Cadmium	Dissolved	2023–2024	4	0.05	**0.072**	0.06
	LC_00.08		Dissolved	2017–2024	18	0.05	**0.16**	0.07
			Total	2017–2024	14	0.11	0.59	0.27
	LC_04.07		Dissolved	2023- 2024	4	0.05	0.05	0.05
	LC_10.36		Dissolved	2015–2016	9	0.2	0.54	0.33
Little Cottonwood Creek-2	LC_14.23	Cadmium	Dissolved	2023–2024	7	0.05	**0.24**	**0.16**
			Total	2023–2024	7	0.14	0.34	0.30
		Copper	Dissolved	2023–2024	7	0.65	1.94	1.14
			Total	2023–2024	7	1.22	**128**	**24.90**
		Zinc	Dissolved	2023–2024	7	5.65	20.8	9.94
			Total	2023–2024	7	8.35	42.2	18.05
	LC_10.80	Cadmium	Dissolved	2017–2018	10	0.08	0.38	0.21
			Total	2017–2018	6	0.09	0.38	0.24
		Copper	Dissolved	2017–2018	10	0.55	8.36	2.26
			Total	2017–2018	6	0.85	2.82	1.61
		Zinc	Dissolved	2017–2018	10	6.49	34.6	18.38
		Zinc	Total	2017–2018	6	5.47	31.4	17.97
Midas Creek	MS_00.12	Selenium	Dissolved	2017-2024	24	0.25	**5.15**	2.18
			Total	2023-2024	14	0.50	**5.73**	3.68

AU	Monitoring Location ID	Impaired Parameter	Fraction Type	Sample Date Range	Count	Minimum	Maximum	Average
Parleys Canyon Creek-2	LB_00.55	Cadmium	Dissolved	2023–2024	7	0.05	0.05	0.05
			Total	2023–2024	7	0.05	0.36	0.14
		Copper	Dissolved	2023–2024	7	0.24	0.80	0.49
	PC_14.40	Cadmium	Dissolved	2017–2024	11	0.05	0.06	0.05
			Total	2017–2018	8	0.05	0.05	0.05
		Copper	Dissolved	2017–2024	8	1.52	6.12	2.92

Note: **Bolded** values indicate values above water quality criteria outlined in Table 4-20.

Arsenic

The sole AU within Salt Lake County identified as impaired for arsenic is Jordan River-8, which is listed as not meeting designated beneficial use Class 1C (domestic source) (Figure 4-27). Although only a small portion of the Jordan River-8 AU lies within the county, the AU within the county's boundaries significantly exceeds the water quality criteria, with an average arsenic concentration of 23 micrograms per liter (Figure 4-28; see Table 4-20).

Cadmium

Four AUs within the county are identified as impaired for cadmium for not meeting designated beneficial use Class 3A (aquatic wildlife-cold water) (Figure 4-27). Data from the past 10 years for dissolved cadmium are below the acute water quality standard (Figure 4-29). Higher concentrations of cadmium are observed at the monitoring locations near the headwaters of Little Cottonwood Creek.

Copper

Three AUs within the county are identified as impaired for copper for not meeting beneficial use Class 3A (aquatic wildlife-cold water) (Figure 4-27). Data from the past 10 years for dissolved copper are below the acute water quality standard (Figure 4-30). Copper concentrations in Little Cottonwood Creek increase moving downstream.

Selenium

The Midas Creek AU is impaired for selenium for not meeting beneficial use Class 3D (waterfowl, shorebirds, and other water-oriented wildlife) (Figure 4-27). Data available from the past 10 years for dissolved selenium show exceedances above the acute water quality standard, with higher concentrations in the total fraction (Figure 4-31).

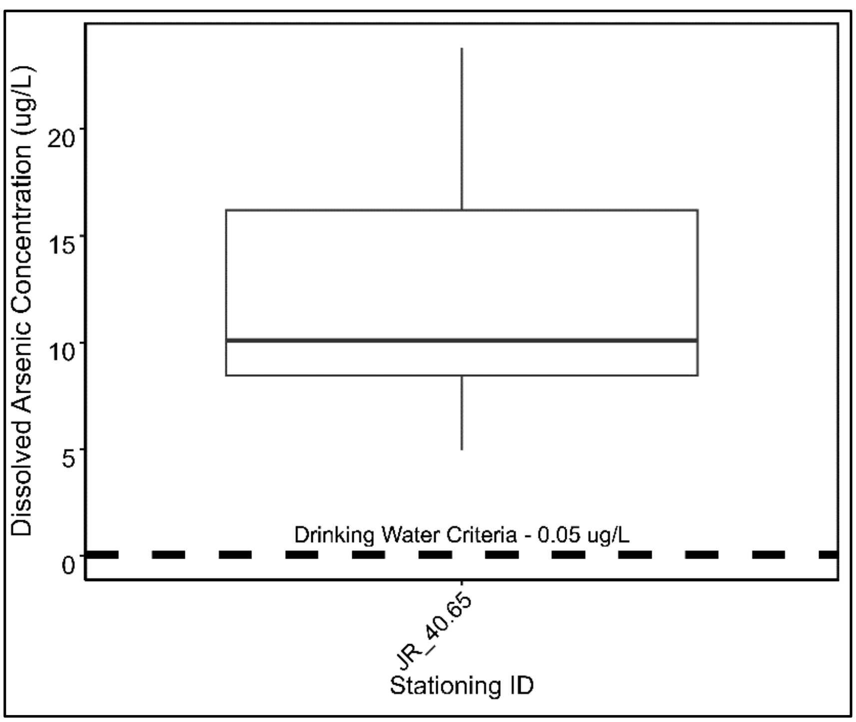

Figure 4-28. Arsenic concentrations from 2015 to 2024 in the Jordan River-8 AU.

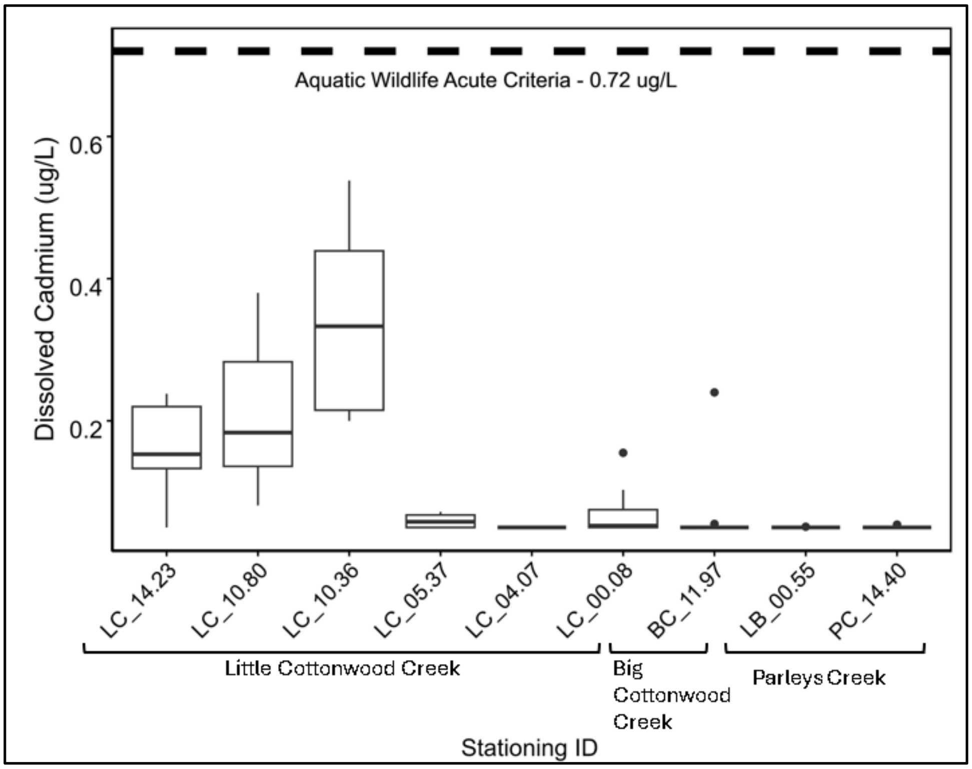

Figure 4-29. Cadmium concentrations from 2015 to 2024 in Little Cottonwood Creek, Big Cottonwood Creek, and Parleys Creek.

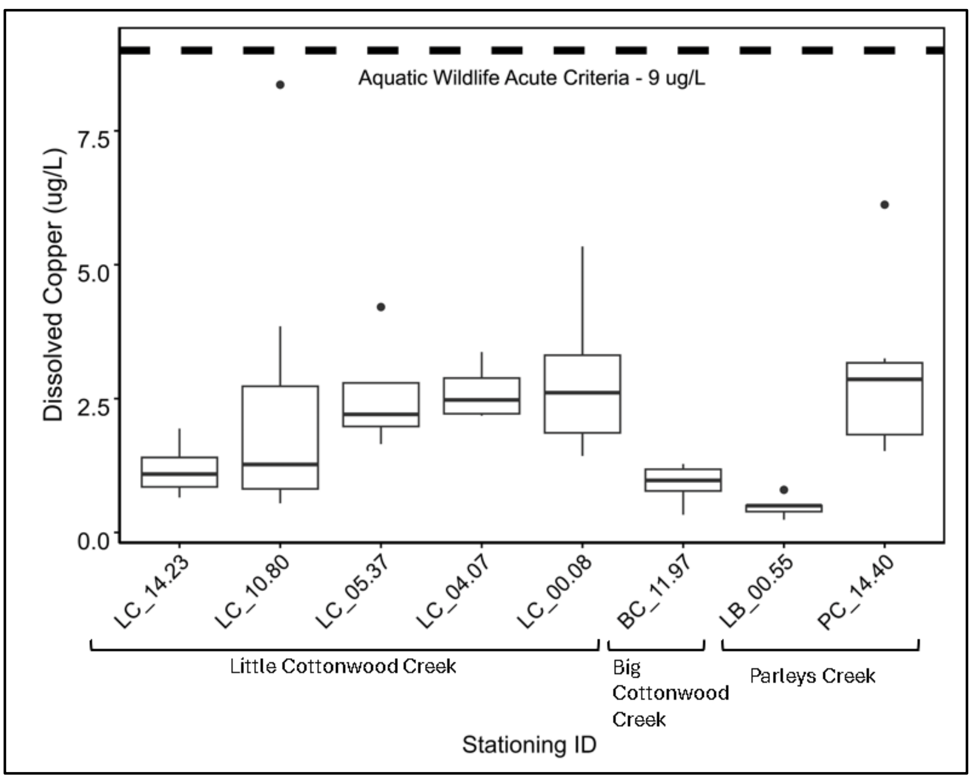

Figure 4-30. Copper concentrations from 2015 to 2024 in Little Cottonwood Creek, Big Cottonwood Creek, and Parleys Creek.

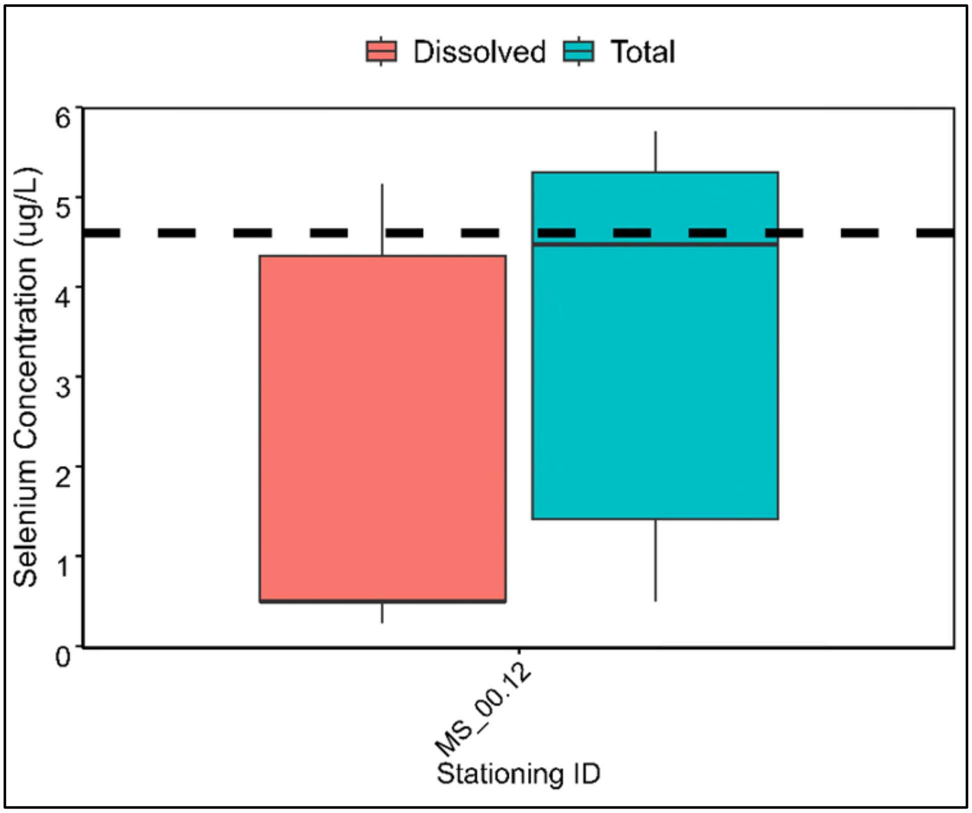

Figure 4-31. Selenium concentrations from 2015 to 2024 in Midas Creek AU.

Zinc

Zinc toxicity affects fish and macroinvertebrates, which are crucial to the aquatic food chain, and zinc toxicity levels are influenced by water hardness. The sole AU within the county identified as impaired for zinc is the Little Cottonwood Creek-2 AU, which is listed as not meeting designated beneficial use Class 3A (aquatic wildlife-cold water) (Figure 4-27).

There is an EPA-approved TMDL study for Little Cottonwood Creek that addresses dissolved zinc pollution from its headwaters to the confluence with Red Pine Fork (Shepherd Miller 2002). Initiated after a 1994 monitoring program revealed zinc levels exceeding water quality criteria for cold water fisheries, Little Cottonwood Creek was listed on Utah's 2000 303(d) list of impaired waters. The area, influenced by historic mining activities, features numerous mine shafts and overburden piles, particularly around Alta.

Significant zinc pollution sources identified in the TMDL include the Howland Tunnel and Wasatch Drain Tunnel. The TMDL study identifies both point and nonpoint sources contributing to zinc loads in Little Cottonwood Creek. Significant point sources included the Howland Tunnel and Wasatch Drain Tunnel, with discharges from the Snowbird co-generation plant and bypass flow contributing notably to zinc levels. Nonpoint sources comprised diffuse groundwater inflows and surface runoff, influenced by precipitation and snowmelt events. These nonpoint sources, along with natural background zinc loads, were challenging to isolate due to the area's historic mining activities (Shepherd Miller 2002).

A 1998 USGS synoptic study provided a comprehensive assessment of zinc loading, revealing that zinc concentrations exceeded both acute and chronic criteria in certain areas, particularly below the Wasatch Drain Tunnel (Shepherd Miller 2002). This study also highlighted the significant role of diffuse subsurface inflows, which accounted for approximately 48% of zinc loading during the study period. The TMDL study used an assumed background zinc concentration of 0.04 mg/L based on measurements in drainages with limited mining activity, such as White Pine Fork and Gad Valley Gulch (Shepherd Miller 2002).

Stormwater monitoring in 1990 indicated increased zinc loading during storm events, although the temporal component of zinc loading was not deemed a significant factor in water quality impairment (Shepherd Miller 2002). The study identified the Howland and Wasatch Drain Tunnels as the primary zinc loading sources, with the Wasatch Drain Tunnel alone accounting for 40% of the total load. Despite remediation efforts, such as those in the Tanner Flat area, further sampling was recommended to confirm zinc loading sources.

Overall, the TMDL study concluded that zinc loading from the Howland and Wasatch Drain Tunnels significantly impacted Little Cottonwood Creek's water quality, necessitating management efforts to mitigate these sources and protect the creek's ecological health.

Data for zinc are still limited within Little Cottonwood Canyon since the development of the TMDL; however, of the samples collected in the past 10 years, they all remain below the aquatic wildlife acute standard (Figure 4-32). This possibly indicates that implementation activities from the TMDL have been successful; however, more monitoring, particularly during different hydraulic events (storm and spring runoff), is needed to confirm this.

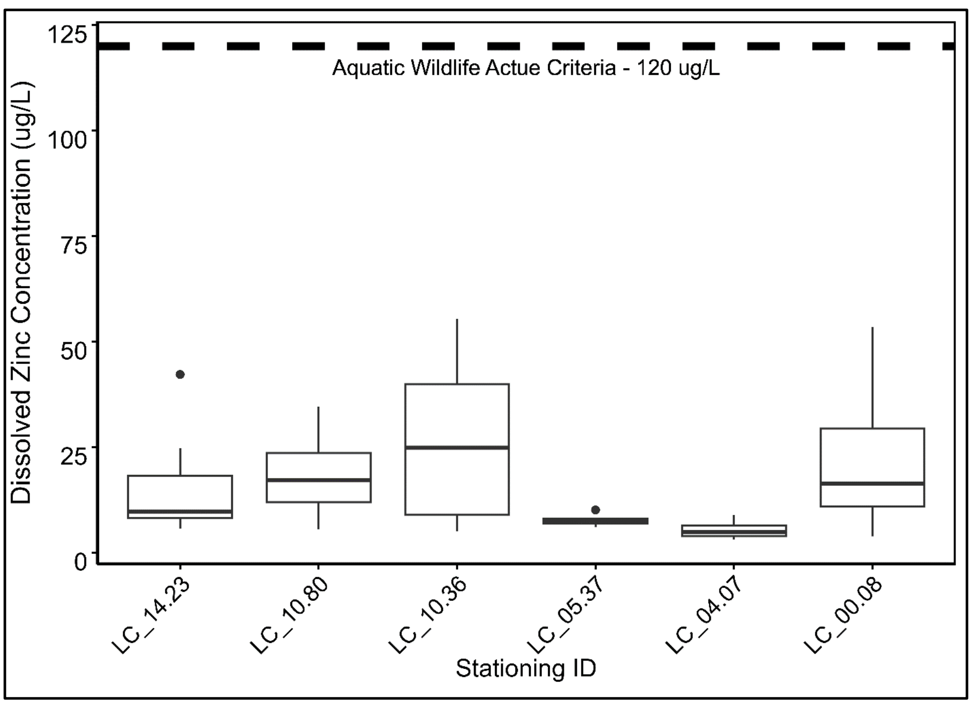

Figure 4-32. Zinc concentrations from 2015 to 2024 in Little Cottonwood Canyon.

4.4.4.1 ESTIMATED POLLUTANT LOADS AND REDUCTIONS NEEDED

b

EPA ELEMENT

Quantify current loads using monitoring/modeling to estimate necessary load reductions and how much each implementation action will reduce pollutant loads.

The TMDL study for Little Cottonwood Creek involved allocating zinc loads at target sites, considering both nonpoint sources and natural background loads (Shepherd Miller 2002). The following loads and load reduction were made for two target sites along Little Cottonwood Creek:

- **Little Cottonwood Creek below Howland** (Target Site 1): The allocation was based on data from the 1998 USGS synoptic study, which calculated nonpoint source loads at discrete locations (USGS 1998). Inflows above this target site ranged from 0.01 to 0.041 mg/L, with a combined background and nonpoint source load calculated using a concentration of 0.04 mg/L, providing a MOS. Treatment of Howland Tunnel discharge to reduce zinc concentrations from 5 to 0.01 mg/L was deemed feasible. No treatment was needed under certain conditions in 2001, but up to 55% of the discharge required treatment during low-flow conditions.
- **Little Cottonwood Creek below Wasatch** (Target Site 2): A similar approach was used, accounting for additional nonpoint sources identified between Howland and Wasatch. Inflows contributed a total load of 3.2 pounds per day, with a concentration of 0.15 mg/L used for calculations. This provided another MOS by not considering zinc attenuation in the creek. Reducing discharge from the Wasatch Drain Tunnel was a method to meet WLAs. During peak runoff periods, significant water could be discharged without exceeding zinc criteria. Conservative assumptions led to WLAs being three times larger than those based on measured stream values, suggesting an average of both for TMDL use.

Currently, the Howland Tunnel is collapsed, and there is no active drainage (personal communication, Robert Thompson, Salt Lake County, to Lily Wetterlin, Project Water Resources Scientist, SWCA, October 24, 2025). Given that the TMDL study for Little Cottonwood Creek is more than 20 years old, it would be beneficial for UDWQ to provide an updated report to determine whether the estimated pollutant reductions have been achieved.

4.4.5 Benthic Macroinvertebrate Assessment

Benthic macroinvertebrates are small aquatic animals, including the larval stages of insects, that live on the bottoms of streams, rivers, and lakes. These organisms are commonly used as indicators of the biological conditions of waterbodies because they spend all or most of their lives in water, are easy to collect, and differ in their tolerance to pollution (EPA 2025b). Based on the most recent 2024 303(d) list, 15 AUs within Salt Lake County are impaired based on benthic macroinvertebrate abundance and variety. The impaired AUs are presented in Figure 4-33.

Although there are no numeric criteria for benthic macroinvertebrate indices, biological assessments fall under narrative standards and are recognized as indicators of water quality. Under Utah Water Quality Standards (UAC R317-2-7), the results of the quantitative biological assessments, such as benthic macroinvertebrate analysis, may be used for purposes of water quality assessment. This includes assessments required by Sections 303(d) and 305(b) of the federal CWA (33 United States Code 1313(d) and 1315(b)).

The UDWQ uses the River Invertebrate Prediction and Classification System (RIVPACS) model approach to quantify biological integrity (Wright 1995). RIVPACS is a system that classifies freshwater sites using macroinvertebrate communities to predict which invertebrate species should be present under undisturbed reference conditions. UDWQ's RIVPACS model, verified and updated by the Utah State University BugLab, compares the observed (O) taxa at a site to the expected (E) taxa from similar, minimally disturbed reference sites. This comparison, expressed as the O/E ratio, serves as an index of biological integrity to assess stream health. More details about Utah's RIVPACS model are available on the UDWQ website (UDWQ 2022).

To translate O/E values into assessment categories, thresholds are set based on the 5th and 10th percentiles of reference sites, with the current assessment using a 5th percentile threshold of 0.69 and a 10th percentile threshold of 0.76. These thresholds are applied to data averaged over 6 years because using multiple years helps account for variability and reduces the risk of misclassifying biological beneficial use support due to unusual sampling events (Table 4-22). The results from the 2024 Integrated Report are presented in Figure 4-33.

Table 4-22. Beneficial Use Support Determination for O/E Values Obtained from Different Sample Sizes

Sample Size	O/E Threshold	Use Determination
≥ 1 sample collected over 6 years	Mean O/E score ≥ 0.76	Fully supporting
≥ 3 samples collected over 6 years	Mean O/E score < 0.76	Not supporting
< 3 samples	Mean O/E score ≥ 0.69 ≤ 0.76	Insufficient data with exceedances
< 3 samples	2 O/E scores < 0.69	Not supporting
< 3 samples	1 O/E scores < 0.69	Insufficient data

Source: UDWQ (2025b).

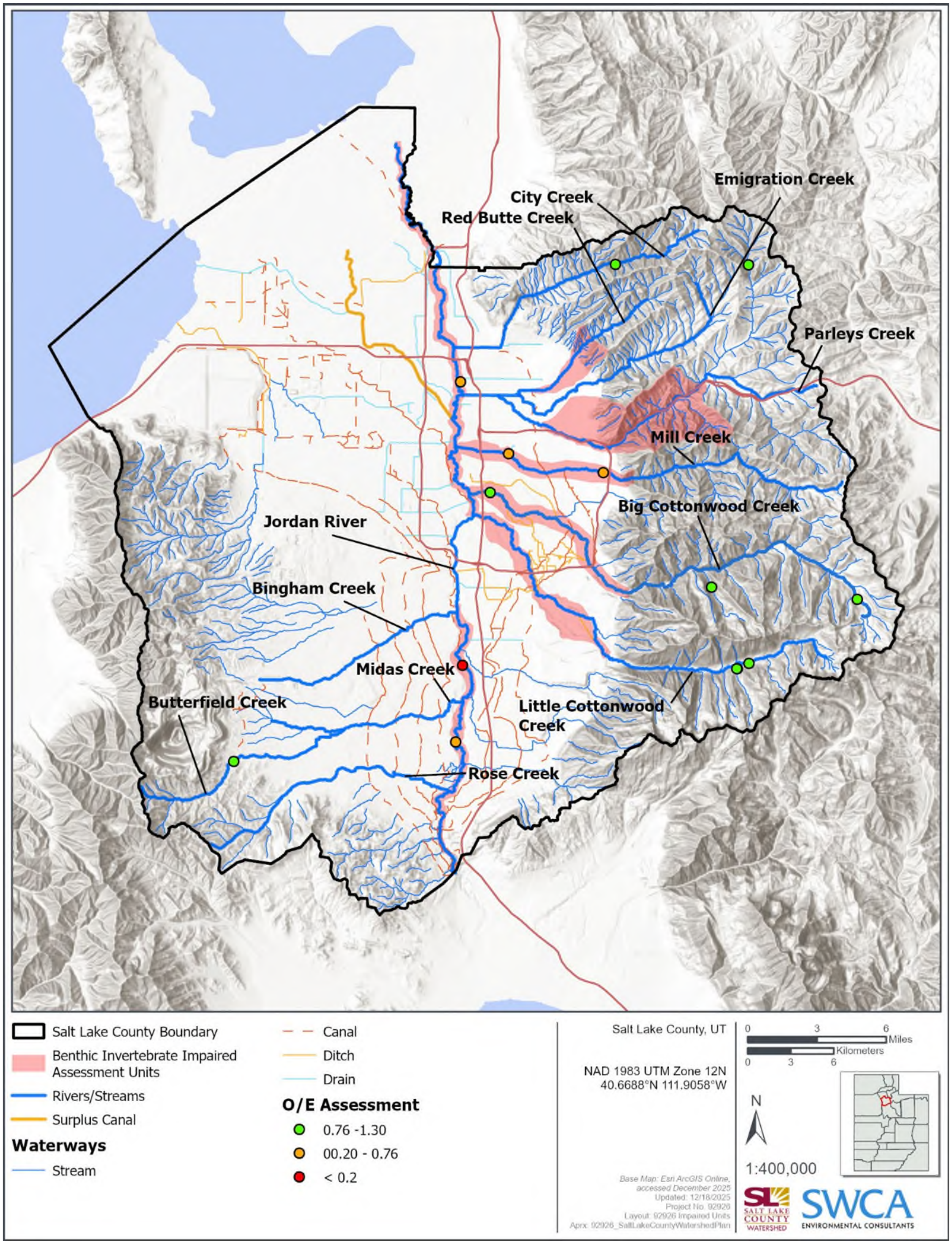

Figure 4-33. O/E Assessment scores across Salt Lake County.

Salt Lake County also collects benthic macroinvertebrate data and uses the Karr Benthic Index of Biotic Integrity (Karr BIBI) method to measure degradation of habitat condition and water quality. This index is dependent on habitat, salinity, and season and integrates multiple parameters, such as total abundance/biomass, species diversity, and prevalence of pollution tolerant/sensitive taxa relative to reference communities/conditions (National Oceanic and Atmospheric Administration et al. n.d.).

The benthic macroinvertebrate analysis followed a standardized multi-step protocol to ensure consistency and comparability of results. The Karr BIBI scores were calculated for each monitoring site in the county from 2017 to 2024. A biological condition gradient was assigned to Karr BIBI score ranges. The EPA uses the biological condition gradient as a framework that describes change in the biological condition of aquatic ecosystems in response to increasing levels of stress (pollution, habitat, alteration, or flow modifications). This framework is intended to complement existing biological assessment and can be populated with state or regional data to develop a quantitative model and establish numeric thresholds (EPA 2016). Table 4-23 presents the relationship between the Karr BIBI scores and their associated biological condition gradient, as summarized from EPA (2016).

Table 4-23. Benthic Macroinvertebrate Karr BIBI Score Description

Karr BIBI Score	Biological Condition Gradient	Description
10–15	Very Poor	Severely degraded; very few, highly tolerant species remain; extremely poor water quality and severely altered habitat.
16–25	Poor	Degraded condition; tolerant species dominate, sensitive species absent; poor water quality and heavily modified habitat.
26–28	Fair	Noticeable stress; sensitive taxa declining and tolerant species increasing; water quality and habitat moderately altered.
39–46	Good	Mostly healthy with minor stress indicators; sensitive species still present and habitat largely intact with limited human influence.
47–50	Excellent	Natural, intact communities with high diversity and no signs of stress; pristine water quality and unmodified habitat.

Source: Berni (2025).

Figure 4-34 shows generally fair to good biological conditions in the headwaters of streams, with poor conditions concentrated within the urbanized Salt Lake County basin. Poor biological conditions were primarily observed along several tributaries to the Jordan River, including the lower reaches of Red Butte, Parleys, Big and Little Cottonwood, and Mill Creeks. Several key stressors contribute to the decline in stream habitat health, including sedimentation, hydromodification, elevated water temperatures, and pollutant and nutrient loading. Although this may suggest that population density and urbanization-derived pollution inputs are the cause for poor biological health within these streams, variables associated with biological degradation in streams are not solely related to pollution. Multilevel modeling identified stream temperature as a major driver of both 1) taxa presence and assemblage health, and 2) speed and degree of change in biological communities once urbanization stressors are applied (Cuffney et al. 2008). The Wasatch Front Water Quality Council has published additional research on the Jordan River, including a habitat assessment and studies on benthic invertebrates and fish assemblages; this research is available online (Richards et al. 2024).

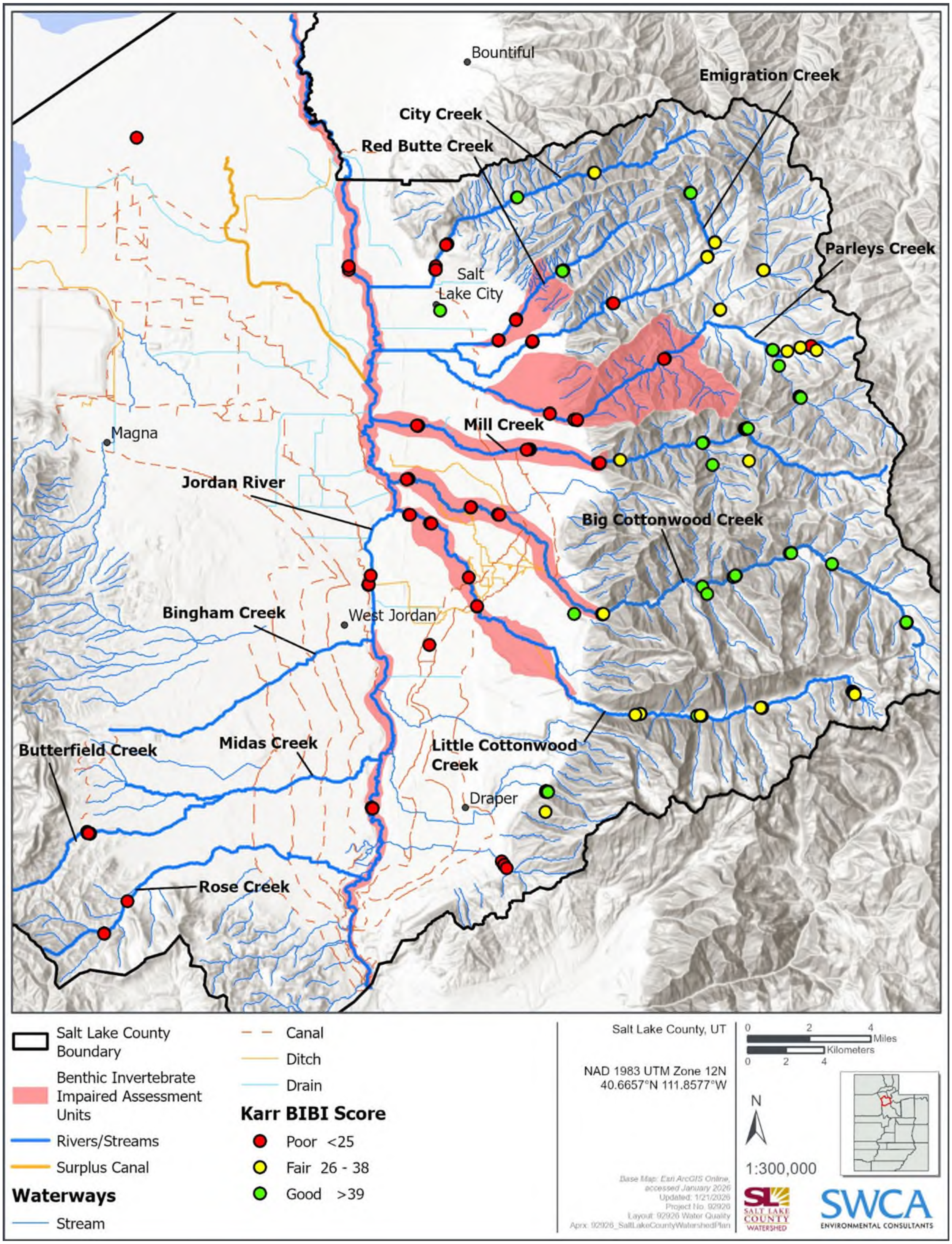

Figure 4-34. Biological monitoring sites across Salt Lake County.

4.4.6 Total Phosphorus

Excess phosphorus in waterbodies leads to eutrophication, which promotes HABs that deplete oxygen and threaten aquatic life. These blooms can block sunlight and, as they decompose, further reduce oxygen levels, resulting in hypoxic conditions and loss of biodiversity as sensitive species die-off. Additionally, some algae produce toxins that contaminate drinking water and recreational areas, posing risks to both aquatic organisms and human health. Overall, nutrient loading disrupts ecosystem dynamics, altering species composition and habitat quality and causing lasting impacts on stream health. Total phosphorus impairments within Salt Lake County are limited to the Jordan River-3 AU. There are no total phosphorus TMDL studies associated with the watersheds within Salt Lake County. Table 4-24 lists pollution indicators for total phosphorus for beneficial uses within the county.

Table 4-24. Applicable Total Phosphorus Pollution Indicators

Beneficial Use	Description	Total Phosphorus (mg/L)*
1C	Domestic source	Headwater rivers and streams: 0.035 mg/L† Rivers and streams: 0.05 mg/L Lakes and reservoirs: 0.025 mg/L
2B	Infrequent primary contact recreation	
3A	Aquatic wildlife-cold water	

Source: UAC R317-2-6.

* Pollution indicator; there is no water quality standard for total phosphorus.

† Criteria for headwater nutrient numeric criteria.

Between 2015 and 2024, monthly sampling results from more than 50 monitoring locations collected by Salt Lake County and UDWQ staff provided valuable insights into the temporal and spatial extent of the total phosphorus pollution. Figure 4-35 illustrates average total phosphorus concentrations from this period across three hydrologic conditions—spring runoff, storms, and baseflow—which were identified by correlating precipitation and flow data. During baseflow, 51% of 65 monitoring locations total phosphorus average concentrations were higher than the 0.05-mg/L pollution indicator. In spring runoff, 62% of 62 locations had average concentrations above the 0.05-mg/L pollution indicator. Storm conditions also exhibited 62% of 52 locations having average concentrations above the pollution indicator. Higher concentrations of total phosphorus were observed throughout the mainstem of the Jordan River and in the lower sections of the tributaries once leaving the canyons and into the valley (Figure 4-35). Average total phosphorus increases were observed in the lower reaches of tributaries, primarily Emigration, Parleys, and Mill Creeks, during storm conditions. Elevated total phosphorus is a primary driver of HABs and eutrophication concerns in waterways downstream of these tributaries, and consideration to variances in phosphorus loading under different hydrologic conditions is necessary for successful watershed management. Locations with fewer than three samples were excluded from the analysis, and some did not have samples within spring runoff or storm hydrologic periods.

The long-term average phosphorus concentration at 35 out of 65 monitoring locations exceeded the Utah water quality pollution indicator for total phosphorus, which is 0.05 mg/L for rivers and streams (UAC R317-2-14.1). Additionally, the percent exceedance of the pollution indicator was calculated for each site, with 46 of the 65 sites having more than 10% exceedances, and over half of those exceeding by 50% or more (n = 28).

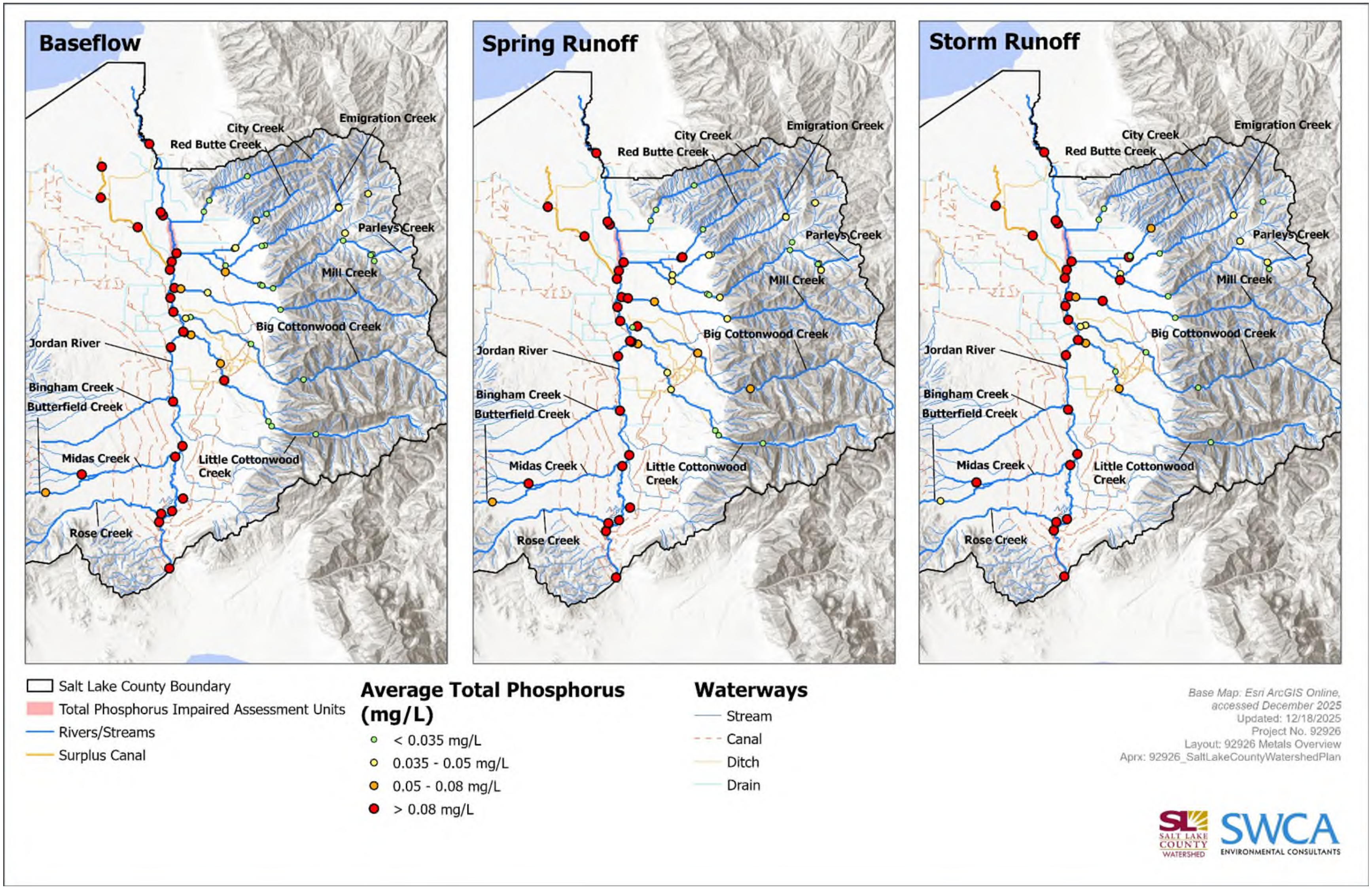

Figure 4-35. Average total phosphorus concentrations measured from 2015 to 2024 under varying hydrological conditions, including baseflow, spring runoff, and storm runoff.

4.4.7 Total Dissolved Solids

TDS refer to the combined content of all inorganic and organic substances dissolved in water, including minerals, salts, and metals. High TDS levels can affect water taste, lead to scaling in pipes and appliances, and potentially harm aquatic life by altering the water's ionic composition. Sources of TDS include urban contributors (such as road salt, fertilizers, and the discharge of soaps and chemicals) that end up in stormwater runoff, agricultural runoff from fertilizers and pesticides, and effluent from industrial facilities or POTWs. Based on the most recent 2024 303(d) list, 10 AUs within Salt Lake County are impaired for TDS, and five of those are segments of the Jordan River. The impaired AUs are identified in Figure 4-36.

Table 4-25 summarizes the TDS water quality criteria that apply to the 303(d) impaired AUs within the Jordan River watershed.

Table 4-25. Applicable TDS Water Quality Criteria for Impaired AUs in the Jordan River Watershed

Beneficial Use	Description	TDS (mg/L)
4	Agriculture - crop irrigation, stock watering	1,200

Source: UAC R317-2-6.

Between 2015 and 2024, monthly sampling results from more than 100 monitoring locations collected by Salt Lake County and UDWQ staff provided valuable insights into the temporal and spatial extent of the TDS impairment. Figure 4-36 illustrates average TDS concentrations from this period across two different time periods: 1) the warmer non-deicing season (May through October) and 2) the colder deicing season (November–April). In the deicing season, 30% of the sites had an average TDS value higher than the 1,200-mg/L water quality criteria compared to only 14% of the sites during the non-deicing season. The highest exceedances are observed in the Jordan River (Segments 3–8), with additional hotspots in the lower portions of Big Cottonwood Creek, Little Cottonwood Creek, and Mill Creek. Higher up in the watershed, elevated TDS values are also observed in Emigration and Parley Canyons.

Figures 4-37 illustrates average TDS concentrations from this period across three hydrologic conditions—spring runoff, storms, and baseflow—which were identified by correlating precipitation and flow data. During baseflow, 20% of 160 monitoring locations TDS average concentrations were higher than the 1,200-mg/L water quality criteria. In spring runoff, only 5% of 111 locations had average concentrations above the 1,200-mg/L water quality criteria. Storm conditions exhibited the highest TDS concentrations with 31% of 98 locations having average concentrations above the water quality criteria. Higher concentrations of TDS were observed throughout the mainstem of the Jordan River, with the highest concentrations during storm runoff in Jordan River-3 and Jordan River-4. High concentrations of TDS were also observed in the baseflow and storm runoff samples at the headwaters of Parleys Creek and in the lower section of Mill Creek before converging with the Jordan River (see Figure 4-37). Locations with fewer than three samples were excluded from the analysis, and some did not have samples within spring runoff or storm hydrologic periods.

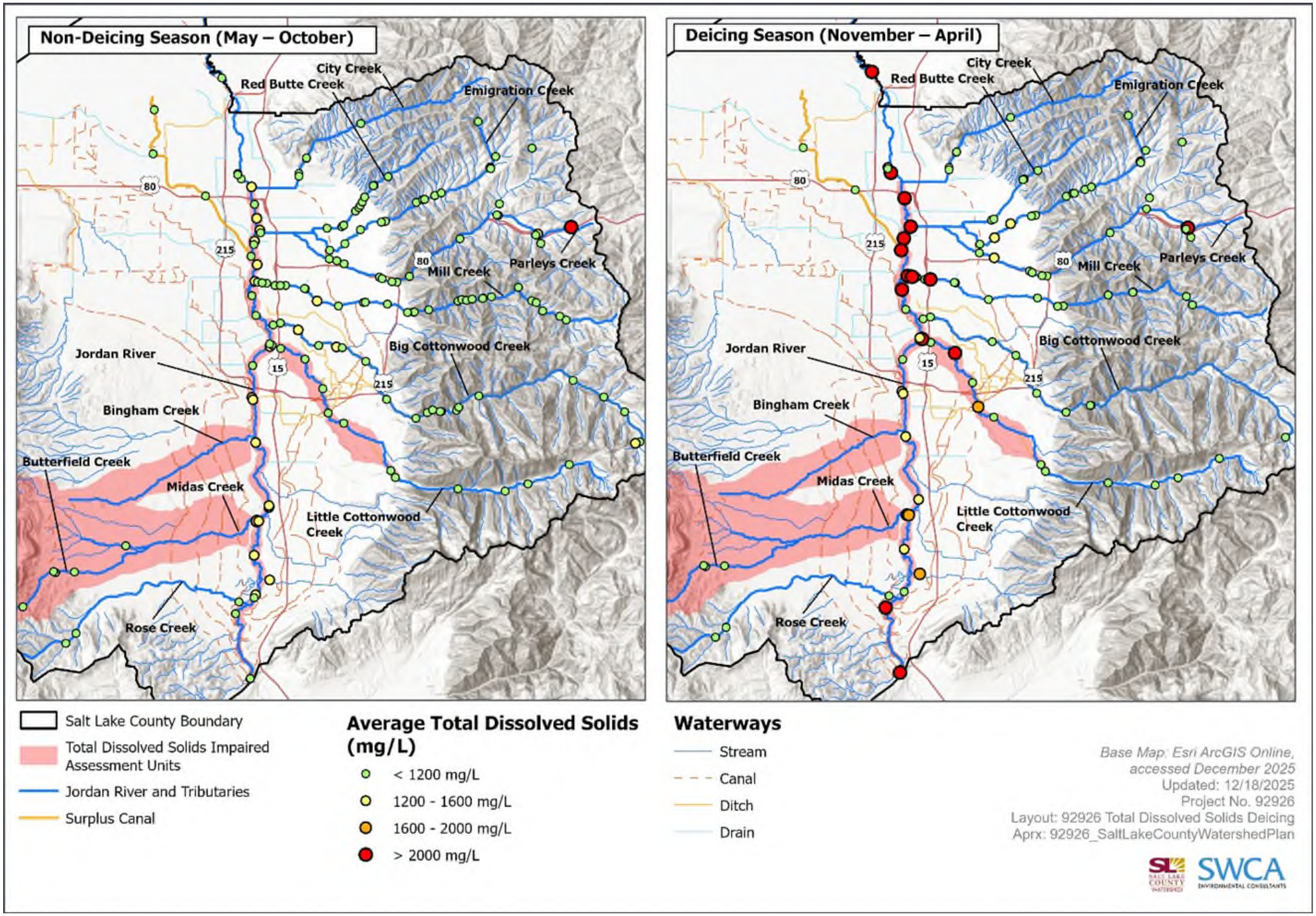

Figure 4-36. Average TDS measured from 2015 to 2024 during the non-deicing season (May through October) and the deicing season (November–April).

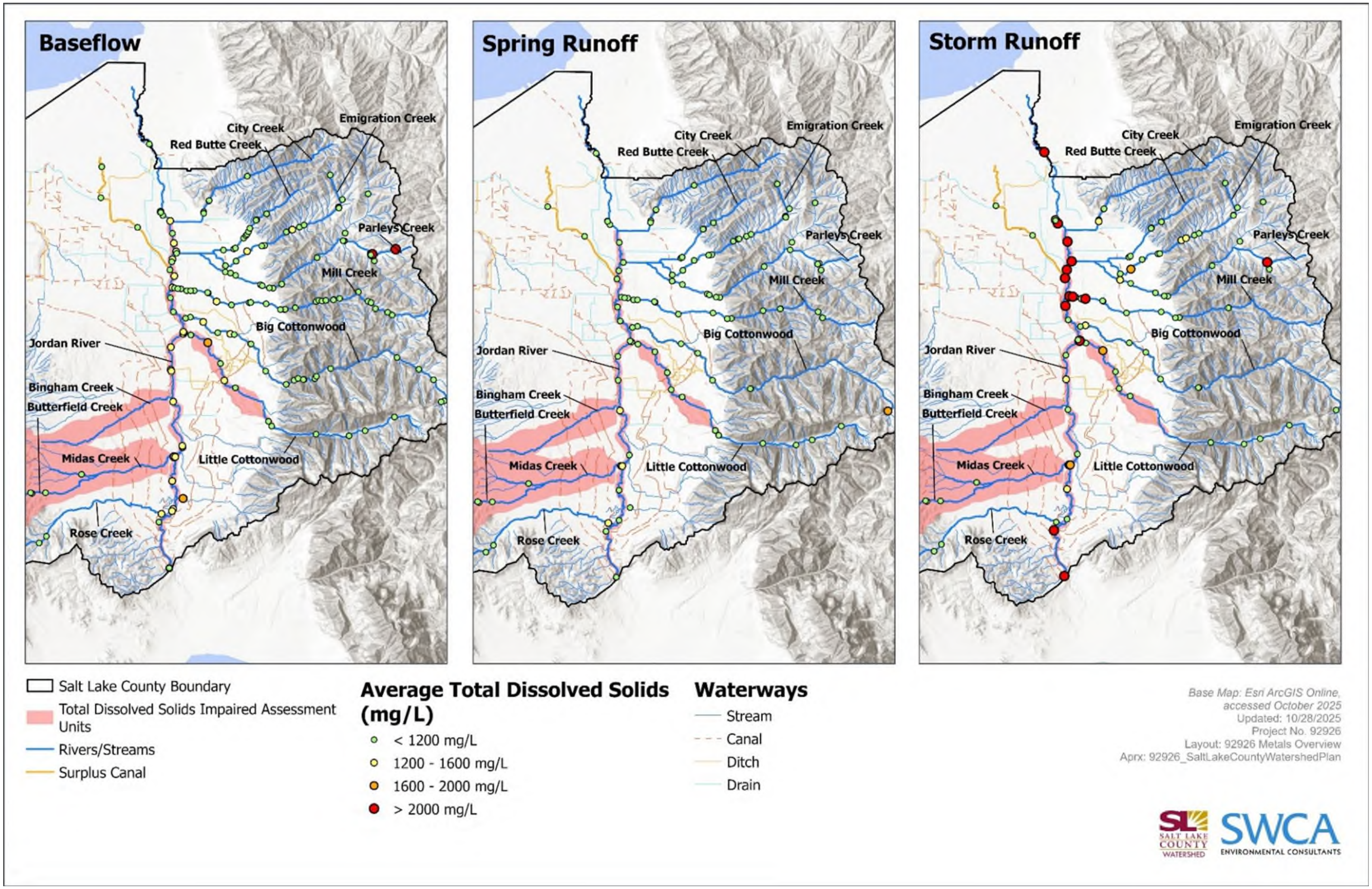

Figure 4-37. Average TDS measured from 2015 to 2024 under varying hydrological conditions, including baseflow, spring runoff, and storm runoff.

5 IMPLEMENTATION PLAN

This section presents the implementation plan developed for Salt Lake County in accordance with the EPA's nine-element watershed planning guidance on implementation planning and was guided by the watershed characterization, source identification, and pollutant loading analysis completed in Sections 3 and 4. This process incorporated valuable input from multiple meetings with watershed stakeholders and drew upon findings from other recent studies and plans within the Jordan River watershed (see Section 2.3). Furthermore, the implementation plan is intentionally designed to achieve the overarching goals and objectives of the watershed plan as outlined in Section 1.5.

The implementation plan outlines proposed implementation activities to reduce pollutant loading in the planning area. It includes individual projects and initiatives (e.g., implementation activities) to be completed between 2026 and 2036. The implementation activities matrix (see Table 5-1), information and outreach matrix (Table 5-5), and monitoring plan (Table 5-8) outline a 10-year implementation plan to primarily address nonpoint source pollution concerns in Salt Lake County. Possible funding sources (see Table 5-4) are directly associated with each activity in the implementation, outreach, and monitoring matrices, ensuring clear connections between funding opportunities and planned actions. These three tables have been complied into a Microsoft Excel workbook to serve as a stand-alone resource to prioritize and track implementation activities in the watershed. The workbook has been provided to Salt Lake County and is available to project partners upon request.

The following information is listed in the implementation activities matrix (see Table 5-1), information and outreach matrix (see Table 5-5), and monitoring plan matrix (see Table 5-8) for each of the activities:

- **Activity ID:** A unique identifier assigned to each implementation or monitoring activity.
- **Activity (Implementation or Monitoring):** A description of the specific implementation or monitoring activity to be carried out.
- **Suggested project partners:** Includes all participating organizations, with the proposed lead organization highlighted in bold within each table.
- **Pollution source(s):** The source(s) of pollution targeted by the activity.
- **Targeted pollutant(s):** Water quality parameters or pollutants addressed by each activity.
- **Priority location:** The area within Salt Lake County where the activity is expected to provide the greatest benefit. Most projects are designated to benefit the entire county.
- **Estimated schedule:** The proposed timeline for implementation or monitoring. Activities designated as ongoing are anticipated to continue throughout the duration of the IWP timeframe (10 years). See Section 5.4 for the full implementation schedule.
- **Implementation activity timeframe:** Indicates whether the project is short term (1–2 years), midterm (3–5 years), or long term (5–10 years). See Section 5.5 for a more detailed description.
- **Project status:** Classifies the project as conceptual (idea/proposal), planned (scheduled/ready), or already in progress (executing). See Section 5.5 for a more detailed description.
- **Indicator to measure progress:** Puts a unit or area measurement to implementation activities to ensure there is a way to track and measure progress. See Section 5.6 for more details.
- **Estimated costs:** Based on literature values and previous implementation activities by watershed stakeholders.

- **Possible funding:** Lists of possible grants and funding sources for each activity. Additional details on funding sources are provided in Table 5-4 in Section 5.2.
- **Expected results:** The anticipated outcomes resulting from the implementation or monitoring activity.

Implementation activities are meant to be mutually beneficial for multiple stakeholder interests and water quality goals in the watershed (as outlined in Section 1.5). The implementation activities are also meant to align with other related plans, such as the Jordan River *E. coli* TMDL (UDWQ 2023a), *Jordan River Total Maximum Daily Load Water Quality Study – Phase 1* (Cirrus Ecological Solutions and Stantec Consulting Inc. 2013), *Final Jordan River Comprehensive Management Plan and Record of Decision* (SWCA et al. 2017), and *Blueprint Jordan River* (Jordan River Commission 2022) (see Section 2.3 for additional details). All of these plans should work together and build on one another for successful watershed improvement. The implementation plan is meant to be adaptive and will serve as a reference for Salt Lake County and other project partners throughout the implementation of solutions in the watershed.

5.1 Implementation Activities to Achieve Load Reductions

C

EPA ELEMENT

Specify the BMPs/practices to be used, why they were chosen, and where they will be located. Prioritize "critical areas" where actions yield the greatest reduction.

As part of the EPA nine-element watershed planning process, watershed plans are required to identify causes and sources of pollution (Element a) and quantify existing pollutant loading and estimate the load reductions that are expected to occur as a result of watershed implementation activities (Element b). For this plan, the load reductions in existing TMDLs and water quality trends identified in Section 4.3 are used to guide and inform implementation activities (see Sections 4.3.1.1, 4.3.2.2, and 4.3.4.1).

Table 5-1. Implementation Activities Matrix

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
PLN-01	Incorporate a standing agenda item in the Jordan River Watershed Council meetings to assign a lead partner to implementation activities without a project lead and track the progress of implementation activities outlined in the 2025 IWP.	**Salt Lake County Watershed Planning & Restoration Program**, **Jordan River Watershed Council,** project partners	All	All	Salt Lake County	2026–2035	Short term, ongoing	Conceptual	Number of lead agencies assigned to each activity; number of activities completed.	Staff time	SLCo-01	Planning and tracking to ensure implementation activities in the 2025 IWP are implemented.
PLN-02	Develop a plan to identify strategies and priority areas to reduce wildlife congregating in urban settings.	UDWR, UDWQ, golf courses	Wildlife	*E. coli*	High recreation areas with known *E. coli* issues	2026–2029	Short term, ongoing	Conceptual	Plan outline strategies and priority areas.	Staff time	EPA-01, UDWQ-01, NRCS-07, MUN-01, UDNR-01, NRCS-06, UDWQ-02, NWF-01	Planning to reduce *E. coli* contribution from wildlife.
PLN-03	Create a working group meeting to identify high-use areas in close proximity to surface waters in need of restroom facilities or increased maintenance. Develop a memorandum of understanding (MOU) that outlines responsibilities of each partner.	**UDWQ**, **Salt Lake County Health Department**, Jordan River Commission, Jordan River Watershed Council, Salt Lake County Parks & Recreation, individual cities, Salt Lake City Department of Public Utilities	Unhoused population, recreation	*E. coli,* nutrients	Jordan River and tributaries in the valley	2026–2035	Short term, ongoing	Conceptual	One MOU developed.	Staff time	MUN-01, SLCo-01	Information, data, and planning to implement STR-10.
PLN-04	Identify parks and public spaces that allow dogs but also do not have existing pet waste stations. Identify the most frequented parks and public spaces on this list to create a priority list of sites to install pet waste collection supplies and disposal cans and informative signage to go along with the stations.	Individual MS4, Salt Lake County Stormwater Coalition, Salt Lake City Department of Public Utilities, Jordan River Commission, UDWQ	Pet waste	*E. coli,* nutrients	Salt Lake County	2026–2027	Short term	Conceptual	Map or plan to outline identified areas.	Staff time	MUN-01, SLCo-01	Information, data, and planning to implement STR-02.
PLN-05	Identify priority areas to implement buffer zones between rivers and roadways/riverside trails.	Individual MS4s, Salt Lake County Parks & Recreation, Salt Lake County Stormwater Coalition, Jordan River Watershed Council, UDWQ	Stormwater, recreation	Metals, garbage, oil and grease	Salt Lake County	2026–2028	Short term	Conceptual	Map or plan to outline identified areas.	Staff time	MUN-01	Data and information to implement STR-03.
PLN-06	Establish a planning document with ski resorts to implement stormwater BMPs at ski resorts.	**Salt Lake City Department of Public Utilities**, ski resorts, Town of Alta, Town of Brighton, USFS	Stormwater, recreation	TDS, metals, oil	Big Cottonwood Canyon, Little Cottonwood Canyon	2026–2030	Midterm, ongoing	Conceptual	Plan outlining priority locations and logistics for BMP implementation.	Staff time	MUN-01	Engagement with partners to implement STR-04.
PLN-07	Develop or identify an existing list of private landowners with culverts and bridges on private lands.	Municipalities, homeowners associations, Jordan River Watershed Council, UDOT, Trout Unlimited	Stream erosion	Sediment, temperature	Salt Lake County	2026–2028	Short term	Conceptual	Landowner list	Staff time	MUN-01	Planning to implement NST-07.
PLN-08	Create a standing agenda item in existing stormwater meetings to discuss LID systems for PLN-14.	Individual MS4s, Jordan River Watershed Council	Stormwater, impervious surfaces	Sediment, temperature, TDS, *E. coli*, nutrients, metals	Salt Lake County	2026–2035	Short term, ongoing	Conceptual	Establish standing agenda items and lead personnel for this effort.	Staff time	MUN-01	Planning to implement PLN-14.
PLN-9	Plan and identify partners to implement STR-13 (divert water from Lee Creek and Goggin Drain to Farmington Bay).	UDWR, duck clubs, UDWRi, Utah Division of Forestry, Fire & State Lands (FFSL)	Wildlife, agricultural runoff, stormwater	HABs, botulism	Farmington Bay	2026–2029	Midterm	Conceptual	Establish list of partners.	Staff time	GSLT-01	Planning to implement STR-13.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
PLN-10	Establish a standing agenda item in a Salt Lake County Watershed Planning & Restoration Program meeting to track and plan for NST and STR projects led by Salt Lake County.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	2026–2035	Short term, ongoing	Planned	Monthly meetings	Staff time	SLCo-01	Planning to track Salt Lake County–led NST and STR projects.
PLN-11	Establish a working group or create a standing agenda in an existing working group to discuss abandoned mine features and water quality implementation projects.	**UDWQ**, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts	Legacy mining	Metals	Big and Little Cottonwood Canyons	2028–2030	Midterm, ongoing	Conceptual	Quarterly meetings	Staff time	UDNR-02	Planning for PLN-18.
PLN-12	Establish a meeting to discuss automating points of water diversion and engage with potential project partners.	Great Salt Lake Office of the Commissioner, UDWRi	Irrigation and canal systems, Surplus Canal	All	Canals	2026–2035	Short term, ongoing	Planned	Quarterly meetings	Staff time	GSLT-01, BOR-01	Planning for PLN-19.
PLN-13	Identify and prioritize areas to implement stream restoration BMPs in high-erosion streams, burn scars, and low-gradient wet meadows.	**Salt Lake County Watershed Planning & Restoration Program,** UDWQ, Jordan River Watershed Council	Stream erosion	Sediment, nutrients	Salt Lake County	2026–2028	Short term	Planned	Map or plan to outline identified areas.	Staff time	SLCo-01	Data and information to implement STR-06.
PLN-14	Identify priority developed areas for LID systems and project partners.	Individual MS4s, Jordan River Watershed Council	Stormwater, impervious surfaces	Sediment, temperature, TDS, *E. coli*, nutrients, metals	Salt Lake County	2026–2027	Short term	Conceptual	Map or plan to outline identified areas.	Staff time	MUN-01	Data and information to implement STR-08.
PLN-15	Identify and prioritize undeveloped areas to establish vegetative buffer zones.	**Salt Lake County Watershed Planning & Restoration Program**, UDWQ, municipalities, Salt Lake County Parks & Recreation	Stormwater	Sediment, nutrients	Salt Lake County	2026–2028	Short term	Planned	Map or plan to outline identified areas.	Staff time	SLCo-01	Data and information to implement STR-09.
PLN-16	Identify priority areas to implement engineered wetlands around the Jordan River.	Utah Mitigation Commission, FFSL, Jordan River Commission, The Nature Conservancy, Salt Lake County Watershed Planning & Restoration Program	Stormwater, wildlife, agricultural runoff, stream erosion	Nutrients, metals, OM, DO, sediment	Jordan River	2026–2030	Midterm	Conceptual	Map or plan to outline identified areas.	Staff time	NWF-01, GSLT-01, NRCS-07	Data and information to implement STR-11.
PLN-17	Identify high-priority Salt Lake County–owned parks to retrofit to improve stormwater runoff and engage partners.	**Salt Lake County Watershed Planning & Restoration Program**, Salt Lake County Parks & Recreation, UDWQ	Recreation, stormwater	All	Salt Lake County	2026–2028	Short term	Planned	Map or plan to outline identified areas.	Staff time	SLCo-01	Data and information to implement STR-14.
PLN-18	Identify areas to install passive treatment systems for abandoned mine features and engage with potential project partners.	UDWQ, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts	Legacy mining	Metals	Big and Little Cottonwood Canyons	2026–2030	Midterm	Conceptual	Map or plan to outline identified areas.	Staff time	UDNR-02	Data and information to implement STR-15.
PLN-19	Identify areas to automate points of water diversion to better measure diverted water and water use.	Great Salt Lake Office of the Commissioner, UDWRi	Irrigation and canal systems, Surplus Canal	All	Canals	2026–2030	Midterm	Planned	Priority list of water diversion data gaps to fill	Staff time	GSLT-01, BOR-01	Data and information to implement STR-16.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
PLN-20	Develop a MOU for NST-03 (financial assistance program for upgrading/ repairing septic systems) to develop criteria or metrics on cost share, eligibility, focus areas, and other specifics from the program.	UDWQ, cities, Salt Lake County Health Department, private landowners	Septic	E. coli, nutrients	Drinking Water Source Protection Zone	2026–2030	Midterm	Conceptual	One MOU developed	Staff time	UDWQ-01, MUN-01	Planning to implement NST-03.
NST-01	Update the Forestry Recreation and Foothill Agricultural zones and Great Salt Lake Shoreline Agricultural zones in the Salt Lake County Ordinance to incorporate stream setbacks for new development and redevelopment.	**Salt Lake County Watershed Planning & Restoration Program,** Jordan River Watershed Council, land conservation groups	Stormwater, streambank erosion, septic, wildlife, recreation sources	*E. coli*, DO, OM, nutrients, temperature	Salt Lake County	2026–2030	Midterm	Planned	Updated ordinance	Staff time	MUN-01, SLCo-01, USDA-01, GSLT-01	Improved protection of water quality and riparian habitats, reduced flood risk, and enhanced ecological resilience along streams in these zones.
NST-02	Inventory existing trash booms in Salt Lake County and identify the primary locations of sources of floatable debris entering the Jordan River to inform the selection of future structural BMPs aimed at reducing trash pollution.	**UDWQ**, Salt Lake County Flood Control, Jordan River Commission	Anthropogenic solid waste	Floatable garbage	Jordan River or tributaries	2026–2028	Short term	Conceptual	Planning document that outlines existing trash booms and priority areas	Staff time	EPA-01, UDNR-01, UDWQ-01, UDWQ-03, UDWQ-02	Data and information to implement STR-01.
NST-03	Develop a financial assistance program (using 319 or municipal general funds) for upgrading/ repairing septic systems.	**UDWQ**, cities, Salt Lake County Health Department, private landowners	Septic	*E. coli*, nutrients	Drinking Water Source Protection Zone	2026–2030	Midterm	Conceptual	Financial Assistance Program components developed		USDA-01, UDWQ-01, MUN-01	Funding to implement STR-17.
NST-04	Establish conservation easements along the Jordan River with a focus on historical agriculture land.	Utah Open Lands, The Nature Conservancy, NRCS, UDAF, Jordan River Watershed Council, land conservation groups	Agricultural runoff, stormwater, wildlife	Nutrients, *E. coli*, OM, sediment	Jordan River	2026–2035	Long term	Conceptual	Identification of potential easement areas, easement creation	$80,00–$130,000 for donated conservation easement	UDAF-03, UOL-01	Protection of water quality and riparian habitats along the Jordan River.
NST-05	Develop pre-fire assessments to identify areas of high concern where wildfires would have the greatest impact on water resources in the Salt Lake City Department of Public Utilities *Watershed Management Plan.*	**Salt Lake City Department of Public Utilities,** USFS, drinking water providers, FFSL	Stormwater, erosion	Sediment, nutrients, DO, temperature	Wasatch Range	2026–2030	Midterm	Planned	Number of assessments performed	Staff time	EPA-01, MUN-01, SLCo-01, UDWQ-02	Data and information to implement STR-12.
NST-06	Engage with private landowners who operate small farms to implement agricultural BMPs via a dinner or specific outreach event.	UDAF, UDWQ, NRCS	Agriculture	*E. coli*, nutrients, sediment	Rose, Bingham, Midas, and Butterfield Creeks	2026–2028	Short term	In progress	Number of landowners engaged with	Staff time	NRCS-01, NRCS-03, NRCS-04, NRCS-05, NRCS-06, NRCS-07, NRCS-08, UDAF-02, UDAF-05	Landowner engagement to implement STR-05.
NST-07	Inspect and review flow obstructions (culverts/ bridges) to ensure culverts are the proper size to allow for adequate flow during high-flow events.	Individual MS4s, Jordan River Watershed Council, UDOT, private landowners	Stream erosion	Sediment, temperature	Salt Lake County	2026–2028	Short term	Conceptual	Number of culverts and bridges inspected	Staff time	MUN-01	Landowner engagement to implement STR-07.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
STR-01	Implement additional garbage booms along the Jordan River or tributaries to reduce floating garbage transport.	Cities, UDWQ, Salt Lake City Department of Public Utilities, FFSL, Salt Lake County Watershed Planning & Restoration Program (on county-owned lands), The Nature Conservancy, Jordan River Commission	Stormwater	Garbage	Jordan River and tributaries	2028–2035	Long term	Conceptual	Amount of garbage captured in booms	$100,000–$240,000 dependent on unit type and maintenance requirements (Stantec Consulting Services, Inc. 2023).	EPA-01, NRCS-06, NRCS-08, MUN-01, SLCo-01, UDNR-01, UDWQ-02, UDWQ-03	Collect garbage to protect narrative water quality standards.
STR-02	Place pet waste collection supplies and disposal cans, along with informative signage, at high-use areas near surface waters. Refer to PLN-04 for details on the preceding planning activity.	Individual MS4s, Salt Lake City Department of Public Utilities, Jordan River Commission, UDWQ	Pet waste	*E. coli,* nutrients	Parks and trails adjacent waterways	2028–2030	Midterm	Conceptual	Number of pet waste collection station installed (the number will be determined in PLN-04)	$930–$1,700 each, including installation (City of Federal Way Public Works Department 2024; Public Works Los Angeles County 2025).	MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03	Reduce *E. coli* and nutrient loading by reducing un-disposed pet waste.
STR-03	Implement buffer zones between rivers and roadways/riverside trails.	Individual MS4s, Salt Lake County Parks & Recreation, Salt Lake County Stormwater Coalition, Jordan River Watershed Council, UDWQ	Stormwater, recreation	Metals, garbage, oil and grease	Salt Lake County	2026–2035	Long term	Planned	Number of acres of buffer zones established	$1,836–$2,863 per hectare (Tiwari et al. 2015).	EPA-01, NRCS-01, NRCS-05, NRCS-07, MUN-01, SLCo-01, UDWQ-01, UDWQ-02, UDWQ-03, GSLT-01, NWF-01	Reduce and mitigate stormwater runoff into surface waters.
STR-04	Implement stormwater BMPs at ski resort parking areas, primarily those nearby waterways, to reduce pollutant transport via stormwater.	Ski resorts, USFS, Salt Lake County Health Department, Salt Lake City Department of Public Utilities	Stormwater, recreation	TDS, metals, oil	Big Cottonwood Canyon, Little Cottonwood Canyon	2028–2035	Long term	Conceptual	Number of BMPs installed	Costs highly variable depending on site characteristics, BMP type, and size.	EPA-01, MUN-01, SLCo-01, UDNR-01, UDNR-02, UDWQ-01, UDWQ-02, UDWQ-03, private (ski resorts)	Reduce and mitigate stormwater runoff into surface waters.
STR-05	Implement agricultural BMPs, such as fencing to prevent livestock from direct access to surface waters, off-channel watering options, drainage management, fertilizer management, and buffer strips where necessary.	Private landowners, UDAF, NRCS, UDWQ, Utah State University small farm program	Agriculture	*E. coli*, nutrients, sediment	Rose, Bingham, Midas, and Butterfield Creeks	2027–2032	Midterm	Conceptual	Number of BMPs installed	$2.90 per linear foot installation of 6-strand barbed wire fence (Line and Doll 2023).	EPA-01, NRCS-01, NRCS-03, NRCS-04, NRCS-05, NRCS-06, NRCS-07, NRCS-08, UDAF-02, UDAF-05, UDNR-01, UDWQ-02, GSLT-01, NWF-01	Protect rivers and streams from streambank erosion and agricultural runoff.
STR-06	Implement BMPs in high-erosion streams (nearest headwaters), burn scars, and low-gradient wet meadows.	**Salt Lake County Watershed Planning & Restoration Program,** UDWQ, Jordan River Watershed Council	Stream erosion	Sediment, nutrients	Salt Lake County	2026–2035	Long term	Planned	Number of BMPs implemented	$20–$4,000 per acre of erosion barrier/grade stabilizer depending on materials and installation method (Utah State University 2015).	BOR-01, EPA-01, NRCS-01, NRCS-07, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03	Improve stream and river function and health.
STR-07	Replace and resize culverts as necessary based on findings from NST-07.	Individual MS4s, private landowners, municipalities, UDOT, Jordan River Watershed Council	Stream erosion	Sediment, temperature	Salt Lake County	2028–2035	Long term	Conceptual	Number of inspected and reviewed culverts; replacements as necessary	$100–$350 per hour for engineer labor (varies by experience).	EPA-01, NRCS-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03, GSLT-01	Mitigate flooding impacts to streams and rivers.
STR-08	Install LID systems for existing development.	Individual MS4s, Salt Lake County Stormwater Coalition (Advisory only)	Stormwater, impervious surfaces	Sediment, temperature, TDS, *E. coli*, nutrients, metals	Salt Lake County	2030–2035	Long term	Conceptual	Number of installed LID systems	Costs highly variable depending on site conditions and LID features to be developed.	BOR-01, EPA-01, NRCS-01, NRCS-07, NRCS-08, MUN-01, SLC0-01, UDWQ-01, UDWQ-02, UDWQ-03, GSLT-01	Mitigate stormwater runoff and reduce impervious surfaces.
STR-09	Establish vegetative buffer zones in undeveloped areas.	**Salt Lake County Watershed Planning & Restoration Program**, UDWQ, municipalities, Salt Lake County Parks & Recreation	Stormwater	Sediment, nutrients	Salt Lake County unincorporated areas	2028–2035	Long term	Planned	Number of acres of buffer zones established and successfully vegetated	$19.50–$28.50 per linear foot for construction and vegetating with seed (EPA 2015).	EPA-01, NRCS-01, NRCS-07, NRCS-08, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03, NWF-01	Establish before increased development to reduce sedimentation.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
STR-10	Develop and maintain restroom facilities in high-use recreation and known unhoused population areas year-round. Refer to PLN-03 for details on the preceding planning activity.	USFS, Salt Lake County Parks & Recreation, individual cities, Salt Lake City Department of Public Utilities	Unhoused populations, Recreation	*E. coli*, nutrients	High-use recreation areas along the Jordan River and tributaries	Installation: 2027–2030 Maintenance: ongoing	Midterm, ongoing	Conceptual	Create a MOU for maintenance.	Permanent plumbed: $95,000–$800,000. Portlets: $744–$5,940 per year with maintenance (Denver Parks & Recreation 2021).	BOR-01, EPA-01, MUN-01, SLCo-01, UDWQ-01, UDWQ-02, UDWQ-03, GSLT-01	Reduce *E. coli* and nutrient loaded from improper human waste disposal.
STR-11	Implement engineered wetlands around the Jordan River. Focus on high recreation areas or areas with high development pressure on city- and county-owned lands.	FFSL, The Nature Conservancy, Salt Lake County Watershed Planning & Restoration Program	Stormwater, wildlife, agricultural runoff, stream erosion	Nutrients, metals, OM, DO, sediment	Jordan River	2028–2035	Long term	Conceptual	Number of acres of engineered wetlands implemented	Unit cost: $600,000 per acre. Maintenance cost: $1,000 per acre per year for surface flow wetlands and $1,500 per acre per year for subsurface wetlands (EPA 2021).	EPA-01, NRCS-01, NRCS-07, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03, GSLT-01, NWF-01	Capture and impound pollutants that may enter Great Salt Lake.
STR-12	Implement fuels reduction measures as outlined in Salt Lake City Department of Public Utilities *Watershed Management Plan* to decrease wildfire intensity, and protect drinking water infrastructure from post-fire impacts in areas identified from NST-05.	USFS, Salt Lake City Department of Public Utilities, FFSL	Wildfire	Sediment	Wasatch Range	2028–2035	Long term	Planned	Acres of fuel reduction completed	Highly variable depending on size of project area, type of fuels reduction measures implemented, and logistics for the work (travel, time, access, etc.),	BOR-01, EPA-01, NRCS-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03, NWF-01	Lower wildfire intensity, thereby minimizing post-fire risks to drinking water infrastructure and water quality.
STR-13	Divert water from Lee Creek and Goggin Drain to Farmington Bay.	UDWR, duck clubs, UDWRi, FFSL	Wildlife, agricultural runoff, stormwater	HABs, botulism	Farmington Bay	2028–2035	Long term	Conceptual	Improved water quality in Farmington Bay	Highly variable depending on water rights transaction costs.	BOR-01, EPA-01, NRCS-01, NRCS-04, NRCS-07, 5a-01, UDWQ-01, UDWQ-02	Mitigate botulism and HABs.
STR-14	Retrofit high-priority, county-owned parks to reduce stormwater runoff.	**Salt Lake County Watershed Planning & Restoration Program**, Salt Lake County Parks & Recreation, UDWQ	Recreation, stormwater	Nutrients, sediment	Salt Lake County	2028–2035	Long term	Planned	Number of high-priority parks retrofitted	Costs highly variable depending on project needs, project area, and labor.	EPA-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03	Cleaner stormwater runoff, increased capacity for high flows.
STR-15	Install passive treatment systems for abandoned mine features. Passive treatments include diversions, soil caps, mine waste removal, limestone systems, and installing wetlands. More information on passive treatment recommendation in Utah can be found in *Utah Nonpoint Source Management Plan for Abandoned Mines in Utah* (EPA 2018).	UDWQ, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts	Legacy mining	Metals	Big and Little Cottonwood Canyons	2030–2035	Long term	Conceptual	Number of passive treatment systems installed	Costs highly variable depending on passive treatment, site conditions, transportation and materials costs, and size of project area.	UDNR-02	Reduce and/or mitigate acid mine drainage and protect surface and groundwater quality.
STR-16	Automate points of water diversion to better measure diverted water and water use.	Great Salt Lake Office of the Commissioner, UDWRi	Irrigation and canal systems, Surplus Canal	All	Canals	2028–2035	Long term	Planned	Number of automated points of water diversions	Costs highly variable depending on project scope.	BOR-01, MUN-01, SLCo-01, UDAF-01, UWDQ-03	Automating the point of water diversions enables more accurate measurement of water use, which supports better management and protection of water quality by preventing over-diversion.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
STR-017	Upgrade and repair failing or near-life-end septic systems.	Private landowners, municipalities, UDWQ	Septic systems	*E. coli*, nutrients	Drinking Water Source Protection Zones	2030–2035	Long term	Conceptual	Upgrade and repair all failing or near-life-end septic systems within Drinking Water Source Protection Zones.	$500–$5,000 for repairs, $6,000–$124,000 cost per house (Seattle Public Health King County 2024).	EPA-01, MUN-01, UDWQ-02	Reduce and/or mitigate *E. coli* and nutrient loading.

Note: **Bolded text indicates the lead agency that has committed to the implementation activity. Many activities do not have a lead agency and will need to be assigned through the completion of PLN-01.**

NST = nonstructural BMP; STR = structural BMP; PLN = planning activity.

* Funding codes are defined in Table 5-4 in Section 5.2.

† Ongoing activities will be evaluated annually.

5.1.1 Priority Areas

Identifying and targeting priority areas for implementation activities are essential for effectively addressing water quality impairments within the watershed. Potential priority areas were initially identified for this IWP using the EPA's Recovery Potential Screening (RPS) tool. The EPA RPS tool is a decision-support resource designed to help watershed managers and stakeholders compare and prioritize watersheds for restoration and protection activities. The tool integrates ecological indicators, stressor indicators, and social indicators (Figure 5-1) to assess the relative potential for successful restoration or protection across multiple watersheds.

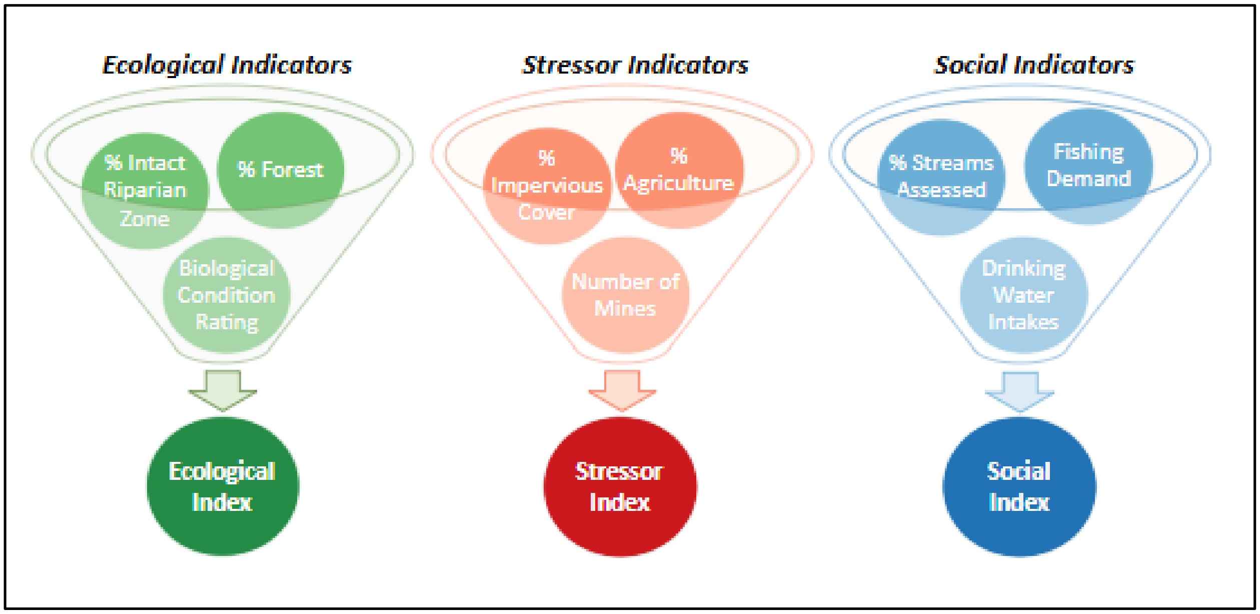

Figure 5-1. Example Indicators used in the RPS tool.
Source: EPA (2025d).

The following index scores are generated by the RPS tool:

- **Ecological index**: Scores (0–100) reflect the health and condition of subwatersheds based on selected ecological indicators; higher scores indicate better ecological conditions and greater potential for successful restoration and protection.
- **Stressor index**: Scores (0–100) summarize the presence and magnitude of risks (e.g., pollutants, threats) to subwatershed health; higher scores indicate greater risk and more environmental stressors.
- **Social index**: Scores (0–100) represent non-environmental, societal factors influencing restoration and protection efforts; higher scores generally mean stronger social support or attributes, but interpretation depends on selected indicators.
- **Restoration and protection integrated (RPI) Index**: Combines ecological, stressor, and social index scores into one overall score for each subwatershed. Subwatersheds with higher RPI scores typically have healthier ecological conditions, fewer stressors, and more favorable social attributes, making them strong candidates for successful restoration with relatively lower effort.

The RPI purpose is to provide an overall assessment of subwatershed health and potential for recovery by combining these different dimensions into a single score (EPA 2025d). The RPI index is designed to highlight subwatersheds that have a distinct and favorable combination of ecological, stressor, and social scores. These areas may require less effort to address water quality issues and restore aquatic ecosystem integrity (EPA 2025d). However, the RPI index is just one tool, and for a complete picture, it should be interpreted alongside the individual ecological, stressor, and social index scores and alongside watershed-specific data (see Sections 3 and 4).

Figure 5-2 identifies potential priority areas based on ecological, stressor, and social indicators (as listed in Table 5-2). These categories of indicators are summarized in the RPI ındex map.

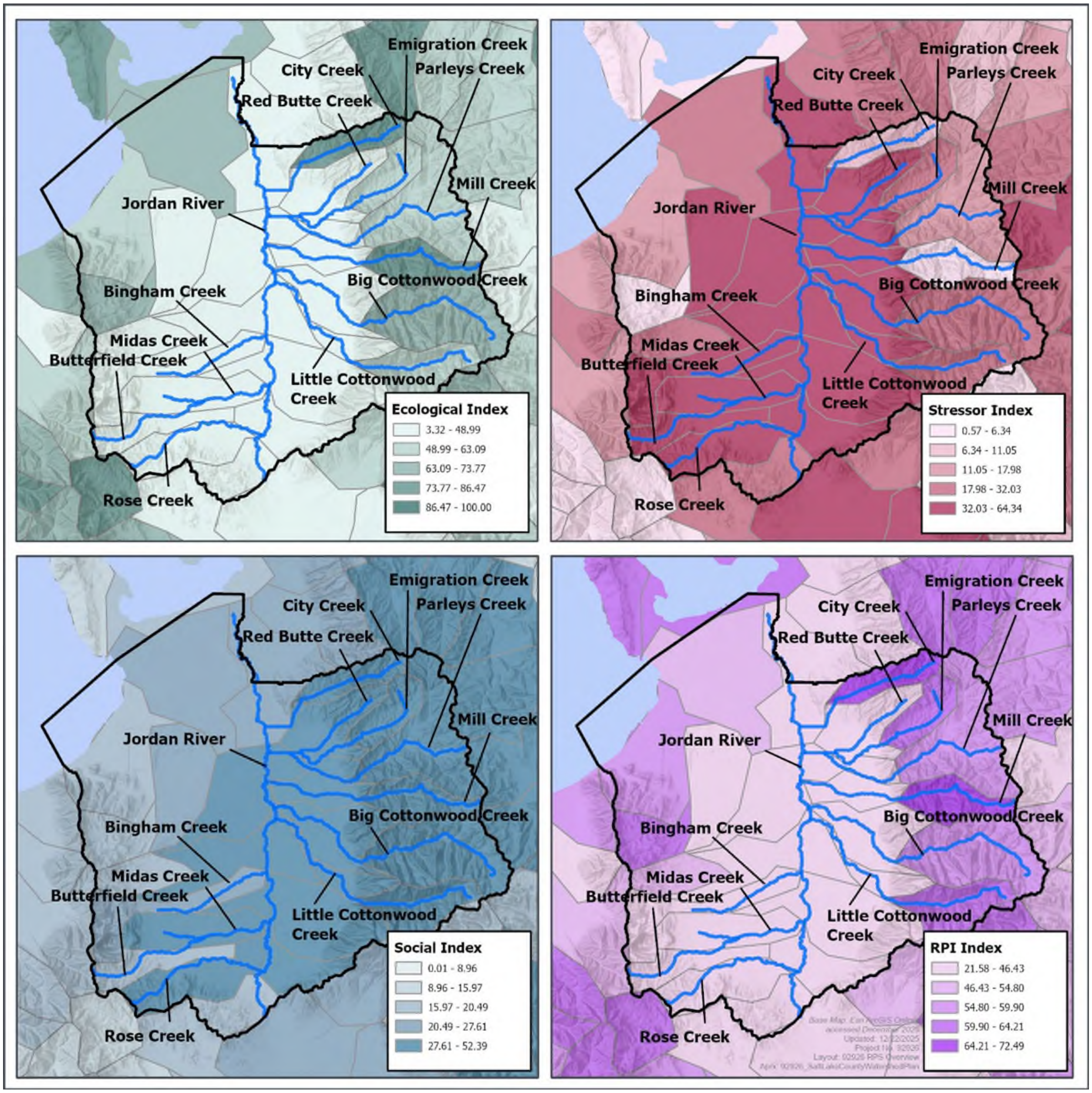

Figure 5-2. Potential priority subwatersheds based on ecological, stressor, and social indicators.

Note: RPI index is an average between the ecological, stressor, and social index scores.

Table 5-2. EPA RPI, Ecological, Stressor, and Social Indicators

Ecological Indicators	Stressor Indicators	Social Indicators
• Preliminary Healthy Watersheds Assessments (PHWA) watershed health index, state • Aquatic condition score, mean in hydrologic unit code (HUC) 12 • Headwater HUC12 flag • Freshwater resilience flow alteration score • PHWA hydrology sub-index, state • PHWA water quality sub-index, state	• % U-Index1 change in HUC12 (2003–2023) • % projected change in developed cover in HUC12, SSP5 scenario • % urban in hydro-connected zone in HUC12 • % urban in riparian zone in HUC12 • % urban change in HUC12 (2003–2023) • % urban change in hydro-connected zone in HUC12 (2003–2023) • % developed, high intensity in HUC12 • % developed, high intensity in riparian zone in HUC12 • % impervious cover in HUC12 • Population density in riparian zone in HUC12 • Impaired waters, % of assessed area in HUC12 • Impaired waters, % of HUC12	• Drinking water surface intake count in HUC12 • % drinking water source protection area in HUC12, Surface • % of HUC12 instate (Utah) • Drinking water population served in HUC12 • Nonpoint source pollution control project count in HUC12 • Waters with TMDLs, % of HUC12 • % minority population in HUC12

Note: A description of each indicator can be found online (EPA 2025e).

5.1.2 Best Management Practices

BMPs are durable structures, graded features, or management practices that are designed to retain and/or treat runoff from various pollutant sources or improve the overall health and function of waterbodies. Structural BMPs are built facilities that typically provide some degree of treatment, whereas nonstructural BMPs involve changes in activities or behaviors that are prevention-focused (UDEQ 2018). BMP adoption is promoted and encouraged to protect waterbodies from pollution and to reduce and restore existing water quality problems. This section will focus on nonpoint BMPs, which are defined as general management practices to minimize or prevent pollution that comes from diffuse, widespread sources rather than a single discharge point (as outlined in Section 4.3.2).

BMPs outlined in this section were chosen based on relevance to the Jordan River watershed and implementation activities outlined in Table 5-1. Nonpoint sources identified in Section 4.3.2 were used to categorize BMPs by targeted pollutant source and are outlined in Table 5-3 and sections to follow.

Table 5-3. Summary of BMPs by Nonpoint Source Category

Nonpoint Source Category	Source	Associated BMPs
Urban	Impervious surfaces	Green roofs, infiltration basins, bioswales, conservation easements
	Road salts	Winter maintenance management
	Fertilizer	Fertilizer management
	Pets	Pet waste containment, litter abatement
	Urban recreation	Trash booms, public restrooms, litter abatement, riparian buffers
	Unhoused populations	Trash booms, public restrooms, litter abatement
Agriculture	Fertilizer Wildlife	Fertilizer management, riparian fencing

Nonpoint Source Category	Source	Associated BMPs
Upper watershed and canyons	Abandoned mines	Passive treatment systems
	Recreation	Public restrooms, litter abatement
	Septic systems	Septic system maintenance and replacement of failing systems
Water management and hydraulic modification	Irrigation and canal systems	Canal diversion improvements, active water management, automating and improving diversion structures, Goggin Drain project
	Utah Lake	Utah Lake water quality implementation plan (in progress)
Stream erosion	Stream stability Soil erosion	Stream restoration and stabilization, wetland construction and enhancement, conservation easements
Other nonpoint sources	Wildlife	Sign installation
	natural background	Pre-fire assessments

5.1.2.1 URBAN

Within Salt Lake County, impervious surfaces such as buildings, roads, and parking lots are extensive and function as a hydrologically impervious cover. These surfaces reduce infiltration and increase both the volume and velocity of stormwater runoff, which increases the rate and magnitude of pollutant transport to receiving waters (EPA 2025f). Most BMPs for urban land use focus on increasing infiltration to improve distribution and slow runoff. These stormwater BMPs are especially important in areas with high densities of impervious surfaces, where rapid flows can quickly transport pollutants. Many of the urban BMPs are also referred to as LID systems, which are either structural or natural engineered systems, that use or mimic natural processes to promote infiltration. BMPs associated with urban land use are outlined below. Additional information on urban BMPs is provided in *A Guide to Low Impact Development with Utah* (UDWQ 2018).

Infiltration Basins

Infiltration basins act as temporary storage and treatment for stormwater. The infiltration basins allow water to seep over time through a soil matrix that can be maintained and replaced on a regular basis (UDEQ 2018). Infiltration basins can also act as recharge basins for groundwater if the water table is deep enough to allow for proper holding times to avoid contamination. In general, infiltration basins can reduce runoff volumes by 50% to 90% depending on the size of area they are treating (Virginia Department of Conservation and Recreation 2013).

Bioswales

Bioswales are designed to detain peak flows, provide flood flow storage, and provide some treatment of stormwater (UDEQ 2018). They are usually constructed by vegetating existing drainage ditches. These linear features can be helpful in urban settings where space is limited and where linear ditches or drainage easement systems already exist.

Green Roofs

Green roofs minimize the inherent imperviousness of structures and buildings by providing bioretention, volume retention, and filtration (UDEQ 2018). Green roofs are equipped with a layer of pervious material such as soil and vegetation. This system prevents instantaneous runoff typical of buildings and other impervious surfaces and helps to minimize runoff volumes (Figure 5-3).

Trash Booms

Trash booms are floating barriers installed across rivers, canals, or ponds to capture and contain floating debris such as litter, branches, and other surface materials (Figure 5-4).

Figure 5-3. Green roof installation at 3 Kings Water Treatment Plant in Park City, Utah (Intermountain Roofscape Supply 2025).

Figure 5-4. Trash boom installed on the Jordan River (KSL News 2018).

Public Restrooms

Public restrooms reduce pollutant inputs from unmanaged human waste in recreation areas, trailheads, and parks. These facilities provide designated collection and treatment systems that prevent direct deposition of human waste into soils and waterways.

Litter Abatement

Litter abatement reduces pollutant load inputs from trash and debris in parks, recreation areas, and other public spaces. Strategically placed garbage cans and regular emptying prevent litter from entering waterways where it may contribute to pollutant load. Additionally, organized cleanups following events and peak recreation seasons can further reduce litter-derived pollutant stream loading.

Pet Waste Containment

Pet waste containment reduces pathogen and nutrient pollution (Hobbie et al. 2017). Installing pet waste collection stations and enforcing pet owner responsibilities can decrease occurrences of uncontained pet waste and prevent pathogen loading into local streams.

Winter Maintenance Management

Winter maintenance management reduces the transport of salt pollution (TDS) into surface waterways by focusing on prevention, containment, and smart application. This approach includes optimizing salt application rates, using alternative deicers, and improving storage and handling practices to minimize spillage and leaching.

5.1.2.2 AGRICULTURE AND LIVESTOCK

Grazing and agricultural land uses are minimal throughout Salt Lake County, but there are hobby farms dispersed throughout the watershed that support horses, cows, goats, and chickens. Agriculture BMPs can be effective in protecting surface waters from the impact of improperly managed agricultural waste. Even on a small scale, practices outlined below can reduce nutrient loading, stabilize streambanks, and improve water quality.

Fertilizer Management

Fertilizer management aims to reduce the risk of excess nutrients, such as nitrogen and phosphorus, from fertilizer applications entering streams and rivers through stormwater runoff or direct inputs (Reisinger et al. 2014). Public outreach and incentive programs can emphasize the benefits of using low-phosphorous fertilizers and following proper application practices. Providing clear guidance on fertilizer use further supports pollution prevention. Soil testing can inform appropriate fertilizer application rates. Although primarily categorized as an agricultural and livestock BMP, fertilizer management is also applicable in urban settings.

Manure Management

Collect and compost stockpiled manure on a regular basis to decrease the likelihood of it draining to surface waters during storm events. Routine collection and proper composting of manure prevents excessive buildup and reduces the risk of nutrient-rich runoff reaching streams and rivers. Composting manure stabilizes nutrients, destroys pathogens, and produces a valuable soil amendment while also minimizing odors and fly breeding. Storing manure in covered or contained areas further reduces potential leaching and runoff.

Riparian Fencing

Riparian fencing protects stream channels by physically excluding livestock from streambanks and directing them to designated watering or crossing locations. By minimizing livestock access, fencing reduces direct waste inputs in streams and prevents soil disturbance from trampling, which accelerates stream erosion.

Drainage Management

Ensuring that there is proper drainage management from pastures, barns, pens, and corrals prevents waste from entering nearby waterways.

Off-Channel Watering Options

Providing livestock with alternative water sources, such as troughs or tanks located away from surface waters, ensures that animals have access to clean drinking water while preventing them from congregating near or entering streams and ponds. Off-channel watering systems can be gravity-fed, solar-powered, or pumped, and they help maintain waterway integrity and reduce the potential for contamination.

5.1.2.3 UPPER WATERSHED AND CANYONS

The AUs in the upper watershed and canyons within Salt Lake County host a variety pollution sources, including recreation, active and abandoned mining operations, and septic treatment facilities. Pollutants associated with these sources can travel downstream and have detrimental impacts on water quality and overall watershed health. Implementing the BMPs outlined below minimizes these threats.

Septic System Maintenance

Septic system maintenance is critical to ensure proper containment and treatment of septic waste, thereby preventing nutrient loading into surrounding soils and waterways. Routine inspections (every 3–5 years), timely repairs, and necessary upgrades are essential to maintain the effectiveness and reliability of these systems.

Passive Treatment Systems

Passive treatment systems can be installed at abandoned mines to reduce pollutant loading from legacy mining impacts (Figure 5-5). These systems may include diversions, soil caps, mine waste removal, limestone treatment, or constructed wetlands. Passive treatments are designed to be self-sustaining once started and to operate without external inputs and with only occasional maintenance (EPA 2018).

Figure 5-5. Cottonwood Mine reclamation project in Emery County, Utah (WW Clyde 2018).

5.1.2.4 WATER MANAGEMENT

The management of irrigation systems, canals, and upstream water bodies, such as Utah Lake, are major features that influence the timing, movement, and storage of water in Salt Lake County. Although these systems are essential for agriculture, flood control, and municipal supply, they also modify natural flow regimes and can contribute to water quality impairments.

Automating and Improving Water Diversion Structures

Automating and improving water diversion structures allow for the accurate measurement of diverted water volumes and overall water use (U.S. Bureau of Reclamation 2024). Although these practices do not directly reduce pollution, they support effective watershed management by improving the ability to track pollutant transport and verify proper operation of diversions located near potential pollution sources.

Canal Diversions and Improvements

Canal diversions and improvements are imperative to water quality and quantity in urban landscapes. A few management practices under this category include proper lining canals, grade control, filtering, and diversion design. Maintenance, design, and upkeep of these structures influence erosion, pollutant travel, and flow volume and velocity (Nevada Division of Environmental Protection n.d.).

Instream Flow Augmentation

Instream flow augmentation during low-flow or no-flow conditions involves regulating flows to maintain a locally specific minimum flow based on fish and wildlife needs and water quality (U.S. Army Corps of Engineers 1997). UDWQ is currently experimenting with flow augmentation in the lower Jordan River to help improve dissolved oxygen.

Utah Lake

UDWQ is currently developing a Utah Lake water quality implementation plan to reduce nutrient pollution (nitrogen and phosphorus) entering Utah Lake, which is a major source of flow to the Jordan River. By improving water quality in Utah Lake through nutrient reductions, stormwater and wastewater controls, and watershed BMPs, the plan will help decrease the nutrient and algal load delivered downstream, which will benefit the Jordan River by reducing OM decomposition, improving DO conditions, and supporting aquatic life and recreation uses.

5.1.2.5 STREAM EROSION

Natural features such as wetlands, riparian zones, and streamside vegetation play a critical role in controlling pollutant movement, erosion, and sediment transport within Salt Lake County. Protecting and enhancing these systems significantly improve their ability to mitigate water quality impairments. These BMPs are broadly applicable across different land uses and provide clear direction for maintaining, restoring, and enhancing watershed functions in both developed and undeveloped areas.

Stream Restoration and Stabilization

Stream restoration and stabilization are among the most cost-effective methods for reducing erosion and lowering pollutant loads associated with instream erosion. In urban areas, channelization and flow diversions often alter natural streamflow, creating higher peak flows during storms. These intensified flows accelerate streambank erosion and degrade channel stability (NRCS 2012). Riparian buffers are a common restoration tool in agricultural or recreational areas proximal to waterbodies and are highly important for preventing trampling of delicate riparian systems by humans or livestock. The purpose of these buffers is to deter soil compaction and disturbance and allow larger root systems of woody shrubs and trees to expand and stabilize streambanks. Additionally, the vegetation of near-streambanks and channel walls can increase infiltration along the stream and slow runoff rates, which contributes to nutrient, pesticide, and sediment filtering from runoff (U.S. Department of Agriculture and USFS 2025) (Figure 5-6).

Figure 5-6. Streambank restoration project (Salt Lake County 2025d).

Wetland Construction and Enhancement

Wetland construction and enhancement are frequently implemented to slow flows by providing additional flood volume capacity. Additionally, these features remove pollutants through settling and biological uptake (EPA 2021). These can be designed to capture small drainage areas, or larger drainage systems. Wetlands can improve local water quality by increasing runoff holding time, removing pollutants, and slowing sediment transport and erosion.

5.1.2.6 OTHER NONPOINT SOURCES

Other nonpoint sources such as wildlife and other natural sources can also contribute to stream pollutants. Although these natural pollutant sources are usually unavoidable, BMPs can be implemented to reduce their impact.

Wildlife Management

To reduce nuisance wildlife congregating near surface waters, the Jordan River *E. coli* TMDL recommends eliminating mowed areas adjacent to riparian zones, placing decoy animals to deter wildlife, and minimizing accessible food sources, such as open dumpsters and pet food left outdoors in urban areas. Collaboration with the UDWR is encouraged to develop effective strategies for managing urban wildlife populations. Additionally, the public should be discouraged from feeding wildlife, including the removal of feeding stations and vending machines, which attract wildlife.

Conservation Easements

Conservation easements restrict certain types of development or land use to protect natural resources. These legal agreements can be applied to preserve riparian zones, wetlands, floodplains, agricultural lands, or other sensitive areas. Conservation easements can also prevent conversion of open land to impervious cover, thereby minimizing stormwater runoff, nutrient loading, erosion, and habitat degradation.

Pre-Fire Assessments

Identifying areas with high wildfire risk allows targeted actions such as brush-thinning and fuel reduction to be implemented. These measures, along with fire-aware signage, help prevent post-fire water quality degradation and erosion (Gannon et al. 2019).

5.1.3 Land Use Planning and Zoning

Land use planning is about making conscious decisions regarding how land resources are used, and it has direct and significant consequences for water quality and water resources. Poorly managed land use can create primary pathways for pollutants to enter water systems, threatening both ecosystems and communities. Effective planning helps prevent this by guiding where development occurs and implementing protective measures, such as buffer zones, which filter pollutants before they reach waterways. Sustainable practices, such as green infrastructure and water conservation, further reduce pollution and support healthy water systems (Sustainability Directory 2025). To help guide Utah cities in land use planning, the Great Salt Lake Advisory Council developed the *Great Salt Lake Water Conservation Toolbox* (SWCA 2024), and Utah State University developed the *Utah Growing Water Smart: The Water-Land Use Integration Guidebook for Southwestern Utah* (Kopp and Endter-Wada 2024).

Zoning is a key tool within land use planning for maintaining water quality, as it shapes development patterns and land uses. Zoning regulations determine which types of buildings, densities, and landscaping are allowed, helping prevent incompatible land uses and protect public safety. Importantly, zoning decisions influence how land absorbs and filters rainwater, whereas impervious surfaces, such as roads and parking lots, can increase stormwater runoff and pollution. By promoting LID and integrating water supply considerations, zoning laws play a vital role in safeguarding water resources as part of the broader land use planning process (Sustainability Directory 2025).

5.2 Technical and Financial Assistance

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Estimate the financial and technical assistance required to implement the plan, including installation and long-term operation and maintenance of implementation activities, information/education activities, monitoring, and evaluation. Identify the relevant implementing authorities and potential funding sources.

The success of a watershed plan depends on the ability to turn the plan into action. Implementation activities will require funding to support administration and management services, operation and maintenance, data analysis, and/or monitoring. Estimates of funding and resources needed for each implementation, education and outreach, and monitoring activity are outlined in each of their associated tables (see the “Estimated Costs” column in Tables 5-1, 5-5, and 5-8). This section outlines several federal, state, and private grants that are available in Utah for application throughout the year to support different water quality improvement activities across urban and agricultural lands. See Table 5-4 for a summary of funding sources available to support the Salt Lake County IWP. Please note that this list is preliminary and not comprehensive, and some of these funding sources may be modified or become unavailable at any time. More research will be needed when planning or implementing watershed projects to identify appropriate funding avenues.

Table 5-4. Funding Sources for Projects

Funding ID	Funding Agency	Grant/ Funding Program	Description	Requirements	Application Period	Description of Funding Amounts and Timing of Availability
BOR-01	U.S. Bureau of Reclamation	WaterSmart	Provides financial assistance to water managers for projects that seek to conserve and use water more efficiently, implement renewable energy, investigate and develop water marketing strategies, mitigate conflict risk in areas at a high risk of future water conflict, and accomplish other benefits that contribute to sustainability in the western United States (U.S. Bureau of Reclamation 2025).	Applicants must be located in the western United States or U.S. territories (U.S. Bureau of Reclamation 2025).	Ongoing.	Up to $500,000 for projects to be completed within 2 years.
EPA-01	EPA	Clean Water State Revolving Fund	Provides low-cost financing to communities for a wide range of water quality infrastructure projects, including municipal wastewater facilities, nonpoint source pollution control, decentralized wastewater treatment systems, stormwater runoff mitigation, green infrastructure, estuary protection, and water reuse.	Projects aligned with one of the following 11 project types are eligible for Clean Water State Revolving Fund assistance: Construction of a POTW, nonpoint source, national estuary program projects, decentralized wastewater treatment systems, stormwater, water conservation, watershed pilot projects, energy efficiency, water reuse, security measures for public treatment works, technical assistance.	Annually, June 30 application deadline.	Assistance in the form of loans, debt purchase or refinance, guarantees and insurance, additional subsidization. States contribute an additional 20% to match the federal grants.
GSLT-01	Great Salt Lake Water Trust	Wetlands Protection and/or Restoration Gran	The program is designed to promote the sustainability of Great Salt Lake and is funded through a $50 million grant provided by the U.S. Bureau of Reclamation. This funding is available for three project categories: voluntary water transactions, system conservation projects, ecosystem and habitat projects (Great Salt Lake Water Trust 2025).	Funding is available to eligible organizations, including public or governmental organizations, NGOs, private landowners, entities, or institutions of higher learning if partnered with public/governmental agency or NGO while a public/NGO serves as lead agency. Funding is available for projects that will protect and or restore wetlands and habitats in Great Salt Lake's surrounding ecosystems to benefit the hydrology of Great Salt Lake (Great Salt Lake Water Trust 2025).	Deadline to apply is October 24, 2025.	Up to $3,000,000 of grant funding is available for this grant cycle.
NRCS-01	NRCS	Agricultural management assistance (AMA)	A program that provides funding for production diversification and resource conservation practices that could improve water quality; resource conservation practices include soil erosion control, integrated pest management, and organic farming (NRCS 2025b).	Producers must • be engaged in livestock or agricultural production; • have an interest in the farming operation associated with the land being offered for AMA enrollment; • have control of the land for the term of the proposed contract; • be in compliance with the provisions for protecting the interests of tenants and sharecroppers, including the provisions for sharing AMA payments on a fair and equitable basis; and • be within appropriate payment limitation requirements (NRCS 2025b).	Ongoing; contact your local NRCS office.	AMA provides financial assistance up to 75% of the cost of installing conservation practices. Total AMA payments shall not exceed $50,000 per participant for any fiscal year (NRCS 2025b).
NRCS-02	NRCS	Agricultural Conservation Easement Program (ACEP)	The ACEP comprises two components: 1) to help Tribal landowners, land trusts, and other entities protect croplands and grasslands on working farms by limiting non-agricultural activities through conservation easements and 2) to help landowners protect and restore wetlands previous impacted by agricultural use (NRCS 2025c).	Eligible applications must meet the requirement for farm bill programs under the NRCS (NRCS 2025c).	Ongoing; contact your local NRCS office.	NRCS will pay 50% of development value, with the other 50% coming from land trusts or other partners. Applications for this are ongoing.
NRCS-03	NRCS	Conservation Stewardship Program	A program that works with farmers to reward actions taken to address natural resource concerns in a comprehensive manner and offers compensation for completing additional enhancements (NRCS 2025d).	Eligible lands include private agricultural lands, agricultural Tribal lands, nonindustrial private forestland, farmsteads, associated agricultural lands, and public land that is under the control of the applicant and part of an existing operation. Farmland that is being cleared or prepared for future farming is not eligible. Applicants may include individuals, legal entities, joint operations, or Tribes that own or rent and currently manage land for agricultural or forest production (NRCS 2025d).	Ongoing; contact your local NRCS office.	Annual funds or supplemental funds are available to support conservation practices on farmland (NRCS 2025d).
NRCS-04	NRCS	Environmental Quality Incentives Program	Voluntary program where agricultural producers can receive funding for structural and management practices to improve water quality, reduce soil erosion and sedimentation, improve created wildlife habitat, and mitigate drought (NRCS 2025e).	Applicants must own or manage the land for agricultural commodities that could include cropland, rangeland, pastureland, private forestland, or ranchlands (NRCS 2025e).	Ongoing; contact your local NRCS office.	Funding amounts for all NRCS programs (except ACEP) vary from year to year but are based on set payment rates for each individual practice. Interested parties should contact their local NRCS office for application deadlines and payment rates.

Funding ID	Funding Agency	Grant/ Funding Program	Description	Requirements	Application Period	Description of Funding Amounts and Timing of Availability
NRCS-05	NRCS	National Water Quality Initiative (NWQI)	Program to financially support producers implementing conservation and management practices to reduce nutrient-rich runoff; example projects eligible for funding through this grant include cover crops, filter strips, and tailwater recovery systems (NRCS 2025f).	The land included in the application must be within an NRCS-designated NWQI watershed. The list of NWQI-designated watersheds is updated annually and is available on the NRCS website (NRCS 2025f).	Ongoing; contact your local NRCS office.	Funding amounts for all NRCS programs (except ACEP) vary from year to year but are based on set payment rates for each individual practice. Interested parties should contact their local NRCS office for application deadlines and payment rates.
NRCS-06	NRCS	Regional Conservation Partnership Program	Program that partners with producers to increase the restoration and sustainable use of soil, water, wildlife, and related natural resources on watershed scales (NRCS 2025g).	Applicants can be agriculture and silviculture associations, NGOs, Tribes, state and local governments, conservation districts, and universities (NRCS 2025g).	Ongoing; contact your local NRCS office.	Funding amounts for all NRCS programs (except ACEP) vary from year to year but are based on set payment rates for each individual practice. Interested parties should contact their local NRCS office for application deadlines and payment rates.
NRCS-07	NRCS	Wetland Reserve Program	Voluntary program that provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resources concerns on private lands in an environmentally beneficial and cost-effective manner; similar to Utah's Watershed Restoration Initiative program (NRCS 2025h).	Lands that are eligible include wetlands farmed under natural conditions; farmed wetlands; prior converted cropland; farmed wetland pasture; certain lands that had the potential to become a wetland as a result of flooding; rangeland, pasture, or forest production lands where the hydrology had been significantly degraded and could be restored; riparian areas that linked protected wetlands; lands adjacent to protected wetlands that contributed significantly to wetland functions and values; and wetlands that had previously been restored under a local, state, or federal program that need long-term protection (NRCS 2025h).	Ongoing; contact your local NRCS office.	Funds differ depending on the length of easement a landowner agrees to. Interested parties should contact their local NRCS office for application deadlines and payment rates.
NRCS-08	NRCS	Conservation Innovation Grants	Program that targets funding for individual producers and smaller organizations that may not compete well on larger state and federal grants (categories of projects are selected each year, and updated categories can be found on the NRCS website); example categories include soil health, water optimization technologies, and urban farming technologies (NRCS 2025i).	Eligible applicants include state and local governments, NGOs, eligible private businesses, and individuals (NRCS 2025i).	Variable from year to year, but generally March through April.	It is anticipated that a total amount of up to $200,000 will be available to fund multiple 1- to 3-year projects. Single projects may be eligible to receive $20,000 to $200,000 in funding (NRCS 2025i).
NWF-01	National Wildlife Federation	America the Beautiful Challenge	A public-private grant program for locally led ecosystem restoration projects that invest in watershed restoration, resilience, equitable access, workforce development, corridors and connectivity, and collaborative conservation consistent with the America the Beautiful initiative.	Projects focus on at least one of the following core areas: • Conserving and restoring rivers, coasts, wetlands, and watersheds • Conserving and restoring forests, grasslands, and other important ecosystems that serve as carbon sinks • Connecting and reconnecting wildlife corridors, large landscapes, watersheds, and seascapes • Improving ecosystem and community resilience to coastal flooding, drought, and other climate-related threats • Expanding access to the outdoors, particularly in underserved communities State government agencies, U.S. territories, and Tribal Nations are eligible to apply for all grant categories. Non-profit 501(c) organizations, local governments, municipal governments, and educational institutions are eligible to apply for grants in categories: (3) Sentinel Landscape, (4) National Forest, and (5) Private Forests and Farmland.	Variable from year to year but applications are typically due in July and awards are announced in November.	1. Implementation Grants: Awards range from $1 to $5 million, and landscape-scale restoration requests over $5 million will be considered on a case-by-case basis. 2. Planning Grants: Awards range from $200,000 to $2 million and are contingent upon awards from the U.S. Department of the Interior. 3. Sentinel Landscape Grants: Awards range from $250,000 to $1.5 million and are contingent upon awards by the Department of Defense. 4. National Forest grants: Awards range from $250,000 to $1.5 million and are contingent upon awards by the USFS. 5. Private Forests, Rangeland, and Farmland Grants: Awards range from $200,000 to $500,000 and are contingent upon awards by the NRCS. Cost sharing: For states, the federal cost share is 90%, and states must provide 10% of costs, of which at least 2.5% must be cash. For Tribal Nations and territories, the federal cost share is 97%, and they must provide 3% of costs, of which at least 0.75% must be cash. The cost share is waived for Tribes fully covered by partnerships with Native Americans in Philanthropy and waived for territories per U.S. Department of the Interior legal interpretation.
MUN-01	Local Municipalities	General funds	Supports local water quality, erosion control, or habitat restoration efforts.	Not applicable (N/A)	N/A	N/A
SLCo-01	Salt Lake County	General funds	Provides funding for projects that improve water quality in Salt Lake County.	N/A	N/A	N/A

Funding ID	Funding Agency	Grant/ Funding Program	Description	Requirements	Application Period	Description of Funding Amounts and Timing of Availability
UDAF-01	UDAF	Agricultural Water Optimization Program	Program created during Utah's 2018 General Session (House Bill 381) to reduce agricultural water diversion or consumptive use while maintaining or improving agricultural production and profitability (UDAF 2025a).	Reporting is required to participate in this grant program, and reports must be submitted annually for 3 years beginning the year after the project is completed (UDAF 2025a).	Two annual application deadlines: August 31 and March 31.	Grants are awarded late fall/early winter. There will be future application periods (dates not yet determined) on an ongoing basis as long as funding is available.
UDAF-02	UDAF	Agriculture Resource Development Loan Program	Program provides low-interest loans to farmers and ranchers for projects that meet conservation and pollution goals outlined by the program (UDAF 2024).	Applicants must have a farming "operation" of 5 or more acres with annual sales of at least $1,000.	Ongoing.	Loan awarded at the time of applicant approval.
UDAF-03	UDAF	LeRay McAllister Critical Land Conservation Program	Program uses funds from the legislature to purchase conservation easements and important pieces of land from private owners (UDAF 2025b).	Applicants are counties, cities, towns, UDNR, other Utah agencies, and charitable organizations that qualify as tax exempt under Section 501(c)(3) of the Internal Revenue Code (UDAF 2025b). Funds received must be matched by the applicant.	Ongoing.	Funds awarded by UDAF must be matched by the applicant.
UDAF-04	UDAF	Utah Pollinator Habitat Program	Program committed to help establish and enhance pollinator habitat, with a particular emphasis on targeting habitat improvement for native bees (UDAF 2025c).	Projects must be in Utah to qualify, with a project area needing a minimum of 900 square feet to qualify. Applicants must complete the entire online application before June 15. Each separate project requires a second application. Applicants must agree to a 3-year project follow-up review.	Variable, but typically runs from March to April, annually.	Qualified applicants will be awarded up to 25% of the project cost through the distribution of plant and seed mixtures. No cash awards will be distributed.
UDAF-05	UDAF	Agricultural Voluntary Incentive Program	Program designed to help farming operations develop comprehensive nutrient management plans (CNMPs) (UDAF 2025d).	If producers do not follow the CNMP developed as part of the initial planning with UDAF, they will not be eligible to receive the $12/acre incentive payment for that year (UDAF 2025d).	Application deadline is generally in July or August of each year. Application period opens in the spring.	One-time $1,000 payment to develop the CNMP. After development of a CNMP, UDAF will pay $12/acre for each acre covered under the CNMP.
UDNR-01	UDNR	Watershed Restoration Initiative (WRI)	Program with a focus on improving ecosystem values in high-priority watersheds in the state of Utah (WRI 2025).	Applicants can be private landowners, private organizations, or state agencies (WRI 2025).	Early January every year.	No funding limit.
UDNR-02	Utah Division of Oil, Gas and Mining	Abandoned Mine Reclamation Program	The Abandoned Mine Reclamation Program works to protect the public from dangers of old mines by sealing off access to openings and cleaning up waste (UDNR 2025).	Information is not available. Email amrinfo@utah.gov for more information.	Information is not available. Email amrinfo@utah.gov for mor information.	Information is not available. Email amrinfo@utah.gov for mor information.
UDWQ -01	UDWQ	Water Quality Improvements: Financial Assistance Programs	Grants to fund actions focus on reducing pollution from sewage and runoff, conserving and protecting water and natural resources, improving aquatic and groundwater quality, implementing TMDLs, and supporting education to promote long-term water quality improvements (UDEQ 2025b).	Individuals, businesses, corporations, associations, private entity and government agencies are eligible for loans and grants (UDEQ 2025b).	Ongoing; see UDWQ website for more details.	Information not available online.
UDWQ-02	UDWQ	State nonpoint source (Section 319)	Federal funding distributed by UDWQ for watershed planning and outreach campaigns and to help with projects that reduce nonpoint source pollution; example projects include stream restoration projects, outreach projects, irrigation improvements, and grazing management projects (UDEQ 2025c).	The project must be within a watershed with a completed nine-element watershed plan and benefit water quality conditions. Applications will be ranked based on multiple criteria, including immediate water quality benefits, degree of local support, and severity of existing water quality degradation (UDEQ 2025c).	Variable from year to year, but generally March through April (UDEQ 2025c).	Funds are made available to grant recipients at the beginning of the fiscal year (UDEQ 2025c).
UDWQ-03	UDWQ	Water Quality Board State Revolving Fund	Funding for community water quality infrastructure projects, including stormwater management programs, septic system density studies, and wastewater treatment and collection system upgrades.	Applicant must submit a proposal to the Water Quality Board that will be evaluated on a case-by-case basis by the board. Applications will be evaluated based on multiple criteria, including financial needs of the community and immediate needs for the project.	Ongoing.	Information not available.
USDA-01	U.S. Department of Agriculture	Single-Family Housing Repair Loans and Grant Programs	Offers low-interest loans to repair, improve, or modernize rural single-family homes or grants to elderly very-low-income homeowners to remove health and safety hazards, including septic systems. Loans may be used on repairs and improvements, and grants must be used to remove health and safety hazards. The maximum loan amount is $40,000 and the maximum grant amount is $10,000.	To qualify for a loan or grant, applicants must be homeowners who are unable to obtain affordable credit elsewhere and have a household income that meets eligibility requirements. For grants, applicants must also be 62 years of age or older.	Year-round.	Loan amounts are capped at $40,000 while maximum grant amount is $10,000. Loans are termed for 20 years at 1% fixed interest. Grants have a $10,00 lifetime limit, except in residentially declared disaster areas, which have a $15,000 limit. Grants must be repaid if property is sold in less than 3 years.
UOL-01	Utah Open Lands (UOL)	UOL	Provides landowners in Utah the ability to donate private land as an open space conservation easement (UOL 2025).	Contact UOL for land-specific requirements.	Ongoing.	Information not available.

5.3 Information and Outreach Activities

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Include an information and outreach component that specifies the outreach actions supporting plan implementation. Information and outreach activities should promote adoption and long-term operation and maintenance of management practices and sustain stakeholder engagement.

To continue promoting awareness in the watershed, to increase effectiveness of the BMPs outlined in Table 5-1, and to support water quality improvement planning processes, Salt Lake County and watershed partners will continue to lead and coordinate around specific information and education implementation activities identified in Table 5-5.

Table 5-5. Information and Outreach Activities

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
INF-01	Continue to coordinate and sponsor the annual Salt Lake County Watershed Planning & Restoration Program Symposium for the public and stakeholder groups.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	Once per year	Short term, ongoing	In progress	Once per year	Staff time, $30,000 for venue and food	SLCo-01	Enhance stakeholder collaboration and public engagement on watershed issues.
INF-02	Attend and distribute watershed and water quality information at outreach events at public, education, and governmental events, and other potential venues.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	As scheduled	Short term, ongoing	Planned	As necessary or as opportunity presents	Staff time	SLCo-01	Increase public awareness of watershed and water quality issues and foster community engagement.
INF-03	Prepare and distribute the *Watershed Watch* newsletter.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	Twice per year	Short term, ongoing	Planned	Distribute biannually.	Staff time	SLCo-01	Keep stakeholders and the public informed and engaged with current watershed activities and issues.
INF-04	Update and maintain current website with programmatic information, studies, projects, and collected data.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	Ongoing	Short term, ongoing	In progress	As necessary	Staff time	SLCo-01	Provide accessible, up-to-date information on watershed programs, studies, projects, and data to the public and stakeholders.
INF-05	Schedule reoccurring meetings with the Salt Lake County representative participating in the Jordan River Watershed Council to keep watershed stakeholders informed about current issues and Salt Lake County Watershed Planning & Restoration Program activities.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	Ongoing	Short term, ongoing	Conceptual	Quarterly meetings	Staff time	SLCo-01	Stakeholders are regularly informed about watershed issues and Salt Lake County Watershed Planning & Restoration Program activities, fostering transparency and collaboration.
INF-06	Distribution of partnering, funding, watershed planning, and water quality project implementation information to interested parties via website and social media.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	Ongoing	Short term, ongoing	Planned	Once per year	Staff time	SLCo-01	Increase stakeholder awareness, encourage collaboration, and support project participation.
INF-07	Participate in relevant advisory and committee meetings, including Utah Watershed Coordinating Council, Jordan River Commission, Jordan River–Farmington Bay Water Quality Council, Salt Lake County Stormwater Coalition, Mountain Accord, Mountain Planning District, Wasatch Legacy Partnership, Salt Lake County Health Department, and Utah Water Quality Task Force.	**Salt Lake County Watershed Planning & Restoration Program**	All	All	Salt Lake County	As scheduled	Short term, ongoing	In progress	Number of meetings per year	Staff time	SLCo-01	Strengthen interagency collaboration, ensure representation of watershed interests, and facilitate information sharing on water quality and planning initiatives.
INF-08	Target environmental justice populations for outreach, information, and educational efforts during project implementation.	**Salt Lake County Watershed Planning & Restoration Program,** University of Utah	All	All	Salt Lake County	As required	Short term, ongoing	Conceptual	As necessary	Staff time	SLCo-01	Ensure outreach, information, and educational efforts are equitable and effectively reach underserved communities during project implementation.
INF-09	Continue to conduct a public survey for watershed and water quality awareness.	**Salt Lake County Stormwater Coalition**	All	All	Salt Lake County	Once every 5 years	Midterm, ongoing	In progress	Once every 5 years	Staff time	SLCo-01	Monitor changes in watershed and water quality awareness, helping to guide future outreach and education efforts.

Activity ID	Implementation Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe†	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
INF-10	Install permanent signs describing watershed resource concerns and various nonpoint source pollution BMPs.	**Salt Lake County Watershed Planning & Restoration Program,** Salt Lake County Parks & Recreation, UDWQ, NRCS, UDNR	All	All	Salt Lake County parcels and parks	2026–2028	Midterm, ongoing	Conceptual	Number of signs	$5,000–$8,000	SLCo-01	An educational tool for widespread dissemination of project goals of protecting and improving watershed conditions.
INF-11	Install signs at parks that discourage feeding waterfowl in order to prevent waterfowl from congregating there.	Cities, Salt Lake County Parks & Recreation (county-owned parks), Salt Lake County Watershed Planning & Restoration Program, UDWQ, UDWR, Jordan River Commission, Salt Lake City Department of Public Utilities	Wildlife	*E. coli*	Parks along the Jordan River and tributaries in the valley	2026–2030	Midterm	Conceptual	Number of signs	$75- $1,500 per sign dependent on sign type and size	SLCo-01, MUN-01	Prevent waterfowl from congregating in areas with high *E. coli* loading.
INF-12	Update and distribute a subsequent edition of the *Stream Care Guide* (Salt Lake County 2014) to the public to equip homeowners with up-to-date best practices for stream stewardship.	**Salt Lake County Watershed Planning & Restoration Program**, UDWQ, NRCS	All	All	Salt Lake County	2026–2027	Short term, ongoing	Planned	Distribute once before next plan update (2035).	Staff time	SLCo-01	Protect and maintain waterways on private property.
INF-13	Organize and host monthly #LoveYourWatershed cleanups on the second Saturday of each month along different roads, and coordinate neighborhood cleanup days on the first Friday for community members to remove trash from roads in their areas, providing clean up kits to participants, to help reduce garbage entering the river.	**Jordan River Commission**	Stormwater	Trash, microplastics	Jordan River	2026– ongoing	Short term, ongoing	In progress	Number of monthly cleanups	Staff time, Volunteer time	–	Cleaner roads and neighborhoods, reduced trash entering rivers, increased community engagement and awareness, and improved local habitats through regular.
INF-14	Distribute educational materials on the impact of improper management of pet waste at appropriate locations such as veterinary offices, pet stores, dog parks, and adoption clinics.	Salt Lake County Stormwater Coalition Members, Jordan River Commission, UDWQ	Stormwater	*E. coli*, nutrients	Salt Lake County	2026–ongoing	Midterm, ongoing	Conceptual	Number of education materials distributed	Staff time	–	Reduce *E. coli* and nutrient loading to waterways from pet waste not properly disposed.
INF-15	Education and outreach campaign targeting septic system users on system use, cleaning and maintenance.	Cities with septic, UDWQ	Septic systems	*E. coli*, DO, OM, nutrients	Areas with septic	2026–ongoing	Ongoing	Conceptual	Number of septic users targeted	Staff time	MUN-01	Reducing septic system failures and associated pollution through increased user knowledge and proper maintenance practices.
INF-16	JVWCD is expanding the Conservation Garden Park. The expansion will include exhibits on why water conservation is important and will try to connect people with the one water concept. The expansion will also include examples of stormwater BMPs.	**Jordan Valley Water Conservation District**	Stormwater	All	JVWCD Conservation Garden Park	2026–2027	Short term	Planned	Number of stormwater BMP examples	Unknown, acreage dependent	MUN-01	An educational tool for widespread dissemination of information related to water quality of protecting and improving watershed conditions.
INF-17	Continue to coordinate with partners and the public during the preparation and updating of this IWP.	**Salt Lake County Watershed Planning & Restoration Program**, UDWQ	All	All	Salt Lake County	Once every 10 years or as needed	Long term, ongoing	Planned	Number of partners coordinated with	Staff time or hiring a consultant $100,00–$200,000 (dependent on level of effort)	SLCo-01	Foster broad support, ensure the plan addresses local priorities, and enhance its effectiveness and successful implementation.
INF-18	Develop a communication and engagement plan for providing information to private landowners.	UDWQ, cities, Salt Lake County Health Department, private landowners	Septic	*E. coli*, nutrients	Salt Lake County	2026–2028	Short term	Conceptual	One communication and engagement plan	Staff time	USDA-01, UDWQ-01, MUN-01	Outreach program to support NST-03 and STR-17.

Note: **Bolded text** indicates the lead agency that has committed to the implementation activity. Many activities do not have a lead agency and will need to be assigned through the completion of PLN-01 (see Table 5-1).

INF = information and outreach.

* Funding codes are defined in Table 5-4 in Section 5.2.

† Ongoing activities will be evaluated annually

5.4 Implementation Plan Schedule

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Provide a realistic implementation schedule for the implementation activities covering planning, design, installation, and operation and maintenance. Align this schedule with interim, measurable milestones (Element f) to track whether implementation activities are being implemented effectively.

This IWP aims to implement watershed projects that lead to water quality improvements and watershed health. A critical component of an implementation plan is a timely and realistic schedule that provides a way to measure the progress of individual implementation activities. Table 5-6 contains a schedule of all implementation activities outlined in the implementation plan (see Tables 5-1, 5-5, and 5-8). Some activities are scheduled annually; others will be ongoing on an opportunistic basis depending on resource concerns. In Table 5-6, the solid blue shading indicates activities that would take place during the implementation period, and the hatched blue shading indicates ongoing activities.

Table 5-6. Implementation Plan Schedule

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
PLN-01	Incorporate a standing agenda item in the Jordan River Watershed Council meetings to assign a lead partner to implementation activities without a lead and track the progress of implementation activities outlined in the 2025 IWP.	Salt Lake County Watershed Planning & Restoration Program, Jordan River Watershed Council, project partners										
PLN-02	Develop a plan to identify strategies and priority areas to reduce wildlife congregating in urban settings.	UDWR, UDWQ, golf courses										
PLN-03	Create a working group meeting to identify high-use areas in close proximity to surface waters in need of restroom facilities or increased maintenance. Develop a memorandum of understanding (MOU) that outlines responsibilities of each partner.	UDWQ, Salt Lake County Health Department, Jordan River Commission, Jordan River Watershed Council, Salt Lake County Parks & Recreation, individual cities, Salt Lake City Department of Public Utilities										
PLN-04	Identify parks and public spaces that allow dogs but also do not have existing pet waste stations. Identify the most frequented parks and public spaces on this list to create a priority list of sites to install pet waste collection supplies and disposal cans and informative signage to go along with the stations.	Individual MS4, Salt Lake County Stormwater Coalition, Salt Lake City Department of Public Utilities, Jordan River Commission, UDWQ										
PLN-05	Identify priority areas to implement buffer zones between rivers and roadways/riverside trails.	Individual MS4s, Salt Lake County Parks & Recreation, Salt Lake County Stormwater Coalition, Jordan River Watershed Council, UDWQ										
PLN-06	Establish a planning document with ski resorts to implement stormwater BMPs implementation at ski resorts.	Salt Lake City Department of Public Utilities, ski resorts, Town of Alta, Town of Brighton, USFS										
PLN-07	Develop or identify an existing list of private landowners with culverts and bridges on private lands.	Municipalities, homeowners associations, Jordan River Watershed Council, UDOT, Trout Unlimited										
PLN-08	Create a standing agenda item in existing stormwater meetings to discuss LID systems to plan for PLN-16.	Individual MS4s, Jordan River Watershed Council										
PLN-09	Plan and identify partners to implement STR-14 (divert water from Lee Creek and Goggin Drain to Farmington Bay).	UDWR, duck clubs, UDWRi, Utah Division of Forestry, Fire & State Lands (FFSL)										
PLN-10	Establish a standing agenda item in a Salt Lake County Watershed Planning & Restoration Program meeting to track and plan for NST and STR projects led by Salt Lake County.	Salt Lake County Watershed Planning & Restoration Program										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
PLN-11	Establish a working group or create a standing agenda in an existing working group to discuss abandoned mine features and water quality implementation projects	UDWQ, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts										
PLN-12	Establish a meeting to discuss automating points of water diversion and engage with potential project partners.	Great Salt Lake Office of the Commissioner, UDWRi										
PLN-13	Identify and prioritize areas to implement stream restoration BMPs in high-erosion streams, burn scars, and low- gradient wet meadows.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, Jordan River Watershed Council										
PLN-14	Identify priority developed areas for LID systems and project partners.	Individual MS4s, Jordan River Watershed Council										
PLN-15	Identify and prioritize undeveloped areas to establish vegetative buffer zones.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, municipalities, Salt Lake County Parks & Recreation										
PLN-16	Identify priority areas to implement engineered wetlands around the Jordan River.	Utah Mitigation Commission, FFSL, Jordan River Commission, The Nature Conservancy, Salt Lake County Watershed Planning & Restoration Program										
PLN-17	Identify high-priority Salt Lake County–owned parks to retrofit to improve stormwater runoff and engage partners.	Salt Lake County Watershed Planning & Restoration Program, Salt Lake County Parks & Recreation, UDWQ										
PLN-18	Identify areas to install passive treatment systems for abandoned mine features and engage with potential project partners.	UDWQ, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts										
PLN-19	Identify areas to automate points of water diversion to better measure diverted water and water use.	Great Salt Lake Office of the Commissioner, UDWRi										
PLN-20	Develop an MOU for NST-03 (financial assistance program for upgrading/repairing septic systems) to develop criteria or metrics on cost share, eligibility, focus areas, and other specifics from the program.	UDWQ, cities, Salt Lake County Health Department, private landowners										
NST-01	Update the Forestry Recreation and Foothill Agricultural zones and Great Salt Lake Shoreline Agricultural zones in the Salt Lake County Ordinance to incorporate stream setbacks for new development and redevelopment.	Salt Lake County Watershed Planning & Restoration Program, Jordan River Watershed Council, Land Conservation Groups										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
NST-02	Inventory existing trash booms in the Salt Lake County and identify the primary locations of sources of floatable debris entering the Jordan River to inform the selection of future structural BMPs aimed at reducing trash pollution.	UDWQ, Salt Lake County Flood Control, Jordan River Commission										
NST-03	Develop a financial assistance program (using 319 or municipal general funds) for upgrading/ repairing septic systems.	UDWQ, cities, Salt Lake County Health Department, private landowners										
NST-04	Establish conservation easements along the Jordan River with a focus on historical agriculture land.	Utah Open Lands, The Nature Conservancy, NRCS, UDAF, Jordan River Watershed Council, Land Conservation Groups										
NST-05	Develop pre-fire assessments to identify areas of high concern where wildfires would have the greatest impact on water resources in the Salt Lake Public Utilities Watershed Management Plan.	Salt Lake City Department of Public Utilities, USFS, Drinking water providers, FFSL										
NST-06	Engage with private landowners who operate small farms to implement agricultural BMPs via a dinner or specific outreach event.	UDAF, UDWQ, NRCS										
NST-07	Inspect and review flow obstructions (culverts/bridges) to ensure culverts are the proper size to allow for adequate flow during high-flow events.	Individual MS4s, Jordan River Watershed Council, UDOT, private landowners										
STR-01	Implement additional garbage booms along the Jordan River or tributaries to reduce floating garbage transport.	Cities, UDWQ, Salt Lake City Department of Public Utilities, FFSL, Salt Lake County Watershed Planning & Restoration Program (on county-owned lands), The Nature Conservancy, Jordan River Commission										
STR-02	Place pet waste collection supplies and disposal cans, along with informative signage, at high-use areas near surface waters. Refer to PLN-04 for details on the preceding nonstructural activity.	Individual MS4s, Salt Lake City Department of Public Utilities, Jordan River Commission, UDWQ										
STR-03	Implement buffer zones between rivers and roadways/riverside trails.	Individual MS4s, Salt Lake County Parks & Recreation, Salt Lake County Stormwater Coalition, Jordan River Watershed Council, UDWQ										
STR-04	Implement stormwater BMPs at ski resort parking areas, primarily those nearby waterways, to reduce pollutant transport via stormwater.	Ski resorts, USFS, Salt Lake County Health Department, Salt Lake City Department of Public Utilities										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
STR-05	Implement agricultural BMPs, such as fencing to prevent livestock from direct access to surface waters, off-channel watering options, drainage management, fertilizer management, and buffer strips where necessary.	Private landowners, UDAF, NRCS, UDWQ, Utah State University small farm program										
STR-06	Implement BMPs in high-erosion streams (nearest headwaters), burn scars, and low-gradient wet meadows.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, Jordan River Watershed Council										
STR-07	Replace and resize culverts as necessary based on findings from NST-07	Individual MS4s, Private landowners, municipalities, UDOT, Jordan River Watershed Council										
STR-08	Install LID systems for existing development.	Individual MS4s, Salt Lake County Stormwater Coalition (Advisory only)										
STR-09	Establish vegetative buffer zones in undeveloped areas.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, municipalities, Salt Lake County Parks & Recreation										
STR-10	Develop and maintain restroom facilities in high-use recreation and known unhouse population areas year-round. Refer to PLN-03 for details on the preceding planning activity.	USFS, Salt Lake County Parks & Recreation, individual cities, Salt Lake City Department of Public Utilities										
STR-11	Implement engineered wetlands around Jordan River. Focus on high recreation areas or areas with high development pressure on city- and county-owned lands.	FFSL, The Nature Conservancy, Salt Lake County Watershed Planning & Restoration Program										
STR-12	Implement fuels reduction measures as outlined in Salt Lake City Department of Public Utilities Watershed Management Plan to decrease wildfire intensity, and protect drinking water infrastructure from post-fire impacts in areas identified from NST-05.	USFS, Salt Lake City Department of Public Utilities, FFSL										
STR-13	Divert water from Lee Creek and Goggin Drain to Farmington Bay.	UDWR, duck clubs, UDWRi, FFSL										
STR-14	Retrofit high-priority county-owned parks to improve stormwater runoff.	Salt Lake County Watershed Planning & Restoration Program, Salt Lake County Parks & Recreation, UDWQ										
STR-15	Install passive treatment systems for abandoned mine features. Passive treatments include diversions, soil caps, mine waste removal, limestone systems, and installing wetlands. More information on passive treatment recommendation in Utah can be found in *Utah Nonpoint Source Management Plan for Abandoned Mines in Utah* (EPA 2018).	UDWQ, USFS, Utah Geological Survey, USGS, Utah Division of Oil, Gas, and Mining, Salt Lake City Department of Public Utilities, Trout Unlimited, Utah Mining Association, ski resorts										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
STR-16	Automate points of water diversion to better measure diverted water and water use.	Great Salt Lake Office of the Commissioner, UDWRi										
STR-17	Upgrade and repair failing or near-life-end septic systems.	Private landowners, municipalities, UDWQ										
INF-01	Continue to coordinate and sponsor the annual Salt Lake County Watershed Planning & Restoration Program Symposium for the public and stakeholder groups.	Salt Lake County Watershed Planning & Restoration Program										
INF-02	Attend and distribute watershed and water quality information at outreach events at public, education, and governmental events, and other potential venues.	Salt Lake County Watershed Planning & Restoration Program										
INF-03	Prepare and distribute the *Watershed Watch* newsletter.	Salt Lake County Watershed Planning & Restoration Program										
INF-04	Update and maintain current website with programmatic information, studies, projects, and collected data.	Salt Lake County Watershed Planning & Restoration Program										
INF-05	Schedule reoccurring meetings with the Salt Lake County representative participating in the Jordan River Watershed Council to keep watershed stakeholders informed about current issues and Salt Lake County Watershed Planning & Restoration Program activities.	Salt Lake County Watershed Planning & Restoration Program										
INF-06	Distribution of partnering, funding, watershed planning, and water quality project implementation information to interested parties via website and social media.	Salt Lake County Watershed Planning & Restoration Program										
INF-07	Participate in relevant advisory and committee meetings, including Utah Watershed Coordinating Council, Jordan River Commission, Jordan River–Farmington Bay Water Quality Council, Salt Lake County Stormwater Coalition, Mountain Accord, Mountain Planning District, Wasatch Legacy Partnership, Salt Lake County Health Department, and Utah Water Quality Task Force.	Salt Lake County Watershed Planning & Restoration Program										
INF-08	Target environmental justice populations for outreach, information, and educational efforts during project implementation.	Salt Lake County Watershed Planning & Restoration Program, University of Utah										
INF-09	Continue to conduct a public survey for watershed and water quality awareness.	Salt Lake County Stormwater Coalition										
INF-10	Install permanent signs describing watershed resource concerns and various nonpoint source pollution BMPs.	Salt Lake County Watershed Planning & Restoration Program, Salt Lake County Parks & Recreation, UDWQ, NRCS, UDNR										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
INF-11	Install signs at parks that discourage feeding waterfowl in order to prevent waterfowl from congregating there.	Cities, Salt Lake County Parks & Recreation (county-owned parks), Salt Lake County Watershed Planning & Restoration Program, UDWQ, UDWR, Jordan River Commission, Salt Lake City Department of Public Utilities										
INF-12	Update and distribute a subsequent edition of the Stream Care Guide (Salt Lake County 2014) to the public to equip homeowners with up-to-date best practices for stream stewardship.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, NRCS										
INF-13	Organize and host monthly #LoveYourWatershed cleanups on the second Saturday of each month along different roads, and coordinate neighborhood cleanup days on the first Friday for community members to remove trash from roads in their areas, providing clean up kits to participants, to help reduce garbage entering the river.	Jordan River Commission										
INF-14	Distribute educational materials on the impact of improper management of pet waste at appropriate locations such as veterinary offices, pet stores, dog parks, and adoption clinics.	Salt Lake County Stormwater Coalition Members, Jordan River Commission, UDWQ										
INF-15	Education and outreach campaign targeting septic system users on system use, cleaning and maintenance.	Cities with septic, UDWQ										
INF-16	JVWCD is expanding the Conservation Garden Park. The expansion will include exhibits on why water conservation is important and will try to connect people with the one water concept. The expansion will also include examples of stormwater BMPs.	Jordan Valley Water Conservation District										
INF-17	Continue to coordinate with stakeholders and the public during the preparation and updating of this IWP.	Salt Lake County Watershed Planning & Restoration Program, UDWQ										
INF-18	Develop a communication and engagement plan for providing information to private landowners.	UDWQ, cities, Salt Lake County Health Department, private landowners										
MON-01	Increase *E. coli* monitoring in City, Big Cottonwood, Bingham, Butterfield, and Midas Creeks.	Salt Lake County Watershed Planning & Restoration Program, UDWQ										
MON-02	Monitor water quality above and below irrigation canal inputs throughout the Jordan River watershed to determine which are contributing to impairments.	Salt Lake County Watershed Planning & Restoration Program, UDWQ,										
MON-03	Increase metal monitoring in upper Big and Little Cottonwood Creeks and tributaries to determine sources of metal impairments. Monitor during different hydrologic regimes (i.e., baseflow, stormwater, spring runoff).	Salt Lake County Watershed Planning & Restoration Program, UDWQ, USFS, USGS										

Activity ID	Implementation Activity	Project Partners	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
MON-04	Monitor flow from abandoned mine features to determine main sources of metal loading.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, USFS, USGS										
MON-05	Increase TDS monitoring in Bingham, Butterfield, and Midas Creeks to determine sources of impairments.	Salt Lake County Watershed Planning & Restoration Program, UDWQ										
MON-06	Monitor *E. coli* on the mainstem of the Jordan River.	UDWQ, Salt Lake County Watershed Planning & Restoration Program										
MON-07	Establish flow gages in AUs without continuous flow gages.	USGS, Salt Lake County Watershed Planning & Restoration Program, UDWQ										
MON-08	Conduct microbial source tracking monitoring to determine BMP effectiveness.	Salt Lake County Watershed Planning & Restoration Program, UDWQ, University Partners										
MON-09	Assess stream stability using the stream stability assessment before and after BMP implementation.	Salt Lake County Watershed Planning & Restoration Program										

* Dashed timelines indicate that the actions are ongoing and will be evaluated annually.

5.5 Milestones

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EPA ELEMENT

Establish interim, measurable milestones to track progress in implementing the watershed plan's implementation activities (e.g., on-schedule completion and deployment by location). These milestones assess implementation status.

The Salt Lake County IWP implementation strategy outlines a phased approach over a 10-year horizon, encompassing short-term, midterm, and long-term activities. Each phase focuses on targeted objectives aligned with stakeholder engagement, project implementation, and measurable water quality improvements:

- **Short term (1–2 years):** Initial objectives, such as education, outreach, and small-scale infrastructure improvements, can often be categorized as conceptual or planned projects, given their lower financial and logistical requirements and potential for rapid initiation.
- **Midterm (2–5 years):** Larger-scale activities, requiring coordination among partners and grant preparation, typically move from conceptual to planned status during this period, with some advancing to in progress as resources and approvals are secured.
- **Long term (5–10 years):** Extended-duration projects are designed for ongoing implementation, monitoring, and adaptive management, and may transition from conceptual to planned and then to in progress as part of sustained watershed improvement efforts.

The implementation activities matrix (see Table 5-1), information and outreach matrix (see Table 5-5), and monitoring plan (see Table 5-8) specify whether each project is classified as short-term, midterm, or long-term in the "Implementation Activity Timeframe" column. Many activities in Table 5-1 are interconnected based on their timeframes. For instance, PLN-05 (Identify priority areas to implement buffer zones between rivers and roadways/riverside trails) is designated as a short-term activity that supports STR-03 (Implement buffer zones between rivers and roadways/riverside trails), which is a long-term project. Each activity also includes a progress indicator, with additional details provided in Section 5.6. Each implementation activity is also categorized by its status, allowing tracking of which projects are at each stage of the planning process:

- **Conceptual projects** are in the initial stages of consideration, identified through stakeholder input, preliminary studies, or emerging issues. These projects serve as a foundation for future planning and prioritization, though they may lack detailed designs, funding commitments, or implementation schedules.
- **Planned projects** have progressed beyond the idea stage and are prepared for implementation, with complete designs, identified funding sources, necessary permits, and established schedules. These projects are prioritized for upcoming action and may be awaiting final approvals or resource allocation.
- **In-progress projects** are actively being implemented and tracked, including construction, restoration, monitoring, or outreach activities. Adaptive management may be applied as needed based on interim results or changing conditions.

Most projects currently fall into either the conceptual stage, where they are being identified and developed based on stakeholder input and emerging needs, or the in-progress stage, where implementation activities such as construction, restoration, monitoring, or outreach are actively underway. This combined categorization supports transparent tracking and reporting, helps stakeholders understand where resources are needed, and clarifies which projects are ready to launch or are already making measurable impacts. Categorizing projects by both implementation phase and development status ensures transparent tracking, facilitates stakeholder engagement, and supports effective resource allocation throughout the plan's lifecycle. Salt Lake County can track these milestones though the establishment of quarterly meetings with partners (see PLN-01 in Table 5-1).

5.6 Indicators to Measure Progress

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EPA ELEMENT

Establish water-quality benchmarks to track progress during implementation. Use direct measures and/or indirect indicators of load reduction. Specify how unmet interim targets will trigger plan updates—adjusting practices, revising load analyses, and re-evaluating response timelines.

To effectively track the success of the implementation plan, it is essential to establish clear indicators that measure both the application and effectiveness of management activities. These indicators provide a basis for evaluating progress, guiding adaptive management, and demonstrating the benefits of watershed projects to stakeholders and funding partners.

Application indicators focus on whether planned activities are being initiated and completed. They help answer questions such as the following:

- Are outreach events happening as scheduled?
- Are BMPs being installed according to plan?
- Are monitoring data being collected at the right locations and frequency?

Tracking these metrics ensures that the implementation plan remains on schedule and that resources are being used efficiently.

Effectiveness indicators, on the other hand, measure the actual impact of management activities on water quality and watershed health. These indicators include reductions in pollutant concentrations, improvements in habitat, and enhanced ecological resilience. By regularly assessing these outcomes, project partners can determine whether implemented activities are producing the desired environmental benefits and make adjustments as necessary.

A suite of indicators is provided below to support comprehensive progress monitoring:

Application indicators (implementation tracking). These indicators track the completion and initiation of activities outlined in the implementation plan:

- Number of outreach events, newsletters, and educational materials distributed
- Number of BMPs installed (e.g., signs, pet waste stations, garbage booms)

- Number of monitoring sites established and samples collected
- Completion of ordinance updates, drainage assessments, and financial assistance programs
- Acres of riparian habitat protected or restored
- Participation in advisory committees and coalitions

Effectiveness indicators (water quality outcomes). These indicators measure the environmental benefits resulting from management activities:

- Reductions in *E. coli*, nutrients, metals, and TDS at monitored sites
- Improvements in DO and reductions in HABs
- Increased vegetative buffer zones and riparian vegetation
- Cleaner stormwater runoff and reduced trash entering rivers
- Improved streambank and riparian conditions (quantitative and photographic documentation)
- Enhanced ecological resilience and flood protection

The indicators for the implementation, education/outreach, and monitoring activities are outlined in Tables 5-1, 5-5, and 5-8 in the column "Indicator to Measure Progress." Regular review and adjustment of these indicators are essential to ensure the implementation plan remains effective and responsive to new data and stakeholder input. By combining robust tracking of activities with rigorous measurement of outcomes, Salt Lake County and stakeholders can maximize the impact of its watershed management efforts and achieve long-term success.

5.7 Monitoring Component

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EPA ELEMENT

Evaluate the effectiveness of the implementation efforts over time, measured against the criteria established to determine whether loading reductions are being achieved over time and substantial progress is being made toward attaining water quality standards.".

Decades of watershed improvement work has already occurred and continues to occur throughout the Jordan River basin. This work focuses on water quality improvement, stream and riparian habitat, hydrology, and social and recreational services. Monitoring water quality, watershed function, and stream function parameters provides a scientific foundation for assessing the success of management actions or identifying the need for adaptive management. Monitoring data can be used to evaluate existing conditions, calculate pollutant loads, and inform the development of water quality improvement projects aimed at mitigating adverse conditions or preventing further degradation of watershed functions.

5.7.1 Existing Monitoring Efforts

Numerous federal, state, and local agencies and municipalities collect water quality and watershed-related data throughout the county. These data are used to guide management strategies and implement projects that focus on preserving, protecting, and enhancing water quality, watershed functions, and stream functions. Salt Lake County has been doing extensive data collection since the 2015 IWP. In addition to future monitoring efforts (Section 5.7.2), Salt Lake County and watershed partners will continue to collect the data presented in Table 5-7.

Table 5-7. Entities Conducting Water Quality and Watershed Data Collection

Data Collected	Entity	Data Collected
Water quality	Salt Lake County Watershed Planning & Restoration, USFS, UDWQ, UDOT Stormwater Compliance, Salt Lake County Stormwater Program, Jordan River and Farmington Bay Water Quality Council, Central Valley WRF, Magna Water District, Salt Lake City Department of Public Utilities, Sandy City Public Utilities, Metropolitan District of Sandy and Salt Lake, JVWCD, South Valley WRF, Jordan Basin WRF, industrial point source and stormwater discharge permittees	Chemical parameters (temperature, TDS, nutrients (N+P), DO, bacteria (*E. coli*), turbidity, pH, metals, etc.) from all AUs in Salt Lake County, including 303(d) list of impaired waterbodies
Hydrology	Salt Lake County Watershed Planning & Restoration, USFS, USGS, NRCS, UDWR, Utah Division of Homeland Security, Utah Association of Conservation Districts, Salt Lake County Flood Control Engineering, Salt Lake City Department of Public Utilities, local municipal stormwater and flood-management divisions	Stream flow, floodplain development, floodplain connectivity, bank stability, hydraulic modifications, flow diversions
Habitat	Salt Lake County Watershed Planning & Restoration, USFS, Utah Division of Wildlife Resources	Stream channel characteristics (pool/riffle, water depth, fish passage, aquatic habitat structures, shading, boulders), riparian corridor (width and plant community type), streambed profile and width, macroinvertebrates

5.7.2 Future Monitoring Efforts

Ongoing monitoring within the watershed plays a crucial role in assessing the success of implementation activities and measuring progress toward long-term watershed objectives. The data gathered through these efforts can be leveraged to address information gaps, evaluate trends, and determine the effectiveness of BMPs deployed throughout the watershed. The primary goal of this plan's monitoring program is to track progress toward improved water quality in Salt Lake County as implementation strategies are carried out. The specific objectives consist of the following:

- Collect and analyze water quality data to ensure that target water quality concentrations and loading in the watershed are achieved.
- Assess the effectiveness of BMPs and the resulting reductions in pollutant loads.

To measure progress on this IWP and effectiveness toward water quality improvements in the Jordan River watershed, a comprehensive monitoring program is required to evaluate and report on the performance of the monitoring activities listed in Table 5-8. The program includes two types of monitoring:

- Implementation monitoring: Verifies that the planned activities have been completed in the watershed.
- Effectiveness monitoring: Evaluates whether the implemented activities are achieving the desired outcomes, such as increased stakeholder engagement and pollutant load reductions.

Salt Lake County will monitor watershed improvements as a result of management strategies by implementing monitoring activities outlined in Table 5-8. A centralized database could be used to monitor effectiveness of the proposed implementation activities and could be evaluated regularly as part of a standing Salt Lake County meeting. A status column should be added to the database to track actual implementation progress. One option could be using the EPA's Grants and Reporting Tracking System database more stringently to track projects. This is a national database set up to collect information on all watershed improvement projects that were funded by CWA 319/nonpoint source grants.

Table 5-8 is a resource for Salt Lake County planners and project partners, intended to adapt as objectives and new information emerge, and its components should be re-evaluated as needed. All monitoring efforts are classified as conceptual (see "Project Status" column in Table 5-8) as project-specific sampling and analysis plans are outside this plan's scope and must be prepared prior to any significant monitoring efforts. Existing monitoring will continue congruently with new efforts, which should draw on current agency monitoring sampling and analysis plans developed for monitoring efforts already taking place in the area. Water quality conditions may be assessed through chemical and physical measurements, biological assessments, photo-point monitoring, and comparisons to indirect indicators of load reductions. The planning horizon for this monitoring plan is approximately 10 years. However, Salt Lake County will conduct annual reviews to assess the progress of implementation and monitoring activities. Any changes in watershed conditions, including land use modifications, regulatory updates, new impairments, or additional TMDLs, will be incorporated into the plan as necessary.

Table 5-8. Watershed Implementation Monitoring Plan

Activity ID	Monitoring Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
MON-01	Increase *E. coli* monitoring in City, Big Cottonwood, Bingham, Butterfield, and Midas Creeks.	**Salt Lake County Watershed Planning & Restoration Program, UDWQ**	Unknown	*E. coli*	City Creek, Big Cottonwood Creek, Bingham Creek, Butterfield Creek, and Midas Creek.	2026–2035	Short term, ongoing	Conceptual	Increased monitoring throughout duration of plan.	Staff time for sampling, approximately $20 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Data to better understand and address *E. coli* pollution contributions in these newly impaired AUs.
MON-02	Monitor water quality above and below irrigation canal inputs throughout the Jordan River watershed to determine which are contributing to impairments.	**Salt Lake County Watershed Planning & Restoration Program, UDWQ,**	Hydromodification	Nutrients, *E. coli*, sediment	Canals throughout Salt Lake County.	2026–2035	Short term, ongoing	Conceptual	Increased monitoring throughout duration of plan.	Staff time for sampling, $100–$250 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDAF-01, UDNR-01, UDWQ-01, UDWQ-02, UDWQ-03, NRCS-04	Data to better understand and address pollutant contributions from irrigation canals.
MON-03	Increase metal monitoring in upper Big and Little Cottonwood Creeks and tributaries to determine sources of metal impairments. Monitor during different hydrologic regimes (i.e., baseflow, stormwater, spring runoff).	**Salt Lake County Watershed Planning & Restoration Program, UDWQ, USFS**, USGS	Legacy mining	Metals	Little and Big Cottonwood Creeks.	2026–2035	Short term, ongoing	Conceptual	Increased monitoring at existing and additional locations throughout duration of plan.	Staff time for sampling, $100–$250 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Data to better understand and address contributions from legacy mining.
MON-04	Monitor flow from abandoned mine features to determine main sources of metal loading.	**Salt Lake County Watershed Planning & Restoration Program, UDWQ,** USFS, USGS	Legacy mining	Metals	Big and Little Cottonwood Canyons.	2026–2035	Short term, ongoing	Conceptual	Number of flow monitoring systems installed.	Staff time for sampling, $100–$250 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDNR-02, UDWQ-01, UDWQ-02	Data to better understand and address contributions from legacy mining.
MON-05	Increase TDS monitoring in Bingham, Butterfield, and Midas Creeks to determine sources of impairments.	**Salt Lake County Watershed Planning & Restoration Program, UDWQ**	All	TDS	Bigham, Butterfield and Midas Creeks.	2026–2035	Short term, ongoing	Conceptual	Increased monitoring at existing and additional locations throughout duration of plan.	Staff time for sampling, $15–$50 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Data to better understand and address TDS impairments.
MON-06	Increased monitoring of *E. coli* on the mainstem of the Jordan River.	**UDWQ**, Salt Lake County Watershed Planning & Restoration Program	Failing septic systems, leaking sewer lines, grazed pastures, confined feedlots, wildlife, unhoused populations	*E. coli*	Mainstem of Jordan River, above and below canals and above and below major tributaries, during baseflow and storm events.	2026–2035	Short term, ongoing	Conceptual	Increased monitoring at existing and additional locations throughout duration of plan.	Staff time for sampling, $50–$150 per sample for laboratory fees.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Understand the major contributing waterbodies of *E. coli* to the Jordan River to target *E. coli* implementation efforts.
MON-07	Establish flow gages in AUs without continuous flow gages.	**USGS**, Salt Lake County Watershed Planning & Restoration Program, UDWQ	All	All	Mainstem of the Jordan River upstream of segment 4, Major tributaries near the confluence with the Jordan River.	2028–2030	Short term	Conceptual	Number of flow gages installed.	$25,000–$40,000 per install of each standard stream gage depending on the site conditions, $16,000–$30,000 annual maintenance depending on stream stage height (USGS 2019b).	Joint funding agreement between USGS and funding partner. USGS can fund up to 50% of the cost (USGS 2019b).	Continuous data on flow contributions to the Jordan River from canals and major tributaries during all flow regimes.
MON-08	Conduct microbial source tracking monitoring to determine BMP effectiveness.	**Salt Lake County Watershed Planning & Restoration Program**, UDWQ, University Partners	Failing septic systems, leaking sewer lines, grazed pastures, confined feedlots, wildlife, unhoused populations	*E. coli*	In all AUs that are impaired for *E. coli* and have had BMP upgrades since 2020	2026–2035	Short term, ongoing	Conceptual	Determine load reductions post-BMP installation	Staff time for sampling, Between $250 and $600 per sample.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Understand sources that are contributing pollutants through stormwater.

Activity ID	Monitoring Activity	Suggested Project Partners	Pollutant Source(s)	Targeted Pollutant(s)	Priority Location	Estimated Schedule	Implementation Activity Timeframe	Project Status	Indicator to Measure Progress	Estimated Costs	Possible Funding*	Expected Results
MON-09	Assess stream stability using the stream stability assessment before and after BMP implementation.	**Salt Lake County Watershed Planning & Restoration Program**	Stream erosion	Sediment	Above and below stream stability BMP implementation measures installed on reaches with poor or fair stream stability assessment classifications.	2026–2035	Long term	Conceptual	Determine load reductions post-BMP installation	Staff time.	EPA-01, GSLT-01, NWF-01, MUN-01, SLCo-01, UDNR-01, UDWQ-01, UDWQ-02	Assess the effectiveness of BMP implementation on reducing stream erosion.

Note: **Bolded text** indicates the lead agency that has committed to the implementation activity. Many activities do not have a lead agency and will need to be assigned through the completion of PLN-01 (see Table 5-1).

MON = monitoring

* Funding codes are defined in Table 5-4 in Section 5.2.

† Ongoing activities will be evaluated annually.

6 LITERATURE CITED

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