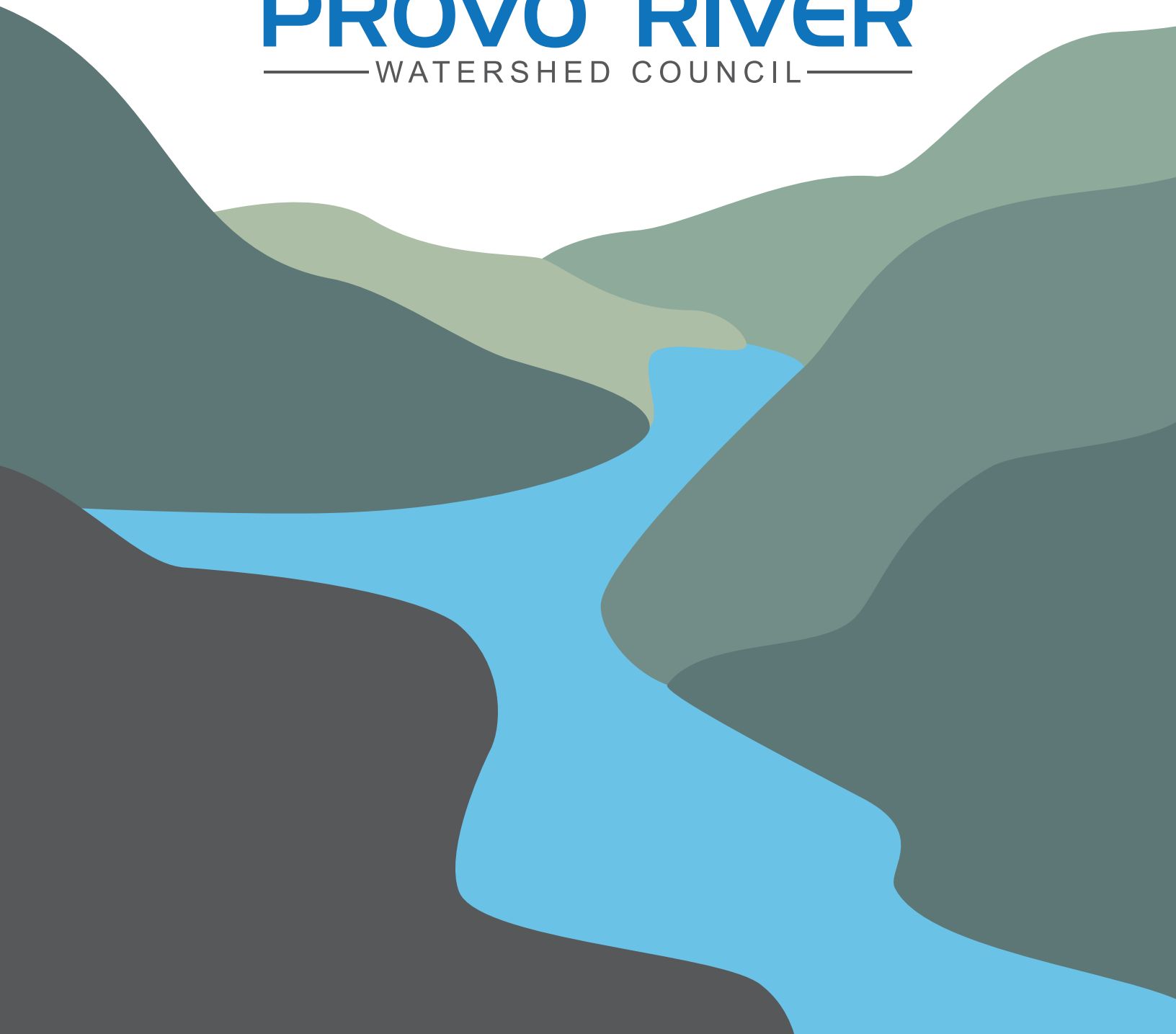




PROVO RIVER

—WATERSHED COUNCIL—



Protecting the Water Quality of the Provo River Watershed



BACKGROUND

The Provo River Watershed Council (PRWC) is a coalition of State, Local, and Federal government agencies; water districts; and private organizations dedicated to protecting the water quality in the Provo River Watershed. The PRWC mission is to promote and support watershed best management practices to ensure high-quality water for all users and to meet designated beneficial uses in the Provo River Watershed. Council members of the PRWC represent many organizations with a vested interest in water quality in the Provo River Watershed. Any interested stakeholders are welcome to be a part of the PRWC, and current PRWC council members are as follows:

- | | |
|--|---|
| Central Utah Water Conservancy District
(funding member) | Mountainland Associates of Governments |
| Jordan Valley Water Conservancy District
(funding member) | Natural Resources Conservation Services |
| Metropolitan District of Salt Lake & Sandy
(funding member) | Provo River Water Users Association |
| Metropolitan Water District of Provo
(funding member) | Salt Lake City Public Utilities |
| Metropolitan Water District of Orem
(funding member) | Summit County |
| | Uinta-Wasatch-Cache National Forest |
| | U.S. Bureau of Reclamation, Provo-area Office |
| | Utah Department of Environmental Quality |
| | Utah Department of Natural Resources |
| | Utah Division of Drinking Water |
| | Utah Division of Parks and Recreation |
| Utah Division of Water Quality | Utah Division of Water Resources |
| Wasatch County | Wasatch Soil Conservation District |
| Heber Valley Special Service District | Provo River Mitigation Commission |
| Jordanelle Special Service District | |

An interlocal agreement between the PRWC funding members was proposed in 2017. This agreement allows the members to take cooperative action to 1) promote protection, 2) facilitate planning and development of lands and waters, 3) facilitate planning and development affecting the quality of water, 4) protect individual jurisdictional abilities, and 5) assist in formulation and implementation of plans for management, protection, and preservation of the watershed.

PURPOSE AND GOALS

The purpose of this Strategic Plan is to provide recommendations on actions and activities for the PRWC for the short-term (5-years) and long-term (20-years) to protect the water quality in the Provo River Watershed. The goal of the strategic planning exercise was to review PRWC’s current activities, understand current and future threats to water quality in the watershed, identify gaps where these threats are not addressed, and create a plan for addressing these gaps.

STRATEGIC PLANNING

The Provo River Watershed is one of Utah’s most important watersheds. It is the primary source of public drinking water for Salt Lake and Utah Counties where nearly 2/3rds of the state population resides. It also provides agricultural and irrigation water for Wasatch and Summit Counties. The drainages beauty, ruggedness, versatility, and proximity to urban centers has made it a highly utilized agricultural and recreational destination. The watershed and it’s associated recharge areas are comprised of high alpine mountains, a national forest, former mineral extraction sites, transportation corridors, recreational resorts, ranching, farming, commercial development, and a growing residential community. This diversity means the threats to water quality vary throughout the watershed and a given threat may be high in one area and nearly non-existent in another. The PRWC’s objective to protect and maintain water quality for its designated beneficial uses, has led to the creation of this strategic plan which addresses the heterogeneity of the area.

THE PROCESS:



IDENTIFY THREATS

Create a list of potential threats to water quality. PRWC identified 10 threats to focus the plan on.



DEFINE STUDY AREA

Divide Provo River Watershed into sub-watershed areas with similar land uses and water resources.

RISK ASSESSMENT

Assess each threat in each sub-watershed separately, to establish risk levels.



PRIORITIZATION

Rank the threats from negligible to extreme based on the risk levels across all sub-watersheds.



RECOMMENDATIONS

Develop detailed recommendations for activities with the potential to make the most impact for the highest-ranked threats.

Jordanelle Reservoir:

Constructed in 1993, this reservoir holds 320,300 acre-feet of water to regulate the natural variability of snowpack and run-off from year to year. With multiple boat docks and state park, this reservoir attracts a large variety of recreational uses. The watershed is a popular place to both visit and live with developed residential lots through out the watershed.

Upper Provo River:

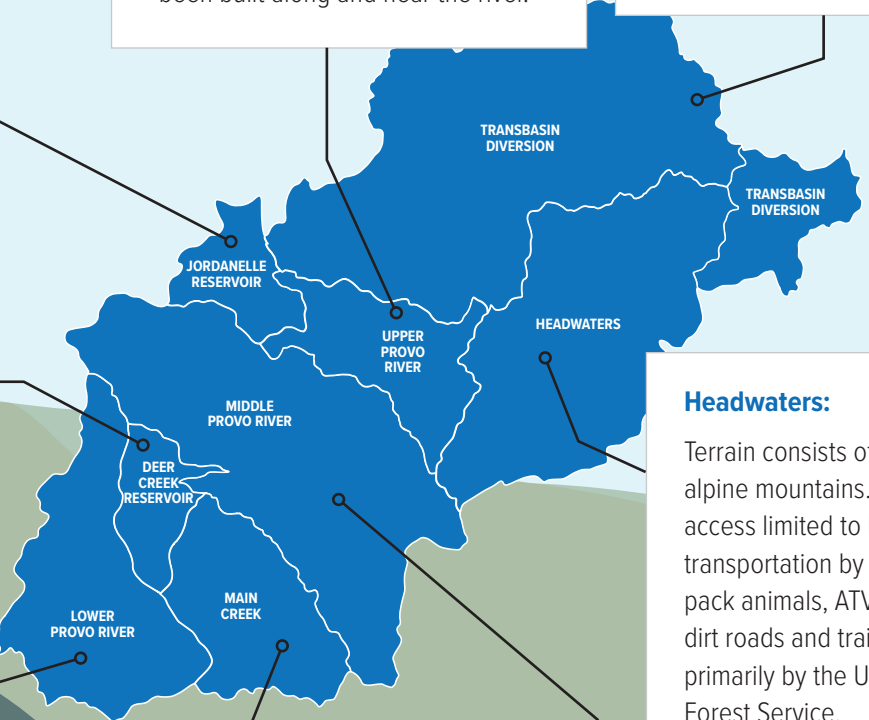
The Upper Provo River terrain consists of a steep mountain canyon carved by the river which runs through the canyon floor. Paved roads and highways parallel the river in many places. Campgrounds, cabin communities, and small towns have been built along and near the river.

Transbasin Diversions:

Terrain consists of high elevation, alpine mountains. Public access is limited to backcountry transportation by foot, horse, and pack animals, ATVs, and limited dirt roads and trails. Managed primarily by the United States Forest Service. This is not a natural drainage into the Provo River Watershed; instead, man-made infrastructure has been constructed to transport water from these basins into the basin of study.

Deer Creek Reservoir:

Constructed in 1941, this reservoir holds 152,570 acre-feet of water to regulate the natural variability of snowpack and run-off from year to year. With multiple boat docks and state park, this reservoir attracts a large variety of recreational uses. The watershed is a popular place to both visit and live with developed residential lots through out the watershed.



Headwaters:

Terrain consists of high elevation, alpine mountains. Public access limited to backcountry transportation by foot, horse, pack animals, ATVs, and limited dirt roads and trails. Managed primarily by the United States Forest Service.

Lower Provo River:

The Lower Provo River terrain consists of a steep mountain canyon carved by the Lower Provo River which runs through the canyon floor. Paved roads and highways parallel the length of the river. Cabin communities and campgrounds have been built along and near the river.

Main Creek:

This is the largest tributary into the watershed aside from the Provo River. Its terrain is a shallow canyon with a moderately wide verdant valley. It is primarily used for agricultural uses including livestock and crops.

Middle Provo River:

This passes through what used to be an agricultural community that is transitioning to an urban community. The river frontage was purchased from private farmers by the federal government and is managed by the mitigation commission. Several canal systems pull from and return to this section of the Provo River.

OVERALL THREAT RISK

● NEGLIGIBLE ● LOW ● MEDIUM ● HIGH ● EXTREME

To identify current and future risks to water quality within the watershed, an analysis of the threats was conducted. The risk assessment focused on the types, location, and severity of the selected threats on their impact to water quality and the system’s beneficial uses. Risk was calculated for each threat uniquely within each sub-watershed. The risk levels were classified as: Extreme, High, Medium, Low, or Negligible. Quantification for the analysis utilized data from the PRWC water quality monitoring program, land-use and management plans, and a number of other sources to determine the following:

- The geographic scope of the threat’s degradation to water quality
- The level of degradation a threat causes to water quality
- Duration of recovery after threat has impacted water quality

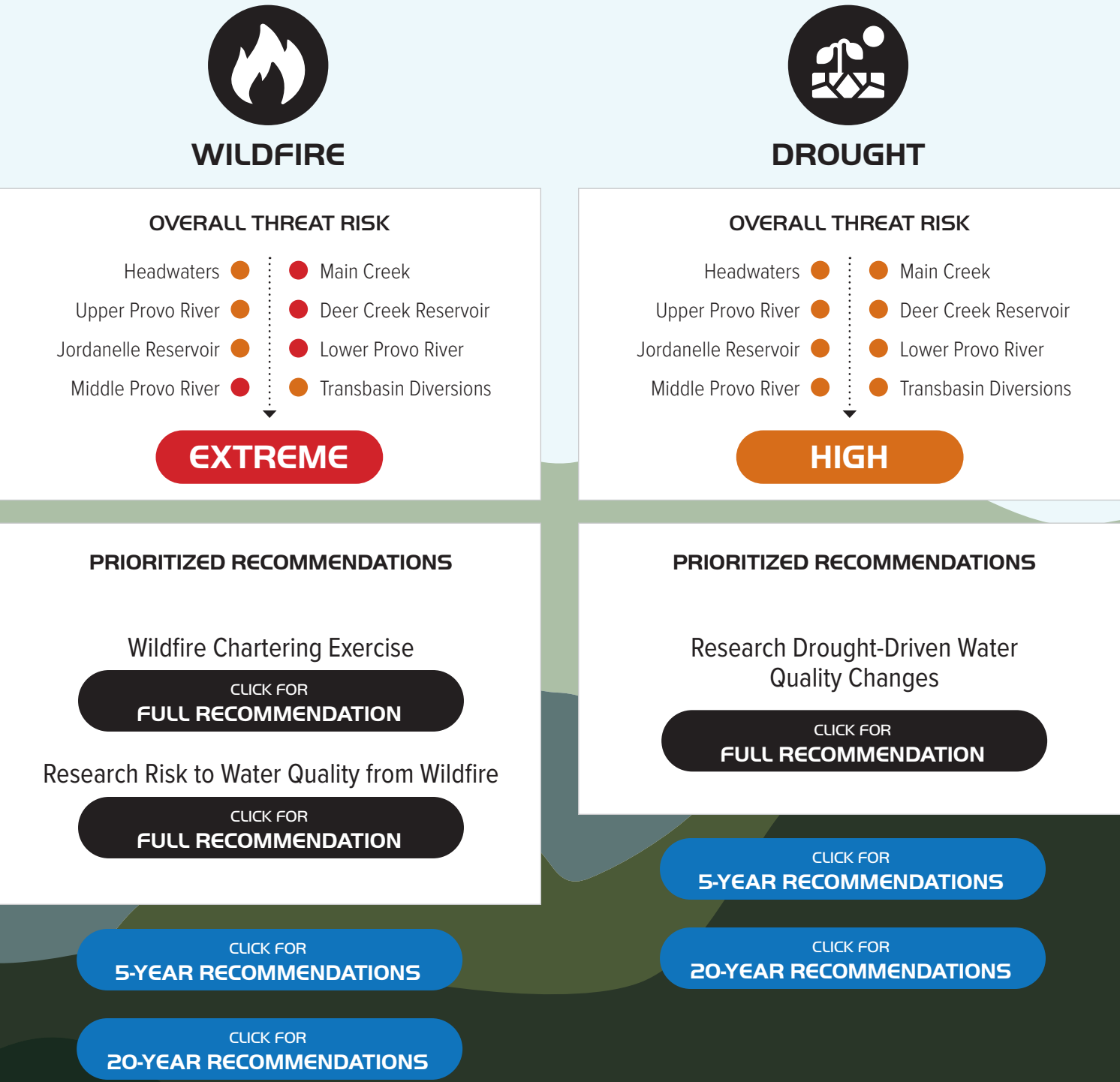
The entire risk assessment method is available [here](#) and all data sources are listed [here](#).



5-Year and 20-Year Recommendations were prepared for each threat. Seven of those recommendations were prioritized for a more detailed recommendation development. The full information on the prioritized recommendations can be found by clicking on the **black box**. The remaining recommendations can be found by clicking on the **blue boxes**.

RISK ASSESSMENT RESULTS AND RECOMMENDATIONS FOR EACH THREAT

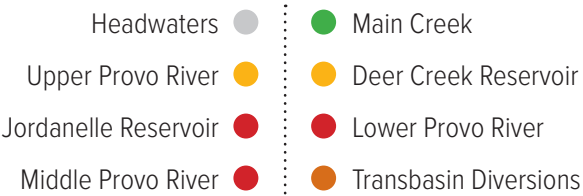
● NEGLIGIBLE ● LOW ● MEDIUM ● HIGH ● EXTREME





DEVELOPMENT

OVERALL THREAT RISK



HIGH

PRIORITIZED RECOMMENDATIONS

Review of Ongoing Development
Review Program

CLICK FOR
FULL RECOMMENDATION

Stormwater BMP Failure Investigation

CLICK FOR
FULL RECOMMENDATION

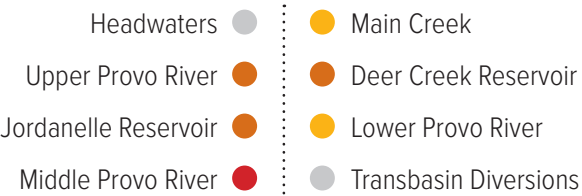
CLICK FOR
5-YEAR RECOMMENDATIONS

CLICK FOR
20-YEAR RECOMMENDATIONS



STORMWATER

OVERALL THREAT RISK



HIGH

PRIORITIZED RECOMMENDATIONS

Review of Ongoing Development
Review Program

CLICK FOR
FULL RECOMMENDATION

Stormwater BMP Failure Investigation

CLICK FOR
FULL RECOMMENDATION

Engagement with UDAF Conservation Districts

CLICK FOR
FULL RECOMMENDATION

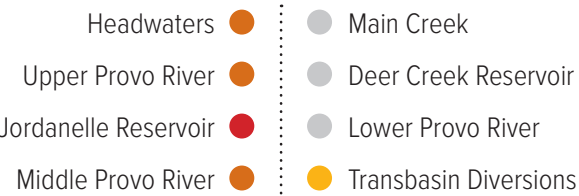
CLICK FOR
5-YEAR RECOMMENDATIONS

CLICK FOR
20-YEAR RECOMMENDATIONS



MINES / CLEAN-UP SITES

OVERALL THREAT RISK



HIGH

No prioritized recommendations were made for mines and clean-up sites for the initial timeframe due to the threat level and capacity to implement recommendations in the initial 5-year timeframe.

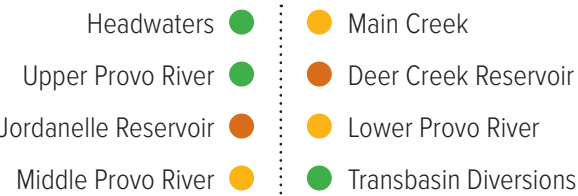
CLICK FOR
5-YEAR RECOMMENDATIONS

CLICK FOR
20-YEAR RECOMMENDATIONS



AQUATIC INVASIVE SPECIES

OVERALL THREAT RISK



HIGH

PRIORITIZED RECOMMENDATIONS

Research Risk of Quagga
Mussel Infestation

CLICK FOR
FULL RECOMMENDATION

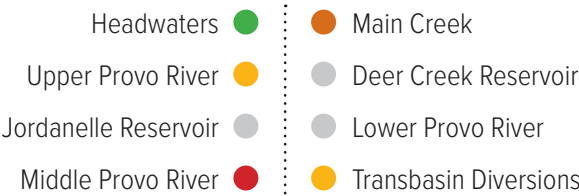
CLICK FOR
5-YEAR RECOMMENDATIONS

CLICK FOR
20-YEAR RECOMMENDATIONS



LAND MANAGEMENT

OVERALL THREAT RISK



MEDIUM

PRIORITIZED RECOMMENDATIONS

Review of Ongoing Development Review Program

CLICK FOR FULL RECOMMENDATION

Research Risk to Water Quality from Wildfire

CLICK FOR FULL RECOMMENDATION

Engagement with UDAF Conservation Districts

CLICK FOR FULL RECOMMENDATION

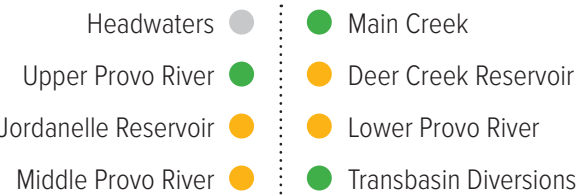
CLICK FOR 5-YEAR RECOMMENDATIONS

CLICK FOR 20-YEAR RECOMMENDATIONS



TRAFFIC EVENTS

OVERALL THREAT RISK



MEDIUM

No prioritized recommendations were made for traffic events for the initial timeframe due to the threat level and capacity to implement recommendations in the initial 5-year timeframe

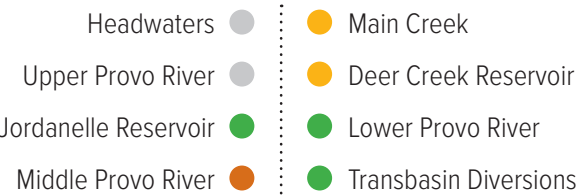
CLICK FOR 5-YEAR RECOMMENDATIONS

CLICK FOR 20-YEAR RECOMMENDATIONS



WASTEWATER

OVERALL THREAT RISK



MEDIUM

PRIORITIZED RECOMMENDATIONS

Review of Ongoing Development Review Program

CLICK FOR FULL RECOMMENDATION

Engagement with UDAF Conservation Districts

CLICK FOR FULL RECOMMENDATION

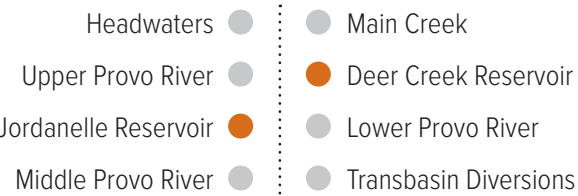
CLICK FOR 5-YEAR RECOMMENDATIONS

CLICK FOR 20-YEAR RECOMMENDATIONS



HARMFUL ALGAL BLOOMS

OVERALL THREAT RISK



LOW

No prioritized recommendations were made for harmful algal blooms for the initial timeframe due to the threat level and capacity to implement recommendations in the initial 5-year timeframe.

CLICK FOR 5-YEAR RECOMMENDATIONS

CLICK FOR 20-YEAR RECOMMENDATIONS

RISK ASSESSMENT BY GEOGRAPHY

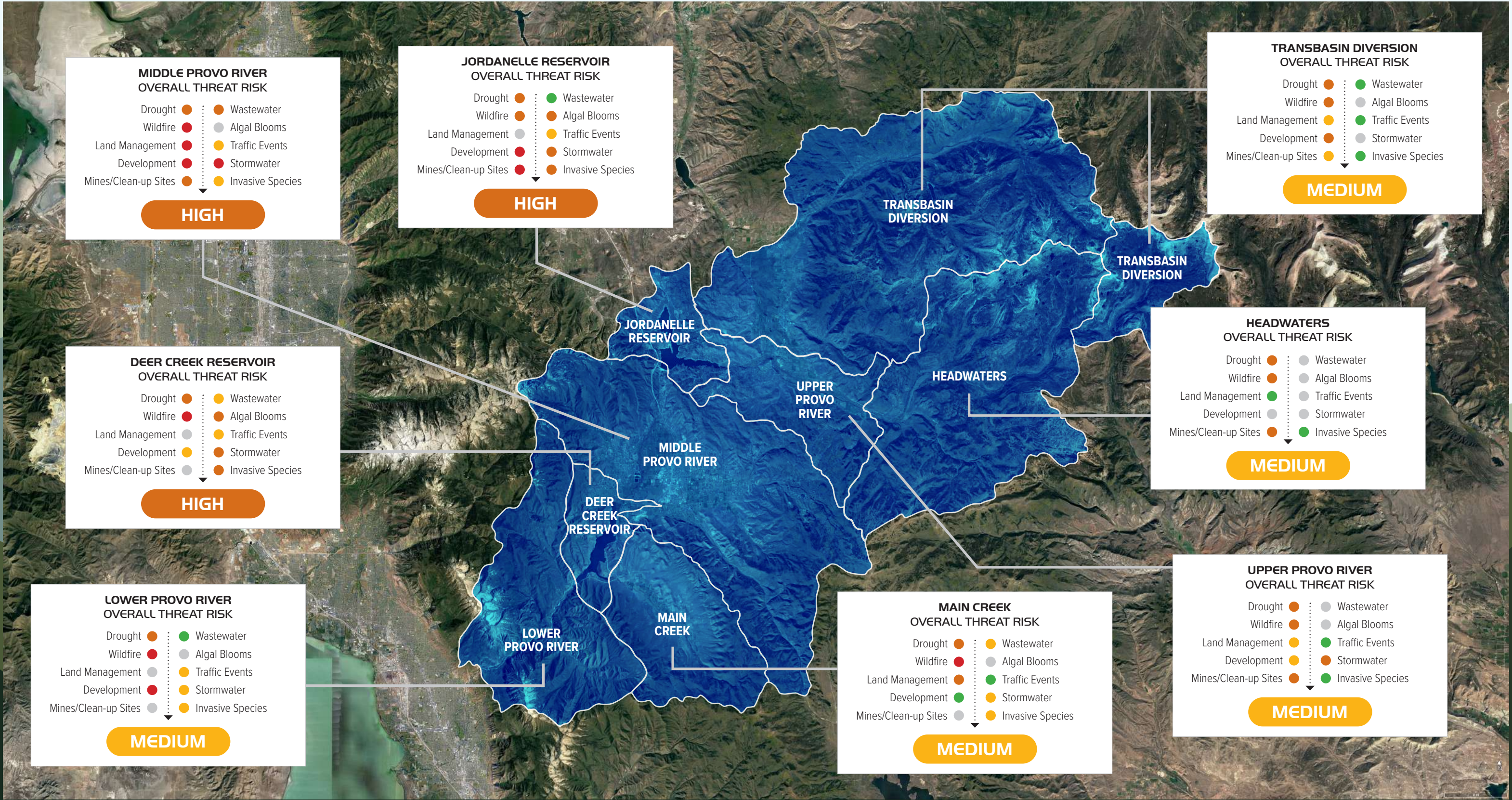
The Provo River Watershed was broken up into these eight sub-watersheds of similar cover, land use, and water resources. These sub-watersheds also tended to have mostly consistent throughout, but diverse from each other, managing agencies. Therefore, the risks for each threat is different for each sub-watershed. While some threats were high throughout the entire watershed, each threat was assessed for each sub-watershed independently. The result of this assessment is shown below.

RISK SUMMARY



RECOMMENDATIONS

● NEGLIGIBLE ● LOW ● MEDIUM ● HIGH ● EXTREME



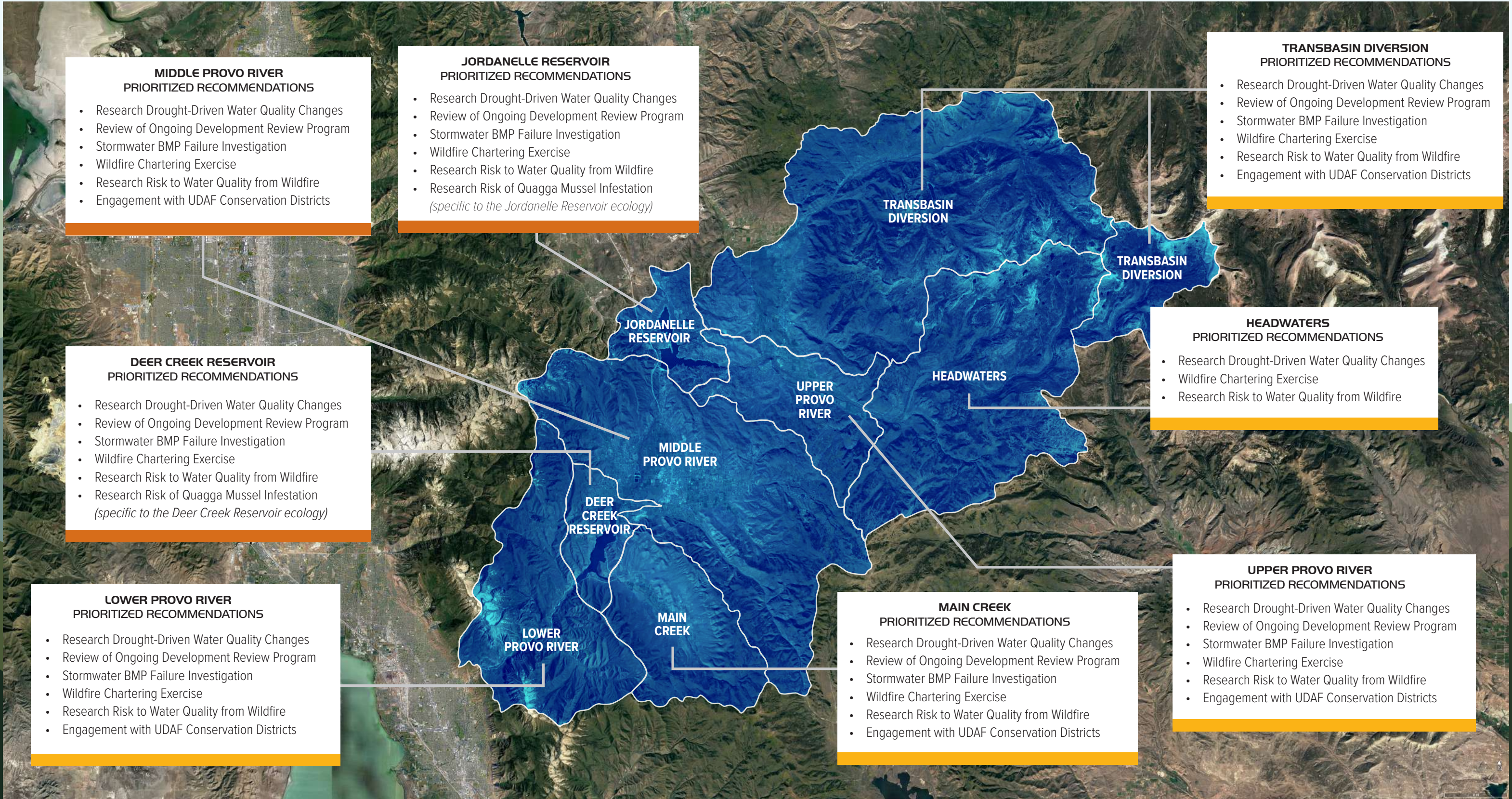
APPLICABLE PRIORITIZED RECOMMENDATIONS TO EACH SUB-WATERSHED

Recommendations were designed to apply to all locations of the watershed where the threat exists.
The map shows how the recommendations apply to the watersheds.

RISK SUMMARY

RECOMMENDATIONS

● NEGLIGIBLE ● LOW ● MEDIUM ● HIGH ● EXTREME





PRIORITIZED RECOMMENDATIONS

Detailed explanation of identified recommendations, goals, next steps, timeline, and estimated costs.

RECOMMENDATION:

● HIGH THREAT RISK



RESEARCH DROUGHT-DRIVEN WATER QUALITY CHANGES

Commission ongoing research studies aimed at furthering technical understanding of drought-driven water quality changes in the watershed.

OUTCOME / GOAL: Work toward quantitative measures of drought-related impacts on the watershed to anticipate specific water quality changes and proactively mitigate harmful impacts.

BACKGROUND / JUSTIFICATION: Utah weather is prone to extremes, from flooding to multi-year droughts. Based on the Utah Lake Basin Plan (Division of Water Resources 2014), the region has experienced seven significant droughts in the past ~100 years. Drought conditions are highly likely in the future based on examination of historical data. The severity of the threat to the Provo River Watershed from drought is a function of the intensity and duration of drought conditions, as well as the timing of the drought (summer vs. winter drought). However, even moderate droughts can significantly affect the PRWC and water users. Conservation measures, which are an important part of addressing the impact of drought on the PRWC and water users in the watershed, are addressed by PRWC member agencies outside of the PRWC. This plan focuses on the impact of drought on water quality because of its connection to the PRWC mission.

A lack of rainfall and/or a decreased snowpack during a drought can lead to reduced flows of rivers and streams, resulting in stagnation/increased residence time, reduced dissolved oxygen and increased release of metals and nutrients from the sediments, a potential build of pollutants and microorganisms, changes in water chemistry, changes in thermal characteristics of lakes and rivers, and the interruption of sediment, organic matter, and nutrients transport. These issues negatively impact recreational opportunities such as swimming, boating, and fisheries within the rivers and streams. Drinking water quality impacts during a drought can include increased turbidity, taste and odor, pathogens, and challenges in managing disinfection byproducts.

The PRWC would benefit from ongoing research that helps to quantify these (and other) drought-related impacts on water quality in the watershed to better prepare for and mitigate potential water quality degradation. Specific questions that ongoing research could help answer include:

- ▶ During low flow periods, are different contaminants being introduced via groundwater inflow that may not be diluted (e.g., nitrates or phosphorus)?
- ▶ Do winter droughts and summer droughts affect water quality differently (e.g., changes to thermal stratification patterns in reservoirs, warmer temperatures exacerbating internal loading of sediment or nutrients)?
- ▶ Are point sources of pollution (e.g., failing septic systems) more problematic during low flow periods? If so, where are these point sources located, and what can be done to mitigate impacts?
- ▶ Can changes associated with droughts on drinking water be quantified or predicted? Can we quantify or predict drinking water changes associated with a drought? Do summer and winter droughts have different effects?
- ▶ What specific metrics can the PRWC use to measure drought-related impacts to water quality? Are there any specific data gaps that could be filled using PRWC's monitoring program?

INITIAL STEPS:

- 1 Establish an annual budget amount to dedicate to ongoing research.
- 2 Research and studies could be accomplished via partnerships with nearby research institutions such as UVU, BYU, and USU; or through a competitive procurement process.
- 3 Draft a scope of work or RFP.



ESTIMATED DURATION:

Establish a research budget for the next fiscal year and implement a research study.



COST:

A PRWC-sponsored drought study could cost between \$50,000 to \$350,000. The low end of the price range might involve a contractor simply designing a study and developing the associated sampling and analysis plan. The PRWC would complete the monitoring to keep costs down. Costs for a study would increase if the PRWC wanted the contractor/research institution to complete the monitoring.

RECOMMENDATION:

● HIGH THREAT RISK

REVIEW OF ONGOING DEVELOPMENT REVIEW PROGRAM



Evaluate the effectiveness of the ongoing development reviews program for achieving PRWC goals and identify opportunities to increase its efficacy.

OUTCOME / GOAL: Ensure the funding PRWC provides for development reviews advances the PRWC goal of protecting water quality within the watershed.

BACKGROUND / JUSTIFICATION: The PRWC and Wasatch County Planning Office coordinate to complete development reviews within unincorporated areas of the County to review possible development pressure and associated water quality impacts. The PRWC provides incremental funding to the Planning Office to conduct thorough stormwater development reviews and follow-up observations based on their discretion. This partnership is crucial to fulfilling the goals outlined by the PRWC.

Commercial and residential development presents an opportunity to integrate management practices that address existing and future water quality issues. Development and land-use changes create changes to pollutant loading waterways. Stormwater management BMPs and other measures to protect water quality can most efficiently be implemented during new and redevelopment where site layout, wastewater treatment methods, landuse, and site drainage can be designed to protect water quality of downstream waters. As the PRWC looks to expand its reviews, we recommend assessing the focus and structure of these reviews to ensure they are accomplishing the goal of determining which municipalities are creating greater impacts due to proximity to the water body or other issues. Hideout Town should be approached to see if they would participate as the next possible expansion. The development process can also provide opportunities for PRWC to fund stormwater treatment at developments above and beyond the required amount. As the PRWC looks to expand their reviews, the focus and structure of these reviews should be assessed regularly to ensure they meet PRWC's goals.

Potential Future Steps Within 5-Year Work Plan Timeline Depending on Outcomes from Initial Steps:

- ▶ Revise the level of engagement PRWC has with stormwater development reviews to include additional opportunities for review and comment, and follow-up during and after the development process.
- ▶ Create a development review protocol that can be implemented in expanded development review areas based upon priority or more sensitive areas.

INITIAL STEPS:

- 1 Review the outcome of development reviews completed during the last five years to determine if Wasatch County and consultant's recommendations were implemented. This review should include whether inspection findings were addressed and if water quality data corroborates these conclusions. Identify where review outcomes were not aligned with the objectives of the Water Quality Management Plan.
- 2 PRWC and Wasatch County staff review these findings with the consultant to determine a path forward and additional resources required to address any misalignments.



ESTIMATED DURATION:

Three (3) months.



COST:

\$20,000 - \$50,000

RECOMMENDATION:

● HIGH THREAT RISK



STORMWATER BMP FAILURE INVESTIGATION

Investigate why construction sites are commonly found to be out of compliance with UPDES Stormwater Permit for Construction Activities. Local ordinances inform future outreach and education programs.

OUTCOME / GOAL: Better understand the causes of stormwater BMP failures on construction sites.

BACKGROUND / JUSTIFICATION: Between 2017 and 2022, DWQ found 58-100% of the inspections for compliance with the UPDES Stormwater Permit for Construction Activities (CG) it conducted were deficient. The objective of the CG is to control and limit pollutants coming off of a construction site so that they do not end up in a water body. The CG requires construction sites to take steps to prevent pollutants such as sediment, common construction chemicals, and trash from leaving the construction site and entering water bodies. Sites are found to be deficient when these requirements are not met, thus increasing the risk of pollutants entering water bodies. The cause of deficiency can extend beyond the physical installation or maintenance of the BMPs and be due to overall site design or the construction stormwater management plan. This recommendation focuses on understanding the cause of deficiencies that identify solutions.

Potential Future Steps Within 5-Year Work Plan Timeline Depending on Outcomes from Initial Steps:

- ▶ Work with USU Extension to implement stormwater management workshops for audiences that address sources of BMP failures. Provide attendee lists to stormwater managers to track how attendees and site deficiencies relate in future years.
- ▶ Provide funding to a group to create a design guide to stormwater BMPs for Wasatch County that identifies successful BMPs for local conditions and situations common within Wasatch County and supports Wasatch County's stormwater management plan, as well as other local stormwater management plans.
- ▶ Participate and support local stormwater coalition.

INITIAL STEPS:

- 1 Provide funding to local governments or a consultant to conduct follow-up interviews with construction site managers, stormwater BMP designers, and on-site engineers after deficiencies are identified on sites to understand why deficiencies occurred. Compile interview results into a findings document that identifies reasons for BMP failures.
- 2 Meet with local governments and DWQ to share results and plan actions to address failure reasons.



ESTIMATED DURATION:

1 - 2 construction seasons.



COST:

\$10,000 - \$30,000

RECOMMENDATION:

● EXTREME THREAT RISK



WILDFIRE CHARTERING EXERCISE

Go through a chartering exercise to establish the fundamental details of the PRWC's involvement in mitigating wildfire risk and the threat to water quality in the Provo River. Develop a (cross-boundary and cross-agency) plan to assess risk and prioritize sediment and wildfire mitigation projects.

OUTCOME / GOAL: Develop the foundation for how the PRWC will work to address the threat of wildfire including identifying staff and resources. Develop a sediment risk assessment and prioritization plan to develop a programmatic approach to collaborate the implementation of projects in cohorts (vegetation treatments, process-based restoration, sediment storage enhancements, and debris hazard reductions).

BACKGROUND / JUSTIFICATION: Wildfire was identified as the greatest threat to the water quality of the Provo River Watershed in the Provo River Watershed Risk Assessment matrix. PRWC is interested in addressing the threat and working on risk mitigation; however, to do so, a plan needs to be developed for how to implement projects to address the threat.

Potential Future Steps within 5-Year Work Plan Timeline Depending on Outcomes from Initial Steps:

- ▶ Implement mitigation projects where partnerships are aligned.
- ▶ Adaptively update PRWC role in wildfire migration efforts.



ESTIMATED DURATION:

Three-five years.



COST:

\$250,000 to \$1,000,000

INITIAL STEPS:

The first step is to perform outreach and develop relationships with the key agencies involved in wildfire mitigation efforts such as USFS, FFSL, Shared Stewardship, WRI, NRCS, etc. Develop an understanding of how wildfire mitigation efforts are planned, funded, and executed in other watersheds. Identify resource gaps to understand how the PRWC would strengthen collaboration, administration, and the implementation of wildfire mitigation projects in the Provo River Watershed.

- 1** Based on information gathered during outreach efforts, initiate a chartering exercise within PRWC to establish the level of involvement the agency will have in mitigating wildfire risk to water quality in the Provo River Watershed.
 - Consider whether PRWC will serve as a third-party administrator of project funding and implementation.
 - Consider whether PRWC will provide a platform for stakeholder engagement that will connect and integrate partnerships for cross-jurisdictional, agency, and land ownership collaboration for project implementation.
- 2** Informed by research and reconnaissance site investigations, develop a programmatic wildfire and sediment mitigation plan to prioritize short-term and long-term projects similar to the Beaver River Watershed Improvement Project and Denver Water's Forests to Faucets program. Work with partners and develop the roadmap for what to do, where, and when.
 - Pursue a meeting with Shared Stewardship to better understand how the agency pursues and coordinates wildfire mitigation efforts. Invite Shared Stewardship to speak at a PRWC meeting, request field tours of wildfire risk mitigation projects already underway, and discuss opportunities to collaborate on projects within the Provo River Watershed.
- 3** Determine the path forward in terms of staffing and potentially hire a wildfire mitigation program lead.
- 4** Pursue funding. State and Federal funding initiatives prioritize holistic projects that build watershed resiliency, such as fuel load reduction, low-tech process-based restoration, debris flow hazard reduction, and other nature-based improvement projects that mitigate wildfire and build watershed resilience.

RECOMMENDATION:

● EXTREME THREAT RISK



RESEARCH RISK TO WATER QUALITY FROM WILDFIRE

Commission ongoing research studies aimed at furthering technical understanding of the risks to the water quality of the Provo River and the treatability of the Provo River for drinking water from wildfire and/or wildfire-related impacts.

OUTCOME / GOAL: Identify the main vulnerabilities of the Provo River as a drinking water source, identify specific areas within the watershed that (if burned) would cause the most significant impact on water quality, and identify specific projects that could increase the resiliency of the Provo River as a drinking water source.

BACKGROUND / JUSTIFICATION: A history of fire suppression and forest (mis)management has resulted in overgrown forests vulnerable to catastrophic wildfire. There is a high probability of a wildfire occurring in the Provo River Watershed that could degrade the watershed and impact the water quality of the Provo River. This could have the potential to leave the river water untreatable for prolonged periods. Given the reliance on the river as a source of drinking water, it would be valuable to understand the most significant vulnerabilities of the system, the potential projects that could help to increase resiliency, and prevent interruptions in delivery to drinking water systems.



ESTIMATED DURATION:

Two-five years.



COST:

\$200,000 to \$500,000

INITIAL STEPS:

- 1** Informed by the Wildfire and Sediment Risk Assessment (Plan), develop an updated list of research questions to address through a series of studies. Potential research questions could include:
 - What areas represent the greatest potential sources of fine sediment to the Provo River?
 - In the headwater and upper watershed areas, conduct a risk assessment of the sediment sources and complete detailed sediment source, sink, and transport modeling to identify zones of concern and opportunity (such as WARSS, GeoWEPP, other).
 - Where are the best opportunities for sediment storage and filtration within the watershed?
 - Where are opportunities to isolate contaminated runoff plumes within the reservoirs to avoid transport downstream?
 - Evaluate delta sediment storage enhancement opportunities at reservoir inlets, the potential for mechanical removal, and the potential for sediment releases or emergency bypass sediment routing channels.
- 2** Identify and pursue funding for research projects.
- 3** Draft scopes of work and identify potential researchers to develop proposals.

RECOMMENDATION:

● HIGH THREAT RISK



RESEARCH RISK OF QUAGGA MUSSEL INFESTATION

Assist with funding DNR / mussel experts to research the survivability and proliferation potential of quagga mussels in Deer Creek, Jordanelle, and Strawberry Reservoirs under current conditions. Additionally, quantify risks that climate, land use, water use, or reservoir operational changes could increase or decrease the potential for a large-scale infestation of quagga mussels to establish in these specific water bodies. The first phase of this research could be a thorough literature review with a second / follow-up phase, including pilot testing in a controlled lab environment.

OUTCOME / GOAL: Better understand the current and future risks that transportation of quagga mussels, to these specific water bodies, would result in a widespread infestation.

BACKGROUND / JUSTIFICATION: Deer Creek Reservoir has previously had five confirmed quagga mussel veligers found in October 2014. Following three years of intensive monitoring by DWR, no additional evidence of quagga mussels was found. Given that the introduction of veligers is the typical pathway to a quagga mussel infestation, it was somewhat surprising that the 2014 discovery of veligers did not lead to a mussel infestation in Deer Creek Reservoir. However, the main source of previous veligers (recreational boats moving from one water body to another, bringing veligers from an infested lake) remains present in the watershed. Since quagga mussel prevention efforts are likely not 100% effective, quagga mussel veligers will inevitably be reintroduced to the reservoirs eventually. Given the massive impact that quagga mussels have on water quality, this recommendation would focus on exploring whether the ecological conditions in Deer Creek and Jordanelle Reservoirs are simply not conducive to quagga mussel infestations, or whether future infestations are possible or even probable. Regardless of the outcome of the study, a potential follow-up study might be to evaluate the potential for habitat conditions to change in the future.

Potential Future Steps Within 5-Year Work Plan Timeline Depending on Outcomes from Initial Steps:

- ▶ Begin collecting data on Deer Creek and Jordanelle Reservoirs pertinent to key factors for quagga mussel survivability.
- ▶ If unknowns or knowledge gaps in quagga mussel habitat requirements exist, help fund or commission lab or pilot testing in a controlled environment that would fill in those knowledge gaps.
- ▶ Commission a study to evaluate if changing reservoir conditions would increase quagga mussel survivability.

INITIAL STEPS:

- 1 Connect with quagga mussel experts throughout North America to learn the state of current research on quagga mussel habitat needs, and compare those conditions to available data on Deer Creek and Jordanelle Reservoirs.
- 2 Based on input from quagga mussel experts, understand unknowns and gaps in the current knowledge base regarding habitat requirements for quagga mussels in reservoirs with similar characteristics to Deer Creek and Jordanelle Reservoirs.
- 3 Identify gaps and unknowns in relevant data on Deer Creek and Jordanelle Reservoirs related to quagga mussel habitat requirements.



ESTIMATED DURATION:

Six (6) months to a year.



COST:

\$100,000 to \$300,000

RECOMMENDATION:

● MEDIUM THREAT RISK



ENGAGEMENT WITH UDAF CONSERVATION DISTRICTS

Engage with the Wasatch Conservation District (WCD) to discuss the Spring Creek TMDL (DWQ 2021) and Heber Valley Watershed Plan (SWCA 2022) and the potential for the PRWC to support the WCD's efforts in implementing the watershed restoration strategies identified in these reports. Pursue partnerships with the other Utah Department of Agriculture and Food (UDAF) Conservation Districts within the PRWC study area: Kamas Valley, Summit County, Duchesne County, Apline, Timp-Nebo.

OUTCOME / GOAL: Develop partnerships with UDAF conservation districts that will allow both groups to leverage limited resources to meet shared watershed management and water quality protection goals. Draw up a Memorandum of Understanding document with specific roles, responsibilities, and cost-sharing agreements if mutually agreeable.

BACKGROUND / JUSTIFICATION: UDAF Conservation Districts' are a local unit of government that works directly with landowners to help them address their natural resource concerns. UDAF conservation districts helps coordinate assistance from various funding sources to provide financial assistance to landowners who implement local projects that address their natural resource concerns. In many cases, private landowner natural resource concerns are shared by the PRWC, including addressing soil erosion and water quality pollution, providing wildlife habitat, and improving aesthetics.

Wasatch Conservation District (WCD) covers a majority of the Provo River Watershed. WCD is an important partner for the PRWC in addressing non-point source water quality pollution from agricultural land uses in the Wasatch County area of the watershed. For example, PRWC water quality monitoring data could be compared to WCD's knowledge of willing landowners to identify realistic locations for natural resource BMPs that could address water quality issues detected through analysis of the PRWC monitoring data. PRWC funding could be provided to WCD to implement these BMPs where WCD provides the technical assistance to landowners and administers the funding. Each UDAF will be different depending on previous collaboration, amount of overlap between conservation district area and the watershed, and conservation district's goals. Here are some ways PRWC could support the conservation districts:

Potential ways the PRWC could support the UDAF Conservation Districts:

- ▶ Plan and host a yearly local workshop with the UDAF Conservation Districts with the aim to:
 - In WCD, review and discuss the implementation strategies presented in the Spring Creek TMDL (DWQ 2021) and Heber Valley Watershed Plan (SWCA 2022).
 - Share the findings from the previous year's water quality sampling efforts (PRWC to lead).
 - Discuss critical source areas and where to focus outreach efforts in the coming year.
- ▶ Host or support local events for agricultural producers (dinners, luncheons, town hall meetings, and so forth) to share information about existing conservation projects.
- ▶ Collaborate with UDAF Conservation Districts to identify host demonstration days to show conservation practices in action.
- ▶ Use information from UDAF Conservation Districts to update the Storymap's non-point source page and help prepare success stories for the non-point source projects.

INITIAL STEPS:

- 1 Prepare for and host a workshop with the WCD to gauge interest and preferred next steps in collaborating on the implementation of the Spring Creek TMDL and Heber Valley Watershed Plan.
- 2 Identify where other UDAF Conservation Districts may share similar goals. Host workshops with these groups to gauge interest and opportunities for collaboration.
- 3 Routinely meet with the Heber Valley Watershed stakeholder group to work on issues that affect the watershed.



ESTIMATED DURATION:

Four (4) months for initial steps. Ongoing after that.



COST:

In kind staff time.

5-YEAR RECOMMENDATIONS

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DROUGHT RECOMMENDATIONS



● HIGH THREAT RISK

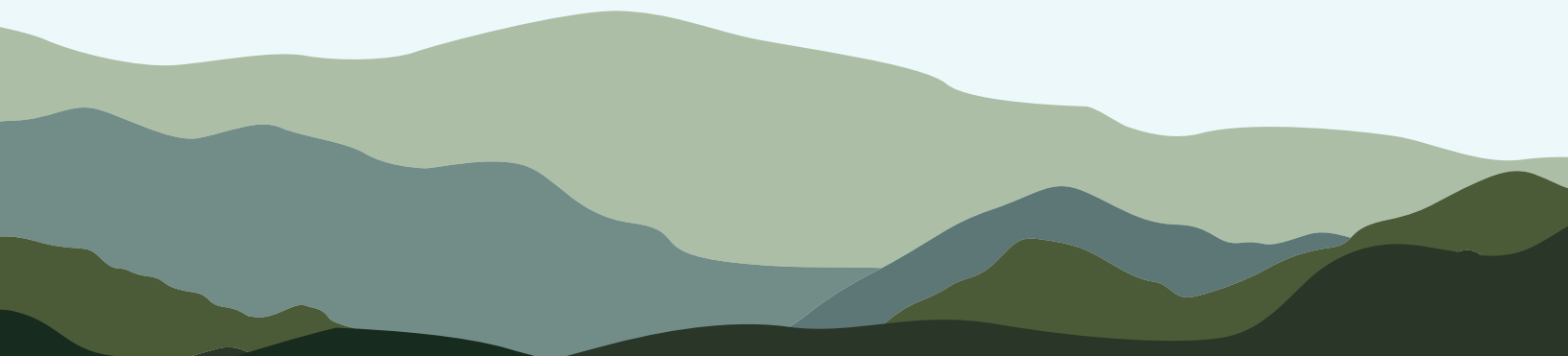
- Identify planning and implementation projects that could qualify for outside funding related to drought-driven impacts to water quality, such as Great Salt Lake Enhancement Trust, FEMA, etc.
 - Support the Division of Wildlife Resources on their effort to enhance in-stream flows in the Lower Provo River.
-

WILDFIRE RECOMMENDATIONS



● EXTREME THREAT RISK

- In the headwater and upper watershed areas, conduct a risk assessment of the sediment sources and complete detailed sediment source, sink, and transport modeling to identify zones of concern and opportunity (such as WARSS, GeoWEPP, other).
- In the reservoir areas, conduct an assessment of debris flow hazards and susceptibility under different burn scenarios to identify zones of concern.
- In the main tributaries and Provo River, assess the channel and bank erosion susceptibility to wildfire post flood, debris flows, and recovery trajectory to identify areas of concern.
- Evaluate delta sediment storage enhancement opportunities at reservoir inlets, the potential for mechanical removal, and the potential for sediment releases or emergency bypass sediment routing channels.
- Share risk assessment information with other groups to support their collaboration with water agencies and municipalities on planning for temporary emergency source water supply and conveyance during catastrophic events.
- Develop a plan to prioritize short-term (5-year), and long-term (20-year) projects aimed at reducing the threat and impacts to water quality from wildfires based on research findings.
- Refer to existing wildfire urban interface and Hazard Mitigation Plans and work with partners to collaborate on the development of cross-boundary Community Watershed and Wildfire Protection Plans (CWP2).
- Work with public land managers, private landowners, and partners to enhance riparian wet meadow habitat and abundance.
- Implement floodplain sediment storage and sink enhancement projects. Channel and floodplain reconnection projects provide an opportunity to attenuate flood and sediment debris flows and enhance sediment splays and overbank sediment storage.
- Support funding opportunities with federal agencies for wildfire mitigation efforts.





LAND MANAGEMENT RECOMMENDATIONS

MEDIUM THREAT RISK

- Support the development of an updated, watershed-scale nutrient budget for Deer Creek Reservoir (e.g., an update to the nutrient budget identified in the 2005 Deer Creek Reservoir TMDL). Re-evaluate strategies based on the updated nutrient budget.
- Support microbial source tracking efforts in Heber Valley area.
- Collaborate with DWQ to understand if there are additional monitoring needs in the upper Snake Creek watershed. The PRWC could consider modifying their annual water quality monitoring plan to fill gaps (if necessary).

DEVELOPMENT RECOMMENDATIONS



HIGH THREAT RISK

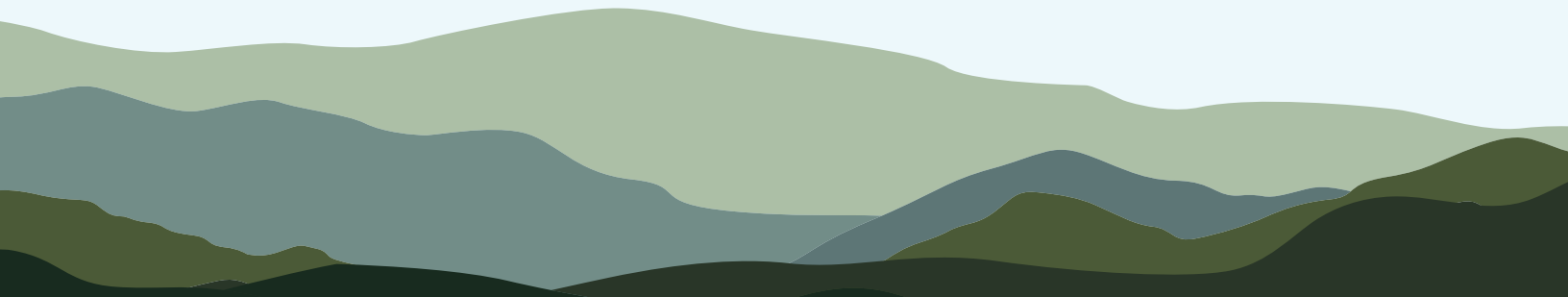
- Work with the Bureau of Reclamation and local developers to confirm the current optimal development setback distance from Jordanelle. Review development plans to ensure new facilities are incorporating best practices to protect water quality during construction and ongoing operation of facilities and/or homes.
- Continue to increase outreach with developers around Jordanelle Reservoir to improve adherence to stormwater regulations. The intensity of new development around Jordanelle Reservoir presents a challenge, and an opportunity, in protecting and preserving water quality in the reservoir and the Provo River.
- Engage in land-use planning process to ensure it is compatible with drinking water source protection plans. Engagement could include providing drinking water source protection plans to groups engaged in land-use planning process, holding a workshop for landuse planners on drinking water source protection plan goals, and review and comment on land-use plans.

MINES / CLEAN-UP SITES RECOMMENDATIONS



HIGH THREAT RISK

- Review water quality data needs with DWQ and identify if additional water quality monitoring is needed to support their efforts of managing water quality degradation caused by historic mining activity in the McHenry Creek area above Jordanelle Reservoir.
- Review water quality data needs with DWQ and identify if additional water quality monitoring is needed to support DWQ and their efforts to identify and mitigate specific sources of metal contamination in the Snake Creek watershed.





AQUATIC INVASIVE SPECIES (AIS) RECOMMENDATIONS

● HIGH THREAT RISK

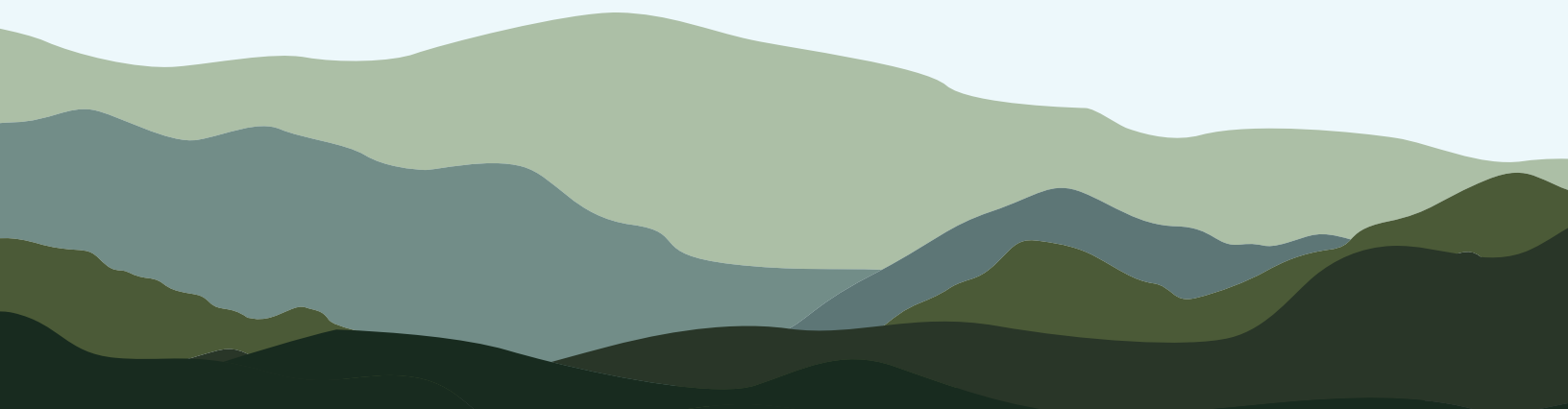
- Work with DNR to evaluate the need to expand AIS prevention programs at Jordanelle and Deer Creek Reservoirs to the shoulder seasons, prior to Memorial Day and after Labor Day.
- Lead a pilot AIS screening and treatment program at Strawberry Reservoir to screen and treat watercraft before they are launched at Strawberry Reservoir.
- Work with DNR to expand education and outreach efforts related to managing and preventing AIS introductions. These efforts could include additional signage or marketing materials and campaigns regarding specific AIS threats and prevention measures that should be taken at additional access points.
- Continue to participate in DNR's program to ensure understanding of the importance of program implementation. Track results, maintain relationships, and engage when needed.

WASTEWATER RECOMMENDATIONS



● MEDIUM THREAT RISK

- Engage with Wasatch County Health Department (WCHD) to discuss their on-site wastewater treatment program and the potential for PRWC to provide additional support (if needed). Examples of PRWC support include, but are not limited to:
 - Examination of WCHD's spatial data to identify on-site systems along riparian corridors and in the sensitive/vulnerable areas of the Heber Valley aquifer (as identified in the WCHD Groundwater Study (2020)). Subsequently, work with DWQ to conduct microbial source tracking sampling, or additional pharmaceutical sampling along these riparian corridors to pinpoint failing septic systems.
 - Working with WCHD to develop public outreach materials and conduct targeted outreach to homeowners in riparian areas to aim to inform homeowners of tools and financial assistance for proper maintenance of on-site systems, as described in the Spring Creek TMDL implementation plan (DWQ 2020).
 - Collaborate with WCHD on the groundwater quality monitoring effort by providing funding, collecting additional surface water samples to pair with groundwater samples, or other in-kind means.
- Support local point-of-sale ordinances that require when a property is bought / transferred, the septic tank must be inspected and, if needed, serviced. Encourage record submittals on property transfers.





HARMFUL ALGAL BLOOMS (HABS) RECOMMENDATIONS

● LOW THREAT RISK

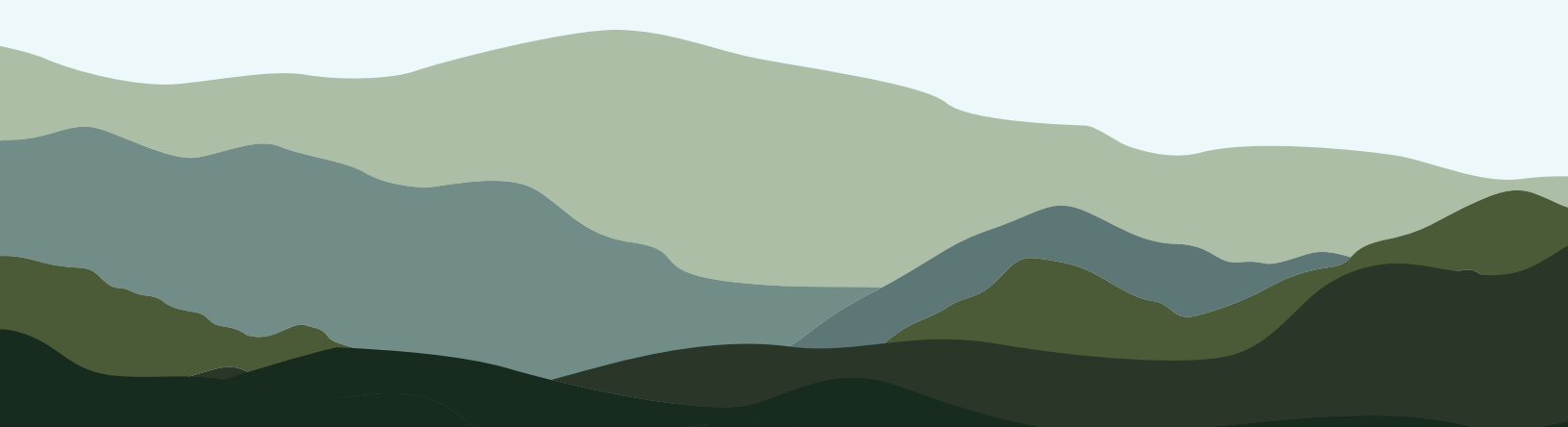
- Increase partnerships and collaboration with DWQ and Wasatch County to ensure that efforts to monitor and understand HABs on reservoirs are coordinated and effective.
- Increase monitoring efforts to characterize depth profiles of temperature and dissolved oxygen through the water column of Deer Creek Reservoir during the growing season. Additional monitoring would be focused on improving the understanding of vertical stratification dynamics and the influence of vertical stratification and lake turnover on HABs. More detailed understanding of water quality dynamics and HABs will help inform strategies to reduce and manage HABs.
 - Install a series (recommended locations; 5913220, 5913230, and 5913240) of high frequency (measurements every 15 to 60 minutes) water quality probes (that measure [at a minimum] temperature and dissolved oxygen) at roughly 1 m intervals to collect data throughout the growing season.
- Identify and support (with funding or other resources) watershed restoration projects to stabilize sediments and reduce erosion (and subsequently nutrient loading).
- Work with DWQ to identify critical locations for installation of continuous flow stations in the watershed. Additional continuous flow data will be important in calculating nutrient loads, as well as developing and calibrating a potential future watershed model to update the nutrient budget for Deer Creek Reservoir first identified in the 2002 TMDL.
 - Subsequently, engage with the USGS Utah Water Science Center to see if any additional flow gage stations can be placed throughout the watershed at the critical locations identified by DWQ.

TRAFFIC EVENTS RECOMMENDATIONS



● MEDIUM THREAT RISK

- Work jointly with UDOT, UDEQ, Highway Patrol, and other local agencies to build a database of traffic events along the Provo River and its tributaries.
- Use the database to identify stretches of road that have the highest volume of traffic events or are most likely to allow spillage to enter the waterway. Review the causes of the traffic events (i.e. roadway design, snow and ice, driving behavior, traffic/roadway congestions) to identify potential changes.
- Identify most likely spillage pathways to the river at the identified locations.

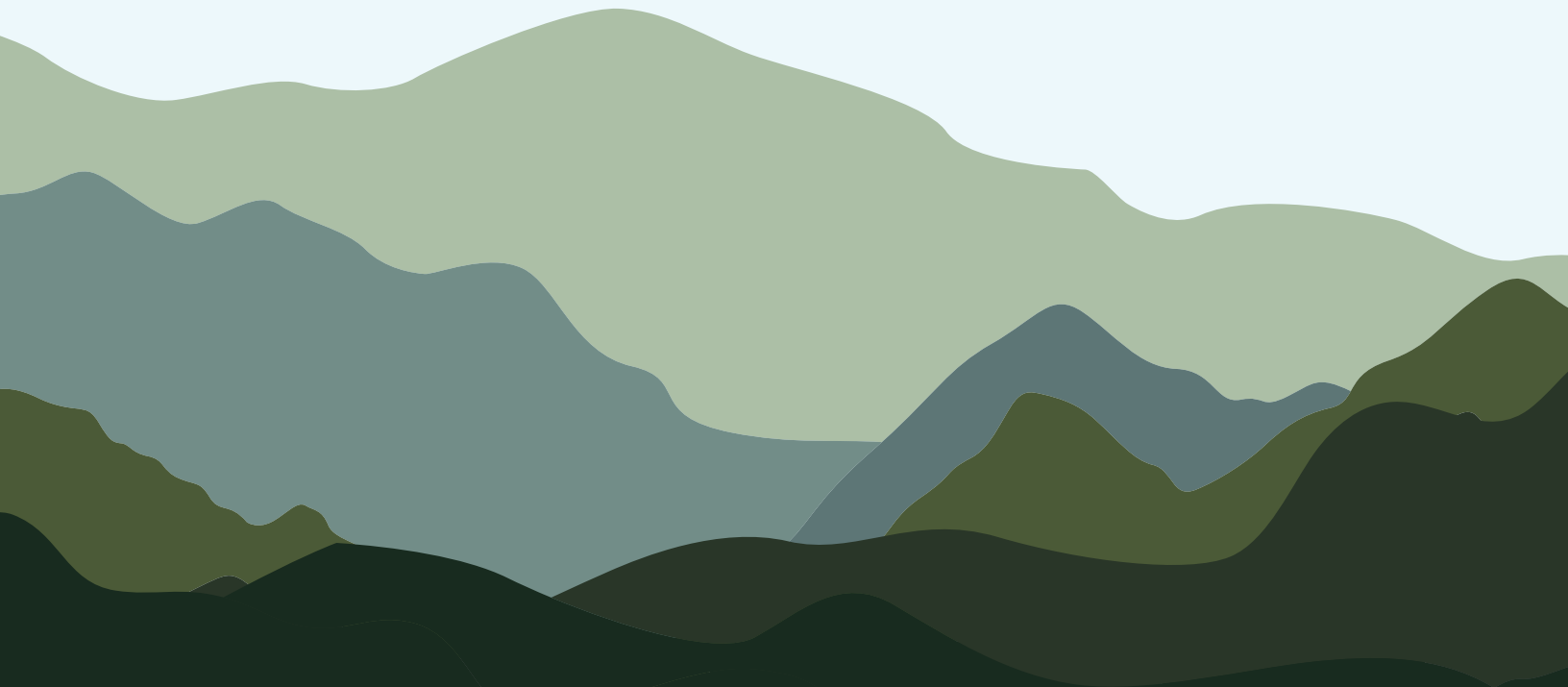




STORMWATER RECOMMENDATIONS

● LOW THREAT RISK

- Support developing the voluntary Wasatch County Stormwater Coalition through programming of joint outreach events and preparation of education materials.
- Review applicability of North Village stormwater management plan to other locations.
- Add water quality monitoring to a subset of permanent stormwater BMPs to evaluate BMP effectiveness and identify areas where BMPs need to be improved.
- Participate in developing the Wasatch County Stormwater Management Plan by providing feedback and suggestions to plan preparers.
- In collaboration with USU Extension and local governments, continue to implement stormwater management workshops for audiences which can include developers, stormwater BMP owners, people responsible for implementing construction stormwater management, stormwater management system designers, and other stormwater practitioners. Develop metrics to assess success of workshops and adapt plan based on feedback.



20-YEAR RECOMMENDATIONS

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DROUGHT RECOMMENDATIONS



● HIGH THREAT RISK

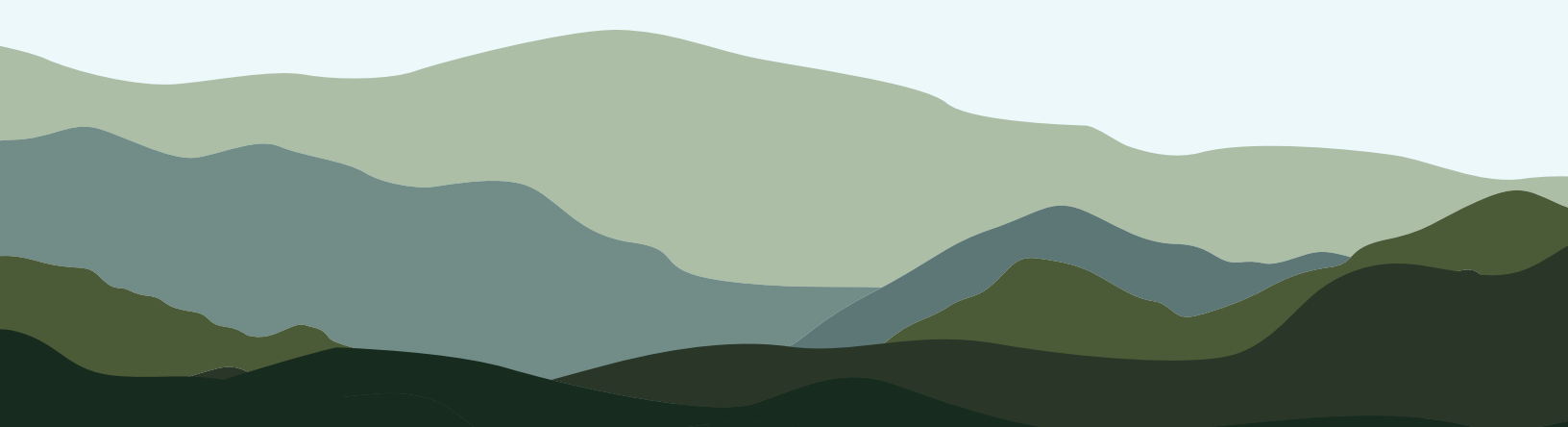
- Based on the findings of drought/water quality research in the watershed, continue monitoring key metrics and indicators, and update strategic plan to mitigate drought accordingly.
- Partner with local planners to see if they are looking for any help to educate and implement water conservation projects which are identified in the general county and city planning documents.
- Continue to work within the appropriate State watershed councils and modify/adapt the PRWC's role in the Provo River Watershed based on new information, changing conditions, needs, and organizational changes.

WILDFIRE RECOMMENDATIONS



● EXTREME THREAT RISK

- Continue to work with partners to develop a programmatic approach to fund wildfire and sediment risk reduction planning and implementation projects.
- Continue to work with partners to update their Hazard Mitigation and Emergency Response planning efforts. Encourage cross-boundary collaborative community planning and resource sharing. Post-fire is typically emergency response and recovery driven, such as Burned Area Emergency Response (BAER) actions and water treatment and conveyance system emergency measures.
- Informed by the detailed assessments, continue to implement pre-wildfire fuel load reductions, vegetation treatments, and sediment mitigation projects in the identified zones of concern and opportunity.
- Continue to work with the county floodplain administrators and landowners to delineate fluvial hazard zones and to develop floodplain sediment storage resiliency projects to post-fire flood and debris flows.
- Continue to work with reservoir operators to manage sluicing of sediment and environmental flushing flows to manage sediment, particularly following a fire event.
- Develop alluvial fan sediment storage enhancements, sediment routing, and gully stabilization projects near reservoirs and conveyance channels. These types of projects may include drainage and debris flow routing at alluvial fans to route potential deposition and expand capacity. Sediment retention and trap facilities to permanently or temporarily store sediment with site-specific maintenance and management plans. Gully stabilization and plugs may be considered in ephemeral drainages with high debris flow hazard.





LAND MANAGEMENT RECOMMENDATIONS

MEDIUM THREAT RISK

- Support efforts to achieve the TMDL for the Spring Creek-Heber assessment unit by supporting efforts to achieve requirements for TMDL and continuing to collect robust monitoring data that can support future TMDLs by DWQ.
 - Work with the governing bodies over the Middle Provo River sub-basin to provide funding and implement restoration projects similar to the Main Creek Restoration projects.
 - Continue to monitor BMP effectiveness in the Main Creek watershed.
 - Continually look for opportunities to support local landowners with implementing BMPs aimed at improving water quality from agricultural runoff from their land.
-

DEVELOPMENT RECOMMENDATIONS



HIGH THREAT RISK

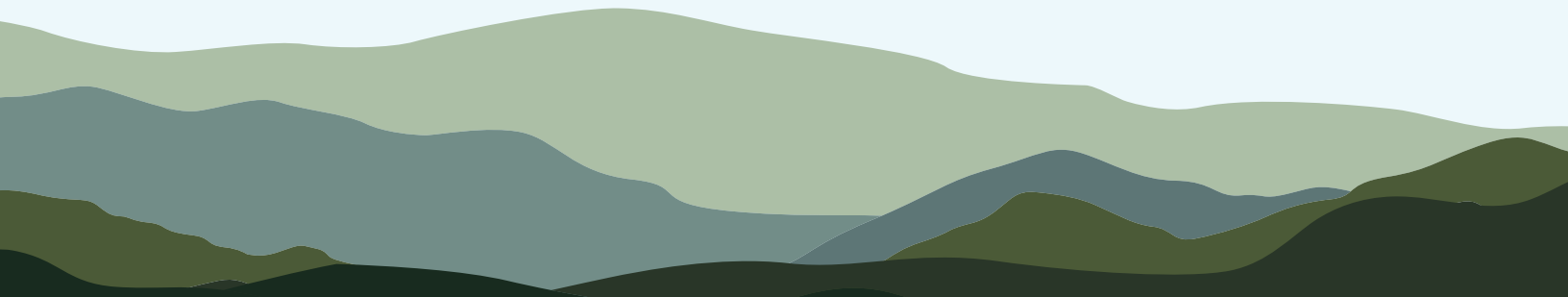
- Continue to review funding of land-use planning and development reviews to identify if participation is meeting PRWC goals.
 - Work with the Bureau of Reclamation and local developers to confirm the current optimal development setback distance from Jordanelle and review development plans to ensure new facilities are incorporating best practices to protect water quality during construction, and ongoing operation of facilities and/or homes.
 - Continue to increase outreach with developers around Jordanelle Reservoir to improve adherence to stormwater regulations. The intensity of new development around Jordanelle Reservoir presents a challenge, and an opportunity, in protecting and preserving water quality in the reservoir and the Provo River.
-

MINES / CLEAN-UP SITES RECOMMENDATIONS



HIGH THREAT RISK

- Due to the highly regulated nature of abandon mines and environmental clean up sites, PRWC should follow the regulatory actions and changes for these sites and participate where appropriate rather than set independent 20 year recommendations.





AQUATIC INVASIVE SPECIES (AIS) RECOMMENDATIONS

● HIGH THREAT RISK

- Continue to allocate funding to support AIS prevention, control, and education efforts.
 - Establish relationships with experts in AIS throughout the country to stay up-to-date on emerging technologies and strategies to prevent and eradicate AIS within the Provo River watershed.
 - Monitor the condition of, and the effectiveness of, existing educational signage at access locations, and adapt education efforts based on findings.
-

WASTEWATER RECOMMENDATIONS



● MEDIUM THREAT RISK

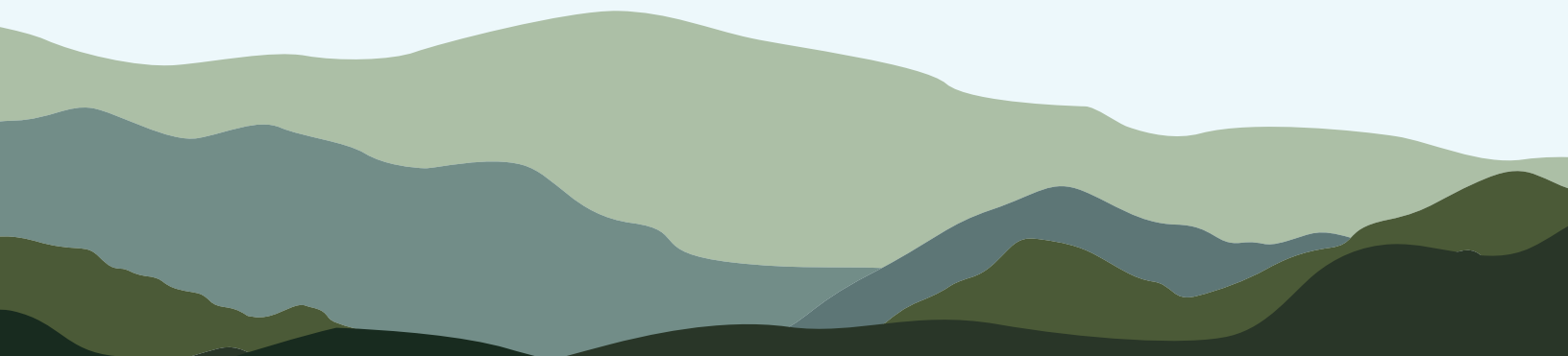
- Support the Heber Valley Special Service District (HVSSD) as a stakeholder in considering and planning for upgrades to the treatment plant capacity and technology to minimize impacts to surface and groundwater quality.
 - Collaborate with Heber City, Midway, and other townships on sanitary sewer and understand their hurdles in the way of expanding their sewer systems. Work together to remove roadblocks. If needed, the PRWC could support municipalities by helping to identify funding sources for sewer line inspections/cleaning to identify capital repair needs and to reduce seepage from sewer pipes.
-

HARMFUL ALGAL BLOOMS (HABS) RECOMMENDATIONS



● LOW THREAT RISK

- The PRWC story map shows higher phosphorous loading in the headwaters area. If this becomes a problem, the PRWC should review monitoring locations and activities to identify sources of high phosphorus loading in the watershed.
- Collaborate with DWQ to continue to monitor, investigate, and research HABS in Utah and specifically Jordanelle and Deer Creek Reservoirs. Provide additional funding where needed to ensure that PRWC is on the leading edge of the science around HABS and the unique dynamics in the Provo River Watershed.
- Depending on the findings from data collection efforts on Deer Creek Reservoir, consider contracting a study of stratification and internal loading in Deer Creek Reservoir. Investigate potential solutions to increase permanent burial of phosphorus in the sediments of the lake.



TRAFFIC EVENTS RECOMMENDATIONS



● MEDIUM THREAT RISK

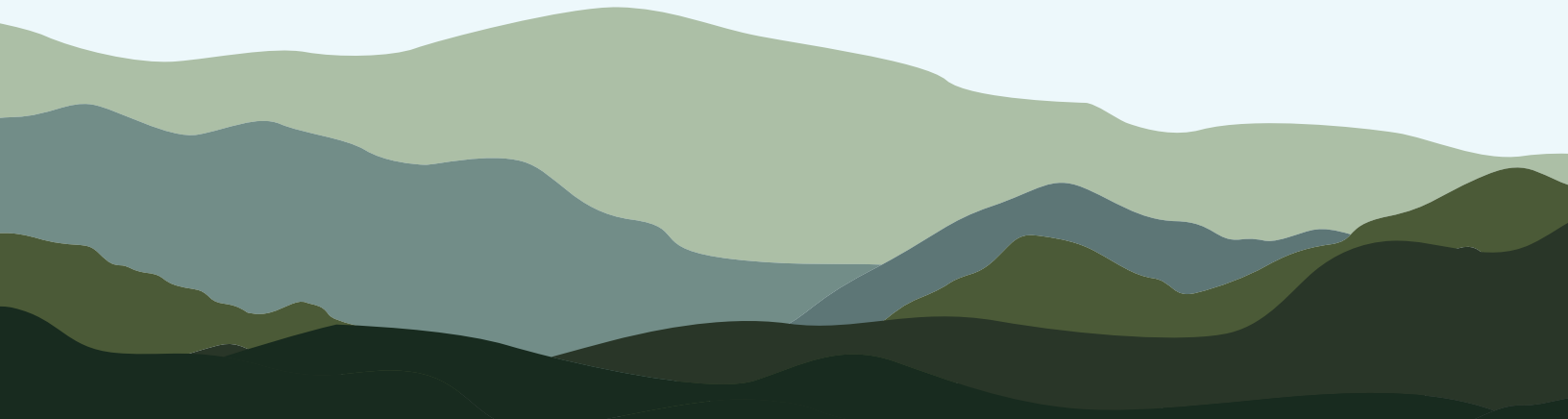
- Work with local transportation agencies (UDOT, Cities, and Counties) to determine if infrastructure upgrades, operational changes, or public programs are needed to mitigate traffic events at the identified locations.
 - Assist with funding studies to identify BMPs for environmental and water quality cleanup for potential lithium-ion battery spillages from electric vehicles.
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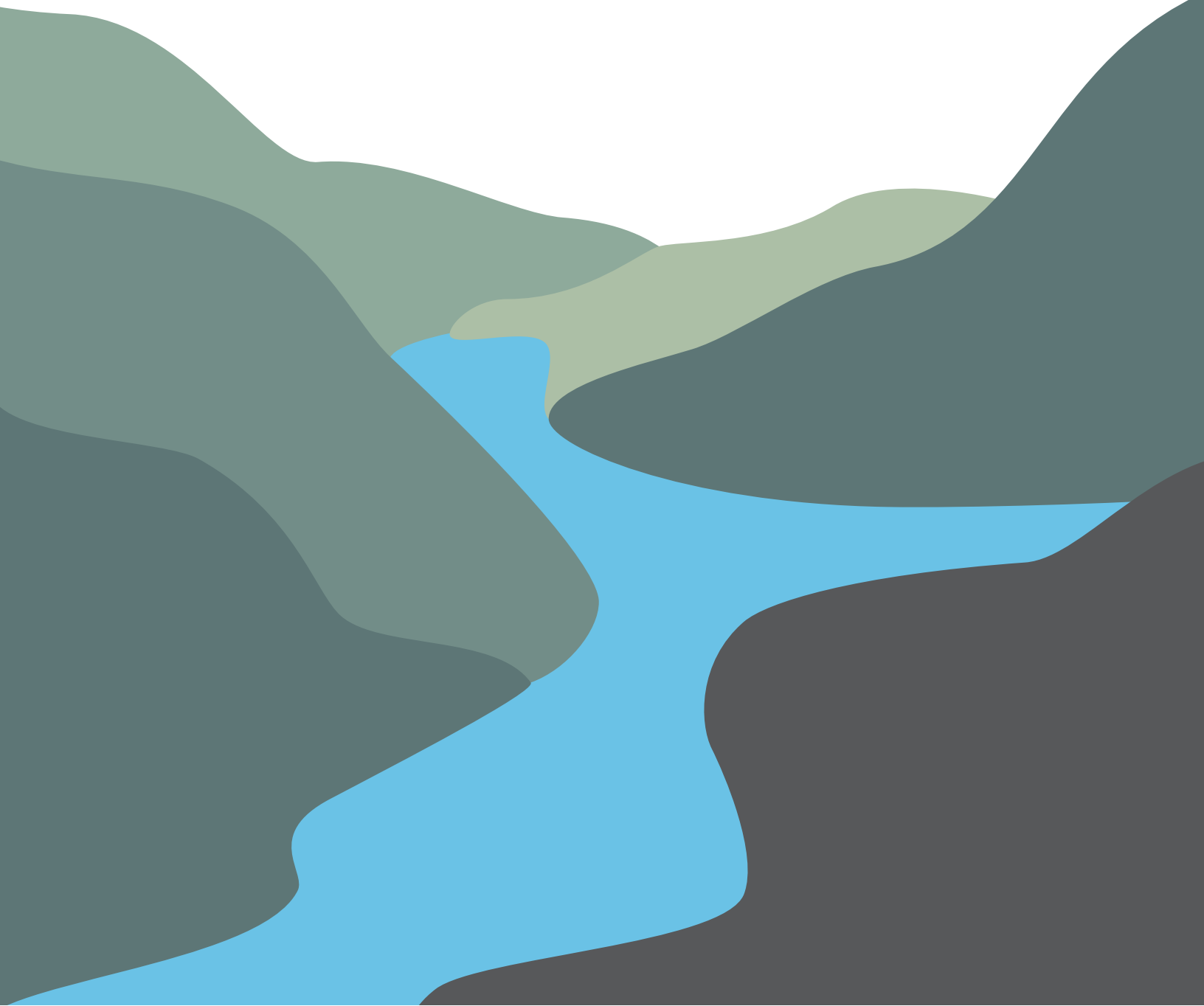
STORMWATER RECOMMENDATIONS



● LOW THREAT RISK

- Participate in development reviews and identify areas for future BMPs.
- Expand the Development Review Program to include areas upstream of the Weber Provo Diversion Canal.





PROVO RIVER
—WATERSHED COUNCIL—

Prepared by AE2S

APPENDIX

Risk Assessment Method Supplemental Information

RISK ASSESSMENT METHOD SUPPLEMENTAL INFORMATION

This write up documents the structure of the risk assessment performed for the PRWC strategic plan and the definitions used by the team.

Calculation Overview

Risk was calculated as the product of the consequence of the threat and the probability of the threat to occur.

Consequence was calculated as a function of severity, scope, and irreversibility. Each of these are defined as:

- **Severity of Impacts:** the level of degradation a threat causes to water quality.
 - **Scope of Damage:** the geographic scope of the threat's degradation to water quality.
 - **Irreversibility:** duration of water quality recovery after threat has occurred.
 - **Probability:** likelihood of threat causing impacts to water quality.
-

Risk Assessment Definitions

For each threat in each sub-watershed, the five components of the risk assessment were scored as negligible, low, medium, high, or extreme. Each component used a separate working definition. The definitions are listed below.

Severity of Impacts

- **Extreme:** Likely to fully degrade water quality over some portion of the threats' occurrence in the sub-watershed.
- **High:** Likely to severely degrade water quality over some portion of the threats' occurrence in the sub-watershed.
- **Medium:** Likely to moderately degrade water quality over some portion of the threats' occurrence in the sub-watershed.
- **Low:** Likely to impair water quality only slightly over some portion of the threats' occurrence in the sub-watershed.
- **Negligible:** Threat will not alter water quality over any portion of the sub-watershed.

Scope of Damage

- **Extreme:** Likely to be very widespread or pervasive in its scope, and will affect water quality throughout the reservoirs, lakes, rivers, and streams within the sub-watershed.
- **High:** Likely to be widespread or pervasive in its scope, and will affect water quality in many of the reservoirs, lakes, rivers, and streams within the sub-watershed.
- **Medium:** Likely to be localized in its scope, and will affect water quality in some of the reservoirs, lakes, rivers, and streams within the sub-watershed.
- **Low:** Likely to impair water quality only slightly over some portion of the threat's occurrence in the sub-watershed.
- **Negligible:** Threat will not alter water quality over any portion of the sub-watershed.

Irreversibility

- **Extreme:** Water quality takes a long time to recover after the threat has occurred regardless of how many resources are used to mitigate impact of threat.
- **High:** Water quality is capable of recovery over a medium duration with investment of resources after the threat has occurred.
- **Medium:** Water quality is capable of recovery over a short duration with investment of resources after the threat has occurred.
- **Low:** Water quality is capable of recovery over a short duration with limited or no investment of resources after the threat has occurred.
- **Negligible:** Threat will not alter water quality over any portion of the sub-watershed.

Probability:

- **Extreme:** Certain to occur.
- **High:** 51-100% chance of threat occurring in strategic plan timeframe.
- **Medium:** 50% chance of threat occurring in strategic plan timeframe.
- **Low:** 1-49% chance of threat occurring in strategic plan timeframe.
- **Negligible:** No chance of occurring in strategic plan timeframe due to conditions in sub-watershed.

Scoring Method

The risk level is calculated for each threat in the following steps:

- Each threat is scored from negligible to extreme for each of the four risk assessment components: severity of damage, scope of damage, irreversibility, and probability.
- Threat magnitude is calculated using the matrix of scope and severity scores (below).
- Consequence is calculated using the matrix of magnitude and irreversibility scores (next page).
- Risk level is calculated using the matrix of consequence and probability scores (next page).

Risk level was done for each threat in each sub-watershed. These levels were then averaged by threat and sub-watershed to create an overall risk level by threat and overall risk level by sub-watershed.

Scoring Matrix for Magnitude

		Severity				
		Extreme	High	Medium	Low	Negligible
Scope	Extreme	Extreme	High	Medium	Low	Negligible
	High	High	High	Medium	Low	Negligible
	Medium	Medium	Medium	Medium	Low	Negligible
	Low	Low	Low	Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Scoring Matrix for Consequence

		Magnitude				
		Extreme	High	Medium	Low	Negligible
Irreversibility	Extreme	Extreme	Extreme	High	Medium	Negligible
	High	Extreme	High	Medium	Low	Negligible
	Medium	Extreme	High	Medium	Low	Negligible
	Low	High	Medium	Low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Scoring Matrix for Threat Risk

		Likelihood				
		Extreme	High	Medium	Low	Negligible
Consequence	Extreme	Extreme	Extreme	High	Medium	Low
	High	Extreme	High	High	Medium	Low
	Medium	High	Medium	Medium	Low	Negligible
	Low	Medium	Low	Low	Negligible	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

APPENDIX

Data Sources

A stylized illustration of a landscape at the bottom of the page. It features rolling hills in shades of green and grey, with a light blue river or stream flowing through the center. The background is a solid blue color.

DATA SOURCES

Bergendorf, Scott. January 17, 2022. Annual Report Provo River Distribution System. State of Utah – Office of the State Engineer – Division of Water Rights.

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