JEFFERSON RIVER WATERSHED DROUGHT RESILIENCE PLAN

Jefferson River Watershed Council

PO Box 550 Whitehall MT 59759

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Prepared for the Jefferson River water users as an educational guide to drought impacts, drought vulnerabilities and adaptation strategies to proactively plan for drought.

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Jefferson River Watershed Drought Resiliency Plan Contents

Drought Resiliency

Project Overview

The definition of drought is difficult and complex to understand. Depending on primary water use and how it impacts an area, different impacts of drought in different sectors will be observed. In general, drought is broken out into four main sectors: meteorological, hydrological, agricultural and socioeconomic drought. Drought is also considered into either terrestrial or freshwater ecosystems. How a community defines drought, will help guide how a resilience and adaptation process, minimizes the impacts of drought and frequency of a critical drought status in a defined area.

The Jefferson River Watershed Council (JRWC) has dedicated it's planning efforts in what is considered the Upper Jefferson River Watershed as shown in figure (8). Historically, the JRWC has had a robust Drought Management Plan since its inception in 1999. This simple yet effective plan responds to drought conditions and communicates to water users in the basin to conserve water during periods of low flow and sportsman to observe warm temperatures and potential fishing closures. This existing plan relies on the USGS Twin Bridges Jefferson River Gaging Station 06026500 reporting as target flows. There has been discussion to amend the Drought Management Plan by adding additional sites that describe streamflow and temperature conditions but to keep the flow targets that the plan has always had in place. This plan, although effective at responding to drought conditions, is missing the drought planning component that this document will provide as a tool for the basin.

As a part of the Upper Missouri Drought Resilience project, the JRWC aims to produce a workplan as a result of consensus from stakeholders in the basin aiming to mitigate the impacts of drought. Engagement in the Upper Missouri Drought Resilience project provided capacity for the Jefferson to proactively plan for more common, drought conditions in the watershed. With other groups in the headwater region of the Upper Missouri, the goal of this project is to demonstrate on the ground efforts to encourage collaboration and ultimately provide solutions to drought impacts across the geography. Regions across the globe can learn how to approach watershed-level planning and collaboration by using tactics put forth from each group in the Upper Missouri basin facing a variety of similar and distinct issues.

Vulnerabilities to drought have been defined in previous areas throughout the world and is just as complex as the definition of drought itself. A vulnerability assessment is best created when knowing the exposure, sensitivity and adaptive capacity of the area it is created for, explained in Figure 1, below. The vulnerability assessment is commonly described by utilizing the monitoring data, previous studies and reports, geography, climate, history of drought conditions and surface and groundwater budgets.

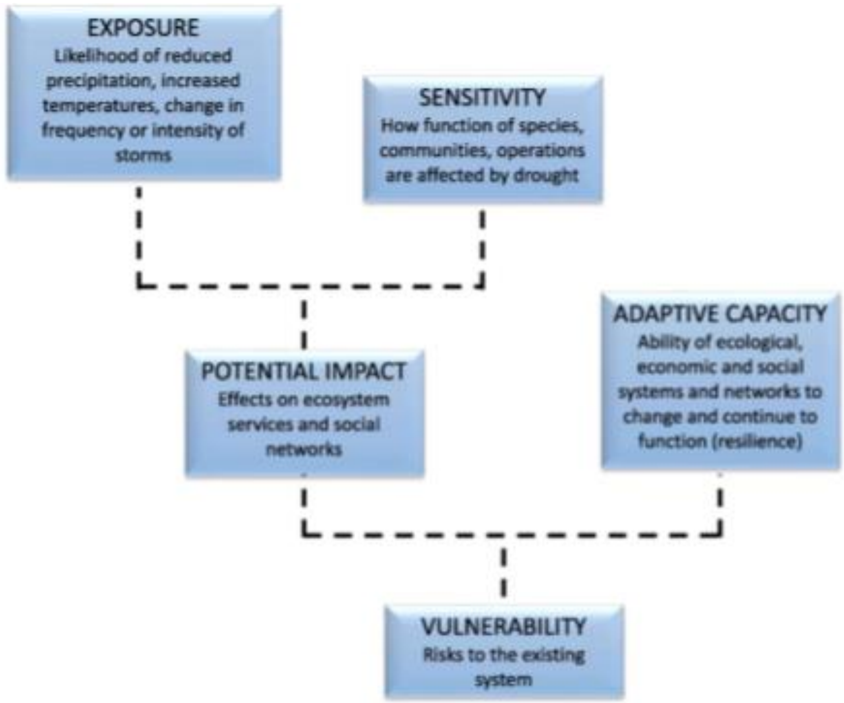

Figure 1: Elements and analysis of conducting a drought vulnerability assessment.

A drought vulnerability assessment is designed to analyze all water use sectors such as public drinking water systems, irrigators and dryland farmers, ranchers, wildlife, recreation, and forest health. To simplify a vulnerability assessment, creating a smaller subset of vulnerabilities is ideal for coming up with tangible tasks to complete. Overall, the vulnerability assessment as part of a drought plan, can be one of the most important aspects as it guides mitigation strategies. These mitigation strategies, act as a workplan to best address vulnerabilities that have been identified using a local, holistic watershed approach. Vulnerabilities are then addressed with adaptation strategies to mitigate the impacts of the vulnerabilities put forth. This drought resilience plan will comment on general vulnerabilities in different watershed areas from the stream to the headwater regions.

The JRWC approached the components of a drought resiliency and drought plan, by hosting presentations that provided expert speakers the opportunity to address different aspects of drought in the watershed. During monthly meetings in conjuncture with JRWC committee meeting, topics of interest to the local stakeholders were discussed related to drought in the watershed.

To best account for future planning, it is important to consider the scientific studies and reports completed in the area of interest. Entities that have worked in the watershed that have produced relevant drought documents include the JRWC, Montana State University, Montana Technological University, Montana Bureau of Mines and Geology (MBMG), National Center for Appropriate Technology, Montana Fish Wildlife and Parks, Environmental Protection Agency, and the Montana Department of Natural Resource and Conservation (DNRC) to name a few. These entities and their products are valuable to understanding the watershed and having valuable data on land-use sustainability and water management strategies.

Drought Mitigation

Drought Mitigation Planning Documents presented by the Bureau of Reclamation (BOR) describe that Project Planning must look at answering the following questions to be eligible for Drought Contingency Planning Funding. It is to note, that not all funding sources will be required to meet these goals, however, to reduce the impacts of drought, they are exemplary topics to focus projects around. Not only do these questions address BOR's planning interests, but other funding sources throughout the state and nationwide.

- How will we recognize the next drought in the early stages?
- How will drought affect us?
- How can we protect ourselves from the next drought?
- How can the reliability of water supplies and sustainability be increased?
- How can water management and operational flexibility be improved?
- How can fish, wildlife and the environment benefit?
- How can poor water quality be improved in drought conditions?
- What systems can be implemented to facility voluntary sale, transfer or exchange of water?

Defining Drought

Drought in a watershed as stated earlier, can be difficult to define. As these drought resiliency projects continue to adapt and develop, it is important that the four major drought sections be considered in the planning and implementation process. The Jefferson is impacted by each drought type, however, stakeholders and planning entities in the basin may be able to address different aspects of drought more effectively depending on adaptive capacity measures.

- Meteorological drought, defined as a deficit in precipitation and above average evapotranspiration that lead to increased aridity
- Hydrological drought, characterized by reduced water levels in streams, lakes, and aquifers following prolonged periods of meteorological drought
- Socioeconomical drought, defined as a prolonged period over which an ecosystem's demand for water exceeds the supply (the resulting water deficit, or shortage, creates multiple stresses within and across ecosystems.
- Agricultural drought, commonly understood as a deficit in soil moisture and water supply that lead to decreased productivity (in this assessment, we will treat this form of drought as an important component of ecological drought)

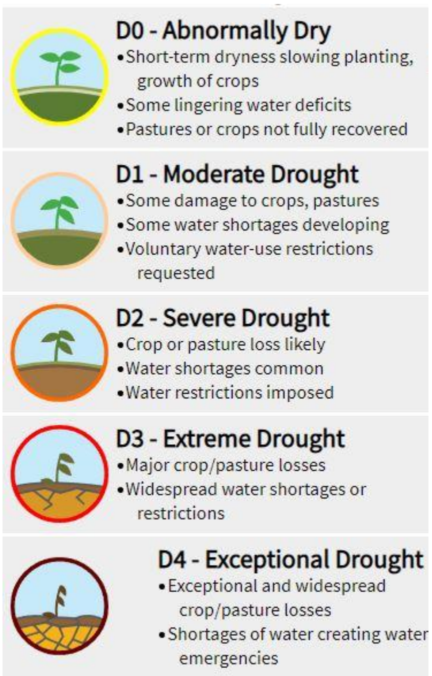

Figure 2: Drought Condition determinations.

The United States Drought Monitor is an online resource that describes Drought through a series of intensities as shown below and utilize all aspects of the four major types of drought throughout Montana. Primarily, the use of precipitation and temperature data, soil moisture models and USGS streamflow percentiles drive intensity determinations for different watershed and county areas. Take note, that at no point is the U.S. Drought Monitor a replacement for on the ground field observations and decisions should be made at the local level by utilizing existing monitoring equipment and local knowledge of an area.

Utilization of Resources for Defining Drought Resilience Efforts

Describing priorities for Drought Resilience in the Jefferson Watershed started with understanding the watershed itself. A handful of resources were utilized or read to understand the current health of the watershed, previous watershed health issues, landscape management, and ultimately water resource determinations.

- Current trends of land use
- Water budgets
- Population and growth potential
- Current climate trends
- Streamflow and stream temperature trends
- Air temperature trends
- Research from a watershed perspective
- Watershed location and susceptibility
- Economy including recreation, industry productions

Jefferson River Watershed Characteristics

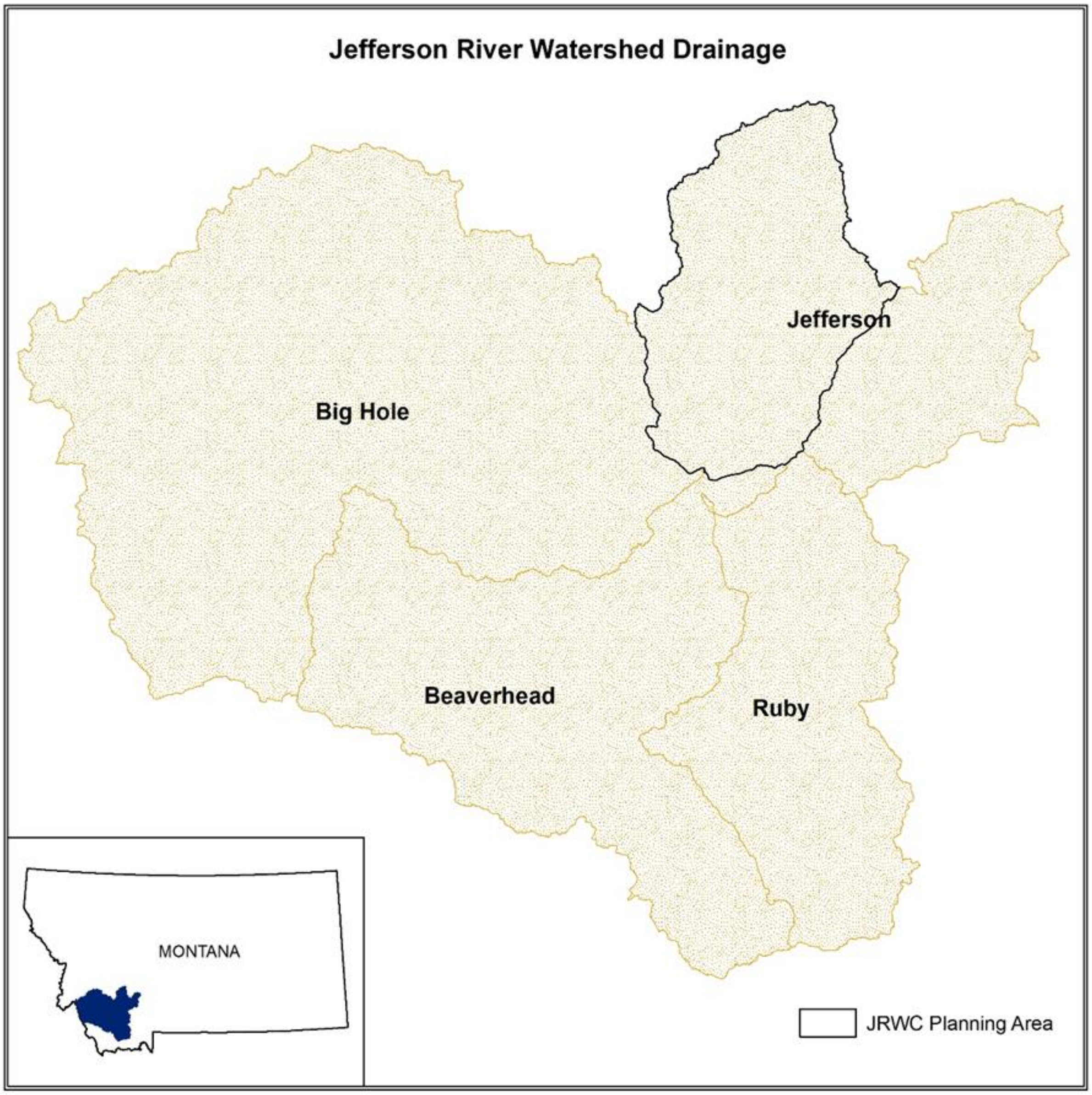

Figure 3: Jefferson River Watershed Planning Area as part of the Upper Missouri Headwaters in Montana.

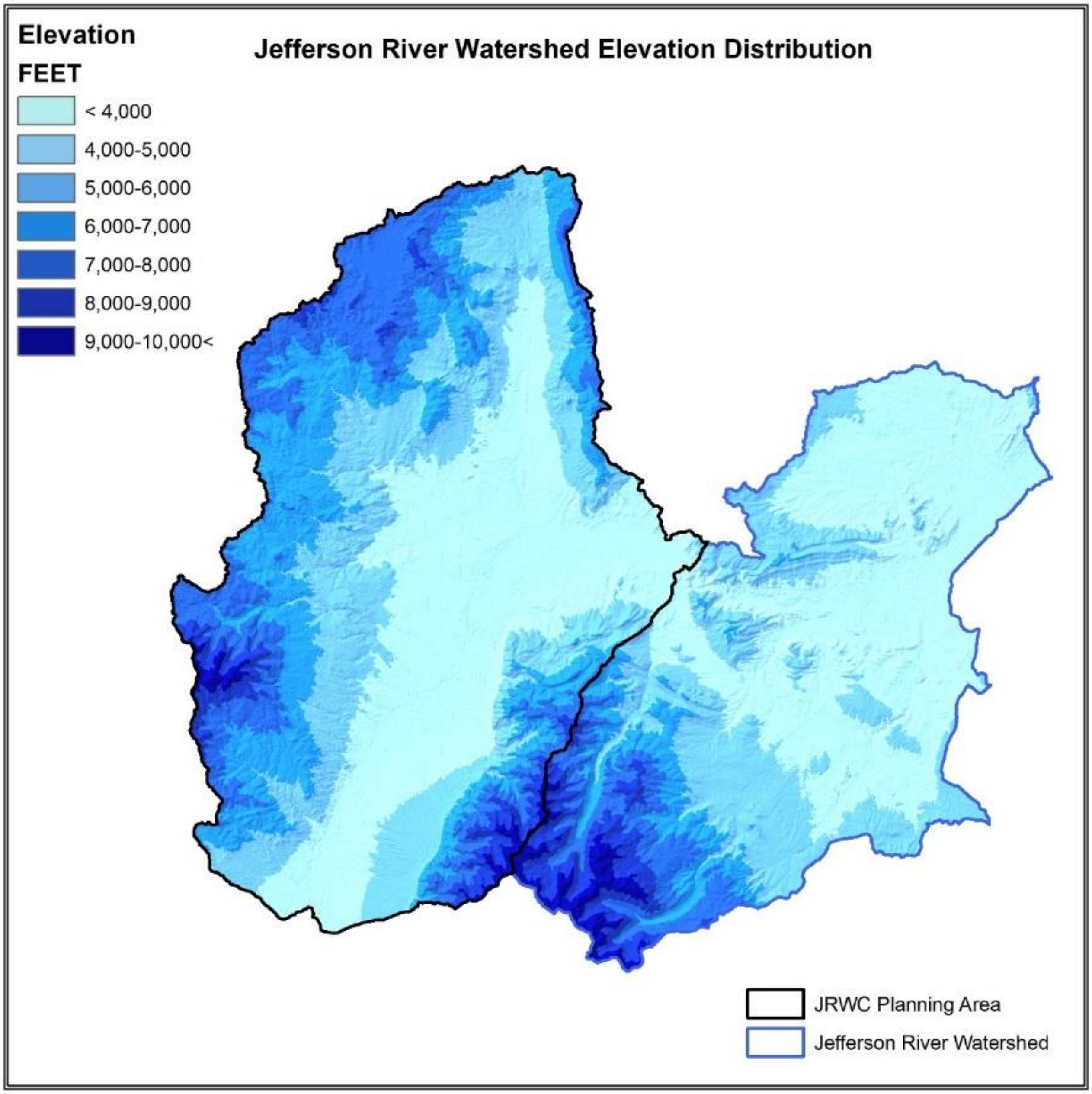

Figure 4: Jefferson River Watershed Drainage Elevation Distribution.

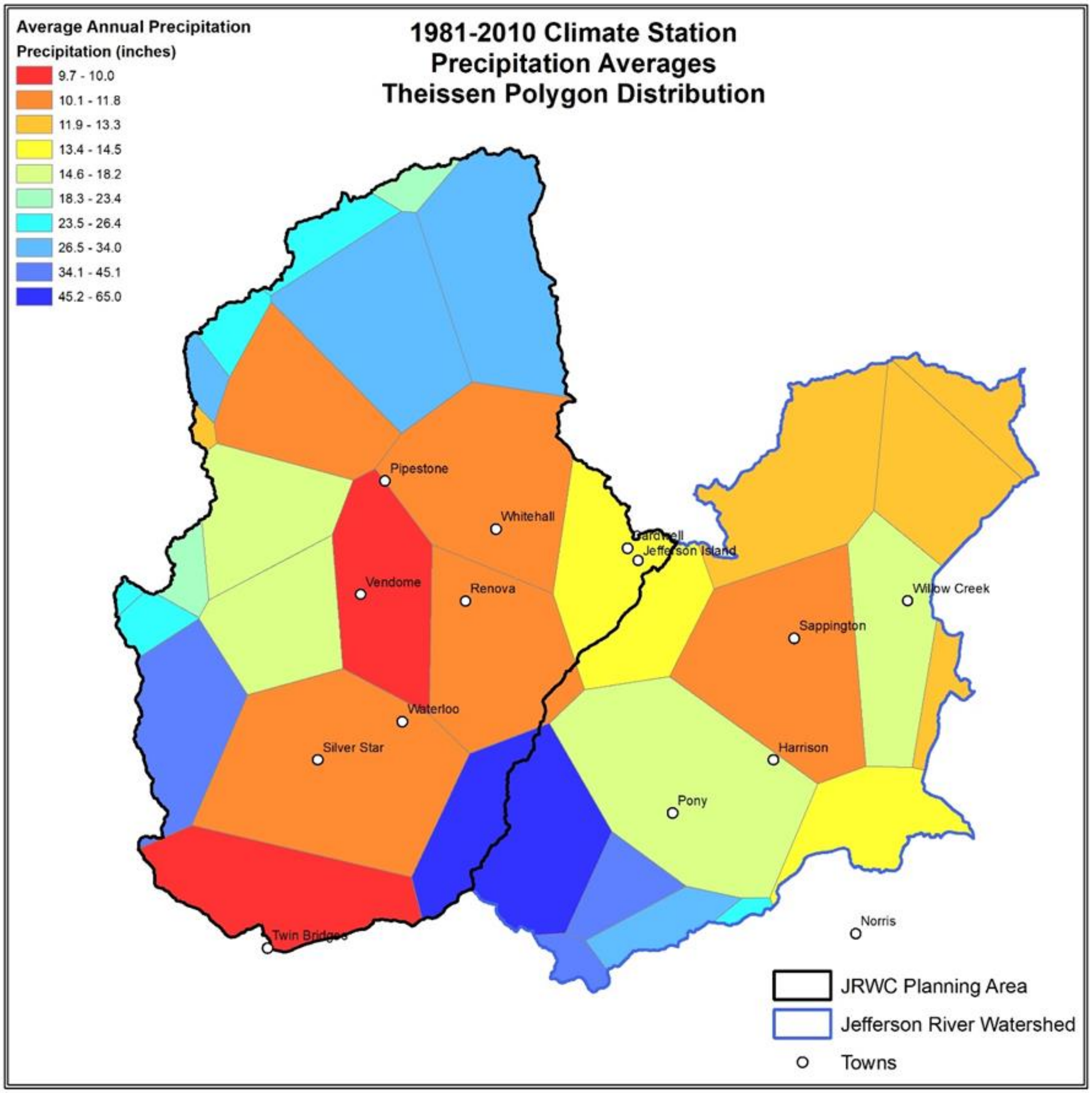

Figure 5: Jefferson River Watershed Precipitation Distribution.

Land and Soil Distribution

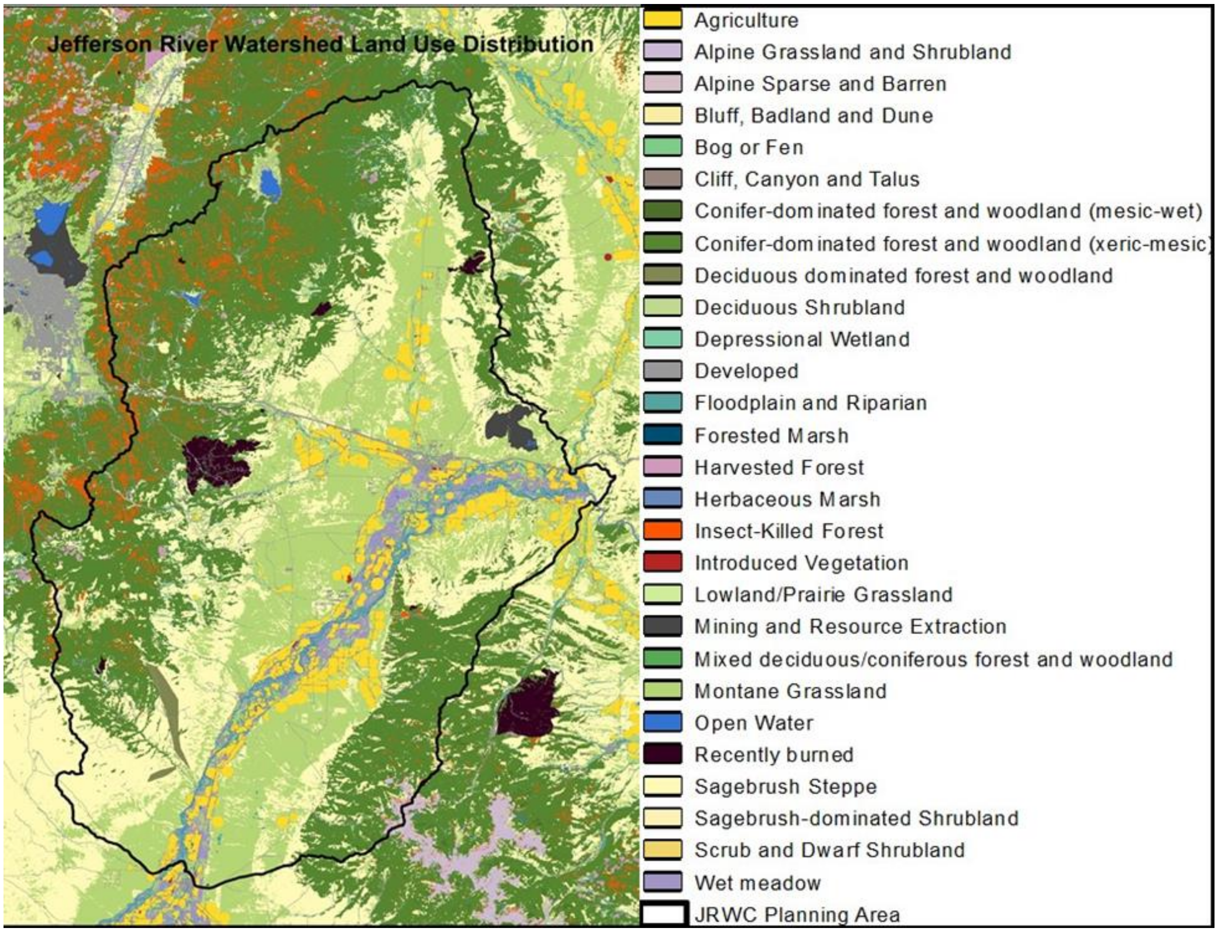

Figure 6: Jefferson River Watershed Land Use Distribution- National Land Cover Dataset.

Table 1: National Land Cover Dataset - Jefferson River Watershed.

Type	Area (km2)	Coverage (%)
Open Water	11.85	0.4
Perennial Ice/Snow	0	0
Developed, Open Space	60.5	1.8
Developed, Low Intensity	20.56	0.6
Developed, Medium Intensity	1.59	0
Developed, High Intensity	0.15	0
Barren Land (Rock/Sand/Clay)	5.52	0.2
Deciduous Forest	0.75	0
Evergreen Forest	989.27	29.5
Mixed Forest	1.5	0
Shrub/Scrub	354.51	10.6
Grassland/Herbaceous	1,551.50	46.3
Pasture/Hay	226.54	6.8
Cultivated Crops	87.32	2.6
Woody Wetlands	37.67	1.1
Emergent Herbaceous Wetlands	2.54	0.1

Table 2: National Land Cover Dataset Soil Infiltration Rate Estimates - Jefferson River Watershed

Type	Area (km2)	Coverage (%)
A - High Infiltration	604.36	18
A/D - High/Very Slow Infiltration	0	0
B - Moderate Infiltration	1,569.63	46.8
B/D - Medium/Very Slow Infiltration	13.2	0.4
C - Slow Infiltration	481.24	14.4
C/D - Medium/Very Slow Infiltration	29.13	0.9
D - Very Slow Infiltration	655.85	19.6

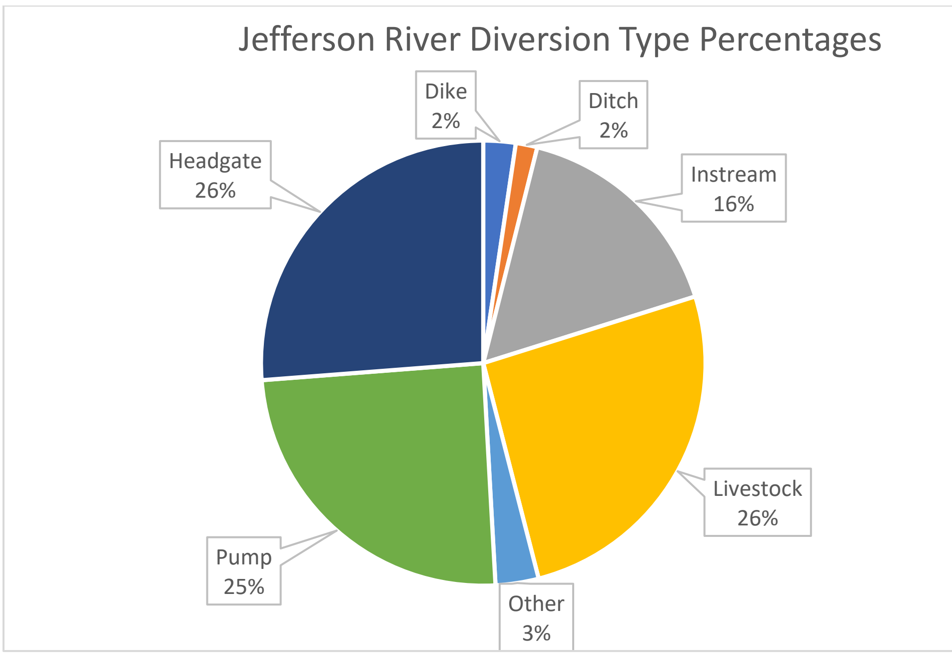

Figure 7: Jefferson River Diversion Infrastructure Type Percentages

Table 3: Total Irrigated Acreages in Jefferson County - 2009-2017. Courtesy of Department of Revenue.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Acres	18,623	19,890	19,772	19,929	19,929	19,952	19,818	20,848	20,779

AgriMet – JVWM, Jefferson Valley, MT

In figures 8 – 10 show average maximum temperature, average annual precipitation and average evapotranspiration rates (ET). The year 2012 shows how one input of ET, temperature, can drive increased evapotranspiration rates. Increased evapotranspiration rates with a decreased annual precipitation indicate potential drought conditions.

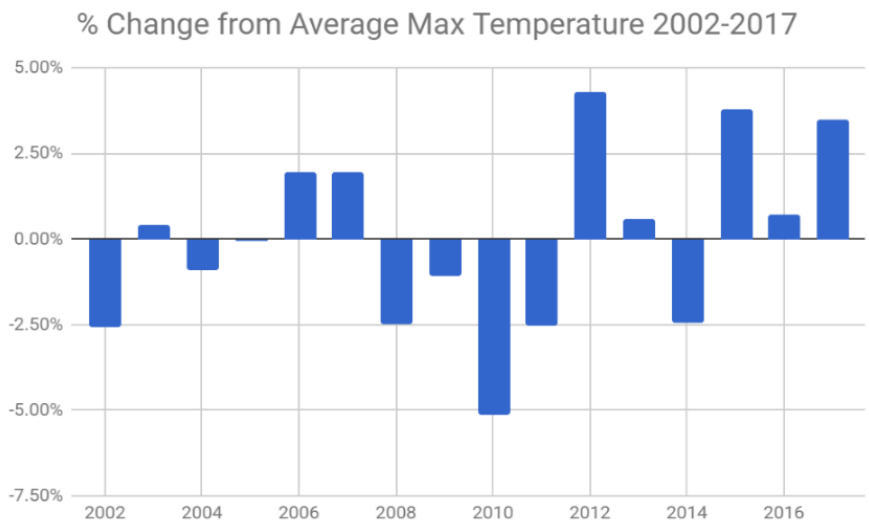

Figure 8: AgriMet Dataset- Whitehall Montana Temperature trends 2002-2017

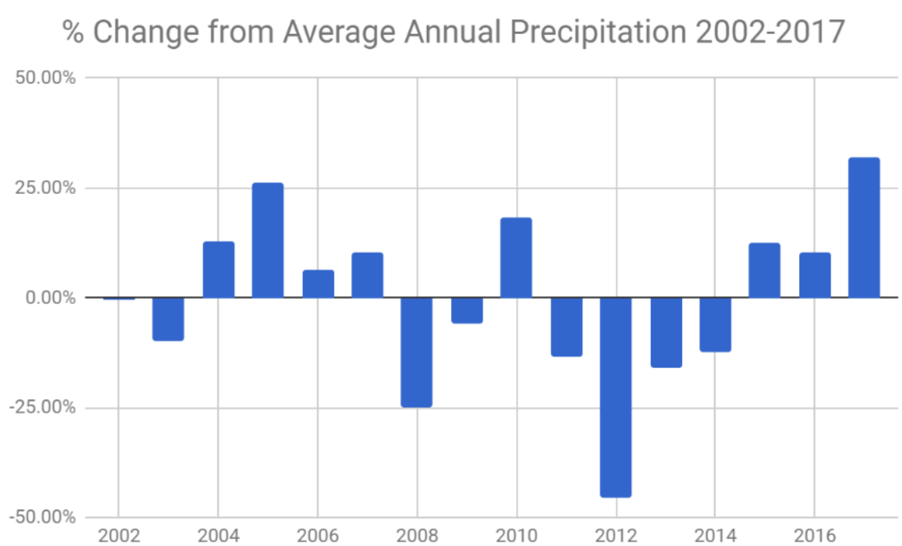

Figure 9: AgriMet Dataset- Whitehall Montana Precipitation trends 2002-2017

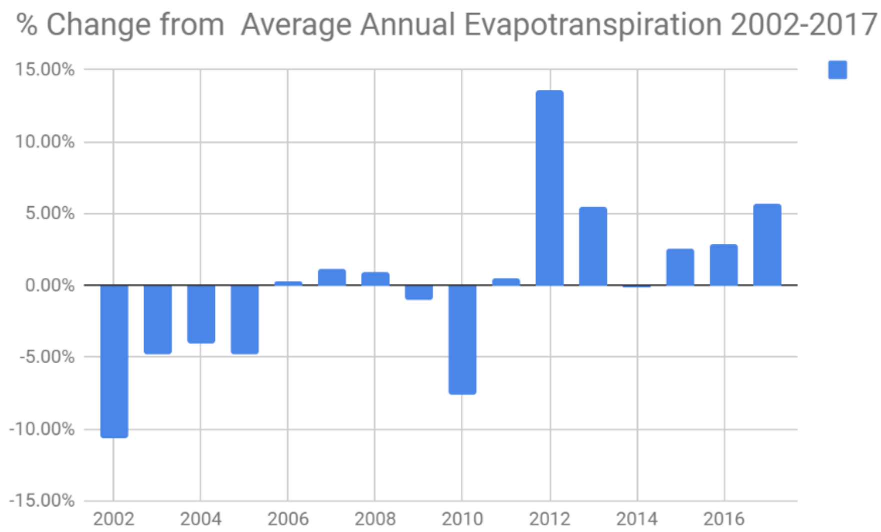

Figure 10: AgriMet Dataset- Whitehall Montana Evapotranspiration trends 2002-2017

Tobacco Root Mountain Snowpack

Higher elevation snowpack shows little decrease in snow water equivalents over the historic record. At higher elevations, snowpack will seemingly be prevalent, however, decreased values during drought years such as from 2000-2007 will be noticeable.

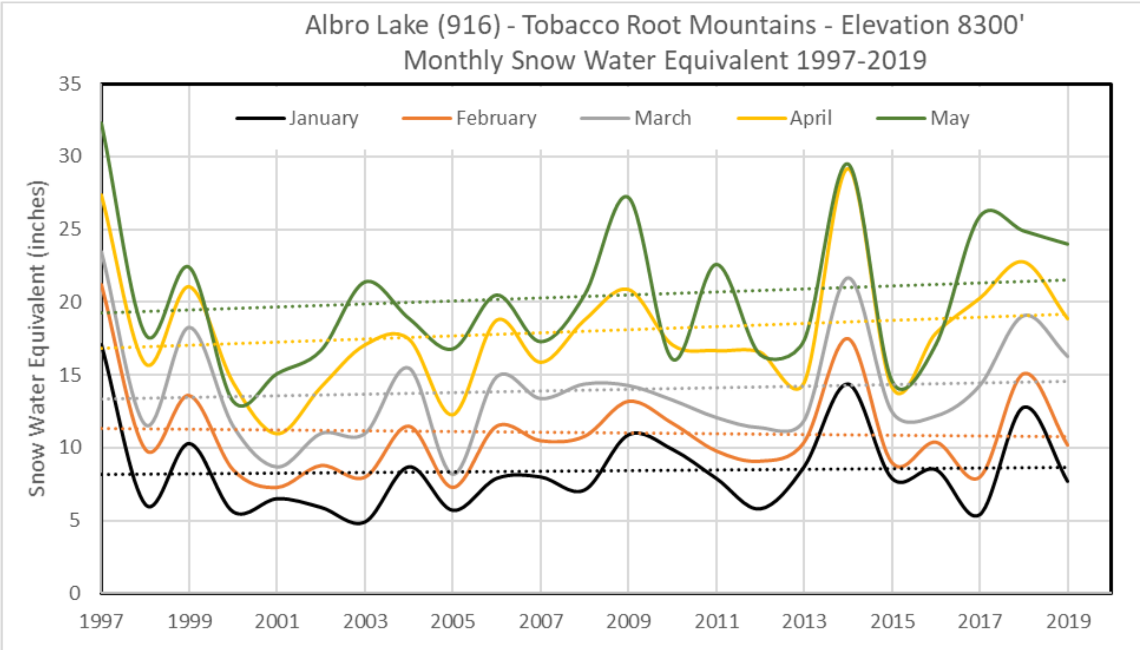

Figure 11: Albro Lake Snotel Site Monthly SWE Values, 1997- 2019.

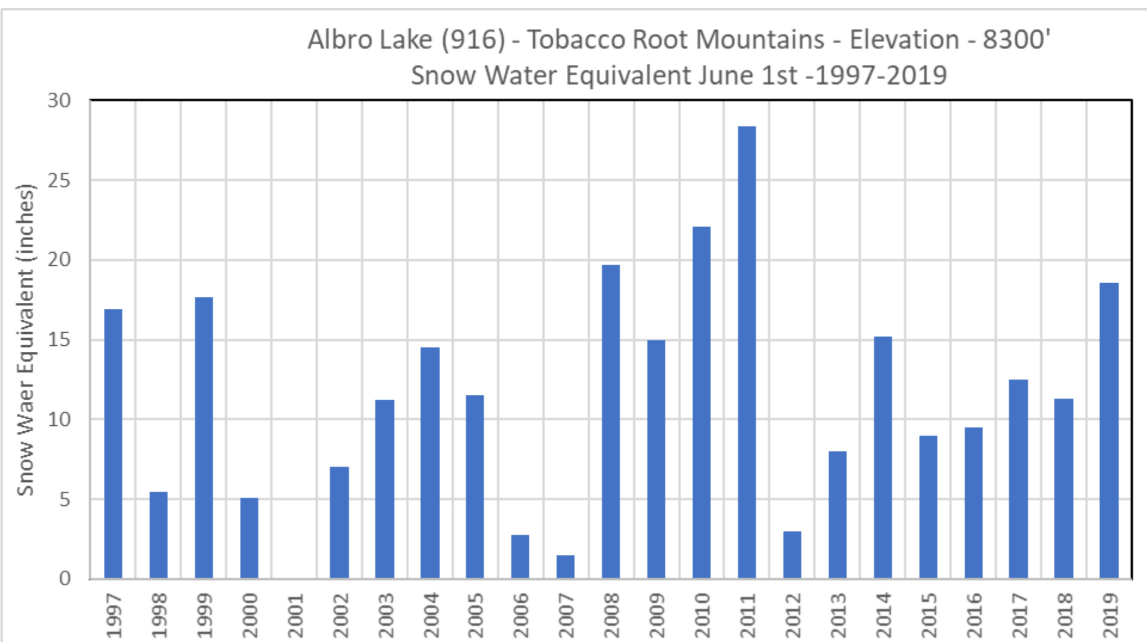

Figure 12: Albro Lake Snotel Site June 1st SWE Values, 1997-2019.

Highland Mountain Snowpack

The snowpack in the Highland mountains is more vulnerable to reduced snowpack in the future based on climate trends from 1981-2019 during the late spring months as shown in Figure 14.

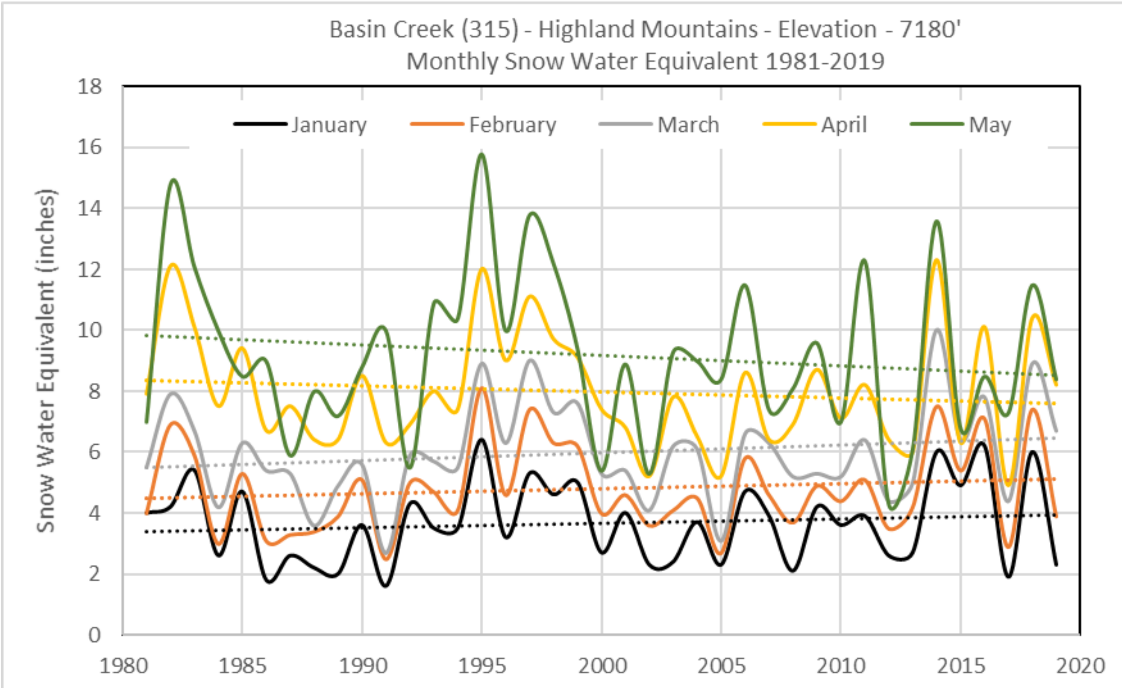

Figure 13: Basin Creek Snotel Site Monthly SWE Values, 1982-2019.

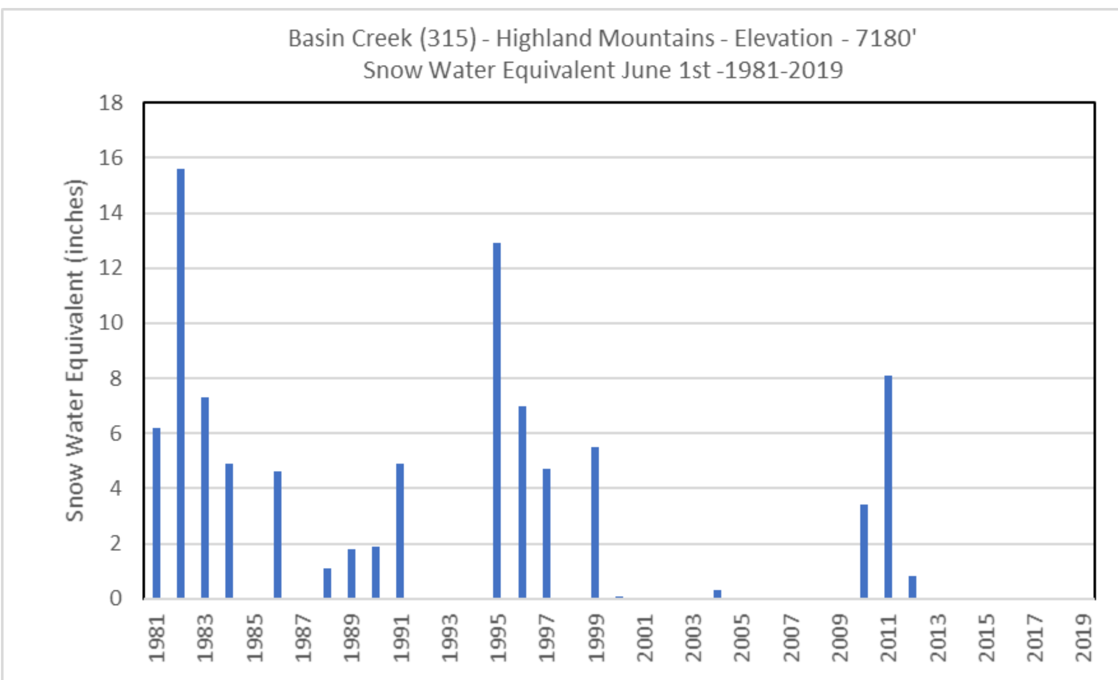

Figure 14: Basin Creek Snotel Site June 1st SWE Values, 1982-2019.

Jefferson River Stream Flow and Stream Temperature Trends

During the month of August, minimum mean daily stream flows dropped below the Drought Management Plan threshold of 280 CFS year eight of the 18 years from 2000-2018.

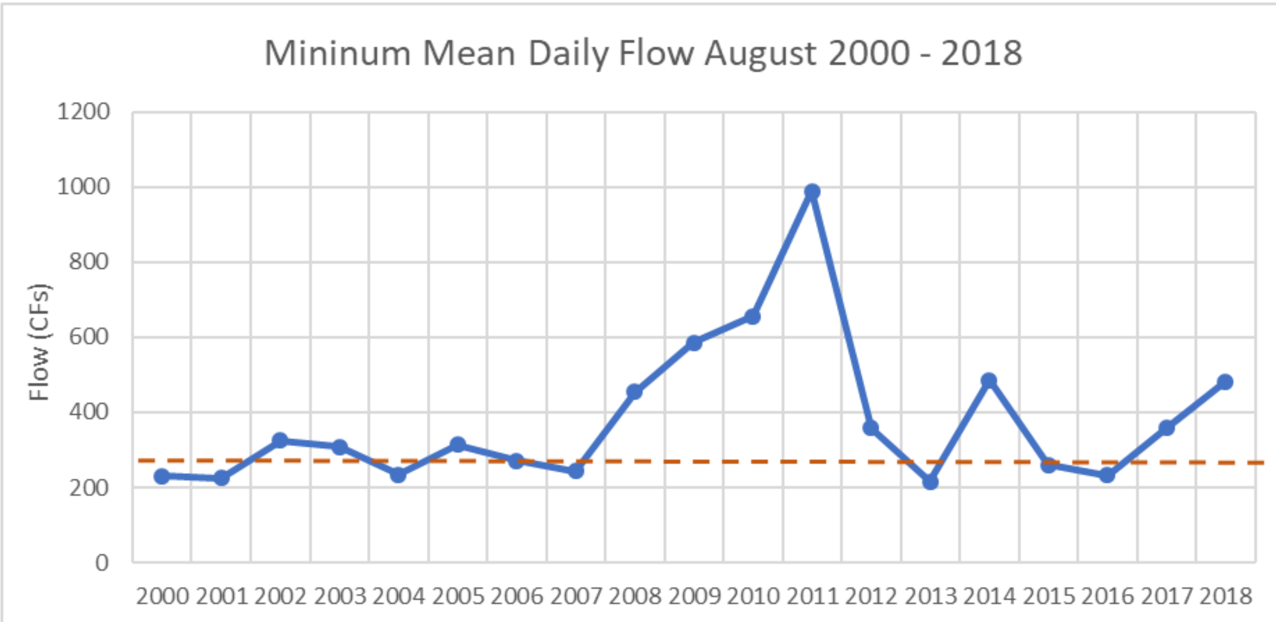

Figure 15: Jefferson River low-flow conditions since formation of JRWC, 2000-2018.

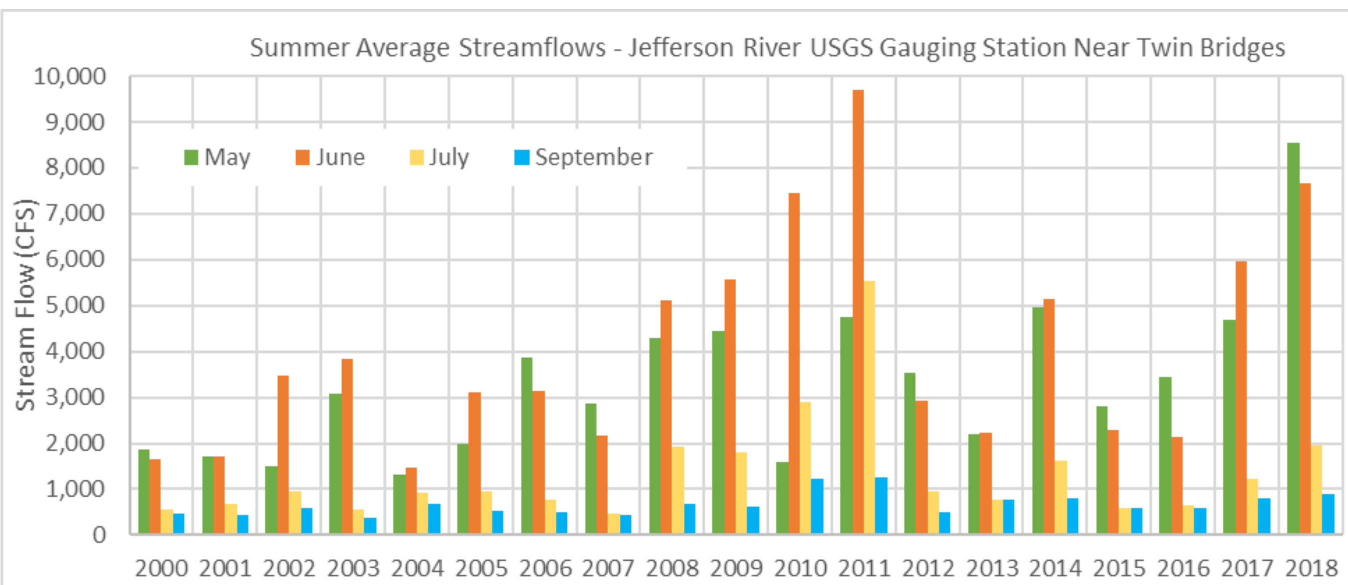

Figure 16: Jefferson River USGS Summer Flow trends, 2000-2018.

Maximum daily temperatures on record from 1994-2019 show spikes in temperatures from late June to Mid-August that meet or come close to Hoot-Owl criteria.

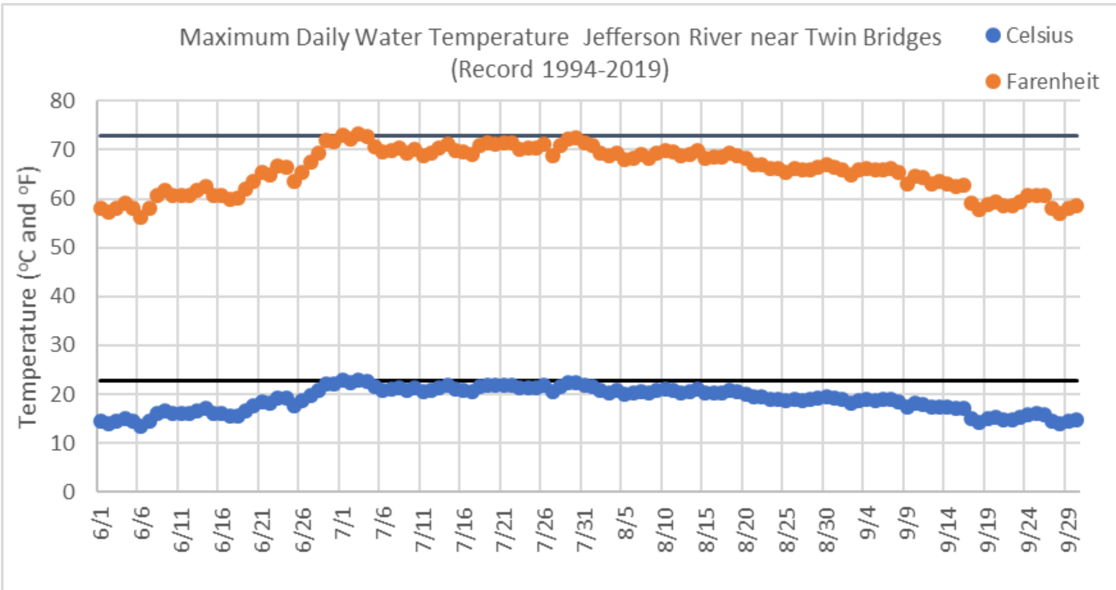

Figure 20: Jefferson River Average Maximum Daily Temperatures 1994-2019. Black lines indicate FWP Hoot-Owl Threshold in Degrees Fahrenheit and Degrees Celsius.

Jefferson Drought Intensities - 2000 – 2017

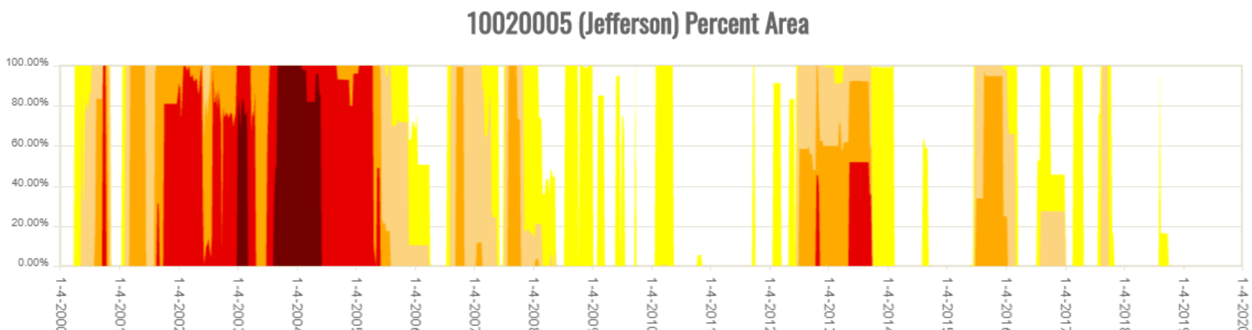

Figure 17: U.S. Drought Monitor Percent Area in Drought Conditions for Jefferson River Watershed 2000-2019

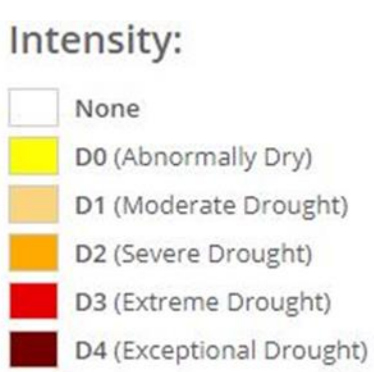

Figure 18: Drought Intensity labels D0-D4.

Climate Projections

Climate Explorer Projections in Jefferson County:

In low and high emission scenarios, mean daily maximum temperatures are expected to increase while fluctuating year to year in Jefferson County. Daily maximum temperatures below 32°F are decreasing, threatening the longevity of water resources stored in snowpack. Mean daily average precipitation shows little correlation from 2010 -2100 and will continue to fluctuate in consistency.

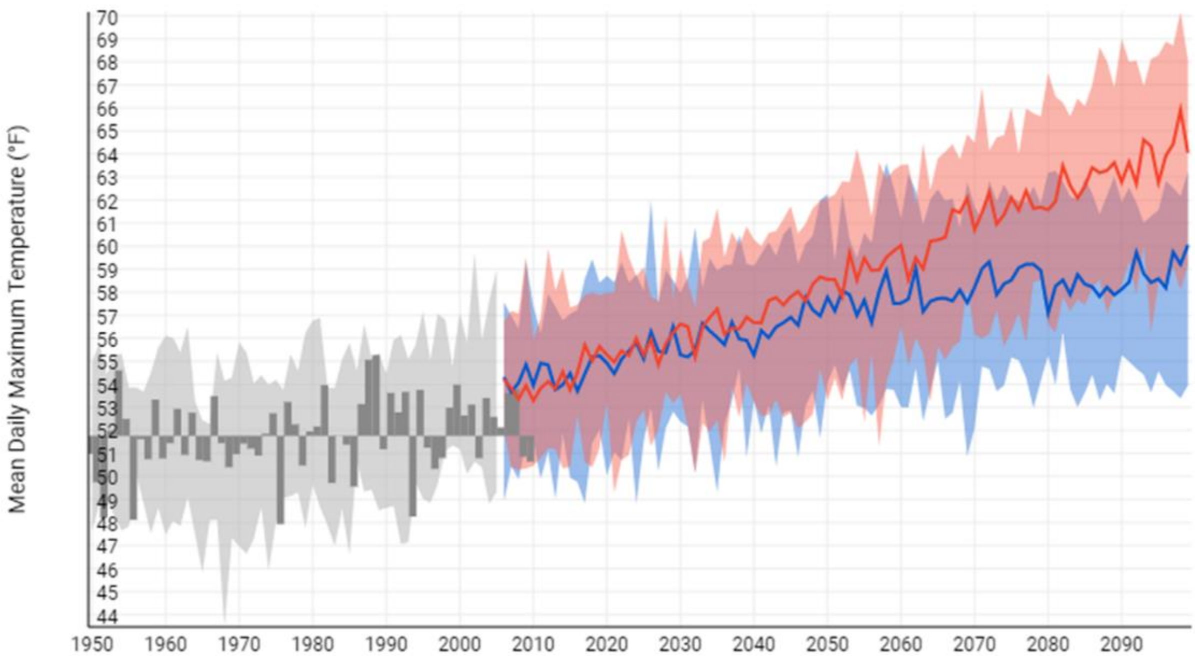

Figure 19: Jefferson County Mean Daily Maximum Temperature Projections: U.S. Climate Explorer.

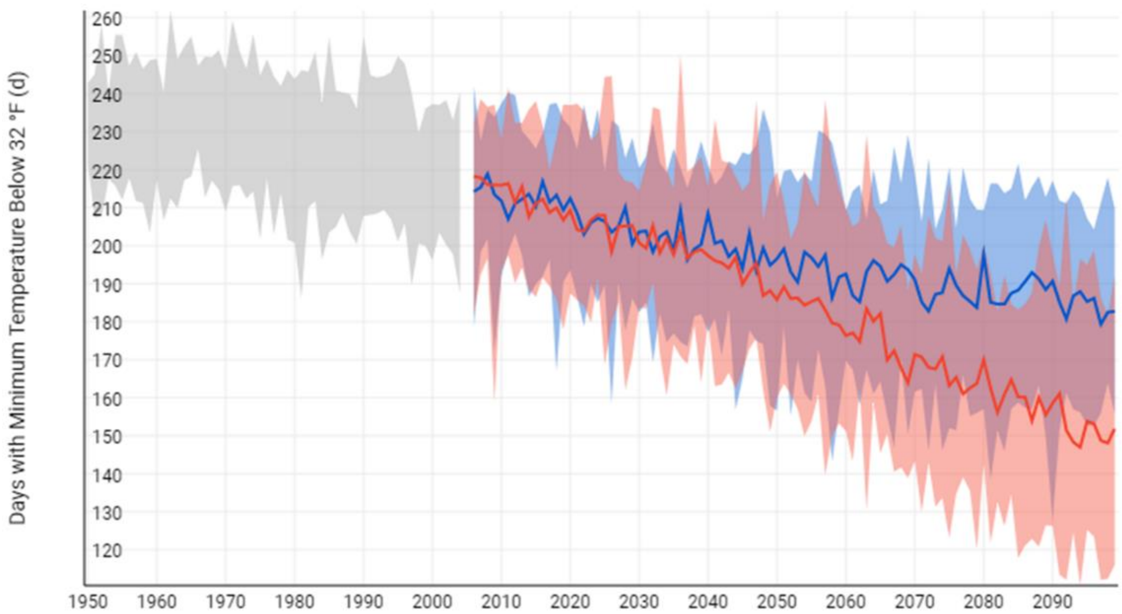

Figure 20: Jefferson County Days with Minimum Temperature Below 32° F: U.S. Climate Explorer.

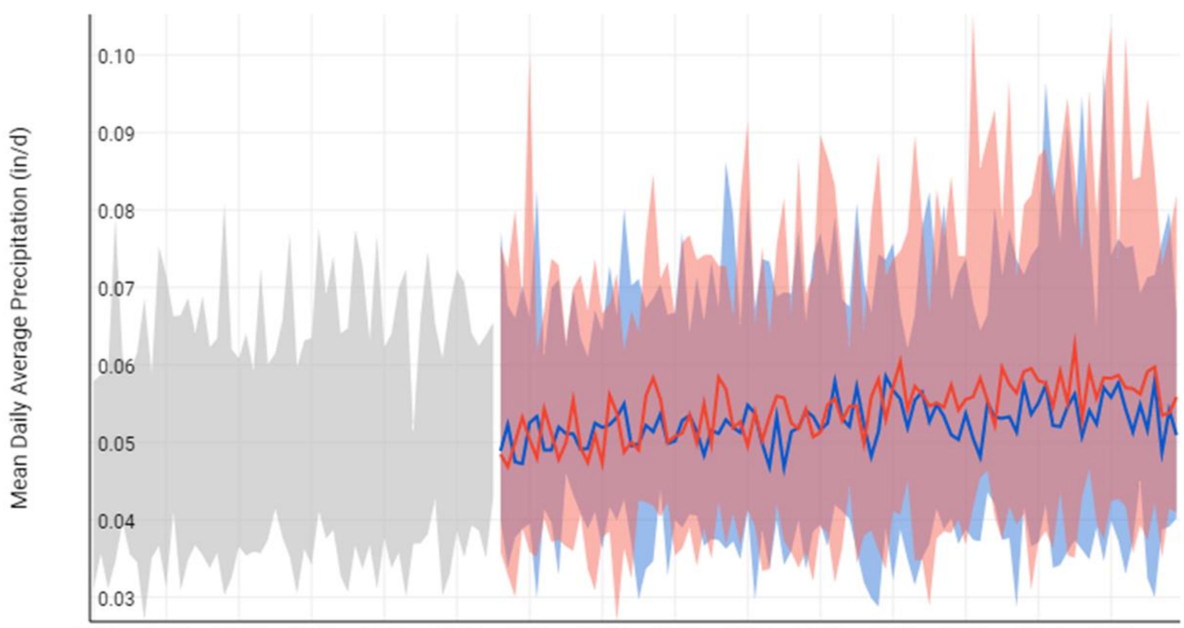

Figure 21: Jefferson County Mean Daily Average Precipitation: U.S. Climate Explorer. '

Population Projections

Year	County Population
2018	11,983 [1]
2038	16,096 [1]

(1) Regional Economic Models, Inc.

Figure 22: Jefferson County Population Projections- Courtesy of Great West Engineering.

Modeled Stream Temperatures

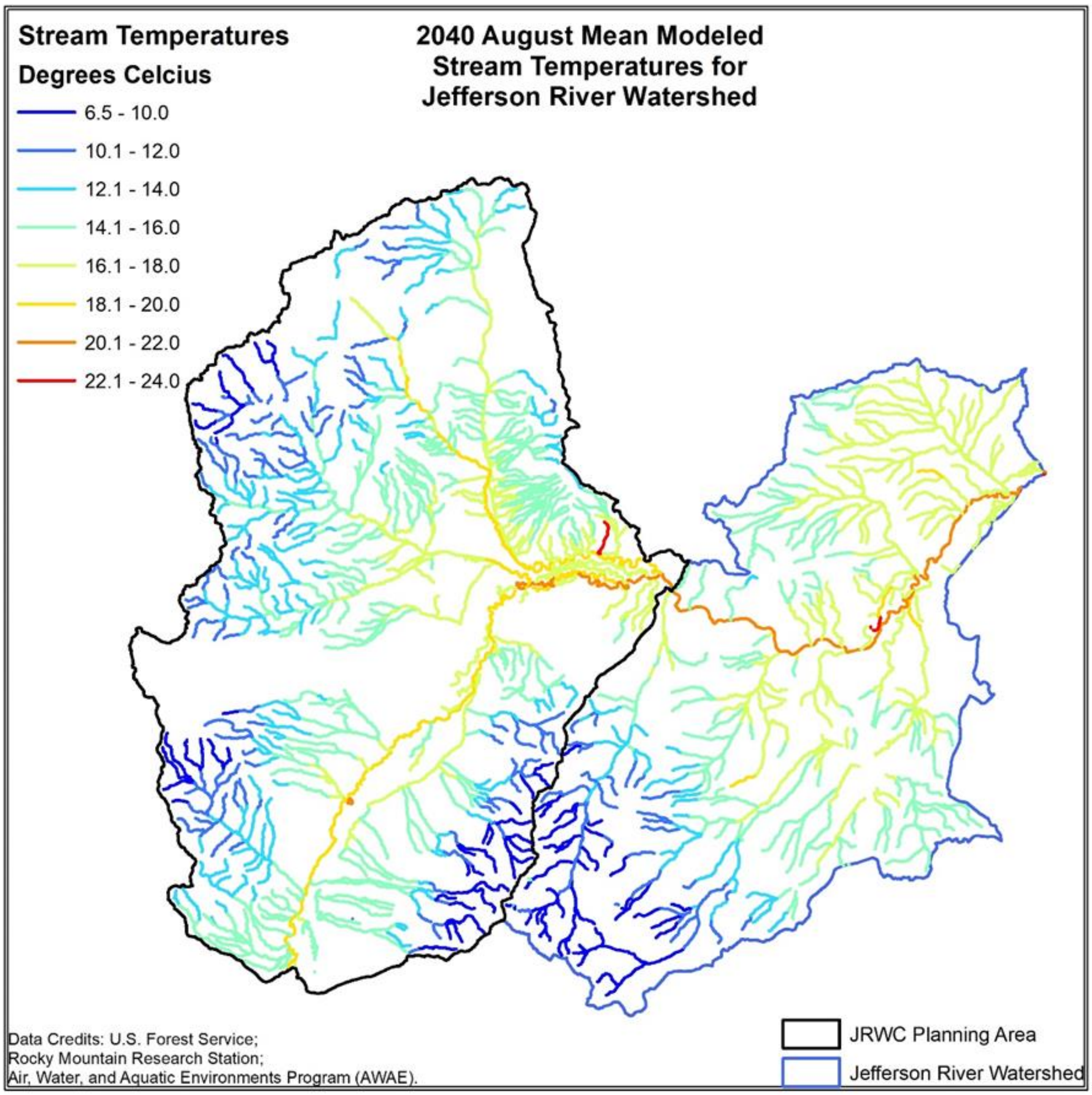

Figure 23: 2040 Mean Modeled Stream Temperatures for Jefferson River Watershed Area.

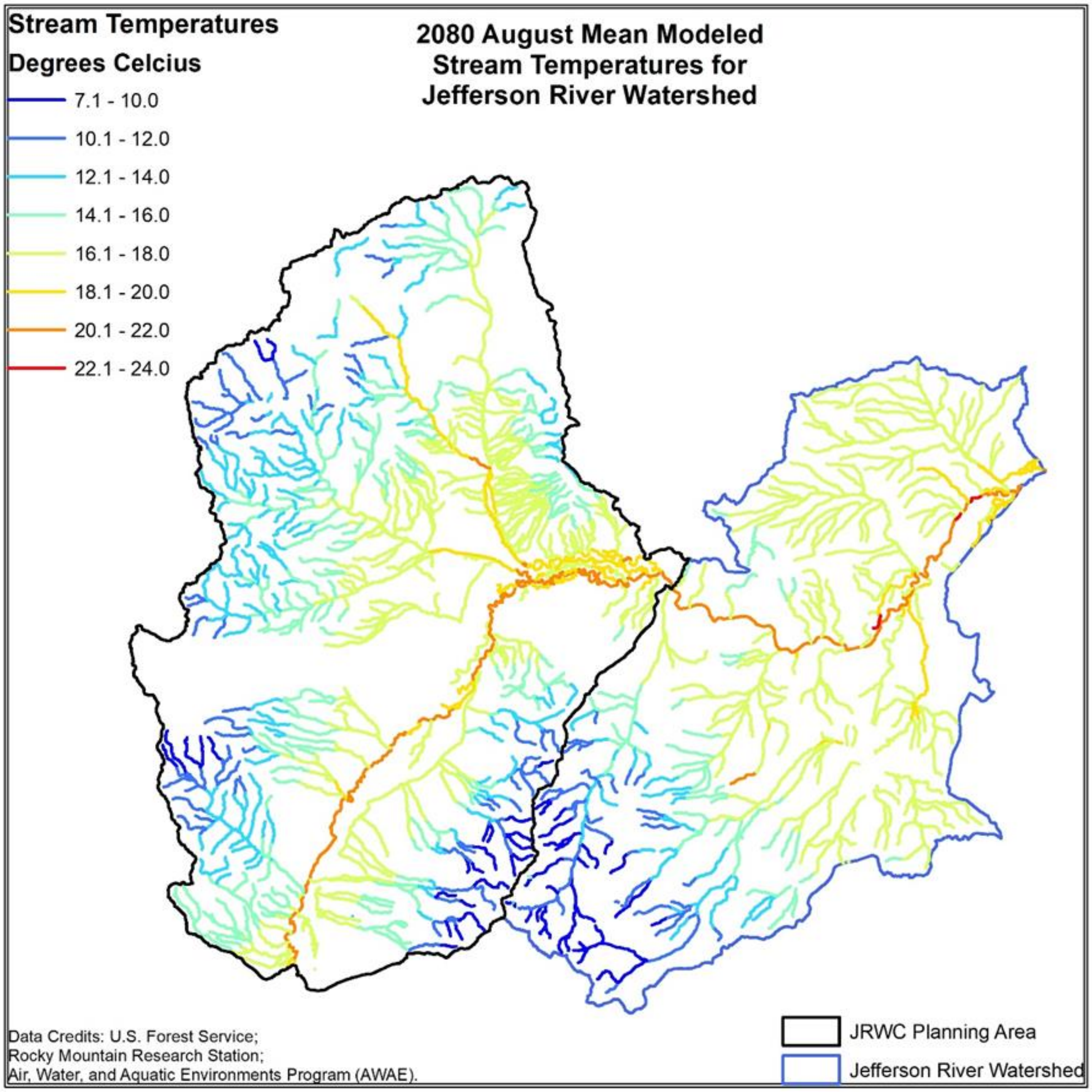

Figure 24: 2080 Mean Modeled Stream Temperatures for Jefferson River Watershed Area.

Watershed Planning Background

The Jefferson River Watershed sits along the continental divide and is fed from three major watersheds upstream in the Beaverhead, Big Hole and Ruby. The Jefferson River itself extends from Twin Bridges to the confluence of the Madison, Gallatin and Jefferson at Three Forks. While the river extends from Twin Bridges to Three Forks, the JRWC planning jurisdiction ends at Cardwell. For inclusive purposes, watershed and climate data may include the entire Jefferson Watershed, while drought planning and outreach was held to the JRWC planning area and Jefferson County.

Jefferson Watershed Restoration Plan 2010

In 2010, the JRWC published a watershed restoration planning document which provides resource issues that drive the drought resilience discussion nearly a decade later.

- Jefferson River main stem base flows and quality maintenance and restoration
- Riparian Restoration
- Noxious Weed Control
- Flood plain planning
- Conifer encroachment
- Fisheries enhancement
- Irrigation water management
- Prescribed grazing systems
- Sediment loading due to gully and rill erosion along interstate 90 and unpaved roads
- Sediment problems associated with irrigation return-flow sites
- Protection and maintenance of the local agricultural economy
- Periodically evaluate the Drought Management Plan
- Ground-water characterization and management

Drought Committee Meeting Conversations

Background

A drought committee was created to aid in the conversation of drought topics in the watershed. It was observed that during periods of precipitation and cooler weather, attendance decreased as Drought Committee attention was focused elsewhere. As the groundwork for defining drought in the Jefferson was lain, Drought Resiliency Project efforts were discussed during the normally scheduled JRWC meetings. There were five special presentations on Sustainable Agriculture, Watershed Management from a Fire Perspective, Groundwater Studies, Private Pond Impact to Fisheries and Surface Water Balances and a Water Rights Overview.

Discussion Topics

The resources listed from the Watershed Restoration Plan remain crucial to improving integrity of drought and watershed resilience. In addition to previously identified topics, the Jefferson River Drought Committee and JRWC meetings focused discussion on:

Table 4: Drought Resiliency Project Topics of Interest

Drought Committee Meeting Topics of Interest –	
Agriculture	-Soil health -Rangeland health -Peak flow and time of diversion discrepancies -Pivot and flood irrigation efficiencies -Split season irrigation -Cover crops, livestock rotations
Water Resources	-Surface water baseflows -Temperature reduction projects -Off-stream groundwater storage -Groundwater and surface water exchange -Upstream reservoir capacities -Water banking -Surface water loss through pond and reservoir evaporation

	-Use of monitoring reports for surface, groundwater, fisheries, temperature, TMDL
Riparian & Upland	-Headwater storage and flood control -Sediment control systems on high-delivery roads and streams -Mass wasting following fire events -Water availability following fire events -Forest density including conifer removal -Habitat availability -Noxious and invasive weeds
Human Relations	-Real-time monitoring systems -Fire risk in the wildland urban interface -Flood risk -Angling pressure, number of fishing days -Off-road vehicles usage -Fire initiation risk -Beaver conflict in populated areas

Implementation

Table 5: Project developed from drought committee, watershed group, local stakeholders and research.

Topic	Project Theme	Project Theme	Project Theme
Stream Restoration	Beaver Mimicry Structures- Ideal for incised tributary streams with high sediment loads, poor floodplain connectivity	Tile drains, bottom release impoundment, infiltration basins can help reduce temperatures	Invasive Species Control and Herbicide Application- Control Eurasian Watermilfoil and other
Irrigation Efficiency	Head gate Improvement and Replacement- Identify failing head gates, gates that can be automated during high flow events, and gates that direct water back to river form ditches	Soil Moisture Sensor and Nutrient Monitoring- Understand soil storage capacities, drainage rates, nutrients and bacteria populations in soil, improvement capacities	Cover Crops – Reduced erosion, increase soil organics, improving nutrients, reduce soil compaction
Livestock Management (soil health)	Riparian Zone Protection – For livestock accessing river, tributaries, or ditches, provide limited access location with riprap to reduce sediment and encourage riparian area	Rotation of livestock- Educate on scheduling for densities across different areas of cropland to promote growth, natural fertilization	Engage with the USDA NRCS office in Whitehall discussing soil health improvement strategies including crop residue management, increasing diversity and activity of soil microbes.

Watershed Monitoring	Tributary Stream Flows & Temps – Undergo multi-year study to understand larger tributaries to Jefferson River	Reservoir monitoring- Forecast Delmoe Lake and Whitetail Reservoir capacities	*Remote Stream Monitoring Equipment – Groundwater and surface water monitoring across high-density areas
Upland Management	Prescribed Burning and Thinning – Improves groundwater availability, habitat	Zeedyk Structures – Encourage groundwater recharge, sediment capture, and habitat	Road Sediment Reduction and Erosion Control – controls sediment loading to streams
Economics	Water Leasing & Cost Sharing-– Changes to consumptive water uses to ensure flows in the river – can be irrigated acreage, and irrigation improvements	*Local Business Development – Encouraging hunting, fishing, floating canoeing in Montana and towns between Whitehall, Twin Bridges and Cardwell see visitors	Outfitters & Fly Shops – ensure groups have better involvement in drought management plan implementation,
Groundwater	Banking Early Season Flows- Applying for new water right or change of right for closed-basin water usage during high flows for groundwater recharge projects	Canal Seepage – line canals that are actively losing and not returning to stream in reasonable time scale, biodegradable lining, and use of canals as a late-season flow encouragement	Off and On-Stream Storage – Reservoir, tanks help utilize high water flows for stock water tanks, wetlands

Natural Hazard Risk Reduction	*Structure Protection – Analyze defensible space, thinning, mowing, reducing local forest density, pruning, removing litter	Flood Control Barriers- near homes, roads, install levees in flood susceptible areas current floodplain extent, channel migration zones	Communication & Outreach – educate to homeowners on fire and flood risk and vulnerable areas, flood insurance, steps to take in preparation of events and spring floods
Early Season Warning Update	*Communication & Outreach – Continue social media updates, email and phone communication regarding precipitation trends, snowpack, early season temperatures	Snowpack & Reservoir Storage Data Analysis – Review snowpack data and reservoir storages, identify and provide recommendations on releasing water, storing water during season	*Cumulative Discharge Analysis – Big Hole, Beaverhead, and Ruby River cumulative flows compared to Jefferson River near Twin Bridges and Waterloo

*Comments in section: Additional Considerations to Drought Resilience.

Additional Considerations to Drought Resilience

Early Warning System Approach

Use of USGS Stream Gages can help quantify net gain or net loss streamflow volumes between confluence of Big Hole River, Beaverhead River and Ruby River and the gauging station at Twin Bridges on the Jefferson River. This approach can also be taken for the stream gage at Parsons Bridge nr. Silver Star and the Twin Bridges gauging station, both on the Jefferson River. Overall, this will provide a ballpark surface water balance of percent of total stream flow gains or losses, and return flows through canal seepage, groundwater recharge through mountain front recharge. Due to glimpses in surface water balances, estimation of evapotranspiration or precipitation events will not be considered while looking at these flows. This highlights the importance of upstream watershed users and watershed groups communicating drought conditions as certain percentage of flows come from different rivers above Twin Bridges.

Table 6: Example of upstream inflows to the Jefferson River and percentage of impact.

8/1/2018	BHR below Hamilton Ditch	Ruby River	BVHD at Twin Bridges	Cumulative Flow (CFS)	JFR at Twin Bridges	Net Difference (CFS)
Time: 15:00	329	38.4	280	647.4	706	+ 58.6
Percent Contribution	51%	6%	43%	100%		

Reliance on USGS Stream Flow Stations

Accuracy of stage-discharge curve relationships may be impacted after high spring runoff periods. These discrepancies from may last for just a few weeks before stream flows are collected and USGS gage flows are corrected. These weeks the USGS gage is off, can falsely inactivate or activate the Drought Management Plan to begin watching flows and to take note that the Twin Bridges gage has reached 600 CFS. This was evident during spring flows in 2018 as discharge was corrected to a higher level than what was reported, but multiple weeks after a drought management trigger had been reached. Flows on 6/2/2018 peaked at 12,400 CFS and never dropped below 400 CFS during summer 2018 which was well above flow targets of 280 CFS at the Twin Bridges Gauging Station.

Automated Flow Gages

Per a drought planning discussion, it is important to consider the cost effectiveness of monitoring utilizing an automated flow gage using stage-discharge relationships versus manual flow measurements for the entirety of the summer. At an average of thirty-minutes per monitoring event and travel time of staff or contracted personnel for at least six monitoring events during a summer, the automated flow gage could prove to be cost effective over a multiple year time period. Consider, that the annual cost for the Jefferson Slough installed HOBO RX3000 Remote Monitoring Station is $300. This station reports stage and temperature on websites and mobile devices. Installation of remote monitoring stations should be carefully considered with water use interest, river or creek bank full discharge, contribution to the overall surface and ground water budget and driving distance proximity.

Automated Groundwater Levels

MBMG has a well distributed network of automated well level readers within the Ground Water Investigation Center website. As many water levels are checked manually throughout the year, installing automated groundwater transducers will allow observation of groundwater withdrawals through exempt wells and aquifer recharge throughout the spring, summer and fall months. Groundwater withdrawals from changed land use, such as a subdivision or housing complex in replacement of an irrigated field, ultimately impact the timing and availability of water resources especially in those resources are in proximity and have strong hydrologic connections to surface water bodies. This monitoring equipment would provide a glimpse as to what MBMG studies, provide research opportunities to Montana Technological University, and provide a showcase first-hand impacts of changing land use in the Upper Missouri Headwaters. An example of a static water level reading gage can be seen below.

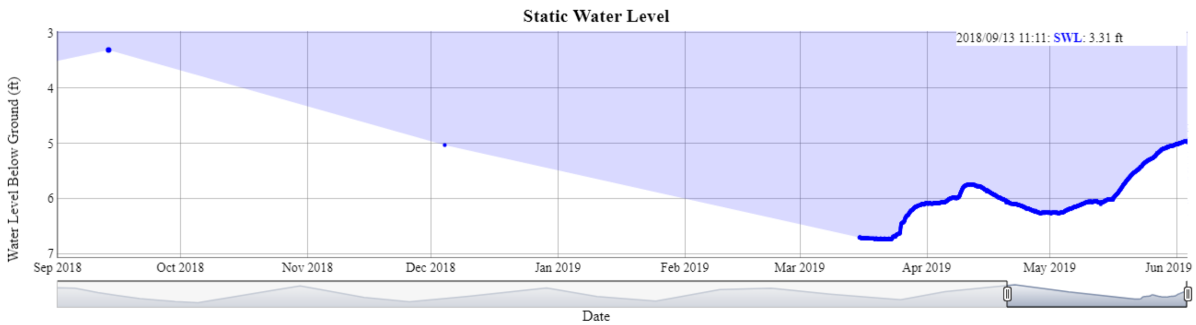

Figure 25: MBMG GWIC Well ID# 279259 showing static real time static water level below ground surface.

Communication

Long-term upkeep on flow condition, temperature, and snow water equivalent measurements in the Jefferson River to stakeholders can provide an efficient way to keep updates on watershed conditions. The JRWC has improved their website material and uploaded more Drought and Drought Monitoring related information. Below is an example of the River Conditions Webtool for the Upper Missouri that can be implemented and sent to stakeholders as an outreach tool.

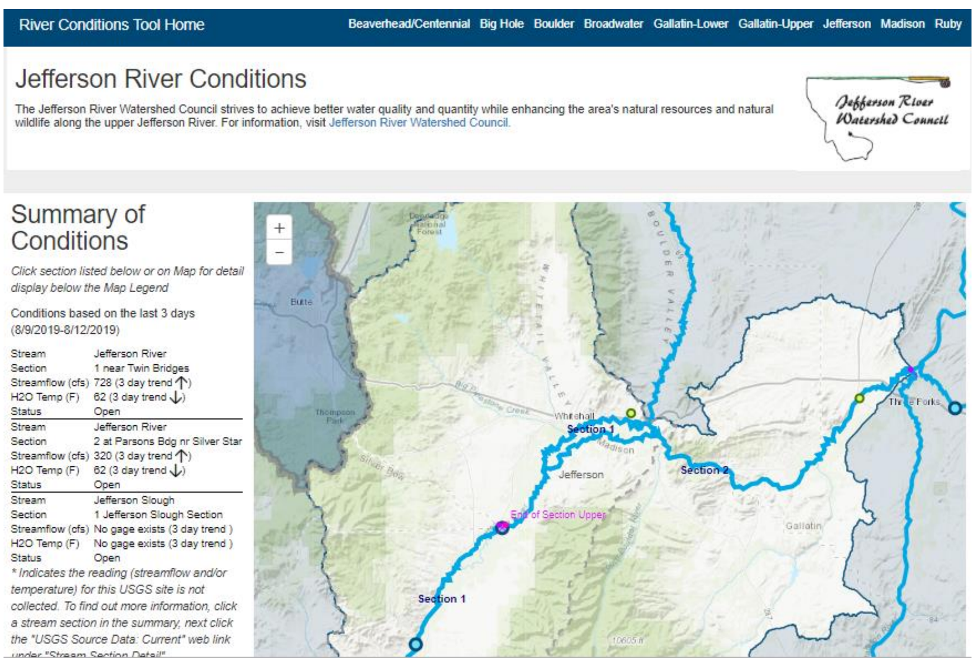

Figure 26: River Conditions Webtool for Upper Missouri Watersheds including the Jefferson River

Additionally, local radio such as KBOW Party Line provides a listening opportunity for updates on the Council, upcoming projects and opportunities to become involved. Besides radio, continuing to be involved in local events such as the Jefferson River Rally held every spring, hosting a fundraiser event in the fall, providing scholarship opportunities to local students and keeping council updates posted to social media all prove to be ways to reach different and diverse stakeholders of all ages within the Basin.

Structure Protection Methods

Fire mitigation methods will become increasing important on public and private lands as landowners who are near forest lands, are susceptible to fire. In the Jefferson County – Pre-disaster Mitigation Plan, wildfire is the first of eight hazards of highest concern. With the use of ponds, lakes and reservoirs as surface water sources to fight fire, managing these resources appropriately with streamflow will be crucial near structures most vulnerable to fire. To further decrease vulnerabilities to fire, residents should see Figure 24 below and the Tri-County FireSafe Working Group webpage. The Tri-County non-profit group dedicates their mission to wild land fire mitigation planning, population protection, education, forest health and wildland urban interface projects in Broadwater, Lewis and Clark and Jefferson Counties in Montana.

Figure 27: Defensible space checklist for fire protection: Courtesy of Colorado State Forest Service

Canoeing the Upper Missouri

The Jefferson River Canoe Trail as part of the network of Upper Missouri, flows through the heart of JRWC projects. A recent inquiry about late season flows and water quality was followed with an estimate of spending during the Montana Trip. The economic viability for local businesses relies on natural resources such as the scenery and river flows. During drought years, businesses are vulnerable to losing clientele as a result of reduced precipitation, stream flows and increased wildfires.

$1440.00 = 2 nights hotel stay for 16 people
$2975.00 = Canoe rental & delivery
$2550.00 = Chartered ground transportation
$2000.00 = Local food and other supplies
$ 735.00 = Restaurant dinners for 16 (excluding drinks)
$ 300.00 = State park admission and camping permits/fees
~$10,000 Group Total Estimate
~$4000 (gas, food supplies, touristy things, restaurant meals & tips, etc.)
~$14,000 Grand total for 7 days on the Jefferson River

Upcoming Project Considerations

Projects released by state and public entities in both Jefferson and Madison Counties will help guide how the JRWC moves forward with implementing projects with collaboration. The previously mentioned MBMG Groundwater Study within the Waterloo area will include an interpretive report crucial to managing groundwater and surface water resources appropriately. The DNRC will be hosting public meetings and outreaching to the public as part of a detailed Floodplain Study. As new floodplain maps are released, structure flood insurance needs, may change. Additionally, the Montana County United States Department of Agricultural offices are releasing County Long-Range Plans in December of 2020. These long-range plans will echo comments made in this drought resiliency plan.

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