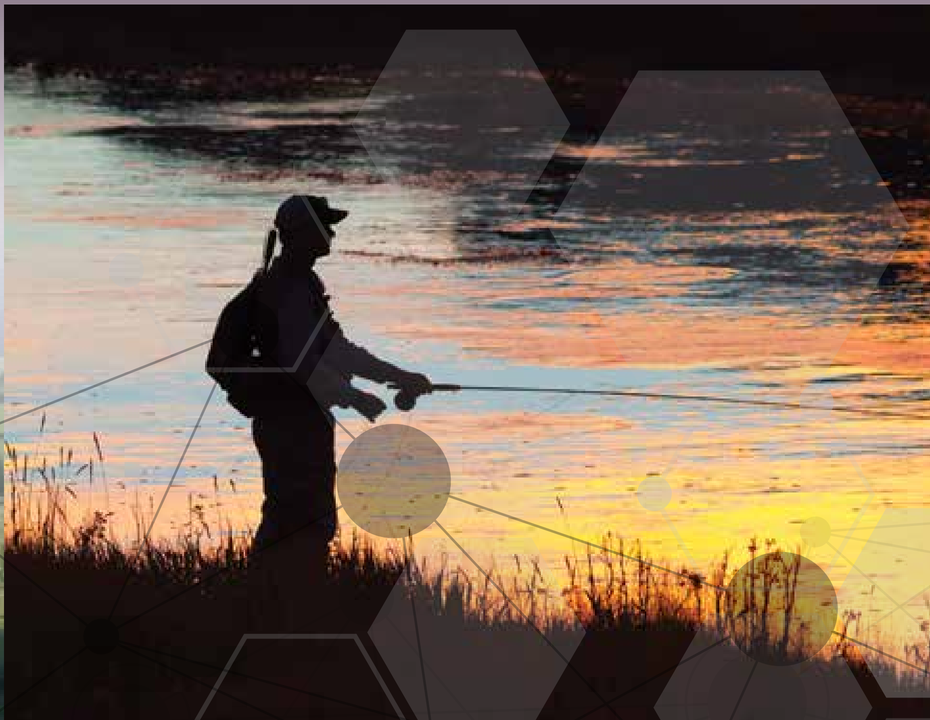
Silver Creek

Annual Report

2023

Ecosystem Sciences Foundation



Ecosystem Sciences Foundation

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Silver Creek Watershed

2023 Annual Monitoring Report

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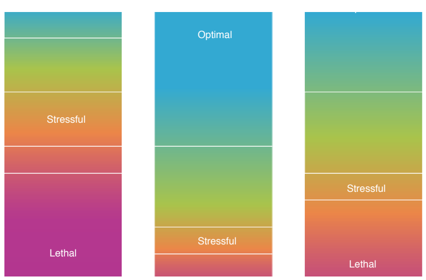


2023 Report

Silver Creek Watershed

Ecosystem Sciences Foundation (ESF) has been monitoring the Silver Creek watershed since 2009, when it partnered with The Nature Conservancy to develop a Restoration and Enhancement Strategy for the Silver Creek Watershed. The strategy identified numerous actions to be taken, including addressing data gaps on stream flow, temperature, and sediment conditions. To address these data gaps, ESF began its monitoring program in 2010 to increase our understanding of the Silver Creek system. This past year, ESF and its partners continued to gather critical data on stream flows, temperature, and dissolved oxygen. In addition, ESF participated in a three-year project that will integrate water quality and water quantity monitoring data into an interactive stream flow forecast model for the Wood River Valley.

To date, the Silver Creek monitoring program has enjoyed support from numerous stakeholders. Most of the land within the watershed is privately owned; consequently, landowners in the watershed recognize the need to protect the ecological health of the watershed, as well as their rights as landowners. Our partners and stakeholders have been integral in helping us achieve the vision of providing direction for stewardship of the Silver Creek Watershed and in designing and promoting appropriate stream restoration and enhancement actions.

The significant conclusions and findings from 2023 are:

- In 2023, Silver Creek flows were above the historic average discharge volume within the stream system. The Big Wood Basin's snowpack was significantly impacted by a flurry of late-winter and early-spring storm cycles that benefited the water availability within the Silver Creek system. The stream volume in all of Silver Creek's stream tributaries were above average.
- Stream and spring temperatures in the Silver Creek system were the coolest they've been since 2019. Fewer areas saw temperatures sustained above the stressful limit for fish for prolonged periods. The number of days that saw temperatures rise above the 70 °F stress band threshold decreased from 2022.
- Dissolved oxygen monitoring indicated that in some areas of Silver Creek, dissolved oxygen concentrations have become so low that they stress all life stages of trout, especially in Butte Creek and Grove Creek. However, these conditions are generally limited to early morning hours. In the afternoon, dissolved oxygen levels typically rise rapidly.

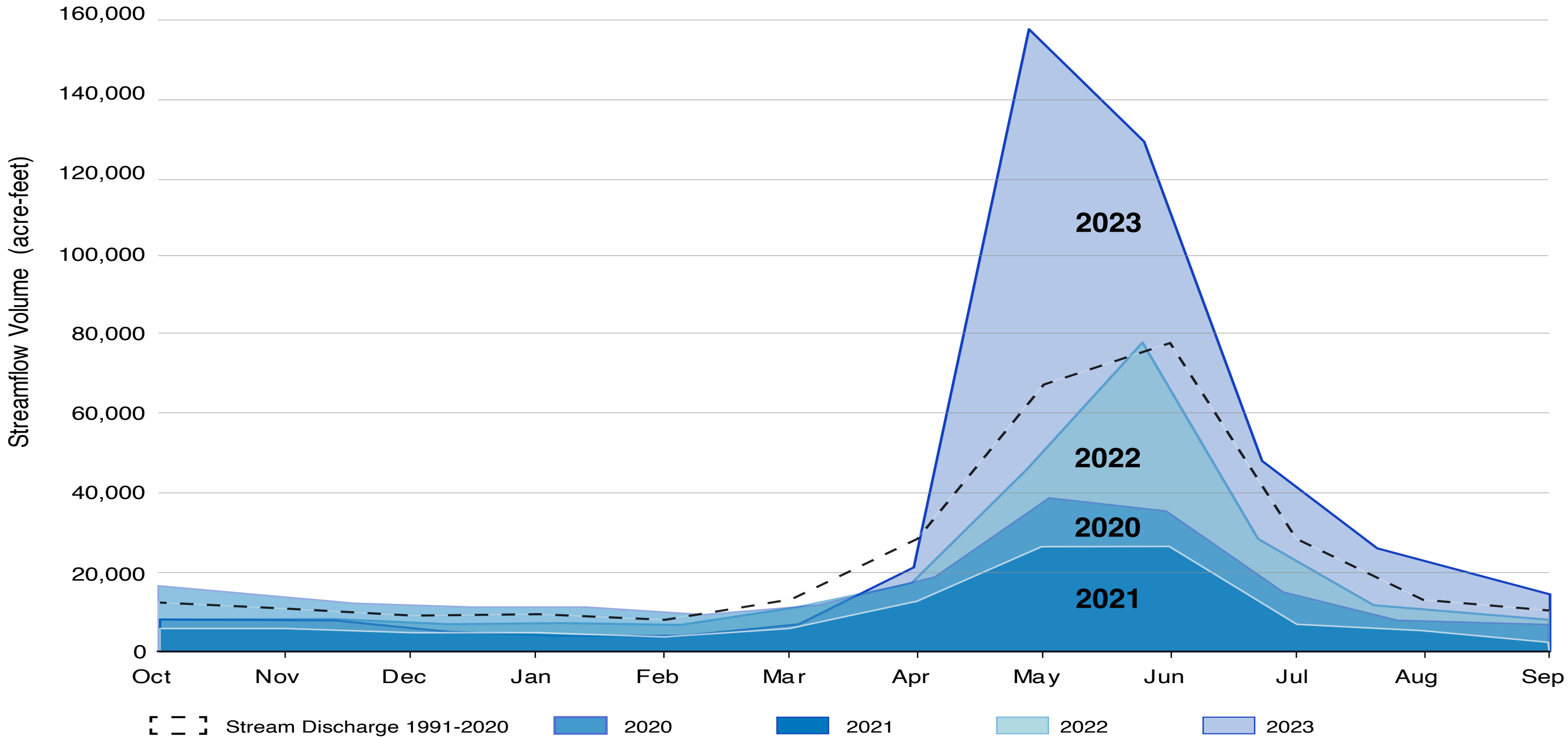
For more details please visit: **www.savesilvercreek.com**

The information that is presented in this report reflects summarized analysis of all data. We are presenting the most important aspects of the past season's work in a way that tells a story of the stream system and watershed. The information presented here is the result of detailed, scientific analyses, and reflects a considerable amount of field work to collect. The website, which has been recently updated and redesigned, has additional information on programs in the watershed, including raw and tabulated data.

Winter Snow + Water Year 2023

The water year for 2022-23 featured snowpack levels above the most recent 30-year average. In April 2023, snow water equivalent (SWE) levels within the Big Wood Basin were measured at 161% of median from those measured from 1991-2020. We calculate the total streamflow volume for the Big Wood River at Hailey (USGS gauge #13139510) to be 155% above median from streamflow measured 1991-2020. In 2023, the Big Wood River at Hailey saw streamflows above the historical median for much of the duration of the monitoring period. The accumulated precipitation measured at the Picabo Agrimet Weather Station was higher than in the previous three years due to a wet spring and fall in 2023. This was good news for the Silver Creek system that relies almost entirely on groundwater levels within the Wood River Valley Aquifer system for springhead flows.

As a spring-fed system, Silver Creek's water comes from groundwater upwelling at springheads and streambed groundwater inputs for consistent flow. In 2023, monitoring within Silver Creek's tributaries showed an increase in spring and stream flows compared to 2022. Well water monitoring within the South Valley Groundwater District showed that groundwater depth and artesian pressure was sustained at most wells throughout the May to October 2023 time frame. The consistent, cool groundwater inputs that continued throughout the summer months led to a reduction in average and maximum stream temperatures at most locations when compared to some monitoring years. These benefits underscore the importance of groundwater as one of the key ecological drivers of the Silver Creek ecosystem.



Big Wood River stream flows (measured in acre-feet) for 2023 as compared to the 30-year median (1991-2020).

April 1, 2023

Idaho Water Supply Outlook Report

Big Wood Basin **161%** of median snowpack

Big Wood Basin **114%** of median precipitation

Streamflows up to **155%** of average

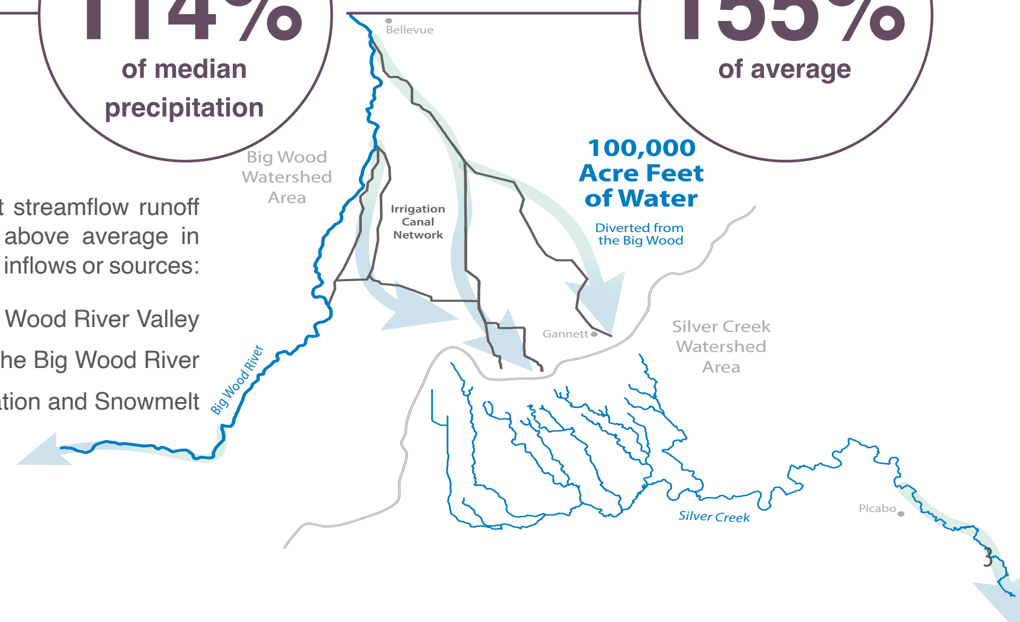
In 2023, the Big Wood Basin received above average precipitation between Oct 1 and April 1.

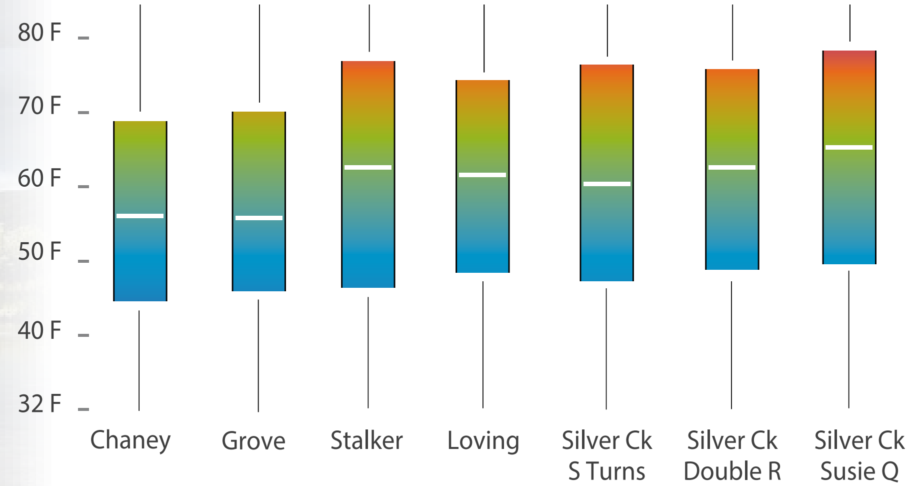
Snowpack conditions, forecast streamflow runoff and groundwater flows were above average in 2023. Major Silver Creek water inflows or sources:

1) Groundwater inflows, Wood River Valley

2) Irrigation diversions from the Big Wood River

3) Precipitation and Snowmelt





Summer Stream Temperatures: The graph above indicates the maximum, average and minimum summer water temperatures on selected areas of Silver Creek over a thirteen-year period (2011-2023). This year, 39 stream temperature loggers and 10 springhead loggers were monitored throughout Silver Creek and on each tributary to record critical information and track changes in the system.

Stream Temperature

In 2023, we deployed 10 springhead and 39 stream temperature loggers in key locations throughout the Silver Creek Watershed. It is important to monitor the springs that feed Silver Creek because they are the primary source of water to the system and these springs provide consistent, cool water to Silver Creek's tributaries that can mitigate against changes in air temperature and climatic conditions. For the 10 springhead loggers, median temperatures stayed near 49°F throughout the summer of 2023. The average 2022 water year carried over somewhat to the 2023 water year as spring and stream temperatures saw slight decreases from 2022. The above average water year in 2023 and a relatively wet spring and summer in 2022, in terms of precipitation, allowed for near-normal groundwater levels to return to the Wood River Valley. As a spring-driven system, these springs are critical to the health and persistence of Silver Creek.

Temperature monitoring within Silver Creek and its tributaries recorded median and maximum stream temperatures below average at most locations. Cumulative median stream temperatures recorded in 2023 were lower than the previous two years of monitoring. There was a 0.5 degree

Fahrenheit decrease in the average median temperature from 2022 to 2023 throughout the tributary and mainstem stream system. This illustrates the connection between the above-average water year in 2023 and carryover from a relatively wet spring in 2022, which led to an increase in the duration and quantity of groundwater upwelling. There were many locations in the Silver Creek monitoring array that had median temperature decreases from 2022, including Lower Thompson Creek (-2.3 °F), North Fork Loving Creek below pond (-3.7 °F), Lower Loving Creek (-1.2 °F), Lower Cain Creek (-1.8 °F), and Lower Mud Creek (-0.5 °F). Tributaries that saw increases in median temperatures from 2022 included Mid Loving Creek (0.7°F) and Grove Creek (0.5°F).

A Thirteen-Year Review of Stream Temperature Monitoring

This year marks the 13th year of accumulating stream temperature data from tributaries across the Silver Creek tributaries and mainstem.

Perennial hot spots across all years of temperature data monitoring in the Silver Creek system include Silver Creek at Highway 93, Silver Creek at Susie Q, Silver Creek at Priest Bridge, Mid Mud Creek, Lower Mud Creek, and North Fork Loving Creek. Many of those sites are in locations far downstream in the monitoring array, and as such, are most likely to incur warmer water temperatures through the summer season. In contrast, none of the 10 headwater springs or upper tributaries that were monitored saw median daily temperatures go above the 70 °F temperature fish stress threshold.

From 2011 to 2023, the data shows a decreasing trend in stream temperatures across the Silver Creek and its tributaries. In the first six years of temperature monitoring, from 2011-2016, daily median stream temperatures exceeded 70°F an average of 21.9 days. From 2017-2023, the average number of days that stream temperatures exceeded 70°F dropped to 14.8 days.

Average median stream temperatures in 2023 were cooler than they were in the previous two years, and the average number of days that stream loggers recorded temperatures above the 70 °F temperature fish stress threshold decreased from 16.5 days in 2022 to 8.1 days in 2023.

The highest recorded average median stream temperature occurred within the first six years of temperature monitoring, which was 60.3°F in 2013. In the last seven years, the average median temperature across all streams has hovered around 58.8°F. In 2023, the average median temperature across all tributaries increased to 59.6°F.

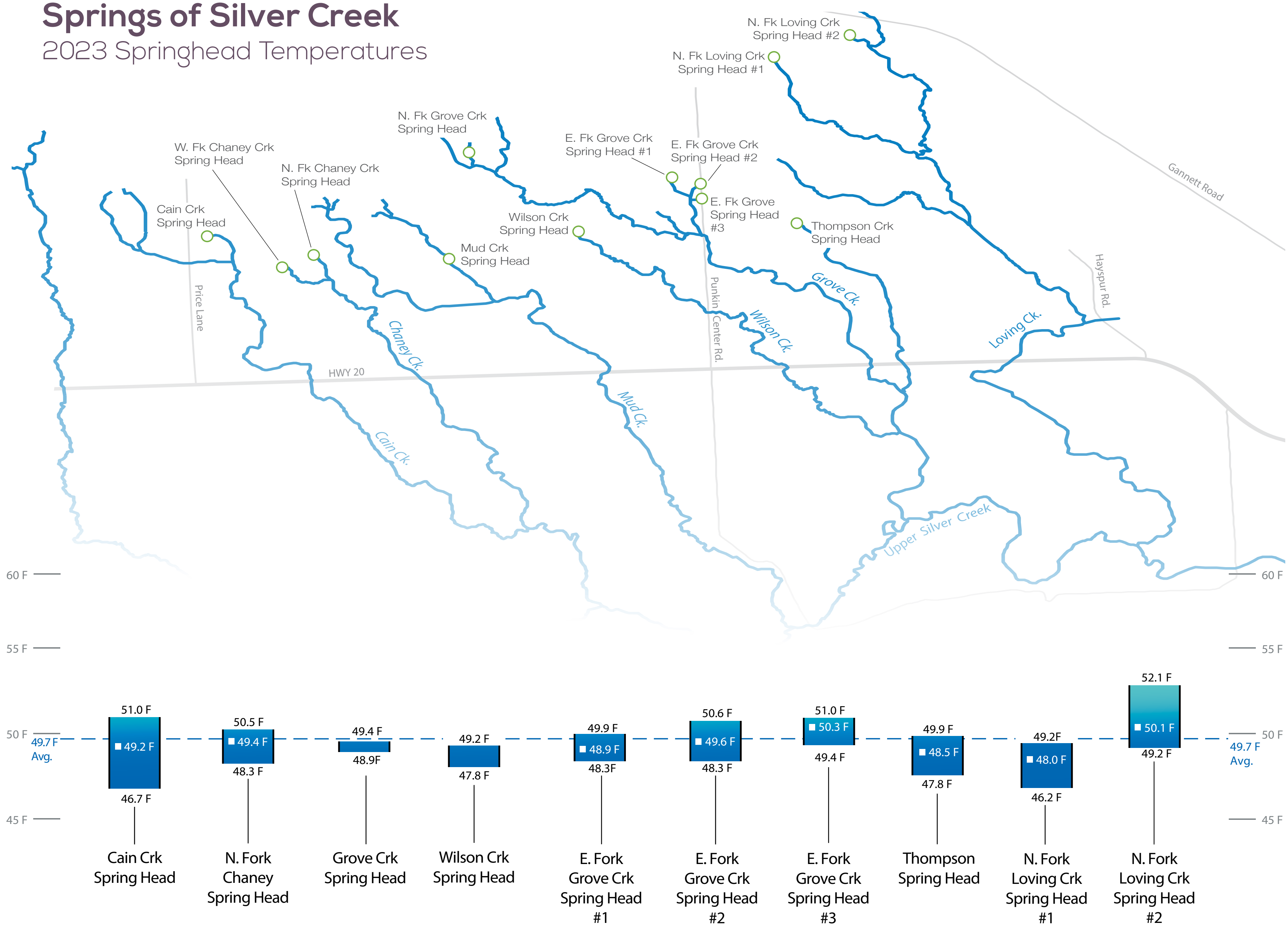
In 2016, we found in our analysis of stream temperature that the relationship between stream temperature and stream flows was more closely related than the relationship between stream temperature and ambient air temperature. While it is unclear if the relationship between stream flows and stream temperatures remains the case today, the three years with the fewest average number of days that exceeded the 70°F temperature during the period of record, 8 days in 2017, 5.1 days in 2019, and 6.4 days in 2023, occurred during years with above average stream flows in the Silver Creek and Big Wood River systems.

The hydrology of Silver Creek basin consists of a complexly interconnected surface water - ground water system. Silver Creek rises from a series of springs in the Gannett area, south of Baseline Road, and flows south and eastward out of the basin.

These springs are formed as a result of recharge from snowmelt and runoff entering the groundwater system; by application of irrigation water in amounts in excess of consumptive use requirements of crops; and, upward pressure from the underlying artesian aquifer system. The artesian groundwater system contributes to the spring flow by means of upward leakage through the overlying sediments to the surface.

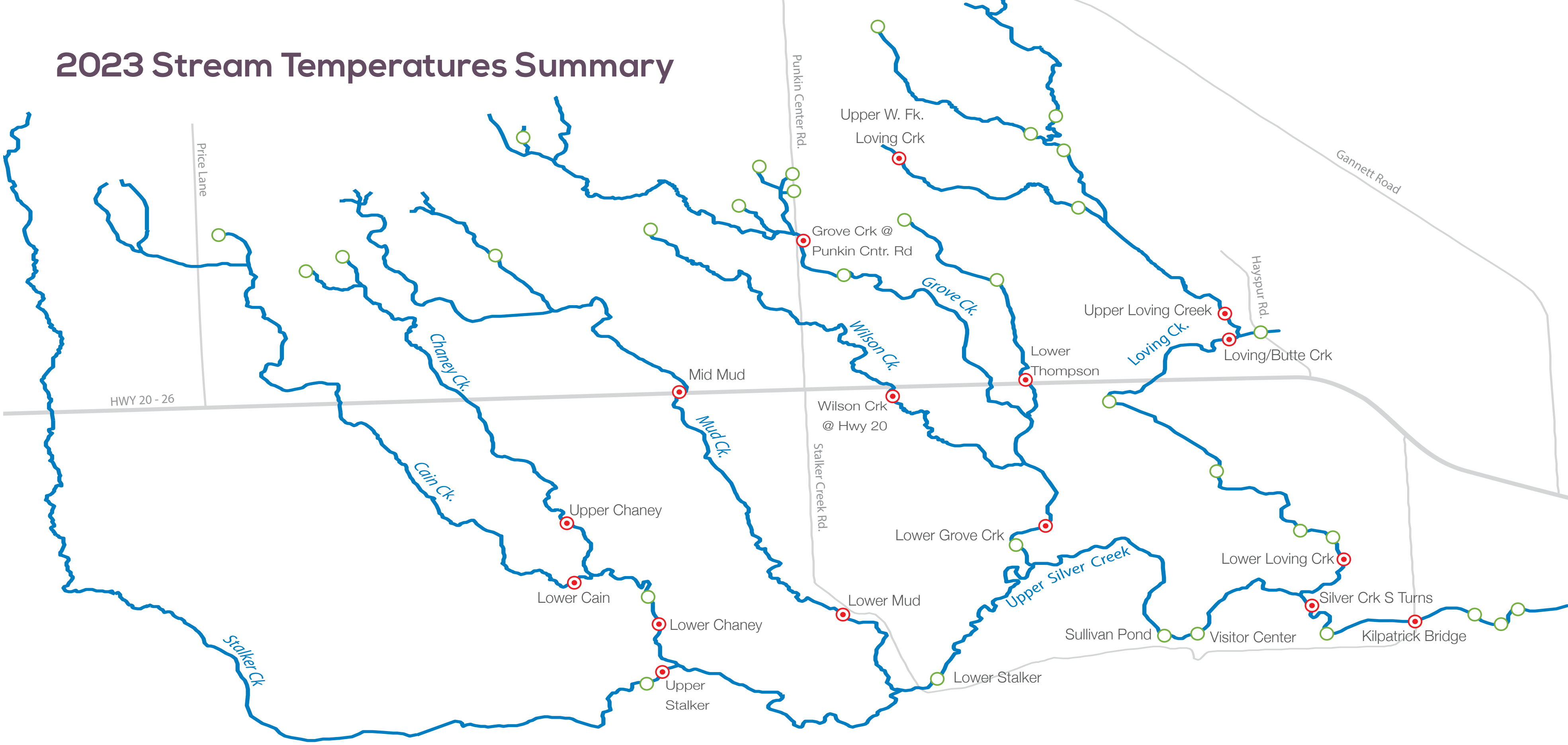
Springs of Silver Creek

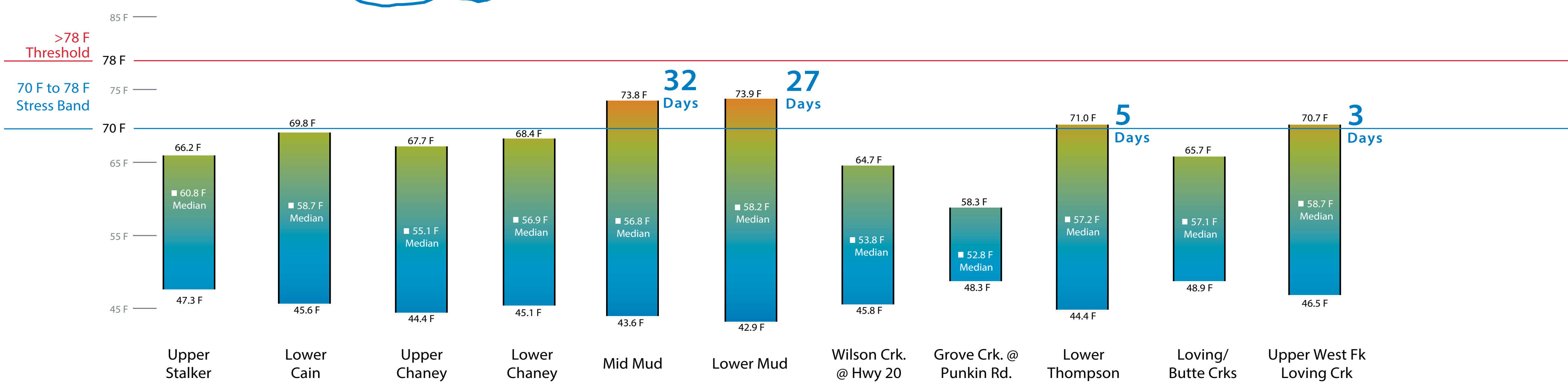
2023 Springhead Temperatures



Springhead Temperature Bands The above graphic depicts the summarized spring head temperature data for the entire summer season. The data were analyzed for the summer season to illustrate the spring temperatures that occurred for the period of June through September 2023. Each graph displays the total temperature range from June 1 to September 30; the absolute high and low temperatures are given, and the median water temperature is shown for that particular spring.

2023 Stream Temperatures Summary





▲ **Stream temperature bands** The above graphic depicts the summarized stream temperature data for the entire summer season for a selected group of data loggers and locations. The data were analyzed for the summer season to illustrate the high temperatures that occurred throughout the stream system for the period of June through the end of September 2023. Each graph displays the total temperature range for the period of record; the absolute high and low temperatures are given, and the median stream temperature is shown for that particular stream logger.

Locations of Stream Temperature Logger Array

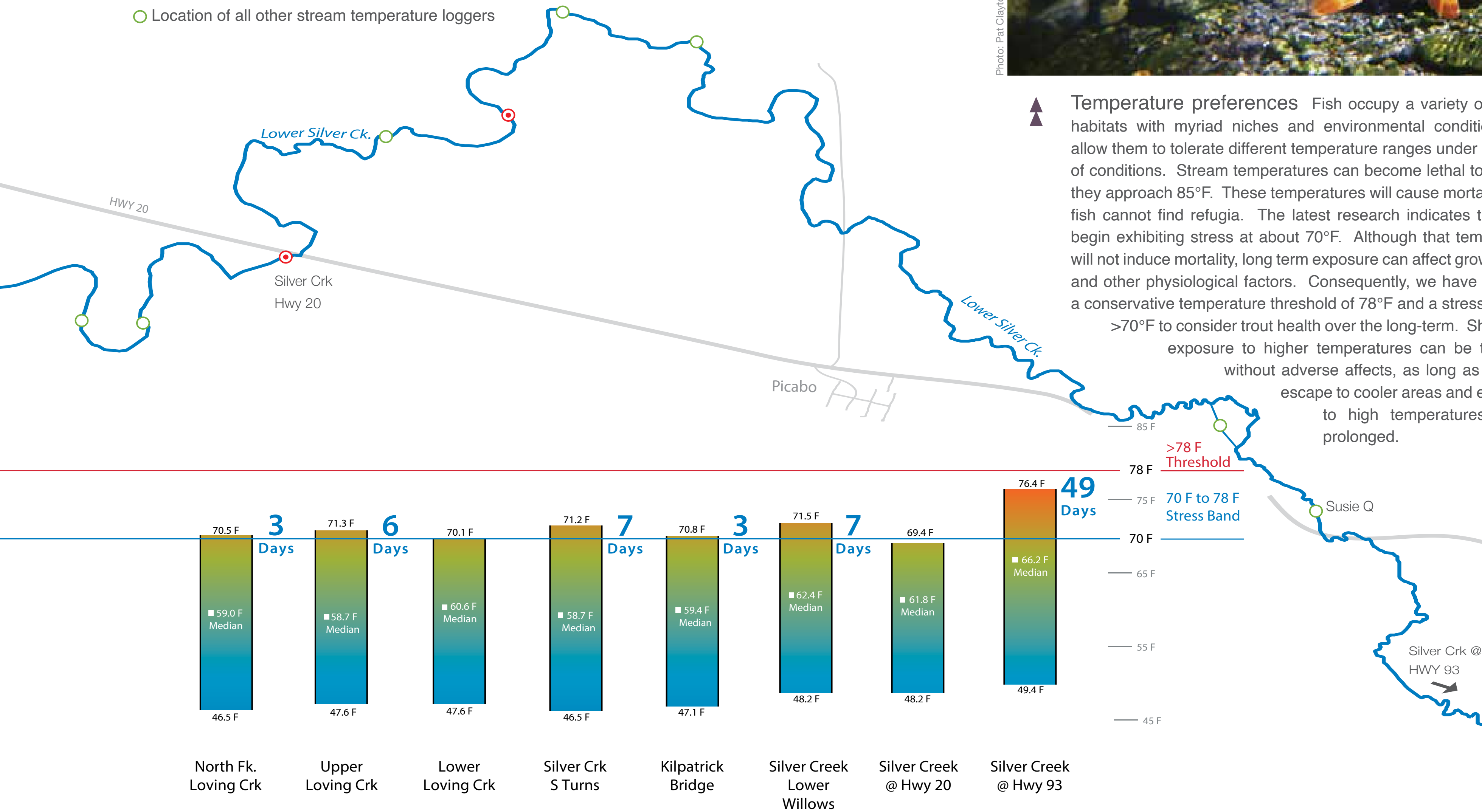
This map illustrates the Silver Creek stream and tributary system along with the locations of the stream temperature loggers. The temperature loggers are expressed in two categories for discussion and analysis purposes:

⦿ Location of stream temperature loggers illustrated in bottom graphic of seasonal temperatures

○ Location of all other stream temperature loggers

Stream temperatures are logged continuously at one-hour intervals. The array of stream temperature loggers in the Silver Creek system is designed to capture temperature differences for each stream and tributary segment, from the spring source to Lower Silver Creek at the Highway 93 crossing.

Photo: Pat Clayton

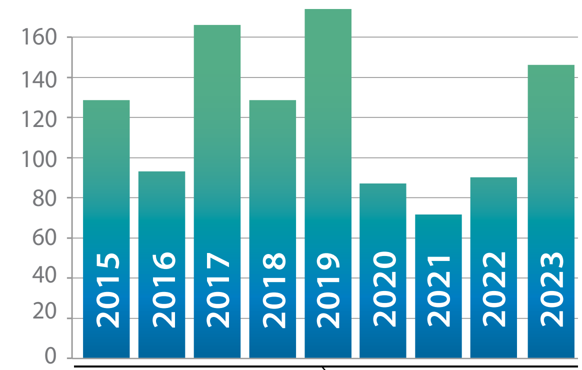


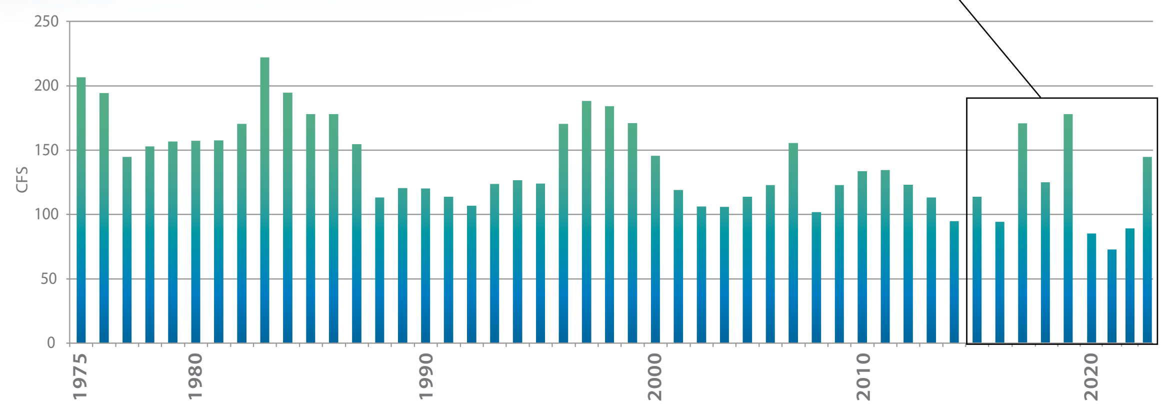
Temperature preferences Fish occupy a variety of stream habitats with myriad niches and environmental conditions that allow them to tolerate different temperature ranges under a variety of conditions. Stream temperatures can become lethal to trout as they approach 85°F. These temperatures will cause mortality if the fish cannot find refugia. The latest research indicates that trout begin exhibiting stress at about 70°F. Although that temperature will not induce mortality, long term exposure can affect growth rates and other physiological factors. Consequently, we have selected a conservative temperature threshold of 78°F and a stress band of >70°F to consider trout health over the long-term. Short-term exposure to higher temperatures can be tolerated without adverse affects, as long as fish can escape to cooler areas and exposure to high temperatures is not prolonged.

The overall median temperatures throughout the summer were within the preference range for trout (around 55-60 degrees) in Chaney (55-57), Mud (57-58), Wilson (54), Grove (55-57), Thompson (57), Cain (59), the upper reaches of Loving Creek (59), North Fork Loving Creek (59), and S-Turns at Silver Creek (59). Stalker Creek (61) had a median temperature above 60°F. The number of days that temperatures were within the stress band for trout (70°F-78°F) decreased compared to measurements taken in 2022.

Stream Hydrology

Annual average streamflow (cfs) at USGS gage (Sportsman Access) 2015 - 2023.





Silver Creek annual average streamflow (cfs) at USGS gage (Sportsman Access) 1975 - 2023.

Monitoring stream flows is important, as it helps build our understanding of the volume and origin of water entering Silver Creek's tributaries and its potential influence on water temperature, dissolved oxygen, and other water quality parameters.

Total annual discharge at Sportsman's Access in 2023 was above average and flows were near the 30-year average. Silver Creek's tributaries varied slightly but in general were above average in flows recorded since 2019. It was an above average water year for Silver Creek and its tributaries. The Big Wood River had an above average annual discharge in 2023.

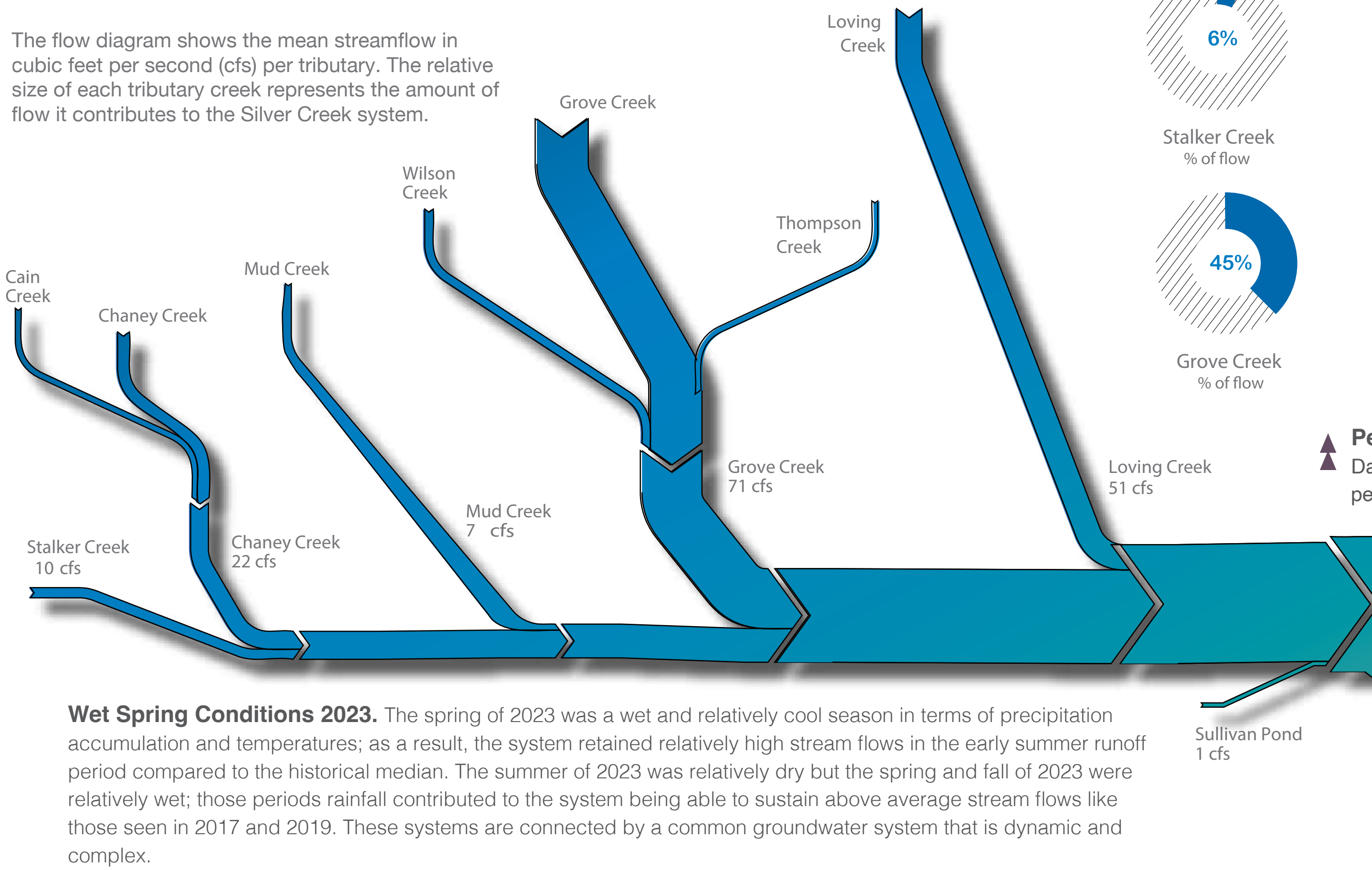
Big Wood River Average Annual Discharge at Hailey gage (cfs):

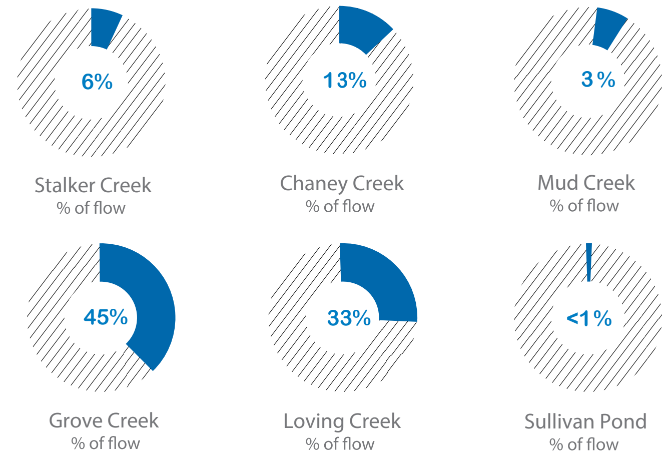
2017	**1,003.0**
2018	**478.6**
2019	**598.9**
2020	**253.9**
2021	**188.2**
2022	**331.1**
2023	**689.6**

The 2023 water year resulted in above-average flows in the Big Wood River, as well as above-average flows in Silver Creek and its tributaries. Stream flows in the Big Wood River at Hailey in 2023 were the highest they've been since 2017, and close to the flows seen in 2019. This is likely due to a cold, wet spring that brought snowpack levels in the basin from below average in March 2023 to above average in April 2023. In addition, the region saw much rainfall in the basin in the months of April and May.

2023 Streamflow

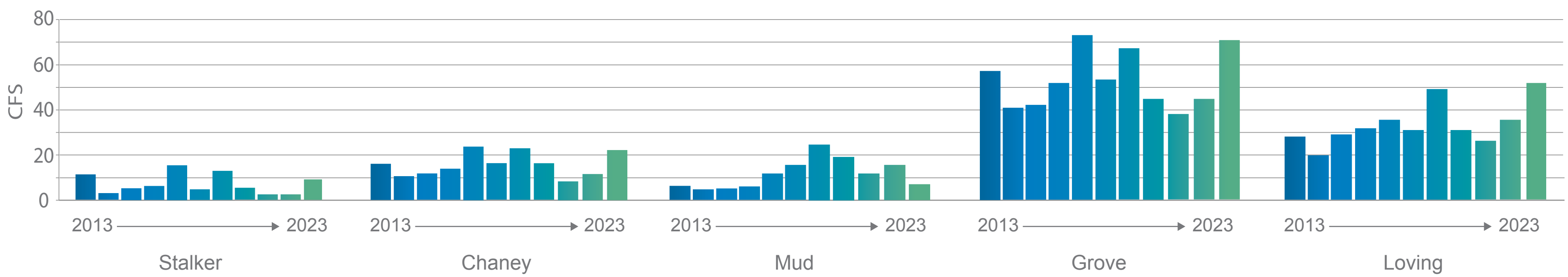
The flow diagram shows the mean streamflow in cubic feet per second (cfs) per tributary. The relative size of each tributary creek represents the amount of flow it contributes to the Silver Creek system.





Percent of Flow Contribution by Creek. Data collected in 2023 indicates each creek's cfs and percent contribution of Silver Creek's flow.

Wet Spring Conditions 2023. The spring of 2023 was a wet and relatively cool season in terms of precipitation accumulation and temperatures; as a result, the system retained relatively high stream flows in the early summer runoff period compared to the historical median. The summer of 2023 was relatively dry but the spring and fall of 2023 were relatively wet; those periods rainfall contributed to the system being able to sustain above average stream flows like those seen in 2017 and 2019. These systems are connected by a common groundwater system that is dynamic and complex.



Annual average streamflow by creek for 2013-2023. Data collected from 2013 - 2023 shows each creek's average flow. Recent decreases in overall streamflow affects many critical components of the aquatic ecosystem. Measurements were not continuous, but were distributed throughout the spring, summer, and fall.

Dissolved Oxygen

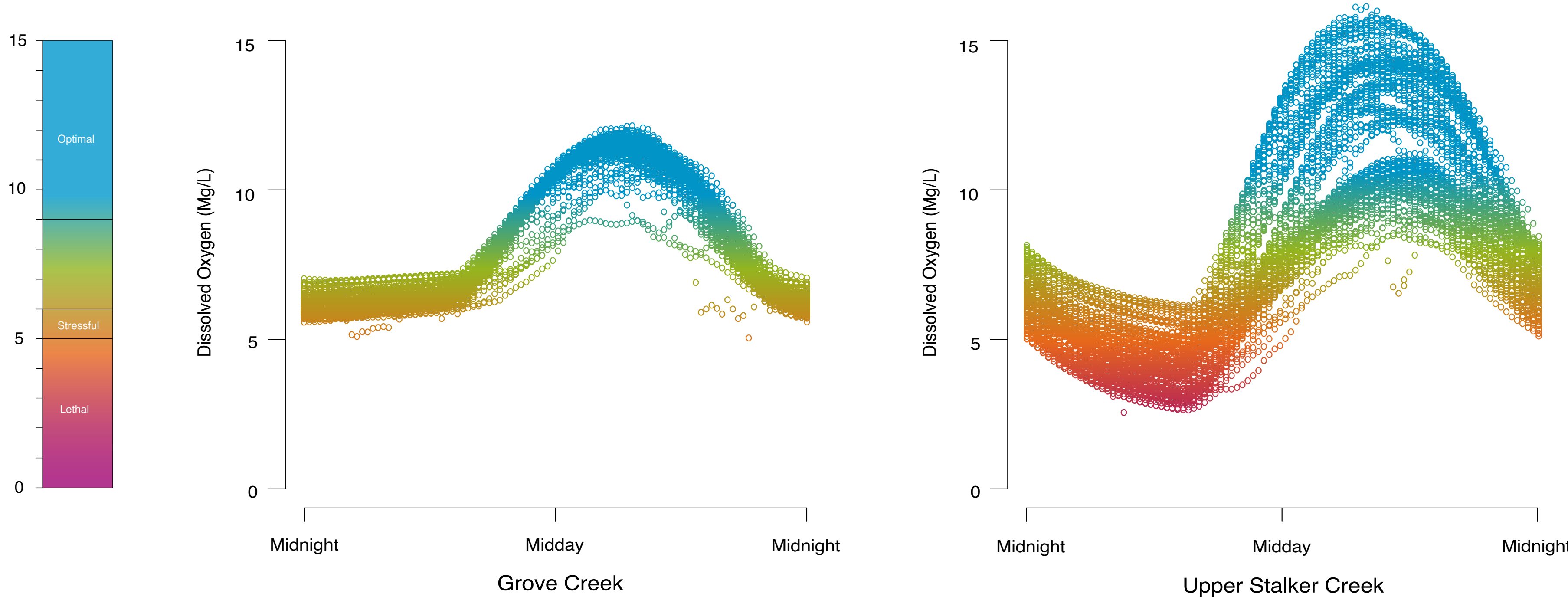
Since 2017, dissolved oxygen (DO) has been measured continuously from June through September at 7 sites. Data is recorded using optical sensors that record DO and temperature values every 15 minutes.

Similar to past year's results, the data indicated that not all of Silver Creek's waterways exhibit the same pattern of DO values and that DO levels stress fish in certain locations at certain times of the day. Seasonal fluctuations also occur, as changes in sunlight, temperature, streamflow, and aquatic plant growth vary throughout the year.

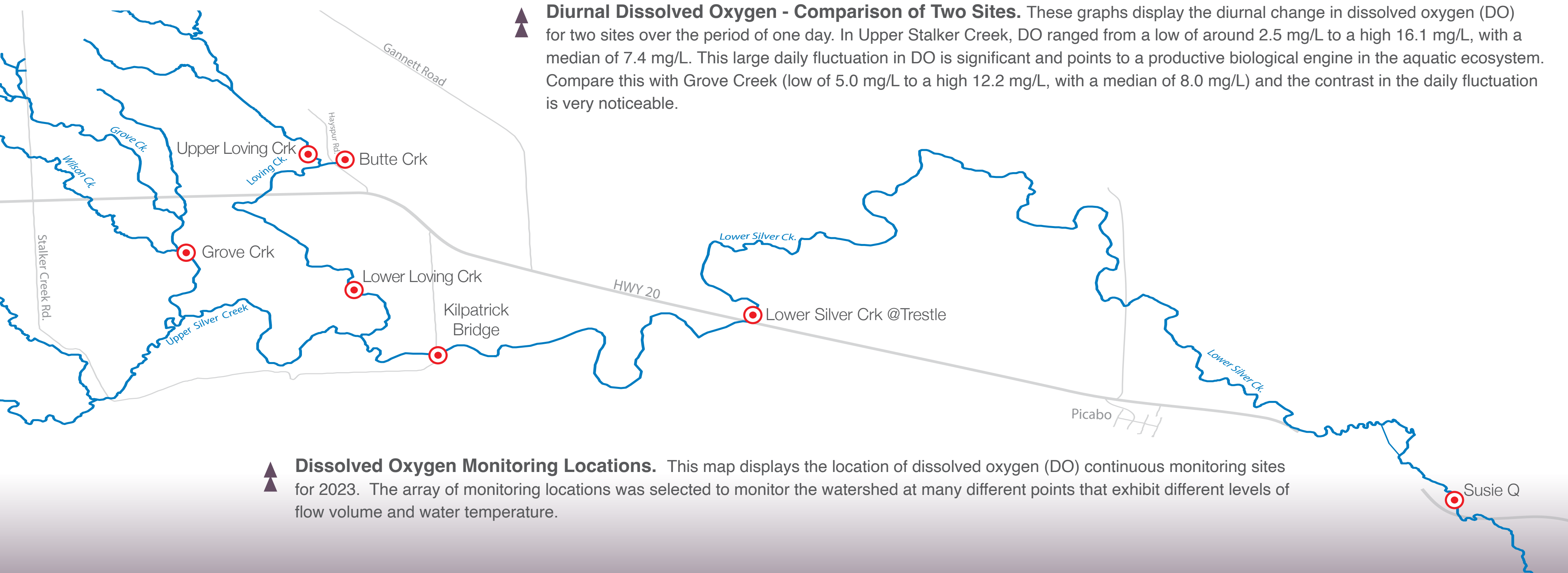
In many areas within the Silver Creek system, the daily fluctuations in DO are significant, which points to a productive biological engine in the aquatic ecosystem. As aquatic plants within the stream utilize light from the sun to grow (a process known as photosynthesis), oxygen is produced as a by product and released as DO. This process results in increased DO levels during the afternoon and decreased DO levels from the evening-to-morning hours.

Aquatic plants do, however, continue to respire oxygen overnight without photosynthesis occurring. This part of the process requires oxygen (i.e., biological oxygen demand), which is taken directly from the water. The process causes DO levels to fluctuate throughout the day and exhibits a distinct diurnal cycle. As shown by the diurnal graphs presented, not all cycles are the same. The sensor placed at Grove Creek exhibits much different diurnal characteristics as compared to the Upper Stalker Creek location. Despite their proximity in geographic space, their DO levels vary significantly (see diurnal plots on the facing page). This is due to a combination of factors, including streamflow magnitude, temperature, nutrient concentrations, and aquatic plant life, among others.

When DO readings fall into the stressful range for fish, they will seek refuge in areas that have higher DO concentrations. Fish eggs, which are often buried within gravel substrate in the streambed, lack the mobility to escape these conditions. At the selected sites, 25% of all measurements made were between stressful to lethal levels for fish and their eggs (1st quartile at Suzie Q: 5.8 mg/L; Butte: 4.5 mg/L; Lower SC at the Trestle: 5.4 mg/L). The seasonal graphs present all the data points that were taken during the 2023 season.

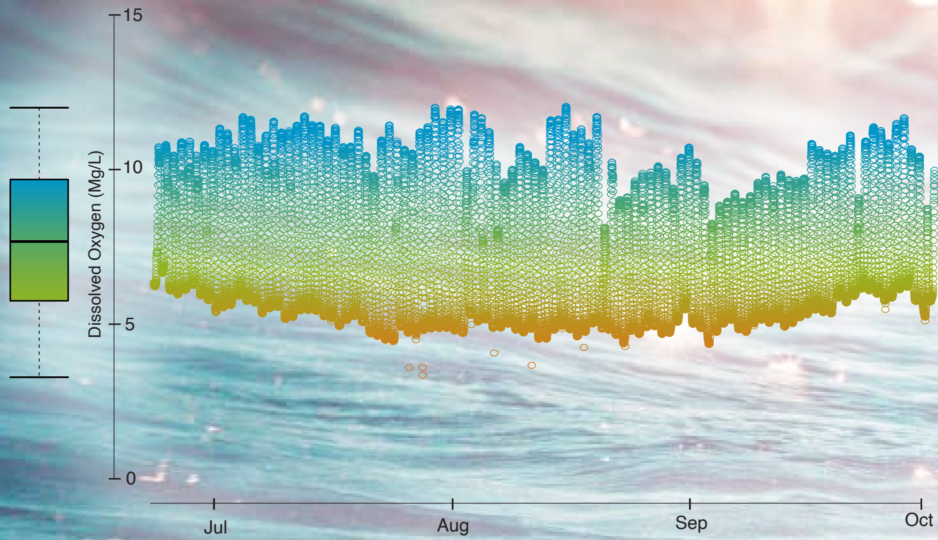


Diurnal Dissolved Oxygen - Comparison of Two Sites. These graphs display the diurnal change in dissolved oxygen (DO) for two sites over the period of one day. In Upper Stalker Creek, DO ranged from a low of around 2.5 mg/L to a high 16.1 mg/L, with a median of 7.4 mg/L. This large daily fluctuation in DO is significant and points to a productive biological engine in the aquatic ecosystem. Compare this with Grove Creek (low of 5.0 mg/L to a high 12.2 mg/L, with a median of 8.0 mg/L) and the contrast in the daily fluctuation is very noticeable.

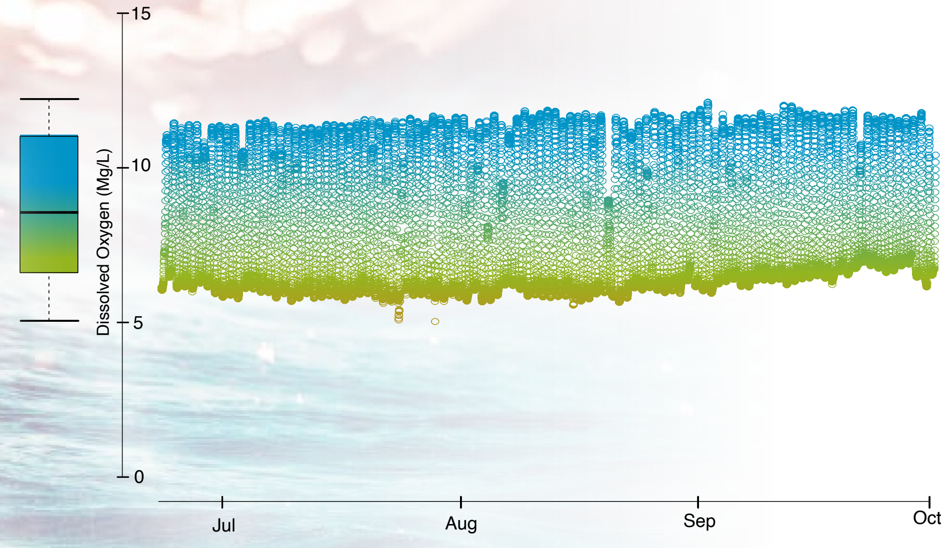


Dissolved Oxygen Monitoring Locations. This map displays the location of dissolved oxygen (DO) continuous monitoring sites for 2023. The array of monitoring locations was selected to monitor the watershed at many different points that exhibit different levels of flow volume and water temperature.

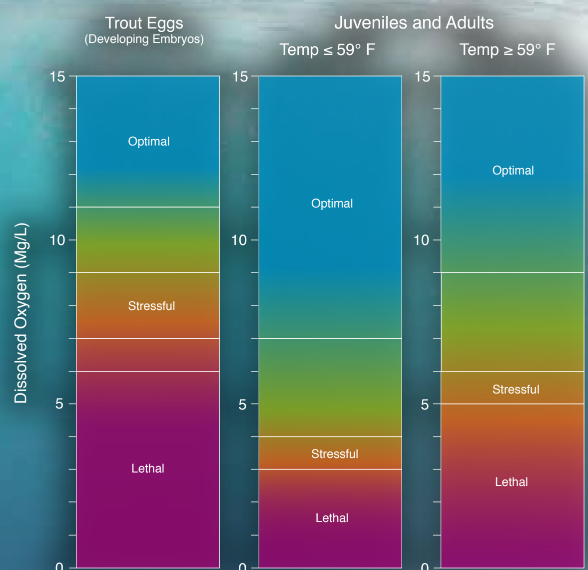
Dissolved Oxygen Results



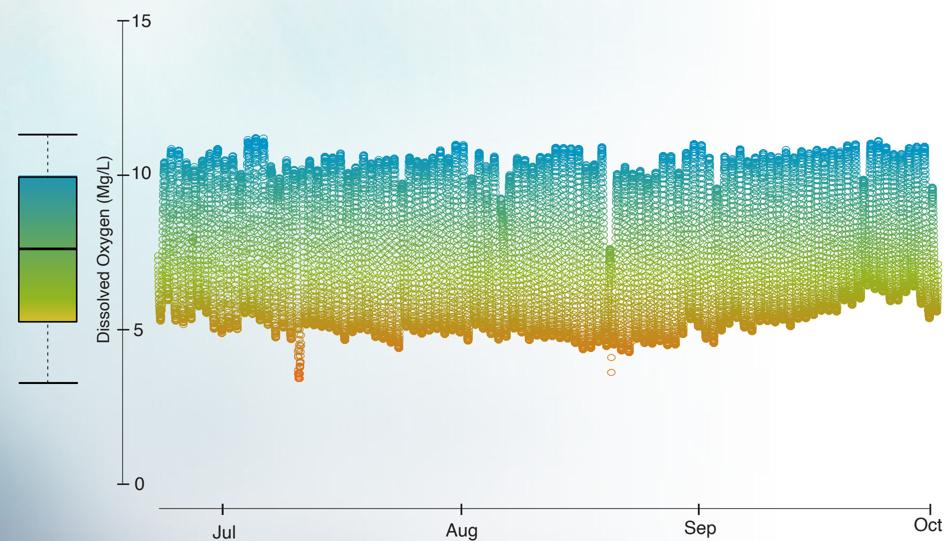
Upper Loving Creek



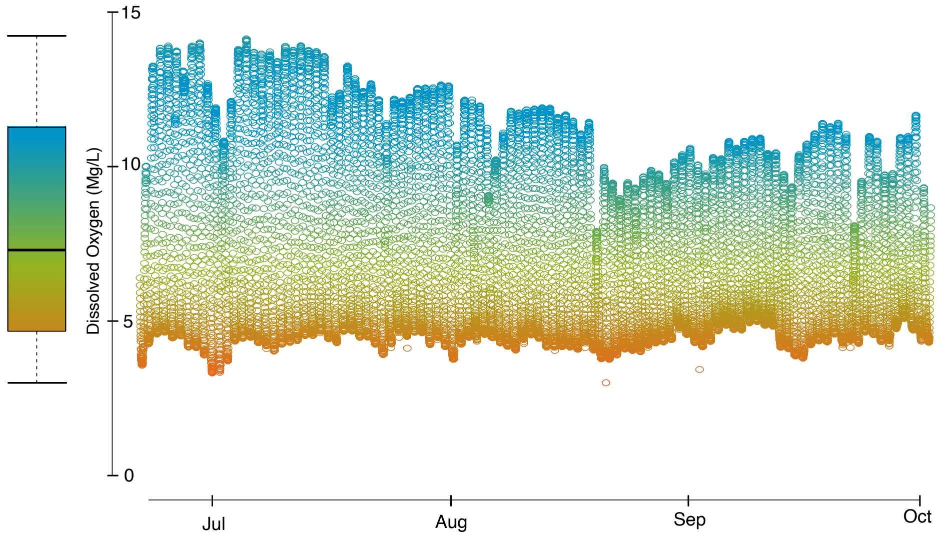
Grove Creek



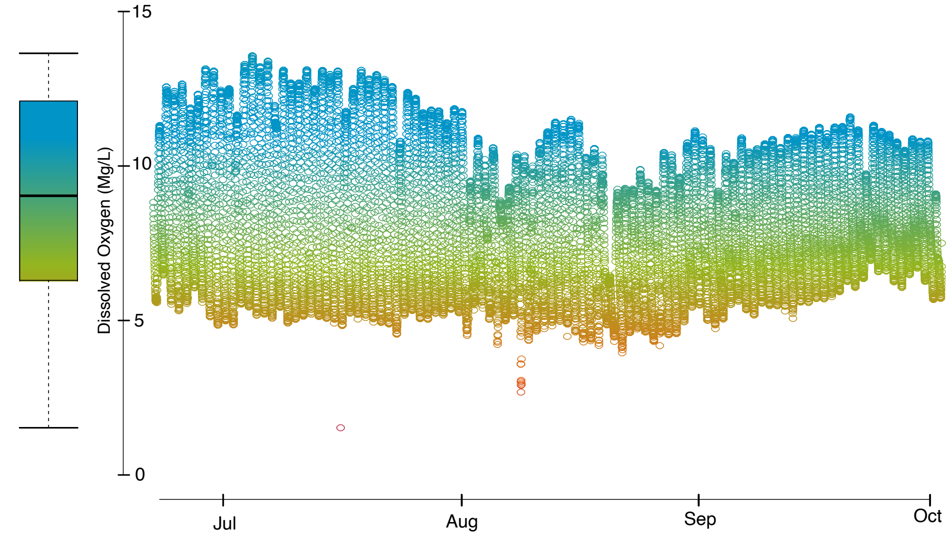
Average Dissolved Oxygen Requirements for Salmonids. Trout, depending on their particular life stage (egg, Juvenile, Adult), have differing requirements and thresholds for dissolved oxygen levels. Water temperature also plays a major role in dissolved oxygen levels. (Adapted from EPA's Chapman, 1986, and USFWS's Raleigh et al 1984, and Raleigh et al 1996).



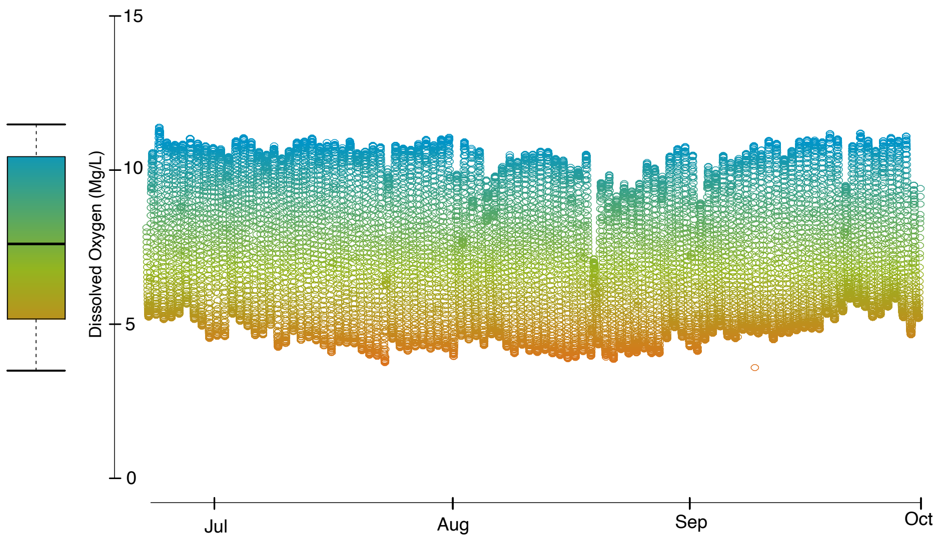
Kilpatrick Bridge Silver Creek



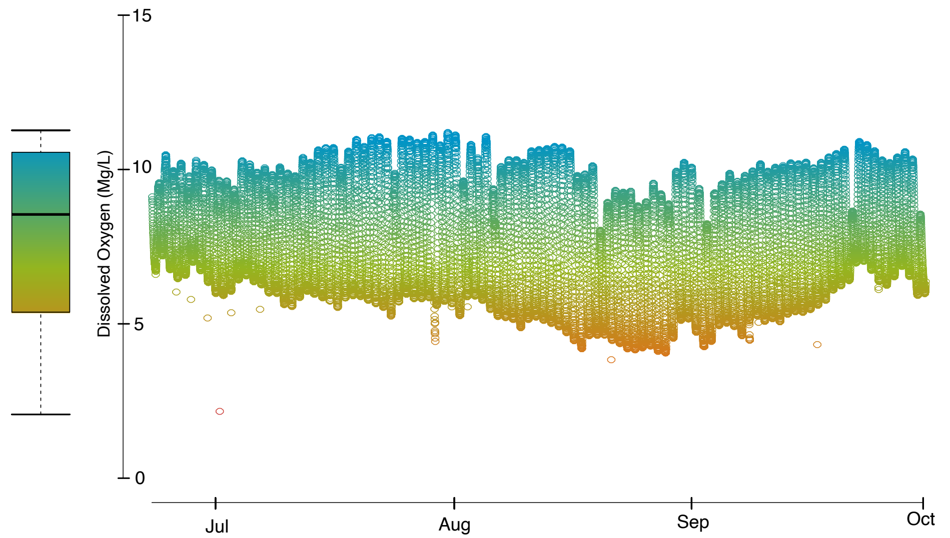
Butte Creek



Lower Silver Creek at Trestle



Lower Loving Creek



Susie Q

Big Wood River Groundwater Management Area

Since 1991, with the creation of the Big Wood River Groundwater Management Area (BWRGWMA), regulatory agencies and stakeholders have recognized that the surface and ground waters of the Big Wood River drainage are interconnected and complex. Due to diminishing surface water flows from groundwater diversions, the Idaho Department of Water Resources (IDWR) restricted the approval of new groundwater appropriations for non-consumptive uses unless a new application could show an ability to mitigate for depletions that would injure senior water users. The restrictions minimized new depletions within the BWRGMWA, but concerns from stakeholders over the relationship between surface and ground water interactions in the Big Wood River drainage continued over the ensuing years.

In order to better understand the complexity of surface and ground water interactions in the Big Wood River drainage, a number of initiatives were undertaken by various agencies and stakeholders to address knowledge gaps. Examples include an expansion of the existing hydrological monitoring network in the Wood River Valley, the development of a groundwater flow model for the Wood River Valley, and the creation of two distinct groundwater

monitoring districts within the Wood River Valley—the Galena Groundwater District (GGWD) and the South Valley Groundwater District (SVGWD). These efforts led to the drafting of a BWRGWMA groundwater management plan, which was created by the GGWD and the SVGWD and submitted to IDWR in 2020. An advisory committee was formed later that year to evaluate the various management options proposed in the draft BWRGWMA groundwater management plan.

Severe drought conditions in 2021 caused water supply shortages to occur in the Big Wood River drainage. Junior groundwater users in the SVGWD were ordered to curtail their use to increase water supply to senior water rights holders in the Silver Creek and Little Wood River drainages. Following the curtailment, the advisory committee and IDWR approved the BWRGWMA groundwater management plan. Its primary goal is, "to manage the effects of groundwater withdrawals on the aquifers from which the withdrawals are made and any other hydraulically connected sources of water." In practice, the plan will ensure that a four-day moving average streamflow of 32 cfs is maintained from May 1 through September 30 at the Station 10 stream gage on the Little Wood River near Richfield.

Through such actions, and in conjunction with a continuation of meetings on surface water and groundwater use, stream health in the Silver Creek drainage can be supported. This initial plan had a three-year time horizon and is only in effect through 2024.

A long-term management plan is currently being developed for the Big Wood River basin that would help to manage groundwater use and surface water availability for the next 15 to 20 years.

Additional Information on the BWRGWMA can be found at: **https://idwr.idaho.gov/water-rights/groundwater-management-areas/big-wood-ground-advisory-committee/**

Water Quantity & Water Quality Forecast Tools

Last year, we discussed the development of an interactive, online forecast for water quantity and quality modeling for Silver Creek, Camas Creek and Big Wood River. Ecosystem Sciences Foundation, in conjunction with lead partners at Boise State University, and Montana State University, worked on developing the model tools and interface. The forecast tools are designed to anticipate stream flow volumes at four locations in the watershed; Big Wood River at Stanton Crossing and Hailey, Camas Creek, and Silver Creek. The tools also facilitate and inform strategies to anticipate late summer streamflows and mitigate associated impacts on aquatic health in the watershed.

The interactive interface, called the Wood River Dashboard, was launched in the Spring of 2024. It is now available through Boise State University at:

http://redi.boisestate.edu/data-services/wr-tools/

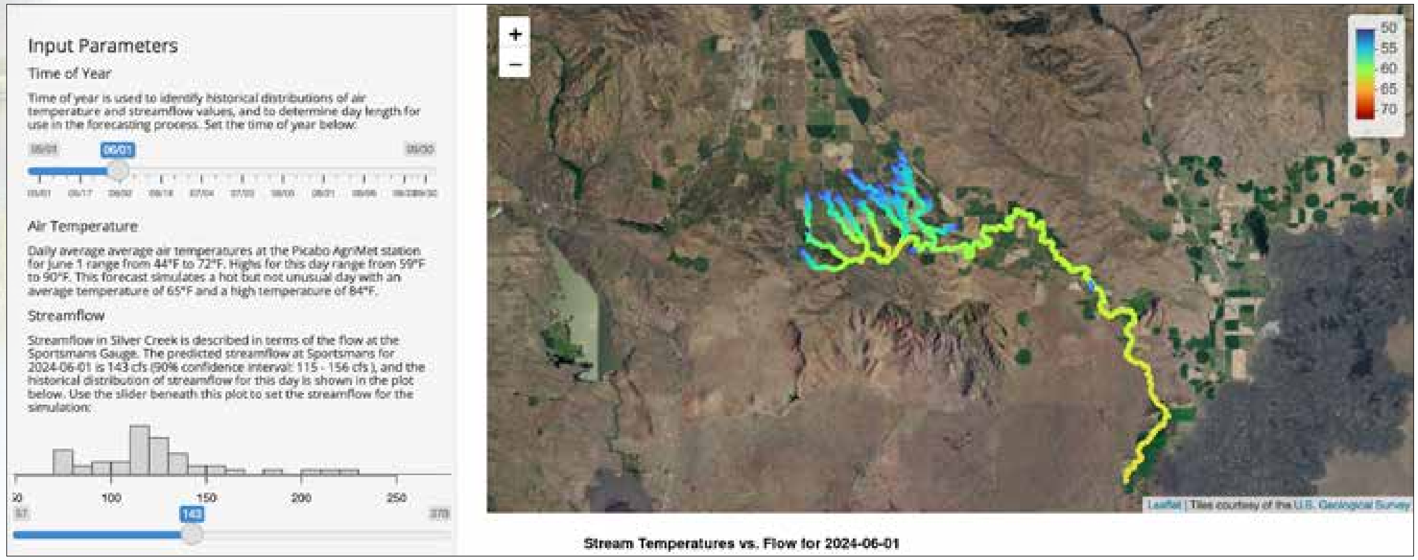
The dashboard displays current forecasts of total streamflow volume in irrigation season, as well as an interactive model of the relationships between streamflow and stream temperature. The Wood River Dashboard includes a set of tools to visualize observational data and modeling output in the Big Wood River Basin. The dashboard integrates data from a range of sources and provides timely information that may be used to inform water management in the basin, including thirteen years of temperature and dissolved oxygen data collected by Ecosystem Sciences Foundation. The tools in the Wood River Dashboard provide real-time forecasts of the upcoming irrigation season streamflow volumes.

The water quality tools in the dashboard are focused on stream health in Silver Creek as it pertains to the trout fishery. Maintaining adequate late summer flows in Silver Creek is a major goal for stakeholders in the basin and the outcomes of this work will help to manage water resources for multiple benefits.

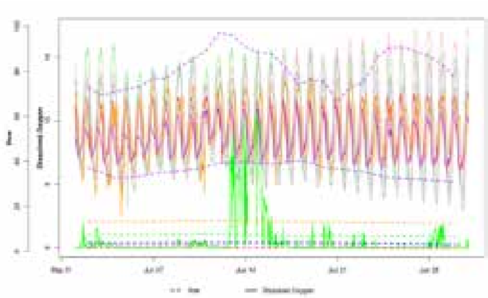
The Big Wood River Dashboard

An interactive set of tools to visualize observational data and modelling output in the Big Wood River Basin and Silver Creek.

This integrates data from a range of sources and provides timely information that may be used to inform water management in the basin. Use the toolbar at the top of the page to select the data or information category of interest, and you'll be directed to a dynamic graph for visualization.



Water Quality tools / Forecasting. The Water Quality Tools are focused on stream health in Silver Creek as it pertains to the fishery.



Data Explorer. Allows access into the datasets behind these models and the ability to explore changes over time.

Streamflow Forecasting. The Big Wood Streamflow Tools provide real-time forecasts of the irrigation season streamflow volumes on the Big Wood River at Hailey and Stanton Crossing, Camas Creek, and Silver Creek.

Stream Restoration & Riparian Buffer Zones

Conditions in the Silver Creek watershed have changed over the decades, resulting in many of the observed impacts that now adversely affect aquatic habitat. The magnitude of impacts relative to the rates of "natural" recovery suggest that habitat is unlikely to be repaired by natural stream evolution within the foreseeable future (i.e., many decades). To restore the fishery's high quality, and accessible habitat for all life stages, channel restoration is needed to improve conditions by building new habitat (active restoration) and/or accelerating the stream's ability to naturally repair itself and create new habitat (passive restoration).

Other than human influence, Silver Creek functions like most other spring-fed streams that are highly stable and exhibit very slow rates of natural recovery. It is apparent that improving habitat conditions for wild trout in the foreseeable future will require active restoration actions including narrowing over-widened channel segments, adding woody debris and other forms of in-stream structure, creating more sinuous channels, and reducing fine sediment deposition.

An often overlooked component to successful stream restoration is implementing buffer zones along the stream riparian system. Buffered areas help to mitigate land use impacts to the stream. Riparian buffers filter sediment from runoff, reducing the amount of sediment in streams and can provide additional stream shading and habitat. There have been many stream restoration projects on Silver Creek over the years. To protect and enhance these very expensive investments stream buffers need to be considered and implemented. In the summer of 2024, ESF and partners will conduct an assessment and develop prioritized actions of stream buffer locations to protect and enhance recent stream restoration projects.

RECENT SILVER CREEK STREAM RESTORATION SITES //
For a full list and description of stream restoration on Silver Creek please see:
www.savesilvercreek.com

LOVING CREEK //LOVING CREEK RANCH, 2011

Key Features: increase stream flow, improve biodiversity, spawning habitat, wetland areas and water quality. Project is very effective. All goals met and exceeded. Approximate Stream length: 3,580 ft.

SILVER CREEK //KILPATRICK/PURDY POND-TNC/RR RANCH, 2014

Key Features: restoration to remove sediment, narrow stream with bank restoration and creation of islands to increase flow and sediment movement. Other purposes included deeper water for fish refuge, wetland diversity and enhanced angler experience. The project was widely received as successful. Water temperatures were reduced, and biodiversity was improved. Approximate stream length: 3,415 ft.

SILVER CREEK //RR RANCH - 2016, 2017, 2018-2021

Key Features: Sediment removal. Dredging project purpose was to remove sediment. No bank restoration. Project has improved stream substrate diversity and moderated thermal influence. Approximate stream length: 6,000 ft.

LOVING CREEK //AUBREY SPRINGS, 2022

Key Features: Restoration goals were to narrow the channel, remove sediment and enhance spawning and aquatic habitat. A robust riparian planting was completed in 2023. Approximate stream length: 2,595 ft

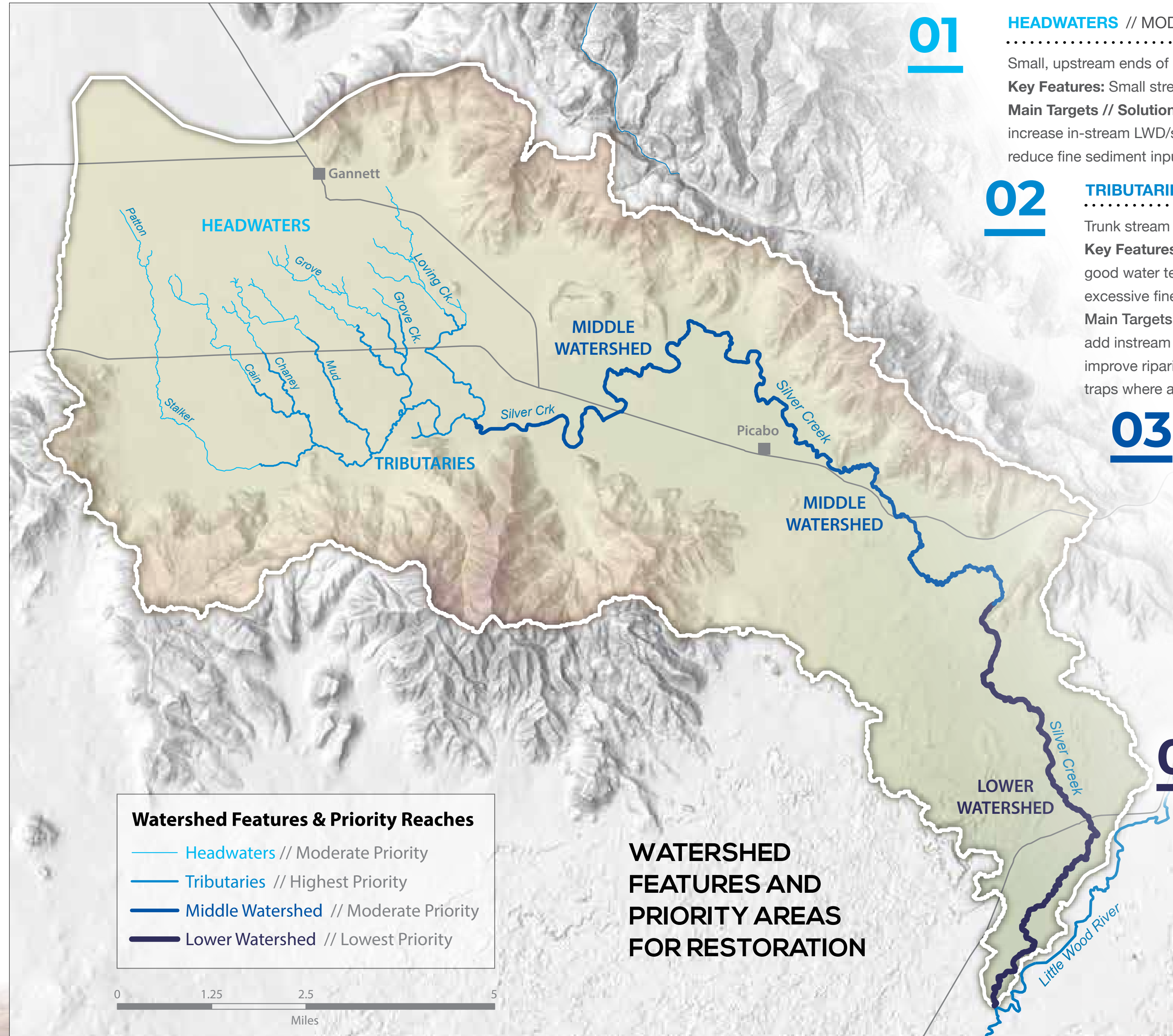
STALKER CREEK //CREEK RESTORATION TNC, 2022-2023

Key Features: Restoration target was to re-define the stream to a more functional system, narrow stream width and restore stream banks. The project reconstructed the pond area, removed sediment, and enhanced riparian areas. All goals met. Approximate stream length: 5,320 ft

LOVING CREEK //LOVING CREEK RANCH, 1995-PRESENT

Key Features: Project goals were to improve stream flows and sediment removal. Goals are met by removing sediment before it can be transported downstream. Approximate stream length: 2,405 ft

WATERSHED FEATURES AND PRIORITY AREAS FOR RESTORATION



01 HEADWATERS // MODERATE PRIORITY

Small, upstream ends of headwater tributaries.

Key Features: Small streams with mixed habitat and fish use potential.

Main Targets // Solutions: Increase sinuosity, reduce width-to-depth ratio, increase in-stream LWD/structure forcing constrictions and pools with cover, reduce fine sediment inputs. Increase riparian buffers and vegetation.

02 TRIBUTARIES // HIGHEST PRIORITY

Trunk stream of tributaries and Silver Creek Preserve.

Key Features: Over-widened, single-threaded channel, generally good water temperatures, high habitat connectivity, few pools, excessive fine sediment.

Main Targets // Solutions: Reduce stream width, increase sinuosity, add instream LWD/structure forcing constrictions and pools, improve riparian buffers and vegetation, and use ponds as sediment traps where appropriate.

03 MIDDLE WATERSHED // MODERATE PRIORITY

Main-stem Silver Creek from Preserve downstream to Priest Road (roughly 1 miles south of Hwy 20)

Key Features: Over-widened, single-threaded channel, poor summer water temperatures, many disconnected side channels, poor floodplain connection, poor riparian habitat.

Main Targets // Solutions: Reconnect relic side channels and habitat, reduce stream width, add LWD/structure forcing constrictions and pools with cover, improve riparian buffers and vegetation, use ponds as sediment traps where appropriate.

04 LOWER WATERSHED // LOWEST PRIORITY

From Priest Road downstream to the confluence with the Little Wood River.

Key Features: Confined valley with poor floodplain connection, high summer water temperatures, poor habitat connectivity.

Main Targets // Solutions: Low restoration potential, poor benefit-to-cost ratio, opportunities should focus on improving riparian buffers and vegetation and adding in-stream LWD/structure within existing channel.

Restoration objectives should focus on a sustainable, wild trout fishery by reducing over-widened and simplified channel forms, increasing in-stream hydraulic structural complexity, and improving riparian buffers.

A SUSTAINABLE, RESILIENT, WILD TROUT SPRING CREEK FISHERY

Next Steps

Stream Restoration

Stream restoration that balances water conservation values with agricultural land use is vital to the preservation of many aquatic species, and a healthy fishery. Stream restoration using natural channel design methods can be implemented to address these issues. Water conservation and stream restoration have become increasingly important to sustainable water resource management and finding equitable solutions that help reduce conflicts and solve complex economic and environmental problems. In the face of climate change, increased water demand and intensive land uses, adverse impacts to water quality and quantity are evident in Silver Creek. Among dwindling water supplies, competition for water has increased, especially within this arid watershed. Silver Creek has impaired stream and ecological function in many areas of the watershed that can be addressed through targeted restoration.

Silver Creek offers many opportunities to improve in-stream conditions and restore ecological integrity. Restoration goals should include: (1) reconstruction of self-maintaining and resilient streams that connect to historical floodplains and contain high-quality, diverse habitats; (2) creation of off-channel oxbow ponds and restoration of productive wetlands and riparian habitats; (3) raising the groundwater table to improve subsurface saturation conditions; (4) enhancement of hydrological connections and baseflows to maintain fish habitat and ecological functioning; and, (6) improvement of wild trout populations and increasing diversity of non-salmonid fish and benthic invertebrate species in stream reaches identified as problematic.

Riparian Buffers

Riparian buffer zones need to be evaluated as permanent solutions to address sediment reduction and removal. A field effort to collect data on the riparian buffer systems will help to prioritize areas that need improvement, protection and restoration.

Monitoring and Maintenance

Over the past 13 years, the Silver Creek Program has monitored stream hydrology, water temperature, sedimentation, and most recently dissolved oxygen. Combined, these parameters are indicators of ecosystem health—much like checking our own body temperature and circulatory system. Monitoring is paramount to understanding ecological processes and relationships, identifying trends and establishing effective strategies for enhancement. However, monitoring is a long-term scientific tool that must be done consistently over time; the more data collected, the more meaningful the results. As our monitoring program continues, it is necessary to periodically replace temperature sensors, redeploy DO sensors, and upgrade stream flow measurement equipment, all of which come at a capital cost. We are seeking additional funding to maintain our monitoring equipment to continue these important programs.

Funding

To continue our ongoing monitoring work and perform new analyses, as described above, our Silver Creek Program needs additional funding. Our program is heavily based on monitoring and data analysis; we have found that these activities alone are rarely funded through traditional grant programs. Please consider a donation to continue this important work.

A substantial volunteer effort goes into the Silver Creek program each year and your donations directly support the Program. Thank you for your support!

Please send donations to:

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2023

Silver Creek Annual Report

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