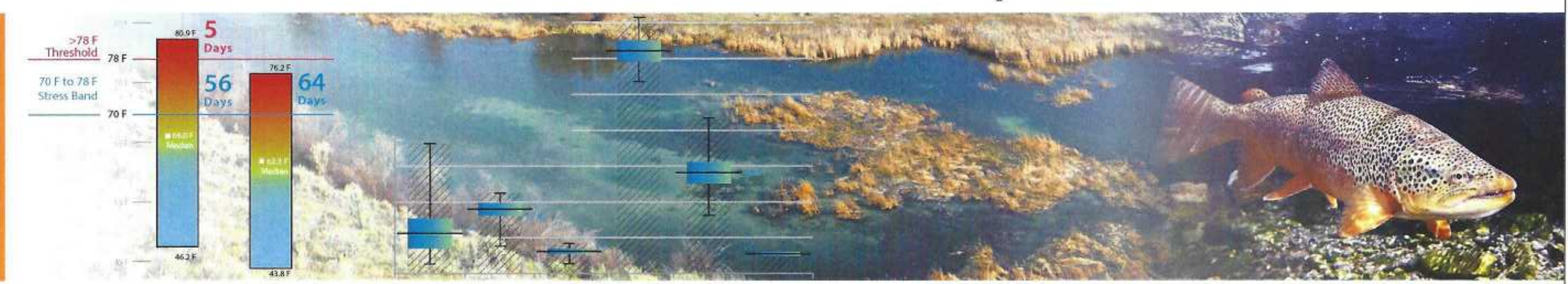
2014

Silver Creek Annual Report

Ecosystem Sciences Foundation



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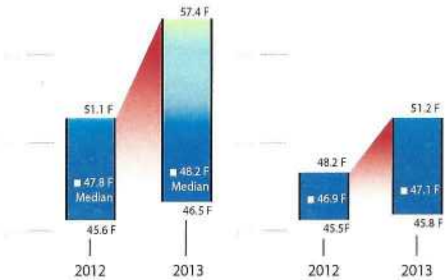

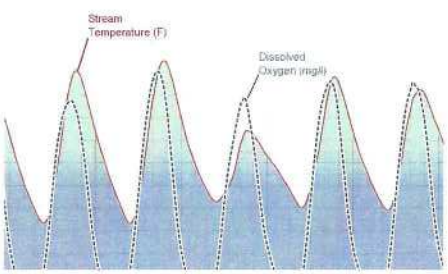

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2014 Report

Silver Creek Watershed

Since 2010, Ecosystem Sciences Foundation (ESF) has developed a better understanding of the Silver Creek Watershed through targeted monitoring. ESF developed a Restoration and Enhancement Strategy for the Silver Creek Watershed. The strategy identified numerous actions to be taken including filling critical data gaps on stream flow, temperature, and sediment conditions.

A logical outcome of the Silver Creek Watershed Enhancement Strategy was to implement monitoring to better understand the creeks and then develop effective management and restoration tools. This past year ESF and its partners made a significant effort to monitor the low stream flow conditions and the effect on the fishery and aquatic conditions.

Many of the numerous stream restoration projects which have been performed throughout the watershed have been on private land using private funds.

Landowners want stream reaches on their property to support a good fishery, to be ecologically functional, and to ensure that restoration investments already made are sustained. Additionally, landowners recognize that all of the streams in the watershed are maintained primarily by spring flows and irrigation water diverted from the Big Wood River into the Silver Creek system.

This report summarizes 2014 data for:

- **Spring Head Temperature**
- **Stream Temperature**
- **Stream Flow / Hydrology**
- **Dissolved Oxygen Levels**
- **Effects from Low Flow and Drought Conditions**

The significant conclusions and findings from 2014 are:

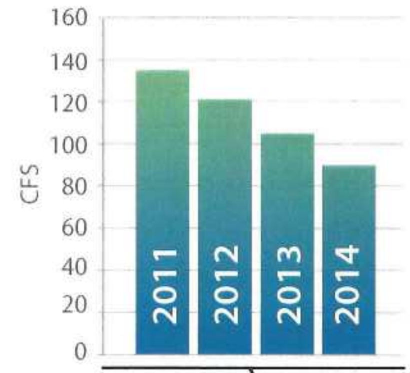
- Significantly reduced flows in all streams have had considerable impact on the ecosystem and aquatic species.
- Several creeks continue to exhibit high temperature above the threshold for trout.
- A four year comparison of stream temperatures shows marked increases in some stream reaches.
- An analysis of dissolved oxygen levels describes conditions that can negatively effect the fishery.
- 2014 exhibited stressful conditions related to flow, water quality and the effects on the fishery. If the trend in low flow continues to worsen an ecological tipping point will be reached with detrimental effects to the fishery.

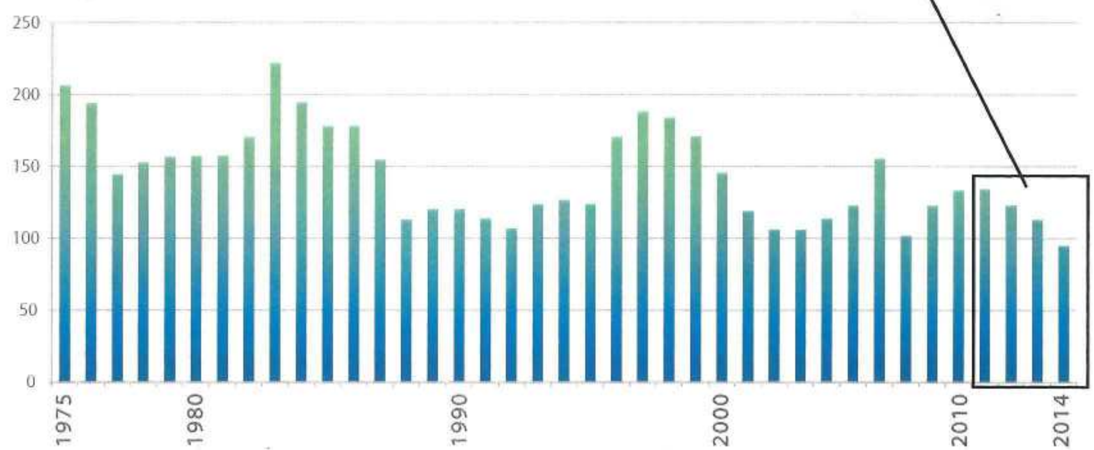
For more details please visit: www.savesilvercreek.com

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 a result of detailed, scientifically rigourous analysis, and reflects a considerable amount of field work to collect. The website has additional information on programs in the watershed, including raw and tabulated data.

Stream Hydrology

Annual average stream flows at USGS gage (Sportsmans Access) 1975 - 2014.





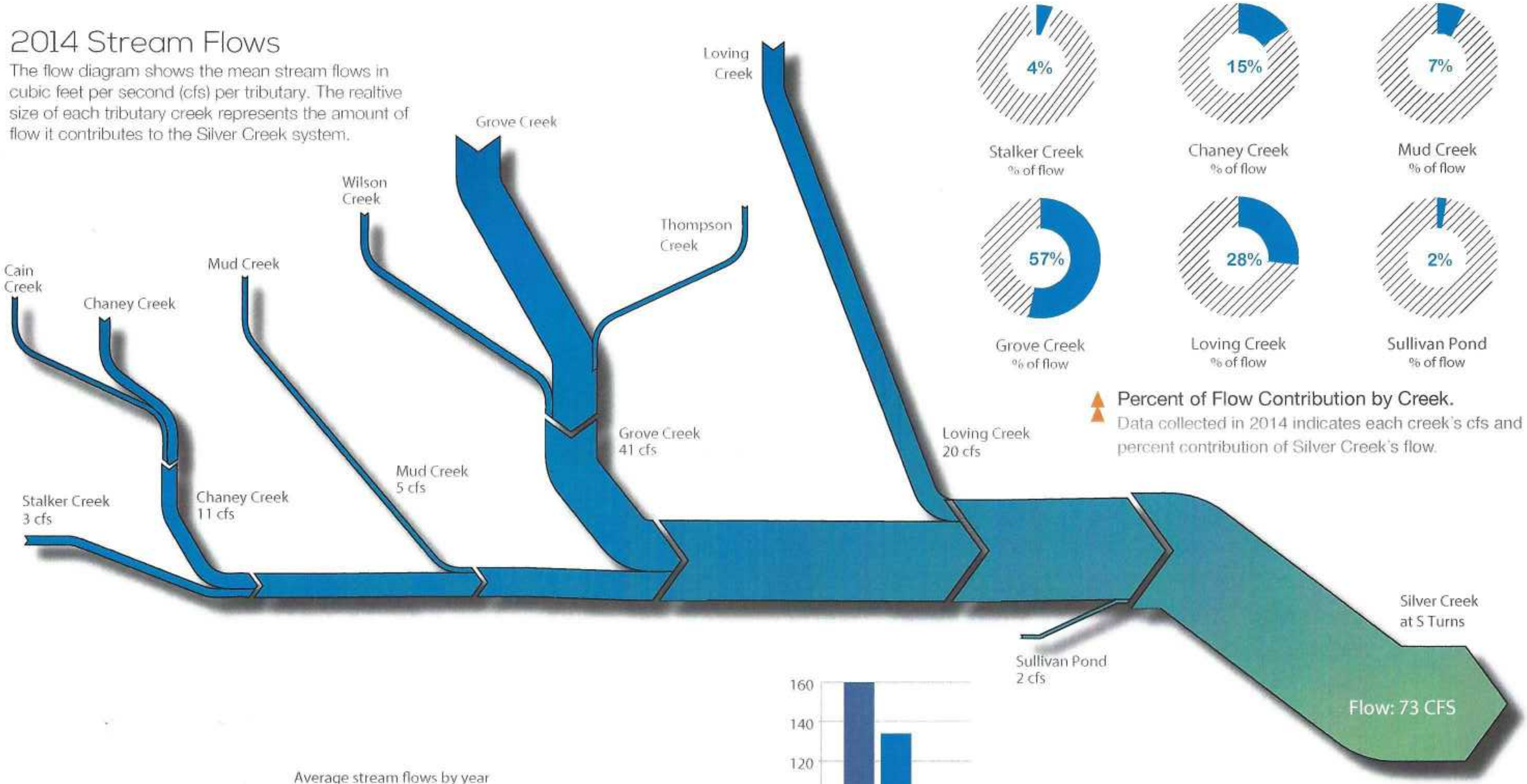
Understanding the hydrology of Silver Creek and its tributaries is fundamental to understanding how Silver Creek functions and what makes it such a special place. Before 2011, the flows in the major tributaries to Silver Creek had never been measured on a regular basis. In 2011, ESF initiated a surface flow monitoring program.

After three seasons of hydrology data on the tributaries, the characteristics of each creek are becoming clearer. In 2014, measurements were made on each of the major tributaries: Stalker, Chaney, Mud, Grove and Loving Creeks, as well as the S-turns site on Silver Creek.

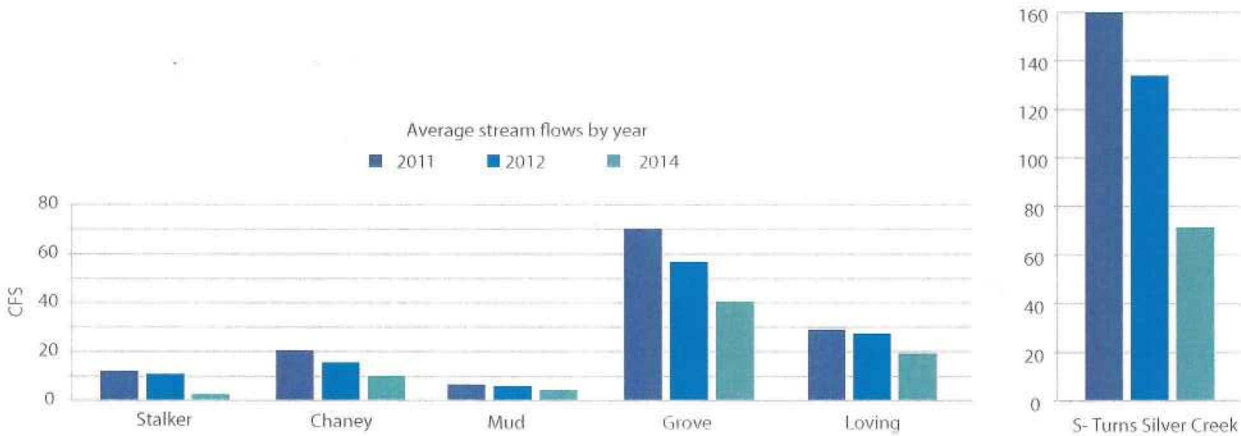
Based on the average annual discharge (cfs) at the USGS gage at Sportsman's Access, 2014 was the driest year for the period of record (1975-2014) at 95 cfs. Wet and dry cycles occur as part of the natural variation in climate, but many professionals believe that water use (both surface and groundwater, domestic and agricultural) and climate change could be exacerbating the lower flows in dry years. The three years prior to 2014 have been successively drier, ranking 20th (2011 -134cfs), 15th (2012 – 123cfs), and 7th (2013 – 114cfs) over the 39 year period. Climatic cycles are difficult to predict, variable, and impossible to control, but management of water can be controlled and Silver Creek could benefit from well thought out cooperative management and individual landowners choices.

2014 Stream Flows

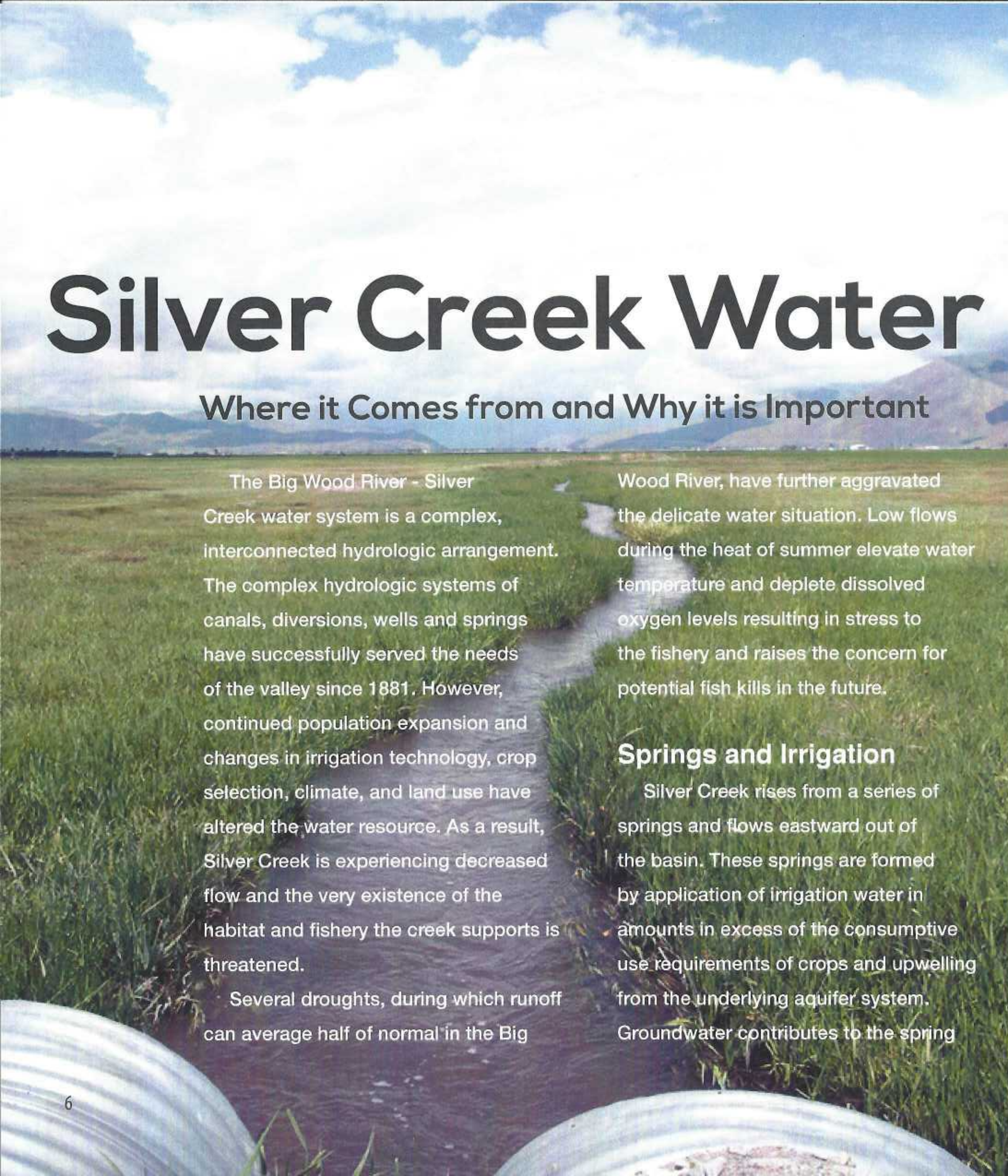
The flow diagram shows the mean stream flows in cubic feet per second (cfs) per tributary. The realtive size of each tributary creek represents the amount of flow it contributes to the Silver Creek system.



Percent of Flow Contribution by Creek. Data collected in 2014 indicates each creek's cfs and percent contribution of Silver Creek's flow.



Annual average stream flows by Creek for 2011, 2012 and 2014. Data collected in 2011, 2012 and 2014 indicates each creek's average flow. The reduction in flows throughout the Silver Creek system is significant. At the S-Turns site on Silver Creek there has been a 65% reduction in stream flow from 2011. The reduced stream flows effect many critical components of the aquatic ecosystem. Measurements were not continuous or systematic, but were distributed through the spring, summer and fall.



Silver Creek Water

Where it Comes from and Why it is Important

The Big Wood River - Silver Creek water system is a complex, interconnected hydrologic arrangement. The complex hydrologic systems of canals, diversions, wells and springs have successfully served the needs of the valley since 1881. However, continued population expansion and changes in irrigation technology, crop selection, climate, and land use have altered the water resource. As a result, Silver Creek is experiencing decreased flow and the very existence of the habitat and fishery the creek supports is threatened.

Several droughts, during which runoff can average half of normal in the Big Wood River, have further aggravated the delicate water situation. Low flows during the heat of summer elevate water temperature and deplete dissolved oxygen levels resulting in stress to the fishery and raises the concern for potential fish kills in the future.

Springs and Irrigation

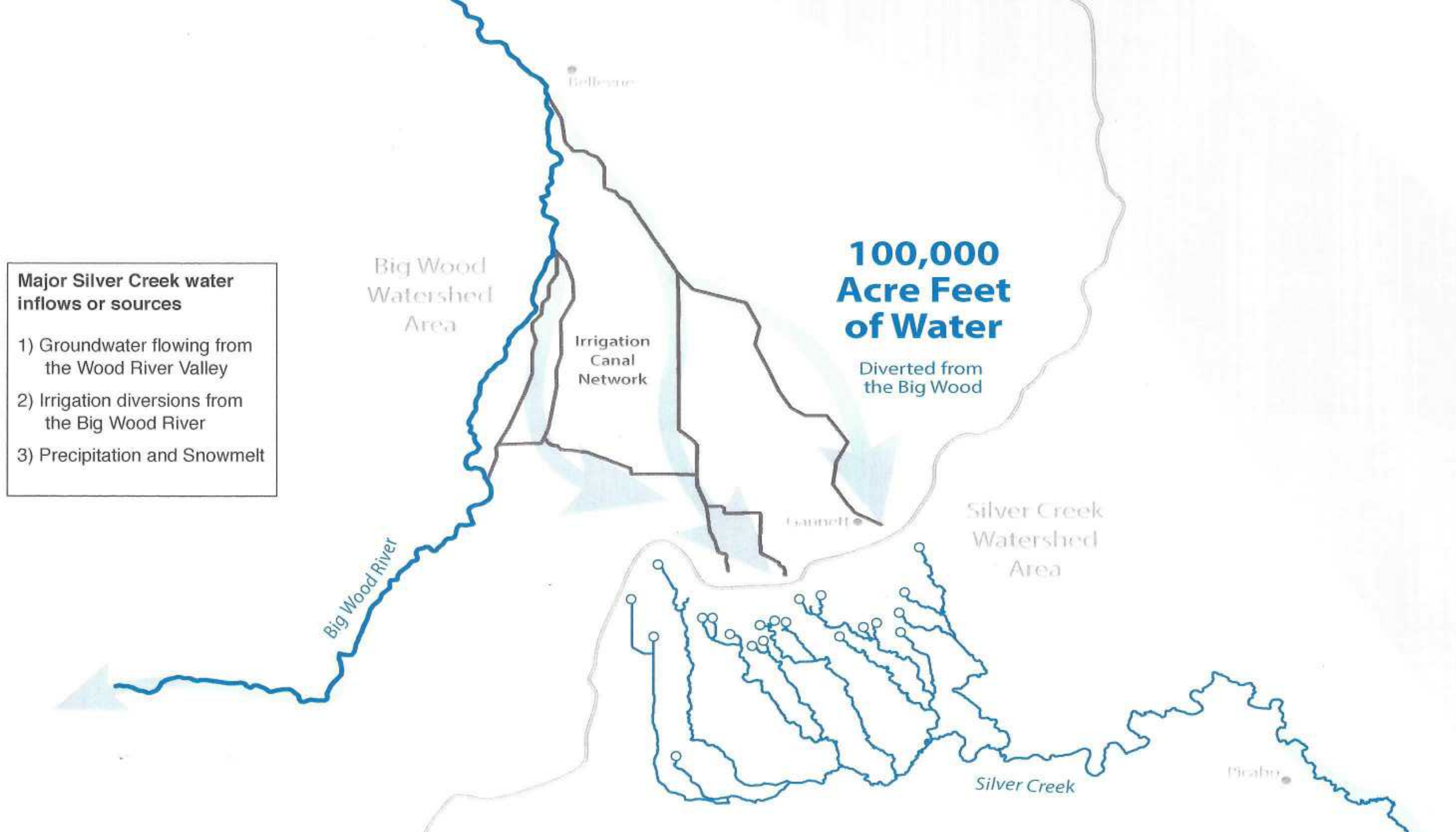
Silver Creek rises from a series of springs and flows eastward out of the basin. These springs are formed by application of irrigation water in amounts in excess of the consumptive use requirements of crops and upwelling from the underlying aquifer system. Groundwater contributes to the spring flow by means of upwelling through the overlying sediments to the surface.

Since much of the flow of Silver Creek is the result of irrigation water recharging the groundwater system, the delivery of water from the Big Wood system is critical to the maintenance of Silver Creek stream flows. It is estimated that over 80% of the flows in Silver Creek come directly from upwelling springs in the aquifer system.

The major sources of recharge to the groundwater system are irrigation, snow melt, and precipitation. A significant contribution to recharge is made by the percolation of excess irrigation water applied to crops, leakage from canals and ditches, and seepage in the northern part of Big Wood River channel and tributary streams. Land owners also divert surplus canal water to designated ponds which recharge the aquifer.

The canal irrigation water diversion usually begins in April and continues through October each year. The total amount of canal water diverted to Silver Creek from the Big Wood River during the irrigation season is typically around 100,000 acre feet. Ditches in the study

◀◀ Irrigation water delivered from the Big Wood river is fundamental for aquifer recharge and Silver Creek stream flows.

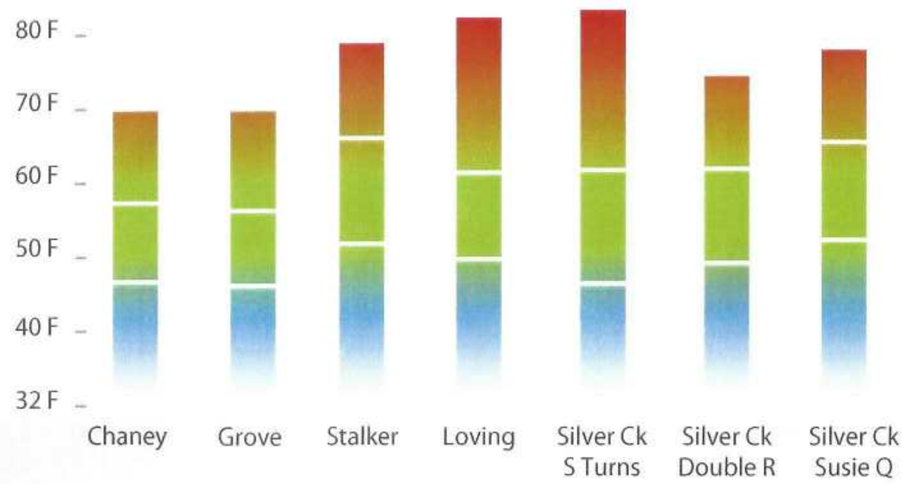


area carrying canal water to fields contribute to recharge to the aquifer through seepage and application to crops. The growing season typically occurs from May until the end of September. Over half of the irrigation water applied is diverted from streams by irrigation canals and the rest is extracted by groundwater pumping.

Source: Brockway and Grover, 1978; Brockway and Kahlown, 1994; Wetzstein et al., 2000; Gillilan Associates, Inc., 2007; Skinner et al., 2007; Bartolino, 2009, 2014

Water Reductions

The USGS has found that stream flows have decreased in every month except March, where they have increased. This indicates an earlier runoff and possible climatic shift. If southern Idaho continues to face drought conditions, climatic variability and increased demand for water, then conflicts will arise. If water supply is further compromised, the availability and delivery of water could be reduced, which would jeopardize an already fragile Silver Creek ecosystem.



Summer Stream Temperatures: The graph above indicate the maximum, average and minimum summer water temperatures on selected areas of Silver Creek over a four year period. This year 55, stream temperature loggers were monitored throughout Silver Creek and on each tributary to record critical information and track changes in the system.

Stream Temperature

ESF continued its fourth year of water temperature monitoring and analysis within the Silver Creek watershed. In 2014, the monitoring array consisted of 44 stream temperature loggers and 13 spring head temperature loggers that were maintained by Save Silver Creek with additional data provided by The Nature Conservancy.

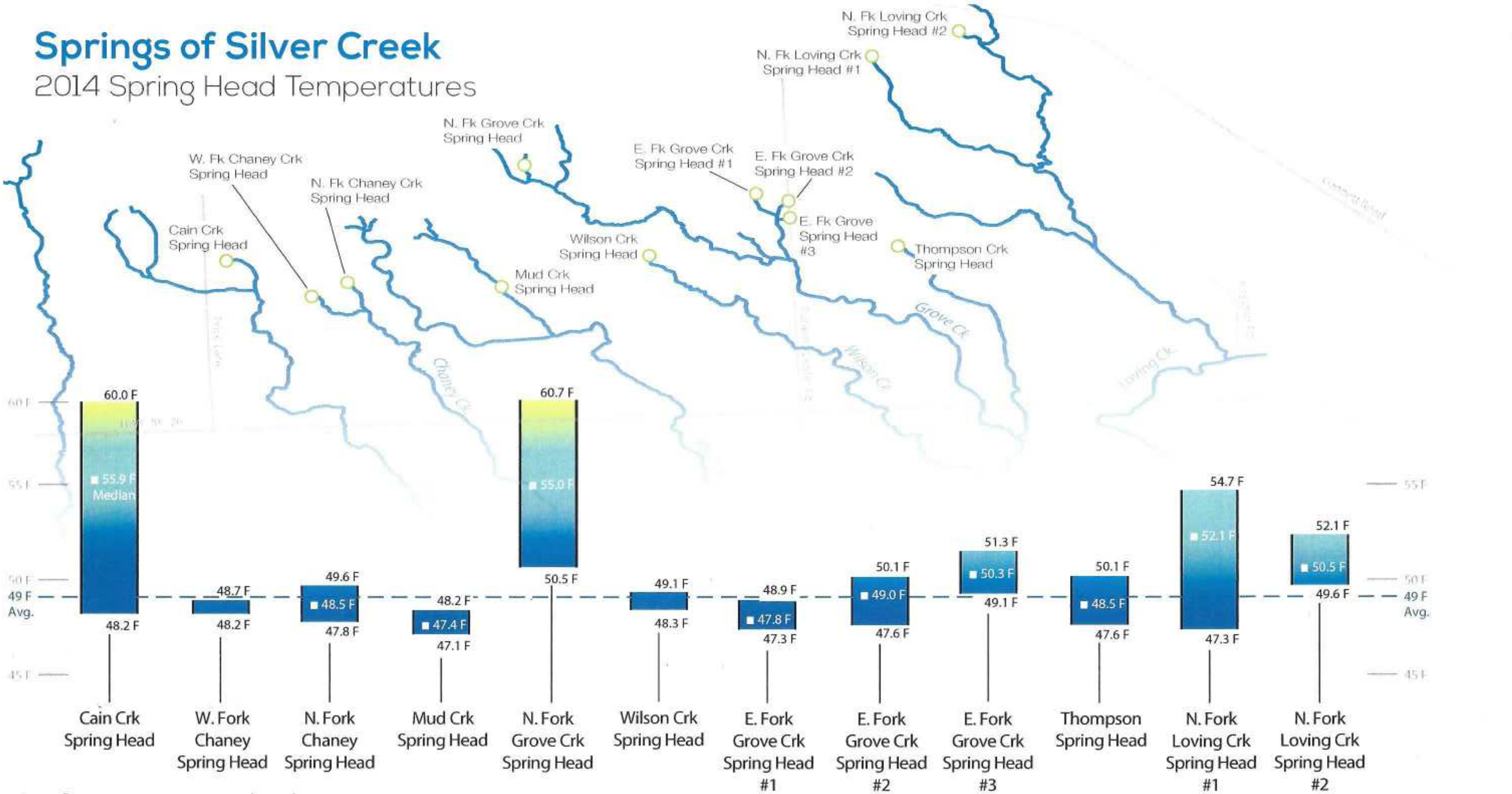
Spring Driven Ecosystem

Stream temperatures in a spring driven system, such as Silver Creek, should be relatively constant and not fluctuate greatly with changes in air temperature or climatic conditions. Long periods of warm weather accompanied by clear sunny skies (high solar input) could elevate stream temperatures in a spring system. Of the 13 spring heads monitored, 10 provide near constant cool water throughout the summer season, with median temperatures around 48.7°F.

For three spring heads located on Cain, Grove and Loving creeks, temperatures began increasing in July (median temperatures around 54.3°F), which is likely a result of spring flow reduction (see the spring temperature graphs and data on page 14).

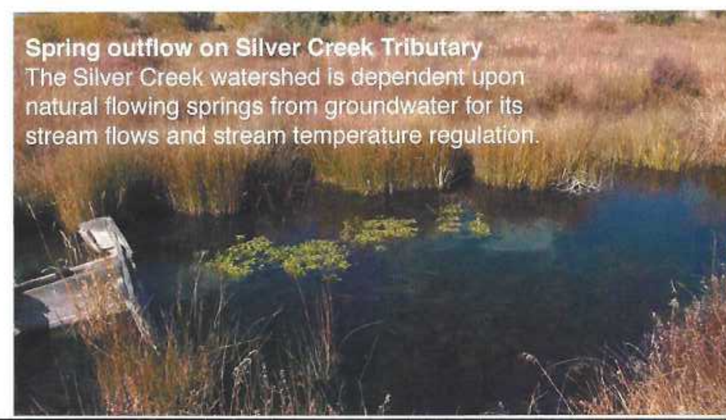
Springs of Silver Creek

2014 Spring Head Temperatures

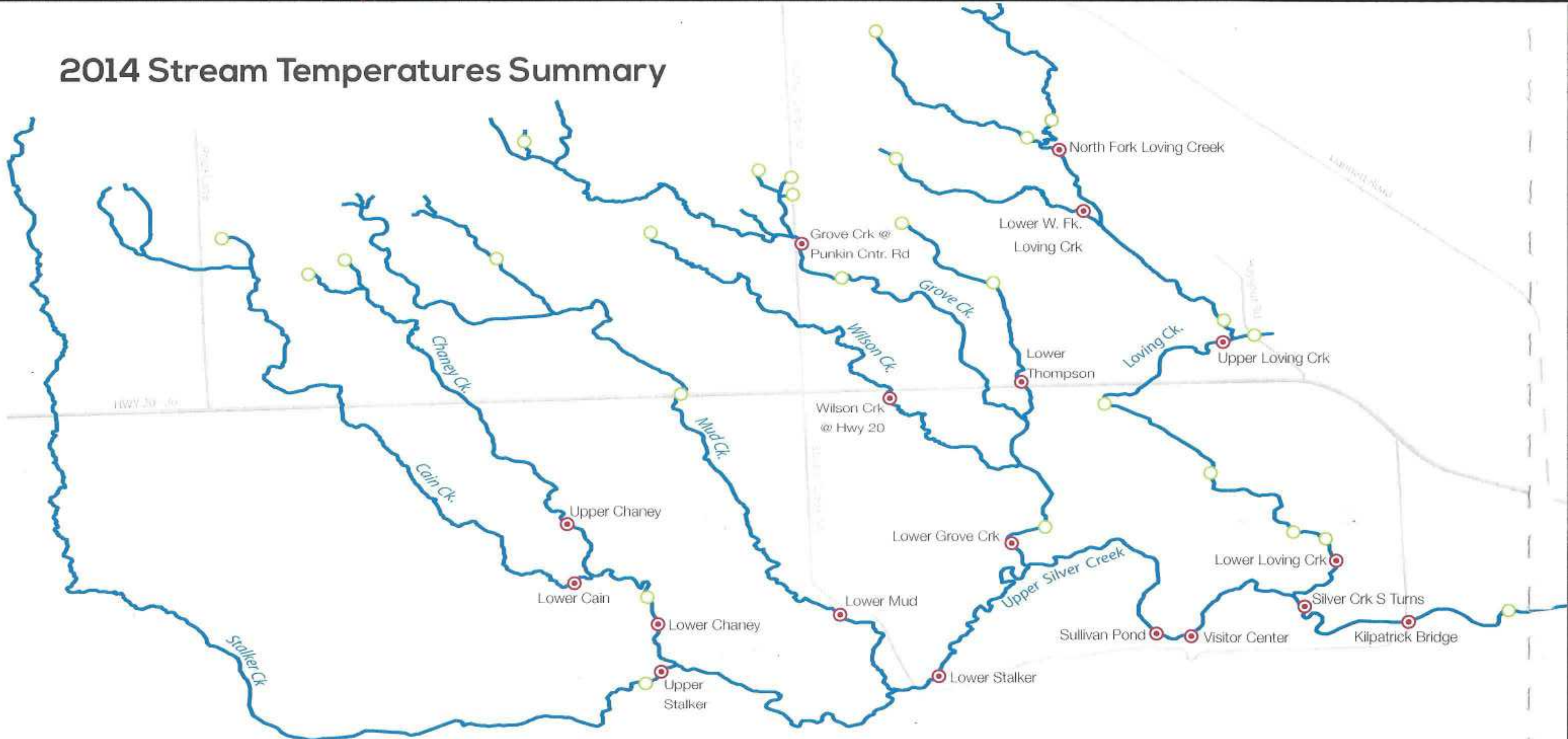


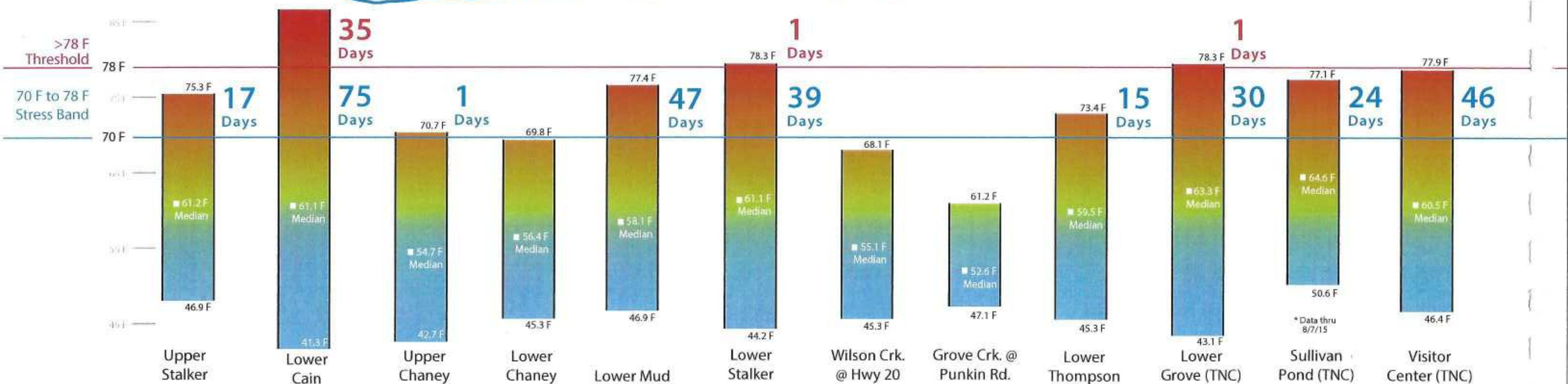
Stream temperature bands The above graphic depicts the summarized spring head temperature data for the entire summer season. The data was analyzed for the summer season to illustrate the spring temperatures that occurred for the period of June through September 2014. Each graph displays the total temperature 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.

This was also recorded for the same sites at the end of August in 2013. Stream temperatures downstream of the Cain and Loving spring head sites subsequently increased. It is not yet clear how much flow was reduced at each spring head. Further investigation could indicate whether changes in land use, groundwater levels or other factors have led to the increase in temperature. As a spring-driven system, these springs are paramount to the health and persistence of Silver Creek. Additional flow monitoring at these sites could provide insight into the nature of these conditions.



2014 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, 2014. 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.

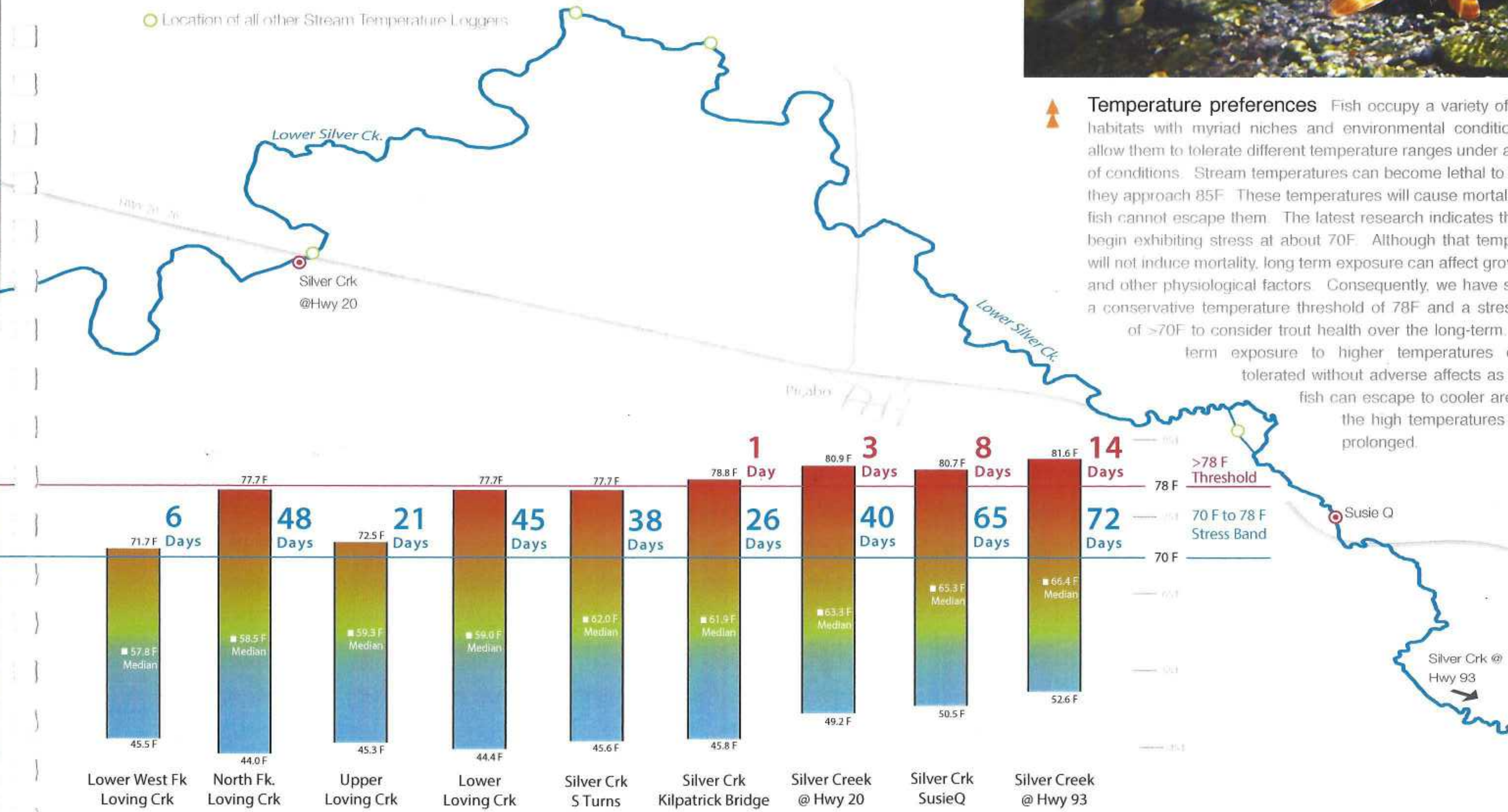
Locations of Stream Temperature Logger Array

The map illustrates the Silver Creek stream and tributary system 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 at one hour intervals over a twenty four hour period for as long as the logger is left in place. 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 through to Lower Silver Creek at the Highway 93 crossing.

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 85F. These temperatures will cause mortality if the fish cannot escape them. The latest research indicates that trout begin exhibiting stress at about 70F. Although that temperature will not induce mortality, long term exposure can affect growth rate and other physiological factors. Consequently, we have selected a conservative temperature threshold of 78F and a stress band of >70F 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 the high temperatures are not prolonged.



The overall average temperatures between night and day, throughout the summer, in all streams were well within the preference range for trout (around 55-60 degrees). Chaney, Grove and Wilson creeks' temperatures never entered the stress range. However, several streams did show temperatures exceeding the threshold of 78 degrees for several days (particularly Lower Cain and Lower Silver Creek), and temperatures in most streams fell within the stress range for many days.

Temperature Comparison

Flows and Temperature

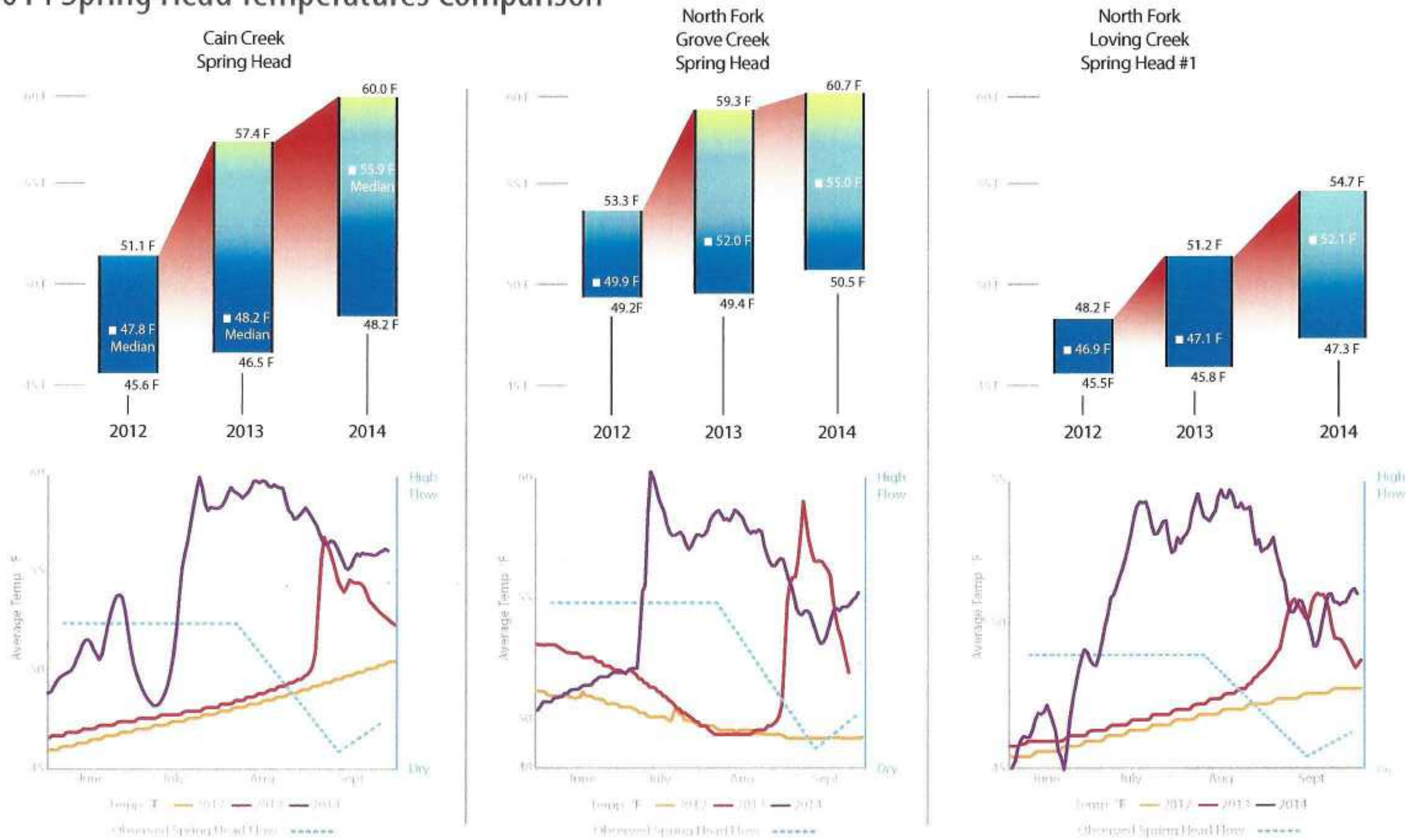
Warming as a stream flows downgradient is a natural process, but summer downstream temperatures have risen noticeably over the 4-year monitoring period. Six sites exceeded temperature threshold limit for trout (>78F) ranging from 10 to 35 days. In 2013, only one site had temperatures above the threshold within that range (12 days). In 2011 and 2012, the maximum number of days above the threshold was 6 days. Drought conditions resulting in lower flows in conjunction with high air temperatures contribute to these conditions.

However, while maximum temperatures increased, median temperatures fell by about 1-2°F from 2013 at most locations. There are several contributing factors that could explain this occurrence:

1. Average summer temperatures were approximately 3°F cooler than 2013;
2. Decreased flow is correlated with higher diurnal fluctuations, meaning there are higher highs and lower lows;
3. A shortened irrigation season meant that irrigators switched to groundwater sources by mid-August, which may have resulted in cooler irrigation returns into the streams from that point onward.

Median temperatures generally trend upward when looking at all four years of data. In addition to flow volume and air temperature, riparian cover and shade, channel morphology, associated land use, groundwater interaction and sedimentation all affect stream temperatures. Continued monitoring is necessary to further understand the factors influencing stream temperatures in the Silver Creek watershed, to track temperature trends, and to help determine strategies for future management and enhancement.

2012-2014 Spring Head Temperatures Comparison



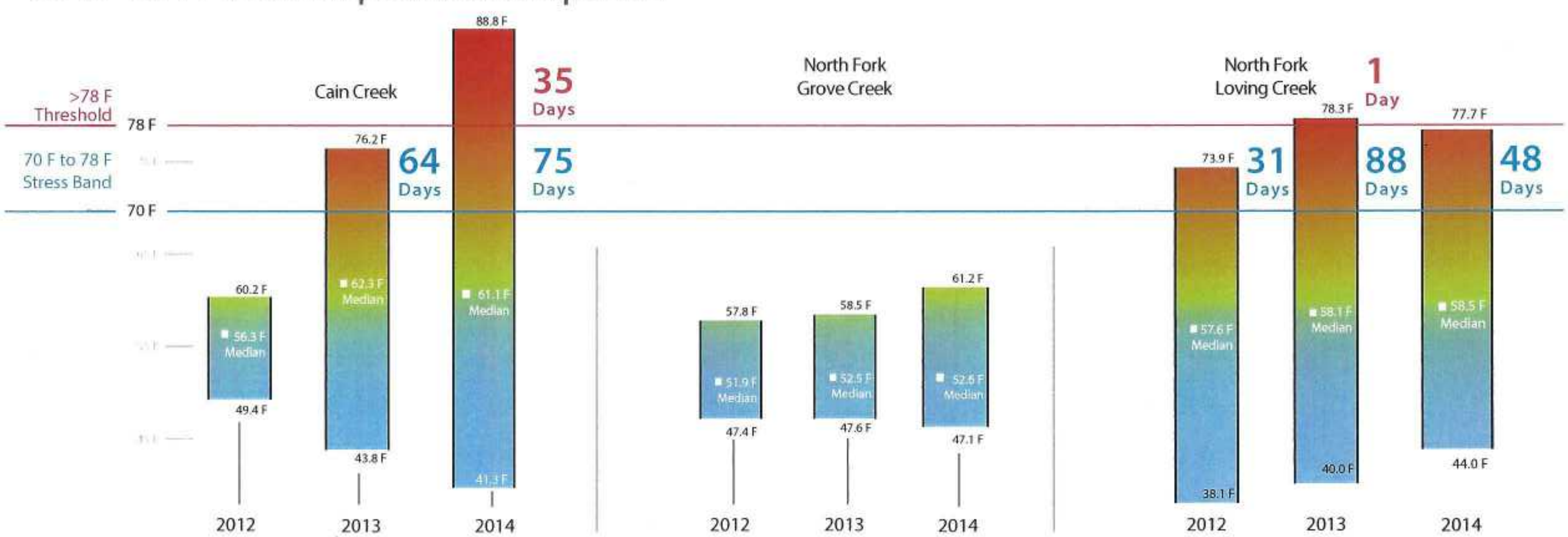
Selected Temperatures ▶▶

The temperature comparisons on this page display three spring heads and three stream temperature records that indicate large changes, areas that need more investigation or anomalies over the past three years.

The three spring heads all had an increase in temperature in late August to early September, 2013; but a much different trend in 2014 with an earlier rise in temperatures.

The large spikes in temperature from 2013 and 2014 is presumed to be associated with significant reductions in spring flow, allowing water to sit in the spring head pool for a long period of time and heat up considerably.

2012 - 2014 Creek Temperatures Comparison



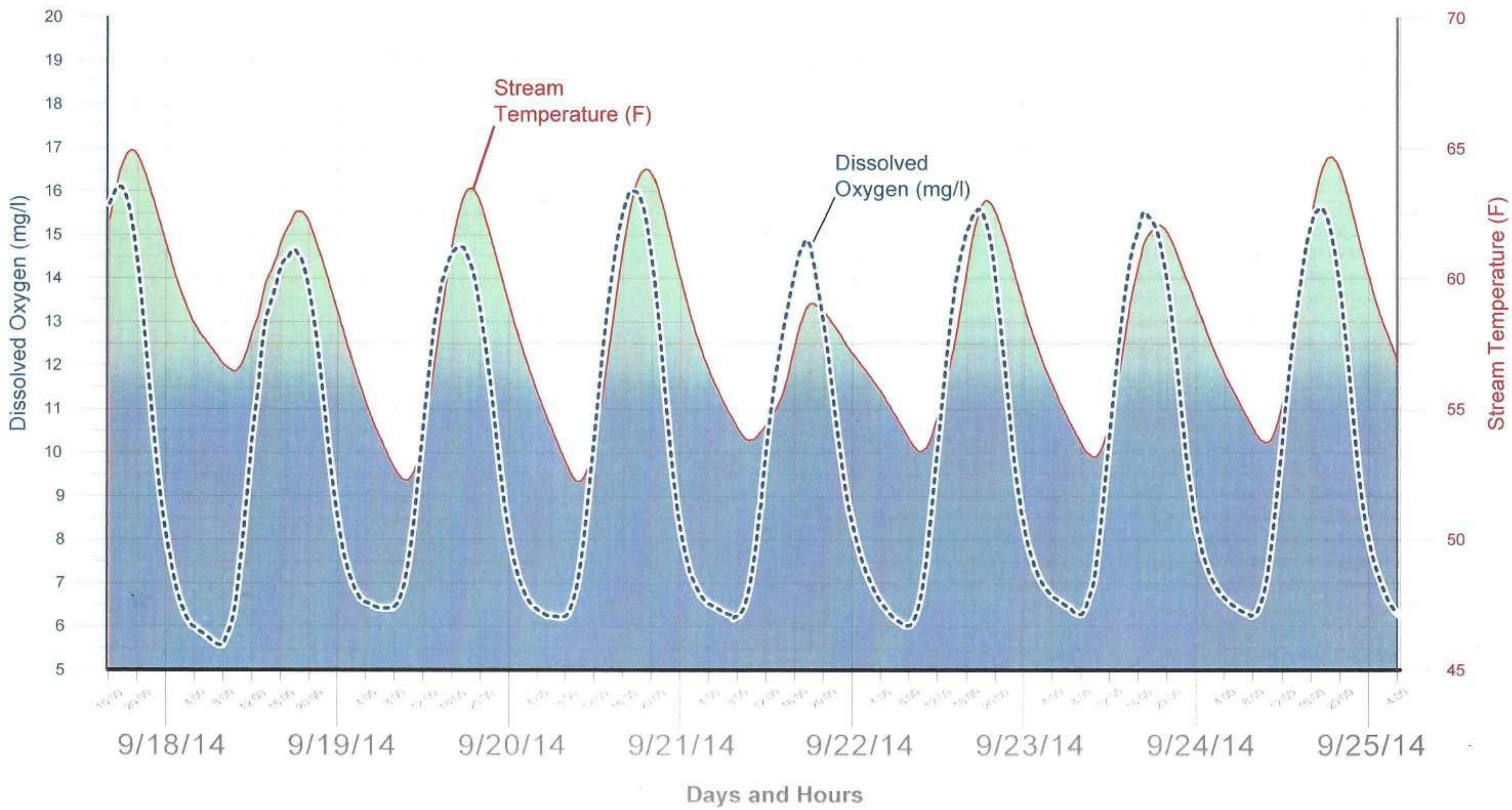
Water Quality

Dissolved Oxygen

During the summer of 2014 Dissolved oxygen (DO) was measured at 10 sites and results indicate that the percent saturation of DO in Silver Creek and some tributaries is extremely high in the daytime. Loving Creek with over 200% and Stalker Creek over 175% exhibited the highest levels of DO saturation. These levels of DO saturation can cause a disease in trout called Gas Bubble Trauma (GBT) and is seen in trout as blisters around the mouth and over the skin. This condition, as well as lethargy, has been noted by guides and anglers in Silver Creek. Pathology tests by IDFG have been inconclusive but GBT is strongly suspected.

2014 DO monitoring gives us greater insight into the biological engine for the Silver Creek watershed. The driving force for aquatic plant growth is typically nitrogen or phosphorus. Although nutrient monitoring is needed to pinpoint sources, we do know that nitrogen and phosphorus are natural, background elements usually found in springs and groundwater. However, excessive nitrogen and phosphorus can come from runoff and be contained in sediments and substrate. While extreme photosynthetic production from aquatic plants has downsides, aquatic plants in the Silver Creek system also provide important habitat for fish especially escapement and cover habitat for young-of-the-year and juvenile trout. Aquatic plants also provide essential habitat for macroinvertebrate production. The trick is to avoid an ecological tipping point in Silver Creek by maintaining a balance between necessary fish habitat and avoidance of adverse water quality conditions.

Now that we have a better picture of the biological engine, we can begin to focus on restoration actions to enhance the fishery and improve water quality. Grove Creek water quality improved as a consequence of canal inflow being held and filtered by upstream ponds. This reduced or removed sediments and nutrients. Portions of Chaney Creek (pond) were dredged to remove legacy sediments and reduce downstream accumulations. These actions combined with riparian buffer strips minimized runoff and bank erosion. Observations indicated trout movement into the streams increased and access to spawning areas improved and more trout than usual were observed building redds in both streams.



Silver Creek at Kilpatrick Bridge - Dissolved Oxygen and Stream Temperature. This graph displays the diurnal change in dissolved oxygen (DO) and temperature for one site over the period of one week. DO ranged from a low of 5.5 mg/l to a high 16 mg/l. This large daily fluctuation in DO is significant and points to a productive biological engine in the aquatic ecosystem. The productivity of the stream ecosystem is a balancing act, and one that could be easily tipped toward even greater fluctuations with detrimental consequences if any stressor is increased (lower flows, higher ambient temperatures, greater amounts of aquatic plant growth, etc.)

Dissolved Oxygen (cont)

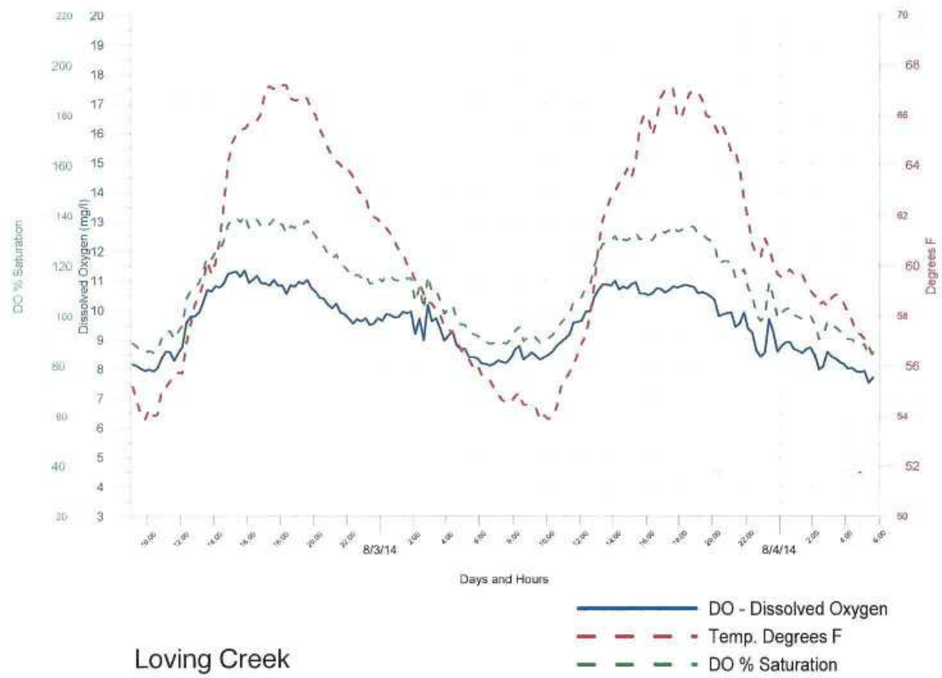
Dissolved Oxygen, 2014

During the summer of 2014 tributaries of Silver Creek were tested for DO (dissolved oxygen) levels. A level of 5.5 milligrams per liter (mg/l) is generally considered the minium tolerable by Rainbow Trout. A decline in DO is known to happen during warm summer months in all waters. It is not surprising to see some streams with very low pre-dawn DO concentrations. The mechanism driving low DO during "dark-cycle photosynthesis" is well documented. However, the release of oxygen to the water during the daylight photosynthesis cycle is often ignored. We deployed continuous data loggers in strategic locations throughout the watershed to track DO fluctuations (diurnal cycle) over a period of time during warm summer temperatures combined with low stream flows. The graphs on these two pages depict the measurements for different streams during this period.

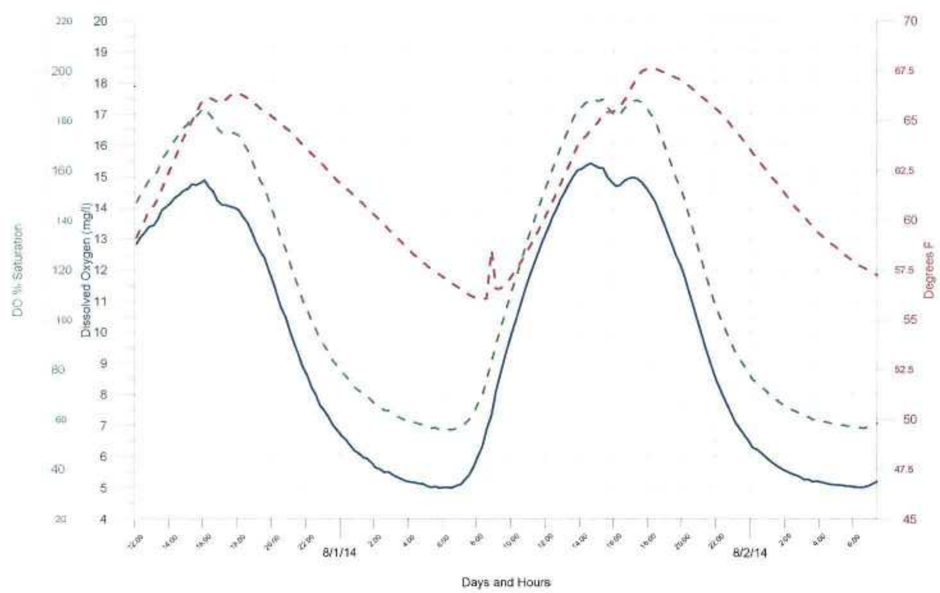
Bodies of fresh water contain not only aquatic plants (macrophytes) but also microscopic plants (phytoplankton) that conduct photosynthesis. This initial uptake of nutrients by these plants and its conversion to biomass is commonly referred to as "Primary Productivity" - it is the first step in the food web. We would expect all streams in the watershed to contain roughly the same species mix of aquatic plants, both large and small. Therefore, if it is photosynthesis that accounts for both the very high and very low DO and DOS readings, then the densities of plants must not be equal. In that light, it stands to reason that primary productivity must be higher in the affected streams versus the others.

The data presented here is a summary discussion of water quality conditions that were measured in Silver Creek, 2014. This DO data and reporting was provided by Fisher & Associates working with Ecosystem Sciences Foundation

Chaney Creek

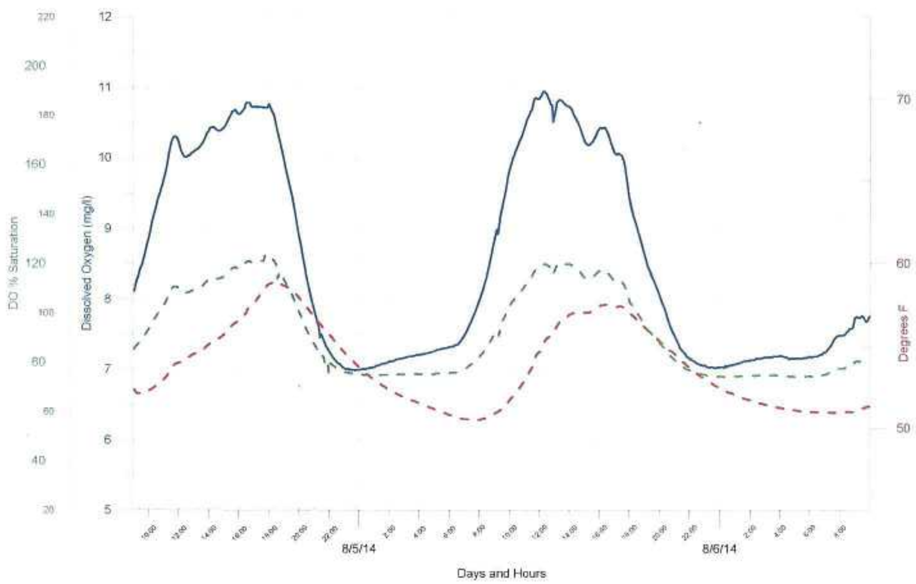


Loving Creek

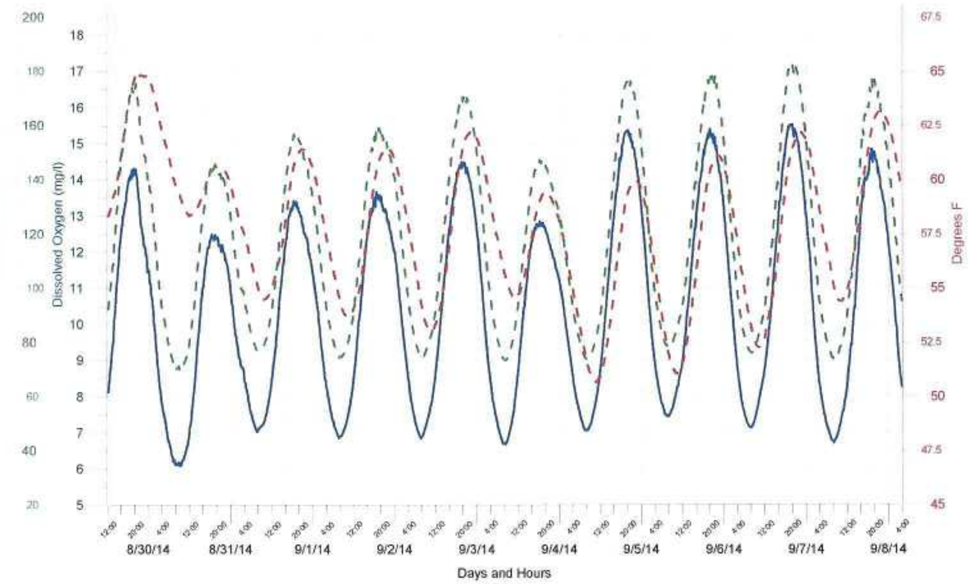


Aquatic plants (like those typical of Silver Creek and its tributaries) as well as algae are the likely cause of these extreme fluctuations in DO

Grove Creek

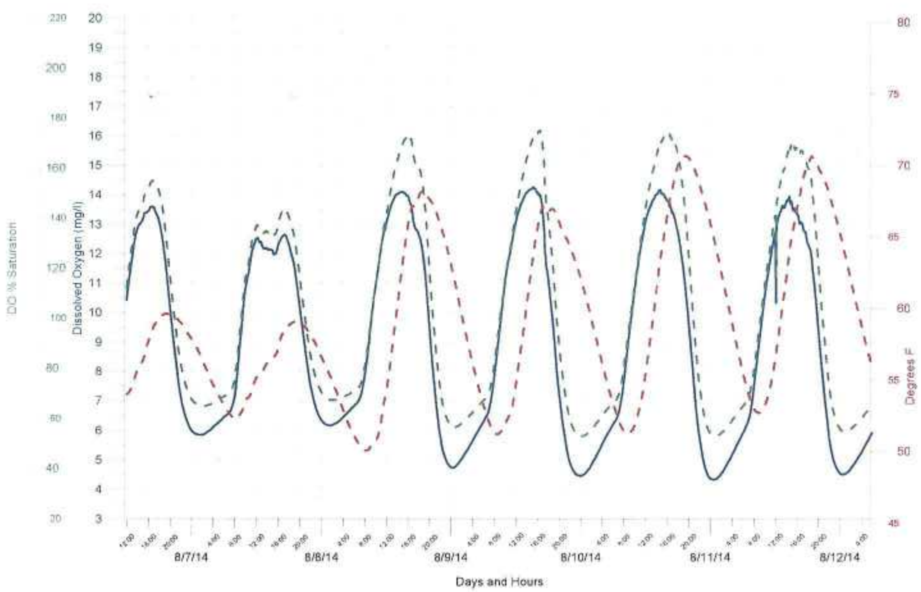


Silver Creek at RR Ranch - below Kilpatrick Pond

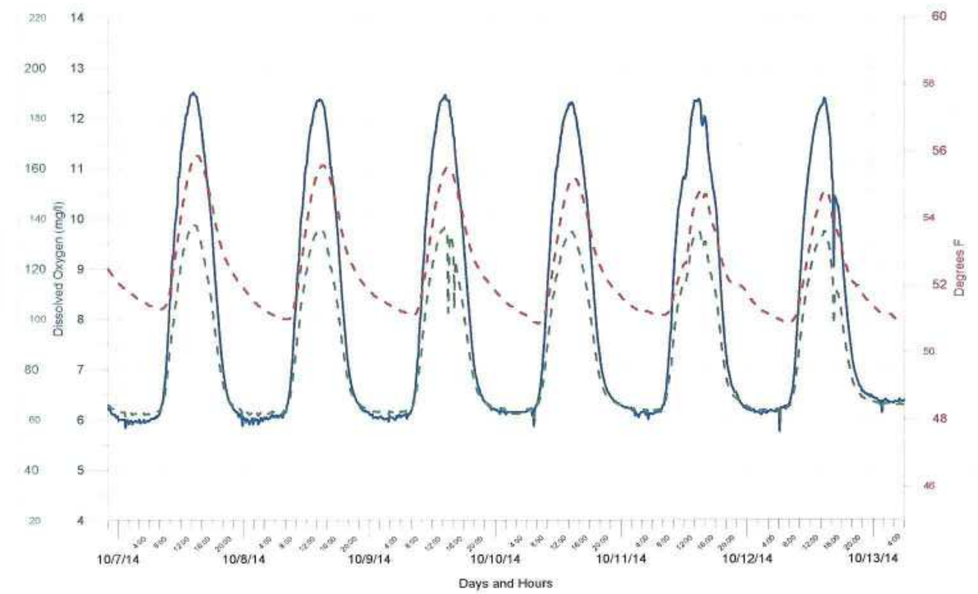


DO - Dissolved Oxygen
Temp. Degrees F
DO % Saturation

Mud Creek



Butte Creek - below Hayspur Hatchery



Fishery and Stream Health

Concern for the Silver Creek fishery and fear of further stress to fish prompted the Nature Conservancy to close fishing for part of the day on the Preserve in July 2014. Fortunately anglers and guides followed suit and voluntarily reduced fishing on the stream; exhibiting the sound stewardship that may help protected Silver Creek fishery in times of stress.

What is the nature of this stress? Of course elevated temperatures in summer months are a well-known problem. Anglers know the risk associated with low DO levels and that below certain thresholds trout cannot survive. Less understood is the impact of extremely high levels of dissolved oxygen saturation (DOS).

DO is a gas produced by photosynthesis. During the daylight hours growing aquatic plants and algae add DO to the water and at night decomposing plants and algae take DO out of the water through respiration. So that DO is generally lowest in the morning and increases throughout the day, peaking in the afternoon.

If aquatic plants (like that typical of Silver Creek and its tributaries) as well as algae are the cause of these extreme fluctuations in DO, what is the driver that creates the aquatic plants and algae? The most likely culprit is nutrient enrichment. Elevated nitrate levels have been documented in some wells and springs as well as in runoff from agriculture lands within the watershed.

It is important to know the sources of nutrients before solutions can be found. For example, buffers and set-backs on agriculture fields are known to intercept nutrients such as nitrite before reaching streams via runoff from precipitation or irrigation.

While we know what thresholds are dangerous at lower levels, below 5.5 mg/l for example, there is little knowledge about what levels pose risks to trout at the extreme upper ends. Supersaturated DO is known to cause Gas Bubble Trauma (GBT) which can be fatal. GBT can be seen externally on trout as blisters around the mouth, on the head and over the skin. Anglers and guides have noted this condition in Silver Creek trout as well as a loss of vigor. Many studies have documented the effects on salmonids. Most of these studies were undertaken in response to fish kills or observed morphological effects. Furthermore, fish hatcheries, public aquariums, and other fish holding facilities, particularly those utilizing large pumps, have understood that excessive gas saturation in water should be avoided. Measures to "de-gas" supply water or to avoid entrainment of air into pump systems are often employed.

Most studies and tests measure the effects of super saturation by atmospheric air. Because air is about 70% Nitrogen and only about 20% Oxygen, past studies should be viewed as discussions of super saturation by Nitrogen, primarily, and Oxygen only anecdotally. This is an important distinction because Nitrogen is most often entrained into water by mechanical means (dam spillways, pumps, pressurized atmospheric gas in very confined aquifers, etc.) and not by biological processes.

The data presented here is a summary discussion of water quality conditions that were measured in Silver Creek, 2014. This DO data and reporting was provided by Fisher & Associates working with Ecosystem Sciences Foundation.

Based on our water quality monitoring this year we conclude that:

- Excessive DO saturation occurs and likely does adversely affect trout.
- Excessive DO saturation is a product of primary productivity (photosynthesis) by aquatic plants and algae which may be fueled by nitrates, either from natural sources in springs and wells, or by runoff from agriculture land.
- Low DO concentrations are usually within safe limits for trout.
- Tracking DO percent saturation (and diurnal DO) is an indirect measure of changes in primary productivity.
- The DO levels measured in 2014 are somewhat exacerbated by the low stream flows experienced at the time.
- The water quality (temperature and DO) creates a potential lethal environment for fish during times of low flow. The data suggest that the system is stressed on a seasonal basis.

Water quality monitoring in 2014 provided new insight into the driving forces in Silver Creek and tributaries. We now understand the magnitude of diurnal fluctuations in DO levels and how it varies across each tributary. We have an indicator of potential processes that are creating these conditions. Consequently, not only is continued monitoring called for but we must also include nitrate measurements. Following the 2015 monitoring we hope to identify reasons for higher primary productivity by comparing soil, water chemistry, and land use and management between streams so the reasons for the stressors become clearer.

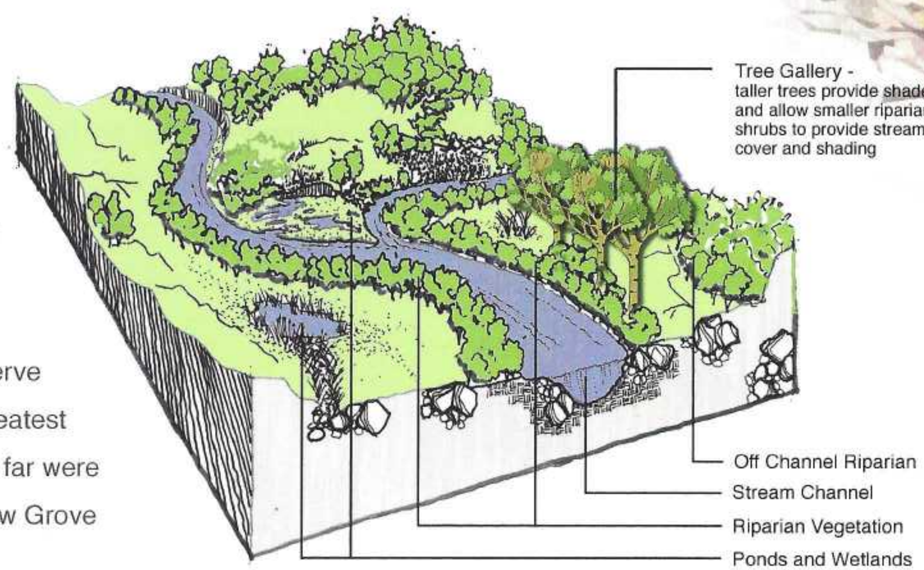
Supersaturation of dissolved oxygen is known to cuase gas bubble truama which can be fatal. Above, sub-dermal emphysema on the head of a rainbow trout.

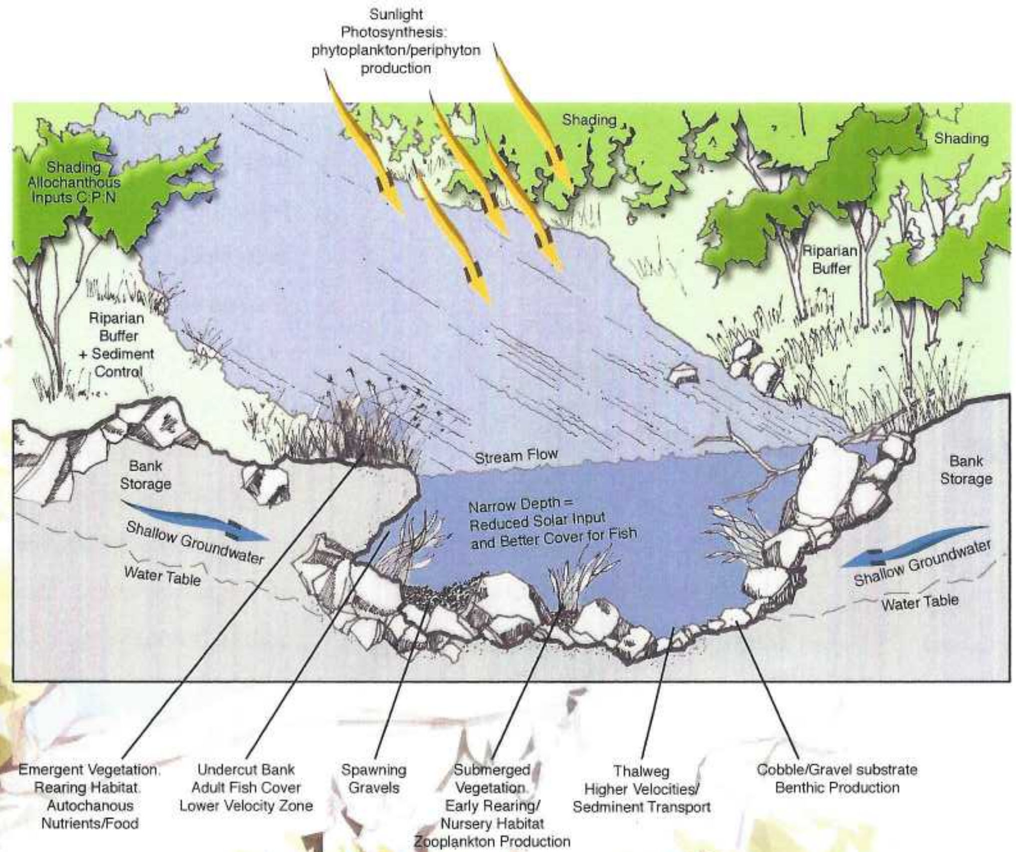
Protect and Restore

In 2014 both Grove and Chaney creeks exhibited beneficial habitat and water quality characteristics over other creeks. Grove Creek water quality improved as a consequence of canal irrigation inflow water being held and filtered by ponds upstream. This reduced or removed sediments and nutrients. Portions of Chaney Creek were dredged to remove legacy sediments and reduce downstream accumulations. These actions combined with riparian buffers minimize runoff and bank erosion substantially improving fish habitat.

Stream bank observations indicated trout movement into the streams improved and access to spawning habitat improved. The quality of spawning habitat, less silt and sediment clogging interstitial substrate, improved and more trout were observed building redds. Higher recruitment of young-of-the-year and juvenile rainbow and brown trout should follow improved habitat conditions in Grove and Chaney creeks. The Nature Conservancy performed redd counts on the Preserve and reported the greatest number of redds by far were in Silver Creek below Grove Creek confluence; likely a reflection of better water quality (lower stream temperatures, better DO) coming out of Grove Creek. However, Grove also has the largest outflow (cfs) of all creeks which is also a significant fish attractant. Loving Creek also contributes a high flow to Silver Creek but the water quality (temperature and DO) is often not desirable for trout spawning and TNC found virtually no redds at the confluence with Silver Creek.

Visual surveys and creel reports from guides and anglers reported greater fish abundance in Grove





and Chaney creeks compared to others. This might indicate the higher quality habitat in Grove and Chaney provides refugia from poor water quality conditions typical of Silver Creek and other tributaries in summer. However, without data from fish tagging, a thorough redd count in all streams, and abundance analysis, most of the conclusions are anecdotal.

The take away lesson from restoration work on Grove and Chaney is that using ponds to filter canal irrigation inflows, improved riparian buffers to minimize runoff and erosion (as well as stream side shading), and judicious dredging are active interventions that show immediate results. The results of improved spawning and rearing habitat and refugia on Grove and Chaney are a template for ways to improve Loving, Wilson, Mud, Cain, Stalker, and Upper Silver creeks.

Next Steps

Watershed Health

The critical environmental issues throughout the Silver Creek Watershed are temperature, sediments, and flow. These parameters are indicators of the health of the watershed much like checking our own body temperature and circulatory system. Consequently it is important to maintain our temperature logger arrays throughout the streams and measure flows and sediment seasonally in all the streams to alert us to changes that indicate a serious issue with the functioning of the ecosystem.

Surface Hydrology and Temperature Monitoring

After four years of monitoring, it is clear that the hydrology and temperature monitoring must continue on Silver Creek - particularly as we continue to face reduced flows and drought conditions. As we build the database, we will better understand the system and be able to detect data trends that indicate problems with the system. As an example, if flows continue to decrease and temperatures rise, stress on fish will increase. Monitoring is a long-term scientific tool that must be done consistently and funding is needed to continue the monitoring efforts.

Riparian Buffers

Riparian buffers are streamside vegetation that "buffer" the stream from the upland landscape. They are critical ecosystem components that provide shade, sediment and nutrient filters, and habitat for fish and wildlife. However, not all buffers are created equal. Width, height and species composition all influence the functionality and value of a riparian buffer. We are seeking willing landowners to create a case study. We will evaluate the current riparian buffers on the property, assess the site specific conditions, and make recommendations as to how riparian buffers can be improved for temperature, sediment or erosion control, nutrients, habitat and ecosystem values.

Groundwater Protection

All of the surface water in all of the tributaries to Silver Creek originates, for the most part, in headwater springs. Thus, groundwater is the ecological driver for the entire watershed.

If groundwater levels drop such that spring flows are diminished or stopped, the ecosystem faces collapse. The 2014 spring head monitoring indicates that some springs may temporarily dry up. While temperature thresholds and sedimentation are critical parameters that influence the health of the ecosystem, it is groundwater which determines whether there is an ecosystem or not. Consequently, establishing a program to protect Silver Creek's aquifer (part of the Wood River Valley Aquifer) is of paramount importance. Before landowners can determine how the groundwater can be protected, we need to understand the fundamental dynamics of extraction versus recharge. Our current knowledge is that aquifers may be recharged in wet years, and may be depleted in dry years. If these 'maybes' are correct, then a succession of dry years (drought periods) could result in the "mining" of the aquifers in which recharge is never able to replace what was lost. Severe drought could, in a short period of time, lead to the attenuation of spring flows with adverse ecological consequences to follow. Overdrafting of the aquifer as more groundwater wells go into production throughout the upper watershed can also result in mining.

The cooperative effort between the USGS and IDWR to create a groundwater model for the Wood River Valley Aquifer will be a key tool to understand the greater aquifer dynamics. However, local dynamics can be better understood by implementing shallow monitoring of groundwater on a finer scale.

Fish Habitat Mapping

Fish habitat mapping would delineate trout spawning areas, early rearing and nursery areas within Silver Creek and in side channels, pools (deep and shallow), undercut banks, resting and feeding zones, sediment conditions, beaver ponds, riparian vegetation and stream bank conditions, areas of reed canary grass growth, channel constrictions, and over-widened reaches. Also, fish population sampling can be an important part of any monitoring program. Fish are one of the treasured resources in Silver Creek and they should be understood and protected.

Funding

In order to continue this important work and increase our understanding of the Silver Creek system it requires funding. Please consider a donation to continue this important program. Without your contributions this work cannot be done. Substantial volunteer effort goes into the Silver Creek program each year and your donations directly support the work.

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Silver Creek Annual Report

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