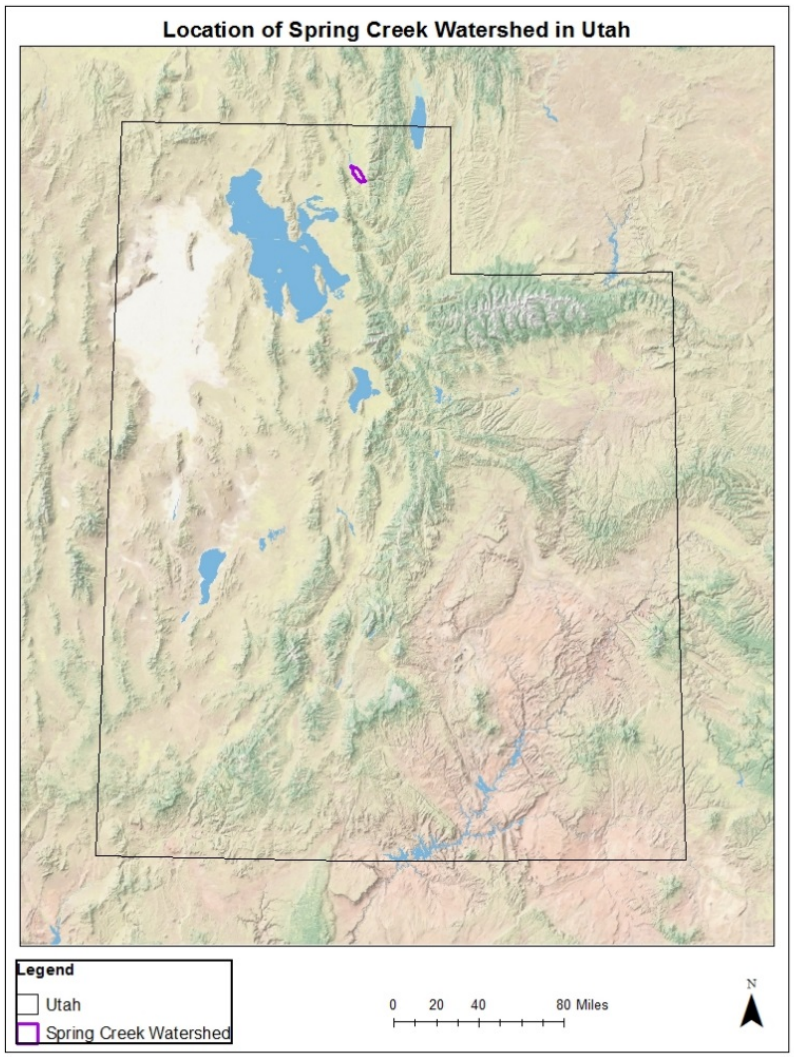
Benefits of Water Quality Improvement Projects Observed in Spring Creek Watershed

Waterbody Improved

Spring Creek meanders for approximately five miles through private agricultural lands until it joins the Little Bear River. Water quality assessments identified the creek as not supporting its beneficial uses for recreation, fisheries, and agriculture due to exceedances of numerical criteria and pollution indicator values for fecal coliform, total phosphorus, temperature, dissolved oxygen, and ammonia. In response, landowners, producers, and conservation specialists teamed up and set out to implement practices and projects targeted at improving water quality. As a result, over 15 projects on animal feeding operations, riparian areas, streambank restoration, and irrigation efficiency improvements were developed and implemented to address these sources of impairment. These efforts and practices have contributed to the restoration of water quality and the subsequent removal of Spring Creek from the Clean Water Act (CWA) section 303(d) list of impaired waters.



Problem

Spring Creek begins as a spring in the middle of Cache Valley of Northern Utah and, after joining the Little Bear River, discharges into Cutler Reservoir, an impoundment of the Bear River and a significant water resource for the State of Utah. As required by the Clean Water Act, Spring Creek has been assigned beneficial uses and assessments have been made as to whether or not water quality standards meet these uses. Through these assessments, it was determined that fecal coliform standards did not support beneficial use class 2b: protection for secondary contact recreation such as boating, wading, or similar uses. It also determined that ammonia, dissolved oxygen, and total phosphorus did not support beneficial use class 3a: protection for cold water species of game fish and other cold water aquatic life, and that total dissolved solids did not support beneficial use class 4: protection for agricultural uses including irrigation of crops and stock watering.

As a result, in 2002, a Total Maximum Daily Load (TMDL) was developed for total phosphorus (target of 0.05 mg/l), fecal coliform (target of 200 Cfu/100ml), dissolved oxygen (target of 8 mg/l 1-day avg. and 6.5 mg/l 30-day avg.), and ammonia (target of 0.08-2.49 mg/l based on temperature and pH). The Spring Creek TMDL concluded that the overall water quality of Spring Creek was in poor condition, with the stream system characterized by extremely high concentrations of phosphorus and ammonia, low dissolved oxygen, and high fecal coliforms. The high fecal coliform counts indicated that the stream system posed a potential health hazard. It was apparent that the system did not support a healthy aquatic ecosystem as no cold water species of game fish were found. Algae production was high and stream eutrophication was apparent. It was concluded that the restoration of the stream system would require a concerted effort from both point sources and nonpoint sources to control their respective pollutant loads. Regarding nonpoint sources, a large portion of the agricultural lands were heavily manured with minimal efforts to effectively manage nutrient applications and winter manure applications were common. Many crop fields were farmed up to the edge of banks of streams, effectively providing no buffer for storm water runoff and eliminating healthy riparian areas. Additionally, many of the animal feeding operations within the Spring Creek watershed lacked proper animal waste storage facilities that insured the prevention of discharging nutrients into nearby waterways.

Project Highlights

The 2002 TMDL also provided recommendations on where to begin water quality improvement efforts within the Spring Creek watershed. Through diligent cooperation of determined producers and landowners, plans were created and technical services were provided to assist with project implementation. Since 2002, producers have dramatically improved animal waste management and prevented discharges by installing 21 properly sized waste storage facilities. Along with these facilities, nutrient management plans are in place to insure fertilizer and manure is applied based on soil test recommendations, and individual fields are assessed as to their runoff risk if manure is applied during frozen or snow covered conditions. These producers

have also installed 7,124 feet of berms and 1,110 feet of fence that acts to prevent uncontrolled access to Spring Creek.

Additional measures have been taken by other landowners and producers to protect the streambanks and riparian areas along Spring Creek through the installation of 6,284 feet of riparian fencing, 5 off-site watering facilities, and 1,200 feet of streambank protection. Currently there are two other similar projects under construction within the Spring Creek watershed that aim to improve water quality, and efforts will continue to maintain the momentum that has been generated thus far.

Results

Implementation of these projects has resulted in great improvement in water quality. Water quality data showed that before 2002 average total phosphorus concentrations were 0.70 mg/l while 2014 average total phosphorus concentrations at the lowest point in the watershed, was 0.086 mg/l. When looking at long term total phosphorus concentration reductions, a strong downward trend is observed (see graph 1 below).

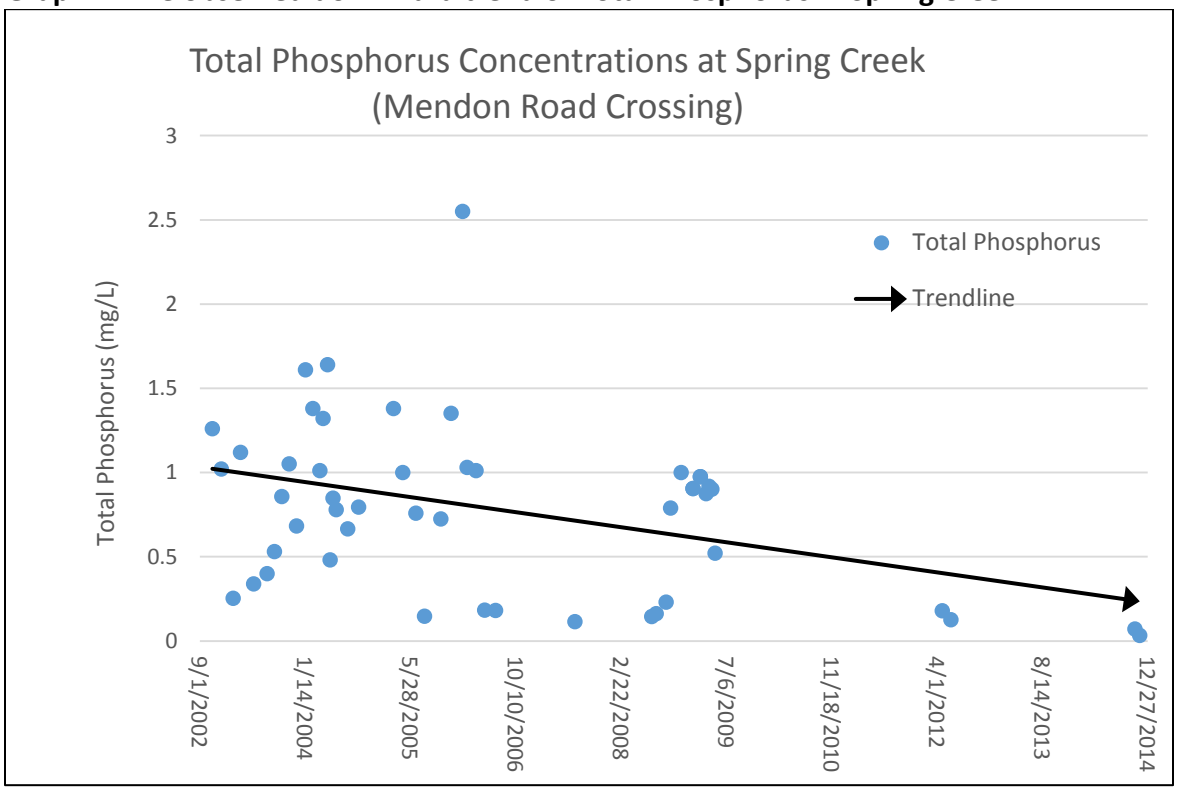
These efforts have allowed riparian areas to be rested and rehabilitated, which has resulted in more stable vegetated streambanks and allows for the riparian area to act as a properly functioning buffer zone that captures sediment and nutrient runoff.

Partners and Funding

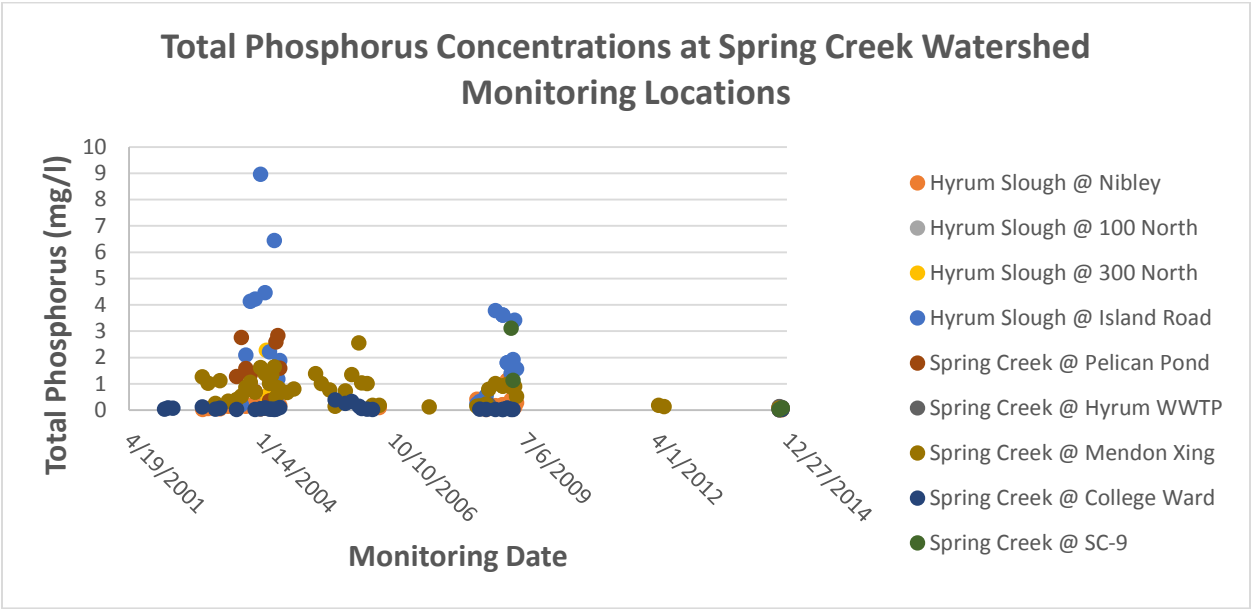
Since efforts have begun to improve the water quality of the Spring Creek watershed, many partners have stepped forth in a display of great stewardship. The Blacksmith Fork Conservation District has been very vocal in their support of projects that target improving water quality and they have continually encouraged local producers to make water quality a priority within their operations. The Utah Division of Water Quality has been a strong supporter in this cause through supplying monitoring equipment and lab analysis support. Many of the BMP's installed within the Spring Creek watershed have come from individual landowner contracts with the Natural Resources Conservation Service (NRCS), who have provided planning, engineering, and financial support. Since 2002, these NRCS contracts have totaled over $691,500. Additional funds have come from the Clean Water Act Section 319 Program in the amount of $317,271, while producers have provided in kind match funds in the amount of $252,200. Utah State University Extension has worked side by side with the Blacksmith Fork Conservation District and NRCS to provide technical support and outreach education in an effort to raise awareness for water quality related issues within the Bear River and Spring Creek watersheds.

Graphs

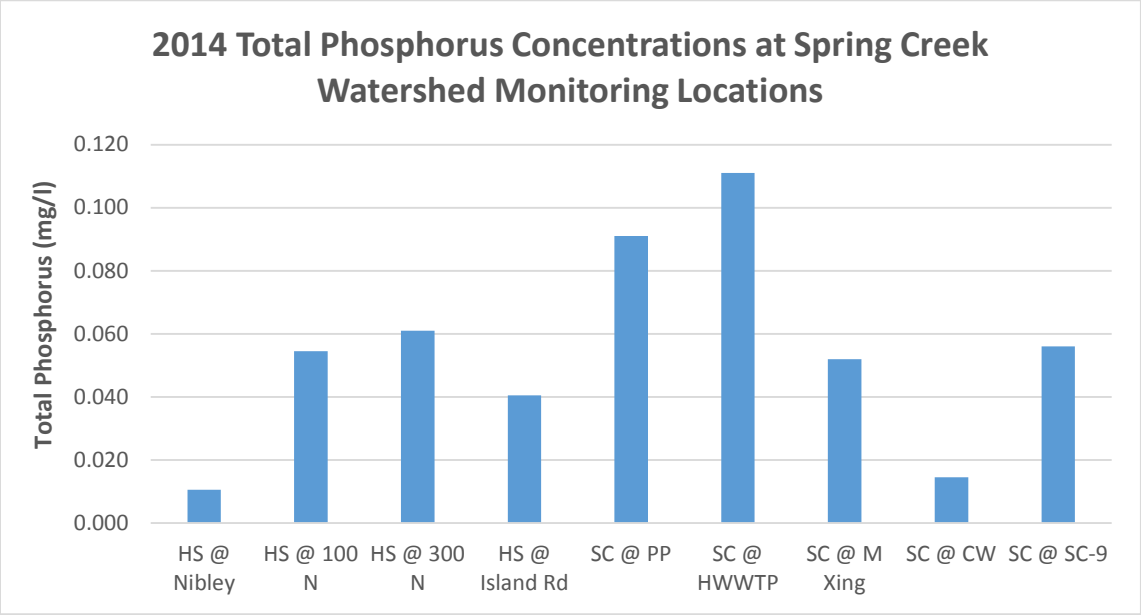
Graph 1. The observed downward trend of Total Phosphorus in Spring Creek.



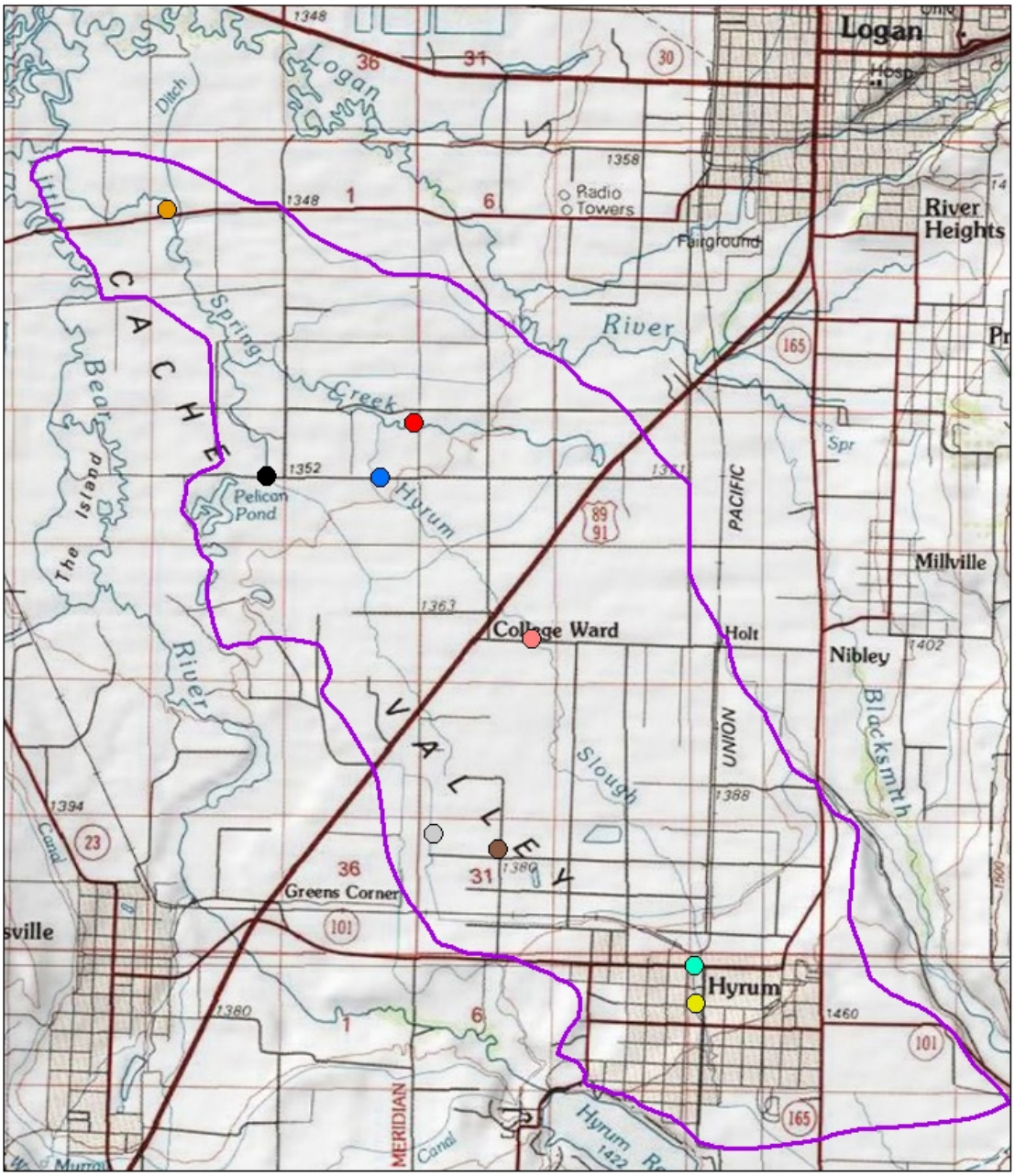
Graph 2. Total Phosphorus Concentrations at monitoring locations.



Graph 3. Total Phosphorus Concentrations in 2014.



2014 Spring Creek Watershed Monitoring Locations



Legend

- Spring Creek Watershed
- HS @ Nibley
- HS @ 100 N
- HS @ 300 N
- HS @ Island Rd
- SC @ PP
- SC @ HWWTP
- SC @ M Xing
- SC @ CW
- SC @ SC-9

N W E S

Photos

This pre-project photo below shows uncontained animal waste runoff that often entered Spring Creek.

The post-project photo below shows an animal waste storage facility that has been installed to properly contain animal waste and prevent discharge into Spring Creek.

This pre-project photo below shows the unprotected streambank along Spring Creek that lacks a proper riparian area. Livestock were able to have free access to the creek and had cause erosion and aver grazing.

The post-project photo below shows the newly installed fence and recently planted trees and shrubs that will act to prevent livestock induced degradation, protect the riparian area, establish supported banks, and provide shading.