

SECTION 319 NONPOINT SOURCE POLLUTION CONTROL PROGRAM
WATERSHED PROJECT FINAL REPORT

Snake River Watershed Plan
Summit County, CO

by

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This project was conducted in cooperation with the State of Colorado and the United States Environmental Protection Agency, Region 8

Funding Agreement # WQC 08000056

EXECUTIVE SUMMARY

PROJECT TITLE: Snake River Watershed Plan

PROJECT START DATE: 2/ 27/08

PROJECT COMPLETION DATE: 4/30/09

FUNDING:	TOTAL BUDGET	\$42,000.00
	TOTAL EPA GRANT	\$25,000.00
	TOTAL EXPENDITURES OF EPA FUNDS	\$23,640.74
	TOTAL SECTION 319 MATCH ACCRUED	\$51,000.00
	BUDGET REVISIONS	
	TOTAL EXPENDITURES	\$74,640.74

SUMMARY ACCOMPLISHMENTS

The Blue River Watershed Group was awarded funds under state agreement #WQC 08000056 to develop a Watershed Plan for the Snake River above Keystone. The Snake River is a tributary to the Blue River in Summit County, Colorado. Much of the watershed was heavily mined in the late 1800's and is heavily mineralized. While there have been ongoing efforts for nearly 40 years to clean up problems associated with abandoned mines in this watershed, most of the efforts have focused on a small number of properties in the Peru Creek subwatershed. Since the entire basin has natural or anthropogenic problems associated with the geology and mining legacy of the watershed, a plan for the entire watershed was necessary in order to more fully understand and attract funds to begin remediation of priority projects within the watershed.

The goals for the Watershed Plan were to:

- identify the stakeholders,
- establish an organizational structure to coordinate cleanup efforts,
- develop a Community Outreach program to foster support for the Watershed Plan,
- delineate and inventory the important features of the watershed,
- identify the sources of water-quality degradation in the watershed,
- prioritize these sources and develop Best Management Practices required to remediate these problem sources and quantify the improvements that might accrue from remediation,
- estimate the potential water-quality improvements to the Snake River at selected sites from implementing the Plan
- develop a monitoring program for the watershed that could provide the baseline water-quality data needed to evaluate remediation efforts as they are implemented.

The majority of these goals were achieved. More importantly, the first actual clean-up projects were approved for a Clean Water Act (CWA) § 319 grant based on the Plan. The only goal not achieved in total was the establishment of an organizational structure to implement the Plan. This goal is still a work in progress. There are several reasons this goal was not achieved. The most significant reason is that most of the more serious problems in the watershed are from draining adits. These adits cannot be remediated by a "Good Samaritan" without incurring significant long term liabilities under the CWA. Finding organizations willing to fund remediation will not occur until a solution to this problem is found. The Blue River Watershed Group does not yet have the capacity to be a potential implementing organization. Other involved groups like Trout Unlimited are unwilling to move ahead until the liability issue is solved. Therefore, the first projects will be remediated by a consortium of involved parties, Northwest Colorado Council of Governments, Trout Unlimited and the Blue River Watershed Group with technical support and funding from the Colorado Department of Reclamation, Mining and Safety. It is possible that ad hoc consortiums of interested parties may form the "organizational structure" for implementation. However, even such groups are not tackling the serious draining adit issues, but are confining their initial remediation efforts to the non-point source waste rock and tailings issues where long term liability can be mitigated.

Significant accomplishments were achieved. The entire basin was carefully inventoried and the major sources of anthropogenic water-quality degradation were identified. These projects were prioritized and Best Management Practices for each were identified. The likely improvements from remediating these sites were developed. These pollutant load reductions were modeled in the watershed at key sites and potential water-quality post remediation was estimated. The modeling efforts showed that if all of the highest priority projects were remediated, existing water-quality standards would still not be met at Keystone, the endpoint for the Plan. However, it also showed that the violations at that point were relatively minor and that in all likelihood, the Snake River above Keystone might become a modest fishery of some of the hardier species of trout such as brook trout. All of this is documented in a Watershed Plan that is designed to be placed in a three ring binder and updated as more data becomes available.

In addition, the Plan discusses and proposes a monitoring program necessary to document the existing problems and to develop the background data necessary so remediation programs can compare post remediation water-quality to pre-remediation water-quality. While there are limited current water-quality data for much of the basin, there are insufficient data correlated to flow and during parts of the year, such as winter. To remedy this situation, the Blue River Watershed Group and Colorado River Watch implemented a temporary monitoring program in the watershed. Effective in June, 2009 the USEPA will take over the monitoring program and has committed to continue the program through 2011.

1.0 INTRODUCTION

The Snake River watershed encompasses approximately 78 square miles (mi²) and is located east of Dillon Reservoir in Summit County, Colorado (Figure 1, the meta data for this map, also used in the Watershed Plan and one of the Tasks required by the grant, is in Appendix A to this final report). It is part of the larger Blue River watershed. The Blue River sub-basin of the Upper Colorado River basin has a HUC Code of 14010002. The eastern part of much of the Snake River watershed originates along the Continental Divide. The headwaters of the Snake River begin between the Continental Divide and Teller Mountain. A short distance below the upper valley, the Snake River is joined by Deer Creek, a tributary of nearly equal flow. This confluence occurs in a valley of wetlands, just above the town of Montezuma. As the Snake River flows through this upper valley, there are a number of leaking abandoned mine adits, many of which contribute flows, as well as regular seeps in the wetlands area. At the town of

Montezuma, the tributary Sts. John Creek joins the Snake River. This tributary is also impacted by past mining activity. There are other leaking adits, old tailings piles and small tributaries as the Snake River flows past the Town of Montezuma. Not far below Montezuma is the confluence of the Snake River with Peru Creek. Peru Creek is one of the larger tributaries of the Snake River and begins in the high elevation southern slopes between Gray's Peak and Mt. Edwards immediately west of the Continental Divide. It has been heavily impacted from past mining activity. There are a number of small tributaries that join the Snake River as it flows below Peru Creek toward Keystone, but there are no significant water quality impacts until the North Fork Snake River joins the Snake River at River Run in Keystone. This large, clean water tributary significantly improves the water quality of the Snake River.

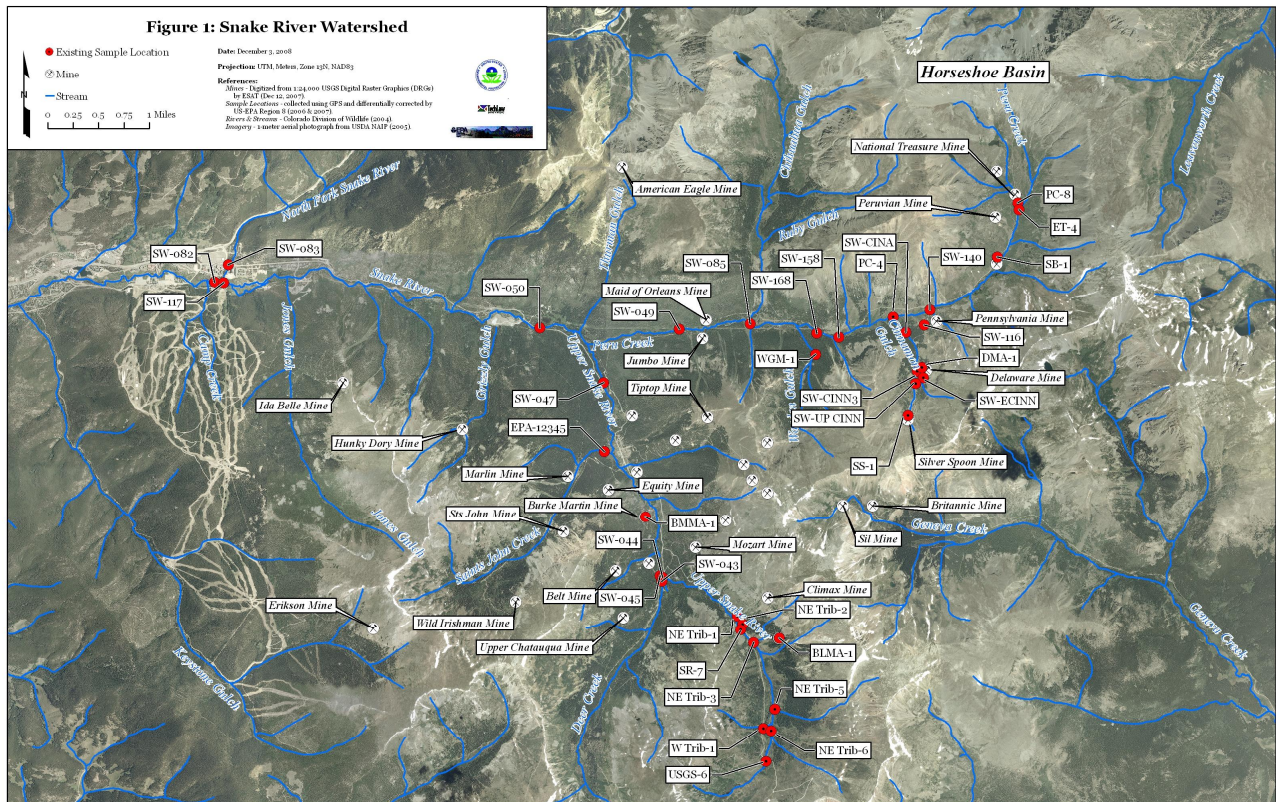


Figure 1 Snake River Watershed Mines and Sampling Sites

Land uses in the watershed are varied and include extensive US Forest Service lands used mostly for dispersed recreation, two internationally renowned ski resorts, the small town of Montezuma, considerable residential development in unincorporated areas, and a multitude of historic mining sites. Keystone Resort and Arapahoe Ski Area draw water from the watershed for snowmaking. The town of Montezuma was established as a mining community in the headwaters of the Snake River in the late 1860s. The community (approximate population: 70, 2000 US census data) does not provide water or sewage facilities, although the town owns senior water rights in the basin. About 3,000 people live year-round in the Snake River Watershed. Resort use, particularly in the winter, frequently swells that number to over 20,000.

The pollutants that exceed water quality standards in the Snake River watershed are pH, dissolved cadmium, dissolved copper, dissolved lead, dissolved manganese and dissolved zinc. These problems are caused by a combination of natural and anthropogenic (man-made) sources. The watershed is heavy mineralized and was mined heavily in the late 1800's. The upper Snake River and

Cinnamon Gulch and Warden Gulch (tributaries to Peru Creek) are in areas of heavy mineralization and disseminated pyrite. Natural runoff and seepage in those areas violates water quality standards. The mainstem of the Snake River, including Sts. John Creek and the mainstem of Peru Creek, including Cinnamon Gulch and Warden Gulch are on Colorado's "impaired" waters list, which is required by Section 303(d) of the Clean Water Act (CWA) for not meeting water-quality standards.

When stream segments are listed as impaired on the 303(d) list the State of Colorado is required to develop a Total Maximum Daily Load (TMDL) assessment. Colorado has developed TMDL's for the Snake River watershed. To meet the existing water quality standards, the TMDL analysis shows that the metals of concern, listed above, must be reduced by more than 95% in many cases. The Watershed Plan shows that this is unlikely, because the natural sources of contamination provide too many metals to the watershed.

Previous work in the Snake River watershed has shown that there is a combination of natural and anthropogenic sources of pollution. The exact amount from each source is not determinable from existing data. The previous work clearly shows that there are many anthropogenic sources contributing significant pollution. The Watershed Plan was designed to better quantify the relationship between the natural and anthropogenic sources. Building on the previous work, the Watershed Plan shows that indeed the anthropogenic sources are significant and remediation of the worst sources will have a dramatic impact. However, it also shows that the natural sources are significant enough that even if the worst sites are remediated, existing water quality standards will not be met. Given all of the uncertainties in the analysis, the Watershed Plan strongly suggests that existing water quality standards should be modified. Locally funded work is underway on a Use Attainability Analysis (UAA), which is the process used to consider changing the water quality standards. The amount of remediation that is possible will most likely have a significant impact on the ability of the mainstem of the Snake River to support fish below Deer Creek.

2.0 PROJECT GOALS, OBJECTIVES AND ACTIVITIES

The primary goal of the Watershed Plan was to provide the framework necessary to improve the water quality of the Snake River. The water quality in the watershed is heavily impacted by mining activity in the late 1800's. Many agencies have been involved in working to characterize some of the sites, but most of the activity has been focused in Peru Creek. By developing a plan for the entire watershed, groups can now apply for grants to do actual remediation. It can be difficult to obtain grants for specific projects until an overall plan for a watershed is developed.

The goals for the Watershed Plan were to:

- identify the stakeholders,
- establish an organizational structure to coordinate cleanup efforts,
- develop a Community Outreach program to foster support for the Watershed Plan,
- delineate and inventory the important features of the watershed,
- identify the sources of water-quality degradation in the watershed,
- prioritize these sources and develop Best Management Practices required to remediate these problem sources and quantify the improvements that might accrue from remediation,
- estimate the potential water-quality improvements to the Snake River at selected sites from implementing the Plan
- develop a monitoring program for the watershed that could provide the baseline water-quality data needed to evaluate remediation efforts as they are implemented.

Objective #1 was to identify the stakeholders in the watershed. Many stakeholders participate in the Snake River Watershed Task Force. Others do not or have not. Task #1 was to identify the stakeholders.

Objective #2 was to establish an organizational structure to coordinate remediation efforts in the watershed. While the Snake River Watershed Task Force (SRWTF) has been working in the watershed for 10 years, it is not a formal organization. The SRWTF, under the leadership of the Keystone Center, has been effective in coordinating the activities of the many different agencies and parties conducting water-quality related activities in the watershed. The focus of the Watershed Plan is on the technical details of how to clean up the watershed, but time was planned to think about and work on the best organizational structure for remediation efforts. Task #2 was to organize at least two stakeholder meetings to get input on an appropriate organizational structure for watershed remediation. Task #3 is to develop an organizational structure with a work product of a functional organizational plan and legal framework to implement the Watershed Plan.

Objective #3 was to work to foster sustainable community support for the Blue River Watershed Group and the Snake River Watershed Plan. This objective was basically the normal community outreach expected of such a project. Task #4 was to develop and implement such a community outreach program. Measurable outputs would include community meetings, website displays, newsletters and progress reports.

Objective #4 was to delineate the watershed and inventory the important features of the watershed. In this watershed this primarily includes the major abandoned mines that are creating the water-quality problems in the watershed. Task # 5 was to develop a base map from existing sources and the inventory of important watershed features. The measurable output was the map and inventory, including the meta data of the map developed for the Plan.

Objective #5 was to develop a Watershed Plan that identifies the key water-quality issues in the watershed and specifies a plan of corrective action, taking into consideration the TMDL developed for the Snake River. This objective was divided into a number of tasks. Task # 6 was to identify the potential and actual sources of contamination that, when corrected, would lead to improved water quality in the watershed. Task #7 was to summarize the water-quality issues in the watershed, identify the problem sources and to identify the data gaps in the less studied tributaries. Task #8 was to take the identified problem sites and develop remediation plans for these important sites. Task #9 was to prioritize the proposed remediation activities and estimate the possible reduction in metals loading from the remediation. Task #10 was to propose areas where additional water quality monitoring and/or flow measurement will improve ongoing remediation planning activities. Task #11 was to prepare a Watershed Plan, adhering to the EPA nine elements of a watershed plan, and following the Watershed Cookbook. Finally, Task#12 was to submit two semi-annual reports and one final 319 Project Report to the CDPHE. The measurable output would be the Watershed Plan and the reports.

2.1 Planned and Actual Milestones, Products, and Completion Dates

The principal “deliverable” or Product of this grant is a Watershed Plan for the Snake River in Summit County, Colorado. The intent of the proposal was to deliver the Plan and the final report in April, 2009. The other Product was the interim report, which was due in and delivered by September, 2009. The final report and the Watershed Plan are being delivered on schedule in April, 2009. The specific outputs of the tasks are delivered as part of the Watershed Plan.

Since the SRWTF has been working in the Snake River watershed for 10 years only a limited number of “new people” were added as interested parties. One landowner who was not previously that active attended two of the meetings. Mr. Jim Martin, one of the actual miners in the watershed, who has been involved in the area since 1948 attended one of the meetings. He has not been active in SRWTF meetings. The local section of Trout Unlimited had not been involved, with TU input from the state office. The local chapter attended several of the meetings.

There were two public meetings specifically to discuss the Watershed Plan or its development. In addition there were many other public information forums such as the BRWP website. Section 6 of this report discusses the public contact activities in more detail.

Before work began on the Watershed Plan there was a feeling that road had a major impact on water quality in the watershed. The Plan did not confirm this. The most serious problems in the watershed are associated with the heavy metals coming largely from point source leaking or draining old adits. While runoff from the roads is not helping the water quality in the watershed, the evidence that runoff from old mine tailings and waste rock is a bigger issue than runoff from roads. The roads can be a particulate problem, but no evidence was found that it is contributing significantly to the metals problem.

Only one new map was developed for the Watershed Plan. Other maps were taken directly from other reports. The one map, the major map of the watershed, Figure 1 was developed for the Plan. The meta data for this map is available in Appendix A.

The Watershed Plan does identify the major sources of pollution and prioritizes them. Each of the major sources were evaluated and Best Management Practices proposed. Zinc was used to demonstrate the problems at each problem mine site. Estimates are provided of the amount of zinc leaving from each priority site. Further, estimates are provided of the amount of clean-up likely at each site from the application of the BMPs. The Plan then shows the likely impacts on water quality for Peru Creek and three sites on the lower Snake River if the BMPs are implemented at each of the priority sites.

The final task was to develop a monitoring program appropriate for the watershed. This was accomplished. Initially the USEPA was not able to commit to monitoring sufficient to document the background conditions from Cinnamon Gulch, which is necessary as part of the §319 grant recently approved for initial remediation in Cinnamon Gulch. Therefore, as part of the development of the Watershed Plan, the BRWG arranged with Colorado River Watch, of the Colorado Department of Wildlife, to conduct water quality monitoring of four key sites. Discussions with the USEPA and other key participants in the SRWTF has resulted in a commitment of the USEPA to monitor these key sites through 2011. Therefore, after the May 1, 2009 sampling, the BRWG/Colorado River Watch monitoring program at the four key sites will end. The data collected in the February, April and May sampling programs will be added to the USEPA data base.

The only major objective not accomplished is Task #3. This task was to develop a functional organization plan and legal framework to implement the Plan. This Task was not met for at least two reasons. First, implementation of the most important remediation, the draining adits, cannot begin until the long-term liability issues associated with the Clean Water Act are resolved. The solution to this problem could be legislative relief that removes the liability or it could be a resolution of the liability under existing laws that might involve the formation of a Foundation or other non-profit structure that by virtue of its structure can "get around" or mitigate the potential liability. Each of these possible outcomes would likely create different organizations and different frameworks for remediation. Therefore, until the liability issue is resolved the organizational framework will not be solved.

The second reason is that the framework tentatively chosen for initial remediation actions needs to be tested before it can be put forward as a possible long term remediation vehicle. For the first remediation projects proposed under the plan, four current organizations working in the watershed to remediate the mining legacy water-quality problems are combining forces. The Blue River Watershed Group, Trout Unlimited, Northwest Colorado Council of Governments and the Colorado DRMS have come together to apply for (and have received) a § 319 grant to remediate three projects in Cinnamon Gulch, a tributary to Peru Creek. This cooperative model might be the vehicle to proceed with other remediation projects. However, it will not be the ultimate solution because this funding mechanism and this organization vehicle will not address the draining adit issues, but rather will confine activities to the NPS issues.

One of the subtasks in the proposal was to do a short survey of key people involved in the Plan development concerning the processes for completing and the success of 1) the development of an

organizational plan and legal framework to carry out the Plan and 2) the development of the Watershed Plan itself. This was done via a conference call with the “advisory committee” and other key participants. Included were representatives of the USEPA, USGS, CDPH&E (water quality and hazardous materials divisions), CRMS, NWCCOG, BRWG and TDS Consulting. There was considerable discussion concerning the development of an organizational framework. References were made to the model used in Clear Creek County and the early attempts create such a “Foundation” in Summit County. The problem of the liability issue and the need for its resolution was agreed to be the obstacle to resolution of this issue. Concerning the development of the Plan, there was less consensus. Each person represented their agencies point of view. There was concern that expectations in the Plan not be set too high, concern that the higher metal concentrations seen in the recent years and its possible implications be better addressed, concern that our understanding of the watershed was incomplete and that any Plan acknowledge such and concern that the Plan not be too pessimistic to lose community support for remediation activities. Following the meeting, changes were made in the Plan to better address these issues. The process used to develop the Plan was accepted, recognizing the differences in point of view and data limitations. The coordination through the Snake River Watershed Task Force was viewed as good. Although the USEPA was viewed as doing a good job of coordinating the activities in the Peru Creek subwatershed, there was generally a view that there needs to be an overall coordinator for the watershed. The Keystone Center, which sets up and facilitates the meetings of the SRWTF, is not in a position to provide the technical coordination that would improve the development and implementation of the many studies underway in the watershed.

2.2 Evaluation of Goal Achievement and Relationship to the State NPS Management Plan

Colorado’s mining nonpoint source program is designed to address mining water quality impacts which are the result of mining activities that occurred previous to the passage of the Clean Water Act in 1972. The program provides an iterative approach to the control of these sources. This approach begins with the identification of stream segments that exhibit water quality problems from these sources. The process uses a scientific approach to remediation based upon the targeting of sources of pollution through the collection of data, setting goals for remediation efforts, determining clean-up strategies, using appropriate regulatory and non-regulatory mechanisms to implement those strategies, and providing follow-up monitoring to determine if the efforts are successful. Completion of this project was in support of this program and process.

The primary goal of a Watershed Plan that can guide the remediation efforts in the Snake River watershed was achieved. The Watershed Plan was coordinated with the key members of the Snake River Watershed Task Force, which has been coordinating characterization activities in the watershed for 10 years. There is now a prioritized list of remediation projects in the watershed. The first positive outcome from this effort is a § 319 grant to begin actual remediation of three sites in Cinnamon Gulch, which are all “Priority One” projects in the Watershed Plan. The Plan complements the TMDL report issued by the Colorado DPH&E in that it confirms that the reductions required in the TMDLs to meet existing water quality standards cannot be achieved in the watershed. The TMDL report suggests this because of the amount of trace metal removal that was necessary to achieve the TMDLs. As a result, a draft Use Attainability Analysis is being reworked and improved with a likely result of a proposal to revise water quality standards in parts of the watershed.

The Snake River Watershed mining related water pollution comes from both point and non-point sources. The Snake River Watershed Plan addresses both sources of pollution. The NPS Best Management Practices proposed at a number of sites are consistent with the plans of the state of Colorado, both in the DPH&E and the DRMS. The Best Management Practices for the point sources are consistent with the water-quality issues at each site. Point source remediation comes with potential liabilities under the Clean Water Act which present a significant barrier, along with high costs, to remedial work at historic mining sites. The State of Colorado made a decision in the 1990’s not to take responsibility for cleaning up the point source discharge at the Pennsylvania Mine until the potential long term liability issues associated with such a clean-up are resolved.

3.0 BEST MANAGEMENT PRACTICES DEVELOPED AND/OR REVISED

The objective of this grant was to develop a Snake River Watershed Plan. As such, there were no BMP's implemented or tons of pollution removed. Rather, a Plan to do so was developed. Existing mining BMP's were proposed for a number of projects, but no new technologies were developed. The remediation actions proposed for this Plan would result in substantial water-quality improvements. The following table shows the projected zinc removals in lbs/yr.

<i>Project Description</i>	<i>Est. Reduction</i>	<i>Project Description</i>	<i>Est Reduction</i>
Pennsylvania Mine	12,000	Saints John Mine	4,000
Jumbo Mine	1,500	Blanche Mine	200
Warden Gulch Mine	200	Unnamed Mine	500
Delaware Mine	100	<i>(east of Montezuma)</i>	
Brittle Silver Mine	100		
Silver Spoon Mine	300		
Totals:	14,200 lbs/y		4,700 lbs/y

4.0 MONITORING RESULTS

There was no monitoring planned for this grant. A limited amount of water-quality data at selected sites were collected and/or analyzed by other organizations to allow prioritization to occur. These data were generally to determine which sites were contributing the most metals to the stream rather than stream water quality monitoring. What was planned and completed in the Plan was to propose watershed wide water quality monitoring to better characterize the problems and to provide a baseline to compare against post remediation monitoring. The following two paragraphs, taken from the Plan, summarize the monitoring needs of the watershed.

What is needed now is a more systematic monitoring program, continuing sample surveys at a few selected key sites over a period of time and combined with field measurements and streamflow data. The most important monitoring sites for continued monitoring are SW-47 (the Snake River above Peru Creek), SW-49 (Peru Creek above the confluence with the Snake River), SW-50 (Snake River below Peru Creek) and SW-82 (Snake River below North Fork confluence). Although there is an argument for adding the Snake River above the NFSR confluence to this list, it is not being recommended at this time because the dilution provided by the NFSR is relatively consistent and the results above the dilution can be reasonably accurately calculated from the data from SW-082 and monitoring funding is limited. In addition, because the initial remediation work is planned for the upper Peru Creek area and Cinnamon Gulch, it makes sense to develop one upper Peru Creek monitoring site where regular (systematic) data can be collected. The two most logical sites are PC-3 and SW-158. The site PC-3 is the site just downstream of the Cinnamon Gulch confluence and site SW-158 is the site at the upstream end of the "canyon" just upstream of the Warden Gulch confluence. Both sites have existing data and both sites should help to characterize improvements to Peru Creek's water quality from remediation activities in Cinnamon Gulch. A site in lower Cinnamon Gulch does not make sense, because the channel is proposed for realignment. Data collection at either of these sites can begin now and continue beyond the channelization, where any other site will be affected by the cleanup activity. Access is much easier at SW-158 and there is a good site to measure flow. The best site to add to the monitoring plan in Peru Creek is SW-158.

It is recommended that these 5 key sites be monitored at least eight times per year. This would include 4 times during high flow season (monthly during May through August) and 4 times during low flow (bimonthly from October through April). Flows should be measured whenever possible. It may not be possible to measure flow during some of the low flow, winter season due to thick ice and snow cover. A suggested sampling frequency for each monitoring (calendar) year is February, April, March, June, July, August, October and December. As discussed previously, Colorado River Watch is currently monitoring site SW-82 monthly and flow is measured by the USGS' stream gage located at this site (note that this is seasonal; it is not operational during winter months). The Blue River Watershed Group and Colorado River Watch initially implemented this monitoring. Recently, the USEPA has agreed to conduct this monitoring through 2011.

5.0 COORDINATION EFFORTS

5.1 Coordination from other State Agencies

Several state agencies were directly involved in the development of the Watershed Plan. The grant was coordinated by the CDPH&E Nonpoint Source Program which provided ongoing support for keeping track of costs, billing and other administrative requirements. That department also provided ongoing support via review of documents, comments on draft reports, and general assistance in grant compliance. Other parts of the CDPH&E, such as the Hazardous Materials and Waste Management Division were more directly involved in the actual drafting of the Plan.

The CDPH&E published in 2008 a TMDL report for the Snake River. This document provided the best summary of existing water quality data in the watershed and a road map of what would be necessary, in terms of pound of trace metals removed from the streams to meet water quality standards. The Watershed Plan took freely from that document and did not try to duplicate the voluminous work in the TMDL report. In addition, Rebecca Anthony, the principal author of the TMDL report was very helpful in reviewing the Plan and providing information whenever some was requested of her.

The Hazardous Materials and Waste Management Division of the CDPH&E was also a direct participant in the development of the Plan. This group published in 2008 the "Cinnamon Gulch and Pennsylvania Mine Site, Final Analytical Results Report for Site Inspection." This report provided much of the data and analysis used to develop the Plan for Cinnamon Gulch and the Pennsylvania Mine. In addition, the principal author, Mark Rudolph provided comments and assistance on the Plan whenever asked. He is an active participant in the Snake River Watershed Task Force and was always quick to help and to coordinate his ongoing activities with others in the watershed.

The other state agency directly involved was the Colorado DRMS. This agency, represented by Jeff Graves, has been involved in mining related activities in the Snake River Watershed for a number of years. His help and counsel were essential in the development of the Plan. His knowledge of the watershed and its problems was freely shared. He spent time in the field reviewing issues. He helped with the writing of the geology section of the Plan. He provided important input into the prioritization. His comments on the draft Plan allowed the final Plan to be much improved. His assistance in the design of Best Management Practices for different sites was critical. He made sure the Plan was consistent with the CDRMS efforts in the watershed.

5.2 Other State Environmental Program Coordination

The other state program that was very helpful was Colorado River Watch of the Division of Wildlife. This program monitors the water quality of Colorado's rivers and streams. They currently monitor the water quality monthly at SW-82, which is the Snake River at Keystone, just behind River Run. The BRWG collects the samples and does the field measurements and River Watch does the metals analysis.

For this study, River Watch agreed to do the metal analysis for eight special sites for the development of the Plan. These sites provided the key data to allow a number of draining adits to be prioritized.

There is a critical need to begin regular monitoring in the watershed at key sites. This need is discussed above in Section 4. Much of the needed monitoring could be conducted under a § 319 grant that was just approved for remediation in Cinnamon Gulch. However, that monitoring cannot begin until the grant funding is initiated which is most likely the first quarter of FFY2010. By the time funds are available to monitor, construction will only be a couple of months from beginning. Therefore, critical loading data, that is water-quality monitoring with flow data, cannot be collected before construction begins. What is needed is 2009 water quality monitoring on a regular basis. To meet this need, Colorado River Watch agreed to fund the 5 needed sites, eight times per year as was recommended until the new grant is funded. This willingness to fund this monitoring until the grant is funded is very important and River Watch is to be commended for funding these interim data collections. In April, 2009 the USEPA committed to conduct this monitoring program through 2011. As a result the River Watch/BRWG effort ended with the May 1 sample collection.

5.3 Federal Coordination

The USEPA has been coordinating much of the pre-remediation work in the area of the Pennsylvania Mine and in Cinnamon Gulch. They have funded a number of important studies. The Watershed Plan development relied on the data and analyses from these studies. In addition, the EPA funded and coordinated collection of certain water quality data over the last several years, which were important in the development of the Plan. The USEPA also was very helpful in responding to any requests for assistance. For example, Figure 1 in the Watershed Plan, which is a comprehensive map of the Snake River Watershed, was put together by the USEPA, just for the Watershed Plan, from a request to do so. The leadership of the USEPA in the Snake River Task Force allows for the kind of coordination needed among the many parties working in the watershed. Jean MacKenzie of the EPA has been the de facto watershed coordinator for the many activities underway in the Peru Creek tributary. Working with the USEPA in these activities has been Robyn Blackburn of the US Fish and Wildlife Service.

The second federal agency which has been very helpful in the development of the Plan has been the US Geological Survey. Stan Church of the USGS provided the geological map in the Plan. Andrew Todd of the USGS has been one of the key researchers and contributors to characterization activities in the watershed. He helped with the biological assessment in the Plan and provided important comments on the first draft of the Plan. His work in the watershed has contributed significantly to our understanding of the watershed.

The USFS is also an active participant in the Snake River Watershed Task Force. Brian Healy has conducted biological assessments in the watershed and was helpful in drafting that section of the Plan. In addition, the map he created for one of his reports is used in the Plan to show the more important monitoring sites in the watershed. The Forest Service was willing to adjust the map to add a site important to the report. Justin Anderson, a hydrologist with the Forest Service, visited several sites to discuss remediation possibilities and prioritization among sites.

All of these Federal agencies are active members of the Snake River Watershed Task Force and try to coordinate their activities with that group. Their active involvement with the SWRTF made it easy for them to be involved in the development of the Plan.

5.4 USDA Programs

The only USDA activity in the development of the Watershed Plan was the involvement of the USFS, which is discussed in Section 5.3.

5.5 Accomplishments of Agency Coordination Meetings.

There were no “agency coordination meetings” per se. There is coordination among all of the participants in the remediation activities in the watershed via the SRWTF. There were several SRWTF meetings during the preparation of the Plan. The activities of each agency are reviewed at the SRWTF meetings.

5.6 Resources/Coordination from Federal Land Management Agencies

The only Federal land management agency involved in the development of the Plan was the USFS. Their involvement is discussed in section 5.3.

5.7 Other Sources of Funds.

There was no direct funding other than those funds provided via the § 319 grant. There were significant matching contributions. Matching contributions were provided by ZeoponiX, Inc., Trout Unlimited, Northwest Colorado Council of Governments, and TDS Consulting. The amounts contributed are shown below.

Matching Contributions		
Contributor	Hours	Dollars
ZeoponiX, Inc.	420	\$42000
Trout Unlimited		\$2,000
NWCCOG	30	\$2,100
TDS Consulting	49	\$4,900

6.0 SUMMARY OF PUBLIC PARTICIPATION

The BRWG has been working since receiving the grant to keep the people of Summit County informed of the activities underway in the basin. The Snake River Watershed Plan development was discussed at a March, 2008 and March, 2009 Summit Water Issues class held at the Colorado Mountain College campus in Breckenridge. The Plan development was again discussed at the “State of the River” meeting held in June, 2008. The Plan was also discussed at the June, 2008 “Future of Water” forum held by the BRWG and Our Future Summit. In July, 2008, at the awards presentation held by the Summit Foundation to award its second half of 2008 grants, the plan was again discussed as the BRWG was asked to be the environmental awards recipient speaker. In August, 2008, the BRWG had a booth at the Continental Divide Land Trust annual meeting, where the plan development was displayed. Finally, in September, 2008, the Plan development and status were again discussed at the Patagonia Film Festival.

The BRWG had four mailings to water interested parties in 2008 which is designed in part to keep citizens informed of the development of the Snake River Watershed Plan. These mailings were sent in April, August, September and December, 2008. These newsletters discussed the progress of the plan development.

During the summer of 2008, the development of the BRWG website was finalized. This site provides up to date information on the plan development including the interim report filed in September, 2008. All of the events sponsored by the BRWG are also described on the web site. The actual Plan will be placed on the site once it is approved.

On December, 4, 2008 a public meeting to discuss the water-quality issues leading to the development of the Plan was held in Frisco, CO. The discussion at the meeting outlined the issues that have been addressed, different prioritization methodologies, the tradeoffs that need to be made (such as the tradeoff between remediating a site versus preserving the site for its historical significance), and the

challenges associated with Plan development. A second public meeting was held on March 19, 2009. This meeting was held to discuss the specific elements of the Plan and the implementation challenges. The meeting was structured to first put the problems in context and then to discuss the potential solutions outlined in the Plan. Other remediation activities and studies underway in the watershed were also discussed.

7.0 ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

Two principal aspects of the project did not work out as anticipated. The first one is discussed in section 2.2. In the Plan development it had been hoped that an organizational plan for implementation could be developed. However, in order to develop such a framework, the liability issues raised by the Clean Water Act must first be solved.

The second issue was the project was improperly scoped. It was not possible to develop a Watershed Plan for the Snake River and to help with the administrative functions of the BRWG for the \$42,000 budgeted. With a watershed the size of the Snake River watershed and the hundreds of old mines in the watershed, more money should have been budgeted. The Plan was able to be developed because of the increased matching contributions provided by the key participants. When proposing to develop a watershed plan, groups should pay more attention to the realistic costs of such an endeavor.

8.0 FUTURE ACTIVITY RECOMMENDATIONS

The most important future activity is the implementation of the Watershed Plan. A new § 319 grant has been applied for and approved to begin actual remediation in the watershed. To prepare for this grant and to improve the understanding of the metals loadings, monitoring is needed and as discussed above has been initiated with the support of Colorado River Watch. It is hoped that more grants and more remediation projects will follow.

Remediation activities will continue to be coordinated by the SRWTF. This coordination is essential to make all of the activities useful to all parties. The Keystone Center, which coordinates the SRWTF and the USEPA, which has provided much of the funding for ongoing work, have been doing an excellent job of coordination to date.

Appendix A Meta data for Figure 1

Theme: Biota, 002, environment, 007

Ecosystem Monitoring, Pollutants and Toxics, Water Quality

Sample Locations, Mining, Legacy Hardrock Mine, Legacy Hardrock Mining

Peru Creek

Place: USEPA Region 8, Colorado, Summit County, Keystone, Pennsylvania Mine, Peru Creek, Cinnamon Gulch, Snake River

Temporal: 11/19/2008

Description

Abstract

Water sample locations and proposed task areas in and around the Pennsylvania Mine site and upper Cinnamon Gulch.

Purpose

In support of an EPA grant

Bounding Coordinates

Horizontal, In decimal degrees

West: -105.823138836241

East: -105.803983154395

North: 39.6043248939404

South: 39.5852346904062