



COLORADO

Parks and Wildlife

Department of Natural Resources

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Bert Garcia
Director, Ecosystems Protection Program
EPA Region 8
1595 Wynkoop St,
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Subject: Comments on EPA's *Post-Gold King Release Incident: Conceptual Monitoring Plan for Surface Water, Sediments, and Biology*

Dear Mr. Garcia,

Colorado Parks and Wildlife (CPW) appreciates the opportunity to comment on EPA's *Post-Gold King Release Incident: Conceptual Monitoring Plan for Surface Water, Sediments, and Biology*. CPW manages the fisheries in much of the Animas River in Colorado, and has an interest in identifying any long-term impacts to biological communities from the Gold King Mine release. CPW and our River Watch (RW) program are willing to collect water quality samples, fish community data, and fish tissue samples at EPA's request.

Historical and Pre-Release Data Sources

CPW has a long record of fish community metrics at many locations in the Animas River including historical data, pre-release data, and post-release data (Table 1). EPA may request the data for surveys of interest. CPW routinely surveys the fish community in two stretches of the Animas River through Durango: From the Durango High School Footbridge to the 9th Street Bridge, and from the pump plant to the Highway 160 High Bridge.

CPW completed fish surveys in these two stretches of the Animas near Durango just before and after the Gold King Mine release, and is planning to resurvey those populations in the next year to evaluate any changes in fish communities or recruitment. CPW is also planning to examine reproduction by fry shocking at eight locations on the Animas that were sampled annually from 1996-1999: Bakers Bridge, Trimble, Durango High School Footbridge, above Carbon Junction Canyon (behind the mall), Hwy 160 Crossing (High Bridge), Basin Creek, Weaselskin Bridge, and High Flume Canyon.

Table 1. CPW fish survey summary.

Station ID	Site Name	Lat	Long	First Record	Most Recent Record	Number of Surveys
11849	above Howardsville at Cataract Gulch	37.84253	-107.59180	8/21/2010	9/10/2015	5



Table 1. CPW fish survey summary.						
Station ID	Site Name	Lat	Long	First Record	Most Recent Record	Number of Surveys
11269	LAT/LONG: M37 (48 57.68 -49 01.15); W107 38 (51.64-59.81)	37.81704	-107.64805	10/26/1996	10/26/1996	1
3517	USGS GUAGING STATION BELOW SILVERTON	37.78865	-107.66828	10/5/1992	9/9/2015	4
938	BLW CNFL W/ MOLAS CRK ABV COLORADO TRAIL	37.73421	-107.66086	7/13/1994	7/13/1994	1
3516	ELK PARK--RAILROAD WYE ANIMAS CANYON	37.72643	-107.65517	10/7/1992	9/9/2015	4
940	B-REC #3 0.25 MI BLW ELK CRK	37.71828	-107.65385	4/28/1992	4/28/1992	1
939	B-REC #5 0.75 MI ABV NEEDLE CRK	37.63644	-107.69137	4/29/1992	4/29/1992	1
488	LAT/LONG: N37 37 41.22; W107 41 52.92 (DOWNSTREAM END)	37.62806	-107.69751	10/28/1996	10/28/1996	1
3515	BRAIDED SECTION AT TEFT SPUR ANIMAS CANY	37.59996	-107.77032	10/6/1992	9/8/2015	6
11730	BAKER'S BRIDGE	37.45387	-107.80143	12/9/1975	7/30/1996	3
11731	Trimble Lane Br.	37.38540	-107.83642	7/31/1996	7/31/1996	1
11516	6.7 MI NORTH OF DURANGO	37.35212	-107.84716	7/15/1954	2/1/1979	2
11271	4.5 MI N OF DURANGO @ CG	37.33884	-107.84524	7/15/1954	7/15/1954	1
11270	2.2 MI FROM WIEHE FARM	37.31059	-107.84849	7/16/1954	7/16/1954	1
11517	.25 MI NORTH OF POND INLET	37.30777	-107.85822	7/16/1954	7/16/1954	1
11729	32ND ST BRIDGE	37.29941	-107.86904	7/15/1954	9/18/1996	14
11527	DHS Footbridge	37.28633	-107.87167	7/30/1996	9/6/2006	4
12154	Durango Fish Hatchery	37.28070	-107.87618	3/28/2011	3/28/2011	1
11749	ANIDURCO	37.27949	-107.88012	8/11/1912	7/15/1954	2
12150	DHS pedestrian bridge to 9th St.	37.27429	-107.88454	9/9/2008	9/8/2014	4
11542	BEHIND HOLIDAY INN 0.7 MI E OF DURANGO	37.27131	-107.88635	7/15/1954	10/24/1991	10
11540	Gateway	37.26142	-107.88006	11/7/1986	9/19/1996	2
9879	DURANGO HATCHERY TO HWY 160 WEST BRIDGE	37.24219	-107.86558	12/12/1983	9/5/2006	3
9865	BMX PARK TO HIGH BRIDGE	37.23534	-107.86882	11/21/2002	8/27/2015	6
10245	PURPLE CLIFFS	37.22080	-107.85829	12/10/1975	6/21/2010	20
9862	BTWN PURPLE CLIFFS & BASIN CRK	37.19330	-107.86356	7/6/1992	7/20/2005	4
9727	#3F W BANK ABV CNFL W/ BASIN CRK S UTE TRIBAL LAND	37.18900	-107.87232	7/6/1992	7/21/2005	3

Station ID	Site Name	Lat	Long	First Record	Most Recent Record	Number of Surveys
10545	1.3 KM BLW INDIAN CRK	37.16789	-107.87366	7/25/2005	7/25/2005	1
10248	Weaselskin	37.15245	-107.88431	12/10/1975	7/31/1996	6
9860	#CO-2 (WJM); DIVERSION 0.25 MI N TO 0.25 MI S OF LA POSTA	37.11652	-107.89215	8/30/1994	8/30/1994	1
10244	ABOVE BONDAD	37.06995	-107.87531	12/10/1975	7/8/1992	6
9725	BELOW BONDAD BRIDGE	37.05051	-107.87467	9/22/1980	7/25/2005	4
9869	IMMED DOWNSTREAM OF FLORIDA RIVER CONF	37.04829	-107.87288	9/22/1980	7/8/1992	3
9728	#NET-1 WJM @ TWIN XING ABV RR BRIDGE	37.02762	-107.87513	8/30/1994	8/30/1994	1
9861	FLORIDA R (BONDAD) & STATE LINE	37.00071	-107.86708	10/25/1991	4/27/2007	3

CPW's River Watch program has water quality data at many locations in the Animas River including historical data, pre-release data, data from the release itself, and post-release data. Table 2 includes a list of active RW stations, although additional RW sampling stations also have historic and pre-release data, which can be provided at EPA's request.

Station ID	Station #	River	Station Name	Lat	Long
506	3611	Animas	A72	37.78993	-107.66756
1187	88	Animas	Baker's Br	37.45810	-107.80010
1195	89	Animas	Trimble Lane Br	37.38505	-107.83668
735	3577	Animas	32nd St	37.30010	-107.86910
734	3576	Animas	Hatchery	37.28130	-107.87330
746	3590	Animas	High Br	37.23550	-107.86910

CPW is aware of other sources of water-quality and biological data collected in the Animas River prior to the release, during the release, and after the release.

USGS published the results of water, sediment, periphyton, macroinvertebrate and fish data collected in the late 1990's in *Integrated investigations of environmental effects of historical mining in Upper Animas watershed, San Juan County, Colorado* (Anderson 2007, Besser et al. 2001, Besser et al. 2006, Besser and Brumbaugh 2007, Besser and Leib 1999, and Besser and Leib 2006). Tables 3 and 4 summarize the USGS data from that report that may be useful for establishing pre-release conditions in portions of the Animas and published

Stream/River	Location
Animas River	upstream Cement Cr.
Cement Cr.	mouth

Table 3. Selected sites sampled for macroinvertebrate community, fall 1996, spring 1997, and fall 1997 (Anderson 2007)

Stream/River	Location
Animas River	upstream Mineral Cr.
Animas River	upstream Deer Park Cr.
Elk Cr.	mouth
Animas River	Upstream Elk Cr.
Animas River	Upstream Needle Cr.
Animas River	Upstream Cascade Cr.
Animas River	downstream Bakers Br.
Animas River	upstream Hermosa Cr.
Hermosa Creek	mouth
Animas River	32 nd St. Br., Durango
Animas River	upstream Lightner Cr.
Animas River	Purple Cliffs
Animas River	Weaselskin Br.
Animas River	upstream Florida R.
Animas River	mouth

Table 4. Selected sites with water quality, sediment, macroinvertebrate community, macroinvertebrate metals, fish liver metals data (Besser and Brumbaugh 2007)

Stream/River	Location
Animas River	above Silverton
Cement Cr.	mouth
Animas River	below Silverton
Animas River	at Elk Park
Animas River	at Needleton
Animas River	above Cascade Creek.
Cascade Cr.	mouth.

Colorado's Water Quality Control Division (WQCD) has macroinvertebrate data for several locations, and periphyton data from the Animas River near Trimble (Table 5).

Table 5. WQCD Sites with macroinvertebrate community data and/or periphyton biomass and community data 2005-2014

Stream/River	Location
Animas River	above Maggie Gl.
Animas River	at James Ranch
Hermosa Cr.	at gage
Animas River	Trimble
Junction Cr.	at Forest Service Boundary

Sgro et al. (2007) evaluated diatom communities in the Animas River in relation to metals concentrations and pH (Table 6).

Table 6. Sites where diatoms were collected 4-7 August 2005 (Sgro et al. 2007)

Stream/River	Location
Animas River	above S. Fk. Eureka Cr.
Animas River	above Cunningham Cr.
Animas River	above Cement Cr.
Cement Creek	near mouth
Animas River	above S. Mineral Cr.
Animas River	above Deer Cr.
Animas River	above Elk Cr.
Animas River	above Needle Cr.
Animas River	above Cascade Cr.
Cascade Creek	near mouth

Courtney and Clements (2002) analyzed macroinvertebrate communities and zinc concentrations in macroinvertebrates in the Animas River watershed in 1998 and 1999 (Table 7).

Table 7. Macroinvertebrates community, periphyton biomass, and periphyton zinc collected 1998-1999 (Courtney and Clements 2002)

Stream/River	Location
Animas River	below Mineral Cr.
Animas River	above Deer Cr.
Animas River	below Deer Cr.
Animas River	above Elk Cr.
Elk Creek	
Animas River	below Elk Cr.

Macroinvertebrates were sampled from several sites by Sam Duggan from Will Clements' lab at Colorado State University 24 to 36 hours after the leading edge of the Gold King plume was running down the Animas River.

Table 8. Macroinvertebrate samples collected with a Hess sampler by Sam Duggan in August 2015.

Stream/River	Location	Latitude	Longitude
Hermosa Creek	at Hwy 550 crossing (note this site is downstream of return flow from a ditch that may take water from the Animas).	37.414107	-107.835907
Animas River	at "The Cove" housing development in Hermosa	37.400352	-107.830376
Animas River	downstream of 32 nd St. bridge in Durango	37.298517	-107.869676
Junction Creek	near start of Colorado Trail	37.330959	-107.903531
Animas River	at Dalbetta Park in Durango	37.221854	-107.862048

The Animas River Stakeholders Group and Mountain Studies Institute may also have additional chemical and biological data for relevant portions of the Animas River watershed.

Suggested Changes and Additions

Selected Monitoring Sites

CPW suggests moving site GKM01 (Animas River at Southern Ute Reservation Boundary) 1.4 miles upstream to Animas at Hwy 160 bridge crossing (37.235759, -107.868852). CPW routinely surveys the fish community from the pump plant to the Highway 160 High Bridge. Below Highway 160, the Animas River widens and is too shallow and rocky to be effectively surveyed by raft. The Animas at Highway 160 High Bridge also has a better existing data set for water quality data (RW site 3580, sampled from 2002-2015; WQCD site 9418, sampled 2009-2010), macroinvertebrate community data (Anderson 2007; ARSG, sampled in 2003), and fish community data (CPW 2002-2015).

Addition of Control Sites

CPW suggests adding control sites in unimpacted tributaries to establish any basin-wide trends in biological communities or water-quality during EPA's monitoring period. Data from control sites is needed to understand if changes in biologic communities in the Animas are due to the Gold King release or climate, particularly if flows or temperatures in the coming year are significantly different from baseline conditions. Junction Creek and Hermosa Creek are good candidates to establish these trends.

Junction Creek has a roller dam at the mouth that acts as a fish barrier to prevent migration between this tributary and the Animas, and has a good record of baseline water-quality and biological data. RW and WQCD have water-quality data for Junction Creek. WQCD has periphyton community data and biomass data for Junction Creek, and EPA may have periphyton data as well (REMAP). WQCD, EPA and Sam Duggan have macroinvertebrate community data for Junction Creek, and CPW has fish community records as well.

Hermosa Creek could be sampled approximately 5-miles upstream of the mouth to minimize the chances of collecting fish migrating between Hermosa Creek and the Animas River. Hermosa Creek also has existing water-quality data, macroinvertebrate community data, and fish community data. RW and WQCD have water-quality data for Hermosa Creek. WQCD and Sam Duggan have macroinvertebrate community data for Hermosa Creek, and CPW has fish community records as well.

Water Quality

The biotic ligand model (BLM) considers the influence of hardness and other water-quality parameters on the toxicity of metals to aquatic organisms¹. CPW suggests adding water-quality parameters included in the copper BLM, since copper is one the metals of concern in the Animas River. Copper BLM parameters that are not specifically listed in EPA's current monitoring plan are dissolved inorganic carbon (or alkalinity), chloride, and sulfate. Sulfide is not used in the current version of the BLM, but is likely to be included in future versions of the model.

Periphyton Biomass

¹ http://www.hydroqual.com/blm/BLM_manual.pdf

CPW suggests adding periphyton biomass and metals analysis to EPA's monitoring plan. Periphyton biomass is inversely related to the iron concentration in periphyton, therefore primary productivity is likely to be reduced by sediment deposition from the Gold King Mine release. There are several sources of pre-release periphyton biomass data for the Animas River (Besser et al. 2001, Besser and Brumbaugh 2007, Courtney and Clements 2002, WQCD site 9426).

Macroinvertebrate Community

CPW suggests using a Hess sampler to collect macroinvertebrate community data rather than the Rapid Bioassessment Protocol². Hess sampling is a quantitative method that allows density to be compared across sites, and allows variability to be calculated. EPA will need to know the variability in samples collected at a single site and sample date to make statistical comparisons between sites, or to make statistical comparison at the same site through time. CPW also recommends targeting a single habitat such as riffles, since habitat strongly influences the macroinvertebrate community.

Fish Community

CPW supports EPA's inclusion of fish community in the study plan. CPW has not observed acute impacts to the fish community from the Gold King Mine release to date, but it is possible that a reduction in fish biomass could be observed due to reduction in primary productivity due to smothering of periphyton.

Reductions in growth and reproduction could also occur due to fine sediment impacts to redds, or through trophic transfer of metals from the deposited sediments to algae, macroinvertebrates, and fish. CPW's comments about the ability to survey fish populations at EPA's proposed sites are summarized in Table 9.

EPA site	Location	Comments
CC48	Cement Creek upstream of Silverton	This location is currently fishless, but could be re-surveyed to record the current condition. This site is not currently in CPW's 2016 work plan.
A68	Animas abv Cement Cr.	This location has brook trout. A site further upstream near Cataract Gulch is routinely surveyed by CPW. It is possible to survey at this site, but this location is not currently in CPW's 2016 work plan.
A72	Animas below Silverton	This location is currently fishless, but could be re-surveyed to record the current condition.
A73	Animas upstream of Elk Cr.	CPW is planning to survey this location in 2016.
A75D	Animas upstream of Cascade Cr.	This location can be surveyed in side channel under most flow conditions.
Bakers Bridge	Animas at Bakers Br	This location is difficult to fully survey due to access issues. CPW is planning to do fry shocking at this location in 2016.

² <http://water.epa.gov/scitech/monitoring/rsl/bioassessment/index.cfm#Table of Contents>

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