2010 Animas River Report

San Juan Basin

Jim White, Aquatic Biologist
Colorado Division of Wildlife
151 E. 16th Street
Durango, CO 81301

Contents

Tables

Figures

Photos

Animas River

Animas #1&2 (Durango) Mark and Recapture Population Estimate

Date(s)	September 7-10, 2010
Gear	14 ft Raft Electrofishing boat with Smith-Root 2.5 GPP and throwable anode arrangement. VVP settings were High Range 20-25% and 60PPS.
Drainage	San Juan
Water Code(s)	Animas #1 (37982) and Animas #2 (37994)

INTRODUCTION

The Animas River is split into two management sections through the City of Durango. Animas #1 is defined as the Gold Medal Reach from the confluence of Lightner Creek just below the Highway 160 Bridge to Riviera Bridge behind Home Depot. This 4.4 mile reach of river is managed with a two-fish 16 inches or greater bag limit and artificial fly and lure only. Gold medal criteria is defined as a reach of river that consistently produces 60 pounds of trout per surface acre or more and 12 fish greater than or equal to 14 inches per surface acre of river. Rainbow trout consist of 30% of fish captured by anglers and brown trout 66%[1]; catch rates average about 0.3 fish per hour. An estimated 1,955 anglers fished the Animas River Gold Medal reach from July-September, 1997. Those anglers released all of the rainbow trout and 96% of the brown trout captured. With the increase population of Durango over the last 10+ years, the number of anglers has undoubtedly grown. Stocking on the Animas River #1 consists generally of 10k brown trout and 10k rainbow trout fingerlings each year. These fish are distributed by raft in June and July. Since 2005 approximately 10k Colorado cutthroat trout fingerlings have been stocked annually.

The Animas River #2 is managed with Standard Regulations that allow the use of bait and a 4 trout daily bag limit (no size restrictions). This 2.7 mile reach of the Animas River unofficially begins at 32nd Street and continues downstream to the Lightner Creek confluence. Anglers, estimated at 1,635, during the 1997 fishing season reported catching 45% rainbows, 54% brown trout, and 1% Snake River cutthroats. Approximately 72% of trout captured were released. This is a high percentage for a Standard Regulation

[1] 1997 Animas River Creel Census Data. Note. There were no trout stocked into the Animas River #1 and #2 in 1997 because of hatchery shortages caused by whirling disease.

water. Angler catch rates were reported at 0.44 fish per hour. Stocking over the past 10 years varies a little but generally 10k rainbow and brown trout fingerlings are stocked by raft each year in the Animas #2. Since 2005 we have been stocking approximately 10k Colorado cutthroat trout fingerlings in addition to the browns and rainbows. Because of the higher use associated with Standard Bag limits in an Urban Area, an average of 2000 catchable rainbow trout have been stocked annually.

The Animas River will be impacted by the Animas La-Plata Project. The Animas La-Plata's featured project component, Ridges Basin Dam was completed in November 2007. Limited pumping began in the fall of 2008 with full pumping of 280 cfs from the Animas River started in June 2009. Pumping was shut down in August 2009 and resumed in the spring of 2010. The reservoir, Lake Nighthorse, is now approximately 70% full.

The Bureau of Reclamation (BOR) is mitigating the impacts from pumping by stocking a total of 100,000 sub-catchable rainbow trout into the Animas River from Durango to Bondad. A Memorandum of Understanding (MOU) was signed by the Bureau of Reclamation, Southern Ute Indian Tribe (SUIT), and Colorado Division of Wildlife (CDOW) in the Fall of 2009. The purpose of this MOU is to coordinate fish management efforts on the Animas River between the signatory parties so that a quality trout fishery is maintained (defined by Gold Medal standards on waters managed by CDOW). Specific action items in this agreement include the CDOW supplying whirling disease resistant strains of rainbow trout eggs to the Fish and Wildlife Service for rearing. The BOR will pay for raising and transporting the fish to the Animas River. SUIT and CDOW agreed to stock out the fish annually and coordinate fish inventories on a biennial basis. The CDOW and SUIT will provide the BOR with a report at the end of the 2016 field season evaluating the effectiveness of the stocking program relative to existing fish populations before pumping operations began. The results and discussion presented in this report can be considered part of the coordination effort and adaptive management clauses of the MOU agreement.

METHODS

A 2-pass mark and recapture population estimate was conducted by electrofishing raft on the Animas #1 and #2 during the week of Sept. 7-10. Animas River flows ranged between 300-350 cfs during this time period. All fish were marked with by punching a small hole in the caudal fin and releasing them back to the river. The Animas #1 was Marked on 9/8 and fish were recaptured on 9/10. The Animas #2 was Marked on 9/7 and the Recapture run done on 9/9. All data were entered into the CDOW's "Jake-O-Matic" or JOM database. JOM uses the Peterson index for mark and recapture population estimates.

RESULTS AND DISCUSSION

The density (fish per mile) and biomass (lbs/acre) of trout in the Gold Medal reach of the Animas River has declined since 2002 and 2006, respectively (Table 1). The Animas River still qualifies as a Gold Medal fishery by exceeding 60 lbs/acre of trout biomass and trout density of 12 trout $\geq$ 14 inches per surface acre. This declining trend in biomass is primarily marked by a downward trend in the abundance of large (>400 mm; ~16 in) rainbows and browns since 2002 (Figure 1). The density of rainbow trout and brown trout greater than 14 inches is down about 62% from the historic average (Table 1). The abundance of trout (fish/mile) during the 2010 survey was about twice as high as the average abundance reported since 1991; however, approximately 80% of those fish were from earlier stocking of 5 inch rainbow trout (Hofer/Colorado River rainbow hybrids or HXCs). The HXC rainbows were stocked to mitigate impacts to the fishery in the Animas River.

Table 1 Trout population statistics for the Gold Medal reach of the Animas River

Animas #1 Gold Medal												
Month/Year	Oct-91	Nov-93	Sep-94	Sep-96	Sep-98	Sep-00	Nov-02	Nov-04	Sep-06	Sep-08	Sep-10	Average
All trout combined (fish/acre)	61	53	56	146	54	141	51	90	141	73	148	87
All trout combined (fish/mile)	738	641	678	1752	653	1706	617	1089	873	887	1792	972
Total trout biomass (lbs/acre)	64	51	43	128	65	144	120	96	93	75	71	89
All trout > 14 inches (fish/acre)	21	22	17	61	35	69	49	44	31	21	13	35
Rainbows> 14 inches (fish/acre)	10	9	9	38	9	28	19	33	10	10	5	16

The most striking result of this year's fish inventory on the Animas River is the noticeable decline in the density and biomass of larger rainbow trout. Length frequency analysis suggest about 43% of the biomass in the 2004 and 2006 fish surveys was attributable to the higher abundance of larger rainbow trout (Figure 1). The length frequency chart for rainbows clearly shows captures of rainbows over about 12 inches (300 mm) has been in the 8% or greater range since 2002. This year less than 2% of the rainbows captured were in that same size range and there appears to be little recruitment of Age-1+ fish (250-300 mm; Figure x) into the larger size classes of rainbows. A similar observation was made for the Animas River #2, Standard Regulation reach, just upstream (Table 2).

Brown trout (Figure 1) density and age class structure in the Gold Medal Reach appears relatively stable over the past 10 years. A relatively large cohort of Age-1+ browns are poised to recruit into the quality size (14 inch) group of fish next year (2011). Brown trout are becoming more abundant relative to rainbow trout in the Gold Medal reach. In 2006, at the peak of large rainbow abundance, there were almost 3 rainbows over 14 inches for every brown trout per mile of river. That ratio has flipped and now there is less than 0.6 rainbows for every brown trout in the Gold Medal reach of the Animas River.

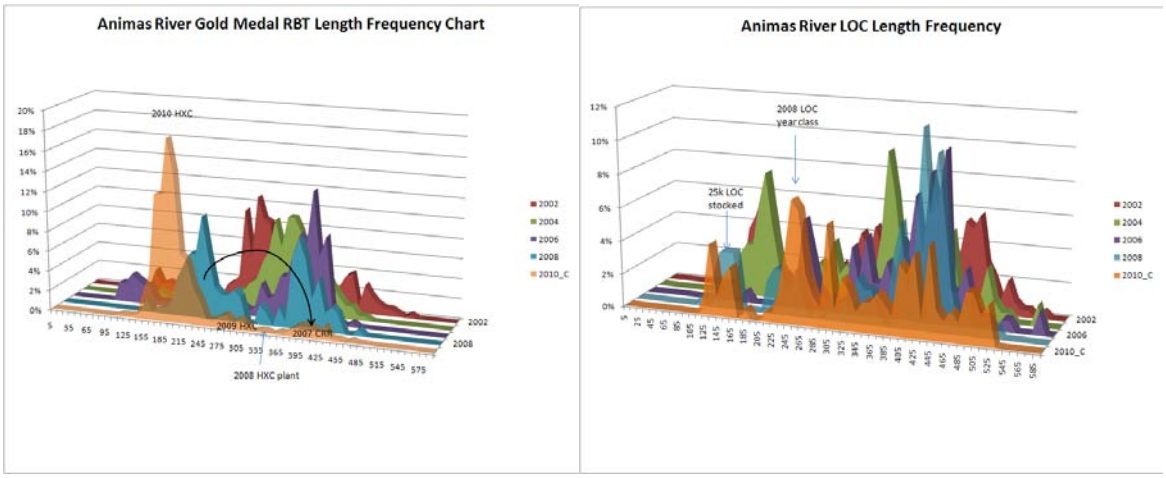

Figure 1 Length frequency charts of rainbow trout (left) and brown trout (right) captured in the Animas River Gold Medal reach during 2010 (orange area) fish inventory.

The Animas River #2, or Standard Regulation Reach, from 32nd Street Bridge to the Lightner Creek confluence has also experienced a decline in trout abundance and biomass since 2006. We recorded the second lowest biomass of trout in 11 fish inventories (Table 2). Biomass of trout has declined about 45% since 2008 is now 52% of the historic average. Larger browns (>14 inches) typically dominate the fish species composition in the Standard Regulation reach; however, both larger browns and rainbows were depressed in total numbers and quality sized fish (Figure 2).

Table 2 Trout population statistics for the Standard Regulation reach of the Animas River.

Animas #2 Standard												
Month/Year	Oct-91	Nov-93	Sep-94	Sep-96	Sep-98	Sep-00	Nov-02	Nov-04	Sep-06	Sep-08	Sep-10	Average
All trout combined (fish/acre)	147	43	122	66	38	57	130	115	84	97	56	87
All trout combined (fish/mile)	1779	520	1476	799	460	690	1573	1392	1406	1171	720	1090
Total trout biomass (lbs/acre)	115	32	56	41	28	42	99	104	115	58	32	66
All trout > 14 inches (fish/acre)	37	12	10	11	12	16	38	17	34	13	4	19
Rainbows> 14 inches (fish/acre)	3	2	2	2	6	5	10	7	11	4	0.2	5

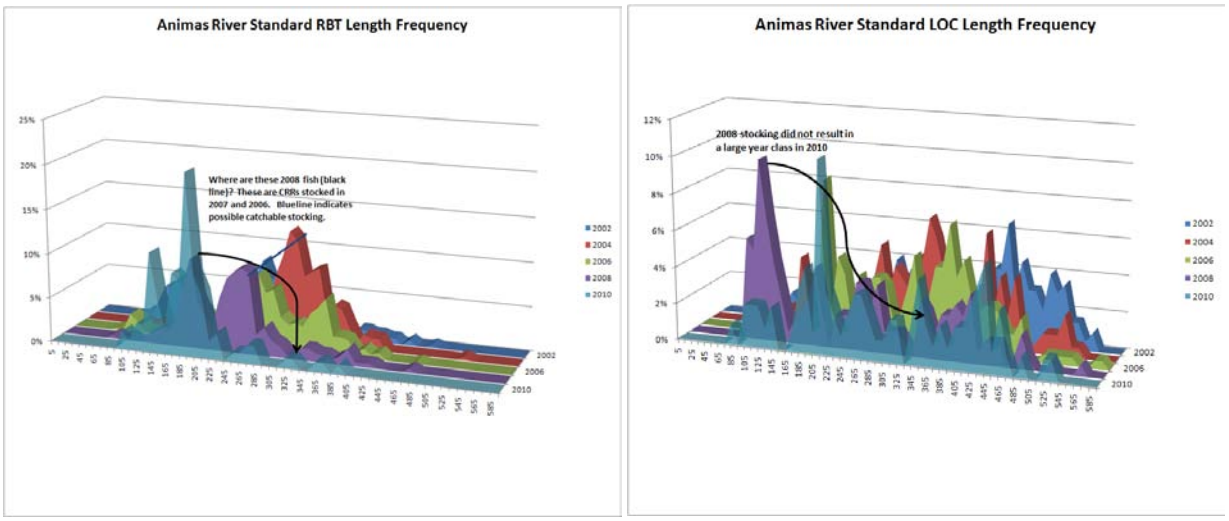

Figure 2 Length frequency charts of rainbow trout (left) and brown trout (right) captured in the Animas River Standard Regulation reach during 2010 (orange area) fish inventory.

The decline of larger rainbows, and apparent lack of recruitment into the Age 1+ or larger size groups, is probably related to the interactions between flow, temperature, water quality, and stocking. The quality of habitat for both rainbow and brown trout is typically best if river flows exceed 50% of the average annual daily flow. Average annual daily flow (1900-2005) for the Animas River in Durango is 819 cfs. "Excellent" habitat conditions are present at 410 cfs or better, "Fair" at 410-205 cfs, and "Poor" at anything below 205 cfs[2].

Baseflows in the Animas River mostly explain the fluctuation in fish biomass and abundance. When baseflows are relatively high such as during the 2004-2007 timeframe (Table 3) biomass is relatively high (Table 2 and 3). When baseflows are relatively low, such as in 2009 and 2010, biomass and abundance tends to move downwards.

High baseflows may also be more beneficial to larger rainbows relative to larger brown trout. The ratio of rainbow to brown trout greater than 14 inches is much greater during high baseflow years than in low baseflow years (Figure 3). This relationship may explain why larger rainbows in the Standard and Gold Medal reaches of the Animas are in decline. Although habitat suitability models predict these relationships, it is helpful to see our fish inventory results validate those relationships for the Animas River through Durango.

[2] Habitat Suitability Information for rainbow and brown trout from Raleigh et al. 1984 & 1986, respectively.

Table 3 Average daily flow (cfs) for the Animas River from 2000-2010.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average Base (cfs)	Rank (best-worst)
2000	190	175	236	958	2169	1155	350	271	318	327	289	230	278	9
2001	204	198	311	955	3155	2101	737	580	245	192	179	190	288	8
2002	178	154	138	322	544	358	154	134	317	302	213	180	202	12
2003	166	149	200	494	1830	1338	335	340	583	245	207	169	310	7
2004	161	171	582	1002	2450	1919	622	277	600	518	439	317	443	4
2005	318	374	521	1620	3929	3434	1447	571	344	642	323	240	470	3
2006	223	207	230	918	2136	1295	582	574	489	1595	457	316	564	1
2007	274	263	525	829	2304	2312	831	890	657	563	299	315	502	2
2008	247	235	483	1150	2592	3453	1305	477	343	257	216	186	391	5
2009	183	208	344	831	3409	1735	744	236	213	203	170	145	248	10
2009*	194	224	369	867	3420	1390	557	242	225	213	188	158	264	11
2010	159	164	200	859	2130	1920	442	572	302	277	237	220	315	6

Baseflow = July-March

Winterflow = November, December, January and February

2009 = discharge below the Pumpstation for Lake Nighthorse*

Note: 1999 baseflows averaged 600 cfs!

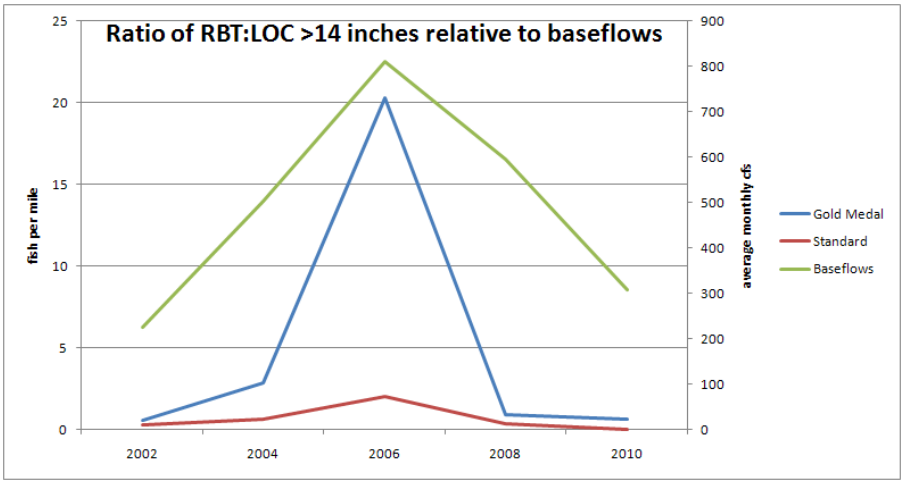

Figure 3 Relationship between baseflows and the ratio of quality rainbow and brown trout in the Animas River through Durango.

Other factors possibly limiting the biomass, density, and quality of trout observed in the Animas River in 2010 are water temperatures, stocking, and possibly increased heavy metal contamination from the Upper Animas River Basin. Low baseflows and warm water temperatures were observed through much of 2009 and 2010. Unfortunately, water temperature monitoring was not started on in the Gold Medal reach of the Animas River until August 2009 – a moot effort considering our temperature data logger was stolen! However, data collected in 2010 suggest low baseflows coupled with high ambient air temperatures created warm water conditions very stressful to salmonids (Figure 4). In mid-July 2010, trout were subjected to three days of water temperatures exceeding Colorado's coldwater temperature threshold. Fish were exposed to temperatures above 70ºF for up to 9 hours at time coming dangerously close to the upper lethal temperature of 77ºF. Similar conditions were observed in 2009 when baseflows were even further depressed naturally and by A-LP pumping operations.

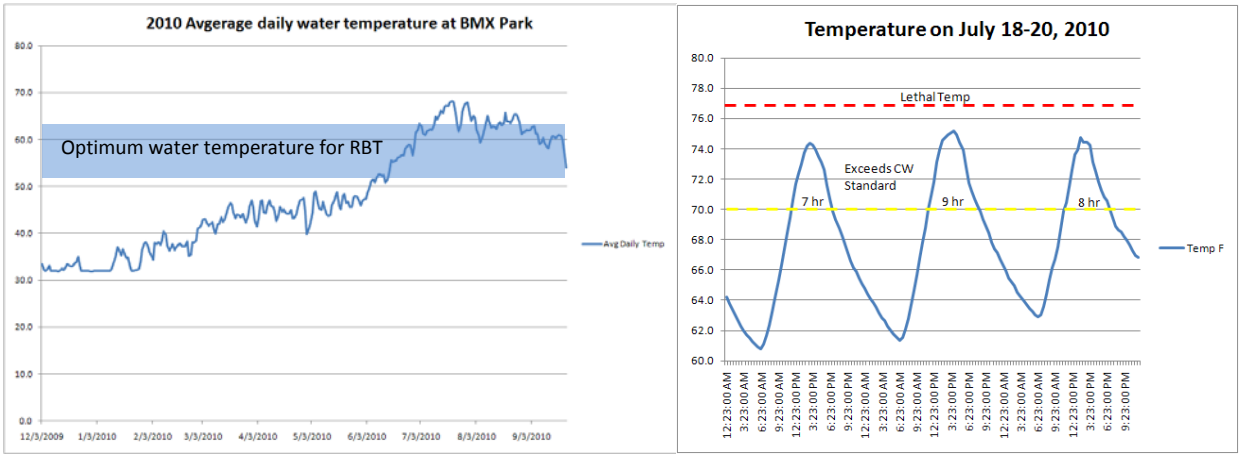

Figure 4 Average daily water temperature for the Animas River below the Animas-LaPlata pumping plant between December 2009 and September 2010 (left) and three of the warmest days in July 2010 (right). Baseflows during the July 18-20 period were 282 cfs (288 cfs above the pumping plant).

At higher water temperatures, trout do not like to move. The Animas River #2 experiences extremely heavy recreational use during the warmest days of summer from rafters, swimmers, and "tubers". If trout are disturbed and displaced by these activities, it could be very stressful and possibly lethal to some trout. We are witnessing increased use, and encouragement of this use, by building whitewater park features in the Animas and San Juan rivers. The impacts of increased recreation such as tubing during the most stressful periods for trout are not known but more study on movement and habitat use is needed.

Dissolved heavy metal concentrations since 2006 are, with increasing frequency, exceeding chronic and acute water quality standards (Table 4). Rainbow trout and mottled sculpin are very sensitive to high concentrations of zinc. Rainbow trout recruitment, density, and biomass are down since 2006 which do correspond to a rise in both chronic and acute zinc levels as well as other dissolved metals. The drop in trout biomass is most dramatic in the Standard Regulation trout section (115 lbs/ac to 32 lbs/ac). Whether that drop is caused by, or associated, with zinc toxicity is not known but rainbow trout abundance does improve downstream where presumably zinc concentrations are reduced by increasing sediments from Lightner Creek.

This year we captured the fewest mottled sculpin in the Animas #2 (Standard) in the last 10 years of sampling this section. Mottled sculpin are captured incidentally during fish inventories and total numbers of sculpin captured are probably not very indicative of the overall population status of these fish. However, with the low abundance of trout (and suckers) in this section, netters were eager to net any fish immobilized by the electrofishing boat; therefore, one would assume we would capture more sculpins, not less during this year's survey. We also saw a corresponding decline in the abundance and distribution of fish in the Upper Animas River Basin (see next Section) where metals, not habitat (i.e., baseflows) are the limiting factor.

Table 4 Percent exceedence of State water quality standards (A) & (B). Paired Data collected at Bakers Bridge (A), Trimble Bridge (B), and 32nd Street Bridge (B) (note: over 15% of chronic standard is a violation of the State's Water Quality standards, except for iron where 50% is used). Data table assembled by Peter Butler, with the Animas River Stakeholders Group (ARSG) on 11/17/10. Butler provided the following notes: Comparing data by going back in five year increments. (Notes: Additional discharges above Gladstone started around 2000-2001. They appear to have stabilized to current levels in 2005. Discharges added proportionally more zinc than cadmium. The period of 2000-2005 included extreme drought and low flow conditions. Although some remediation began in 1991, most projects were done between 1995 and 2005. Samples were essentially collected monthly, but before 1999, more intensive sampling occurred April though July - three to four samples per month.)"

Year	Zn chronic	Zn acute	Cd chronic	Pb chronic	Iron chronic
1992-1995	56%	27%	32%	3%	34%
1996-1998	42%	9%	19%	0%	29%
2002-2005	39%	17%	71%	0%	27%
2006-mid 2009	73%	41%	59%	23%	56%

(B) Paired Data for Trimble Lane and 32nd St.

	Trimble lane			32nd St.	
Year	Zn chronic	Zn acute		Pb chronic	
1992-1995	34%	6%			
1996-1998	14%	5%			
2002-2005	7%	2%		2%	
2006-mid 2009	11%	3%		17%	

Dissolved heavy metals have always been present in the Animas River #1 and #2 at levels where little trout reproduction occurs but juvenile and adult trout survival in recent times has always been adequate to provide quality fishing opportunities. Young trout and mottled sculpin were noted in low abundance near Baker's Bridge in the late 1990s when acute levels of zinc were at their lowest (Table 4). Poor water quality in Durango is probably not limiting juvenile and adult trout populations. Sub-optimal baseflows creating poor habitat conditions may be more detrimental. However, given the increase in dissolved metal concentrations, particularly zinc, one cannot rule out some population level impacts associated with dissolved metal toxicity. If toxicity events occurred, they would be most apparent on rainbow trout and sculpin populations.

Stocking may be an additional factor in the observed decline of rainbow trout in the Animas River. Fingerling stocking, and method of stocking (raft), of both rainbow and brown trout has remained relatively stable over the past 10 years. The only significant change was a switch to fingerling Hofer/Colorado River rainbows (HXC) fish in 2008 and a change to 5 inch HXCs in 2009 and 2010. Research by the CDOW on the Gunnison River suggest recruitment rates (% of Age -1+ fish) of the Colorado River rainbow strain (CRR) and Hofer crossed with CRRs are about the same (HXCs may actually do a little better than CRRs). Higher densities of HXC stocking probably does not explain an overall dip in rainbow trout numbers or recruitment. An average of 2,100 catchable rainbow trout (10+ inches) were stocked from 2003-2007. These fish were eliminated in 2009 and 2010 because of hatchery shortages. There is some indication (Figure 2) that catchables made up a significant portion of the Animas River #2 biomass and probably contributed to the Animas #1 biomass as well with catch and release so widely practiced. The absence of these catchable trout in the past two years may have some impact to total biomass but probably not a significant one.

One task with the recent fish sampling effort is to evaluate recruitment of HXC stocking in the Animas River. HXCs have been stocked by the CDOW in 2008 and by the BOR/FWS in 2009 and 2010 as part of the Animas-La Plata (A-LP) mitigation. Stocking rates for HXCs were determined by past management efforts and available habitat. Stocking rates for HXC's in the Gold Medal Reach were doubled to compensate for anticipated losses from dewatering the Animas. Stocking numbers went from 10k rainbow trout fingerlings to 20k rainbow sub-catchables. All fish were raft stocked in 2009 and 2010. In 2010, we moved our stocking point upstream to 32nd Street bridge instead of across from the A-LP pumping plant at Santa Rita Park in Durango. We did this because the Southern Ute Tribe was planning their 2010 fish inventory in late July and did not want to spend a lot of time capturing and working up newly stocked fish. Fish were also stocked above the Gold Medal reach because HXC movement in the Gunnison River is generally about 3 miles downstream after stocking; therefore, we thought we could get better distribution into the mitigation area by stocking a portion of the fish upstream.

The 2008 year class of HXC were stocked at 3.1 inches in late August. It appears that predation by brown trout and poor baseflows limited their recruitment into the 300-350 mm range (10-14 inches; Figure x). Competition between Age-1 brown and HXC trout may also have played a role in the poor recruitment of the 2008 HXC age class. In an effort to bump up a declining brown trout population we stocked 24,000 fingerlings in late June 2008. Browns and rainbows use similar habitats at that early age. Age-2+ (2008 class) browns did relatively well relative to the HXCs suggesting competition between the two may have been a factor in low HXC recruitment.

Poor baseflow conditions and high temperatures most likely limited the recruitment of Age-1+ (2009 year class) HXC stocked as mitigation for A-LP to less than 2% in the Gold Medal reach of the Animas. Although large brown trout are capable of preying on 5-6 inch stocked HXC, the sheer density of HXCs stocked relative to the population of larger brown trout suggest predation was not a controlling factor in recruitment. Many of the 2009 HXCs were captured by anglers in the late fall of 2009. Anglers reported catching very few of these 2009 HXC plants in the spring of 2010 before runoff suggesting many of these fish did not survive the winter. Domestication, brought about by genetics and hatchery life prior to stocking, may limit the survival capability of these fish during stressful times. One school of thought is to limit the exposure of these fish to hatchery life for as little time a possible and stock them out young allowing greater natural selection to occur thereby increasing the remaining fish chances of recruiting into the adult population from one year to the next. Stocking more numerous and smaller HXCs may be a management option we want to pursue next year.

The relative contribution of catchable trout to the rainbow trout biomass in the Animas River is not known. We have assumed it was low more than 1 year out because highly domesticated catchable trout do not overwinter well or tolerate natural events like spring flooding without either being displaced or dying. We have not tested this assumption in the Animas using catchable HXCs. Stocking a limited number of catchable HXCs, in addition to fingerling HXCs, may help maintain a quality fishery in the CDOW and SUIT reaches. These stocking strategies need to be vetted through the MOU partnership and a management strategy and assessment protocol implemented in 2012.

Conclusion:

- Low baseflows likely explain most of the downward trend in trout biomass. Rainbows are more sensitive to habitat alteration (warm temperatures and poorer quality riffle habitat). One would expect rainbows to be disproportionately affected by the loss of quality riffle habitat and colder water due to low baseflows relative to brown trout.
- Zinc toxicity is not likely to significantly affect rainbow trout in the Durango Area and south to the SUIT waters. However, it is worth monitoring through the Animas River Stakeholers Group and the River Watch program. Additional fry shocking may be warranted at historic sites.
- The whirling disease resistant Hofer Colorado River rainbow hybrids, or HXCs, are probably the best strain of fish to stock in the Animas River. Five inch sub-catchables may not be the best stocking size. More work needs to be done on a stocking strategy (smaller but more abundant and/or larger but less abundant stocking).

Recommendations:

- Interim sampling (i.e., do Gold Medal run in early march to determine overwinter survival)
- Evaluate option of stocking larger fish at densities compatible with the Animas River's average density (e.g., 1000 fish/mile x 3 miles in Standard Reach = 3000 fish). Mark these fish and look for them in 2012.
- Deploy more temperature loggers to assess flow and temperature impacts
- Conduct a Creel Census – last one done in 1997 (harvest changes? Angler attitude? C&R practice?)
- Coordination and communication with the Animas River Stakeholders Group (ARSG) on water quality testing
- Repeat 1996 fry shocking; mottled sculpin and trout reproduction found as high as Bakers Bridge – an absence or skewed distribution of fishes could indicate zinc toxicity
- Explore the possibility of a movement study of rainbow trout in the Animas #2 to assess recreational impacts to fish during the peak summer tubing season (2012)
- Communication: Present results to Area 15; Post results on Web; E-mail to TU and angling community and present at ART

Animas #3&4 (Upper Animas) Walk Shocking

Date(s)	September 20-22, 2010
Gear	Bank shocking array with Smith-Root 2.5 GPP. VVP settings were High Range 40-60% and 60PPS.
Drainage	San Juan
Water Code(s)	Animas #3 (38009), Animas #4 (38011), and Mineral Creek (42076)

INTRODUCTION

In 1997, the Animas River Stakeholders Group (ARSG) initiated a number of smaller mining reclamation projects aimed at improving water quality in the Animas River. The CDOW agreed to assist the ARSG by monitoring the Upper Animas River fishery at 4 different locations every five years (Figure 5). The question everyone was interested in was would remediation efforts be enough to see a biological response in the fish populations in the Animas River? A biological response in the upper Animas would be an expansion in distribution and abundance of adult trout. In the lower Animas River (Durango) we might expect better water quality conditions to create better survival of mottled sculpin, rainbow, and brown trout fry.

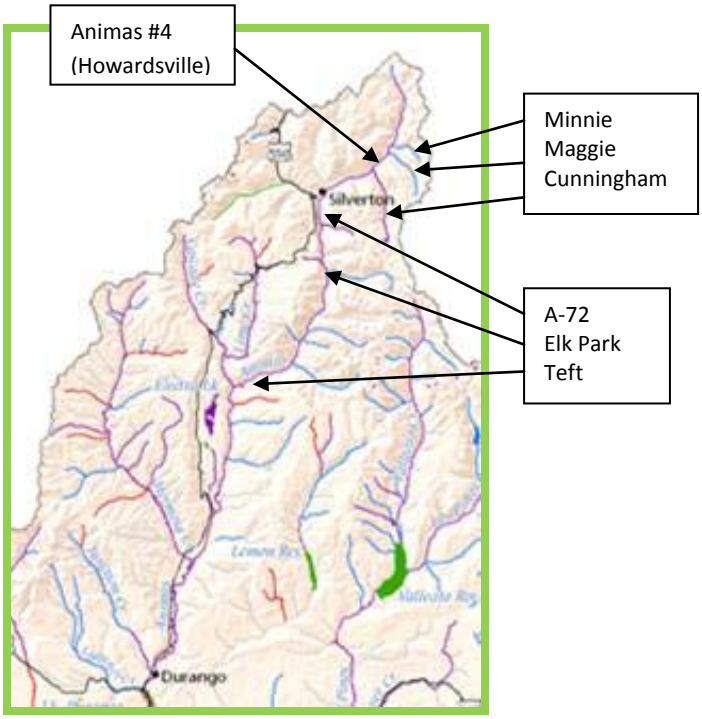

Figure 5 Upper Animas River fish sampling sites for 2009 and 2010.

METHODS

Fish were collected using a Smith-Root 2.5 GPP bank shock set up with an 5 anode array and 500 ft of cable. Two passes were done at each station unless no adult fish were captured on the first pass. All data were entered into the JOM database.

RESULTS AND DISCUSSION

A biological response (i.e., fish abundance and distribution) to mine cleanup efforts is mixed. In the Animas River #4 (above the Mineral Creek confluence with the Animas River in Silverton) we have documented increasing brook trout abundance and distribution in Howardsville, Cunningham, Maggie, and Minnie gulches (creeks; Table 5). Abundance of brook trout dramatically increased in Cunningham, Maggie, and Minnie Gulches from surveys done in the late 1980s. The Howardsville site on the mainstem of the Animas River produces a respectable 29 lbs/acre. Poor physical habitat condition appears to be the limiting factor at this site not water quality.

Table 5 Fish density estimates for seven sites in the Upper Animas River drainage.

Teft Spur (fish/mile)						Cunningham Gulch (fish/mi)		
Year	1992	1998	2005	2010		Avg. of 2 sites		
brook	349	349	338	98		Year	1987	2009
rainbow	48	24	8	0		brook	94	528
brown	0	8	23	0		cutthroat	10	84
RXN	0	16	0	0				
						Maggie Gulch (fish/mi)		
Elk Park (fish/mi)						Year	1987	2009
Year	1992	1998	2005	2010		brook	22	339
brook	88	69	81	0		cutthroat	45	21
rainbow	0	0	1	0				
A-72 USGS (fish/mi)						Minnie Gulch (fish/mi)		
Year	1992	1998	2005	2010		Year	1976	2009
brook	0	0	5	0		brook	0	442
						cutthroat	1	0
Howardsville (fish/mi)								
Year	1992	1998	2005	2010				
brook	78	559	1024	1082				
rainbow	4	0	0	0				
cutthroat	4	0	0	0				

Trout populations in the Animas River #3, below the Mineral Creek confluence, are declining in abundance and distribution (Figure 6). Brook trout are an important water quality indicator because they are much more tolerant of heavy metals than cutthroat, rainbow, or brown trout. A large water treatment project was apparently discontinued in the Gladstone area near Silverton (Cement Creek) in 2004. While there are a number of natural and anthropomorphic background sources of dissolved metals in and around the Silverton area, declines in fish abundance suggest water quality has declined significantly since 2005.

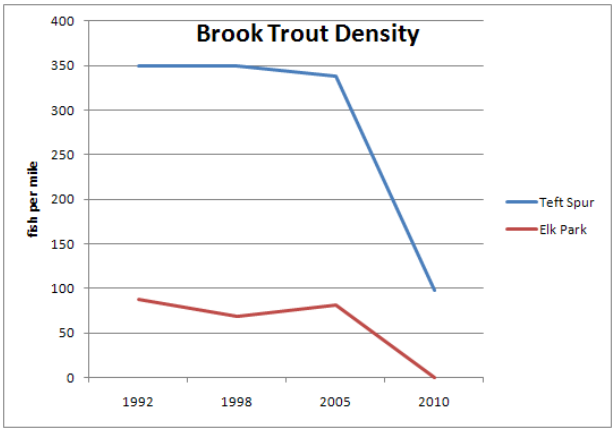

Figure 6 Brook trout density in two historic upper Animas River electrofishing sites.

CONCLUSION

- Poor physical habitat conditions are not suspected of limiting trout populations in the Upper Animas River basin. Low baseflows and warm temperatures are not significant factors in this steep gradient and colder upper reaches.

RECOMMENDATIONS

- Continue to assist ARSG with biological information
- Communicate report with ARSG and interested parties
- Approach BLM with physical habitat improvement project on the Animas River #4




Photo 1 Representative photos of the Upper Animas River fish shocking. From top right to bottom left. Loading the train at Rockwood (9am start). Top of braided section at Teft Spur. Bottom two photos are of the trip down the canyon from Silverton (7am start) to Elk Park.