



2012 Fish Studies on the Animas River

Southwestern Colorado
Cooperative Agreement No. R10AV40005



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Executive Summary

In 2012 a two-pass electrofishing survey from June 4-13 was conducted capturing a total of 2,331 fish consisting of 9 species and 2 hybrids. During this two-pass survey, a total of 2,331 fish were collected consisting of 9 species and 2 hybrids, in Reaches 1-3. A total of 648 trout were tagged during the first pass. During the second pass of the survey, 142 trout were recaptured. Trout comprised 49.4% of the catch, native fish 44.8%, non-salmonid non-natives 3.4%, and hybrid suckers 2.3%.

An additional section of the Animas River was surveyed in 2012 referred to as Reach 4. Only one pass was done to document species composition and presence of stocked trout. A total of 993 fish were collected in Reach 4 consisting of 8 species and 2 hybrids. Trout comprised 24.0%, native fish 64.1%, non-salmonid non-natives 7.8%, and hybrid suckers 4.0%.

Since June of 2009, approximately 80,000 three to five inch Hofer/Colorado River rainbows (HXC) were stocked each year in the Animas River from Durango to Bondad. Our evaluation during the 2012 electrofishing survey determined the 2011 HXC stocking to be 9 to 12 inches in total length: 41 were captured, 36 were marked and 5 recaptured. Using Jake-O-Matic, a population estimate of 258 fish was calculated from the 83,791 stocked in 2011, for a 0.3% return. The 0.3% return is consistent with results collected in the 2010 survey. This return is slightly low compared to other stocking programs.

Acknowledgements

Many individuals from tribal divisions contributed to the success of the 2012 field surveys. From the staff of the Southern Ute Wildlife Resource Management Division: Aran Johnson, Danielle Austin, Jon Broholm, and Steve Whiteman. The Tribe's Youth in Natural Resources (YNR) summer crew: Alex Pena, Aaron Velasquez, Jesse Vigil, Gabriela Garcia. Finally, from the Tribe's Environmental Programs Division Kirk Lashmett and Katie Wohlust.

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**Animas River Trout Population/Longitudinal Survey:
Purple Cliffs (RM 56.4) to Bondad (RM 41.9)**

Background

The Bureau of Reclamation (BOR) is mitigating the impacts from pumping from the Animas River by stocking 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 Park and Wildlife (CPW) 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 CPW). Specific action items in this agreement include the CPW 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 CPW agreed to stock out the fish annually and coordinate fish inventories on a biennial basis. The CPW 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.

Two environmental commitments described in the 2000 Animas-La Plata (ALP) Project Record of Decision guide our studies:

- 1) *“Reclamation will fund acquisition and stocking of wild strains of trout annually in the Animas River within the boundaries of SUIT.”*
- 2) *“Monitoring studies of project-affected waters on the Animas River will be implemented both prior to and continuing for at least four years after project operations begin (project pumping). These studies will be designed to monitor trout populations.”*

Objectives

The Animas River between Durango and Bondad, Colorado contains significant trout populations that are important for recreational fishing. In the Final Supplement to the Environmental Impact Statement (FSEIS) for the Project, the Bureau of Reclamation recognizes this trout resource and proposes pre- and post-Project population monitoring. In 2012, the Tribe and Reclamation conducted a trout population survey as part of this monitoring program.

The objectives of the 2012 trout population survey were as follows:

Determine the success of the annual stocking of 80,000 5 inch Hofer/Colorado River hybrid strain rainbow trout (HXC), stocked 2009-2011 on the Southern Ute Indian Reservation.

Collect data and develop standing crop estimates for the Animas River trout populations between Durango and Bondad, Colorado using raft electrofishing and mark-recapture techniques.

Collect additional data for other fish species encountered during the trout population survey, including species identification, lengths, and weights.

Questions to be answered:

What is the percentage return on the 80,000 5” fish that were stocked annually between 2009 and 2011?

Does the trout fishery found in Southern Ute waters qualify for State of Colorado - Gold Medal status?

Has the brown trout population increased in size and overall biomass due to predation on stocked HXC?

Stocking

The Southern Ute Indian Tribe, working in cooperation with BOR and Colorado Parks and Wildlife (CPW), annually stocked a total of 100,000 three to five inch HXC strain rainbow trout into the Animas River in 2009 through 2012. Approximately 80k HXC were stocked on the Southern Ute Indian Reservation while 20K are stocked by CPW though the City of Durango reach. Additionally, the Southern Ute Indian Tribe stocks approximately 5,000 to 10,000 8 to 10 inch Harris Lake strain rainbow trout in the Animas River during the same period. Stocking numbers were consistent from 2009 through 2012, although the size of the fish stocked in 2012 were smaller, 3 inch versus 5 inch, due to the timing of the eggs received at the Hotchkiss National Fish Hatchery. All stocking dates and numbers are listed in Table 1.

As part of an effort to evaluate winter survival, 20,000 HXC fish were marked by an adipose fin clip in 2011 and 2012 at Hotchkiss National Fish Hatchery. Results will be provided by CPW in their annual report.

Table 1. Stocking of rainbow trout in the Animas River on the Southern Ute Indian Reservation, 2009-2012.

Date	#	Size	Rainbow Trout Strain
June 23, 2009	26,000	5 inch	Hofer/Colorado River (HXC)
July 2, 2009	3,000	8 inch	Harris Lake
July 7, 2009	26,000	5 inch	Hofer/Colorado River (HXC)
July 21, 2009	26,000	5 inch	Hofer /Colorado River (HXC)
August 13, 2009	7,000	8 inch	Harris Lake
June 15, 2010	13,500	5 inch	Hofer/Colorado River (HXC)
June 30, 2010	33,600	5 inch	Hofer/Colorado River (HXC)
July 1, 2010	5,900	10 inch	Harris Lake
July 13, 2010	34,400	5 inch	Hofer/Colorado River (HXC)
July 6, 2011	42,123	5 inch	Hofer/Colorado River (HXC)
July 13, 2011	41,668	5 inch	Hofer/Colorado River (HXC)
August 22, 2011	5,217	10 inch	Harris Lake
June 19, 2012	89,000	3 inch	Hofer/Colorado River (HXC)
June 21, 2012	5,847	10 inch	Harris Lake
June 26, 2012	5,070	9.1 inch	Harris Lake

Methods

This survey consisted of two-pass sampling of the Animas River from the “Purple Cliffs” (River Mile 56.4) Durango to a downstream location in Bondad (River Mile 41.9), Colorado (Figure 1). The first pass was conducted as a “mark” pass, while the second pass covered the same stretch of river several days later and served as the “recapture” pass. In previous trout surveys on this portion of the Animas, the study area was divided into three reaches based on river geomorphic characteristics. Reach descriptions and survey scheduling are presented in Table 2. In addition to the standard monitoring reaches of the Animas, a fourth reach of the Animas was surveyed from Bondad to the New Mexico Stateline to further evaluate distribution of stocked fish.

Table 2. Location, area, and schedule of sampling for the Animas River Trout Population Survey, 2012.

Reach	Location	Surface Area (Hectares)	Pass 1 Dates	Pass 2 Dates
2*	Basin Creek (RM 52.1) to Weasleskin Bridge (RM 49.5)	16.7	April 17	na
1	Purple Cliffs (RM 56.4) to Basin Creek (RM 52.1)	27.8	June 4	June 11
2	Basin Creek (RM 52.1) to Weasleskin Bridge (RM 49.5)	16.7	June 5	June 11
3	Weasleskin Bridge (RM 49.5) to Bondad (RM 41.9)	40.8	June 5-6	June 12
4*	Bondad (RM 41.9) to Stateline (RM 36.2)	32.0	June 13	na

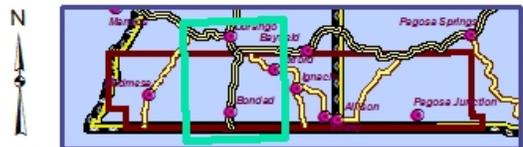
***additional reaches monitored in the 2012 survey**

Figure 1. 2012 Aquatic Monitoring Survey Area Map, Animas River.



0 1.5 3 6 Miles

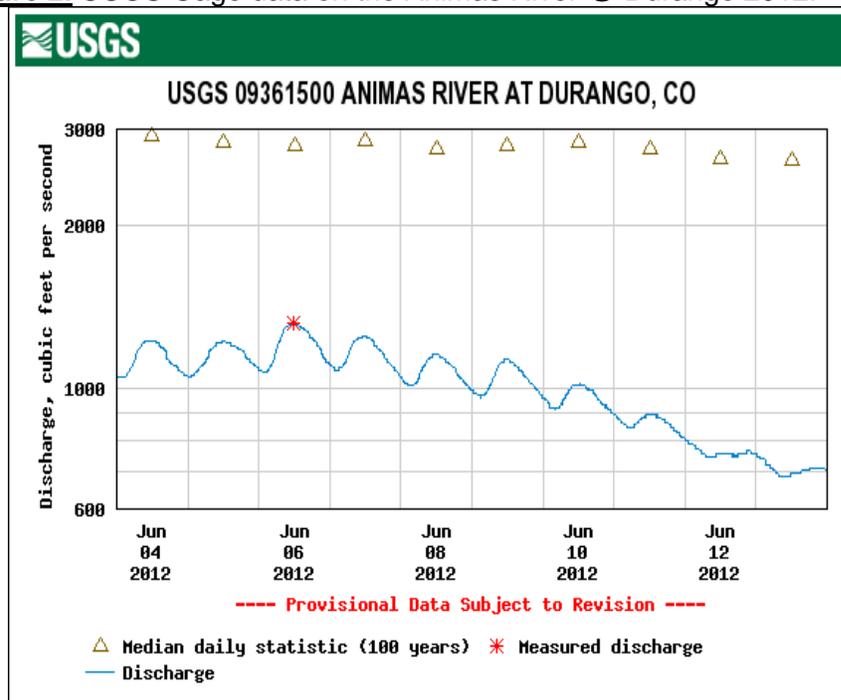
Note: Information represented here is intended for general planning purposes only and does not necessarily represent exact topographic or geographic data. The Southern Ute Indian Tribe however, reserves the right to make changes, corrections and / or improvements at any time and without notice. In addition, the Southern Ute Indian Tribe disclaims any and all liability for damages incurred directly or indirectly as a result of errors, omissions or discrepancies.



Sampling was conducted using two fixed-boom electrofishing rafts outfitted with Smith-Root 5.0 GPP electrofishers. Pulsed 220-volt DC electrical fields of approximately 8 amps were generated in order to temporarily stun all fish. The rafts floated downstream in close proximity to each other, and each worked separate habitats within the river channel where possible. Each raft carried two netters who netted as many stunned trout as possible. Samples of non-trout species were also collected when trout were not present. All captured fish were held in live-wells and then processed when the live-wells reached capacity. The typical distance sampled before stopping to process fish was approximately 0.5 river miles. Efforts were made to end samples at hydraulic controls (e.g., heads of riffles) to minimize movement of released fish into un-surveyed waters. A GPS unit was used to record specific starting and stopping points. Electrofishing time (effort) was recorded for each sampling run. Unique sample numbers were assigned for each sample run. All fish were identified by species and measured for total length in millimeters (mm). A select few were measured for weight in grams (g), and all were checked for any visible abnormalities. During the first pass, a hole-punch was used to mark the upper caudal fin lobe of each captured trout. Trout from the second pass were checked for this hole-punch mark and all recaptures were noted. All fish were released after being processed. Population and biomass estimates were calculated using Jake-0-Matic (JOM), a computer program developed by CPW and used in fish population studies on waters throughout the State of Colorado. JOM uses the Lincoln-Peterson method for mark and recapture population estimates.

During the survey period, flows measured at the U.S.G.S. gage in Durango averaged 875 cubic feet per second (cfs). (range 1,110 – 700 c.f.s.), and water clarity was good during the entire survey. For the purposes of calculating population densities and biomass, an average channel width of 120 feet was utilized. Reach lengths were determined using GIS techniques, and average channel width was determined by averaging numerous field measurements throughout the study area.

Figure 2. USGS Gage data on the Animas River @ Durango 2012.



Results and Discussion

During a two-pass survey, conducted in 2012, a total of 2,331 fish were collected consisting of 9 species and 2 hybrids, in Reaches 1-3. A total of 648 trout were tagged during the first pass. During the second pass of the survey, 142 trout were recaptured. Table 3 summarizes total catch by species for the survey and compares to the 2010 results. Overall, trout comprised 49.4% of the total catch, native fish 44.8%, non-salmonid non-natives 3.4% and hybrid suckers 2.3%.

Table 3. Fish species captured (% of Total) during the 2010 and 2012 Animas River Trout Population Survey. Purple Cliffs (RM 56.4) to Bondad (RM 41.9), All reaches combined.

Common Name	Scientific Name	# Captured 2010	# Captured 2012
Rainbow / Cutbow Trout	<i>Oncorhynchus mykiss x clarki</i>	461 (18.6%)	435 (18.7%)
Brown Trout	<i>Salmo trutta</i>	688 (27.8%)	713 (30.6%)
Snake R. Cutthroat Trout	<i>Oncorhynchus clarki ssp.</i>	2 (0.1%)	3 (0.1%)
Bluehead Sucker	<i>Catostomus discobolus</i>	667 (26.9%)	579 (24.8%)
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	188 (7.6%)	187 (8.0%)
Mottled Sculpin	<i>Cottus bairdi</i>	321 (12.9%)	273 (11.7%)
Speckled Dace	<i>Rhinichthys Osculus</i>	12 (0.5%)	7 (0.3%)
White Sucker	<i>Catostomus commersoni</i>	84 (3.4%)	75 (3.2%)
Flannelmouth x White Sucker	<i>C. latipinnis x C. commersoni</i>	34 (1.4%)	36 (1.5%)
Common Carp	<i>Cyprinus carpio</i>	5 (0.2%)	5 (0.2%)
Bluehead x White Sucker	<i>C. discobolus x C. commersoni</i>	16 (0.6%)	18 (0.8%)
Totals		2,479	2,331

* the number captured does not include second captures (i.e., recaptures).

An additional section of the Animas River was surveyed in 2012, referred to as Reach 4. Only one pass was done to determine distribution of stocked trout and species composition. A total of 993 fish were collected consisting of 8 species and 2 hybrids. Table 4 summarizes total catch by species for the survey. Trout comprised 24.0% of the total, native fish 64.1%, non-salmonid non-natives 7.8%, and hybrid suckers 4.0%. Overall trout numbers drop in this reach to about half compared to Reaches 1-3. Warmer water temperatures are suspected to be the limiting factor for trout in this reach.

Table 4. Fish species captured (% of Total) during the 2012 Animas River Trout Population Survey. **Reach 4** - Bondad (RM 41.9) to Stateline (RM 36.2).

Common Name	Scientific Name	Code Used	# Captured 2012
Rainbow / Cutbow Trout	<i>Oncorhynchus mykiss x clarki</i>	RBT / CB	50 (5.0%)
Brown Trout	<i>Salmo trutta</i>	BNT	189 (19.0%)
Snake R. Cutthroat Trout	<i>Oncorhynchus clarki ssp.</i>	SRC	0
Bluehead Sucker	<i>Catostomus discobolus</i>	BHS	326 (32.8%)
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	FMS	257 (25.9%)
Mottled Sculpin	<i>Cottus bairdi</i>	MSC	48 (4.8%)
Speckled Dace	<i>Rhinichthys Osculus</i>	SPD	6 (0.6%)
White Sucker	<i>Catostomus commersoni</i>	WHS	72 (7.3%)
Flannelmouth x White Sucker	<i>C. latipinnis x C. commersoni</i>	FW	18 (1.8%)
Common Carp	<i>Cyprinus carpio</i>	CCP	5 (0.5%)
Bluehead x White Sucker	<i>C. discobolus x C. commersoni</i>	BW	22 (2.2%)
		Total	993

A pre run-off survey was completed on April 17, 2012 to determine winter survival of the 2011 HXC stocking. One electrofishing raft was used for a one pass survey. Two of the twenty seven rainbow trout captured were from the 2011 stocking and measured 204mm and 287mm.

Table 5. Fish species captured (% of Total) during the 2012 Animas River Trout Survey, Pre run-off. **Reach 2-** Basin Creek (RM 52.1) to Weasleskin Bridge (RM 49.5). April 17, 2012.

Common Name	Scientific Name	Code Used	# Captured 2012
Rainbow / Cutbow Trout	<i>Oncorhynchus mykiss x clarki</i>	RBT / CB	27 (18.4%)
Brown Trout	<i>Salmo trutta</i>	BNT	43 (29.3%)
Snake R. Cutthroat Trout	<i>Oncorhynchus clarki ssp.</i>	SRC	0
Bluehead Sucker	<i>Catostomus discobolus</i>	BHS	49 (33.3%)
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	FMS	11 (7.5%)
Mottled Sculpin	<i>Cottus bairdi</i>	MSC	17 (11.6%)
Speckled Dace	<i>Rhinichthys Osculus</i>	SPD	0
White Sucker	<i>Catostomus commersoni</i>	WHS	0
Flannelmouth x White Sucker	<i>C. latipinnis x C. commersoni</i>	FW	0
Common Carp	<i>Cyprinus carpio</i>	CCP	0
Bluehead x White Sucker	<i>C. discobolus x C. commersoni</i>	BW	0
		Total	147

Electrofishing surveys focused on trout population have been ongoing every other year from 1997-2007 (see Table 6). Average composition for that period for rainbow trout was 26.4% compared to 18.7 % for 2012. Average composition for that period, 1997-2007, for brown trout was 23.5% compared to 30.6% for 2012, a 7.1% increase. Also comparing 2010 to 2012 brown trout results catch numbers have increased by 2.8%. Overall it seems browns numbers are increasing possible due to HXC stocking.

Table 6. Fish species captured (% of Total) from years 1997-2007 during the Animas River Trout Population Surveys. Purple Cliffs (RM 56.4) to Bondad (RM 41.9), All reaches combined.

Common Name	Scientific Name	# Captured
Rainbow / Cutbow Trout	<i>Oncorhynchus mykiss x clarki</i>	5,728 (26.4%)
Brown Trout	<i>Salmo trutta</i>	5,112 (23.5%)
Snake R. Cutthroat Trout	<i>Oncorhynchus clarki ssp.</i>	2,811 (12.9%)
Bluehead Sucker	<i>Catostomus discobolus</i>	4,621 (21.3%)
Flannelmouth Sucker	<i>Catostomus latipinnis</i>	1,924 (8.9%)
Mottled Sculpin	<i>Cottus bairdi</i>	966 (4.4%)
Speckled Dace	<i>Rhinichthys Osculus</i>	24 (0.1%)
White Sucker	<i>Catostomus commersoni</i>	309 (1.4%)
Flannelmouth x White Sucker	<i>C. latipinnis x C. commersoni</i>	88 (0.4%)
Common Carp	<i>Cyprinus carpio</i>	57 (0.3%)
Bluehead x White Sucker	<i>C. discobolus x C. commersoni</i>	70 (0.3%)
Total		21,716

The 2010 and 2012 surveys focused on trout populations and the monitoring of the stocking of HXC from 2009 through 2011. Figures 3 and 4 show the length frequency histograms for all rainbow trout. In Figure 3, the 2009 stocking is less apparent as a distinct group versus the 2010 stocking. Distinct stockings can be seen clearly in the histogram a year after they are stocked. However, after one or more years the stocking groups are not apparent. Our inability to distinguish stocked HXC cohorts one or more years after stocking is the result of similarly sized non-HXC trout being stocked at the same time. The 2011 HXC rainbows clearly stand out in the histogram, Figure 4.

Following these cohorts over time maybe difficult due to the size-overlap of non-HXC trout being stocked in the river. This creates a real challenge for us in evaluating the effectiveness of the HXC stocking. The non-HXC could be marked to help us distinguish them from the HXC stocking.

Figure 3. Rainbow Trout Length Frequency Histogram for captured fish during the 2010 field survey, Reaches 1-3, (n= 548) Animas River, Colorado.

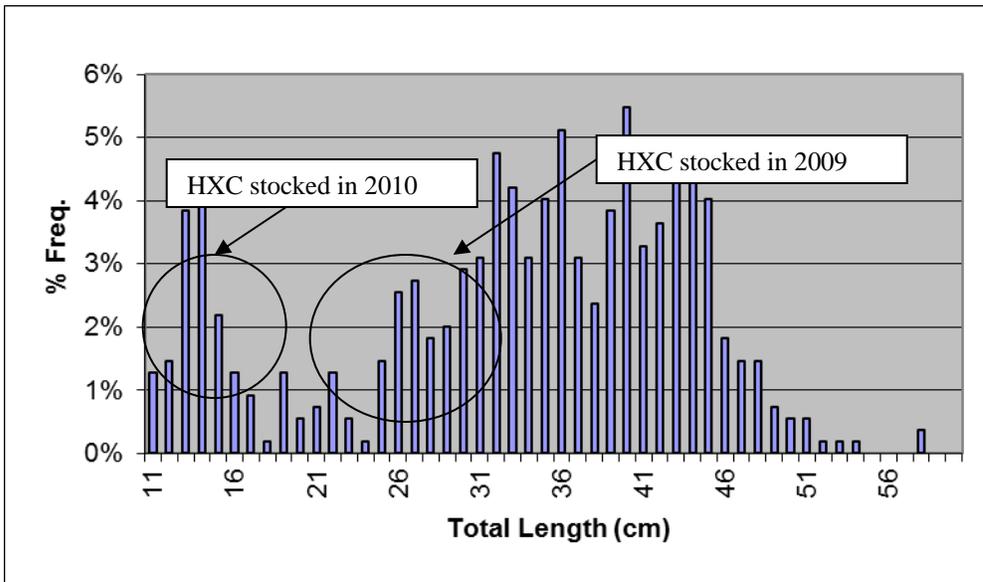
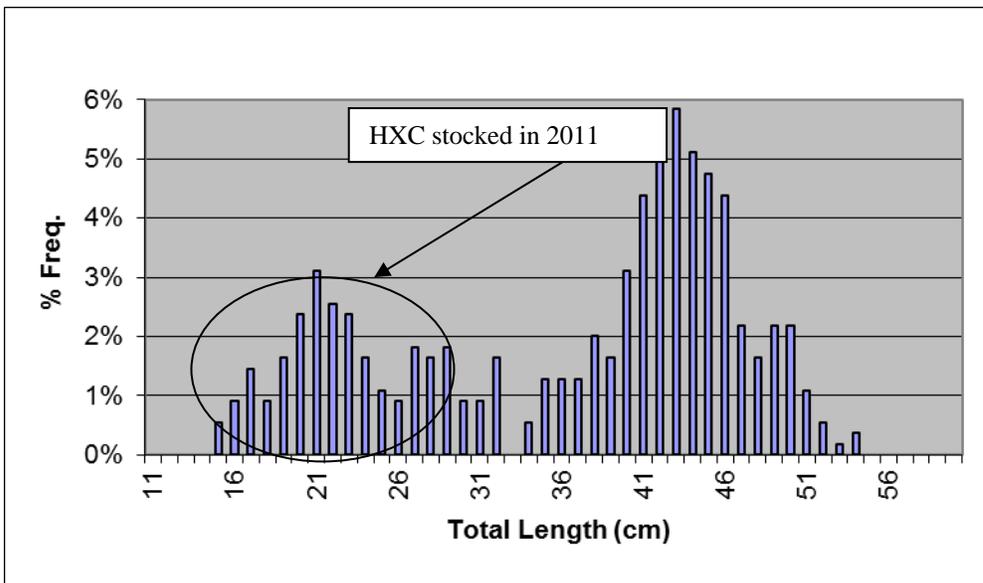


Figure 4. Rainbow Trout Length Frequency Histogram for captured fish during the 2012 field survey, Reaches 1-3, (n=435) Animas River, Colorado.



Brown Trout were also monitored in 2010 and 2012, 287 were marked, 402 were captured on second pass unmarked and 51 recaptured, in 2012. The length frequency histogram is found below in Figures 5 and 6. Brown Trout catch rates and size distribution were comparable with no significant changes between 2010 And 2012.

Figure 5. Brown Trout Length Frequency Histograms for captured fish during the 2010 field survey, (n=688) Reaches 1-3, Animas River, Colorado.

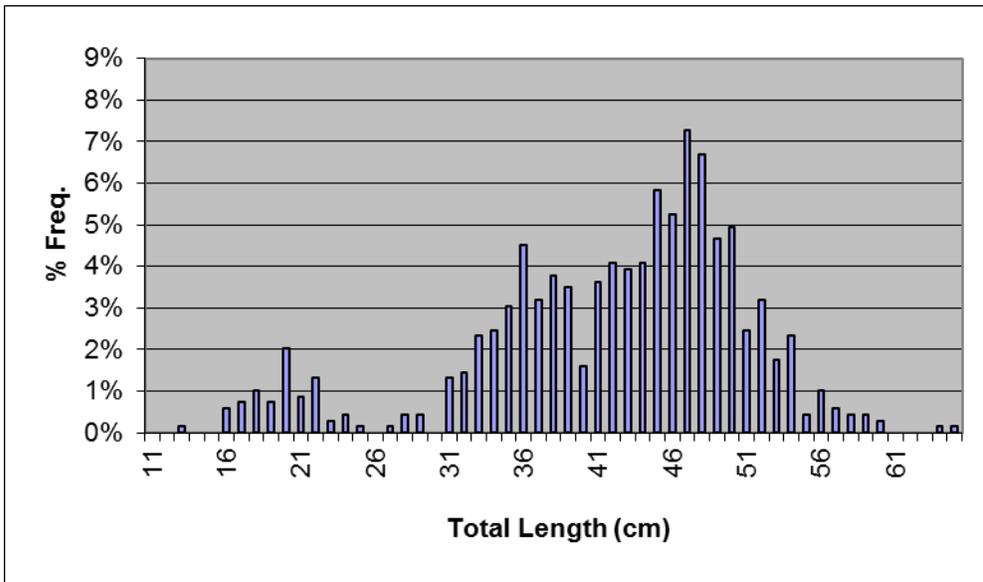
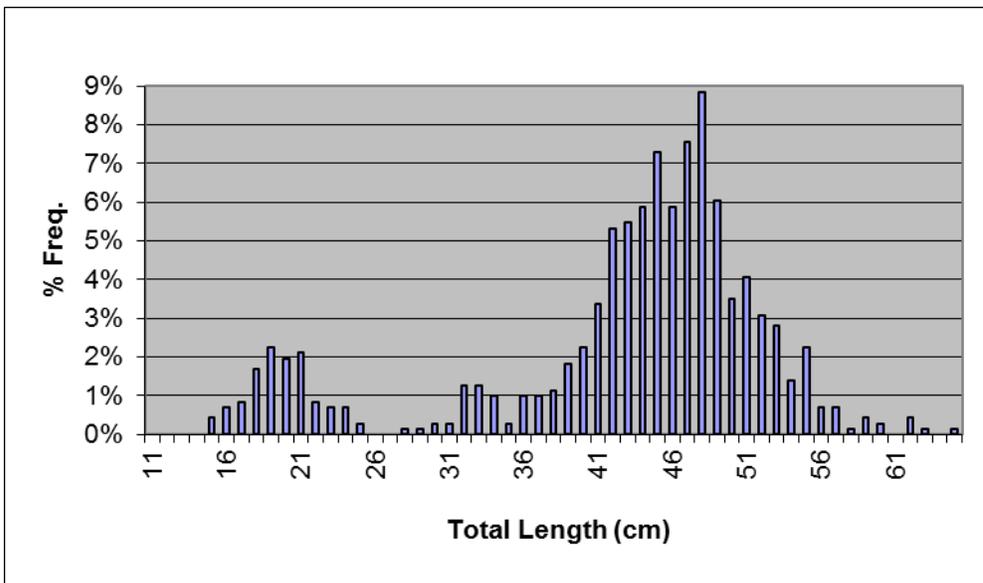


Figure 6. Brown Trout Length Frequency Histograms for captured fish during the 2012 field survey, (n=713) Reaches 1-3, Animas River, Colorado.



Ongoing mark-recapture studies focused on actual trout biomass and population levels, for all trout combined including HXC, have been conducted by the Southern Ute Indian in 1997, 1999, 2001, 2003, 2005, 2007, 2010 and 2012. Comparing yearly surveys against Gold Medal Water standards, calculated by JOM, provides us population trends. Gold Medal Water standards are an minimum trout standing stock of

60 pounds per acre and a minimum average of 12 quality trout per acre. Similar to the State of Colorado, the Southern Ute Tribe has designated a reach on the Animas River for trophy fishing from the northern boundary of the reservation to Weasleskin Bridge. The survey reach from Purple Cliffs to Basin Creek is directly downstream of State of Colorado Gold Medal Waters. Table 7 shows that in 2003 and 2005, Gold Medal standards, if applied to Tribal waters, were met. In 2012, the comparative results, relative to the Gold Metal standards, were the lowest for all survey years and since 2003 results show a downward trend. The CPW has also seen this trend starting in 2002. Possible reasons for the downward trend could be chronic reduction in river base-flows due to climate change over the past thirteen years, increasing metals contaminants from failed mining reclamation in the upper watershed, and higher water temperatures due to lower base flows.

Table 7. for the Animas River from Purple Cliffs to Basin Creek: 1997, 2001, 2003, 2005, 2007, 2010 and 2012.

Animas River Reach 1 (Purple Cliffs to Basin Creek)							
Month/year	Sep-97	Jul-01	Jun-03	Jul-05	Jul-07	Jun-10	Jun-12
All Trout combined (fish/acre)	39	27	56	47	27	26	21
All Trout combined (fish/mile)	338	397	799	690	397	383	296
Total trout biomass (lbs/acre)	47	40	72	61	51	40	37
All trout > 14 inches (fish/acre)	18	16	26	23	19	13	14
Rainbows > 14 inches (fish/acre)	5	4	19	15	11	6	6
Gold Medal Water Standards							
Produces a minimum trout standing stock of 60 pounds per acre							
Produces a minimum average of 12 quality trout per acre							

HXC Rainbows

Our 2012 one year survival estimate of 0.3% is determined by assuming the 2011 stocked HXC rainbows were nine to twelve inches at the time of the electrofishing survey in June of 2012. Growing season April to October with a growth rate of 1/2" to 3/4", 4" to 6" of growth (8 months) 5" to 7" fish should be 9"to 12".

Based on other studies the expected returns range from 5 to 10%. In a Wyoming study, trout stocked in streams survive and return best to anglers when numbers of competing trout (wild or carryover planted) are low. Even then, a mean of only 5.7% of the number of hatchery-reared subcatchable (<8.25 in) and 27.7% of the number of catchable-size (>8.25 in) trout in streams return to anglers (Wiley et al. 1993). Stocking success of the 5" HXC fish cannot be determine with two years of data collection. Several more years of data are needed. A return of 0.3% is low compared with other stocking evaluations. CPW returns for HXC in the Gunnison River range from 1% to 2%, J. White personal communication.

Capture P was better in 2012 compared to 2010 (0.13 versus 0.05) which created a better population estimate for the HXC. Smaller fish, less than 228mm, were captured in 2012 and were not included in the population estimate to be consistent with the 2010 estimate. These could possibly have very poor or slower growth.

Table 8. Hofer/Colorado River Rainbows (HXC) Jake-0-Matic population estimate for the 2009 stocking in the Animas River: 228mm to 305mm in total length.

2009	Estimate	95% CI		
Number/Acre	2.6	2.36	Mark	33
Lbs/Acre	1.35	1.23	Capture	47
Number/Mile	37.45	33.99	Recapture	2
Lbs/Miles	19.51	17.71	Capture P	0.05
			Population Estimate	543.00
			95% CI (+/-)	492.89

Table 9. Hofer/Colorado River Rainbows (HXC) Jake-0-Matic population estimate for the 2011 stocking in the Animas River: 228mm to 305mm in total length.

2011	Estimate	95% CI		
Number/Acre	1.23	.78	Mark	41
Lbs/Acre	0.57	.36	Capture	36
Number/Mile	17.79	11.21	Recapture	5
Lbs/Miles	8.15	5.14	Capture P	0.13
			Population Estimate	258.00
			95% CI (+/-)	162.60

Condition Factor, K, was calculated for HXC rainbows trout captured between the range of 9" to 12" were $K=10^5 W/L^3$. From 19 fish weighted and measure the average condition factor was 1.29 with a range of 1.16 to 1.47, in 2010. This K factor indicates the HXC rainbows are in good to fair condition.

Recommendations

Continue to mark by means of an adipose fin clip HXC stockers to determine growth, movement, and survivorship. Coordinate with Hotchkiss National Fish Hatchery.

Continue to perform a single pass electrofishing surveys pre-runoff to determine over-winter survival.

Further monitor and research a possible decline in native suckers.

Fin Clip 10" trout from Hotchkiss National Fish Hatchery to evaluate survival.

Stock HXC fish by boat where possible. Develop and find more stocking points to better distribute fish and improve survival.

Integrate database and findings of CPW surveys to prepare for the 2016 report.

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Memorandum of Understanding between Bureau of Reclamation (Western Colorado Area Office), Southern Ute Indian Tribe, and Colorado Division of Wildlife