

East Fork Carson Summary Report
July 3rd, August 18th-19th, and August 25th-26th, 2008

Heritage and Wild Trout Program
California Department of Fish and Game



Prepared by Jeff Weaver and Stephanie Mehalick

Introduction:

The East Fork Carson River (EFCR) is an east-slope draining Sierra Nevada river that supports both wild and hatchery-stocked populations of salmonids, including Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*), coastal rainbow trout (*Oncorhynchus mykiss irideus*), and brown trout (*Salmo trutta*). The EFCR originates in the southern end of the Carson Iceberg Wilderness, north of Sonora Pass, in the Toiyabe National Forest (Alpine County) and flows in a northerly direction through California (near the town of Markleeville) and into Nevada, with its terminus in the Carson Sink. For the purposes of this report, the EFCR has been divided into three management areas, based on different fishing regulations (Figure 1). The first management area includes the main-stem and all tributaries from the headwaters near Sonora Pass downstream to Carson Falls. This area is designated by the California Fish and Game Commission as a Wild Trout Water and is managed by the California Department of Fish and Game's (DFG) Heritage and Wild Trout Program (HWTP). Carson Falls is a barrier to upstream fish migration; a refugia population of presumed EFCR-strain Lahontan cutthroat trout exists above Carson Falls. The portion of the EFCR upstream of Carson Falls, including all tributaries, is closed to fishing year-round to protect the native Lahontan cutthroat trout, which is listed as Threatened under the Federal Endangered Species Act.

The second management area extends from the base of Carson Falls downstream to Hangman's Bridge (Highway 89 crossing near Markleeville), where the general DFG Sierra District fishing regulations apply (open to fishing from the last Saturday in April through November 15th, with a bag limit of five per day and ten in possession). This area includes the stretch of the EFCR from Carson Falls downstream to Wolf Creek which is designated as a Wild Trout Water. Many roadside access points to the EFCR exist from Wolf Creek downstream to Hangman's Bridge and hatchery allotments of rainbow trout are stocked annually to accommodate high levels of angling pressure in this portion of the river.

The third management area extends from Hangman's Bridge downstream to the Nevada State line and is also managed by the HWTP as a Wild Trout Water. This portion of the river is open to angling all year, but gear use is limited to artificial lures with barbless hooks and there is a zero bag limit. This section of the river is popular among anglers and is well-known for more remote (hike-in) access to larger coastal rainbow trout and occasional brown trout.

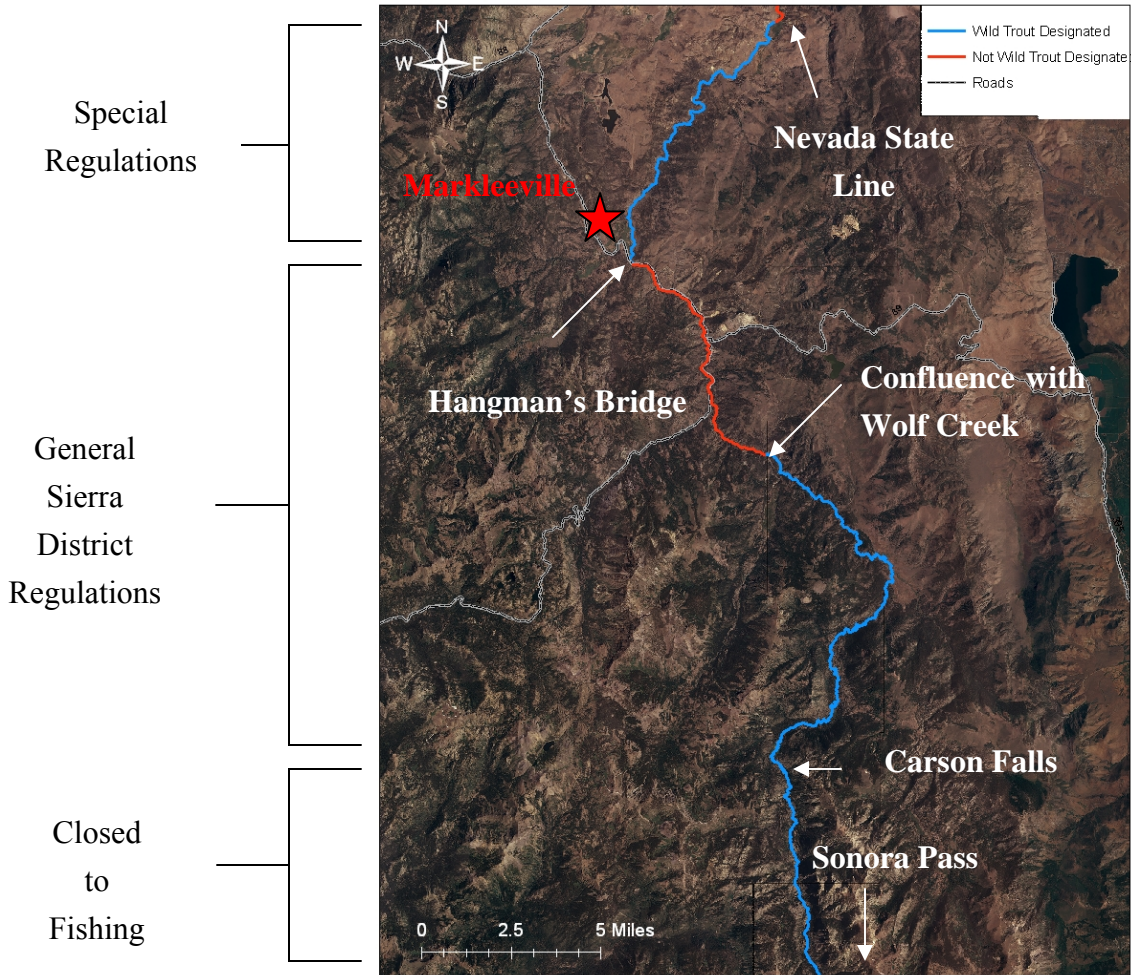
In 2008, the HWTP conducted physical and biological assessments in the two designated Wild Trout sections (above Carson Falls and below Hangman's Bridge) of the EFCR as part of the long-term monitoring and management of this fishery.

In the area above Carson Falls, including the main-stem EFCR, Murray Canyon Creek, and Golden Canyon Creek, HWTP staff conducted Phase 4 (ongoing) monitoring via direct observation snorkel surveys at 38 locations, including four sections surveyed a short distance below Carson Falls (Figures 2-4; Tables 1-5). Surveys were conducted from August 18th through 19th and were designed to assess habitat condition, species abundance and distribution, and size class structure.

The HWTP monitors the section of the river from Hangman's Bridge downstream to the Nevada State line via year-round voluntary reports from Angler Survey Boxes (ASB) which provide insights on this fishery from an angler perspective, including catch rates, catch sizes, and satisfaction. In 2006, direct observation snorkel surveys were conducted at 16 locations throughout this lower Wild Trout-designated section. These surveys indicated the need for further assessments to determine the origin of the trout in this part of the system (hatchery versus wild fish). Since this part of the river is managed as a Wild Trout Water, a better understanding of the relative abundance, size class distribution, and angler catch rates of wild versus hatchery fish is of importance.

Both DFG and Alpine County participate in annual stocking of the EFCR above Hangman's Bridge, and little is known about the instream movement patterns of these hatchery fish and their potential effects on wild trout populations. Hatchery stocked fish may affect wild populations through interbreeding, competition for food and habitat, predation, introduction of disease, and/or by causing incidental over-fishing of wild trout. On July 3rd, August 25th, and August 26th, 2008 the HWTP conducted a Phase 4 (ongoing) monitoring assessment via hook-and-line surveys from Hangman's bridge downstream to the Nevada State line to quantify catch per unit effort (CPUE) rates and to better understand the origins of trout in this section (hatchery versus wild) and the extent of hatchery fish movement within this portion of the EFCR (Table 6; Appendixes I and II).

Figure 1. Map of East Fork Carson River including Wild Trout-designated and non-designated areas



Methods:

Direct Observation Surveys:

Direct observation surveys were conducted from August 18th through 19th, 2008 on the upper EFCR main-stem (principally above Carson Falls), Murray Canyon Creek, and Golden Canyon Creek using snorkeling methods, an effective survey technique in many small streams and creeks in California and the Pacific Northwest (Hankin & Reeves, 1988)(Figures 2, 3, and 4). Prior to the survey effort, a logistical strategy was developed based on satellite imagery and maps. Given the amount of time available for the survey effort, the number of personnel, the length of the total survey area, and difficulty of access to the study area, we estimated the amount of stream each team could survey in a given day.

Our goal was to survey approximately ten percent of the total length of the study area. Groups of two were assigned individual stream segments to survey each day and were tasked with selecting as many sections spread throughout the study area as physically possible in one day. As each team progressed through their assigned area, they identified dominant habitat types and sections were selected that represented these habitats.

Sections were spaced throughout each stream segment to the maximum extent possible to provide greater geographic distribution of sampling. Specific section boundaries were located at distinct breaks between habitat types and/or stream gradient. Surveys were conducted in an upstream direction and the number of divers per survey section was dependent upon wetted width, water visibility, and habitat complexity.

Figure 2. Map of 2008 direct observation survey locations on the upper East Fork Carson River (Sections 108-908, in green) and Murray Canyon Creek (Sections 408-908, in yellow)

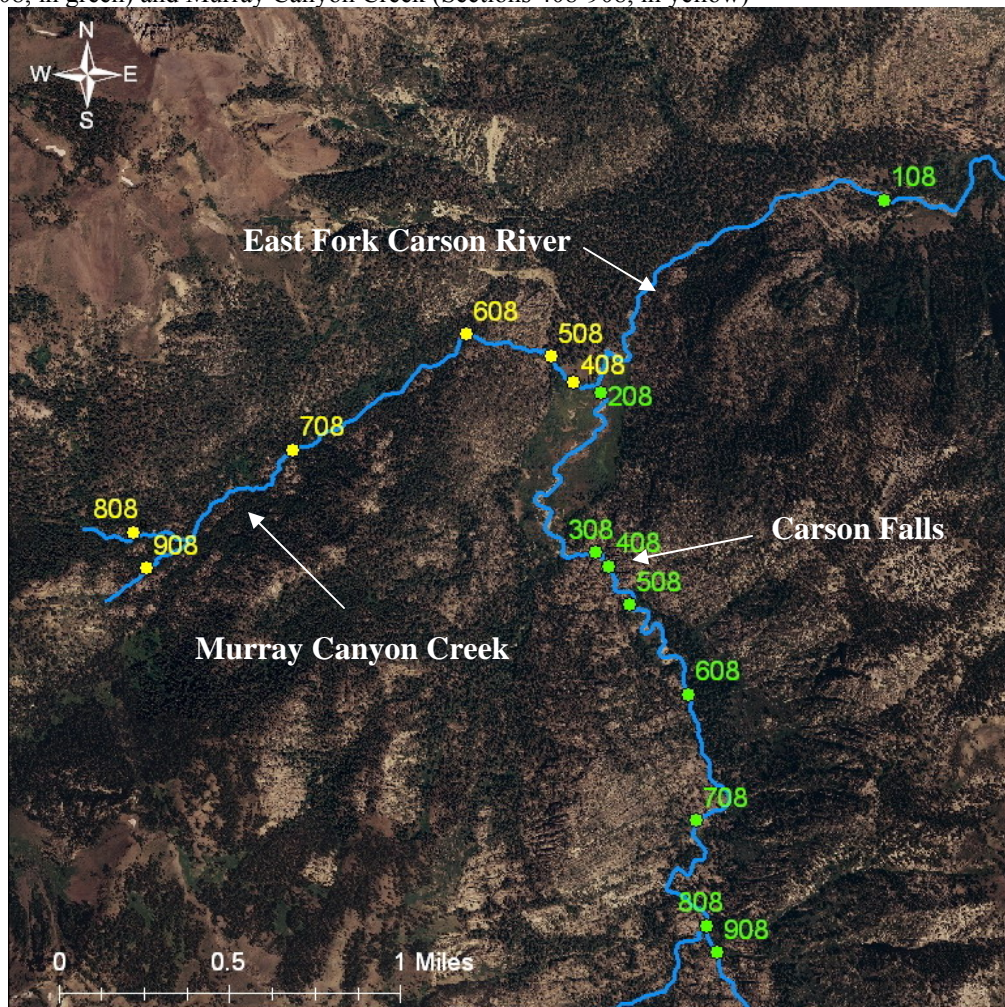


Figure 3. Map of 2008 direct observation survey locations on the upper East Fork Carson River (Sections 708-1408, in green) and Golden Canyon Creek (Sections 108-608, in orange)

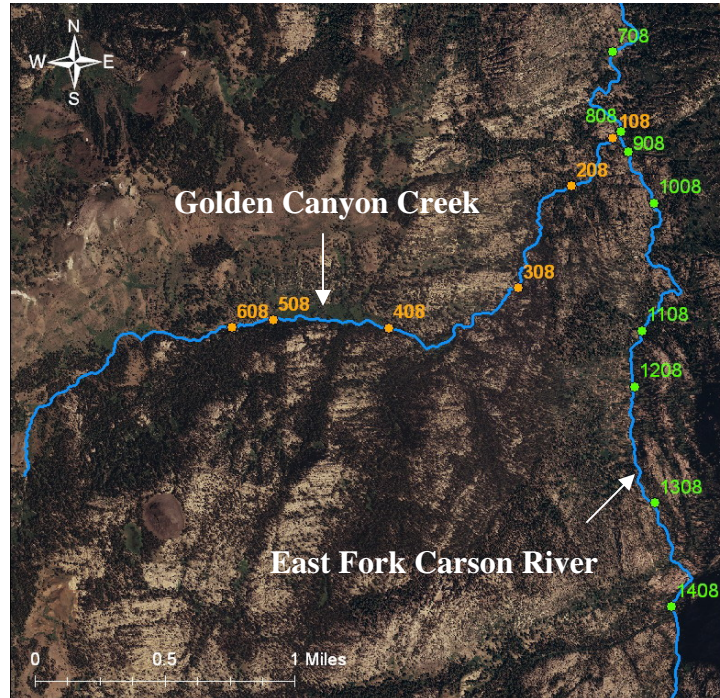


Figure 4. Map of 2008 direct observation survey locations on upper East Fork Carson River (Sections 1408-2608, in green)



Diver(s) counted all fish within each section by species. All observed trout were further categorized and counted by size class. Size classes were divided into the following categories: young-of-year (YOY), small (< 6 inches), medium (6-11.9 inches), large (12-17.9 inches) and extra-large (≥ 18 inches). YOY are defined by HWTP as age 0+ fish, emerged from the gravel in the same year as the survey effort. Depending on species, date of emergence, relative growth rates, and habitat conditions, the size of YOY varies greatly, but are generally between zero and three inches in total length (for trout). If a trout was observed to be less than six inches but it was difficult to determine whether it was an age 0+ or 1+ fish, by default it was classified in the small (<6 inches) size class.

Divers were instructed in both visual size class estimation and proper snorkel survey techniques (establishing a dominant side, determining the extent of their visual survey area, how and when to count (or not count) fish observed, safety considerations, etc.) prior to starting the survey. All surveys were performed in the upstream direction with either one or two divers. For each of the survey sections, thalweg/section length, water and air temperature (in the shade), average wetted width and water depth, and water visibility were measured. We recorded habitat type (flatwater, riffle, or pool) and GPS coordinates for the section boundaries and representative photographs were taken.

Upon completion of the direct observation surveys, density estimates were calculated for each survey section based on the total number of fish observed by species, divided by section length (in feet), converted to fish per mile (Tables 1-4). In addition, to provide a more accurate and comprehensive density estimate of the overall trout populations inhabiting the EFCR, Murray Canyon Creek, and Golden Canyon Creek, we calculated fish densities based on the total number of fish observed, by species, for all of the sections surveyed on each body of water and divided those values by the cumulative survey length of all sections combined on that body of water (Table 5). Finally, we calculated the overall trout density of Sections 108-408 (trout of mixed species downstream of Carson Falls) and Sections 508-2608 (Lahontan cutthroat trout upstream of Carson Falls), in order to compare Lahontan cutthroat trout densities above and below Carson Falls.

Angling:

Phase 4 (ongoing monitoring) angling surveys were conducted on July 3rd, August 25th, and August 26th, 2008 from Hangman's Bridge downstream to the Nevada State line (Figure 1). Eight anglers participated in the surveys and the river was divided into four

sections (Sections 1, 2, 3a, and 3b), based on commonly used angler access points (Figure 5). Teams of two used the different access points along the river in order to sample the entire reach from Hangman's Bridge to the Nevada State line. There were no gear restrictions on individual anglers during the survey effort; both fly fishing and spin fishing gear were used and anglers were able to choose which gear or hook type they wanted. Anglers individually recorded the start and end times of their fishing effort. Upstream/downstream GPS coordinates were recorded for each portion of the river fished. All captured fish were identified to species and total lengths were measured to the nearest inch using a calibrated landing net.

The habitat type in which fish were hooked was recorded (riffle, flatwater, or pool), along with the gear type used (streamer, nymph, dry fly, or lure). Each fish was examined carefully to identify whether it was of wild or hatchery origin. Fin erosion and/or deformities are common in fish raised in hatcheries and studies have shown that the dorsal fins of rainbow trout are the first to erode (Arndt et al. 2001). Hatchery fish were identified primarily by closely examining the fin rays on the dorsal fin; fish with irregularities in the dorsal fin rays were presumed to be of hatchery origin. Other fins were also evaluated for signs of wear and/or fin ray abnormalities. If all fin rays were symmetrical and parallel with no abnormalities, and the fins were intact, we identified the fish as wild (Figures 6 and 7).

Figure 5. Map of East Fork Carson River angling study area (Hangman's Bridge downstream to the Nevada State line), showing delineation of sections surveyed

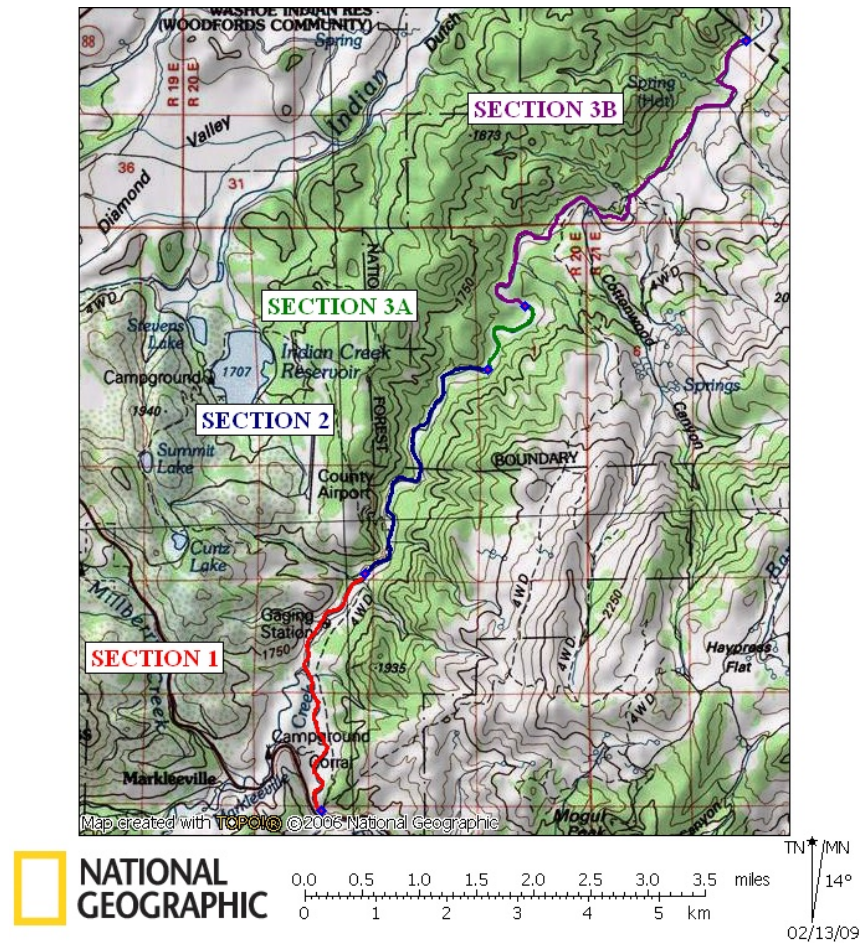
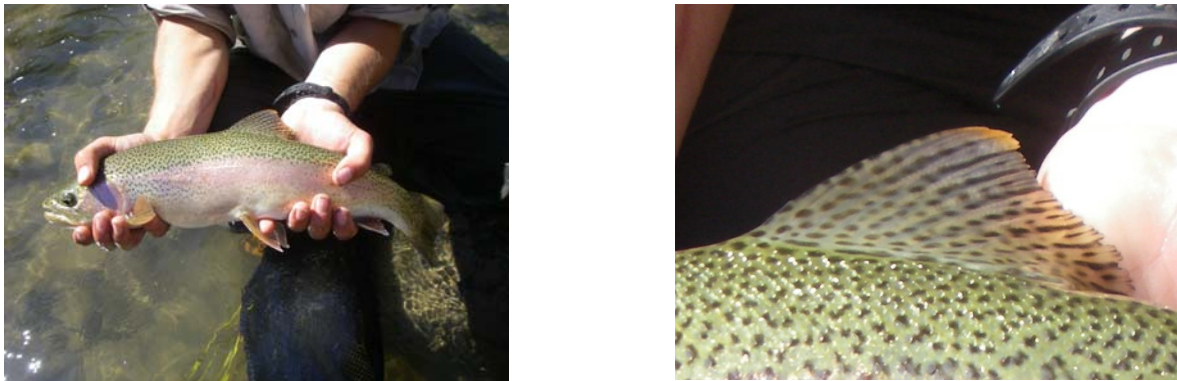


Figure 6. Photograph of hatchery rainbow trout (left) and close-up of dorsal fin (right) captured on East Fork Carson River (in the Wild Trout- designated area downstream of Hangman's Bridge)



Figure 7. Photograph of wild coastal rainbow trout (left) and close-up of dorsal fin (right) captured on East Fork Carson River (in the Wild Trout-designated area downstream of Hangman's bridge)



Results:

Direct Observation Surveys

The uppermost Wild Trout-designated portion of the EFCR is approximately 28-miles in length; our survey efforts focused on approximately 15 miles of this stream habitat, from the headwaters downstream to approximately one mile below Carson Falls. Four sections were surveyed downstream of the falls (August 18th) (Figure 2). Species composition below the falls included: Lahontan cutthroat trout, coastal rainbow trout, brook trout (*Salvelinus fontinalis*), brown trout, and unknown *Oncorhynchus* species (Table 1). For the latter, divers were unable to determine whether they were Lahontan cutthroat trout, coastal rainbow trout or possibly hybrids of the two. Size class composition consisted of small and medium-sized fish, with the majority falling into the small size class. These four survey sections were dominated by flatwater habitat, with one pool sampled at the base of Carson Falls (Section 408). The combined density of all trout species in this reach of the river was approximately 578 trout per mile. The weather was overcast during the survey effort and air temperatures ranged from 13° to 24° Celsius (C). Water temperature was measured between 11° and 22° C, depending on location and time of day. Two divers participated in each survey section. The average wetted width of these sections was 22 feet and the average water depth was 1.4 feet. Water visibility ranged from four feet to ten-plus feet.

Table 1. Summary of 2008 direct observation data on the East Fork Carson River, downstream of Carson Falls (Sections 108-408)

Section #	Section Length (ft)	Species	Number of Fish Observed					Totals	Estimated density (fish/mi)
			YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	XLarge > 18"		
108	96.3	coastal rainbow trout	0	12	1	0	0	13	713
		<i>Oncorhynchus</i> sp.	0	1	0	0	0	1	55
208	124.0	coastal rainbow trout	0	2	1	0	0	3	128
		brook trout	0	0	2	0	0	2	85
		<i>Oncorhynchus</i> sp.	0	1	0	0	0	1	43
308	64.0	coastal rainbow trout	0	4	1	0	0	5	413
		brown trout	0	1	0	0	0	1	83
		<i>Oncorhynchus</i> sp.	0	1	0	0	0	1	83
408	17.3	Lahontan cutthroat trout	0	5	1	0	0	6	1831
Estimated average density (trout per mile) =									578

A total of 22 sections were surveyed on the EFCR, from Carson Falls upstream to the headwaters near Sonora Pass (August 18th and 19th) (Figures 2, 3, and 4). The only species observed above the falls was Lahontan cutthroat trout. The average wetted width of this entire reach was 18.5 feet and the average water depth was 1.1 feet. A total of 62 Lahontan cutthroat trout were observed in the total survey length (all sections combined) of approximately 2857 feet. This yields an overall estimated density of 230 trout per mile (Table 2). Size classes observed included YOY, small, medium, and large, with the majority being small fish. Weather conditions ranged from clear and sunny to cool, overcast, and slightly breezy. Air temperatures were between 13° and 28° C and water temperatures ranged from 10° to 17° C, depending on survey location and time of day. Depending on stream width and water clarity, there were either one or two divers participating in each survey. The majority of habitat was flatwater, with some pools and riffles. Water visibility ranged from six feet to ten-plus feet.

Table 2. Summary of 2008 direct observation fish data on the East Fork Carson River, upstream of Carson Falls (Sections 508-2608)

Section #	Section Length (ft)	Number of Lahontan cutthroat trout observed						Estimated density (trout/mi)
		YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	XLarge > 18"	Totals	
508	80.0	0	0	0	0	0	0	0
608	139.5	0	0	0	0	0	0	0
708	93.2	0	1	0	0	0	1	57
808	73.4	0	0	2	0	0	2	144
908	164.0	0	1	0	0	0	1	32
1008	150.0	0	0	0	0	0	0	0
1108	115.0	0	3	2	0	0	5	230
1208	72.0	0	0	3	0	0	3	220
1308	55.0	0	0	0	0	0	0	0
1408	73.0	0	4	1	0	0	5	362
1508	128.0	0	1	0	0	0	1	41
1608	31.2	0	3	2	1	0	6	1015
1708	78.5	1	6	0	0	0	7	471
1808	130.0	2	12	0	0	0	14	569
1908	14.7	0	1	1	0	0	2	718
2008	189.0	0	2	1	0	0	3	84
2108	20.5	0	2	0	0	0	2	515
2208	58.5	0	0	0	0	0	0	0
2308	107.0	0	7	0	0	0	7	345
2408	31.0	0	2	0	1	0	3	511
2508	29.0	0	0	0	0	0	0	0
2608	24.0	0	0	0	0	0	0	0

Estimated density (trout per mile) =

230

Five sections of Murray Canyon Creek were surveyed (Sections 408-808) on August 19th. The weather was cloudy in the morning and clear/sunny in the afternoon. These five sections were located along 2.4 miles of stream habitat, from the confluence with the EFCR upstream to the headwaters. Air temperatures ranged from 12° to 23° C and water temperatures were between 11° and 13° C. Habitat types included flatwater, pool, and riffle, in order of decreasing abundance. Water visibility was greater than four feet. The average wetted width was 8.8 feet and the average water depth was 0.5 feet. Murray Canyon Creek joins the EFCR downstream of Carson Falls. HWTP surveyors observed three Lahontan cutthroat trout, one coastal rainbow trout, one brook trout, and two unknown *Oncorhynchus* species (Table 3). The estimated overall trout density of Murray Canyon Creek was 120 fish per mile.

Table 3. Summary of 2008 direct observation fish data on Murray Canyon Creek (Sections 408-908)

Section #	Section Length (ft)	Species	Number of Fish Observed						Estimated density (fish/mi)
			YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	XLarge > 18"	Totals	
408	66.0	coastal rainbow trout	0	1	0	0	0	1	80
		brook trout	0	0	1	0	0	1	80
		<i>Oncorhynchus</i> sp.	0	2	0	0	0	2	160
508	82.7	-	0	0	0	0	0	0	0
608	59.7	Lahontan cutthroat trout	0	0	1	0	0	1	88
708	42.0	Lahontan cutthroat trout	0	0	2	0	0	2	251
808	57.4	-	0	0	0	0	0	0	0
Estimated density (trout per mile) =									120

Six sections were surveyed on Golden Canyon Creek on August 18th (Sections 108-608) (Figure 3). Golden Canyon Creek enters the EFCR upstream of Carson Falls; species composition consisted solely of Lahontan cutthroat trout. These six sections were located along 3.5 miles of stream habitat, from the confluence with the EFCR upstream to the headwaters. Only two small-sized cutthroat trout were observed in the six sections, which totaled 335.3 feet in length (Table 4). This yields a density estimate for Lahontan

cutthroat trout in Golden Canyon Creek of 31 fish per mile. The average wetted width was 10.9 feet and the average water depth was 0.7 feet. Water temperatures were measured between 11° and 13° C; weather conditions were the same as during the EFCR surveys mentioned above. Habitat consisted predominantly of riffle, with some flatwater and pools. Water visibility was greater than six feet in all areas surveyed.

Table 4. Summary of 2008 direct observation fish data on Golden Canyon Creek, (Sections 108-608)

Section #	Section Length (ft)	Number of Lahontan cutthroat trout observed						Estimated density (trout/mi)
		YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	XLarge > 18"	Totals	
108	77.8	0	0	0	0	0	0	0
208	23.3	0	0	0	0	0	0	0
308	81.1	0	0	0	0	0	0	0
408	70.4	0	2	0	0	0	2	150
508	52.3	0	0	0	0	0	0	0
608	30.4	0	0	0	0	0	0	0
Estimated density (trout per mile) =								31

Table 5. Summary of 2008 direct observation totals by water for the East Fork Carson River, Murray Canyon Creek, and Golden Canyon Creek, including total trout observed by size class and overall trout densities (total trout includes all trout species observed)

Water	Total Length Surveyed (ft)	Total number of trout observed						Estimated density (trout/mi)
		YOY	Small < 5.9"	Medium 6" - 11.9"	Large 12" - 17.9"	XLarge > 18"	Totals	
East Fork Carson (downstream of falls)	301.6	0	27	6	0	0	33	578
East Fork Carson (upstream of falls)	1856.5	3	45	12	2	0	62	176
Murray Canyon Creek	307.8	0	3	4	0	0	7	120
Golden Canyon Creek	335.3	0	2	0	0	0	2	31

Hook-and-line Surveys

Two anglers fished Section 2 of the EFCR below Hangman's Bridge on July 3rd, 2008 as part of an initial reconnaissance survey of the area. These two anglers each fished for nine hours and caught a combined total of 36 coastal rainbow trout and three brown trout with an average catch rate of 2.2 fish per hour (Table 6). Of these fish, 36 percent of the coastal rainbow trout and 100 percent of the brown trout were of wild origin. All fish were caught in flatwater habitat. Of the 23 hatchery rainbow trout captured, all were 11 inches in length and were hooked using a streamer. The wild coastal rainbow trout ranged in size from six to 15 inches and were captured with either a streamer or nymph.

During the August survey effort, HWTP anglers captured a total of 101 coastal rainbow trout, four brown trout, and one mountain whitefish (*Prosopium williamsoni*) in 43.5 hours of effort (see Appendix I), with an average catch per unit effort of 2.4 fish per hour, not including the July 3rd data (Table 6). Fish were caught throughout the entire lower Wild Trout-designated area of the EFCR, from Hangman's Bridge downstream to the Nevada State line. Anglers recorded GPS coordinates where they landed their first and last hatchery fish each day. Some of these coordinates (enough to demonstrate the distribution of hatchery fish all the way to the Nevada State line) were plotted using GIS (Figure 8). The locations of wild caught fish are not represented on the map; however, anglers captured wild trout throughout the entire study area as well. Of the rainbow trout landed, 66 percent were of wild origin and 33 percent were hatchery fish. Nearly 70 percent of the fish landed were caught on a nymph in riffle and flatwater habitat (16 % pool, 41% riffle, and 43% flatwater).

Anglers noted that many of the hatchery fish captured appeared to be of wild origin at first glance. With the exception of erosion or deformities on the dorsal fin, all other fins were intact; in order to properly differentiate between a hatchery and wild fish, anglers had to specifically examine the dorsal fin.

Figure 8. Map of lower East Fork Carson River Wild Trout study area. The blue line represents the Wild Trout-designated area, the red line is non-wild trout, and the green dots represent some of the locations where hatchery fish were landed (indicating that hatchery fish were present throughout the 10 miles of designated Wild Trout area)

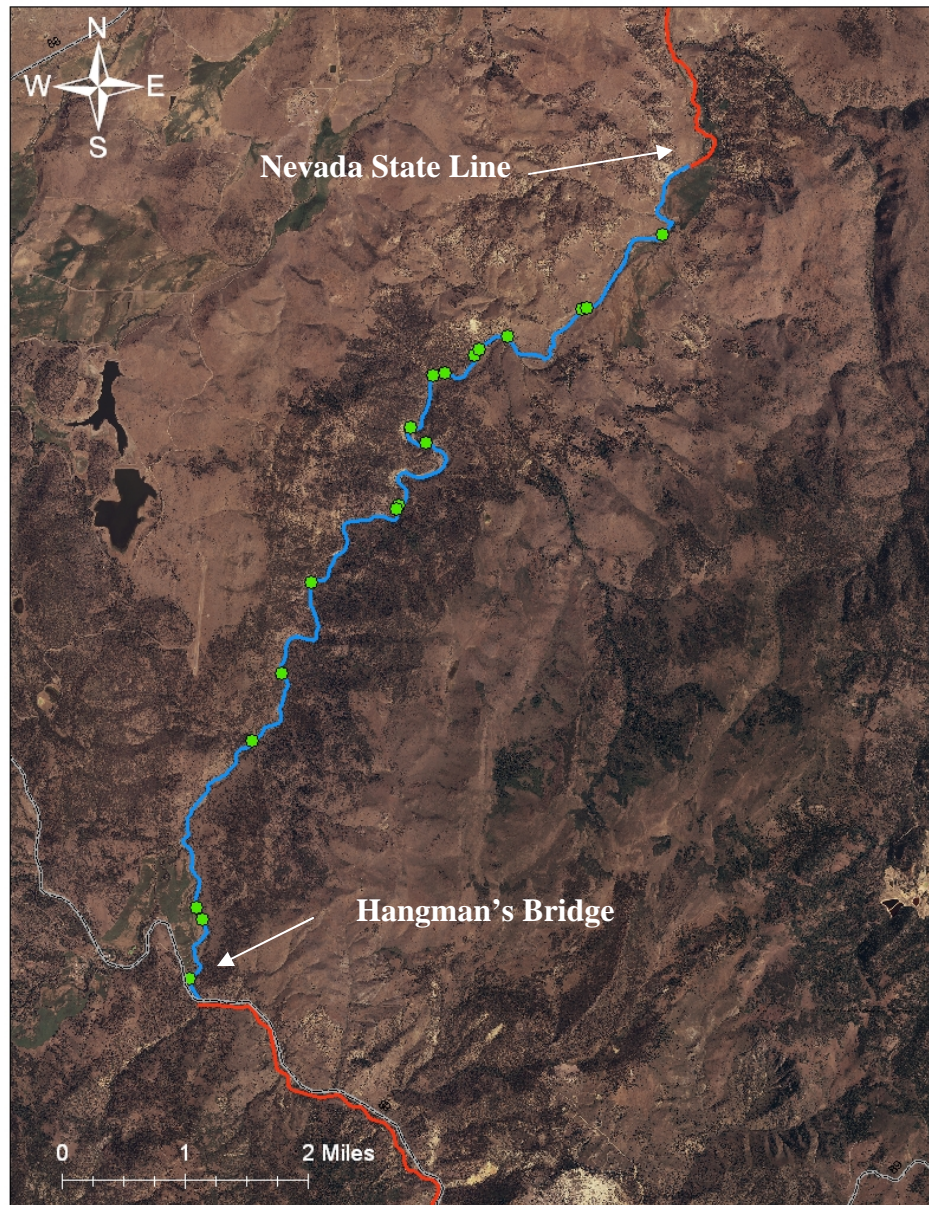
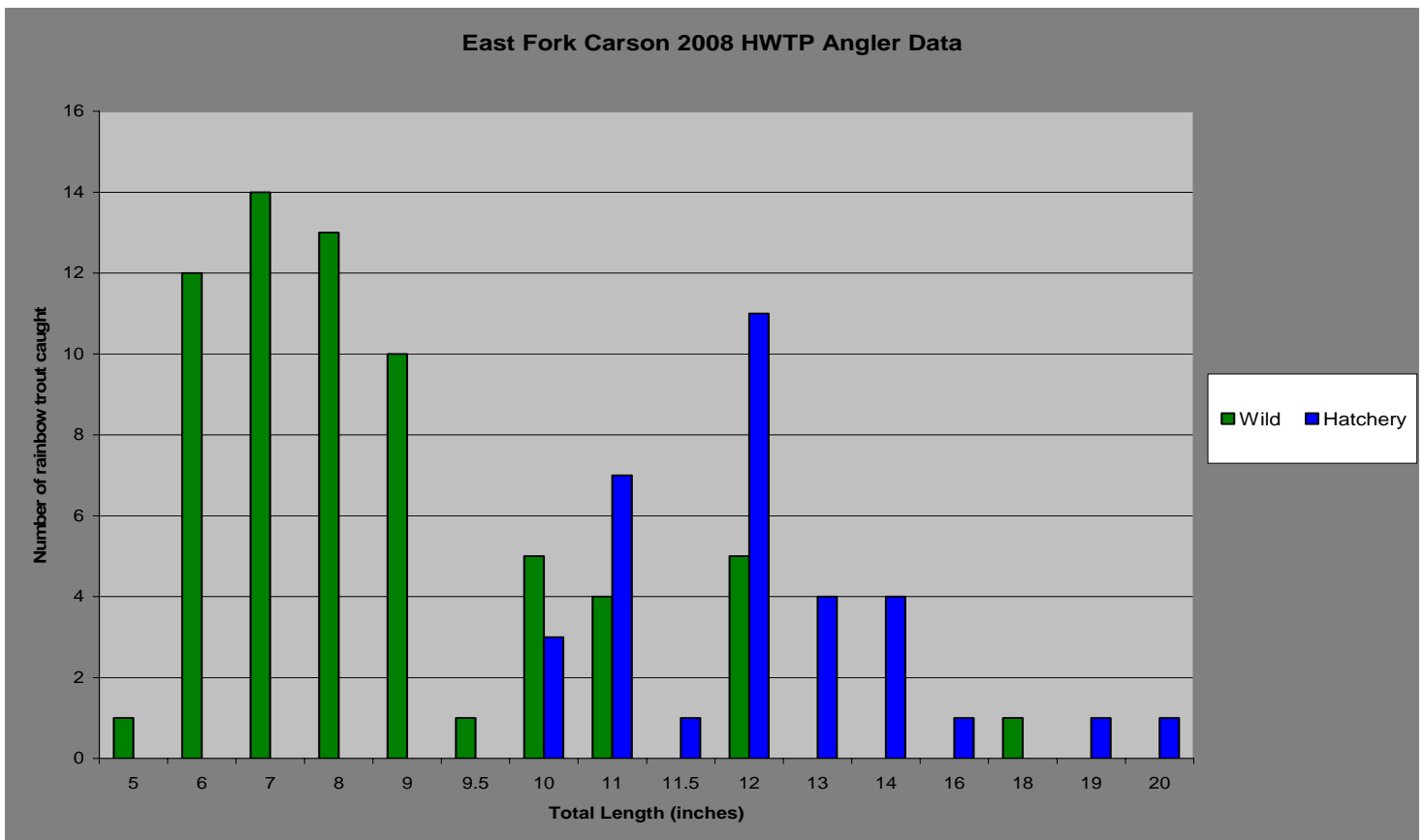


Table 6. Summary of catch rates, effort, and catch per unit effort by angler and section on East Fork Carson River in the Wild Trout-designated area downstream of Hangman's Bridge; see Appendix I and II for detailed information

Angler	Section #	# Fish Landed	Time Fished (hrs)	Catch per Unit Effort
Hennes	1	9	6.33	1.4
Bloom	2	25	9	2.8
Shackelford	2	14	9	1.6
Mehalick	2	3	3.25	0.9
Kirsch	2	5	3.5	1.4
Zuber	1	5	6.5	0.8
Notch	3a	18	3.25	5.5
Buckmaster	3a	8	3.17	2.5
Notch	3b	36	8.5	4.2
Buckmaster	3b	22	9	2.4
Totals		145	61.5	2.4

Figure 9. Histogram comparing length frequency of wild versus hatchery rainbow trout. Data from East Fork Carson River angling assessment August, 2008



Discussion:

The East Fork Carson River supports a native and wild population of Lahontan cutthroat trout, the majority of which are found upstream of Carson Falls. The population of these fish appears to be self-sustaining as all size classes were observed, including young of the year. However, this was the first headwater basin-wide assessment conducted on this river. The HWTP recommends continued assessments in future years in order to quantify trends in the population and to diversify survey section locations to better estimate age class structure and population density.

Numerous species were observed downstream of Carson Falls, including coastal rainbow trout, Lahontan cutthroat trout, and brook trout. Due to time constraints, the HWTP did not examine this entire reach of the river and, since it differs drastically in species composition, it should be evaluated separately from the Lahontan cutthroat trout habitat upstream of Carson Falls. Approximately 13-miles of Wild Trout-designated stream were not evaluated as part of this 2008 survey effort (From the Dumonts Meadows area downstream to the confluence with Wolf Creek). The HWTP recommends future surveys of this area in order to evaluate species composition, size class structure and habitat parameters.

The hook-and-line surveys showed a fairly high proportion of hatchery fish present throughout the entire reach from Hangman's Bridge downstream to the Nevada State line. It appears that the hatchery rainbow trout stocked near and above Hangman's Bridge move downstream throughout the system. California Fish and Game Commission Wild Trout Policy states that domestic strains of catchable-sized trout shall not be planted in designated Wild Trout waters. Although stocking occurs at or upstream of the Wild Trout designation (at Hangman's Bridge), it is apparent that these hatchery fish move throughout the system and utilize the habitat managed for wild fish. HWTP surveyors noted that on many fish, fins other than the dorsal fin were intact. This may make it difficult for the public to be able to differentiate hatchery and wild fish in the EFCR below Hangman's Bridge without knowing the subtleties of fin erosion or fin ray deformities (specifically in the first two rays of the dorsal fin).

On average, the captured hatchery fish were larger than the wild fish (Figure 9). Little is known of their impact to the wild trout population and whether or not the hatchery fish over-winter. The HWTP recommends continued monitoring of this section in 2009 and

into the future through angling and/or electrofishing surveys. HWTP staff recommends conducting surveys in the winter to document the presence/absence of hatchery fish in the Wild Trout-designated area below Hangman's Bridge in order to better understand the ability of hatchery fish to over-winter in the EFCR.

References:

Arndt, R et al. 2001. Influence of raceway substrate and design on fin erosion and hatchery performance of rainbow trout. North American Journal of Aquaculture. 63:312-320.

Baker, G., D. Gillman, and J. Barber. 1990. American Falls Hatchery Annual Report.

Behnke, Robert. 2002. Trout and Salmon of North America. Chanticleer Press, Inc. NY.

Hankin D.G. and G.H. Reeves. 1988. Estimating total fish abundance and total habitat area in small streams based on visual estimation methods. Canadian Journal of Fisheries and Aquatic Sciences. 45:834-844.

Wagner, E. et al. 1996. The effects of fry rearing density on hatchery performance, fin condition, and agnostic behavior of rainbow trout *Oncorhynchus mykiss* fry. Journal of the World Aquaculture Society. Vol. 27, No. 3.

Appendix I. East Fork Carson River July, 2008 hook-and-line survey data (survey area from Hangman's Bridge downstream to the Nevada State line)

Identification Number	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
1	Bloom	7/3/08	9.00	2	coastal rainbow trout	11	N	streamer	Flatwater
2	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
3	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
4	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
5	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
6	Bloom	7/3/08		2	coastal rainbow trout	10	Y	Nymph	Flatwater
7	Bloom	7/3/08		2	coastal rainbow trout	10	Y	Nymph	Flatwater
8	Bloom	7/3/08		2	coastal rainbow trout	12	Y	streamer	Flatwater
9	Bloom	7/3/08		2	coastal rainbow trout	15	Y	streamer	Flatwater
10	Bloom	7/3/08		2	brown trout	6	Y	streamer	Flatwater
11	Bloom	7/3/08		2	brown trout	6	Y	Nymph	Flatwater
12	Bloom	7/3/08		2	brown trout	6	Y	Nymph	Flatwater
13	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
14	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
15	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
16	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
17	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
18	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
19	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
20	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
21	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
22	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
23	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
24	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
25	Bloom	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater

Identification Number	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
26	Shackelford	7/3/08	9.00	2	coastal rainbow trout	11	N	streamer	Flatwater
27	Shackelford	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
28	Shackelford	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
29	Shackelford	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
30	Shackelford	7/3/08		2	coastal rainbow trout	11	N	streamer	Flatwater
31	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	streamer	Flatwater
32	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	streamer	Flatwater
33	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	streamer	Flatwater
34	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	streamer	Flatwater
35	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	Nymph	Flatwater
36	Shackelford	7/3/08		2	coastal rainbow trout	6	Y	Nymph	Flatwater
37	Shackelford	7/3/08		2	coastal rainbow trout	8	Y	Nymph	Flatwater
38	Shackelford	7/3/08		2	coastal rainbow trout	8	Y	Nymph	Flatwater
39	Shackelford	7/3/08		2	coastal rainbow trout	10	Y	Nymph	Flatwater

Appendix II. East Fork Carson River August, 2008 hook-and-line survey data (survey area from Hangman's Bridge downstream to the Nevada State line)

ID #	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
1	Hennes	8/25/08	6.33	1	coastal rainbow trout	7	Y	Nymph	Riffle
2	Hennes	8/25/08		1	coastal rainbow trout	7	Y	Nymph	Riffle
3	Hennes	8/25/08		1	coastal rainbow trout	12	N	Nymph	Riffle
4	Hennes	8/25/08		1	coastal rainbow trout	9	Y	Nymph	Riffle
5	Hennes	8/25/08		1	coastal rainbow trout	9	Y	Nymph	Riffle
6	Hennes	8/25/08		1	coastal rainbow trout	7	Y	Nymph	Riffle
7	Hennes	8/25/08		1	coastal rainbow trout	14	N	Nymph	Riffle
8	Hennes	8/25/08		1	coastal rainbow trout	12	N	Nymph	Riffle
9	Hennes	8/25/08		1	coastal rainbow trout	10	Y	Nymph	Riffle
10	Zuber	8/25/08	6.50	1	coastal rainbow trout	6	Y	Dry	Riffle
11	Zuber	8/25/08		1	coastal rainbow trout	8	Y	Dry	Flatwater
12	Zuber	8/25/08		1	coastal rainbow trout	9	Y	Dry	Flatwater
13	Zuber	8/25/08		1	coastal rainbow trout	6	Y	Dry	Flatwater
14	Zuber	8/25/08		1	coastal rainbow trout	8	Y	Dry	Flatwater
15	Mehalick	8/25/08	3.25	2	coastal rainbow trout	12	N	Dry	Flatwater
16	Mehalick	8/25/08		2	coastal rainbow trout	12	N	Dry	Flatwater
17	Mehalick	8/25/08		2	coastal rainbow trout	8	Y	Dry	Flatwater
18	Kirsch	8/25/08	3.50	2	coastal rainbow trout	16	N	Lure	Flatwater
19	Kirsch	8/25/08		2	coastal rainbow trout	11	N	Lure	Flatwater
20	Kirsch	8/25/08		2	coastal rainbow trout	9	Y	Lure	Flatwater
21	Kirsch	8/25/08		2	coastal rainbow trout	9.5	Y	Lure	Riffle
22	Kirsch	8/25/08		2	coastal rainbow trout	11.5	N	Lure	Pool

#	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
23	Notch	8/25/08	3.25	3a	coastal rainbow trout	6	Y	Nymph	Pool
24	Notch	8/25/08		3a	coastal rainbow trout	7	Y	Nymph	Riffle
25	Notch	8/25/08		3a	coastal rainbow trout	9	Y	Nymph	Riffle
26	Notch	8/25/08		3a	coastal rainbow trout	10	Y	Nymph	Riffle
27	Notch	8/25/08		3a	brown trout	8	Y	Nymph	Riffle
28	Notch	8/25/08		3a	coastal rainbow trout	6	Y	Nymph	Riffle
29	Notch	8/25/08		3a	coastal rainbow trout	6	Y	Nymph	Riffle
30	Notch	8/25/08		3a	coastal rainbow trout	7	Y	Dry	Riffle
31	Notch	8/25/08		3a	coastal rainbow trout	11	Y	Dry	Riffle
32	Notch	8/25/08		3a	coastal rainbow trout	5	Y	Dry	Riffle
33	Notch	8/25/08		3a	coastal rainbow trout	8	Y	Dry	Riffle
34	Notch	8/25/08		3a	coastal rainbow trout	9	Y	Dry	Riffle
35	Notch	8/25/08		3a	coastal rainbow trout	6	Y	Dry	Riffle
36	Notch	8/25/08		3a	coastal rainbow trout	12	N	Dry	Flatwater
37	Notch	8/25/08		3a	coastal rainbow trout	12	Y	Nymph	Riffle
38	Notch	8/25/08		3a	brown trout	10	Y	Nymph	Riffle
39	Notch	8/25/08		3a	coastal rainbow trout	10	Y	Nymph	Riffle
40	Notch	8/25/08		3a	coastal rainbow trout	9	Y	Nymph	Riffle
41	Buckmaster	8/25/08	3.17	3a	coastal rainbow trout	11	Y	Dry	Flatwater
42	Buckmaster	8/25/08		3a	brown trout	8	Y	Nymph	Flatwater
43	Buckmaster	8/25/08		3a	coastal rainbow trout	12	N	Nymph	Pool
44	Buckmaster	8/25/08		3a	coastal rainbow trout	11	N	Streamer	Pool
45	Buckmaster	8/25/08		3a	coastal rainbow trout	10	Y	Dry	Riffle
46	Buckmaster	8/25/08		3a	coastal rainbow trout	18	Y	Nymph	Pool
47	Buckmaster	8/25/08		3a	coastal rainbow trout	7	Y	Nymph	Pool
48	Buckmaster	8/25/08		3a	coastal rainbow trout	8	Y	Dry	Riffle

#	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
49	Notch	8/26/08	8.50	3b	coastal rainbow trout	12	N	Nymph	Flatwater
50	Notch	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Flatwater
51	Notch	8/26/08		3b	coastal rainbow trout	11	N	Dry	Flatwater
52	Notch	8/26/08		3b	coastal rainbow trout	11	N	Nymph	Riffle
53	Notch	8/26/08		3b	coastal rainbow trout	6	Y	Dry	Riffle
54	Notch	8/26/08		3b	coastal rainbow trout	8	Y	Dry	Riffle
55	Notch	8/26/08		3b	coastal rainbow trout	10	N	Dry	Riffle
56	Notch	8/26/08		3b	coastal rainbow trout	11	N	Dry	Riffle
57	Notch	8/26/08		3b	coastal rainbow trout	6	Y	Nymph	Riffle
58	Notch	8/26/08		3b	coastal rainbow trout	10	N	Nymph	Riffle
59	Notch	8/26/08		3b	coastal rainbow trout	11	N	Dry	Riffle
60	Notch	8/26/08		3b	coastal rainbow trout	12	N	Nymph	Riffle
61	Notch	8/26/08		3b	coastal rainbow trout	6	Y	Nymph	Riffle
62	Notch	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Riffle
63	Notch	8/26/08		3b	coastal rainbow trout	6	Y	Nymph	Flatwater
64	Notch	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Flatwater
65	Notch	8/26/08		3b	coastal rainbow trout	14	N	Dry	Flatwater
66	Notch	8/26/08		3b	coastal rainbow trout	13	N	Nymph	Pool
67	Notch	8/26/08		3b	mountain whitefish	10	Y	Nymph	Pool
68	Notch	8/26/08		3b	coastal rainbow trout	12	Y	Nymph	Pool
69	Notch	8/26/08		3b	coastal rainbow trout	13	N	Nymph	Pool
70	Notch	8/26/08		3b	coastal rainbow trout	14	N	Nymph	Pool
71	Notch	8/26/08		3b	coastal rainbow trout	12	N	Nymph	Pool
72	Notch	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Pool
73	Notch	8/26/08		3b	coastal rainbow trout	9	Y	Nymph	Flatwater
74	Notch	8/26/08		3b	coastal rainbow trout	10	Y	Nymph	Flatwater
75	Notch	8/26/08		3b	coastal rainbow trout	16	?	Nymph	Flatwater
76	Notch	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Flatwater
77	Notch	8/26/08		3b	coastal rainbow trout	12	Y	Nymph	Flatwater
78	Notch	8/26/08		3b	coastal rainbow trout	20	N	Nymph	Flatwater

#	Angler	Date	Effort (hrs)	Section	Species	Total Length (in)	Wild (Y or N)	Fly Type	Habitat
79	Notch	8/26/08		3b	coastal rainbow trout	14	N	Nymph	Flatwater
80	Notch	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Flatwater
81	Notch	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Flatwater
82	Notch	8/26/08		3b	coastal rainbow trout	12	N	Nymph	Pool
83	Notch	8/26/08		3b	coastal rainbow trout	6	Y	Nymph	Flatwater
84	Notch	8/26/08		3b	coastal rainbow trout	11	Y	Nymph	Flatwater
85	Buckmaster	8/26/08		3b	coastal rainbow trout	7	Y	Dry	Flatwater
86	Buckmaster	8/26/08		3b	brown trout	7	Y	Nymph	Flatwater
87	Buckmaster	8/26/08		3b	coastal rainbow trout	10	N	Nymph	Pool
88	Buckmaster	8/26/08		3b	coastal rainbow trout	11	N	Nymph	Pool
89	Buckmaster	8/26/08		3b	coastal rainbow trout	16	?	Nymph	Pool
90	Buckmaster	8/26/08		3b	coastal rainbow trout	13	N	Nymph	Flatwater
91	Buckmaster	8/26/08		3b	coastal rainbow trout	12	Y	Nymph	Flatwater
92	Buckmaster	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Flatwater
93	Buckmaster	8/26/08		3b	coastal rainbow trout	6	Y	Nymph	Flatwater
94	Buckmaster	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Flatwater
95	Buckmaster	8/26/08		3b	coastal rainbow trout	9	Y	Nymph	Flatwater
96	Buckmaster	8/26/08		3b	coastal rainbow trout	13	N	Nymph	Flatwater
97	Buckmaster	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Riffle
98	Buckmaster	8/26/08		3b	coastal rainbow trout	8	Y	Dry	Riffle
99	Buckmaster	8/26/08		3b	coastal rainbow trout	12	N	Nymph	Flatwater
100	Buckmaster	8/26/08		3b	coastal rainbow trout	19	N	Nymph	Flatwater
101	Buckmaster	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Flatwater
102	Buckmaster	8/26/08		3b	coastal rainbow trout	11	Y	Nymph	Flatwater
103	Buckmaster	8/26/08		3b	coastal rainbow trout	8	Y	Nymph	Flatwater
104	Buckmaster	8/26/08		3b	coastal rainbow trout	9	Y	Nymph	Riffle
105	Buckmaster	8/26/08		3b	coastal rainbow trout	7	Y	Nymph	Flatwater
106	Buckmaster	8/26/08		3b	coastal rainbow trout	12	Y	Nymph	Flatwater