

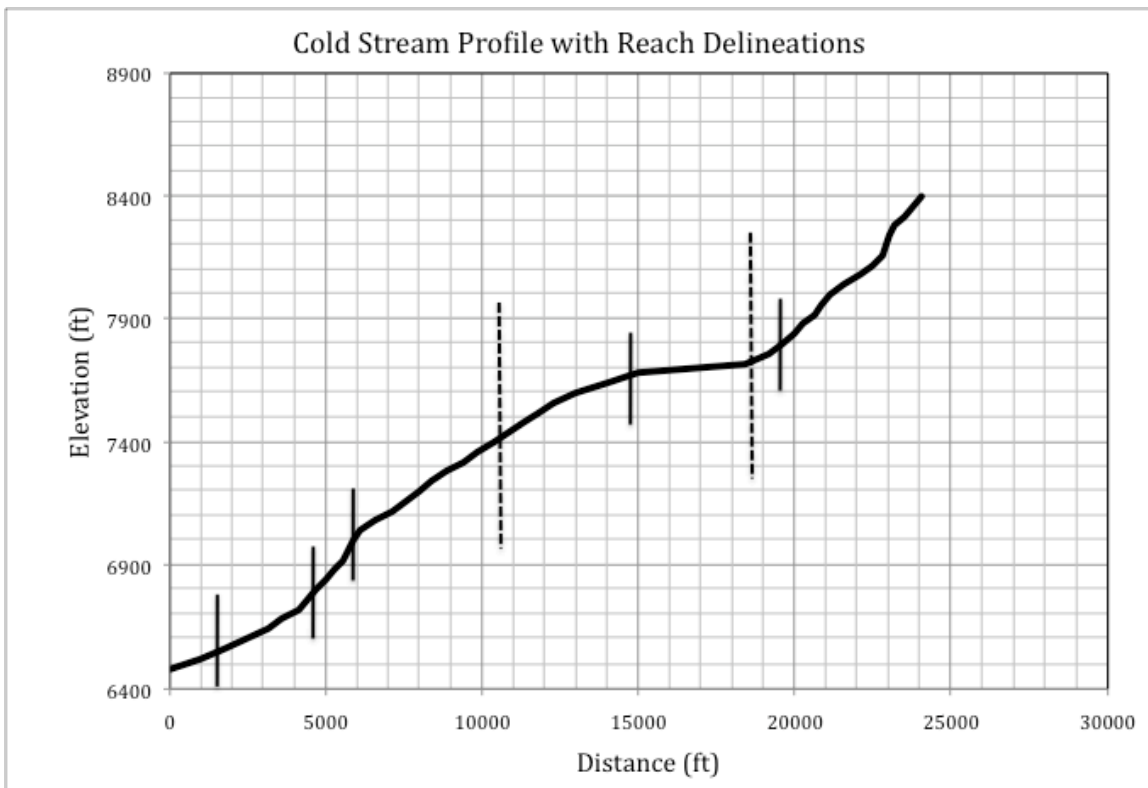
Taken together, the information gathered from these two surveys depict a high-energy channel, still working to adjust its profile as it cuts through layers of glacial material. The stream profile shown below depicts an unusual convex profile through reach 4 indicating a large volume of valley fill and resistant substrate.

Sufficient gravel is present to support spawning (22%-55% depending on reach). High flows and high stream gradients provide enough energy to flush fine sediments out of the basin (fines less than 8% on high gradient reaches and less than 14% through the Cold Stream Meadow reach).

Woody debris is abundant throughout with the exception of the meadow reach. Woody debris plays a very significant role in pool formation and in the rate of bedload movement through the system. Riparian vegetation is mostly in good shape with good recruitment potential for large woody debris.

The periodic release of logs and boulders through the demise of log-formed jams causes episodes of channel scour over short sections and is probably the main mechanism moving large cobbles and boulders down the channel. This dynamic process has the potential to create temporary barriers to upstream fish migration..

Figure 2



Solid vertical lines indicate 2010 reach delineations. Dashed lines show reach delineations from 2000 USFS survey

LAND USE

Roads. Henness Pass road crosses the alluvial fan of Cold Stream at 6550 ft. The crossing is a low bridge with concrete wing walls on the abutments. This crossing forces three distributary channels to coalesce through the crossing. Evidence at the site (repaired erosion around abutments) suggests that the crossing and its approaches are overtopped by high flows on a fairly regular basis. Although these problems are relatively minor, re-design of this crossing is probably justifiable from both engineering and resource conservation grounds.

One principal road accesses the upper basin for a total length of 2.16 miles and crosses Cold Stream twice via log stringer bridges. No major erosion problems were found on this road. Road grade is moderate and the surface is very hard and rocky because of ample rock in the native base material. The lower stringer bridge shows significant damage from over-topping, suggesting that its design results in too much constriction on channel cross sectional area. This road traverses the outer boundary of USFS designated Riparian Habitat Conservation Areas (RHCA's). Past logging associated with the road has reduced tree density in the RHCA but no major erosion sources related to the road were observed.

The upper basin has 2.22 miles of logging spur roads that are now closed, water-barred, and partially re-vegetated. A few small drainage problems were found but major erosion problems associated with these spur roads were not found.

Initial survey plans called for an itemization of road erosion problem sites. Problem sites were so few and small that this effort was deemed unnecessary. Road-related erosion is not an important issue in the Cold Stream Basin.

Timber Harvest History. Timber harvest has been most intense on the private lands in the basin. The "checkerboard" ownership pattern is very apparent on air photos from the differences in stand density alone. Changes to stand density were highest in Section 1, T18N, R14E. Current stand density is roughly 20-30 trees per acre. Most of the logging spur road miles occur in this section. The current stand density is probably the result of multiple harvest entries followed by a thinning.

Harvesting also occurred in Section 29, T19N, R15E. In this area, stand densities are higher (50+ trees per acre) and the distribution of trees is clumpier indicating the salvage was the most likely prescription. Numerous skid trails are present in this section but no major logging spurs. This logging occurred in 1995.

Both logged areas were traversed on foot to look at the general state of soil erosion that might be attributable to harvest operations. Very little was found. Soil cover in the form of duff, litter, slash, and large rocks is usually in excess of 70-80%. The inherent rockiness and high infiltration capacity of the soil limits the erosion potential. These two sections are now under the ownership of the Tahoe-Donner

Land Trust making it highly unlikely that timber harvest entries will occur anytime in the near future.

Timber management on USFS lands in the basin has been minimal. Records indicate a small (~40 acre) 1987 entry in the lower basin but it is not visually apparent either on the ground or from air photos. USFS land in the upper basin shows no sign of entry for timber harvest.

Recreation Use. The Mt. Lola Trail attracts hikers, mountain bikers, and anglers to the basin. The upper basin road provides easy access to Cold Stream Meadow where angler success is undoubtedly higher than elsewhere in the basin. Some off-road vehicle use is also evident in the upper basin. The level of recreation use is not unusually high given the basin's proximity Highways 89 and 80 and the greater Tahoe/Truckee area. None of this activity is causing major problems relative to stream habitat, channel stability, or water quality.

Water Diversion. A few small residential diversions appear to operate periodically based on pipelines encountered during the field survey. Many appeared to be non-functional at the time of the field survey. All diversions were effected through use of natural pools. The amount of water diverted appears to be extremely small relative to natural base flows.

FISHERIES

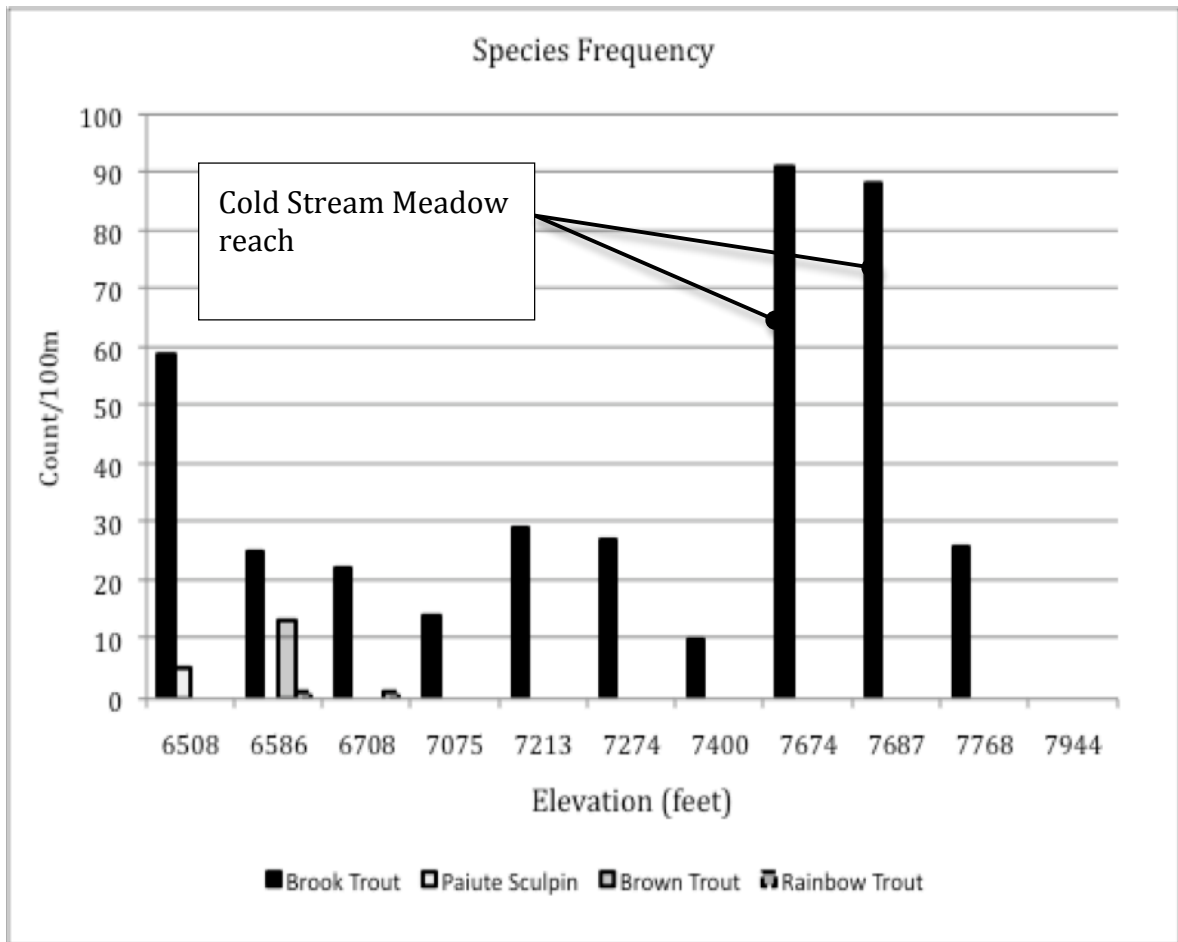
In September 2010, Mr. Derek Bloomquist of the US Fish and Wildlife Service (and his dedicated field crew), conducted fish census surveys in Cold Stream. Eleven transects were surveyed from the confluence with the Little Truckee to above Cold Stream Meadow near 8000' in elevation. A summary of those data is shown below.

Brook trout clearly dominate the stream as a whole. Sculpin, Brown trout and Rainbow trout were all found in very low numbers, all below the high gradient section that begins around 6800'. The highest densities of Brook trout were found in the lowest gradient reaches that include the alluvial fan (reach 1) and the Cold Stream Meadow (reach 5). One plausible scenario is that Cold Stream Meadow is something of a fish "nursery" that supplies the rest of the system through downstream migration and that the rigors of the high gradient reaches below limit the upstream advance of competing salmonids.

Table 4: Summary of fish survey data gathered September 2010

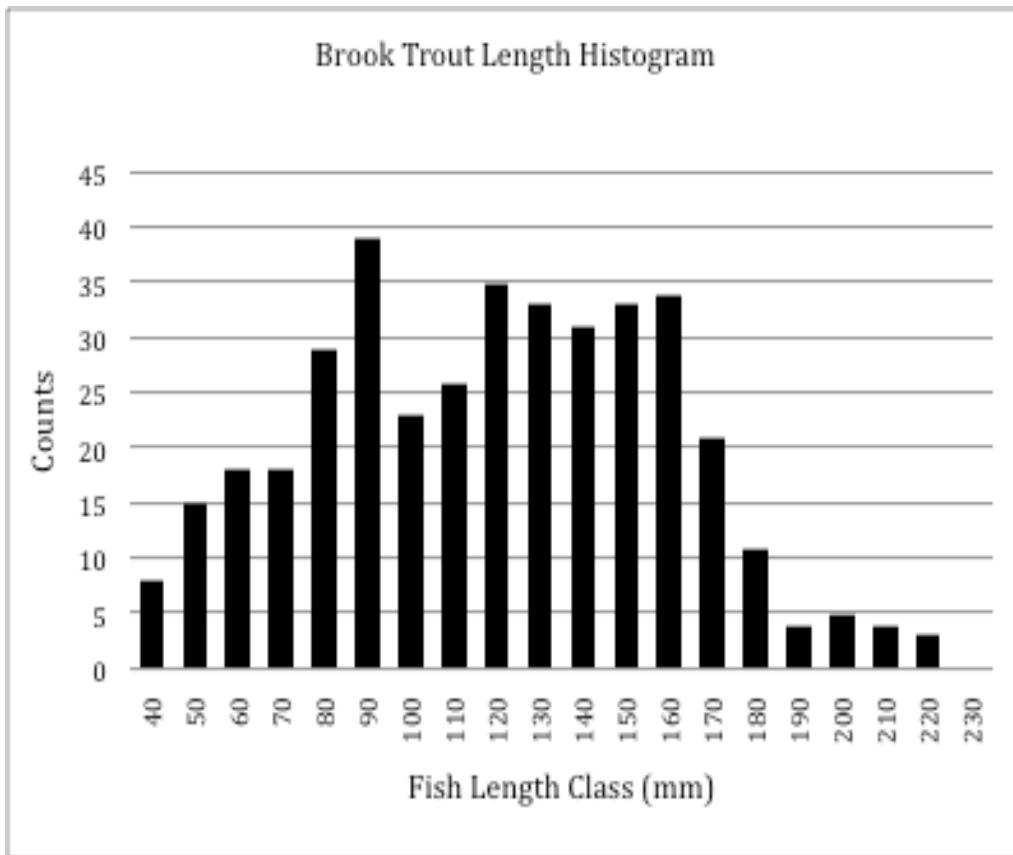
Transect #	Elevation	Brook Trout	Paiute Sculpin	Brown Trout	Rainbow Trout
1	6508	59	5	0	0
2	6586	25	0	13	1
3	6708	22	0	0	1
4	7075	14	0	0	0
5	7213	29	0	0	0
6	7274	27	0	0	0
7	7400	10	0	0	0
8	7674	91	0	0	0
9	7687	88	0	0	0
10	7768	26	0	0	0
11	7944	0	0	0	0

Figure 3: Fish survey results by transect elevation



Frequency Distributions. Only Brook trout were present in sufficient numbers to look at the distribution of sizes and life stages. This analysis suggests that all life stages are present. The median length of BT was 115 mm. The largest BT found was 240 mm. The frequency histogram shows a good spread of size/age classes.

Figure 4: Frequency distribution of Brook trout lengths, all transects combined.



CONCLUSIONS

The Cold Stream watershed exhibits the following important attributes.

- Abundant precipitation dominated by snow. Frequent scouring peak flows and generous summer base flow result.
- Extremely rocky and porous soil surface limits surface erosion
- Frequent channel scour and heavy bedload movement in main channel below Cold Stream Meadow.
- Most sediment input from landslides adjacent to channel in Reaches 3 and 4
- Very good summer base flow (6 cfs) and low water temperatures
- Vegetative recovery from past logging well underway (20 years)
- Future logging on private land in upper basin is unlikely in the near future.
- No significant road problems except at crossings
- Opportunity exists to improve stream crossings at Hennes Pass Road and at log-stringer bridge in upper basin.
- Brook Trout dominate fish population throughout. Highest densities of fish are found in the lowest gradient reaches, particularly through Cold Stream Meadow.
- All life stages of fish are present suggesting adequate spawning-rearing habitat is present
- Other species not found above high gradient reach (Reach 3) suggesting normal presence of upstream migration barriers.

Overall, watershed conditions in Cold Stream are reasonably good and hydrologic function is mostly unimpaired by past land use. Road density is low and erosion rates are close to those that would occur naturally.

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APPENDIX A

ANNOTATED PHOTO GALLERY OF COLD STREAM