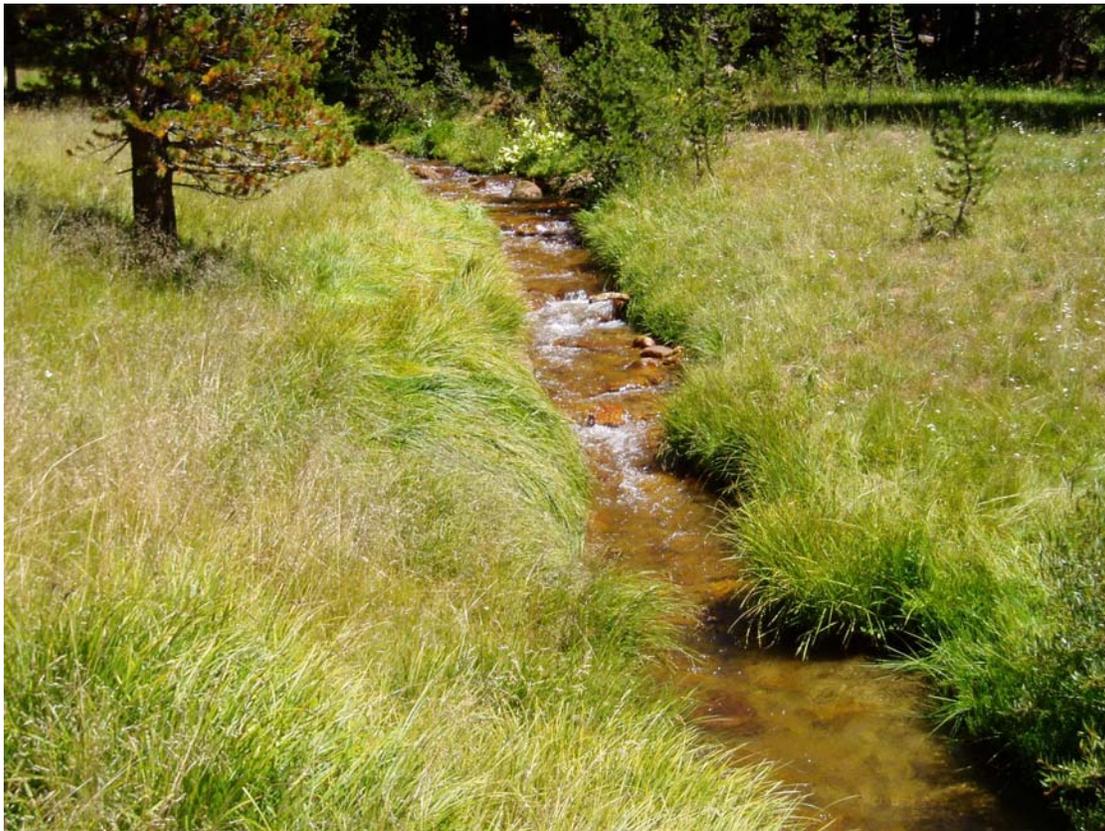


# **WILLOW CREEK**

Alpine County, California

## 2006 Stream Habitat Survey Report



Prepared by:

Carson Ranger District: Humboldt-Toiyabe National Forest

## **Introduction**

Willow Creek is located in Alpine County, California. The headwaters converge to form the mainstem at an elevation of approximately 8750 feet. The stream runs for approximately five miles in a southerly direction to the confluence with the West Fork Carson River (Elev. 7068 feet). The Willow Creek watershed is found primarily within the boundaries of the Humboldt-Toiyabe National Forest, though the lowermost section of stream runs through California state lands (SEE MAP).

## **Purpose and Need**

The 1995 Lahontan Cutthroat Trout Recovery Plan requires that ecosystem management plans be developed for the Truckee and Walker River basins in order to both determine objectives for the future desired conditions of these watersheds, and to create strategies for achieving these objectives. Similar management plans are recommended for the Carson and Humboldt River basins. In 1998 Truckee and Walker River Basin Recovery Implementation Teams were organized to develop strategies for Lahontan cutthroat trout (LCT) restoration and recovery efforts in the Truckee and Walker River basins. In August 2003 both recovery teams completed Short-Term Action Plans for Lahontan Cutthroat Trout Recovery in the Truckee and Walker River Basins. The short-term action plans outline specific tasks to be completed within five years. Many of the short-term tasks identified in the Truckee and Walker River Basin Short-Term Action Plans are similar to one another and are applicable to recovery of LCT in the Carson River basin. The Carson Ranger District adopted some of the short-term tasks identified in the Truckee and Walker River Basin Short-Term Action Plans and began implementing these actions under an informal plan for the Carson River basin. These tasks include: (1) identifying and evaluating fish passage and existing barriers within the Carson River basin, (2) developing a watershed analysis of the physical components of the Carson River basin, and (3) initiating habitat surveys to evaluate potential LCT introduction streams and validating against existing LCT inhabited streams.

The Carson River watershed historically provided an estimated 405 miles of stream habitat (Kling and Mellison 2008) for the native Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*). Populations of these salmonids within the watershed were interactive and interconnected, and therefore these metapopulations likely had high genetic diversity and were capable of long term persistence through adverse conditions.

At present, no self-sustaining populations of genetically pure LCT are known to occupy historic habitat within the Carson River basin and since all of the drainage has been surveyed it is doubtful that any such populations remain to be discovered. The introduction of nonnative trout before the turn of the century is believed to be largely responsible for the extirpation of LCT within the Carson River drainage.

Although naturally occurring Lahontan cutthroat trout populations have been eliminated from the Carson River drainage, small populations have been established in the formerly fishless headwaters of the East Fork Carson River above Carson Falls and in the

tributaries Murray Canyon Creek, Golden Canyon Creek, and Poison Flat Creeks above impassible barriers. Pure populations of LCT also occur in Red Lake, Heenan Lake, Heenan Creek, and possibly in Raymond Meadows Creek. Hybridized populations of LCT occur in Jeff Davis Creek and in Leviathan Creek upstream of Leviathan Mine. The artificially established pure populations of LCT in the East Fork Carson River watershed occupy about 17 miles of stream habitat: approximately 4.2% of the total miles that LCT presumably occupied historically.

The primary causes for the decline of LCT include: 1) reduction and alteration of stream discharge; 2) alteration of stream channels and morphology; 3) degradation of water quality; and 4) introductions of non-native fish species. The Carson River watershed downstream of Carson Falls is primarily inhabited by non-indigenous salmonids which include, but are not limited to: rainbow trout (*Oncorhynchus mykiss*), brook trout (*Salvelinus fontinalis*), and brown trout (*Salmo trutta*). These competitive and aggressive introduced fishes have displaced the endemic Lahontan cutthroat trout.

Long term survival and recovery of LCT within the Carson River watershed will require sustained cooperation and effort from multiple federal and state agencies, including the Forest Service and personnel of the Humboldt-Toiyabe National Forest. Gaining information through immediate action can aid in prioritizing future objectives for the restoration of LCT. The 2006 Carson River watershed surveys are being conducted to gain information about streams in the basin, and furthermore to provide an inventory of potential fish habitat for LCT. The surveys include the tasks of identifying potential fish passage barriers and evaluating physical characteristics that pertain to the success of the native LCT. Should recommendations be made to re-introduce LCT, these surveys can provide baseline information for future management of the fishery. Willow Creek was surveyed by Brian Hodge of the Carson Ranger District on August 21, 2006.

## **Materials and Methods**

Forest Service personnel surveyed Willow Creek by hiking the stream in an upstream manner from the California state game refuge boundary up to the headwaters (SEE MAP).

Interesting and relevant features were documented, photographed, and recorded into a Trimble GPS unit. These features included but were not limited to: road crossings, trail crossings, fish sightings, permanent fish barriers, seasonal fish barriers, tributaries, springs, beaver dams, areas of erosion concern, grazing impacts, dispersed campsites, etc.

Fish passage barriers were noted and categorized into one of four categories: natural-permanent, natural-seasonal, artificial-permanent, and artificial-seasonal. A permanent barrier is categorized as an obstacle, waterfall, or drop in excess of 5ft that would prevent passage of fish year-round (specifically LCT). A stadia rod was used to measure barriers where applicable. Barriers categorized as permanent barriers may actually be seasonal barriers, and some seasonal barriers may actually act as a permanent barrier.

## **Results**

Approximately 3.05 miles of Willow Creek were surveyed (Site 1-Site 23). Three fish barriers were documented (Sites 2, 3, and 22). Sites 2 and 3 are permanent barriers and the barrier at Site 22 is seasonal. Six tributaries were noted throughout the surveyed reach (Sites 8, 15, 17, 19, 20, & 21). Two fish sightings were documented (Sites 12 & 18). Three campsites were documented along the watercourse (Sites 7, 11, & 14). In addition, erosion concerns were noted at Site 6 and Site 13. Two road-stream crossings were identified where Forest Service Road 051 and a spur of 051 cross Willow Creek. Grazing impacts were noted at Site 10, though the impacts of cattle were present from Site 4-Site 20. The overall stream gradient is approximately 6.9 percent.

## **Discussion**

Roughly 1.9 miles of Willow Creek provide potential LCT habitat (Site 4 to Site 21). The reach between Site 1 and Site 4 is steep, containing at least two verified permanent fish passage barriers (Site 2 & Site 3). The waterfall at Site 2 is approximately 10 feet high, with a maximum pool depth of 2.75 feet. The fish barrier at Site 3 is at least 15 feet high, with a maximum pool depth of 4.0 feet. Therefore, the 0.44 mile section between Site 1 and Site 4 is unfavorable for LCT habitat and lacks continuity. The 1.9 mile section of potential LCT habitat is fed by multiple tributaries and has sustainable flows: approximately 4-5 cfs in late August. The reach provides a combination of runs, riffles, and pools. Fish were sighted at Site 12 and Site 18, reinforcing the idea that the stream can support fish. Grazing impacts were noticeable between Site 4 and Site 20. Cattle in the drainage are walking in the riparian zones as well as through the stream bed. Slumping stream banks may provide a source of extra sediment to Willow Creek. In addition, human impacts due to camping were also noticeable. The campsite at Site 7 was spread out roughly 15 meters from the water's edge. Trash piles, an outhouse, and broken chairs have been abandoned. At Site 14 a 20m x 20m campsite is located about 2 meters from the water. In addition, vehicles have driven down to the campsite and into the floodplain.

Upstream of Site 21 the stream is reduced in size because tributaries provide a large amount of water to Willow Creek at and below that point (Sites 17, 19, 20, & 21). The minimal flows and small shallow stream are not conducive to sustainable habitat throughout varying hydrologic conditions. Downstream of Site 1 Willow Creek is located on state land. The status and condition of that section is unknown.

## **Recommendations**

1. Consider the 1.9 mile section of Willow Creek between Site 4 and Site 21 as potential LCT habitat and consider Willow Creek a high candidate for restoration. The lower section of Willow Creek downstream of Site 1 could contribute towards restoring a metapopulation of LCT in the West Fork Carson River watershed (See 2008 Carson River Summary Report).

2. Consider the section of Willow Creek between Site 1 and Site 4, and the section between Site 21 and Site 23 as having no potential LCT habitat.
3. Discuss with ranchers/livestock managers the possibility of isolating a riparian corridor, and or limiting livestock access points to the creek. Consider cost-share in fencing these buffers.
4. Remove and disassemble all campsites within 100 feet of the stream.
5. Close and decommission all non-designated roads that lead to unwanted campsites and/or allow vehicles to drive onto stream banks.

# Willow Creek Stream Habitat Survey 2006



- E** Erosion Concern
- Photo Points
- Tributary
- Campsite
- Survey Start/End
- Other
- Ford/Rd Crossing
- Fish Sighting
- Fish Barrier**
  - Permanent-Natural
  - Seasonal-Natural
- Potential LCT Habitat
- No Potential LCT Habitat

- Legend**
- Ownership**
- Humboldt-Toiyabe NF
  - Lake Tahoe Mngmnt Unit
  - Private
  - State Lands

0 0.25 0.5 1 Miles

klw  
9/26/06



**Site 1:** Willow Creek, Carson Ranger District. Downstream view of canyon at survey start point. This site is located at UTM: N: 4299514 & E: 248019, Elev. 7669 feet (2338m).



**Site 1:** Willow Creek, Carson Ranger District. Bird's eye view of stream at the survey start point. This site is located at UTM: N: 4299514 & E: 248019, Elev.7669 feet (2338m).



**Site 2:** Willow Creek, Carson Ranger District. Upstream photo of a 10-foot waterfall that creates a permanent fish passage barrier (max. pool depth 2.75 feet). This site is located at UTM: N: 4299518 & E: 247997, Elev. 7734 feet (2358m).



**Site 3:** Willow Creek, Carson Ranger District. A 15-foot waterfall with maximum pool depth 4.0 feet prevents fish passage. This site is located at UTM: N: 4299699 & E: 247825, Elev. 7921 feet (2415m).



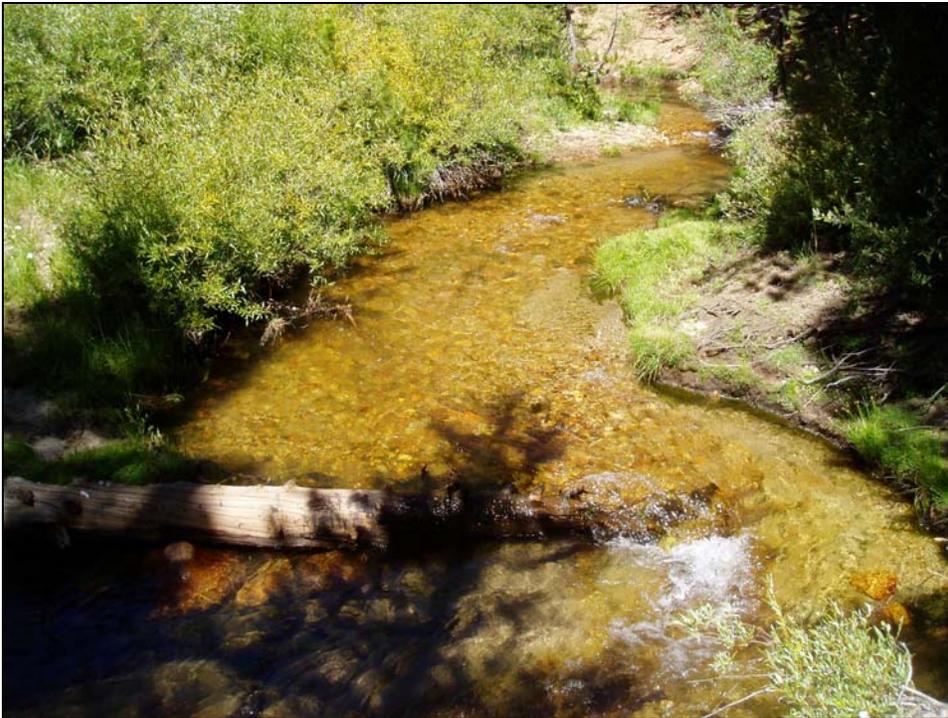
**Site 3:** Willow Creek, Carson Ranger District. Upstream photo of another permanent barrier in this section of stream. This site is located at UTM: N: 4299699 & E: 247825, Elev. 7921 feet (2415m).



**Site 4:** Willow Creek, Carson Ranger District. Upstream view of creek at break-point where the gradient changes. This site is located at UTM: N: 4300033 & E: 247484, Elev. 8163 feet (2489m).



**Site 4:** Willow Creek, Carson Ranger District. Downstream view of creek at break-point where the gradient changes. Note the descending stream. This site is located at UTM: N: 4300033 & E: 247484, Elev. 8163 feet (2489m).



**Site 5:** Willow Creek, Carson Ranger District. Upstream view of Willow Creek. Note the presence of a riffle and large-woody-debris. This site is located at UTM: N: 4300170 & E: 247428, Elev. 8102 feet (2470m).



**Site 6:** Willow Creek, Carson Ranger District. Downstream view of trail running along left bank, potentially increasing the rate of erosion. This site is located at UTM: N: 4300228 & E: 247422, Elev. 8079 feet (2463m).



**Site 6:** Willow Creek, Carson Ranger District. Cross-sectional view of trail-stream intersection. This site is located at UTM: N: 4300228 & E: 247422, Elev. 8079 feet (2463m).



**Site 7:** Willow Creek, Carson Ranger District. Photo shows the outdoor kitchen area of a large campsite located 15m from the stream. The campsite dimensions are roughly 30m x 30m. This site is located at UTM: N: 4300344 & E: 247424, Elev. 8075 feet (2462m).



**Site 7:** Willow Creek, Carson Ranger District. Photo shows a trash pile associated with the campsite. This site is located at UTM: N: 4300344 & E: 247424, Elev. 8075 feet (2462m).



**Site 7:** Willow Creek, Carson Ranger District. The campsite includes a make-shift outhouse, shown collapsed in the photo. This site is located at UTM: N: 4300344 & E: 247424, Elev. 8075 feet (2462m).



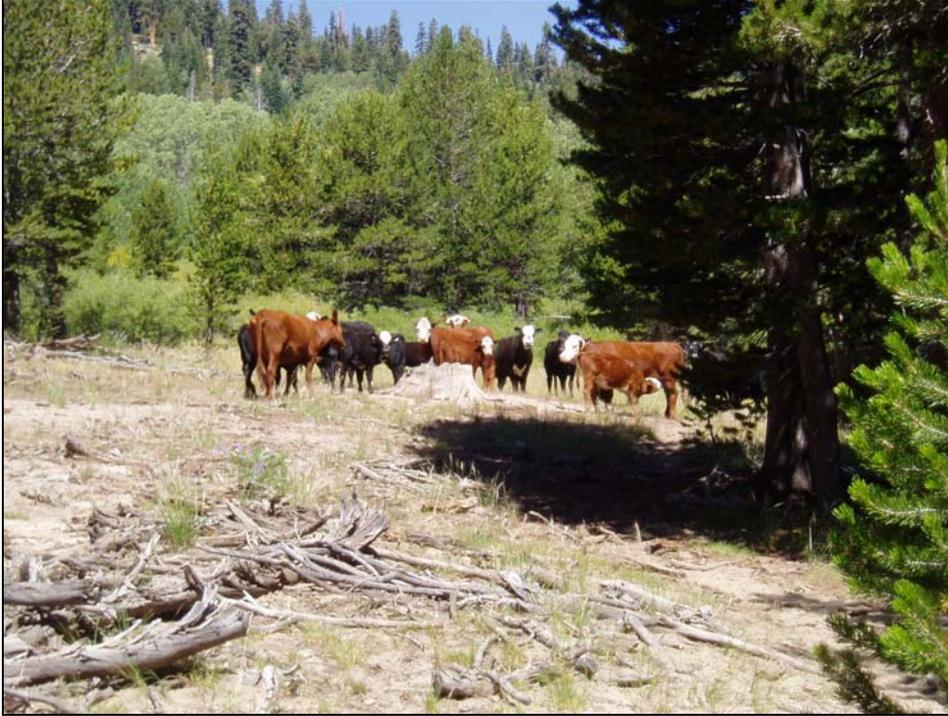
**Site 7:** Willow Creek, Carson Ranger District. Photo shows broken lawn chairs left at the campsite. This site is located at UTM: N: 4300344 & E: 247424, Elev. 8075 feet (2462m).



**Site 8:** Willow Creek, Carson Ranger District. A small tributary enters river right and adds 3 percent to the overall stream flow. This site is located at UTM: N: 4300387 & E: 247440, Elev. 8056 feet (2456m).



**Site 9:** Willow Creek, Carson Ranger District. Photo shows the point where Forest Service Road 051 crosses Willow Creek. The bridge allows free passage of water and fish. This site is located at UTM: N: 4300614 & E: 247450, Elev. 8102 feet (2470m).



**Site 10:** Willow Creek, Carson Ranger District. These cattle were seen grazing just upstream of the road crossing at Site 9. This site is located at UTM: N: 4300614 & E: 247442, Elev. 8108 feet (2472m).



**Site 10:** Willow Creek, Carson Ranger District. Upstream photo of a cow grazing on the right bank. This site is located at UTM: N: 4300614 & E: 247442, Elev. 8108 feet (2472m).



**Site 11:** Willow Creek, Carson Ranger District. Photo shows a campsite with dimensions 10m x 10m, located approximately 20m from river left. This site is located at UTM: N: 4300998 & E: 247512, Elev. 8187 feet (2496m).



**Site 12:** Willow Creek, Carson Ranger District. Upstream photo of a pool where a 7-9-inch fish was sighted. This site is located at UTM: N: 4301226 & E: 247716, Elev. 8216 feet (2595m).



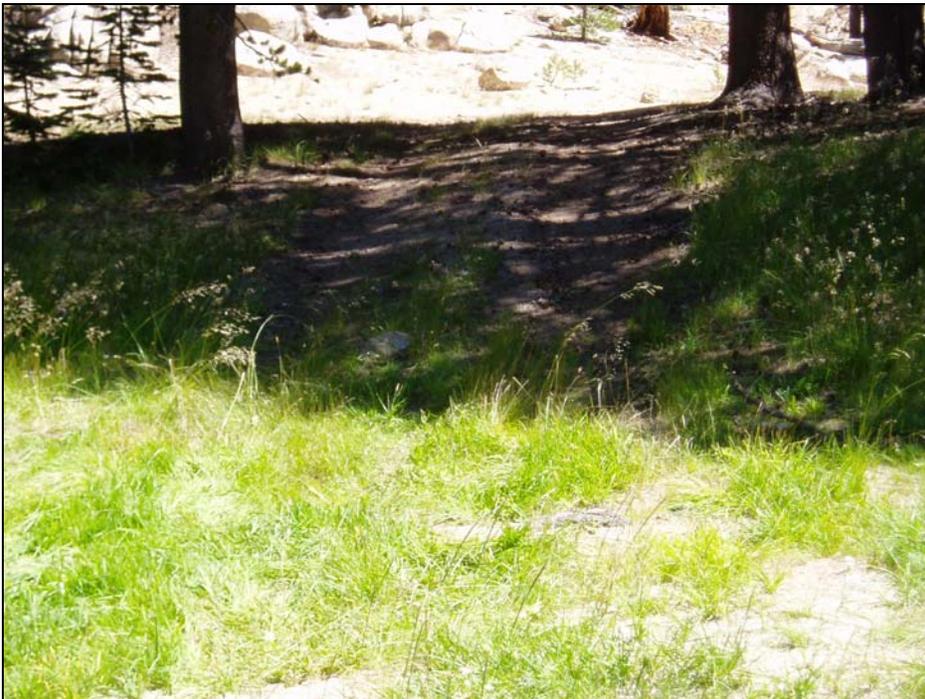
**Site 13:** Willow Creek, Carson Ranger District. Photo shows recent cattle activity in the riparian corridor (i.e. grazing, stream crossings, etc.). This site is located at UTM: N: 4301260 & E: 247794, Elev. 8216 feet (2505m).



**Site 14:** Willow Creek, Carson Ranger District. Photo of a campsite located 2m from Willow Creek. A road spur allows vehicle access to this point. This site is located at UTM: N: 4301568 & E: 248194.



**Site 14:** Willow Creek, Carson Ranger District. Photo of a check-dam created just upstream of the campsite. This site is located at UTM: N: 4301568 & E: 248194.



**Site 14:** Willow Creek, Carson Ranger District. Looking up the road spur that allows vehicle access to the banks of Willow Creek. This site is located at UTM: N: 4301568 & E: 248194.



**Site 15:** Willow Creek, Carson Ranger District. Upstream photo of a large tributary entering Willow Creek on river left. The tributary adds 30-35 percent to the total downstream flow in the creek. This site is located at UTM: N: 4301646 & E: 248239.



**Site 15:** Tributary to Willow Creek, Carson Ranger District. Upstream photo of bridge where the tributary featured above intersects Forest Service Road 051. This site is located at UTM: N: 4301646 & E: 248239



**Site 16:** Willow Creek, Carson Ranger District. Upstream photo of a bridge that crosses over Willow Creek. The trail allows for ATV and foot traffic only. This site is located at UTM: N: 4301721 & E: 248236, Elev. 8282 feet (2525m).



**Site 17:** Willow Creek, Carson Ranger District. Downstream view of a tributary (15% contribution to flow) entering river right. This site is located at UTM: N: 4301715 & E: 248232, Elev. 8282 feet (2525m).



**Site 17:** Willow Creek, Carson Ranger District. Upstream photo of Willow Creek above the confluence. This site is located at UTM: N: 4301715 & E: 248232, Elev. 8282 feet (2525m).



**Site 18:** Willow Creek, Carson Ranger District. Upstream photo of a pool where three fish were sighted. This site is located at UTM: N: 4301920 & E: 248323, Elev. 8374 feet (2553m).



**Site 19:** Willow Creek, Carson Ranger District. Looking up a small trib (4 percent addition) that enters river right. This site is located at UTM: N: 4302215 & E: 248611, Elev. 8380 feet (2555m).



**Site 19:** Willow Creek, Carson Ranger District. Looking up Willow Creek from the confluence noted above. This site is located at UTM: N: 4302215 & E: 248611, Elev. 8380 feet (2555m).



**Site 20:** Willow Creek, Carson Ranger District. Cross-sectional photo of a tributary entering on river right (35% contribution). This site is located at UTM: N: 4302215 & E: 248611, Elev. 8380 feet (2555m).



**Site 21:** Willow Creek, Carson Ranger District. Bird's eye view of a tributary contributing roughly 20-30 percent to flow in Willow Creek. This site is located at UTM: N: 4302347 & E: 248881, Elev. 8462 feet (2580m).



**Site 22:** Willow Creek, Carson Ranger District. Upstream photo of a seasonal fish barrier measuring 3.2 feet high, with a maximum pool depth of 2.1 feet. This site is located at UTM: N: 4302595 & E: 249055, Elev. 8482 feet (2586m).



**Site 23:** Willow Creek, Carson Ranger District. Upstream photo at the survey end point. Stream flow is likely minimal or non-existent at this location during dry years. This site is located at UTM: N: 4303043 & E: 249501, Elev. 8715 feet (2657m).