

INDIAN CREEK

Alpine County, California

2006 Stream Habitat Survey Report



Prepared by:

Carson Ranger District: Humboldt-Toiyabe National Forest

Introduction

Indian Creek is located in Alpine County, California, and feeds into the East Fork Carson River just above Hangman's Bridge (Hwy 89) near Markleeville, CA. The stream runs in a northerly direction for approximately four miles before its confluence with the East Fork Carson River. The mainstem originates at an elevation of approximately 7000 feet and descends to 5481 feet upon reaching Highway 89. Indian Creek is found almost entirely within the boundaries of the Humboldt-Toiyabe National Forest, with at least one headwater tributary originating on a private parcel of land.

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 Laotian 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 Laotian 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. Indian Creek was surveyed on July 31, 2006 by Brian Hodge of the Carson Ranger District: Humboldt-Toiyabe National Forest.

Materials and Methods

Forest Service personnel surveyed Indian Creek by hiking the watercourse in an upstream manner. 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 2.03 miles of Indian creek were surveyed. Four barriers were documented: three seasonal barriers and one permanent fish barrier (Sites 5, 7, & 10 and Site 9 respectively). One road-stream crossing was identified where Indian Creek Road (Forest service Road 40) crosses the creek (Site 4). In addition, one adjacent road impact was noted where Indian Creek Road runs close to the stream channel (Site 8). One fish sighting was specifically recorded (Site 6), though fish were also seen at several other locations (Sites 1, 4, & 5). Photo points were also used to document interesting features and to capture views characteristic of a particular section of stream (Sites 2, 3, & 11). The overall gradient of the reach surveyed is 5.4%.

Discussion

Due to the presence of several permanent fish passage barriers at Site 9 and a lack of sustainable flows upstream of that point, the 1.52 river miles of Indian Creek located downstream of Site 9 provide the best potential LCT habitat. The road-stream crossing at Site 4 looks to allow passage under normal flow conditions. The water depth within the culvert is approximately 0.3 feet deep, velocities are moderate, and the maximum pool depth below the culvert is 1.5 feet. At base flow levels, the water depth within the culvert may hinder passage. Indian Creek Road runs adjacent to the stream for a short distance: recorded in Site 8. The road is located 3-4 meters from the waters edge, and may provide an increased source of sediment, especially under wet conditions.

The permanent barrier at Site 9 consists of an 11.0 foot waterfall followed by a 5.1 foot waterfall, both of which are preceded by a 6.0 foot waterfall. (Max. pool depths 3.5-4.0 feet). Downstream of the waterfalls, the pools are deep and have adequate in-stream and overhanging cover for fish. Above Site 9 and below Site 11, the stream is confined to a narrow and rocky ravine. The seasonal barrier at Site 10 measures 2.9 feet high, with a maximum pool depth of 1.75 feet.

The survey was ended well downstream of the headwaters because parts of Indian Creek are intermittent and the stream goes sub-surface at Site 11. The survey was continued an additional distance of approximately one-half mile above Site 11. At the survey end point (Site 12), flows were minimal and the stream ran beneath large rock bars.

Even following two “wet winters” the amount of sustainable fish habitat within the 1.52 mile section of Indian Creek seems finite. Fish may be confined to certain pools by fall due to low flows and/or elevated stream temperatures. The water temperature was 62° F at Site 1 at the start of the survey (July 31); however, in the previous week during a scouting trip, the water temperature recorded at Site 4 was 72 ° F.

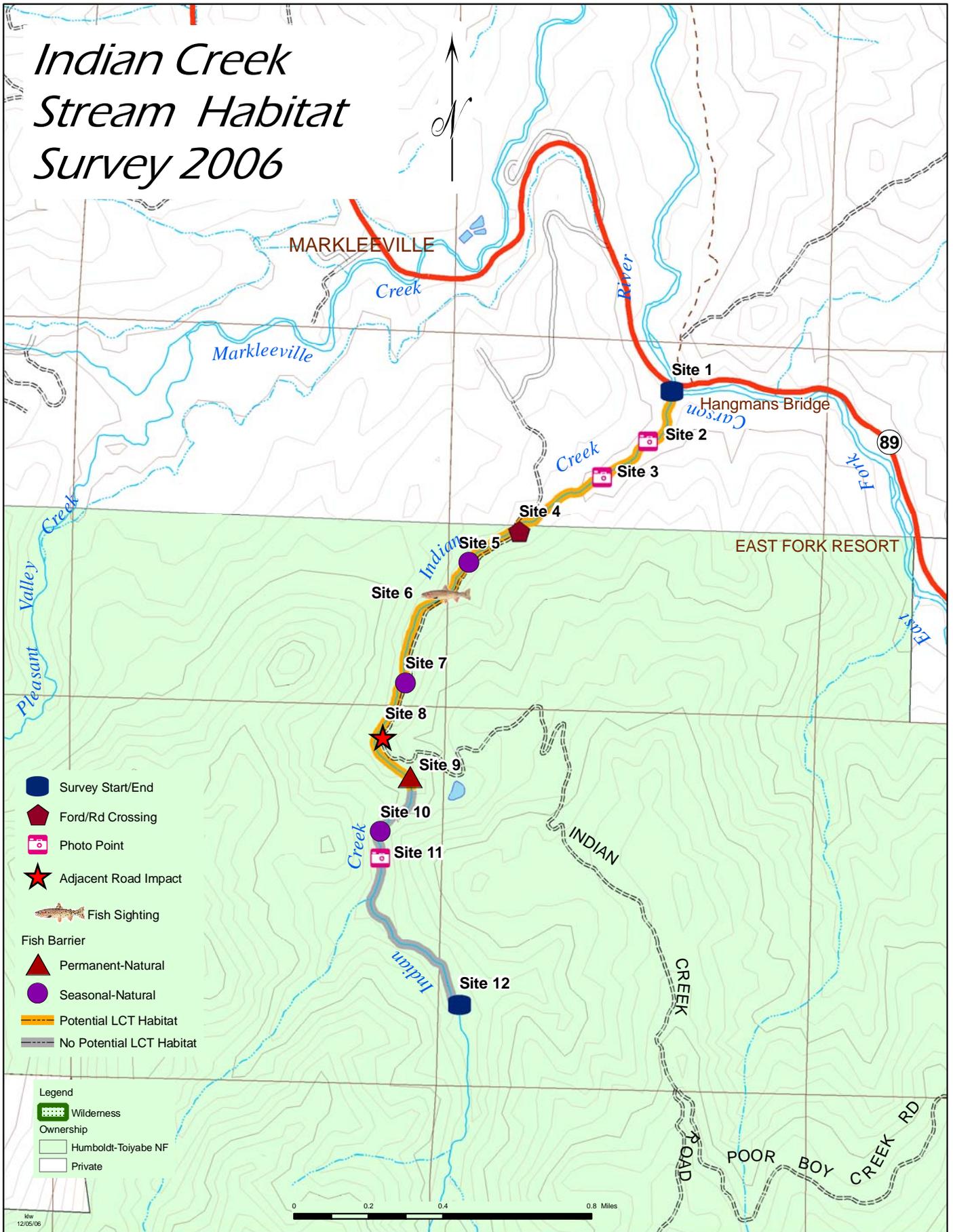
The success of salmonids, and specifically Lahontan cutthroat trout, would be limited in Indian Creek. During the wetter months of the year Indian Creek could provide rearing grounds for young fish; however, a bad drought year would pose a threat to this small

stream and the aquatic inhabitants. Under adverse conditions a small population of fish could inhabit the stream only by occupying interspersed refugia.

Recommendations

1. Consider the 1.52 mile section of Indian Creek between Site 1 and Site 9 as potential LCT habitat and consider Indian Creek a low candidate for restoration.
2. Examine the upstream reaches of Indian Creek to ensure that low flows are a natural condition and not created by water diversions, etc.
3. Consider minor road work to prevent a road slump or point-source of sediment at Site 8.

Indian Creek Stream Habitat Survey 2006





Site 1: Indian Creek, Carson Ranger District. Upstream view of Indian Creek at the confluence with the East Fork Carson River. This site is located at UTM: N: 4285742 & E: 259543, Elev. 5589 feet (1704 m).



Site 1: Indian Creek, Carson Ranger District. Downstream view of Indian Creek at the confluence with the East Fork Carson River. This site is located at UTM: N: 4285742 & E: 259543, Elev. 5589 feet (1704 m).



Site 2: Indian Creek, Carson Ranger District. Upstream viewpoint. This site is located at UTM: N: 4285528 & E: 259430, Elev. 5720 feet (1744m).



Site 3: Indian Creek, Carson Ranger District. Photo shows a steep rocky ravine containing Indian Creek. This site is located at UTM: N: 4285367 & E: 259243, Elev. 5573 feet (1699m).



Site 3: Indian Creek, Carson Ranger District. View from high above left bank shows ravine containing Indian Creek. This site is located at UTM: N: 4285367 & E: 259243, Elev. 5573 feet (1699m).



Site 4: Indian Creek, Carson Ranger District. Looking through the culvert where Indian Creek road crosses the stream. This crossing is located at UTM: N: 4285131 & E: 258860, Elev. 6025 feet (1837m).



Site 4: Indian Creek, Carson Ranger District. Bird's eye view of upstream end of the culvert beneath Indian Creek Road. This crossing is located at UTM: N: 4285131 & E: 258860, Elev. 6025 feet (1837m).



Site 5: Indian Creek, Carson Ranger District. Upstream photo of a small seasonal barrier, measuring 1.9 feet high, 3.5 long, with a max pool depth of 1.6 feet. This site is located at UTM: N: 4284993 & E: 258647, Elev. 5448 feet (1661m).



Site 5: Indian Creek, Carson Ranger District. Photo shows a 4-inch fish in a pool directly below the barrier. This site is located at UTM: N: 4284993 & E: 258647, Elev. 5448 feet (1661m).



Site 6: Indian Creek, Carson Ranger District. A 10-12 inch fish, believed to be a trout based on shape and size, was sighted in this pool. Photo taken from high right bank. This pool is located at UTM: N: 4284910 & E: 258575, Elev. 5678 feet (1731m).



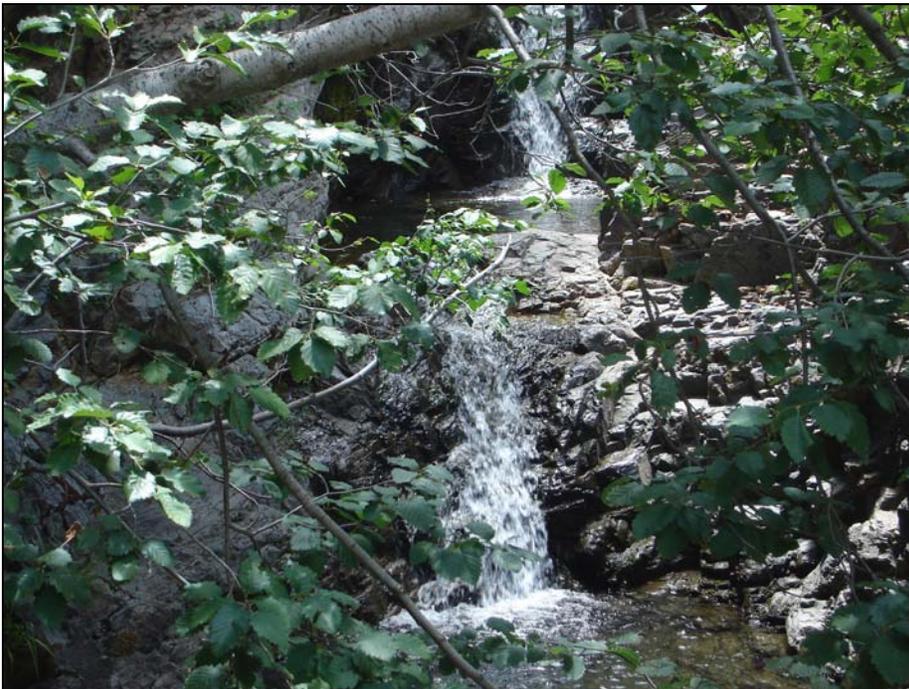
Site 7: Indian Creek, Carson Ranger District. Upstream view shows a seasonal fish barrier, masked in shadows in the photo. The barrier measured 2.5 ft high, with a max. pool depth of 3.0 feet. This site is located at UTM: N: 4284477 & E: 258404, Elev. 5809 feet (1771m).



Site 8: Indian Creek, Carson Ranger District. Photo shows a possible road impact where Indian Creek Road runs adjacent to the stream. This site is located at UTM: N: 4284246 & E: 258300.



Site 9: Indian Creek, Carson Ranger District. Upstream view of an 11 foot waterfall which creates a permanent fish passage barrier (max. pool depth 3.5-4.0 feet). This site is located at UTM: N: 4284075 & E: 258418, Elev. 5979 (1823m).



Site 9: Indian Creek, Carson Ranger District. Upstream view of a 5.1 foot waterfall, which is directly downstream of the 11 foot falls (max. pool dept 3.5-4.0 feet). This site is located at UTM: N: 4284075 & E: 258418, Elev. 5979 (1823m).



Site 9: Indian Creek, Carson Ranger District. Upstream view of a 6.0 foot waterfall, which is directly upstream of the 11 foot falls. This site is located at UTM: N: 4284075 & E: 258418, Elev. 5979 (1823m).



Site 10: Indian Creek, Carson Ranger District. Photo shows a seasonal barrier measuring 2.9 feet high, with a maximum pool depth of 1.75 feet. This site is located at UTM: N: 4283836 & E: 258294, Elev. 6068 feet (1850m).



Site 11: Indian Creek, Carson Ranger District. Upstream photo shows a location where the stream goes sub-surface, leaving a dry-streambed. This site is located at UTM: N: 4283719 & E: 258287, Elev. 6038 feet (1841m).



Site 11: Indian Creek, Carson Ranger District. Downstream photo shows a location where the stream runs several feet beneath a rocky dry streambed. This site is located at UTM: N: 4283719 & E: 258287, Elev. 6038 feet (1841m).



Site 12: Indian Creek, Carson Ranger District. Photo shows the survey endpoint. Flows are minimal and sub-surface in some locations. This site is located at UTM: N: 4283087 & E: 258634, Elev. 6166 feet (1880m).