

Big Cottonwood Creek

Fish Habitat Survey

Conducted in 1997

by

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From July 1 to August 7, 1997, two reaches in Big Cottonwood Creek were surveyed for fish habitat using the R1/R4 fish habitat inventory procedure (Overton et al. 1997). This procedure is very data intensive and includes snorkeling counts in various habitat types. The purpose of this survey was to develop a snapshot view of the upper reaches of Big Cottonwood Creek and identify existing fish habitat conditions associated with the Solitude and Brighton Ski Resorts located in the canyon. Big Cottonwood Canyon is located in Salt Lake County and is part of the Jordan River Drainage. It is heavily utilized for recreational activities which include, but are not limited to, skiing, hiking, mountain biking, picnicing, camping, hunting, fishing and naturism watching. The canyon also serves as a municipal watershed for residents of the Salt Lake Valley. The Canyon has a mix of ownerships. Prior to the arrival of the Mormons, the canyon may have been hunted in by Native Americans. It was used for recreational outing and for the production of timber and stone just after the valley was settled in 1848. Mining became an important part of the area history through the late 1800's. Sigler and Sigler in Fishes of the Great Basin (1987 pages 30-31) state that the first hatchery to be established in Utah, in 1889, was in Murry, just west of Big Cottonwood Canyon. Some of the egg for this facility came from Bonneville cutthroat trout in Big Cottonwood Creek. Brook trout were being introduced into the lakes in Big Cottonwood Canyon as early as 1907 (Sigler and Sigler 1987 page 31). Some of these were growing to 7lbs. in 6 years. And it is suggested that lake trout can be found in Lake Mary in the canyon. Brown trout have also been stocked in the stream. Currently rainbow trout are the only fish which are stocked in the stream. Brown and brook trout are also found in the stream.

Three reaches were surveyed in 1997. The second reach started at the Eagle Express Lift (photos 3 & 4) and went upstream to the bridge crossing into Redman Campground. The third reach starts at the bridge going into Redman Campground and goes to the upper most campsite in the campground. Over the last 100 years, man has altered the stream through the construction of picnic areas, campgrounds, homes, bridges, ski resorts, roads and parking lots. The full extent of these alterations are unknown.

Reach 1

Reach one started at the bridge at Spruces Campground (photo 1) and went upstream to the bridge to an old mine site just below Silver Fork (photo 2). Reach one had a length of 1,963.2 meters. Flow for this reach was 0.69 m³s (22.9cfs). Ninety-one habitat units were identified and measured in Reach One. These included 36 low gradient riffles (LGR, 71.4% by surface area, 62.3% by volume), 10 was a plung scour caused by wood (SPW, 2.8% by surface area, 8.4% by volume), seven Runs (RUN, 4.3% by surface area, 5.2% by volume), 6 Dammed Mid-channels pools caused by wood (DMW, 4.2% by surface area, 5.5% by volume), 6 High Gradient Riffles (HGR, 2.9% by surface area, 2.2% by volume) and 6 Mid Scour pools caused by boulders (SMB, 2.4% by surface area, 3.2% by volume). The average reach's width-to-depth ratio is 23.41 and ranged from 32.63 for Glides to 8.61 for the one SMA. The average width was 5.5 meters and ranged from 7.3m for SPB to 3.1 SMA. The average depth was 0.26m and ranged

from 0.19 for HGR and GLD to 0.49 STP. The mean maximum depth for pool type habitat was 0.80m with a residual maximum depth of 0.50m. Large wood was identified as the major cause for a deeper residual maximum depth. There were 13.8 pieces of large wood per 100m in this reach. Bank stability averaged 91.23% for this reach. Undercut banks averaged 39.56%. The habitat with the greatest undercut was SMW at 64.05%.

While survey Reach One crews noted that there were a number of small side channels. Some of these were being caused by woody debris dams, private home encroaching on the stream, sand bags being used by home owners for erosion control, debris piles caused by water pipes, old miles, bridge footings in need of repair,

Reach 2

Reach Two started at the Eagle Express Lift (photos 3 & 4) and went upstream to the bridge crossing into Redman Campground. Reach two had a length of 1,687.2 meters. The dominant habitat type in this reach was low gradient riffles (LGR, n=30, 39.1% by surface area, 26.7% by volume). The next most dominant habitat type was High Gradient Riffle (HGR, n=20, 17.4% by surface area, 13.9% by volume) followed by Dammed mid channel pools caused by large woody material (DMW, n=12, 7.2% by surface area, 9.8% by volume) and step pool areas (STP, 16.5% by surface area, 21.1% by volume). The average reach's width-to-depth ratio is 21.22 and ranged from 26.00 for LGR to 9.06 for SLM. The average width was 4.3 meters and ranged from 8.7m for SPA to 3.7m for RUN. The average depth was 0.24m and ranged from 0.16m for LGR and 0.41m for DMA. The mean maximum depth was 0.63m with a residual maximum depth of 0.40m. There were 23.8 pieces of large wood per 100m in this reach. Bank stability averaged 89.11% for this reach. Undercut banks averaged 24.9%. The habitat with the greatest undercut is SLM at 39.69%.

In Reach 2 the crew noted just below the lower stream crossing into the Solitude parking lot where trees had been drug out of the riparian zone and up on the parking lot. Also noted was a few foot bridges, with trash being found on the banks and in the channel. The new rip-rap is noted adjacent to the new Solitude lodge. This modification has included a 31 meter low gradient riffle with a lack of riparian vegetation.

Reach 3

The third reach starts at the bridge going into Redman Campground and goes to the upper most campsite in the campground. Reach Three has a length of 845.2meters. A total of 29 habitat types were measured in this reach. These included 12 low gradient riffles (LGR, 75.4% by surface area, 66.7% by volume), five DMW (DMW, 3.3% by surface area, 6.1% by volume), and four high gradient riffles (HGR, 14.2% by surface area, 15.6% by volume). The average reach's width-to-depth ratio was 28.85 and ranged from 12.5 for SLW to 31.49 for LGR. The average width was 5.0 meters and ranged from 4.0m for SLW to 5.3 for SMB. The average depth was 0.19 meters and ranged from 0.17m for LGR and 0.35m for DMW. The mean maximum depth was 0.64m with a residual maximum depth of 0.39m. Large wood, in this

reach, averaged 23 pieces per 100m. Bank stability averaged 87.63% for this reach. Undercut bank averaged 55.69 and ranged from 33.33% for DMW to 80.95% for SLW.

In Reach Three the crew identified a number of side channels and a number of small human made dams. These small human made dams are quite common among urban areas.

Table 1 A comparison of various habitat features between reaches surveyed in Big Cottonwood Creek in 1997.

<u>Reach</u>	<u>1</u>	<u>2</u>	<u>3</u>
Habitat units (n)	91	115	29
Length (m)	1,963.2	1,687.2	845.2
Average Width (m)	5.5	4.3	5.0
Average Depth (m)	0.26	0.24	0.19
Width-to-Depth Ratio	23.41	21.22	28.85
Mean-Max Depth (m)	0.80	0.63	0.64
Mean Residual Depth	0.50	0.40	0.39
Large Woody Debris (n/100m)	13.8	23.8	23.0
Stable Bank (%)	91.23	89.11	87.63
Undercut Bank (%)	39.56	24.90	55.69
Mean Surface Fines (%)	27.0	24.9	21.8
Fines (%)	15.4	11.9	11.7
Small Gravel (%)	11.3	9.4	8.3
Gravel (%)	13.9	16.3	15.0
Small Cobble (%)	13.1	17.5	26.7
Cobble (%)	20.3	16.9	20.0
Small Boulder (%)	14.6	15.6	11.7
Boulder (%)	11.4	12.5	6.7
Bedrock (%)	0	0	0
Fish observed	RT,BK,BN	RT,BK	BK

RT=Rainbow Trout

BK=Brook Trout

BN=Brown Trout

Discussion

The survey reaches appear to be very similar in many areas. The first difference appears in the width-to-depth ratio with reaches 1 and 3 being greater than reach 2. This may be in direction correlation to the amount of human disturbance along the banks of the stream. Stream access is much easier adjacent to the campgrounds and private cabins than adjacent to the Ski Resort. Although through the upper section of reach 2 the ease of access to the stream is high also. Bank stability does not appear to follow the logic suggested of increased public traffic. Mean max depth is greater down stream than upstream. This may be a result of increased discharge. Undercut bank is quite high in reach 3 in comparison to reaches 1 and 2 although no direct reason was identified.

Literature Cited

Overton, C.K., S.P. Wollrab, B.C. Roberts and M.A. Radko. 1997. R1/R4 (Northern/Intermountain Regions) fish and fish habitat standard inventory procedures handbook. USDA, Forest Service, Intermountain Research Station. GTR-346.