Fish in Your Backyard?

Factors Affecting Trout Presence in Wasatch Front Creeks

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Introduction

Throughout the Intermountain West, many headwater streams have become isolated from one another due to urban and suburban community growth and associated human disturbances. In many cases, the isolation of these streams has fragmented their populations of trout in once unified creek systems. We analyzed isolated headwater creeks along the Northern Wasatch Front, the populations of trout that live in them, and the history of catastrophe and human interaction with these streams in order to better understand what factors influence trout presence in headwater ecosystems. Understanding what factors contribute to a creek's ability to support successful trout populations will enable future management of creek habitats for recreational fishing and for re-introduction of Bonneville cutthroat trout (*Oncorhynchus clarki utah*).

Figure 1. Tyler Anderson and Dr. Christopher Hoagstrom electrofishing in Parrish Creek, Centerville, UT.

Methods

Creeks selected for this study lie between Bountiful, Utah and Brigham City, Utah, and generally run in an east/west direction. Many flow directly through urban and suburban areas before terminating in the Great Salt Lake. Backpack electrofishing (Fig. 1) was conducted in each creek's parent canyon, above most manmade structures or large waterfalls. One-hundred-meter sections of creek were fished (twice consecutively) and trout were netted, measured, and immediately released (Fig. 4). Maximum depth, wetted width, and substrate composition were measured along 20 evenly spaced transects. Maximum drainage elevation and creek slope were taken from USGS topographical maps. Stocking records, newspaper archives, and historical population studies conducted by the Utah DWR were found in order to determine whether each creek has had a documented history of containing trout. Newspaper archives and USGS debris- flow studies were used to determine landslide and flood history for each drainage. It is known that floods can eliminate or severely impact trout populations in small streams (Sato, 2006), and understanding the history of landslides and floods in each creek may help explain the disappearance of known trout populations.

Results

Fourteen of 31 creeks had a documented historical trout population, with ten creeks still supporting trout (Table 1). All creeks with a history of trout had an average maximum depth of 9.8 in. (SE +/- 0.86 in.), which was 2.6 in. deeper than the average maximum depth of creeks without trout (7.2 in. SE +/- 0.6 in.). Creeks that have had fish were nearly three ft. wider on average (9.2 ft. SE +/- 0.62 ft.) than fishless creeks (6.7 ft. SE +/- 0.75 ft.) (Fig. 2). Creeks with trout had a maximum drainage elevation of at least 8,500 ft, and had an average slope of 0.178 vertical ft./horizontal ft. (SE +/- 0.017 vertical ft./horizontal ft.). Fishless creeks were steeper on average than creeks with fish (average slope 0.240 vertical ft./horizontal ft. SE +/- 0.016 vertical ft./horizontal ft.). No creek with fish had a slope greater than 0.250 vertical ft./horizontal ft. (Fig. 3).

Of the four creeks that have lost their trout populations, two appear to have lost their populations due to flooding in 1983/1984 (Fig. 6). Newspaper and anecdotal evidence indicate that these creeks had fish immediately preceding the floods, and that no fish were found in surveys conducted shortly after the flooding. The other two creeks that have lost their populations of trout have been stocked since the 1983/1984 flooding (Holmes in 1990 and Willard in 2008), and so must have failed to support trout for other reasons. Holmes creek was one of the steepest of the creeks investigated (slope=0.340 vertical ft./horizontal ft.), steeper than the average slope (0.178, SE +/- 0.017 vertical ft./horizontal ft.) of creeks that still have fish, and this may be a contributing factor in the Creek's apparent inability to support trout.

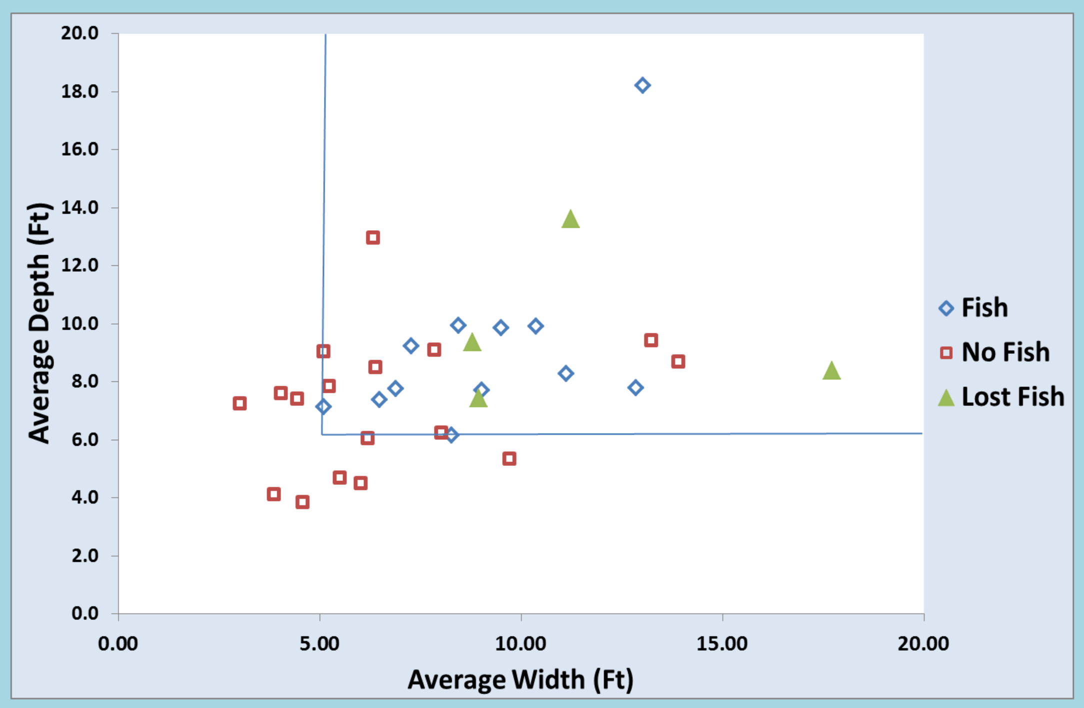

Figure 2. Average depth vs. average wetted width for creeks with and without trout. Lines represent minimum values of creeks with trout.

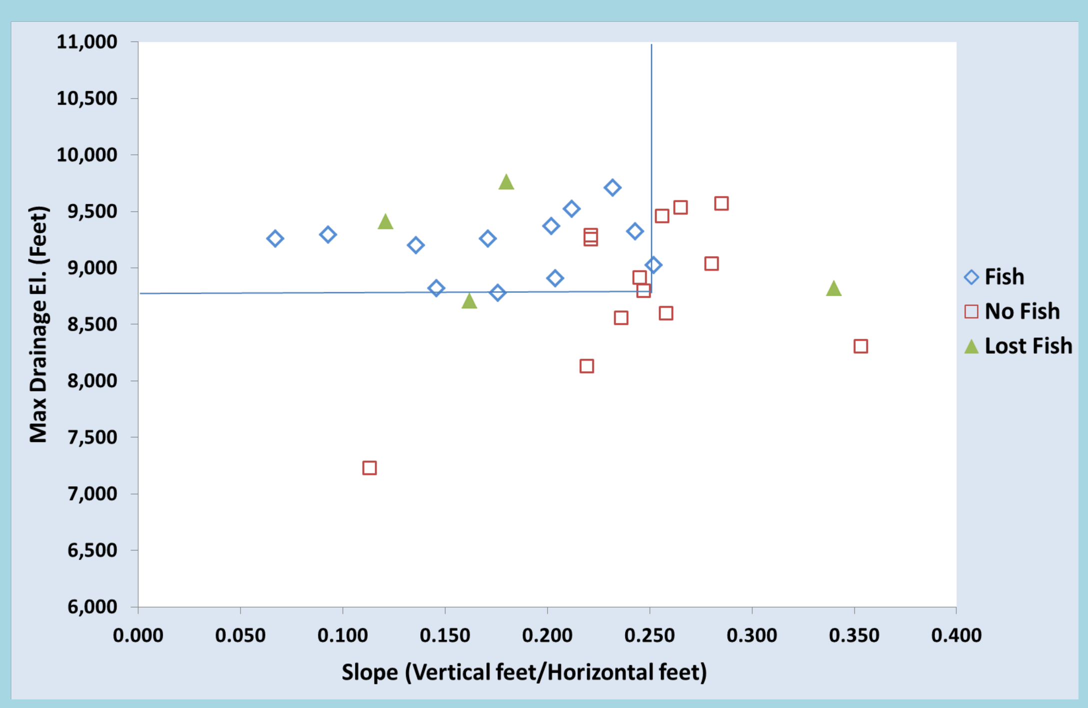

Figure 3. Maximum drainage elevation vs. creek slope for creeks with and without trout and for nearby creeks that are yet-to-be sampled. Lines represent maximum slope and minimum max drainage elevation of creeks with trout.

Table 1. Presence or absence of trout, history of fish presence, and recorded instances of flooding since 1900 in sampled creeks (Keaton and Lowe, 1998) (Wieczorek et. al, 1983). Creeks are arranged from north to south along the Wasatch Front, and alternate names for creeks or canyons known by more than one title are given.

Creek and/or Canyon	Adjacent Community	Record of Trout	Recorded Floods	Present Trout
Box Elder Creek (upper)	Mantua	No	None	No
Threemile Creek	Perry	**Yes**	1923	**Yes**
Willard Creek	Willard	**Yes**	1923,1936	No
North Ogden Creek	North Ogden	No	None	No
Coldwater Creek	North Ogden	No	1983	No
Cold Water Creek	Ogden Canyon	No	1904	No
Taylor Creek	Ogden	No	None	No
Strongs Creek	Ogden	**Yes**	None	**Yes**
Beus Creek	Ogden	No	None	No
Burch Creek	Washington Terrace	**Yes**	None	**Yes**
Spring Creek	Uintah	**Yes**	None	**Yes**
North Fork Kays Creek/ Hobbs Canyon	Layton	No	1984	No
Middle Fork Kays Creek	Layton	No	1947, 1983	No
South Fork Kays Creek	Layton	No	1912,1923,1927, 1930,1945,1947,1983	No
Snow Creek	Layton	No	None	No
North Fork Homes Creek/ Adams Canyon	Layton	**Yes**	None	**Yes**
Holmes Creek/ Webb Canyon	Layton	**Yes**	1917,1983,1984	No
Bair Creek, Baer Canyon	Fruit Heights	**Yes**	1912, 1923, 1927, 1941, 1945, 1947, 1983, 1984	**Yes**
Shepard Creek	Farmington	No	1930,1983,1984	No
Farmington Creek (Lower)	Farmington	**Yes**	16+ occurrences	**Yes**
Left Fork Farmington Creek	Farmington	**Yes**	-	**Yes**
Rt. Fork Farmington Creek	Farmington	**Yes**	-	**Yes**
Rudd Creek	Farmington	No	1860,1983,1984	No
Steed Creek	Farmington	No	1860,1901, 1923,1930,1932,1932, 1983,1984	No
Davis Creek	Farmington	No	1878,1901,1903,1923, 1929,1930,1932,1983, 1984	No
Ricks Creek/ Ford Canyon	Centerville	No	1901,1923,1929,1930, 1932,1934,1983,1984	No
Barnard Creek	Centerville	No	1930,1932,1983	No
Parrish Creek	Centerville	**Yes**	1930,1932,1983,1984	**Yes**
Deul Creek/ Centerville Canyon	Centerville	**Yes**	1983	**Yes**
Stone Creek/ Ward Canyon	Bountiful	**Yes**	1957,1983,1984	No
Barton Creek/Holbrook Canyon	Bountiful	**Yes**	1896, 1983	**Yes**
Mill Creek/ Millcreek Canyon	Bountiful	**Yes**	1983,1984	No
North Canyon Creek	North Salt Lake	No	None	No

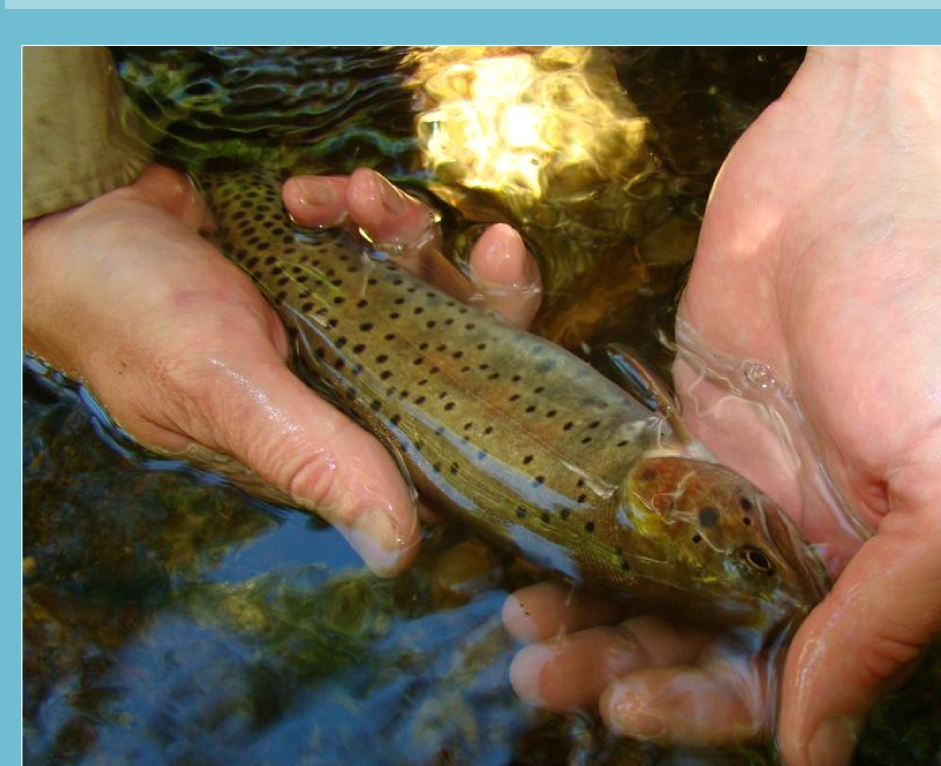

Figure 4. Trout in Parrish Creek, Centerville, Utah. This trout's ancestors have likely survived multiple floods in the creek's history.

Figure 5. Debris at the mouth of Farmington Canyon after the flood of 1923, photographed by the USGS. Seven people were killed in this event, and 100 foot high wave crests were observed coming out of the canyon.

Discussion

In general, larger creeks that were less steep and had a high maximum drainage elevation were more likely to contain trout, but these features did not guarantee the presence of trout. Wider and deeper creeks appear to be more capable of supporting trout because of the increased amount of habitat in which the population can feed, breed, and escape predation. Higher elevation drainage reaches collect more snow, and are thus more likely to have steady and ample water supply through the year. Steeper creeks like Holmes may be inhospitable because of restrictions on fish mobility along the creek, or because of increased potential for catastrophic flooding.

Flooding appears responsible for the absence of trout in two large creeks (Stone and Mill). Other relatively large and shallow creeks that are devoid of fish have not been stocked in the past century, and native trout may have disappeared over time. It is known that isolated trout populations are at high risk of extinction through inbreeding depression due to very small distributions and population sizes (Hilderbrand 2003), and these native trout may have been lost due to floods or inbreeding depression in the centuries since the recession of Lake Bonneville.

Several creeks that continue to support trout have experienced catastrophic flooding (Fig. 5), so it appears that while flooding was responsible for the demise of several Bountiful area trout populations, future floods will not necessarily remove trout from any particular creek. Parrish Creek contained remnants of what appeared to be a Bonneville cutthroat trout population which, if true, means that those trout have survived in the creek since Lake Bonneville receded many thousands of years ago (Fig. 4). Doubtlessly there have been dozens if not hundreds of floods in that creek during that time.

Officials considering future trout management in these creeks should focus efforts in deeper, wider, less-steep creeks with a high maximum drainage elevation.

Figure 6. Debris from the 1983 flood of Stone Creek, photo by Howard C. Moore, archived by the Deseret News.

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