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Area 315
Study 3
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**Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries**

Stream Survey Report

Cold Spring Creek

2012

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General Information

Stream Name:	Cold Spring Creek
Alternate Name:	Brewery Creek
Tributary Number:	M-74-004
Counties:	Stearns
Nearest Town:	Cold Spring
Source of flow:	Wetland complex northwest of the City of Cold Spring
Waterway sequence:	Wetland /Cold Spring Creek/Sauk River/ Mississippi River
Stream Length:	1.7 miles from wetland complex to mouth
Gradient:	7.3 - 62 ft/mile
Sinuosity:	1.04 -1.22
Classification:	Class I-A (Coldwater, brook trout)

Watershed Description

Watershed Name and Number

Major:	Mississippi River (1) – Sauk River (16)
Minor:	Sauk 16011
Watershed Area:	2,799.9 acres
Watershed Land Use:	48.1% cultivated crops, 25.2% pasture/hay, 18.6% developed, and 4.7% grassland (based on 2006 land use cover data).
Riparian Zone:	The riparian zone ranges from mowed grass in the upper reach to residential with substantial impervious surface in town. The stream has been impacted by: ditching, culverts and stormwater inflows, rip rap, mowing, removal of riparian vegetation, and a dam.

Summary

Cold Spring Creek has a self-sustaining population of brook trout, but recent surveys have had poor electrofishing results due to fish kills and loss of habitat. Water temperatures are suitable for brook trout, but high, flashy flows due to stormwater runoff have washed out instream habitat improvement efforts. Results in 2012 showed improvement in the population, but brook trout were mostly confined to the upstream reach, which serves as a refuge and spawning site. Habitat improvement can be pursued if the city redirects stormwater inflows.

Study Area

Cold Spring Creek is a small, designated trout stream that flows through the city of Cold Spring in Stearns County, Minnesota. The stream flows 1.7 miles to the confluence with the Sauk River. Most of the stream has been impacted by culverts, storm water runoff, pollution events, landscaping, bank armoring, vegetation removal, and a dam. Brook trout are naturalized and self-sustaining; the last stocking was in 1973. The watershed is 2,800 acres with estimated land use (based on 2006 National Land Cover Database) of 48.1% cultivated crops, 25.2% pasture/hay, 18.6% developed, and 4.7% grassland (Figure 1).

Cold Spring Creek was first surveyed in 1977. Four surveys were conducted from 1981 to 1993, then annual surveys were conducted from 2002 to 2007. Some previous surveys included geomorphology, discharge estimation, and invertebrate sampling. The last survey was done in 2009.

Temperature and Hydrology

A stage logger was used from 2002 to 2011 to estimate discharge and flow, but was removed at the landowner's request in 2011. Summer base flow has been approximately two cubic feet per second (cfs) in most years and fall flows below one cfs have been recorded (Minnesota DNR 2010). Flows over 100 cfs have been estimated from logger data, but these may be in error. Flows have been directly measured up to 23 cfs using a Marsh-McBirney flow meter, but the stream is unsafe to wade above this flow. Without direct measurement of higher flows, rating curves used to estimate flow are unreliable for high flows.

Water temperatures were recorded hourly from April to October using a HOBO® Pendant logger located just downstream of Second Ave. N., approximately 400 meters from the stream

mouth (Figure 2). Brook trout prefer water temperatures below 20 °C (Scott and Crossman 1979) and growth stops above 20 °C (Wismer and Christie 1987). A literature review found that lethal temperatures for brook trout ranged from 23 °C to over 25 °C (Wismer and Christie 1987). Temperatures during 2012 rarely exceeded 20 °C, with a maximum of 22.3 °C (Figure 3, Table 1). Data from previous years show similarly favorable temperature regimes (Table 1).

Electrofishing

Electrofishing was conducted on October 8, 2012 in three contiguous stations using a Halltech HT 2000 backpack electrofisher with pulsed DC current (Figure 2). Station 1 (EF 1) began just above the mouth at the Sauk River and ended at the sheet piling dam upstream from Second Street N. EF 2 continued upstream, ending at Fifth Avenue. EF 3 continued upstream and ended midway between the footbridge and the white storage shed on the school property.

A total of 92 brook trout were captured, including 46 young-of-year, ranging in length from 87-246 mm (Table 2). Over 2,800 feet were sampled with a maximum catch of 19.2 brook trout per 100 feet in EF 3 and an overall CPUE of 100.4. Most trout were found in EF 3 and nearly all trout in EF 2 were in a large pool at the end of the station. Few trout were captured downstream of this pool. The number and size of brook trout sampled in 2012 exceeded results from 2006-2009, but results prior to this were much better (Table 3). Other species captured included: brook stickleback, creek chub, green sunfish, largemouth bass, and white sucker.

Management Concerns and Recommendations

Cold Spring Creek has a history of partial fish kills, most recently in 2006 and 2009, and is still impacted from a large amount of sand that washed downstream in 2003 (Minnesota DNR 2007, 2010). Much of the sand has moved to the lower reach of the stream in EF 1 or into the Sauk River, but some formerly deep pools in EF 1 and EF 2 are still impacted and shallow. A variety of methods have been employed to improve the riparian area and modify the stream below Fifth Avenue to provide more trout habitat, including: removing rock dams and debris, brush layering, coir log placement in stream, a rain garden at the Gluek Brewery site, buckthorn removal, and willow staking. These have been mostly ineffective due to stormwater inputs at Fifth Avenue. Instream work has been repeatedly washed out by these flows, which can be large and flashy.

The city of Cold Spring is pursuing funding to re-route storm water away from the stream. Some storm water has been re-directed and a number of raingardens have been established nearby. Attempts to remove the sheet piling dam upstream of Second Street N. have been unsuccessful and the dam has trapped large amounts of sediment, resulting in a very wide, shallow area devoid of habitat and trout.

Modifications upstream of Fifth Avenue have been more successful. Root wad placements, bank re-sloping, re-seeding with native plants, and reduced lawn mowing near the stream have improved habitat and provided suitable spawning substrate with visible redds that likely serves as a refuge and source for repopulating downstream reaches after fish kill events. Electrofishing in 2012 showed a substantial population of brook trout in EF 3 (upstream of Fifth Avenue) and just downstream, but no larger (>250 mm) trout (Tables 2 and 3). Larger brook trout were present in all previous surveys except 2006 and 2009, years when fish kills occurred. The deeper habitat present in the downstream areas in the early 2000s is still mostly filled with sediment.

Instream habitat improvement below Fifth Avenue should be tried again if storm water inflows can be reduced. Water temperatures continue to be favorable for brook trout and, if fish kills can be avoided, the lower reaches of the creek may be recolonized. Base flows can be quite low and further ground water appropriation should not be allowed in the vicinity to protect the flow regime. Efforts have been made to install a permanent, remote-access flow (and perhaps other parameters) sampling station. This should be a priority when funding becomes available.

Acknowledgments

Thanks to Jason Neuman and Joe Stewig for assistance with fieldwork. Joe Stewig and Paul Diedrich provided helpful manuscript review.

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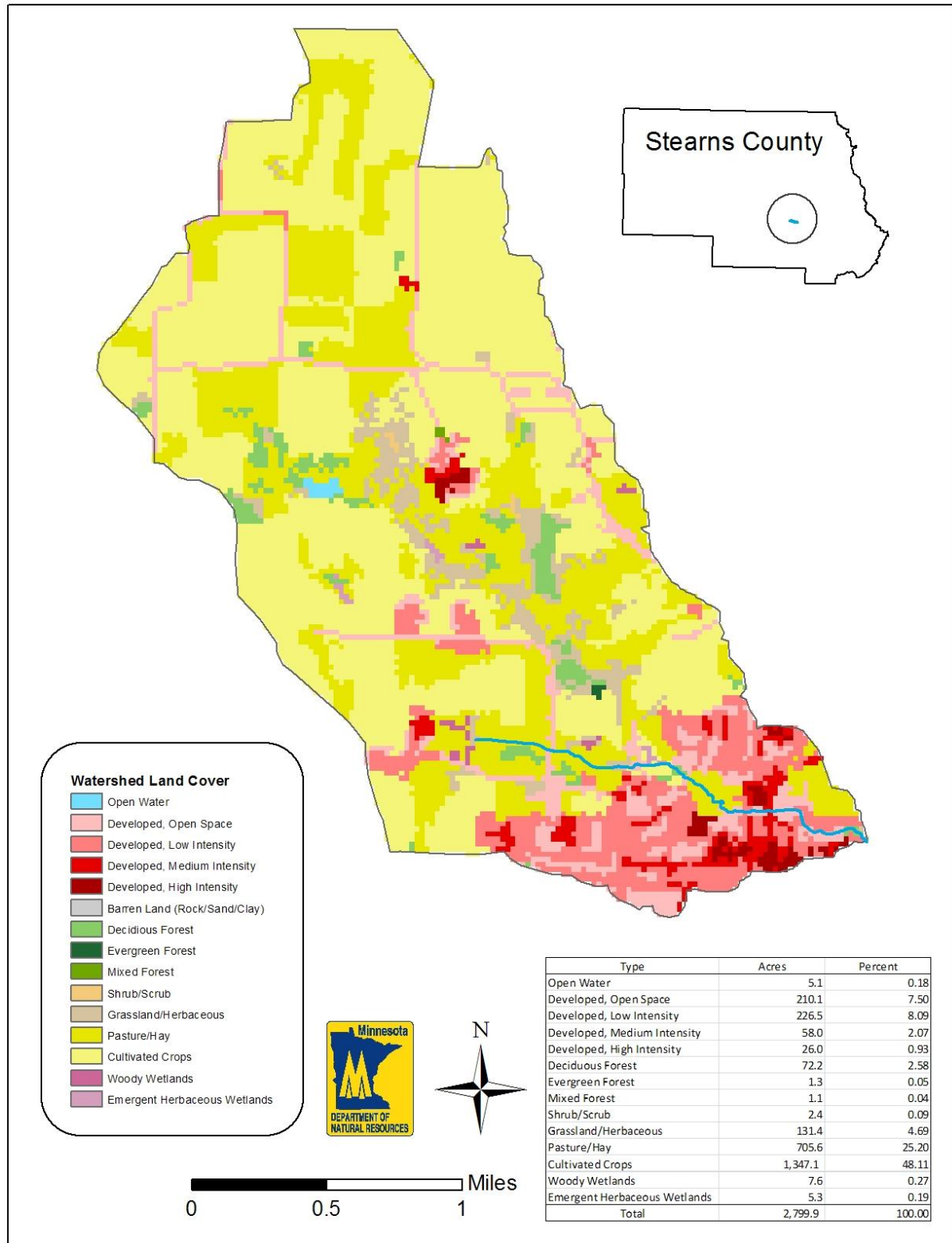


Figure 1. Location and land cover (2006 data) for the Cold Spring Creek watershed.

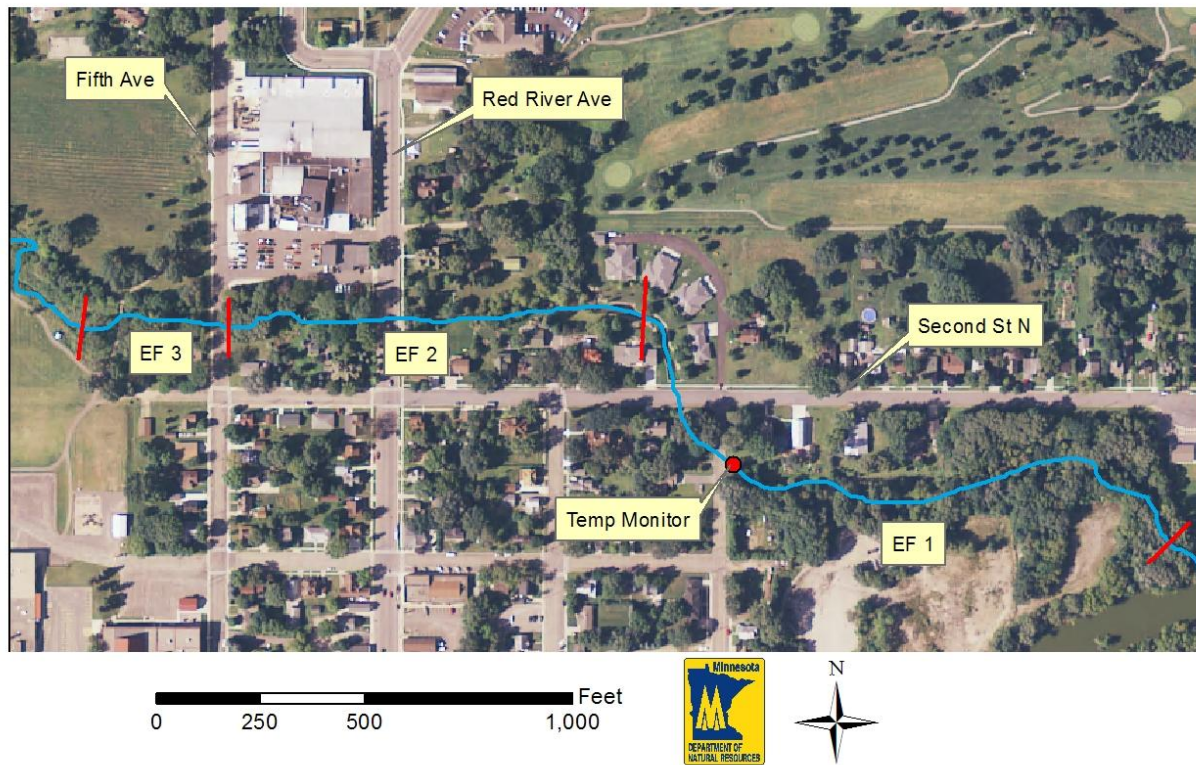


Figure 2. Location of electrofishing stations and temperature logger on Cold Spring Creek, 2012.

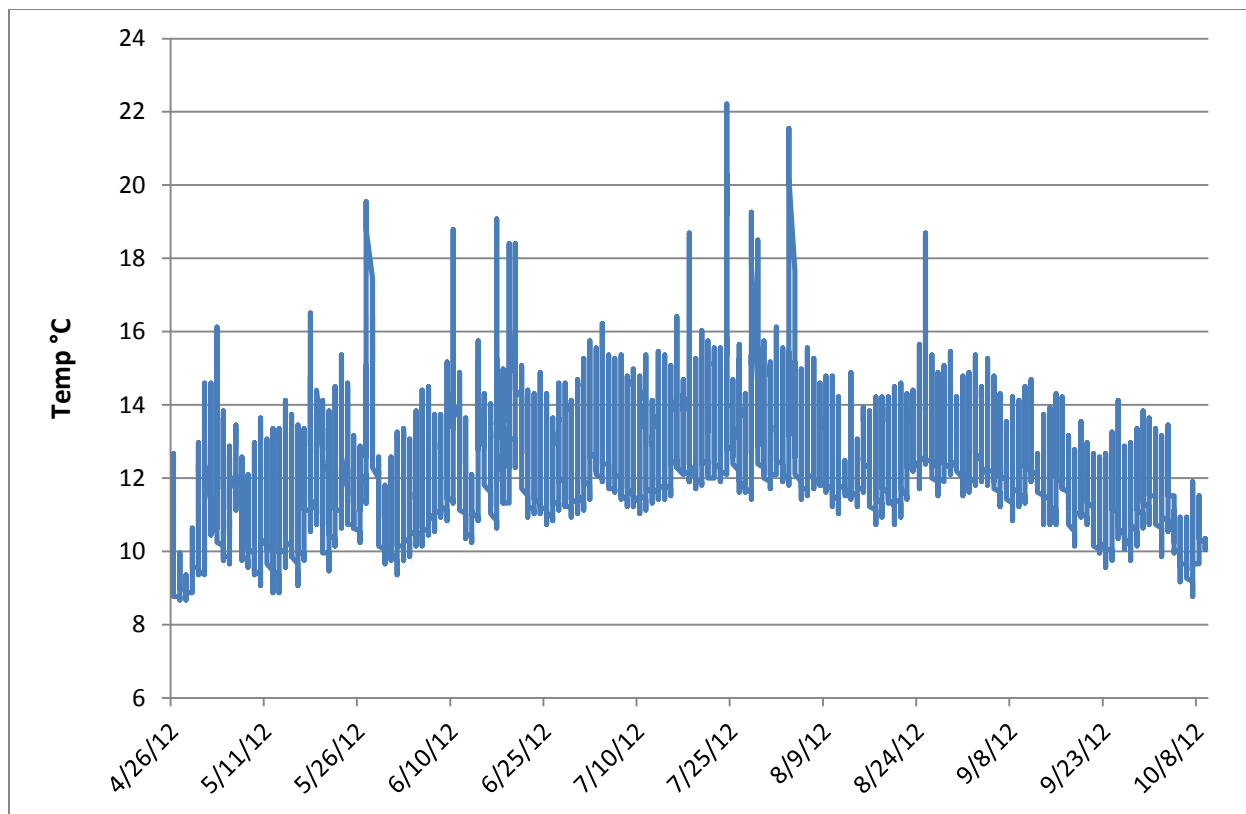


Figure 3. Hourly temperatures at Second Ave N., Cold Spring Creek MN, April-October 2012.

Table 1. Temperature statistics for Cold Spring Creek, Spring to Fall 2006-2012.

	2006	2007	2008	2009	2010	2012
Total Readings*	4,753	4,604	4,753	4,101	5,232	3,982
N hours > 20° C	1	11.5	0	6	15	8
N hours > 22° C	0	3	0	0	2	2
Minimum ° C	3.8	7.1	2.9	7.8	4.9	8.7
Average ° C	11.7	12.0	11.4	11.5	11.8	12.2
Maximum ° C	20.9	23.4	19.7	21.8	23.6	22.2
Consecutive hrs> 20° C	1	2.5	0	2	2	2

*Readings were taken hourly 2008-2012. The interval was 15 minutes in 2006-2007, but all numbers were recalculated to reflect an hourly interval. The logger failed in 2011.

Table 2. Electrofishing results for brook trout (BKT), Cold Spring Creek, October 9, 2012.

Station:	EF 1	EF 2	EF 3	Overall
Length ft	1,549	961	323	2,833
Total N	1	29	62	92
CPUE (#/hr)	3.1	78.8	269.6	100.4
BKT/100 ft	.06	3.0	19.2	3.2
Total Length Range mm	126	90-246	87-245	87-246
N Age 0	1	9	36	46
Mean TL Age 0 mm	126	103.2	98.8	100.3

Table 3. Number of measured brook trout per 10 mm length group from electrofishing all stations, Cold Spring Creek, 2002-2012.

Length group mm	2002	2003	2004	2005	2006**	2007	2009	2012
20					15			
30					15			
40								
50								
60								
70	4	3	1					
80	23	21	6					
90	67	62	19			3		7
100	109	73	54	1		6		18
110	83	46	39	5		5		17
120	67	24	58	17	3	4		2
130	10		36	6	2	1	2	1
140	24	10	25	1	1			1
150	1	27	21	3	2	1		
160	4	12	11	6		2		3
170	7	23	8	9	1	3		
180	16	24	10	9	1	3	3	4
190	11	16	4	17		1	1	6
200	22	13	4	18		5	3	11
210	9	9	3	13		2	1	7
220	19	5	2	17		1	1	9
230	9	12	2	8				3
240	6	8		8				1
250	5	3		3			1	2
260	3	2	1	2		1		
270	3	1						
280		1						
290	1	4						
300		1						
310	2	1						
320	1	1						
330	1							
340								
350								
360								
Total	507	402	304	143	40	38	12	92

*Midpoint of 10 mm group, e.g. 130 mm group contains fish from 125-134 mm. Total length.

**Sampled in June following a fish kill event.

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3/12/13

Author

Date



3/15/13

Area Fisheries Supervisor

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Date

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