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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

2014

Mark Pelham

Montrose Area Fisheries Office

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Summary

Cold Spring Creek has a self-sustaining population of Brook Trout within the City of Cold Spring, Minnesota. Surveys in the early 2000s found a robust population throughout most of the stream, but surveys since 2005 have found fewer trout and a more limited distribution. Several fish kills along with habitat loss are likely to blame. Electrofishing results in 2014 showed some improvement over 2012, with larger fish caught and continued high catches in the upper reach of the stream. If fish kills can be avoided and stormwater diverted, habitat improvements can be made and the Brook Trout population may recover throughout the stream. Water temperatures continue to be favorable for Brook Trout.

Study Area

Cold Spring Creek (M-74-004) is a small, designated trout stream that flows through the City of Cold Spring in Stearns County. The Gluek brewery is located on the north bank of the stream in the middle of town and the stream is also known as Brewery Creek. The stream flows 1.7 miles to the confluence with the Sauk River with an overall gradient of 42.4 ft/mile and sinuosity between 1.04 and 1.22. The headwaters are a wetland complex northwest of the City of Cold Spring. The stream is located in the Sauk River watershed, which is a tributary to the Mississippi River. The watershed primarily consists of cultivated crops (48.6%), pasture/hay (25.9%) and grassland (4.7%), based on 2011 land use cover data (Figure 1). Most of the stream has been impacted by culverts, storm water runoff, pollution events, landscaping, bank armoring, vegetation removal, and a dam.

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 have been directly measured up to 23 cfs using a Marsh-McBirney flow meter, but the stream is unsafe to wade above this flow. Higher flows have been estimated, but without direct measurement, rating curves used to estimate flow are unreliable.

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). Temperatures in 2014 only exceeded 20 °C six times with a high temperature of 21.5 °C and have been consistently favorable in past surveys (Figure 3, Table 1).

Electrofishing

Electrofishing was conducted on September 12, 2014 in four contiguous stations using a Halltech HT 2000 backpack electrofisher with pulsed DC current (Figure 2). Station 1 (EF 1) began at Frogtown Park near the Sauk River confluence and ended at the dam upstream from Second Street North, EF 2 continued upstream from the dam to Red River Avenue, EF 3 continued to the Fifth Avenue bridge, and EF 4 continued upstream through the culvert and ended midway between the footbridge and the storage shed on the school property.

A total of 114 Brook Trout were captured, including 51 young-of-year, ranging in length from 79-305 mm (Table 2). A total of 2,964 feet were sampled with a maximum catch of 24.6 Brook Trout per 100 feet in EF 4 and 3.8 Brook Trout per 100 feet overall; no trout were captured in EF 1 or EF 2. Catch per unit of effort (CPUE) was highest in EF 4 (284/hr) and was 107/hr overall. Most fish in EF 3 were caught in the pool just below the Fifth Avenue bridge, but several were sampled lower in the station. The largest fish sampled in 2012 was 246 mm, whereas nine fish caught in 2014 were larger than this with a maximum length of 305 mm (Table 3). Overall, the larger size of Brook Trout sampled was the main difference compared with 2012 (Minnesota Department of Natural Resources 2013). The number of trout captured was higher in both 2012 and 2014 than in 2006-2009, but caution should be used when comparing results in EF 4. Brook Trout numbers at the end of EF 4 were very high and even a few more minutes of electrofishing would have substantially increased the total. Other species captured included: Brook Stickleback, Blackside Darter, Creek Chub, Green Sunfish, Hybrid Sunfish, Northern Pike and White Sucker.

Management Concerns and Recommendations

Brook Trout have not been stocked in Cold Spring Creek since 1973 and are currently self-sustaining. The stream 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 into the stream in 2003 (Minnesota Department of Natural Resources 2007, 2010). Much of the sand has since washed downstream

into EF 1 or beyond, but several formerly deep pools are still shallow. The stream channel is wide and shallow in EF 3 and a number of instream habitat improvements have been attempted there. However, the storm water inputs in the reach are often large and flashy and have blown out most of the habitat improvement sites. Until storm water is redirected away from the stream, further habitat improvements there will likely fail. The City of Cold Spring has been actively pursuing funding sources to do this, but without success yet.

The stream reach along the school property appears to serve as a refuge from fish kill events and provides suitable spawning habitat for Brook Trout. This area should continue to be monitored and protected. Some habitat improvements have been made in past years and an unmowed buffer is in place. Further habitat improvements are possible in this stream reach and should be pursued. Efforts to remove the small sheet piling dam upstream of Second Street N. have failed, but this option should continue to be pursued. The area upstream of the dam is very wide, shallow and filled with sediment.

Both the city and the brewery are planning additional wells to extract more groundwater in the area. The Division of Ecological and Water Resources began intensively monitoring stream flow in 2014 and the data will be used in the permitting process to determine how much groundwater can be appropriated without harming the stream. Given the low flows seen in the summer and fall, even a small decrease in base flow could be harmful to trout survival and reproduction. Both city and brewery staff are aware of the need to prevent further fish kills and none have occurred since 2009. If fish kills can be avoided and stormwater diverted, the lower reaches of the stream may again support Brook Trout.

Acknowledgments

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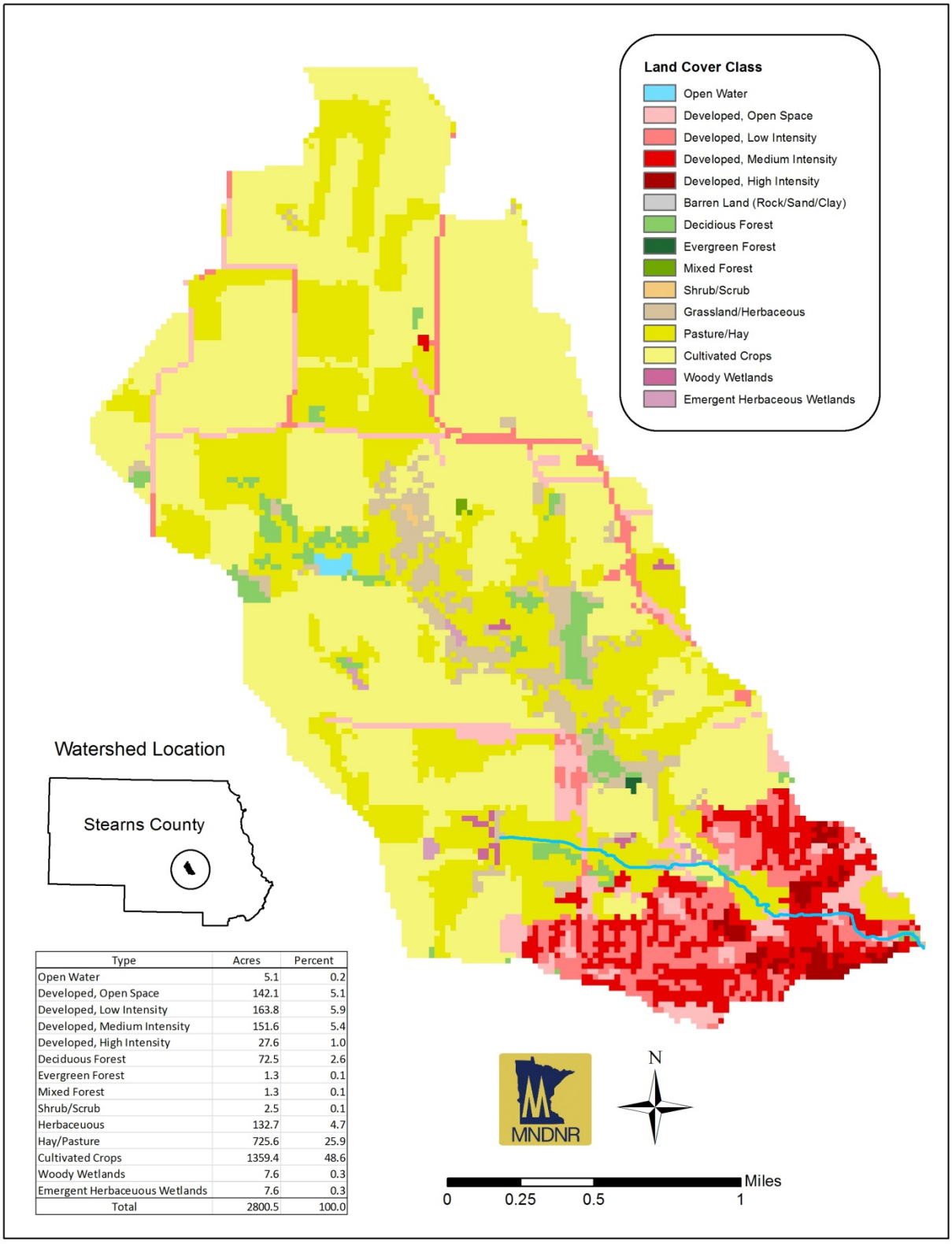

Type	Acres	Percent
Open Water	5.1	0.2
Developed, Open Space	142.1	5.1
Developed, Low Intensity	163.8	5.9
Developed, Medium Intensity	151.6	5.4
Developed, High Intensity	27.6	1.0
Deciduous Forest	72.5	2.6
Evergreen Forest	1.3	0.1
Mixed Forest	1.3	0.1
Shrub/Scrub	2.5	0.1
Herbaceuous	132.7	4.7
Hay/Pasture	725.6	25.9
Cultivated Crops	1359.4	48.6
Woody Wetlands	7.6	0.3
Emergent Herbaceuous Wetlands	7.6	0.3
Total	2800.5	100.0

Figure 1. Location and land cover (2011 data) for the Cold Spring Creek watershed.

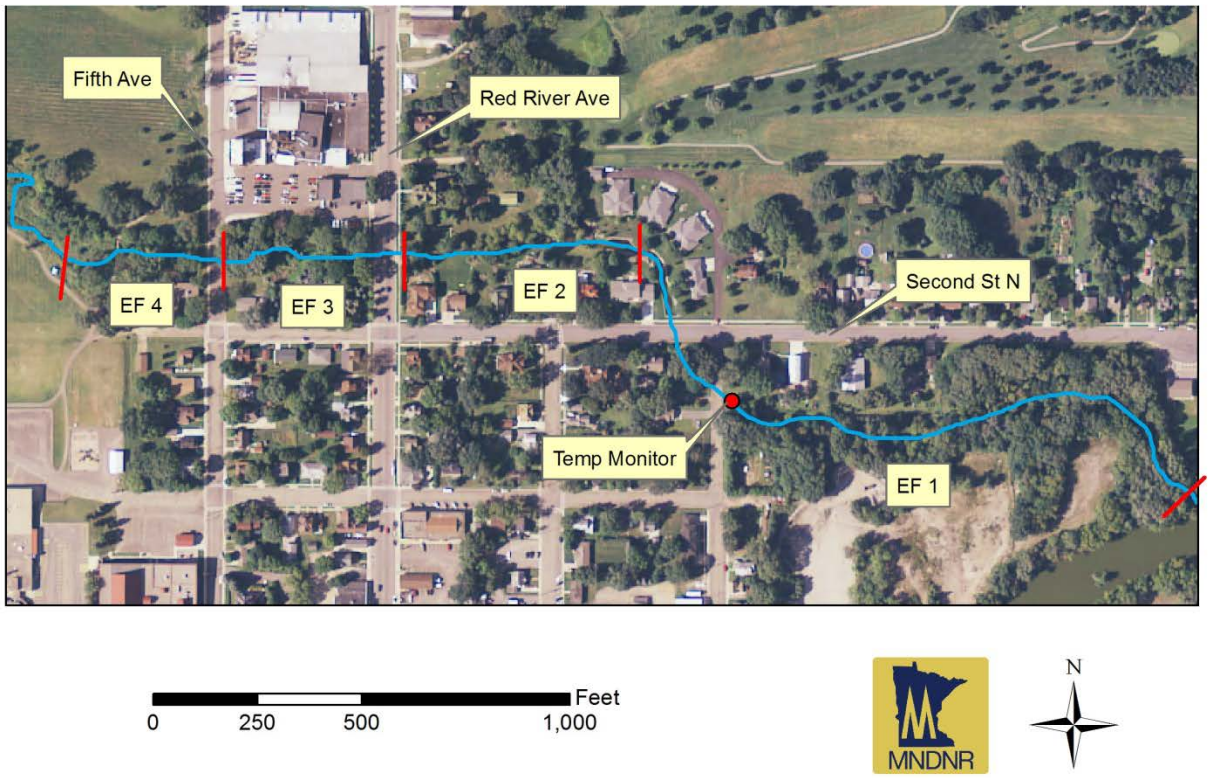

Figure 2. Location of electrofishing stations and temperature logger on Cold Spring Creek, 2014.

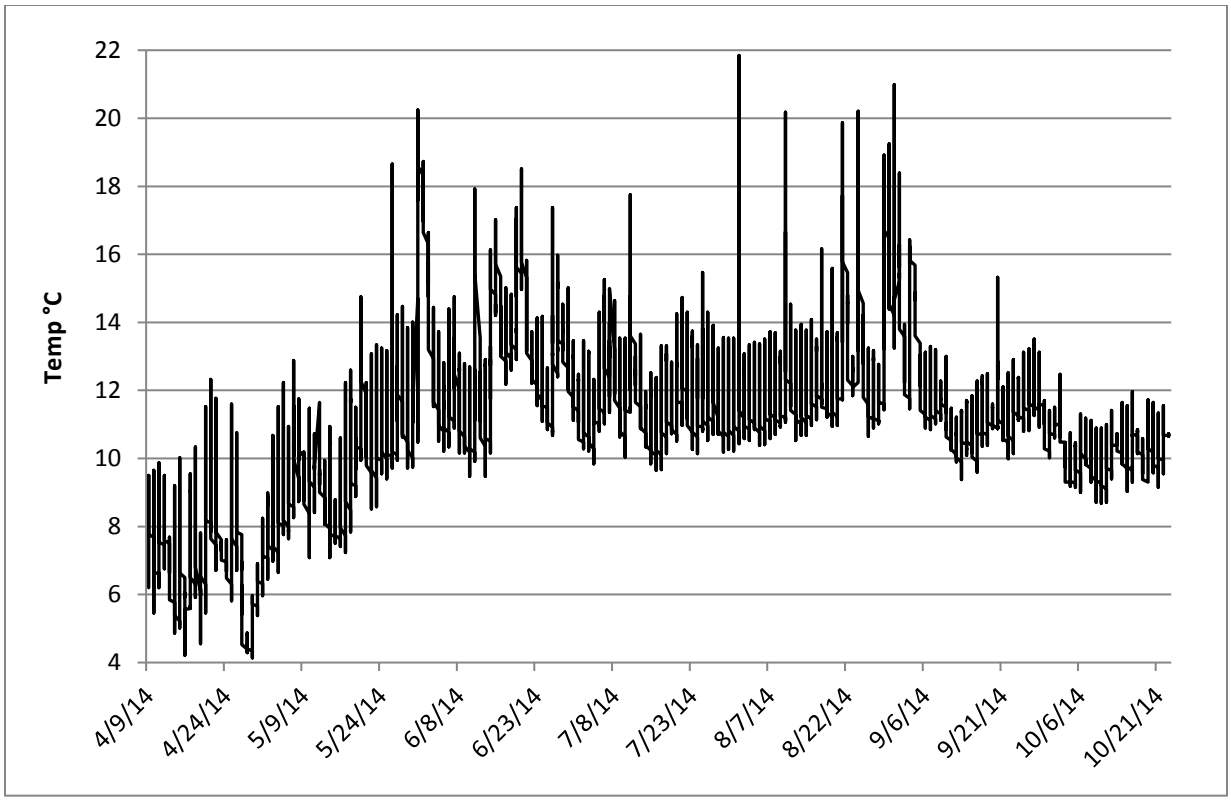

Figure 3. Hourly temperatures (°C) at Second Ave N., Cold Spring Creek, April-October 2014.

Table 1. Temperature statistics for Cold Spring Creek, Spring to Fall 2006-2014.

	2006	2007	2008	2009	2010	2012	2014
Total Readings*	4,753	4,604	4,753	4,101	5,232	3,982	4,728
N hours > 20° C	1	11.5	0	6	15	8	6
N hours > 22° C	0	3	0	0	2	2	0
Minimum ° C	3.8	7.1	2.9	7.8	4.9	8.7	4.1
Average ° C	11.7	12.0	11.4	11.5	11.8	12.2	11.1
Maximum ° C	20.9	23.4	19.7	21.8	23.6	22.2	21.5
Consecutive hrs> 20° C	1	2.5	0	2	2	2	1

*Readings were taken hourly 2008-2014. The interval was 15 minutes in 2006-2007, but all numbers were recalculated to reflect an hourly interval.

Table 2. Electrofishing results for Brook Trout (BKT), Cold Spring Creek, September 12, 2014.

Station:	EF 1	EF 2	EF 3	EF 4	Overall
Length ft	1,549	452	573	390	2,964
Total N	0	0	18	96	114
CPUE (#/hr)	0	0	105	284	107
BKT/100 ft	0	0	3.1	24.6	3.8
Total Length Range mm	NA	NA	91–281	79–305	79–305
N Age 0	0	0	8	43	51
Mean TL Age 0 mm	NA	NA	102.8	95.7	96.8

Table 3. Number of measured Brook Trout per 10 mm length group from electrofishing all stations, Cold Spring Creek, 2002-2014.

*L group (mm)**	*2002*	*2003*	*2004*	*2005*	*2006***	*2007*	*2009*	*2012*	*2014*
20					15				
30					15				
40									
50									
60									
70	4	3	1						
80	23	21	6						9
90	67	62	19			3		7	9
100	109	73	54	1		6		18	21
110	83	46	39	5		5		17	11
120	67	24	58	17	3	4		2	1
130	10		36	6	2	1	2	1	
140	24	10	25	1	1			1	1
150	1	27	21	3	2	1			2
160	4	12	11	6		2		3	4
170	7	23	8	9	1	3			2
180	16	24	10	9	1	3	3	4	10
190	11	16	4	17		1	1	6	6
200	22	13	4	18		5	3	11	12
210	9	9	3	13		2	1	7	4
220	19	5	2	17		1	1	9	2
230	9	12	2	8				3	4
240	6	8		8				1	4
250	5	3		3			1	2	3
260	3	2	1	2		1			
270	3	1							4
280		1							3
290	1	4							
300		1							1
310	2	1							1
320	1	1							
330	1								
340									
350									
360									
Total	507	402	304	143	40	38	12	92	114

*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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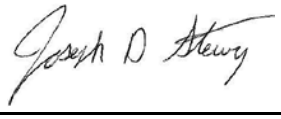
	3/13/15
Author	Date



	3/13/15
Area Fisheries Supervisor	Date
Regional Fisheries Supervisor	Date