Minnesota
F-29-R(P)
Area 315
Study 3
April 2014

Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries

Stream Survey Report

Willow Creek Population Assessment
2013

Mark Pelham

Montrose Area Fisheries Office

Your purchase of fishing equipment and motor boat fuel supports boating access and Sport Fish Restoration.

Funded under Federal Aid by the Sport Fish Restoration Act

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

General Information

Stream Name:	Willow Creek
Alternate Name:	None
Tributary Number:	M-071-009
Counties:	Stearns
Nearest Town:	Kimball
Source of flow:	Wetland complex southwest of the town of Kimball
Waterway sequence:	Wetland /Willow Creek/Clearwater River/ Mississippi River
Stream Length:	3.6 miles from wetland complex to mouth
Gradient:	25-53 ft/ mile
Sinuosity:	1.9
Classification:	Class I-C (Coldwater, Brown Trout)

Watershed Description

Major Watershed:	Mississippi River (17) – Clearwater River (17010)
Minor Watershed:	Willow Creek
Watershed Area:	8,886.7 acres
Watershed Land Use:	45.1% agricultural, 18.8% pasture/hay, 15.0% forest, 9.3% developed, 6.2% grassland, and 4.6% wetland (Based on 2006 National Land Cover Data; Figure 1)
Riparian Zone:	The surrounding land is primarily farmland with residential and commercial development in the city of Kimball. The stream is bordered by wetland or reed canary grass in upper reaches, with some willow and alder downstream. Numerous springs are found within the Willow Creek Park area, which also receives considerable runoff from impervious surfaces in Kimball.

Abstract

A population assessment was conducted on Willow Creek near Kimball, MN on November 1, 2013. Backpack electrofishing was used to sample the Brown Trout population. Fingerling Brown Trout are stocked once every three years and recent sampling has shown good survival and some natural reproduction. Brown Trout lengths ranged from 98 to 240 mm in 2013. No ageing structures were taken, but the length frequency indicates two year classes present: naturally reproduced young-of-year and yearlings from 2012, either stocked or naturally produced. A lack of deeper pools and overhead cover likely limits growth and survival of larger trout. A temperature logger has been deployed just upstream of the survey area for several years; water temperatures have been favorable for Brown Trout in some years, but marginal in others. The current stocking regime is producing a viable fishery and Brown Trout fingerlings will continue to be stocked every third year with electrofishing conducted one year after stocking.

Introduction

Willow Creek is a small, coldwater stream in southeastern Stearns County (Figure 1). Brook Trout were stocked for many years, but natural reproduction was limited. From 1996 to 2005, yearling Brown Trout were stocked in an attempt to establish a naturally reproducing population. Electrofishing catches of adult Brown Trout were low, likely due to high natural mortality, angling mortality or both and few young-of-year Brown Trout were captured. Fingerling Brown Trout have since been stocked in 2006, 2009, and 2012 to evaluate their potential for survival and reproduction. Results from electrofishing in 2007 showed very good survival from the 2006 fingerling stocking and some natural reproduction. Sampling in 2008 found only a few larger adults, presumably from the 2006 stocking, but some survival of the naturally produced 2007 year class. Sampling in 2010 again showed good survival from the 2009 stocking and some natural reproduction. Fingerling Brown Trout were last stocked in 2012 and evaluated by electrofishing on November 1, 2013.

Results

Backpack electrofishing was conducted at three sites within Willow Creek Park (Figure 2.) The three sites covered approximately 5,728 feet and took a total of 1.67 hours of on-time to survey. A total of 43 Brown Trout were captured, including 17 young-of-year (Figure 3; Table

1). Adult fish appear to all be from the 2012 fingerling stocking, since no trout larger than 240 mm were sampled. Lengths ranged from 98 to 240 mm. Survival of stocked fingerlings from 2006 and 2009 compares favorably to stocked yearling survival from years prior to 2006 (Table 1). However, survival of stocked fingerlings from 2012 seems lower than the two previous fingerling stockings in 2006 and 2009. Catch per unit of effort (CPUE) in 2013 (25.7/hr) was lower than in 2010 (88.3/hr), and 2007 (80.2/hr). Each of these three assessments was conducted in the fall of the year following fingerling stocking.

A stage logger was in place from 2002 to 2012, approximately 400 meters from the mouth of the creek at Lake Betsy. The logger was removed in 2012 due to erosion and sedimentation at the site. Flows were somewhat flashy following rain events and ranged between 2 and 14 cfs (MNDNR 2010, 2008; unpublished data 2011, 2012). The large watershed (>8,000 acres) contains the city of Kimball and likely contributes to high flows in the middle and lower portions of the stream, which includes the reach containing trout. The city recently installed a storm water catch basin to capture runoff from part of the city instead of allowing it to run directly into Willow Creek.

Temperature monitors have been placed at various locations in Willow Creek since 2002. Water temperatures have mostly been favorable for Brown Trout in Willow Creek Park and the easement reach upstream. A temperature monitor was deployed between April 4 and October 3, 2013 under the walking bridge upstream of State Highway 15. The maximum temperature in 2013 was 24.4°C and 538 hourly readings were above 20°C. (Figure 4, Table 2). Temperatures have been logged at the same site since 2008 and have varied considerably; 2008 was the coolest season with a maximum temperature of 19.2°C. The highest temperature recorded was 26.7°C in 2012 and the highest number of hours above 20°C was 1,138 in 2011.

Fingerling Brown Trout were last stocked in 2012 and water temperatures were much higher in 2012 than in 2009 when fingerlings were stocked (Table 2). Survival was much higher in 2010 for the 2009 year class than in 2013 for the 2012 year class (Table 1). Temperatures were recorded at a site downstream in the park during 2006 and 2007 and were also cooler. High temperatures may have limited fingerling survival and recruitment for the 2012 stocked fingerlings. Age one fish should be more able to survive the temperatures seen in 2011-2013

than fingerlings, but the length frequency from electrofishing shows the same pattern of lower survival in 2013 (Table 1).

Brown Trout longer than 300 mm have been relatively rare in Willow Creek historically. This is likely due to a lack of deeper habitat and cover in the park. A variety of habitat improvements have been undertaken, including root wad placement, brush layering, and rock vanes. Some of these have been successful, but many have been displaced by high flow events. Brook Trout appear to have been extirpated from the stream; none have been captured since 2005. Displacement by Brown Trout and warmer water temperatures likely played a role in their loss.

Summary and Recommendations

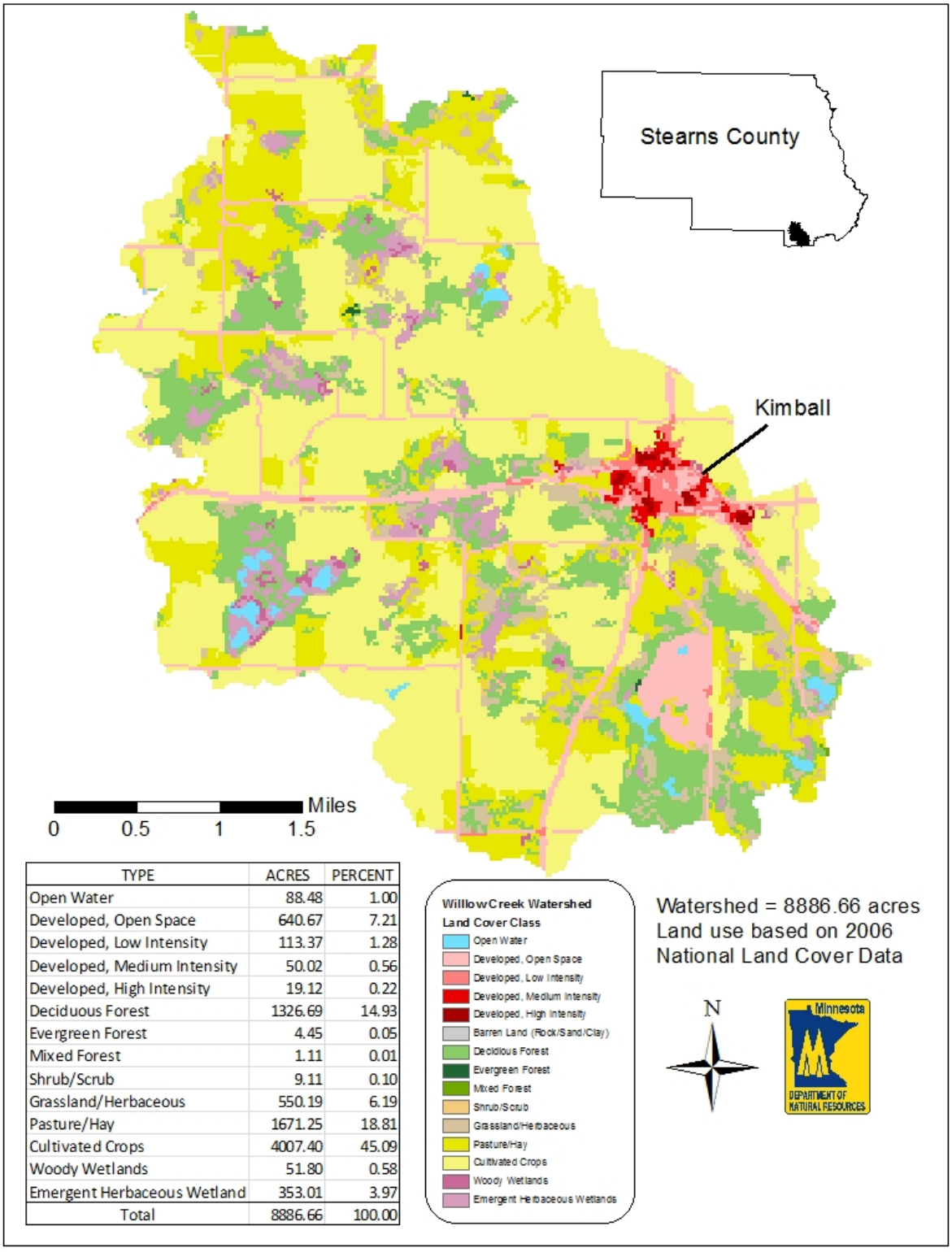
Stocking fingerling Brown Trout seems to be the best method for continuing a fishery in Willow Creek and stocking every third year has been effective. Natural reproduction is providing weaker year classes that augment stocked years. Exploitation is probably low; there is little evidence of angling pressure along the stream and some areas are difficult to access. The lack of deeper pools and overhead cover likely limits growth and survival of larger trout. A variety of habitat improvement methods should be considered and tried as funding and manpower is available. The next Brown Trout fingerling stocking is scheduled for 2015, followed by a population assessment in 2016.

Recent stormwater improvements by the city of Kimball should help moderate flashy, sediment-laden, warm inflows and more such projects are being planned. However, the past three years have had much warmer water temperatures than prior years. No reason for this is obvious aside from weather variability, but if the trend continues, it may be difficult to sustain the fishery.

References

Minnesota Department of Natural Resources. 2010. Willow Creek Stream Survey Report. Division of Fish and Wildlife, St. Paul, MN.

Minnesota Department of Natural Resources. 2008. Willow Creek Stream Survey Report. Division of Fish and Wildlife, St. Paul, MN.



TYPE	ACRES	PERCENT
Open Water	88.48	1.00
Developed, Open Space	640.67	7.21
Developed, Low Intensity	113.37	1.28
Developed, Medium Intensity	50.02	0.56
Developed, High Intensity	19.12	0.22
Deciduous Forest	1326.69	14.93
Evergreen Forest	4.45	0.05
Mixed Forest	1.11	0.01
Shrub/Scrub	9.11	0.10
Grassland/Herbaceous	550.19	6.19
Pasture/Hay	1671.25	18.81
Cultivated Crops	4007.40	45.09
Woody Wetlands	51.80	0.58
Emergent Herbaceous Wetland	353.01	3.97
Total	8886.66	100.00

Figure 1. Watershed land use, Willow Creek, MN.

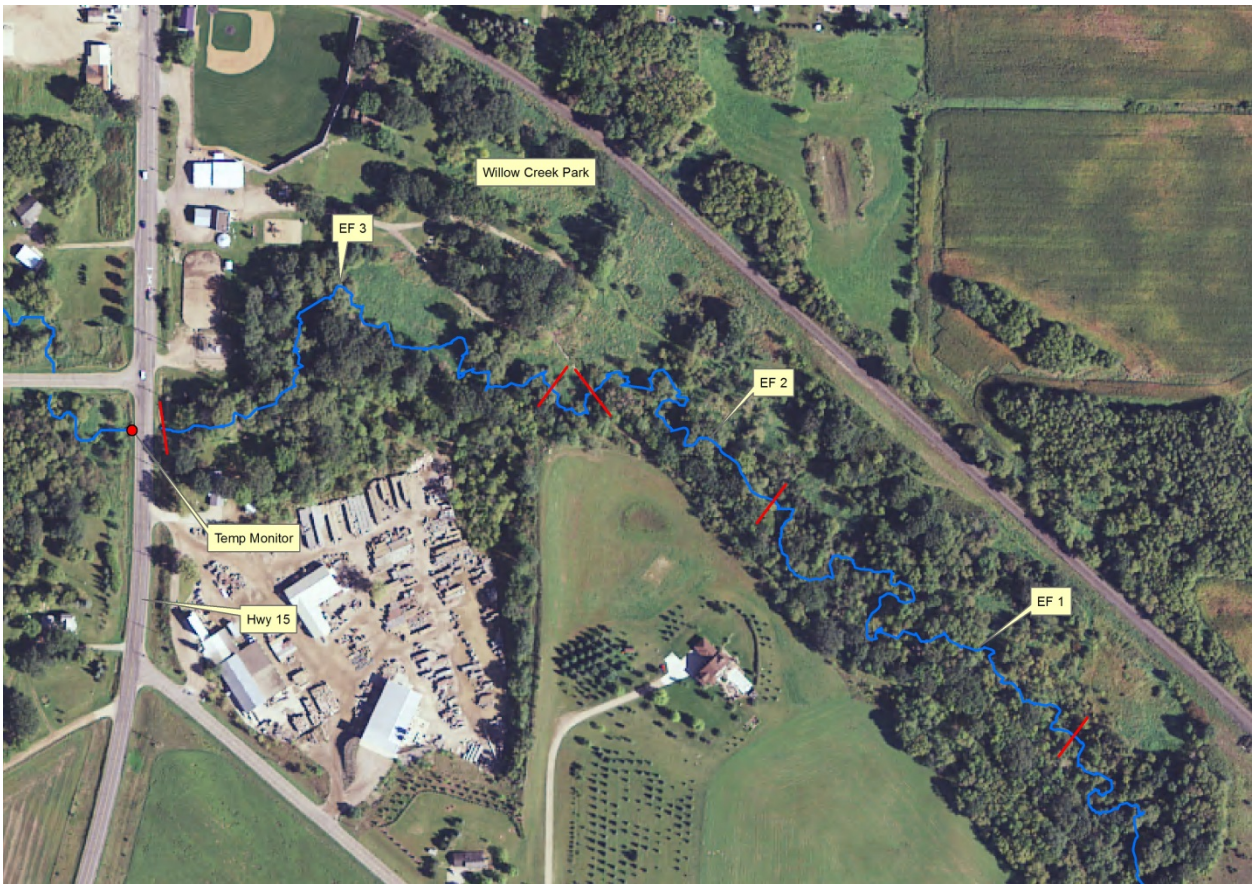


Figure 2. Location of electrofishing sites, Willow Creek, MN 2013.

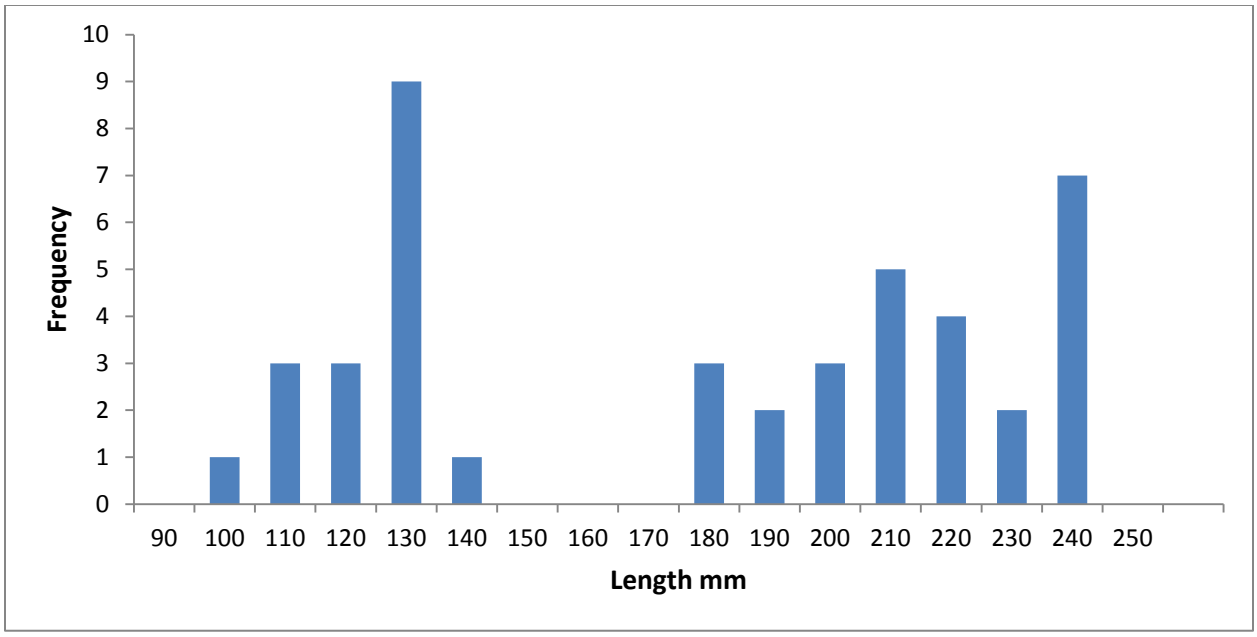


Figure 3. Length frequency of Brown Trout captured by electrofishing, Willow Creek, MN 2013.

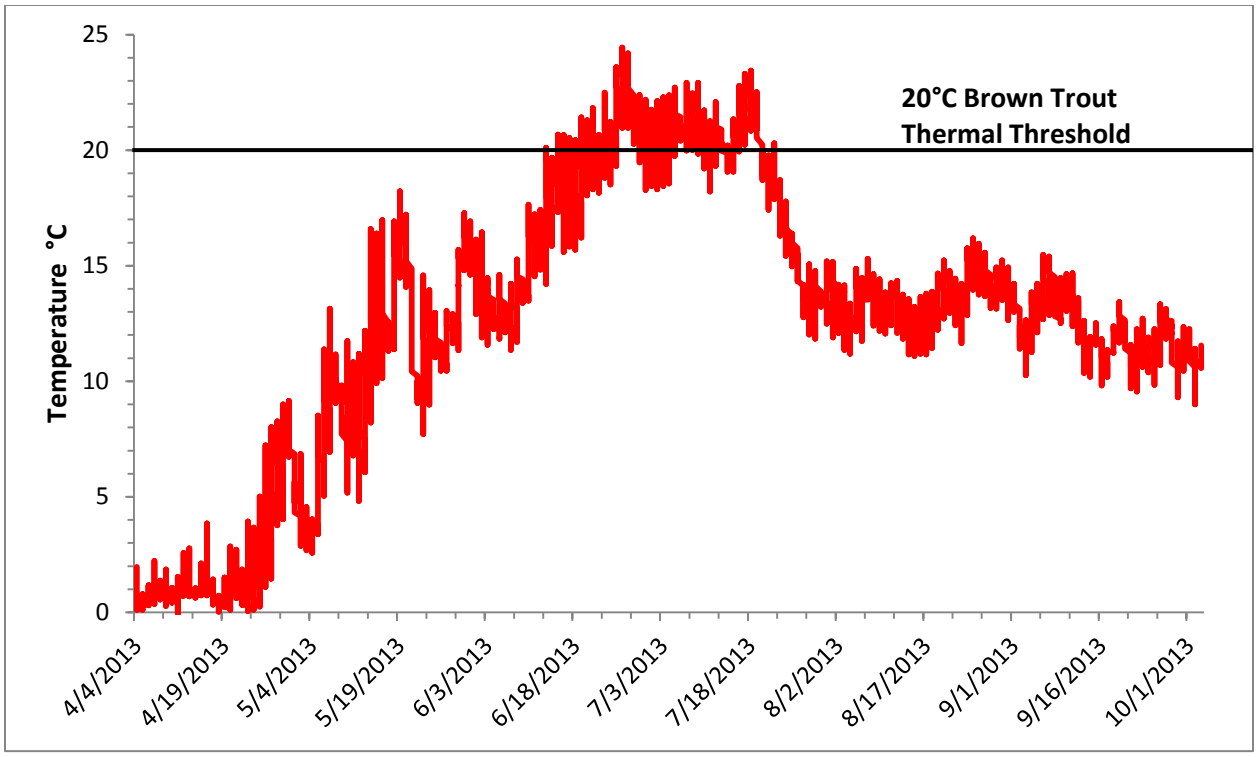


Figure 4. Hourly temperatures (°C) near Highway 15, Willow Creek, MN, April – October 2013.

Table 1. Length frequency of Brown Trout and catch statistics from backpack electrofishing, Willow Creek, MN 2002-2013.

Brown Trout									
Length Group (mm)	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2010**	**2013**
70					1				
80					4	5			
90					7	8			
100					12	12	1		1
110					29	8		2	3
120					30	6	1	4	3
130					19			3	9
140				1	24	1		1	1
150				1	12	3			
160				4	10	9		1	
170				10	2	12		2	
180		1		13	1	12		2	3
190				14		13	1	2	2
200	2	1		20		6	4	3	3
210	1			11		15	6	9	5
220	3			8		13	3	6	4
230	6	4		3	2	8	2	5	2
240	4			4		2		9	7
250	3	1		4	2	8		9	
260	7	1		1	3	1		5	
270	7	3		1	2	1		4	
280		2			1		1	4	
290	2	4			1			2	
300	1	2						1	
310	1	3		1					
320	2						1		
330									
340	1	1							
350							1		
360									
370									
Total	40	23	0	96	162	143	21	74	43
Unmeasured	0	0	0	0	255	0	0	0	0
Effort (hr)	4.64	2.11	1.78	1.76	1.31	1.78	0.91	0.84	1.67
Length (ft)	8,485	5,275	5,275	5,275	5,470	4,391	1,672	1,529	5,728
CPUE	8.6	10.9	0	54.7	318.3	80.2	23.1	88.3	25.7

Table 2. Water temperature statistics from Onset temperature monitor located at the snowmobile bridge upstream of State Highway 15, Kimball, MN.

Year	Max °C	Hrs > 20°C
2013	24.4	538
2012	26.7	499
2011	26.3	1138
2010	20.2	22
2009	20.1	1
2008	19.2	0

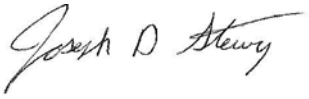
Minnesota Department of Natural Resources
Division of Fish and Wildlife
Section of Fisheries

Stream Survey Report

Willow Creek Population Assessment
2013

4/8/2014

Author — Date



4/8/2014

Area Fisheries Supervisor — Date

Regional Fisheries Supervisor — Date