

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

Stream Survey Report

**North Fork Crow River
Population Assessment
2012**

By

Joseph D. Stewig

Montrose Area Fisheries Office

TABLE OF CONTENTS

LIST OF TABLES.....	3
LIST OF FIGURES	3
SUMMARY	5
STUDY AREA.....	6
METHODS.....	7
RESULTS and DISCUSSION	8
ACKNOWLEDGEMENTS	12
REFERENCES	12

LIST OF TABLES

Table 1. North Fork Crow River (M-64) watershed estimated land use over time by percent. ...	13
Table 2. Presence/absence of fish species sampled from the North Fork Crow River, Stearns and Wright Counties, Minnesota, by MNDNR.....	14
Table 3. Species composition and percent abundance collected from the North Fork Crow River by boat electrofishing, summer 2012.	15
Table 4. North Fork Crow River boat electrofishing catch per unit effort (#/hr) by site and species and IBI score by site, summer 2012.	16
Table 5. Length frequency distribution of measured fish by species collected from the North Fork Crow River by boat electrofishing, summer 2012	17
Table 6. Trotline catch per hook day by electrofishing site for channel catfish collected from the North Fork Crow River, summer 2012.....	19
Table 7. Length at capture (TL) and standard error (SE) for channel catfish collected from the North Fork Crow River, summer 2012.....	19
Table 8. Length at capture (TL) and standard error (SE) for smallmouth bass collected from the North Fork Crow River, summer 2012.....	20

LIST OF FIGURES

Figure 1. Estimated land use within the North Fork Crow River (M-64) watershed. Classification based on 2006 NLCD data.	21
Figure 2. Mean monthly discharge (CFS) for the North Fork Crow River, between March and October 2012 and 10 year average, recorded at the USGS gauging station at Rockford.	22
Figure 3. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Dayton to Hanover)	23
Figure 4. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Rockford to Montrose)	24
Figure 5. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Montrose to Cokato)	25
Figure 6. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Cokato to Kingston)	26
Figure 7. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Dayton to Hanover)	27
Figure 8. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Rockford to Montrose)	28

Figure 9. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Montrose to Cokato)	29
Figure 10. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Cokato to Kingston)	30
Figure 11. Length frequency of channel catfish collected by electrofishing and trotlines from the North Fork of the Crow River, summer 2012.	31
Figure 12. Estimated age frequency of North Fork Crow River channel catfish captured summer 2012 and mean June/July discharge (1999 – 2010).	31

SUMMARY

The North Fork Crow River flows through Pope, Stearns, Meeker, Kandiyohi and Wright Counties and connects with the South Fork Crow River in Rockford, forming the Crow River. The Crow River reaches its confluence with the Mississippi River near Dayton, Minnesota. The watershed includes approximately 945,000 acres of which 56% of land use is agriculture, 14% pasture/grassland, 8% forested, 7% residential, and 5% wetland. During the 2012 population assessment fish, were captured using boat electrofishing and trotlines. A total of 1,758 individual fish were collected (1,583 by electrofishing; 175 by trotline) representing 40 species. Based on number, shorthead redhorse were the most abundant species sampled, followed by common carp, white sucker, fathead minnow, and channel catfish. Of the 8 game fish species sampled, channel catfish were the most abundant by number, followed by smallmouth bass, black crappie, northern pike, and largemouth bass. The abundance of channel catfish based on trotline sampling in the North Fork Crow River (0.28/hook-day) was higher than the Minnesota River (0.14/hook-day), Red River of the North (0.17/hook-day) and Mississippi River (Anoka to St Cloud; 0.17/hook-day). Overall, channel catfish averaged 21.1 inches and 3.8 pounds. Smallmouth bass abundance was lower than the Mississippi River; however, the North Fork Crow River has the potential to produce large fish, especially from the confluence with the South Fork Crow River in Rockford to the confluence with the Mississippi River in Dayton. Walleye and northern pike were sampled in low abundances; however anecdotal evidence indicates that these species can be readily caught by anglers at certain times of the year. Index of biological integrity (IBI) scores ranged from 20 – 49 and were rated as either “fair” or “good”.

STUDY AREA

The North Fork Crow River watershed is located in south-central Minnesota and flows approximately 150 miles through Pope, Stearns, Kandiyohi, Meeker, and Wright Counties. Most of the watershed falls in the North Central Hardwood Forest Ecoregion with a small area in the south-central part of the watershed in the Central Cornbelt Plains Ecoregion (Minnesota Pollution Control Agency (MPCA) 2011). The North Fork and South Fork Crow River join upstream of Rockford forming the Crow River and flows approximately 24 miles to the confluence with the Mississippi River at Dayton, Minnesota (Figure 1). The North Fork Crow River has numerous tributaries along its length, a gradient of 1.8 feet per mile, a valley slope of 3.9 feet per mile and a sinuosity of 2.2 between Dayton and Kingston. Much of the landscape in the watershed has been modified by early settlers and subsequent residents. Logging, draining wetlands and modifying stream channels were all conducted to make the land more suitable for agriculture (MPCA 2011). Prior to settlement, the watershed (945,000 acres; Figure 1) included an estimated 41% wetland and 34% forested areas; however land use based on 2006 National Land Cover Data (NLCD) was 55.6% agriculture, 14.2% pasture/grassland, 8% forested, 6.7% residential and 4.8% wetland (Table 1). Mean discharge recorded at Rockford during the sampling period in 2012 was 758 cubic feet per second (CFS), with a maximum monthly average flow during June (4,627 CFS) and minimum monthly flows in October (91 CFS; Figure 2).

The North Fork Crow River watershed has many water quality issues throughout the entire watershed with many of its tributaries channelized through agricultural land. From 2007 – 2009, MPCA conducted an intensive watershed monitoring program on the North Fork Crow River watershed. Three recurring water chemistry problems found within the watershed were high nitrate levels, high nutrient levels, and low dissolved oxygen levels (MPCA 2011). Results show consistently poor conditions throughout the watershed. Only three of their stream assessment units were fully supporting for aquatic life and one fully supporting aquatic

recreation. Seventeen stream reaches were non-supporting for aquatic life and fifteen for aquatic recreation throughout the watershed (MPCA 2011). Aquatic consumption impairments also span most of the entire length of the North Fork Crow River.

Sixty-nine lakes within the watershed were also assessed. Of these, 28 lakes are fully supporting for aquatic recreation while 41 lakes are non-supporting for aquatic recreation. Deeper, headwater watershed lakes tended to have better water quality. As you progress downstream into more intensively developed land and to shallower basins water quality declined (MPCA 2011). Development and implementation of restoration and protection strategies are needed to improve the conditions and attain water quality standards in the North Fork Crow River Watershed. Steps need to be taken to reduce runoff into these lakes as well as addressing internal loading in order to improve the water quality of the lakes in the watershed.

METHODS

Previous surveys of the North Fork Crow River were conducted in 1974, 1985, and 2000 by the Department of Natural Resources, which compiled information on fish communities, physical and chemical characteristics, and invertebrate species composition and abundance (Kucera and Heberling 1977; MNDNR 1985, Altena 2000). The 2000 assessment also included mapping of major physical features (erosion, riffles, tributaries, access points, and large woody debris) and recorded the stream line using a global positioning system (GPS) unit (Altena 2000). Thirteen electrofishing sites within the North Fork and main stem Crow River were sampled in 2012 at similar locations to the 2000 survey (Figures 3 – 6). Boat electrofishing was conducted from July 9 – July 19, 2012 at each site using a bow mounted Coffelt VVP-15 electrofishing unit and pulsed DC current set at 60 pulses per second (pps) emitting 4 - 10 amps (typically 6 amps) of electricity. Electrofishing runs were started at an upstream point, proceeded downstream sampling both sides of the shoreline using one netter to collect all fish. Start and end locations were marked using a Garmin Map 76CSX GPS and plotted using ArcMap 10.

Five trotlines were set within each electrofishing site to sample channel catfish (Figures 7 – 10). Each trotline was 100 feet long and consisted of 10 size 4/0 hooks on one foot dropper lines spaced three feet apart. Hooks were baited with one inch square pieces of redhorse (*Moxostoma* spp.). Trotlines were secured onshore using rebar and set at a 45° angle downstream of the bank and anchored using a ten pound fluke anchor and marked with a floating buoy. Each trotline was fished for 24 hours.

All fish were identified, weighed (g), measured (mm), and released. Pectoral spines were collected from a subsample of 10 channel catfish per one inch length group and otoliths were taken from all smallmouth bass for age analysis. Electrofishing data were compiled to calculate an Index of Biotic Integrity (IBI) score for each site (Niemela and Feist 2002). The IBI evaluates the health or integrity of a site based on species richness and composition, trophic and reproductive function, and fish abundance and condition. The biotic integrity of sites with IBI scores of < 20 are termed “poor”, 20-34 “fair”, and over 34 “good”.

RESULTS and DISCUSSION

A total of 49 species have been collected in the Montrose Area of the North Fork and main stem Crow River. The 2012 survey sampled 40 species (Table 2) which was 81.6% of the total compared to 35 species (71.4%) in 1974, 21 species (42.8%) in 1985, and 39 species (79.5%) in 2000. Sixteen species were collected in all four surveys. Eight species that had previously been collected from this section were not sampled in 2012. Two species were collected for the first time in 2012 by DNR Fisheries: burbot and golden shiner. Only four species were collected at all sites in 2012: common carp, channel catfish, shorthead redhorse, and white sucker. Altena (2000) found there to be a general increase in species richness from downstream to upstream sites; however in 2012 this trend was not apparent.

A total of 1,583 fish were sampled in 2012 (Table 3). In comparison to, 3,700 fish in 1974, 436 fish in 1985, and 2,953 fish in 2000. In 2012, the most abundant species numerically

were shorthead redhorse (29.1%), common carp (11.5%), white sucker (6.9%), fathead minnow (6.8%), and channel catfish (5.9%; Table 3). Of the fish with recorded weights, the most abundant were common carp (40.3%), shorthead redhorse (22.3%), channel catfish (13.6%), silver redhorse (9.4%), and white sucker (5.0%). Catch rate and length frequency data for all species sampled via boat electrofishing are summarized in Tables 4 – 5.

Channel catfish were sampled in all boat electrofishing sites and in 57 of 67 trotline sets (Tables 4 and 6). Catch rates by boat electrofishing ranged from 1.0 – 16.2/hour with an overall catch rate of 8.4/hour (Table 4). The overall catch rate of channel catfish in 2012 was similar to 2000 (9.9/hour) and seems to have stabilized since the significant increase from 1985 (0.2/hr) to 2000. Ninety-four channel catfish were collected by electrofishing and ranged from 9.1 – 30.7 inches and averaged 19.8 inches and 3.3 pounds (Table 5 and Figure 11).

The abundance of channel catfish from trotline sampling in the North Fork Crow River (0.28/hook-day) was similar to the 2000 survey (0.25/hook-day) and higher than the Minnesota River (0.14/hook-day; Chapman 2004), Red River of the North (0.17/hook-day; Groshens 2010), and Mississippi River (Anoka to St Cloud; 0.17/hook-day; Stewig and Chapman 2009). However, the average size was smaller in comparison to these other systems. Catch rates ranged from 0.18/hook-day – 0.53/hook-day (Table 6). A total of 175 channel catfish were sampled with trotlines and ranged from 11.4 – 30.5 inches and averaged 21.8 inches and 4.1 pounds (Figure 11). Age data indicates that channel catfish reproduction has been consistent over time, with all year classes from 1999 to 2010 represented in the age sample. The 2002, 2003, and 2006 year classes combined to make up 50% of the age sample collected in 2012 (Table 7). Channel catfish reached 12, 20, and 24 inches in 3, 6, and 9 years respectively. This was faster than reported in 2000, (Altena 2000) and similar to that reported from the Mississippi River (St. Cloud to Coon Rapids) in 2008 (Stewig 2009).

Channel catfish abundance increased significantly from 1985 to 2000 and now appears to have stabilized. Previous surveys collected no channel catfish in 1974 and only five in 1985

even though anglers reported catching channel catfish throughout the river in 1985, whereas 469 channel catfish were collected in 2000 and 269 in 2012. The increase in channel catfish abundance from 1985 to 2000 was attributed to the removal of dams in Hanover (1985) and St. Michael (1988), allowing adult channel catfish from the Mississippi River to migrate upstream in the Crow River to spawn (Altena 2000). Altena (2000) also noted the introduction of channel catfish into other water bodies (as early as 1971) within the North Fork Crow River watershed may have provided the necessary brood fish to establish the population in the upstream reaches of the North Fork Crow River.

A total of 33 smallmouth bass were sampled via boat electrofishing and ranged from 2.3 – 17.0 inches and averaged 9.7 inches and 0.6 pounds (Table 5). Smallmouth bass were collected at 11 of the 13 electrofishing sites and represented 2.1% of the total catch, similar to 2000 (2.4%; Tables 3 and 4). Catch rates ranged from 1.0 to 7.4/hour and averaged 3.0/hour (Table 4). The catch of smallmouth bass was higher than reported in 1974 (0.2/hour) and 1985 (1.1/hour), but similar to 2000 (3.3/hour). Only five year classes were sampled, with the 2009 – 2011 year classes comprising 91% of the age sample. Growth was faster than reported for Mississippi River smallmouth bass and reached 6.6, 10.4, and 12.7 inches by ages 1, 2, and 3 respectively (Table 8). The oldest smallmouth bass sampled was a 12 year old, 17 inch female.

Twelve walleye were collected via boat electrofishing and ranged in length from 8.6 – 19.7 inches and averaged 14.8 inches and 1.4 pounds (Table 5). Walleye were collected in 7 of 13 sites and comprised only 0.8% of the total sample, similar to 2000 (1.3%; Tables 3 and 4). Catch rates ranged from 1.0 – 9.8/hour and averaged 1.2/hour (Table 4). The catch rate was lower than reported in 1974 (3.3/hour) and 2000 (3.5/hour), but similar to 1985 (1.3/hour). Walleye abundance in the North Fork and main stem Crow River is relatively low and is mostly an incidental catch as opposed to a primary targeted species, although local anglers say that at certain times of the year they do quite well.

A total of 22 northern pike were sampled via boat electrofishing and ranged from 6.7 – 22.6 inches and averaged 16.9 inches and 1.1 pounds (Table 5). Northern pike were sampled in 9 of 13 sites and comprised 1.4% of the total sample (Tables 3 and 4). Catch rates ranged from 1.1 – 5.9/hour and averaged 2.0/hour. The catch rate in 2012 was similar to 2000 (1.8/hour) and 1985 (2.4/hour), but lower than 1974 (6.8/hour). Altena (2000) reported that northern pike exist in moderate abundance based on angling reports; however, 2012 electrofishing found them to be a small proportion of the overall fish community.

Channel catfish, smallmouth bass, walleye, and northern pike all inhabit the river with varying degrees of abundance. Channel catfish was the most abundant game fish found in the river and was caught at higher levels than reported in the Minnesota, Mississippi, and Red Rivers, but had a smaller average size than those systems. Smallmouth bass abundance was lower than the Mississippi River; however, the North Fork and main stem Crow Rivers have the potential to produce large individuals. Walleye and northern pike were found in low abundance and should be thought of as more of an incidental catch as opposed to a primary target species, although anglers have reported having success for both species at certain times.

Nine intolerant species have been collected in the North Fork Crow River Watershed, five of which were sampled in 2012 (Table 2). Eleven tolerant species have also been collected in the North Fork Crow River watershed, all of which were sampled in 2012 (Table 2). Common carp and white sucker were the only tolerant species collected at all sites (Table 4).

IBI scores at the thirteen sites ranged from 20 to 49 (Table 4). All sites were rated as either “fair” or “good”. However, these numbers should be used with caution because the MPCA IBI protocol was not fully adhered to. IBI guidelines for boat electrofishing call for three passes (left, right, mid-channel) for a 500 m long sample area, covering a minimum of 1200 – 1500 seconds per pass (Niemela and Feist 2002). Comparison studies conducted by the MPCA have shown that IBI scores are fairly sensitive to variations in sampling effort (Scott

Niemela, personal communication). Our sites were generally longer in length, only sampled the left and right banks, and had more variability in effort than desired.

ACKNOWLEDGEMENTS

The author would like to thank Jason Neuman and Brad Maas for help collecting the field data. The author would also like to thank Mark Pelham, Paul Diedrich and Dave McCormack for editing and reviewing the final report.

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Area Fisheries Supervisor (acting)

Date

Regional Fisheries Supervisor

Date

Table 1. North Fork Crow River (M-64) watershed estimated land use over time by percent.

NLCD Land Use Category	Year		
	1991	2001	2006
Undefined	0.2	< 0.1	< 0.1
Residential	3.6	6.1	6.7
Agriculture	61.3	56.0	55.6
Grassland/shrub	15.4	3.9	3.9
Prairie Grassland/pasture	0.7	14.5	14.2
Forest	9.1	8.0	8.0
Lakes (open water)	6.2	6.8	6.9
Wetlands	3.5	4.7	4.8
Gravel pits	0.1	0	0

Table 2. Presence /absence of fish species sampled from the North Fork of the Crow River, Stearns and Wright Counties, Minnesota, by MNDNR.

Species	1974	1985	2000	2012
Amiidae				
Bowfin		X	X	X
Atherinidae				
Brook silverside			X	X
Catostomidae				
Bigmouth buffalo ²			X	X
Golden redhorse			X	X
Greater redhorse ¹			X	
Northern hogsucker ¹		X	X	X
Shorthead redhorse	X	X	X	X
Silver redhorse	X	X	X	X
White sucker ²	X	X		X
Centrarchidae				
Black crappie	X	X	X	X
Bluegill	X	X	X	X
Green sunfish ²	X	X	X	X
Hybrid sunfish			X	X
Largemouth bass	X		X	X
Orangespotted sunfish			X	X
Pumpkinseed sunfish	X		X	X
Rock bass ¹	X	X	X	
Smallmouth bass ¹	X	X	X	X
White crappie	X			
Cyprinidae				
Bigmouth shiner	X		X	
Blacknose dace ²	X	X	X	X
Bluntnose minnow ²	X		X	X
Brassy minnow	X			X
Common carp ²	X	X	X	X
Creek chub ²	X			X
Common shiner	X			X
Emerald shiner				X
Fathead minnow ²	X	X	X	X
Golden shiner ²				X
Hornyhead chub ¹	X		X	X
Longnose dace ¹	X		X	X
Mimic shiner ¹			X	
Sand shiner	X		X	X
Spotfin shiner	X	X	X	X
Spottail shiner ¹	X	X	X	X
Esocidae				
Northern pike	X	X	X	X
Gadidae				
Burbot				X
Ictaluridae				
Black bullhead ²	X	X	X	X
Channel catfish		X	X	X
Tadpole madtom	X	X	X	X
Yellow bullhead	X	X	X	X
Percidae				
Blackside darter			X	X
Iowa darter ¹	X			
Johnny darter	X			X
Logperch	X		X	
Walleye	X	X	X	X
Yellow perch	X		X	X
Percopsidae				
Trout-perch	X		X	
Umbridae				
Central mudminnow ²	X			
Total	35	21	39	40

¹ Intolerant species (Niemela and Feist 2002)

² Tolerant species (Niemela and Feist 2002)

Table 3. Species composition and percent abundance collected from the North Fork Crow River by boat electrofishing, summer 2012.

Species	Number	Percent (%)
Bigmouth buffalo	20	1.3
Black bullhead	80	5.0
Black crappie	32	2.0
Blacknose dace	2	0.1
Blackside darter	29	1.8
Bluegill	4	0.3
Bluntnose minnow	28	1.8
Bowfin	12	0.8
Brassy minnow	3	0.2
Brook silverside	4	0.3
Burbot	10	0.6
Common carp	182	11.5
Channel catfish	94	5.9
Common shiner	3	0.2
Creek chub	1	< 0.1
Emerald shiner	14	0.9
Fathead minnow	107	6.8
Golden redhorse	3	0.2
Golden shiner	1	< 0.1
Green sunfish	24	1.5
Hornyhead chub	27	1.7
Hybrid sunfish	2	0.1
Johnny darter	5	0.3
Largemouth bass	20	1.3
Longnose dace	1	< 0.1
Northern hog sucker	17	1.1
Northern pike	22	1.4
Orange spotted sunfish	8	0.5
Pumpkinseed sunfish	1	< 0.1
Sand shiner	38	2.4
Shorthead redhorse	461	29.1
Silver redhorse	74	4.7
Smallmouth bass	33	2.1
Spotfin shiner	63	4.0
Spottail shiner	29	1.8
Tadpole madtom	1	< 0.1
Walleye	12	0.8
White sucker	110	6.9
Yellow bullhead	1	<0.1
Yellow perch	5	0.3
Total	1,583	100

Table 4. North Fork Crow River boat electrofishing catch per unit effort (#/hr) by site and species and IBI score by site, summer 2012.

Station	1	4	5	6	7&8	9	10	11	12	13	14	15	16	All
Minutes	57	39	53	58	61	65	60	55	45	51	45	52	31	672
Hour	0.94	0.65	0.89	0.96	1.01	1.09	1.01	0.92	0.74	0.87	0.74	0.86	0.51	11.2
Bigmouth buffalo	10.6			2.1	4.0		2.0	1.1	1.4					1.8
Brook silverside					4.0									0.4
Black bullhead		1.5			4.0	3.7	23.8	5.4	18.9	18.4	5.4	4.7	7.8	7.1
Black crappie					10.9	1.8	6.9	4.3	2.7	4.6	1.4		2.0	2.9
Bluegill					1.0		1.0		1.4				2.0	0.4
Blacknose dace													3.9	0.2
Bluntnose minnow	2.1	3.1			1.0		3.0	1.1	6.8	3.4	2.7	7.0	5.9	2.5
Bowfin	1.1				4.0		4.0			2.3		1.2		1.1
Brassy minnow					1.0								3.9	0.3
Blackside darter	1.1	1.5	3.4	7.3	3.0	1.8		1.1	5.4	2.3		2.3	5.9	2.6
Burbot												2.3		0.9
Common carp	11.7	26.2	12.4	26.0	19.8	9.2	20.8	23.9	8.1	9.3	12.2	10.5	25.5	16.3
Channel catfish	11.7	13.8	11.2	11.5	2.0	7.3	1.0	4.3	5.4	6.9	16.2	9.3	15.7	8.4
Creek chub							1.0							0.1
Common shiner	1.1				1.0								2.0	0.3
Emerald shiner					13.9									1.3
Fathead minnow	2.1			4.2	78.2		2.0	7.6	9.5	1.1		1.2	7.8	9.6
Golden redhorse		3.1									1.4			0.3
Golden shiner				1.0										0.1
Green sunfish	3.2		1.1	4.2	8.9		1.0	2.2	1.4		1.4		3.9	2.1
Horneyhead chub	1.1					2.8	1.0	4.3	5.4	2.3	4.1	3.5	11.8	2.4
Hybrid sunfish			1.1		1.0					1.1	1.4	1.2	2.0	0.2
Johnny darter				1.0										0.5
Largemouth bass	1.1			3.1	5.9	1.8	1.0	3.3	4.1			1.2		1.8
Longnose dace										1.1				0.1
Northern hogsucker			1.1					2.2		3.4	4.1		15.7	1.5
Northern pike	4.3		2.2	5.2	3.0		2.0	1.1	1.4	1.1			5.9	2.0
Orange spotted sunfish			1.1	3.1	4.0									0.7
Pumpkinseed sunfish		1.5												0.1
Sand shiner		10.8		3.1			2.0		12.2	2.3	5.4	12.8		3.4
Spotfin shiner	1.1	3.1		1.1	20.8	0.9	5.9	5.4	4.1	8.0	1.4	3.5	23.5	5.6
Shorthead redhorse	46.8	107.7	112.4	39.6	12.9	3.7	11.9	10.9	24.3	29.9	59.5	69.8	43.1	41.2
Silver redhorse	22.3	3.1		1.0	1.0	1.7	10.9	3.3	9.5	10.3	10.8	7.0	5.9	6.6
Smallmouth bass	7.4	1.5		6.3	4.0	2.8	1.0		1.4	4.6	2.7	1.2	5.9	3.0
Spottail shiner					27.7					1.1				2.6
Tadpole madtom				1.0										0.1
Walleye		3.1			1.0	1.8	1.0			1.1	1.4		9.8	1.2
White sucker	7.4	16.9	4.5	8.3	8.9	4.6	13.9	3.3	12.2	6.9	4.1	11.6	41.2	9.8
Yellow bullhead											1.4			0.1
Yellow perch					1.0		1.0			1.1	1.4	1.2		0.5
All species	136.1	196.9	150.6	129.2	247.5	44.0	117.8	84.8	135.1	129.0	148.6	151.0	251.0	141.6
IBI score**	37	36	49	20	28	42	33	35	27	43	43	34	34	

**IBI Ratings - >34 = "Good"; 20 - 34 = "Fair"; <20 = "Poor"

Table 5. Length frequency distribution of measured fish by species collected from the North Fork Crow River by boat electrofishing, summer 2012.

	<u>BIB</u>	<u>BLB</u>	<u>BLC</u>	<u>BLG</u>	<u>BOF</u>	<u>BUB</u>	<u>CAP</u>	<u>CCF</u>	<u>GLR</u>	<u>GSF</u>	<u>LMB</u>
2.00 – 2.49											
2.50 – 2.99				1						1	6
3.00 – 3.49		1								1	4
3.50 – 3.99		12		1						3	1
4.00 – 4.49		16		1						3	
4.50 – 4.99		12	8								1
5.00 – 5.49		9	6							1	1
5.50 – 5.99		7	1						1		1
6.00 – 6.49		2								1	1
6.50 – 6.99		3									
7.00 – 7.49		4	3	1					1		
7.50 – 7.99		6	1				1				
8.00 – 8.49		4	1			1	3			1	
8.50 – 8.99		3				1	2				
9.00 – 9.49						3	1	2			
9.50 – 9.99		1						1			
10.00 – 10.49			1				1				
10.50 – 10.99								1			
11.00 – 11.49											
11.50 – 11.99						2		2			
12.00 – 12.99						3	1				
13.00 – 13.99					1		1	4	1		
14.00 – 14.99	1						6	2			
15.00 – 15.99	1				2		10	6			
16.00 – 16.99	1				3		13	9			
17.00 – 17.99					4		19	2			
18.00 – 18.99	3				1		6	9			
19.00 – 19.99	1						5	12			
20.00 – 20.99	2						3	3			
21.00 – 21.99	1						17	6			
22.00 – 22.99	2						22	6			
23.00 – 23.99	1						29	12			
24.00 – 24.99	2						13	10			
25.00 – 25.99							13	4			
26.00 – 26.99							7	1			
27.00 – 27.99	1						1	1			
28.00 – 28.99							3				
29.00 – 29.99											
30.00 – 30.99							1	1			
31.00 – 31.99											
32.00 – 32.99											
33.00 – 33.99											
34.00 – 34.99											
35.00 – 35.99											
>= 36.00											
Total	20	80	32	4	12	10	182	94	3	24	20
Min Length	14.7	3.3	4.5	2.8	13.9	8.1	7.5	9.1	5.9	2.8	2.6
Max Length	27.0	9.8	10.2	7.3	18.3	12.6	30.1	30.7	13.6	8.3	6.4
Mean Length	20.5	5.4	5.8	4.5	16.5	10.5	20.6	19.8	9.0	4.5	3.7
# Measured	16	80	21	4	11	10	178	94	3	11	15
Unmeasured	4	0	11	0	1	0	4	0	0	13	5

Table 5. Continued

	NHS	NOP	SHR	SLR	SMB	WAE	WTS	YEP
2.00 – 2.49					1			
2.50 – 2.99								
3.00 – 3.49								
3.50 – 3.99								
4.00 – 4.49								3
4.50 – 4.99								
5.00 – 5.49			3					
5.50 – 5.99					2			1
6.00 – 6.49			1		1			
6.50 – 6.99		1			3			
7.00 – 7.49			3		3			
7.50 – 7.99			3					
8.00 – 8.49			9				1	
8.50 – 8.99	1		13			1		
9.00 – 9.49			16		3		1	
9.50 – 9.99	1		4	1	3			
10.00 – 10.49	1		11		1	1	2	
10.50 – 10.99			22		6	1	3	
11.00 – 11.49			39		1	1	3	
11.50 – 11.99	2		47		1		3	
12.00 – 12.99	2	2	29	8	2		17	
13.00 – 13.99	5	1	18	5	3		19	
14.00 – 14.99		2	39	2			31	
15.00 – 15.99	2	1	77	3		3	11	
16.00 – 16.99	2	4	60		1	2	3	
17.00 – 17.99	1	3	33	1	1	1	5	
18.00 – 18.99		3	21	11				
19.00 – 19.99			8	14		2		
20.00 – 20.99		1	3	13				
21.00 – 21.99		3		7				
22.00 – 22.99		1		5				
23.00 – 23.99				4				
24.00 – 24.99								
25.00 – 25.99								
26.00 – 26.99								
27.00 – 27.99								
28.00 – 28.99								
29.00 – 29.99								
30.00 – 30.99								
31.00 – 31.99								
32.00 – 32.99								
33.00 – 33.99								
34.00 – 34.99								
35.00 – 35.99								
>= 36.00								
Total	17	22	461	74	33	12	110	5
Min Length	8.9	6.7	5.0	9.8	2.3	8.6	8.4	4.0
Max Length	17.2	22.6	20.7	23.5	17.0	19.7	17.9	5.5
Mean Length	13.3	16.9	13.7	18.5	9.7	14.8	13.8	4.5
# Measured	17	22	459	74	31	12	99	4
Unmeasured	0	0	2	0	2	0	11	1

Table 6. Trotline catch per hook day by electrofishing site for channel catfish collected from the North Fork Crow River, summer 2012.

Trotline sets	EF Site	N	N/hook-day	Mean TL (in)
1 – 5	1	11	0.22	23.5
6 – 10	2	10	0.20	24.1
16 – 20	4	11	0.22	20.5
21 – 25	5	17	0.34	21.1
26 – 30	6	11	0.28	20.8
36 – 40	7	16	0.53	20.5
41 – 45	8	8	0.20	24.2
46 – 50	9	7	0.18	20.9
51 – 55	10	15	0.30	21.7
56 – 60	11	21	0.42	22.8
61 – 65	12	16	0.32	20.6
66 – 70	13	10	0.25	22.9
76 – 80	14	11	0.22	21.1
81 – 85	15	10	0.25	21.5
ALL TL		175	0.28	21.8

*Trot-lines 11 – 15 and 71 – 75 were not set.

Table 7. Length at capture (TL) and standard error (SE) for channel catfish collected from the North Fork Crow River, summer 2012.

Year Class	Age	Sample Size	Length at Capture (inches)			SE
			Average Length	Minimum Length	Maximum Length	
2010	2	7	10.5	9.1	11.7	0.45
2009	3	17	14.3	12.6	15.8	0.23
2008	4	17	16.8	15.6	18.3	0.20
2007	5	5	18.8	16.7	20.7	0.82
2006	6	27	19.5	17.4	22.3	0.29
2005	7	7	20.3	16.9	25.0	1.07
2004	8	12	22.5	18.9	28.3	0.83
2003	9	29	24.2	19.1	28.8	0.43
2002	10	19	25.1	21.1	30.7	0.50
2001	11	7	24.3	20.9	27.9	1.06
2000	12	3	28.1	26.8	30.5	1.20
1999	13	1	24.4	24.4	24.4	NA

Table 8. Length at capture (TL) and standard error (SE) for smallmouth bass collected from the North Fork Crow River, summer 2012.

Year Class	Age	Sample Size	Length at Capture (inches)			SE
			Average Length	Minimum Length	Maximum Length	
2011	1	7	6.6	5.9	7.1	0.16
2010	2	11	10.4	9.3	11.9	0.24
2009	3	4	12.7	12.4	13.0	0.15
2006	6	1	16.3	16.3	16.3	NA
2000	12	1	17.0	17.0	17.0	NA

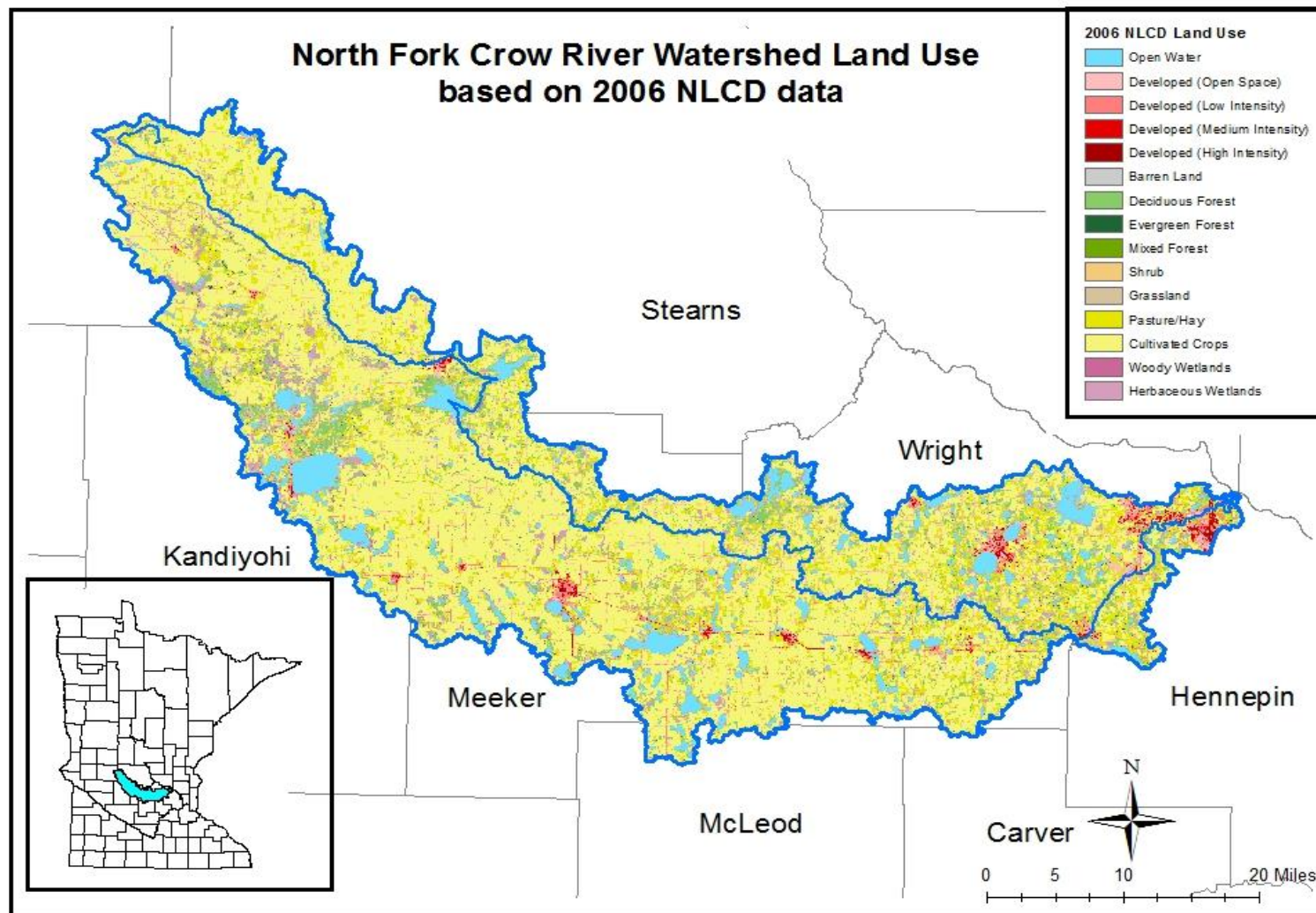


Figure 1. Estimated land use within the North Fork Crow River (M-64) watershed. Classification based on 2006 NLCD data.

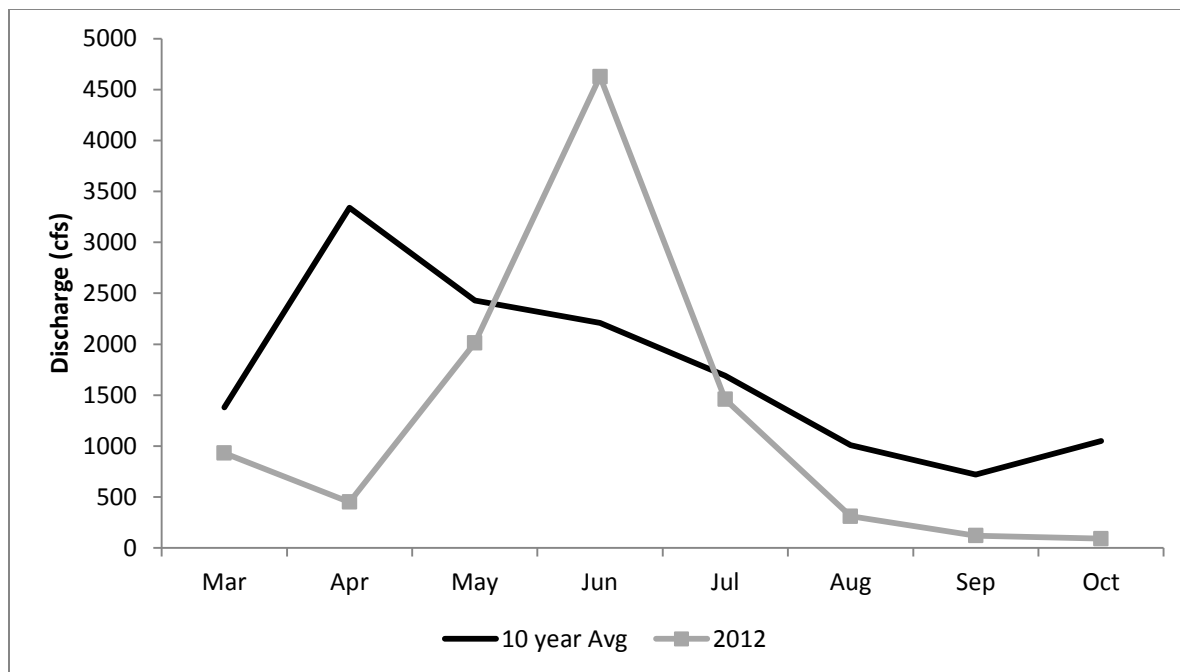


Figure 2. Mean monthly discharge (CFS) for the North Fork Crow River, between March and October 2012 and 10 year average, recorded at the USGS gauging station at Rockford.

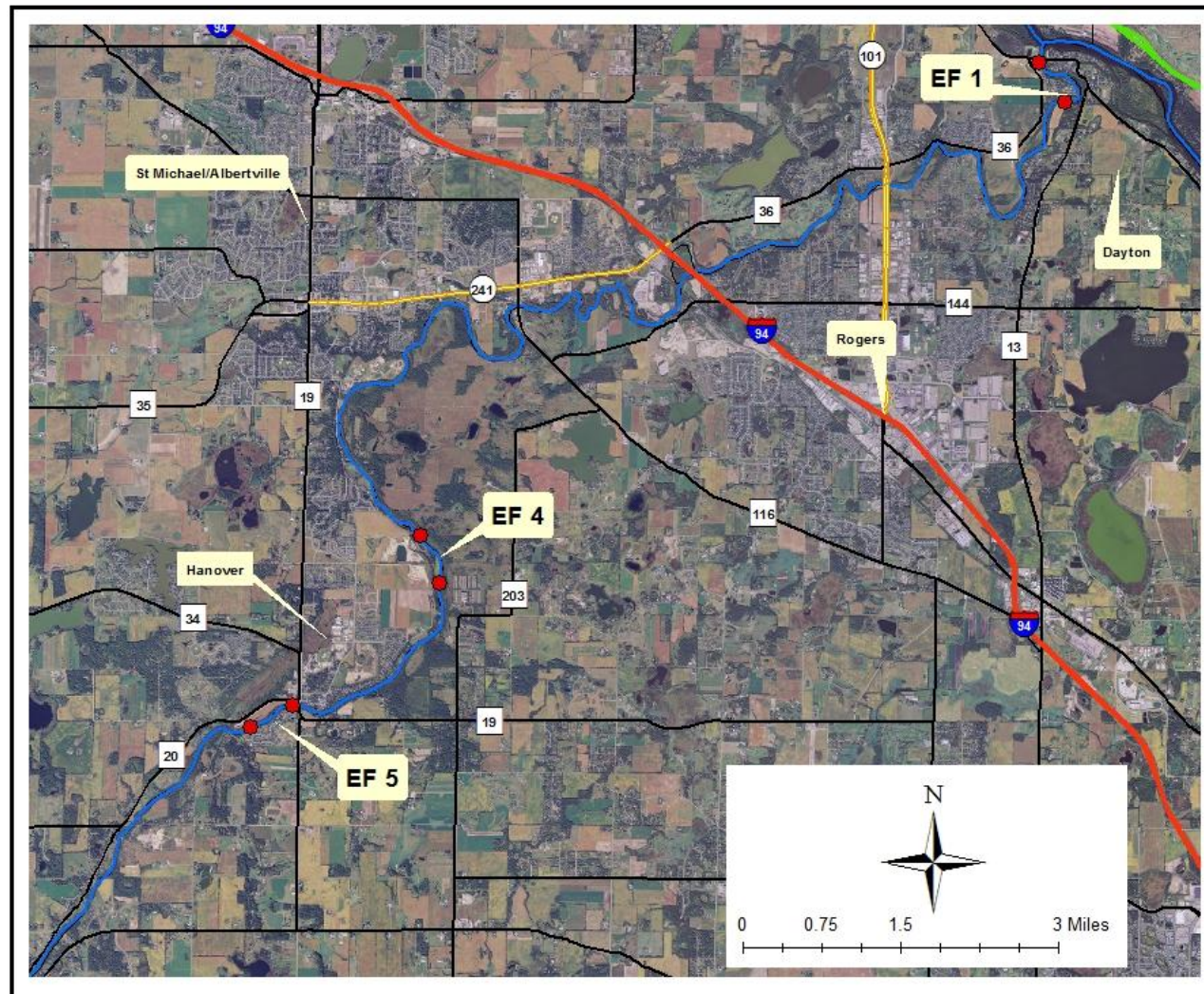


Figure 3. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Dayton to Hanover).

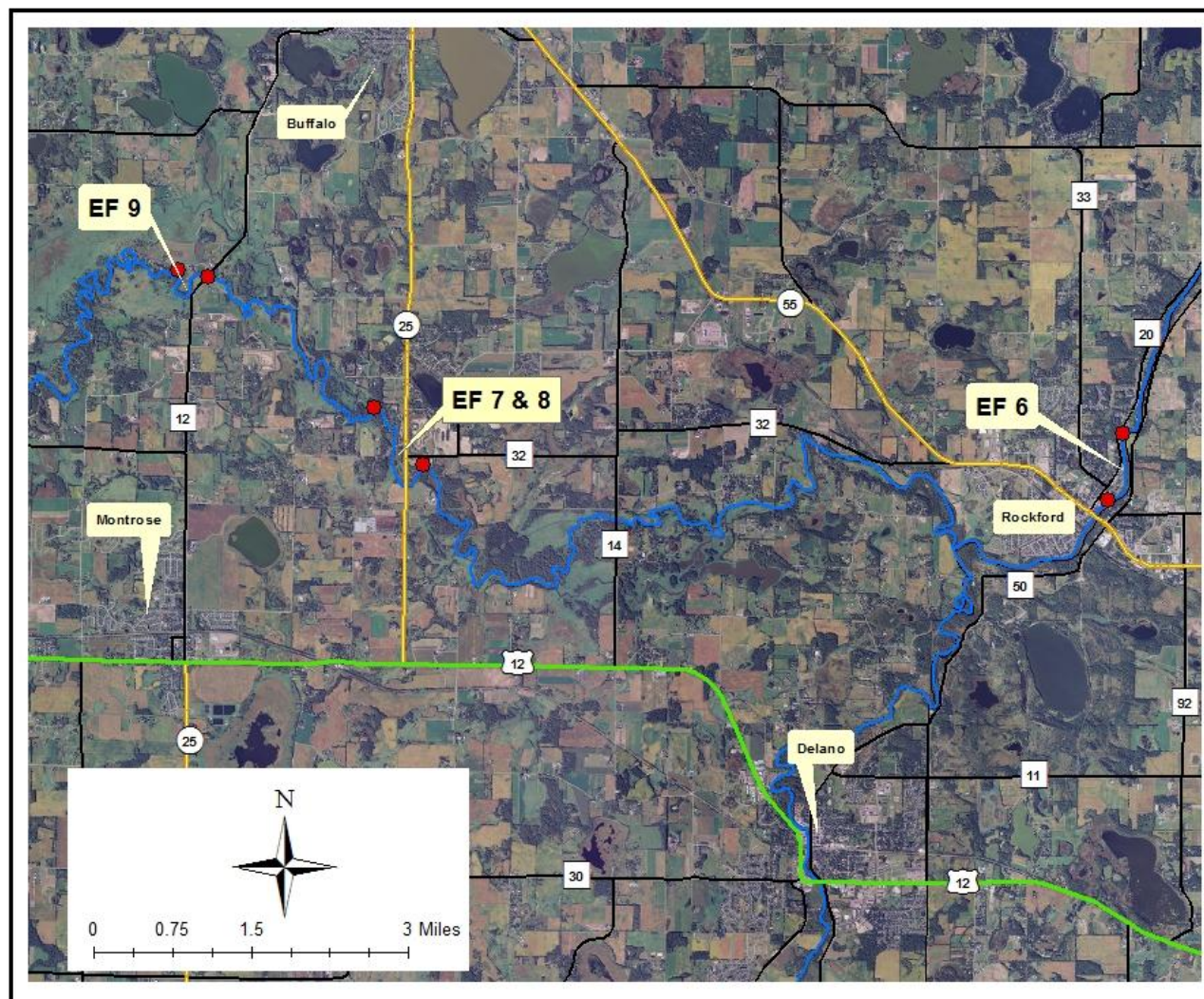


Figure 4. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Rockford to Montrose).

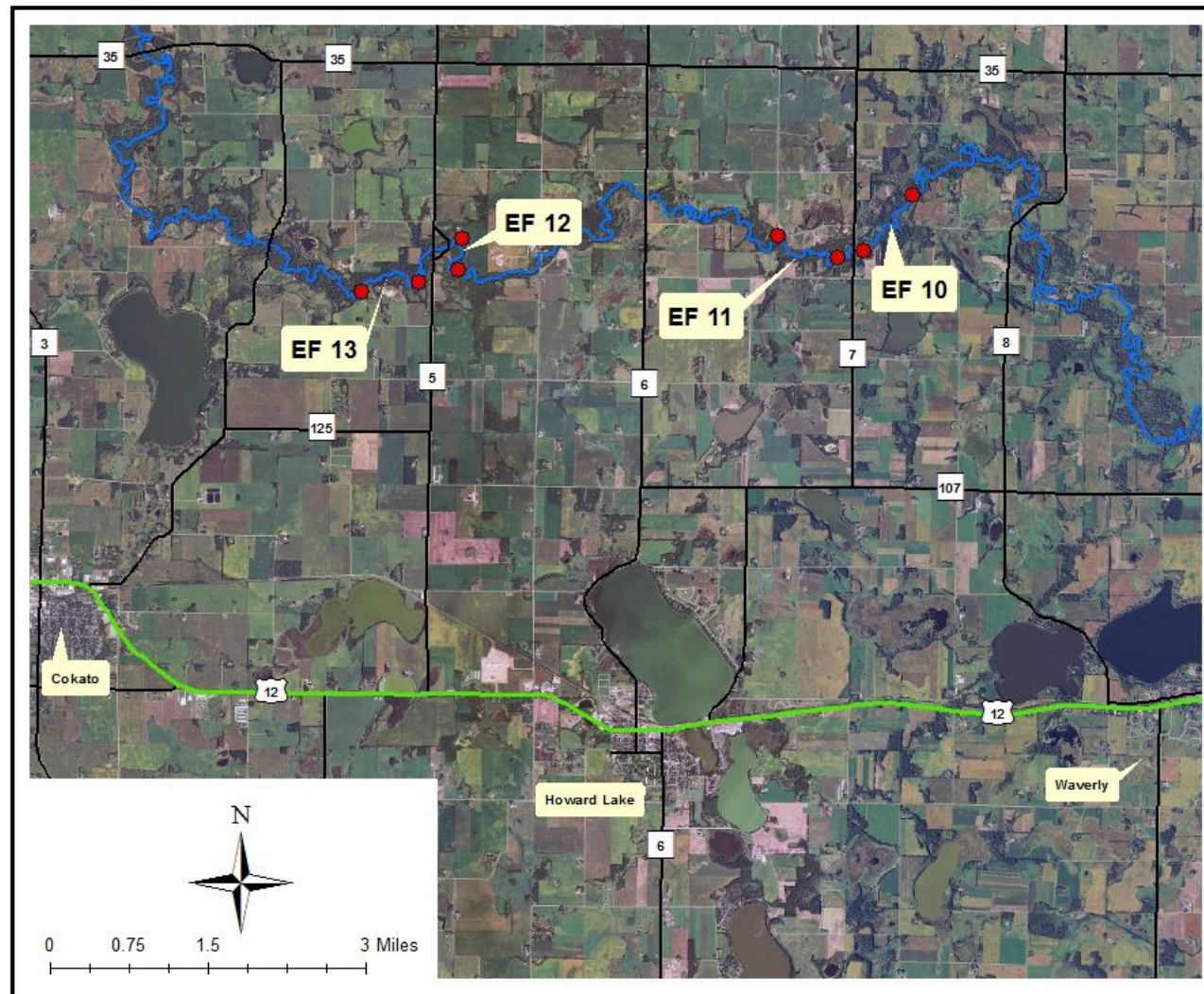


Figure 5. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Montrose to Cokato).

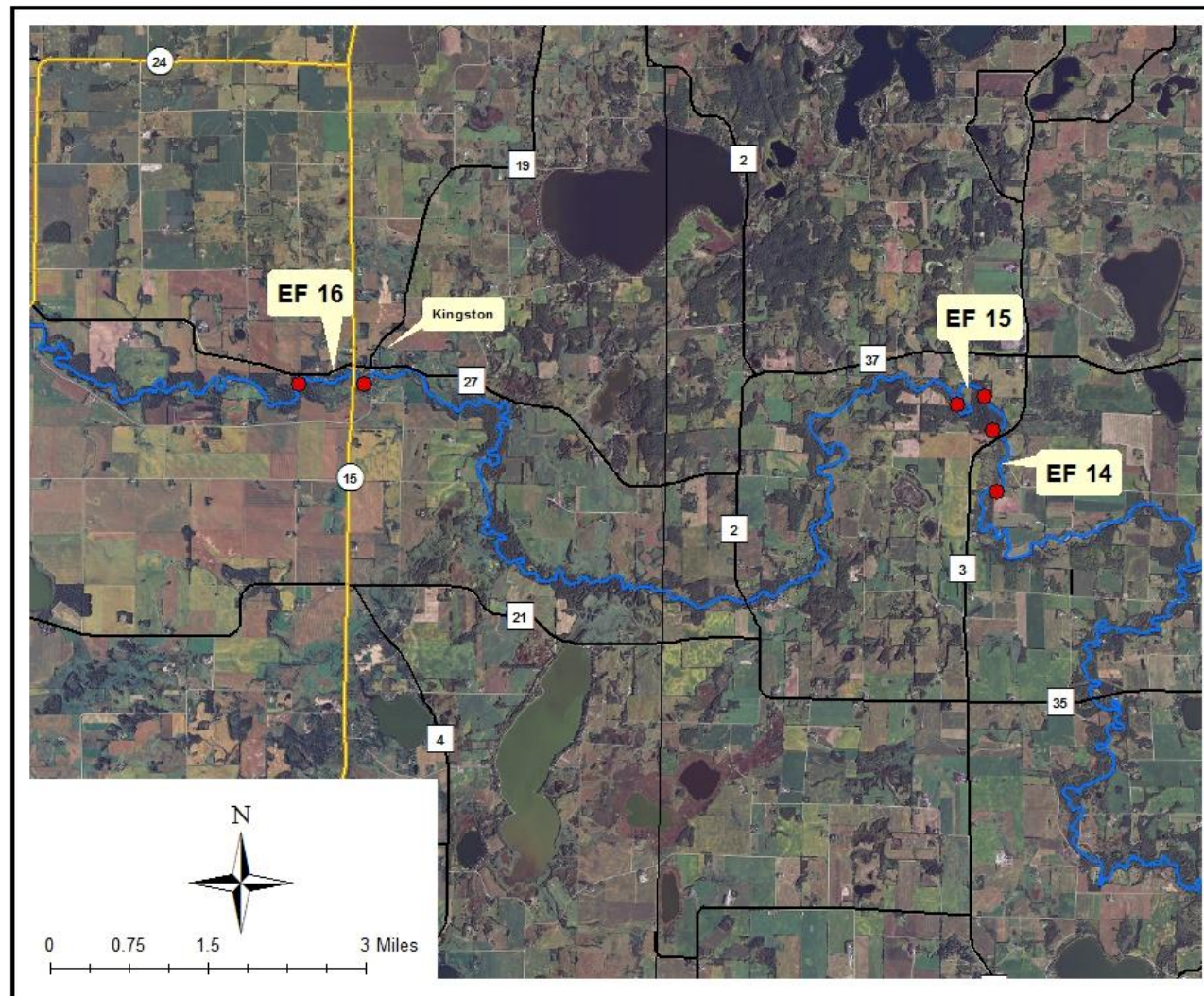


Figure 6. Electrofishing (EF) sampling locations for the North Fork Crow River population assessment, summer 2012 (Cokato to Kingston).

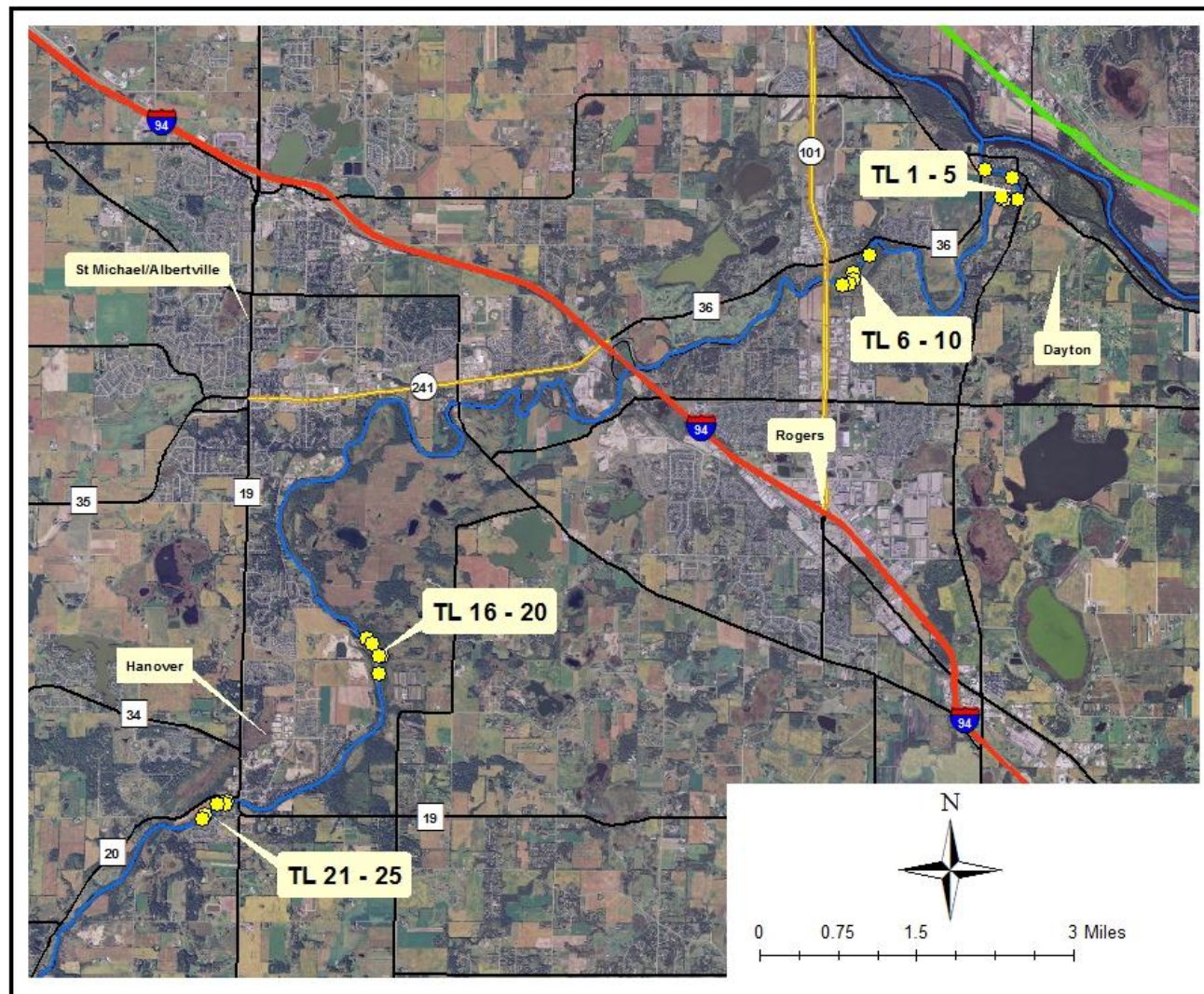


Figure 7. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Dayton to Hanover).

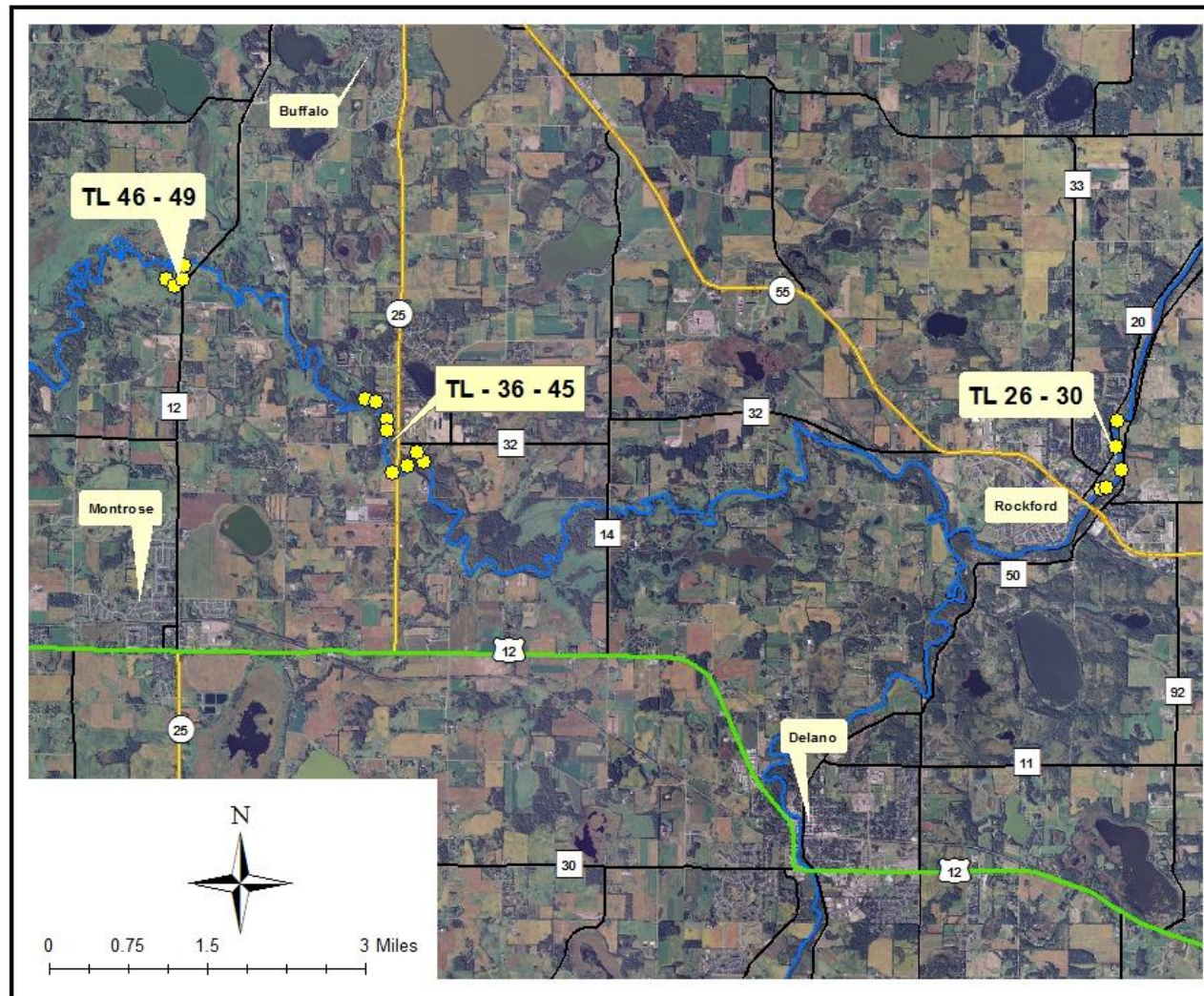


Figure 8. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Rockford to Montrose).

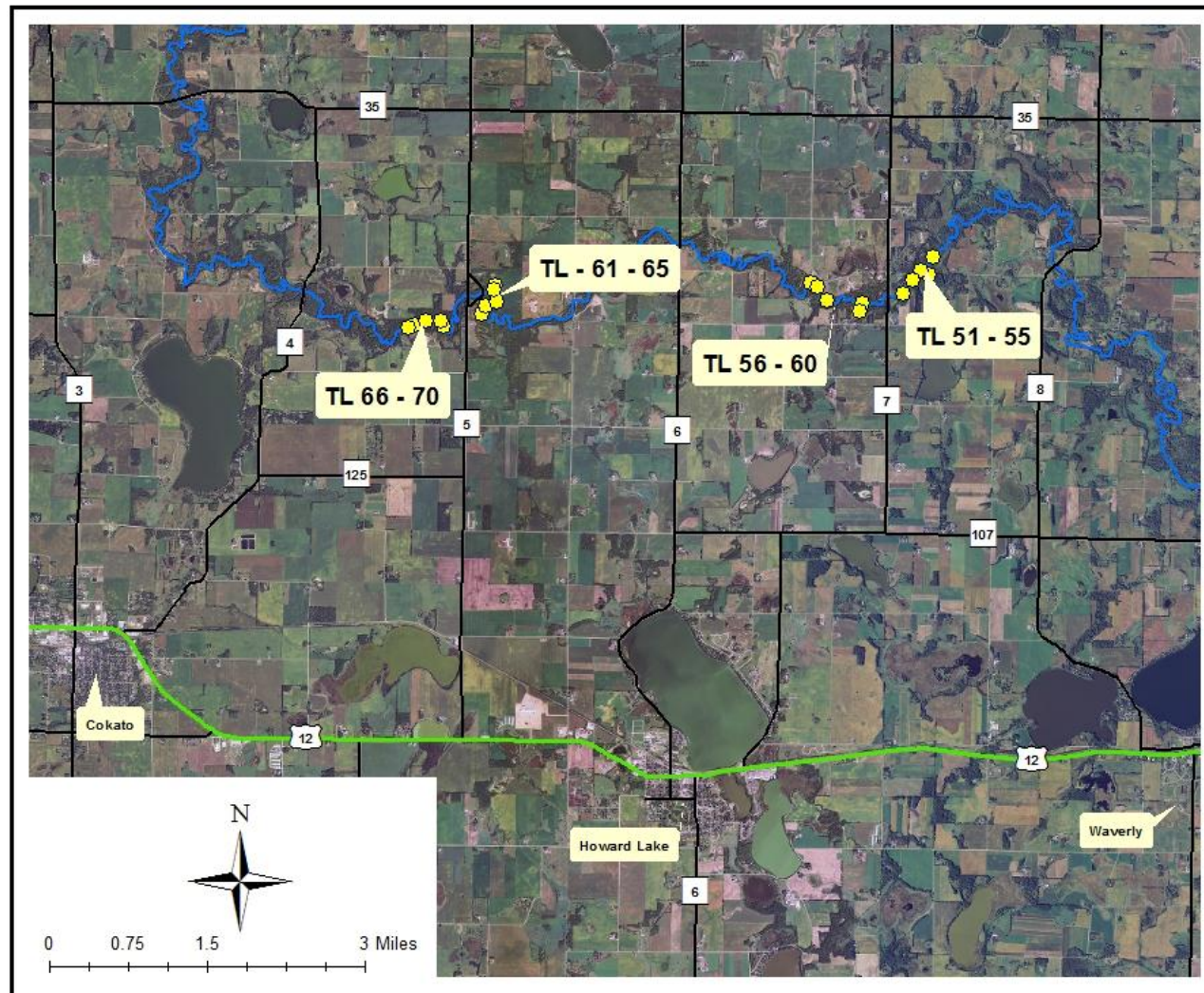


Figure 9. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Montrose to Cokato).

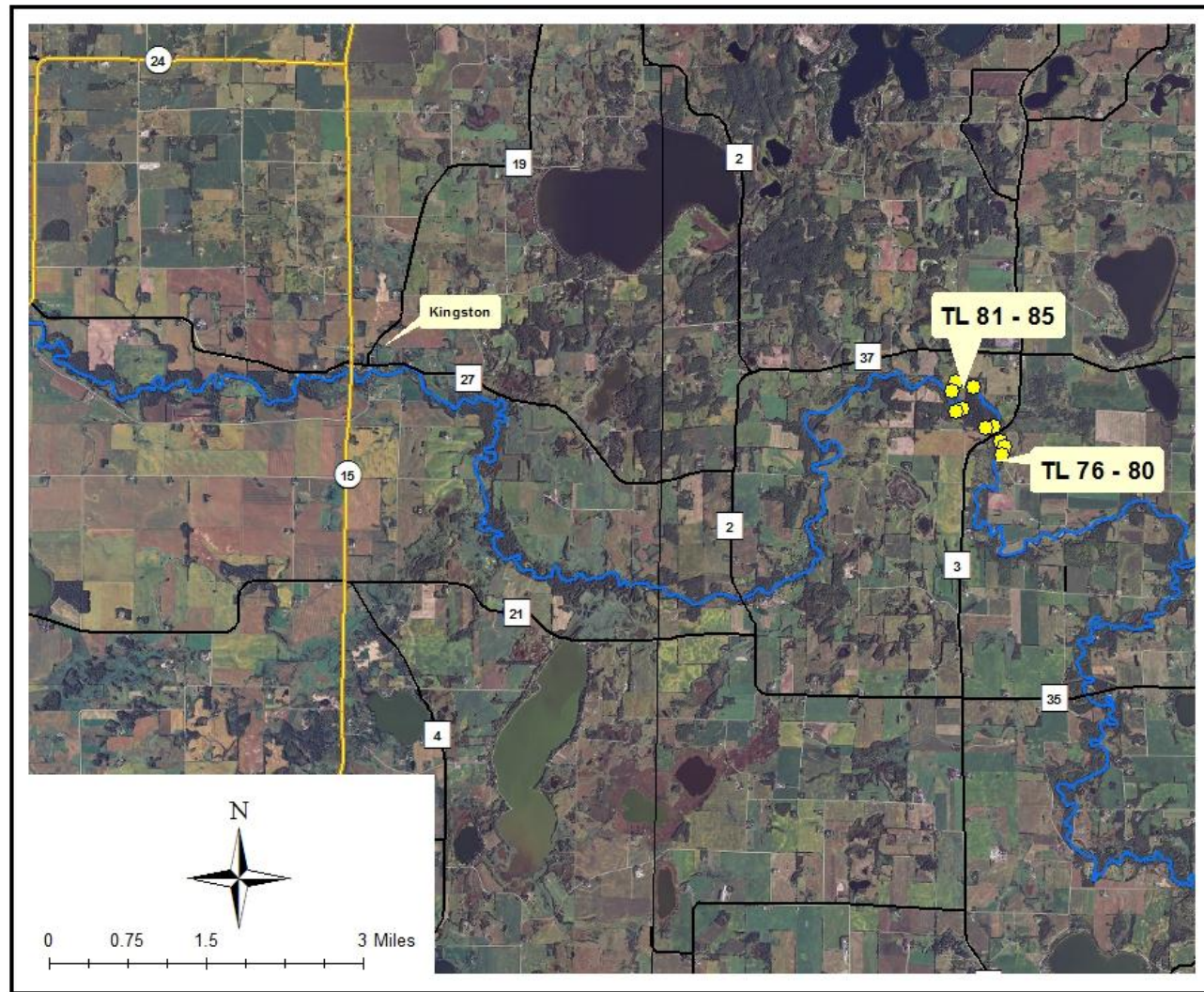


Figure 10. Trotline (TL) sampling locations for the North Fork Crow River population assessment, summer 2012 (Cokato to Kingston).

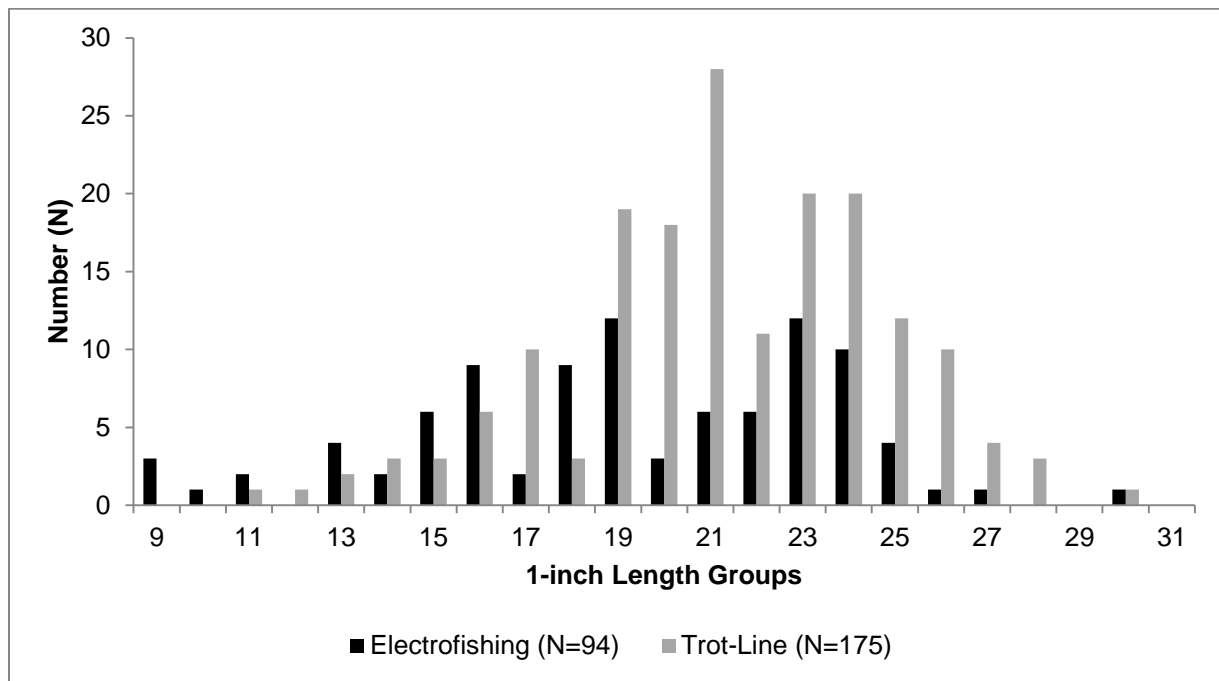


Figure 11. Length frequency of channel catfish collected by electrofishing and trotlines from the North Fork of the Crow River, summer 2012.

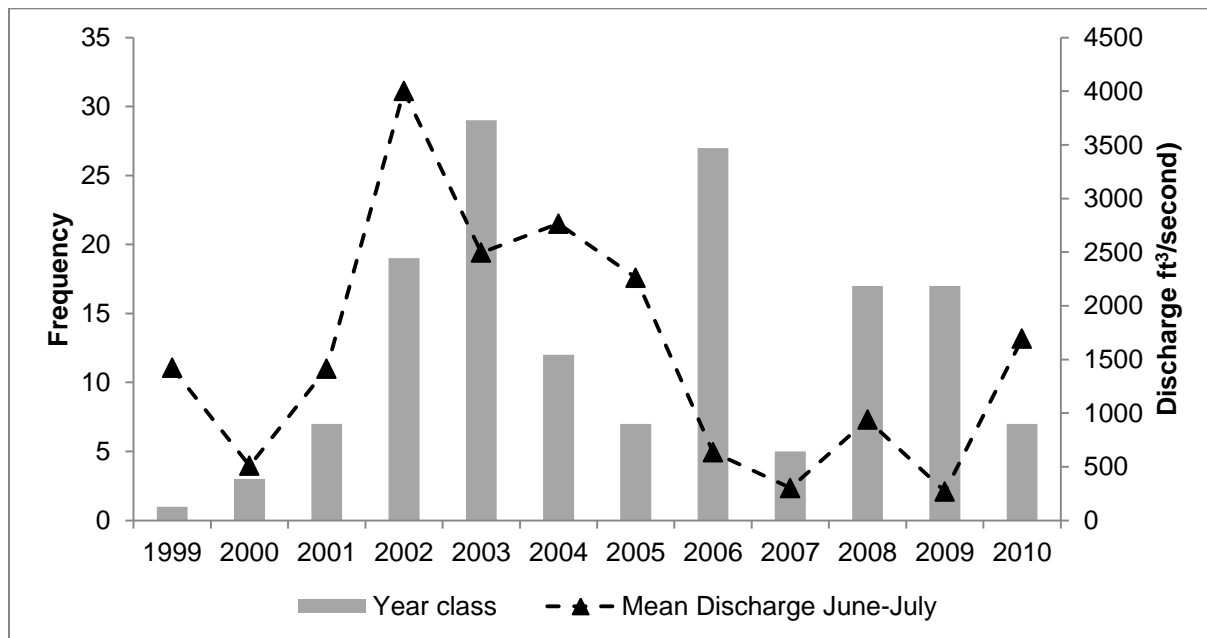


Figure 12. Estimated age frequency of North Fork Crow River channel catfish captured summer 2012 and mean June/July discharge (1999 – 2010).