



Revisits to Known Topeka Shiner Localities:
further evidence of decline in Minnesota

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March 2014

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ABSTRACT

Since 2004, the Minnesota Department of Natural Resources has monitored presence/absence of the federally endangered Topeka shiner (*Notropis topeka*) at randomly selected sites within the federally designated critical habitat. Throughout the first seven years of monitoring (2004-2010), Topeka shiners were present at an average of 76.4% of randomly selected sites, although surveyors in 2009 and 2010 noted an apparent decline in relative abundance at sites where the species was present. Monitoring surveys conducted in 2010, 2012 and 2013 found the lowest to date percentages of sites where the species was present (60%, 40%, and 30% respectively). This shift in prevalence motivated a second set of surveys in 2013 to revisit sites from recent monitoring surveys where the species was present in relatively high numbers. Results are presented for presence/absences surveys at 25 known Topeka shiner localities. Of 25 sites that were revisited in 2013, the species was present at 16 sites in low numbers relative to previous visits. Results from this and previous sampling efforts are indicative of a decline in prevalence of Topeka shiners in Minnesota. Standardization of catch effort at a set of permanent monitoring sites in addition to the annual randomized site selection within the critical habitat is recommended to further characterize Topeka shiner population dynamics in MN.

INTRODUCTION

In 2004, the Minnesota Department of Natural Resources began a program to monitor populations of Topeka shiners within the state. Based upon recommendations from the Topeka Shiner Recovery Team, a protocol was established to conduct a presence/absence survey of Topeka shiners at twenty randomly selected reaches of stream from within the federally-designated critical habitat in the Big Sioux and Rock River drainages in southwestern MN. Surveys were conducted annually from 2004 to 2010 and Topeka shiners were found at an average of 76.4% of sites over the seven year period (Ceas and Anderson 2004; Ceas and Monstad 2005, 2006; Ceas and Plain 2007; Ceas and Larson 2008, 2009, 2010). These values ranged from Topeka shiners present at 90% of the 20 randomly-selected reaches of streams in 2006, to 60% of sites in 2010. Although the annual percentage of sites where Topeka shiners were present was relatively stable for the first six years of monitoring (Figure 1), surveyors began to note a marked decline in relative abundance of the species as well as a decline in the number of segments where the species was present (Figure 2) (Ceas and Larson 2009, 2010).

Results from monitoring surveys conducted in 2012 and 2013 provided further evidence of a decline in prevalence; the percentage of segments where the species was present fell to 40% and 30% respectively, the lowest recorded values since the monitoring began in 2004 (Nagle and Larson 2013). At segments where Topeka shiners were present, they were observed in very low numbers, with the majority of segments (10 of 14) represented by five or less individuals.

In response to rapidly declining numbers in annual randomized monitoring efforts, in 2013 an additional round of surveys was initiated to determine if known localities identified in previous monitoring surveys still harbored populations of Topeka shiners. A set of known localities from recent monitoring surveys (2008, 2009, and 2010) was selected and site revisits

were conducted to determine presence/absence. Results of these surveys are detailed in this report and provide further evidence of a decline in the prevalence of Topeka shiners in Minnesota.

METHODS

Topeka shiners were collected at 43 sites within the 60 randomly selected one-mile segments visited in 2008-2010 (Ceas and Larson 2008, 2009, 2010) following the protocol first implemented by Ceas and Anderson (2004). A set of 25 of these sites was selected to revisit. Sites were selected to provide geographic coverage across the federally designated critical habitat, and sites were prioritized where the surveyor's qualitative assessment of Topeka shiner relative abundance was 'abundant' or 'common' (see Ceas and Larson 2010 for a description of relative abundance assessment). Of the 25 sites, ten were ranked as 'abundant', ten were ranked 'common', two were ranked 'present', and three were not ranked by the surveyor.

A handheld GPS unit was used to navigate to the coordinates of the capture sites from previous monitoring surveys. Photographs of capture sites presented in Ceas and Larson (2008, 2009, 2010) were employed to aid in site location. Presence/absence surveys were conducted at each site with a 15'x5'x1/8" pole seine. Due to habitat heterogeneity, sampling effort was not standardized. Sites were sampled for approximately 30 minutes before Topeka shiners would be considered absent. Surveys were conducted in July 2013 during periods of normal flow. See Map1 and Table 1 for a complete list of site locations.

RESULTS

Topeka shiners were collected at 16 of the 25 previously-known localities. See Table 1 for a complete list of sites, Topeka shiner presence/absence, number of individuals sampled, a brief description of the habitat, and information from the initial survey at each site. Topeka shiners were observed in low numbers at several of the sites where they were present; five or less individuals were collected at eight of the sixteen sites where they were present.

Plains topminnow (*Fundulus sciadicus*), is a Threatened Species in Minnesota. Although survey efforts specifically targeted Topeka shiner localities, the two species have a shared habitat preference and frequently co-occur in reaches of stream with low flow and off-channel areas (Pflieger 1997). Plains topminnows were collected at two of the 14 sites that were sampled within their range: a single individual at site 96-4 (Kanaranzi Creek), and a single individual at site 97-1 (Poplar Creek).

DISCUSSION

The randomized stream segment selection employed in annual monitoring surveys (2004-2013) may result in some portion of the segments falling on reaches of stream that do not contain suitable Topeka shiner habitat or in portions of the watershed that have not historically harbored large populations of the species, yet the species was present at an average of over 75% of these segments through 2010. Site revisits conducted in 2013 found the species present at only 64% (16/25) of localities previously known to harbor Topeka shiners in relatively high abundance. Not only were site revisits unable to demonstrate presence of the species at nine of the 25 known localities, few individuals (< 5) were captured at the majority of sites where they were present. Ceas and Larson (2008, 2009) reported hundreds of individuals at some sites where

the species was particularly abundant, while intense survey efforts at over 65 sites in 2012-2013 yielded only 176 total individuals of Topeka shiners. These results, in conjunction with those presented by Ceas and Larson (2010) and Nagle and Larson (2013) provide further evidence of a rapid decline in the prevalence of Topeka shiners in Minnesota since 2009.

The nine known Topeka shiner localities where site revisits failed to document the species' presence were located on or near the main stem of the Rock River (88-1, 113-1, 123-1), in the Pipestone Creek drainage (83-1, 84-1, 85-1), and in the Kanaranzi Creek drainage (96-4, 97-1, 98-2) (see Map 1). These latter two drainages are of particular concern, as these streams have historically harbored large populations of Topeka shiners; both systems have shown marked and dramatic declines in recent years.

Pipestone Creek

Throughout DNR monitoring efforts conducted from 2004-2010, Topeka shiners were present at 100% (n=15) of randomly selected stream segments within the Pipestone Creek drainage. In 2012 and 2013 monitoring efforts, four one-mile segments were surveyed in the Pipestone Creek watershed, and the species was documented (three individuals) at only a single site (146-6; Nagle and Larson 2013). Four sites, where Topeka shiners were considered to be common and were collected in the first seine haul in 2008-2009 monitoring surveys, were selected for revisits in 2013 (this report). Site revisits to these four localities documented the species at only a single site (104-1): two individuals were collected among hundreds of sand shiners (*Notropis stramineus*) and central stonerollers (*Campostoma anomalum*). Ceas and Larson (2007) noted increasing levels of siltation at sites in the Pipestone Creek watershed relative to previous years, which may be a factor in the observed decline in this system.

Kanaranzi Creek

Kanaranzi Creek has historically harbored a large and stable population of Topeka shiners (Dahle 2001). Throughout monitoring efforts in 2004-2010, the species was present at more than 80% (18/22) of randomly selected segments. However, a marked decrease in relative abundance is apparent in recent years, as very few individuals were collected in 2009 and 2010 (Ceas and Larson 2009, 2010). Topeka shiners were present in five of the seven segments that were surveyed in these years, but were observed in very low numbers; four of these segments were represented by a single individual. Three known localities in the Kanaranzi Creek drainage were selected for revisits in 2013, and Topeka shiners were not present at any of them.

Despite a general trend of decline across the Topeka shiner's range in Minnesota, site revisits conducted in 2013 confirmed the presence of remaining watersheds that appear to harbor large, breeding populations of the federally endangered shiner, and nine of the sites that were revisited exhibited comparable relative abundance to the initial visits. Topeka shiners were collected in spawning condition in high abundance relative to other fish species at sites in the West Branch of the Little Rock (119-1), Champepadan (95-1), and Beaver (91-1) Creek drainages. Individuals in full spawning condition were only collected at sites that had some amount of firm, coarse substrate available. Sites with deeply silted substrate at times yielded high numbers of individuals, but none were observed in spawning condition.

Conclusions

As the monitoring protocol was designed to be a rapid assessment of then-stable (Dahle 2001; Hatch 2001) MN populations, presence/absence surveys were conducted with no standardization of catch effort or enumeration of individuals collected. Given that results of

recent monitoring efforts have demonstrated a loss of stability in these populations, it is recommended that further steps be taken to provide more quantitative documentation of Topeka shiner distribution and abundance. A standardized catch effort conducted annually at a set of permanent monitoring sites would provide a more detailed characterization of Topeka shiner population dynamics in Minnesota. Further, annual characterization of habitats at these stations could potentially correlate specific habitat alterations with Topeka shiner prevalence.

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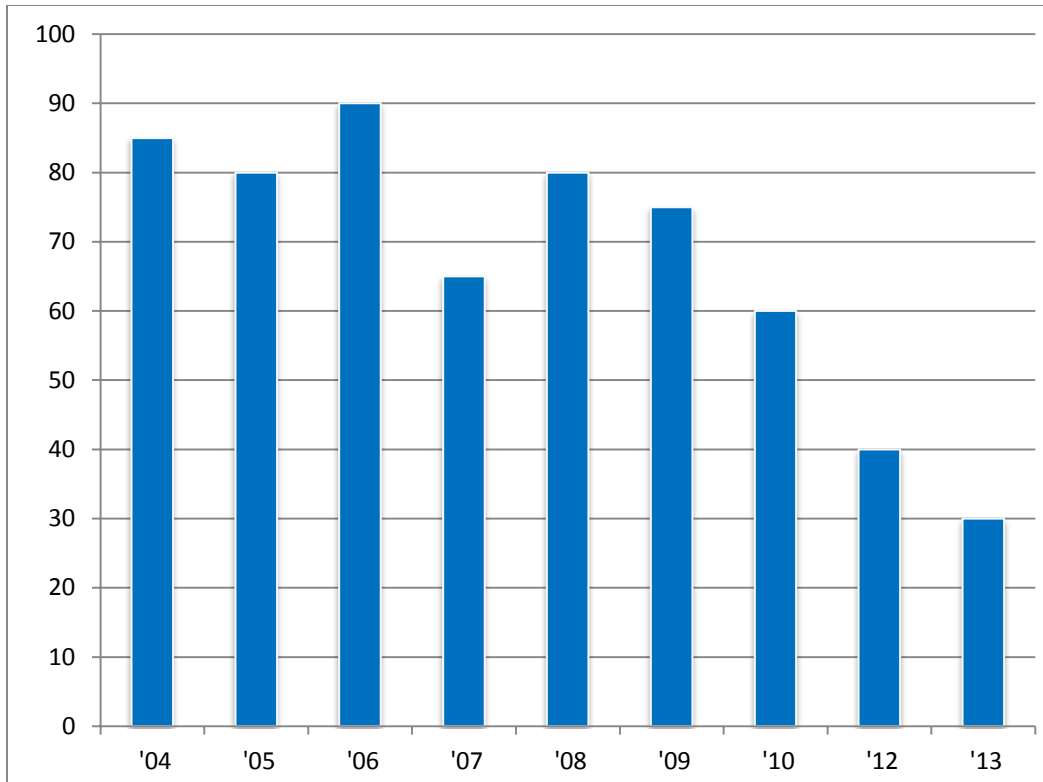


Figure 1: Percentage of randomly selected stream segments where Topeka shiners were captured, 2004-2013.

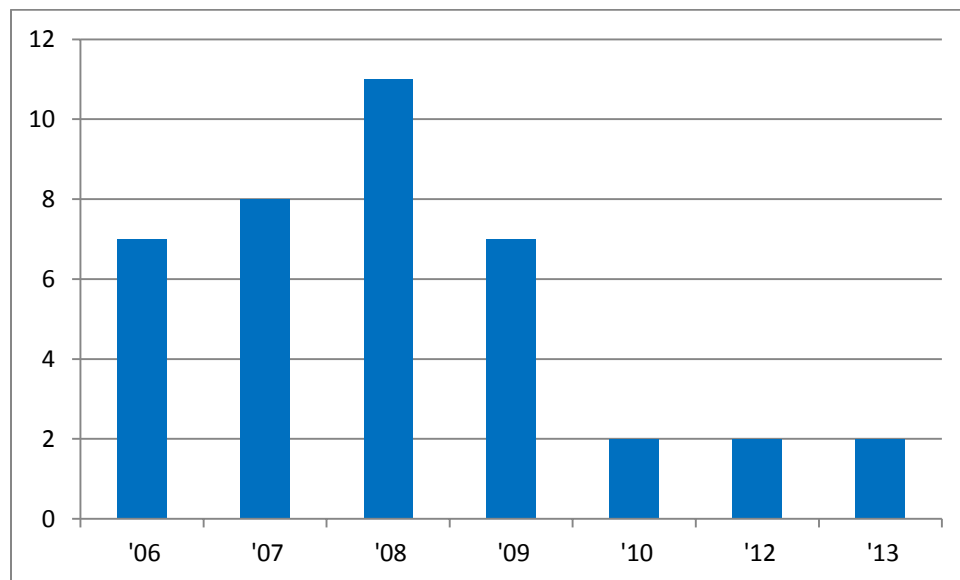


Figure 2: Number of sites where Topeka shiners were considered 'common' or 'abundant': 2006-2013.

Map 1: 2013 site revisits

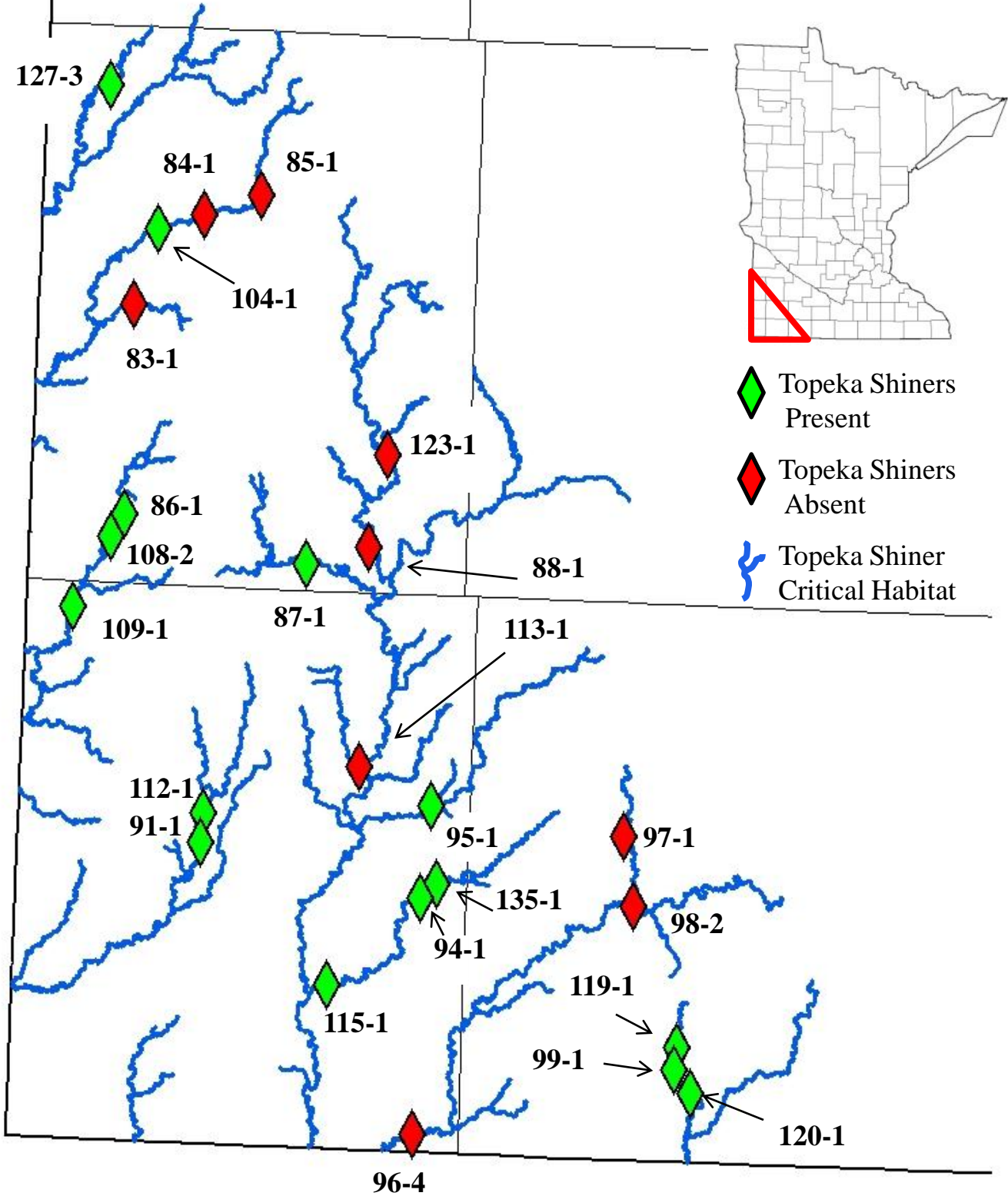


Table 1. Locations of the 25 sites that were revisited in 2013: a brief habitat description for each site, information from prior visits during monitoring surveys, Lat/Long coordinates, and a "Common Location" descriptor (approximate mileage & direction to nearest town/highways). Habitat type is an approximate characterization of the specific sample site: pooled areas along the stream channel ('pool'); low-flow reaches of stream and backwater habitats along the main channel boundary ('in-channel/MCB'); ponds adjacent to the sample reach that are not connected to the main channel of the stream ('pool, off-channel').

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
83-1	<u>South Branch Pipestone Creek</u>					
	3 mi S Cazevovia	Pipestone	Troy	in-channel/MCB	44.02348300	-96.36816800
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Slowly flowing , 3m wide stream. Some submerged macrophytes,reed canary grass on banks.				
	Substrate:	Gravel, sand, silt. Silt deep on MCB.				
	Prior Visits	Topeka shiners were common at this site in 2004, 2007, and 2008 surveys; they were sampled in the first seine haul in all three visits. Surveyors noted an increase in siltation between 2004 and 2007 surveys.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
84-1	<u>North Branch Pipestone Creek</u>					
	at US Hwy 75, 5.5 mi N of Pipestone	Pipestone	Troy	pool	44.08139100	-96.30800700
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Slowly flowing , 3-5m wide stream. Stream is deeply pooled downstream of bridge.				
		Thick algal mats and submerged vegetation. Segment appears to have been channelized				
	Substrate:	Gravel, silt, sand				
	2008 Visit	Topeka Shiners were common and were captured on the first seine haul				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
85-1	<u>North Branch Pipestone Creek</u> 3 mi W of Holland	Pipestone	Grange	pool	44.09503200	-96.25733500
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Pooled area downstream of CR 8 bridge. Black bullhead very abundant, very few minnows.				
	Substrate:	Gravel, cobble, silt				
	Prior Visits	Topeka shiners were common and were captured on the first seine haul in 2004 and 2008.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
86-1	<u>Split Rock Creek</u> S end of S.R.C. State Park at Co Hwy 20	Pipestone	Eden	pool, off-channel	43.8919	-96.3682
	2013 Visit:	<u>3 Topeka shiners captured in approx 30 minutes of seining</u>				
	Habitat Description:	Stream is a series of interconnected pools. Sampled in off channel pool, ~15 m from stream. Orangespotted sunfish extremely abundant in pool (>200 per seine haul).				
	Substrate:	Boulder, silt, gravel				
	2008 Visit:	Topeka shiners captured in first seine haul and were considered to be "extremely abundant (probably 100s in just the one pool)".				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
87-1	<u>Poplar Creek</u> 4 mi WSW of Edgerton	Pipestone	Elmer	in-channel/MCB	43.86598500	-96.20459300
	2013 Visit:	<u>A single Topeka shiner captured in approx 30 minutes of seining</u>				
	Habitat Description:	A sandy backwater along the main channel of the stream. Stream is a small (2-3m wide) meandering headwater.				
	Substrate:	Sand, gravel, silt				
	2008 Visit:	Topeka Shiners were common and were captured on the first seine haul				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
88-1	<u>Rock River</u> 0.5 mi W of Edgerton	Pipestone	Osborne	in-channel/MCB	43.87779200	-96.14987700
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	8m wide, sluggish stream. No perceptible flow. Sampled in a deeply silted oxbow.				
	Substrate:	deep (1m) silt over sand				
	2008 Visit:	Topeka Shiners were common and were captured on the first seine haul				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
91-1	<u>Beaver Creek</u> at Co Rd 8	Rock	Mound	pool	43.688601	-96.28943400
	2013 Visit:	<u>11 Topeka shiners captured in the first two seine hauls. Males were tuberculate and in spawning condition.</u>				
	Habitat Description:	8-10m wide shallow, pooled area. No flow.				
	Substrate:	Gravel, silt, large cobble				
	2008 Visit:	Topeka Shiners were abundant and were captured on the first seine haul				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
94-1	<u>Elk Creek</u> at Co Hwy 3, 1 mi W of Magnolia	Rock	Luverne	in-channel/MCB	43.65984300	-96.09298500
	2013 Visit:	<u>3 Topeka shiners captured in approx 30 min of seining</u>				
	Habitat Description:	3m wide stream with no perceptible flow. Deeply silted and mucky substrate.				
	Substrate:	Deep silt and muck (0.5m) over sand				
	2008 Visit:	Topeka Shiners were abundant and were captured on the first seine haul				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
95-1	<u>Trib to Champepadan Creek</u> at Co Rd 8, 2.5 mi S of Kenneth	Rock	Vienna	pool	43.71754700	-96.08623300
	2013 Visit:	<u>12 Topeka shiners captured on first seine haul. Males were tuberculate and in spawning condition.</u>				
	Habitat Description:	15 m wide pool at culvert at Co Rd 8.				
	Substrate:	Gravel, silt				
	2008 Visit:	Topeka shiners were very abundant and were captured on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
96-4	<u>Kanaranzi Creek</u> 4.5 mi SSW of Kanaranzi	Rock	Kanaranzi	in-channel/MCB	43.51205300	-96.09340700
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Ample sandbars and backwater habitat along MCB.				
	Substrate:	Gravel, sand, silt (deep in off-channel areas)				
	2008 Visit:	Topeka shiners were not common and were captured at the fourth sample site along the segment.				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
97-1	<u>Kanaranzi Creek</u>					
	at Co Rd 14, 5 mi N of Adrian	Nobles	Larkin	in-channel/MCB	43.70290400	-95.91414
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Sandy pools and backwaters downstream of Co Rd 14 bridge				
	Substrate:	Sand, silt, muck				
	2008 Visit:	Topeka Shiners were common and were captured on the first seine haul				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
98-2	<u>East Branch Kanaranzi Creek</u>					
	at Dolan Ave, 2 mi NE of Adrian	Nobles	Olney	pool, off-channel	43.65927900	-95.90449700
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Site is a small, soft-bottomed pool, 2m from the S bank. Thick submerged macrophytes and emergent cattails along perimeter. No fish present in pool. Thousands of toad tadpoles.				
	Substrate:	Silt, muck				
	2008 Visit:	Topeka shiners were abundant and were captured on the first seine haul.				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
99-1	<u>West Branch Little Rock Creek</u> 4 mi WNW of Ransom	Nobles	Little Rock	pool	43.55766100	-95.86343100
	2013 Visit:	<u>4 Topeka shiners captured in first seine haul</u>				
	Habitat Description:	50m long pool downstream of bridge. No perceptible flow. Abundant filamentous algae. Stream is 2-3m wide downstream of pool. Johnny darters very abundant.				
	Substrate:	0.5m silt over gravel and cobble				
	2008 Visit:	Topeka shiners were collected on the first seine.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
101-1	<u>Medary Creek</u> 7.5 mi W of Lake Benton	Lincoln	Verdi	pool	44.24785000	-96.44218000
	2013 Visit:	<u>8 Topeka shiners captured: 2 in the first seine haul, 6 captured in second.</u>				
	Habitat Description:	Extensive pool habitat upstream of bridge. Water was deep enough to hamper seining. Deep silt (0.5m) in off-channel areas.				
	Substrate:	Cobble, gravel, muck				
	2009 Visit:	Topeka shiners were captured on the first seine haul and were "extremely abundant".				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
104-1	<u>North Branch Pipestone Creek</u>					
	at Co Rd 76, 1.5 mi NE Cazenovia	Pipestone	Troy	pool	44.07115000	-96.34819600
	2013 Visit:	<u>2 Topeka shiners captured: a single individual among >200 <i>N. stramineus</i> on the 3rd seine haul, and the second individual was collected among hundreds of other minnows (mostly <i>Campostoma</i> and <i>N. stramineus</i>) in the fourth seine haul.</u>				
	Habitat Description:	Long, shallow pool (7-10m wide) downstream of bridge upstream of small riffle. Little/no flow.				
	Substrate:	Firm. Gravel, sand, silt				
	2009 Visit:	Topeka shiners were common and were collected on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
108-2	<u>Split Rock Creek</u>					
	at Co Rd 51, 2 mi NE of Jasper	Pipestone	Eden	pool	43.878304	-96.379794
	2013 Visit:	<u>6 Topeka shiners captured in the first seine haul, despite boulders and large cobble.</u>				
	Habitat Description:	Small, bouldered pool, connected to pooled area at bridge.				
	Substrate:	Gravel, cobble, boulders				
	2009 Visit:	Topeka shiners were collected in the first seine haul of the second site.				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
109-1	<u>Split Rock Creek</u>					
	1 mi SW Jasper	Rock	Rose Dell	pool	43.83360600	-96.41170100
	2013 Visit:	<u>5 Topeka shiners captured in third seine haul. Males were in spawning condition.</u>				
	Habitat Description:	Side pool at bend in stream. No flow. Some sparse vegetation.				
	Substrate:	Gravel, sand, silt				
	2009 Visit:	Topeka shiners were common and were captured on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
112-1	<u>Beaver Creek</u>					
	5 mi NW of Luverne	Rock	Mound	pool	43.70715200	-96.28818400
	2013 Visit:	<u>6 Topeka shiners captured in first two tangled seine hauls; turbid water and irregular bedrock substrate made seining difficult.</u>				
	Habitat Description:	Shallow, sluggish stream with widened pools				
	Substrate:	Bedrock, silt				
	2009 Visit:	Topeka shiners were abundant and were captured on the first seine haul.				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
113-1	<u>Trib to Rock River</u>					
	3 mi SE of Hardwick	Rock	Vienna	pool	43.73970500	-96.15153000
	2013 Visit:	No Topeka shiners captured in approx 30 min of seining.				
	Habitat Description:	Shallow sandy pool along stream margin. Easy to sample; lots of fish, no Topeka shiners.				
	Substrate:	Sand, gravel, silt				
	2009 Visit:	Topeka shiners were abundant and collected on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
115-1	<u>Elk Creek</u>					
	4 mi NW of Kanaranzi	Rock	Magnolia	pool	43.60262600	-96.17345800
	2013 Visit:	<u>3 Topeka shiners captured in approx 30 min of seining.</u>				
	Habitat Description:	Pooled area at bend in stream, downstream of bridge. Lots of cattle erosion and deep muck				
	Substrate:	Sand, gravel, silt				
	2009 Visit:	Topeka shiners were common and were collected on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
119-1	<u>West Branch Little Rock Creek</u>					
	at Co Rd 56, 4 mi NW Ransom	Nobles	Little Rock	pool	43.57232000	-95.86098400
	2013 Visit:	<u>17 Topeka shiners captured in first two seine hauls. Numerous males in spawning condition.</u>				
	Habitat Description:	Shallow, 3-4m wide stream with no perceptible flow. Firm gravel substrate.				
	Substrate:	Gravel, sand, silt				
	2009 Visit:	Topeka shiners were captured on the first seine haul.				

Table 1 Continued

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
120-1	<u>West Branch Littler Rock Creek</u>					
	2.5 mi W of Ransom	Nobles	Little Rock	pool	43.54323400	-95.84751500
	2013 Visit:	<u>7 Topeka shiners captured in first two seine hauls.</u>				
	Habitat Description:	Deeply silted pooled area downstream of bridge.				
	Substrate:	Deep silt (0.5m) over gravel				
	2009 Visit:	Topeka shiners were common and were collected on the first seine haul.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
123-1	<u>Rock River</u>					
	4 mi N of Edgerton	Pipestone	Osborne	in-channel/MCB	43.93561	-96.1364
	2013 Visit:	No Topeka shiners captured.				
	Habitat Description:	Very slowly flowing, 5m wide reach of stream				
	Substrate:	Gravel, sand, silt				
	2010 Visit:	A single Topeka shiner was collected.				
Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
127-3	<u>Willow Creek</u>					
	2.5 mi E South Dakota state line; 2.5 mi S Lincoln Co. line	Pipestone	Osborne	in-channel/MCB	43.93561	-96.1364
	2013 Visit:	<u>3 Topeka shiners captured in the first seine haul among >1000 <i>Hybognathus hankinsoni</i></u>				
	Habitat Description:	a 30m x 20m stock pond with sparse submerged macrophytes				
	Substrate:	muck, silt, sand				
	2010 Visit:	Topeka shiners were abundant.				

Table 1 Concluded

Site	Stream Name	County	Township Name	Habitat Type	Latitude	Longitude
135-1	<u>Elk Creek</u> 1.5 mi N of Magnolia	Rock	Magnolia	pool/off-channel	43.602626	-96.173458
	2013 Visit:	<p><u>1 Topeka shiner collected in approx 30 min of seining. <i>Pimephales promelas</i> was very abundant in this pool.</u></p> <p>The landowner stated that this pond was completely dry in late summer 2012.</p> <p>We briefly sampled in another pool that was connected to Elk Creek that was >3m deep and difficult to sample.</p> <p>2 individuals were collected in a single seine-dip on the margin of the pool.</p>				
	Habitat Description:	Approximately 20m x 30m off-channel pond, with soft substrate and sparse submerged vegetation.				
	Substrate:	Sand, muck				
	2010 Visit:	Topeka shiners were abundant and were captured on the first seine haul.				

Appendix C- Habitat and Voucher Photographs

Habitat photographs are presented for all sites revisited in additional monitoring surveys in 2013. Photographs represent the specific site where they were collected in previous years of monitoring. Original site number designations are retained from 2008, 2009, and 2010 monitoring surveys. Voucher photographs are presented for each of the sites where Topeka shiners were collected.

Site 83-1, Pipestone Creek: no Topeka shiners captured.



Site 84-1, N. Br. Pipestone Creek: no Topeka shiners captured.



Site 85-1, N. Br. Pipestone Creek: no Topeka shiners captured.



Site 86-1, N. Br. Pipestone Creek: habitat and voucher photos.



Site 87-1, Poplar Creek: habitat and voucher photos.



Site 88-1, Rock River: no Topeka shiners captured.



Site 91-1, Beaver Creek: habitat photo.



Site 91-1, Beaver Creek: voucher photo.



Site 94-1, Elk Creek: habitat photo.



Site 94-1, Elk Creek: voucher photo.



Site 95-1, Trib to Champepadan Creek: habitat photo.



Site 95-1, Trib to Champepadan Creek: voucher photo.



Site 96-4, Kanaranzi Creek: no Topeka shiners captured.



Site 97-1, Kanaranzi Creek: no Topeka shiners captured.



Site 98-2, E. Br. Kanaranzi Creek: no Topeka shiners captured.



Site 99-1, Little Rock Creek: habitat photo.



Site 99-1, Little Rock Creek: voucher photo.



Site 101-1, Medary Creek: habitat photo.



Site 101-1, Medary Creek: voucher photo.



Site 104-1, N. Br. Pipestone Creek: habitat photo.



Site 104-1, N. Br. Pipestone Creek: voucher photo.



Site 108-2, Split Rock Creek: habitat photo.



Site 108-2, Split Rock Creek: voucher photo.



Site 109-1, Split Rock Creek: voucher photo (no habitat photo).



Site 112-1, Beaver Creek: habitat photo.



Site 112-1, Beaver Creek: voucher photo.



Site 113-1, Rock River: no Topeka shiners captured.



Site 115-1, Elk Creek: habitat photo.



Site 115-1, Elk Creek: voucher photo.



Site 119-1, Little Rock Creek: habitat photo.



Site 119-1, Little Rock Creek: voucher photo.



Site 120-1, Little Rock Creek: habitat photo.



Site 120-1, Little Rock Creek: habitat photo.



Site 123-1, Rock River: no Topeka shiners captured.



Site 127-3, Willow Creek: habitat photo.



Site 127-3, Willow Creek: voucher photo.



Site 135-1, Elk Creek: habitat photo.



Site 135-1, Elk Creek: voucher photo.

