APPENDICES

APPENDIX A: Road Stream Crossing Inventory Instructions and Data Form

Great Lakes Road Stream Crossing Inventory Instructions

5/6/2011

This protocol was developed, reviewed, and tested by the following organizations: U.S. Forest Service, U.S. Fish & Wildlife Service, Michigan DNR, Wisconsin DNR, Huron Pines, Conservation Resource Alliance, Michigan Technological University, and road commissions.

Funding for development and testing was provided by the U.S. Forest Service, U.S. Fish & Wildlife Service, and The Nature Conservancy.

Stream Crossing Data Sheet

Site ID: _____

General Information

Stream Name: _____ **Road Name:** _____

Name of Observer(s): _____ **Date:** _____

GPS Waypoint: _____ **GPS Lat/Long:** _____

County: _____ **Township:** _____ **Range:** _____ **Sec:** _____

Adjacent Landowner Information: _____ **Additional Comments:** _____

Crossing Information

Crossing Type: Culvert(s) no.: _____ Bridge Ford Dam Other: _____

Structure Shape: Round Square/Rectangle Open Bottom Square/Rectangle Pipe Arch Open Bottom Arch Ellipse

Inlet Type: Projecting Mitered Headwall Apron Wingwall 10-30° or 30-70° Trash Rack Other

Outlet Type: At Stream Grade Cascade over Riprap Freefall into Pool Freefall onto Riprap Outlet Apron Other

Structure Material: Metal Concrete Plastic Wood

Substrate in Structure: None Sand Gravel Rock Mixture

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed: _____ % Inlet Outlet In Pipe

Rusted Through? Yes No **Structure Interior:** Smooth Corrugated

Multiple Culverts/Spans

Number the culverts/spans left to right, facing downstream. Include #s in site sketch on back page

Culvert/ Span #	Width (ft)	Length (ft)	Height (ft)	Material

Structure Length (ft):[1] _____ **Structure Width (ft):**[1] _____ **Structure Height (ft):**[1] _____

Structure Water Depth (ft):[1] **inlet** _____ **outlet** _____ **Perch Height (ft):**[1] _____ or NA

Embedded Depth of Structure (ft):[1] **inlet** _____ **outlet** _____

Structure Water Velocity (ft/sec):[1] **inlet** _____ **outlet** _____

Structure Water Velocity Measured: At Surface or _____ ft Below Surface **Measured With:** Meter or Float Test

Stream Information

Stream Flow: None < ½ Bankfull < Bankfull = Bankfull > Bankfull

Scour Pool (if present) **Length:** _____ **Width:** _____ **Depth:** _____ **Upstream Pond (if present)** **Length:** _____ **Width:** _____

Riffle Information (measured in a riffle outside of zone of influence of crossing)

Water Depth (ft): _____ **Bankfull Width (ft):** _____ **Wetted Width (ft):** _____ **Water Velocity (ft/sec):** _____

Dominant Substrate: Cobble Gravel Sand Organics Clay Bedrock Silt **Measured With:** Meter or Float Test

Road Information

Type: Federal State County Town Tribal Private Other:

Road Surface: Paved Gravel Sand Native Surface **Condition:** Good Fair Poor

Road Width at Culvert (ft): _____ **Location of Low Point:** At Stream Other **Runoff Path:** Roadway Ditch

Embankment: **Upstream** **Fill Depth (ft):** _____ **Slope:** Vertical 1:1.5 1:2 >1:2

Downstream **Fill Depth (ft):** _____ **Slope:** Vertical 1:1.5 1:2 >1:2

Left Approach: **Length (ft):** _____ **Slope:** 0% 1-5% 6-10% >10% **Ditch Vegetation:** None Partial Heavy

Right Approach: **Length (ft):** _____ **Slope:** 0% 1-5% 6-10% >10% **Ditch Vegetation:** None Partial Heavy

[1] - Fill out for primary culvert (culvert #1). If multiple culverts are used, number each and use embedded table.

Form Date: February 28, 2011

Erosion Information

Use a new row for each distinct gully/erosion location. Note prominent streambank erosion within 50 feet of crossing.

Location of Erosion Ditch, approach, or streambank Left or right facing downstream	Erosion Dimensions (ft)			Eroded Material Reaching Stream?		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam.
	Length	Width	Depth			
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	
				Yes	No	

If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem? Y N

Extent of Erosion: Minor Moderate Severe Stabilized

Erosion Notes:

Photos – enter photo number in blank corresponding to location

❑ Site ID _____ ❑ Upstream Conditions _____ ❑ Downstream Conditions _____

❑ Inlet _____ ❑ Outlet _____ ❑ Road Approach – Left _____ ❑ Road Approach – Right _____

Summary Information

Would you consider this a priority site? Fish Passage Erosion Why?

Would you recommend a future visit to this site? Yes No **Why?**

Were any non-native invasive species observed at the site? Yes No **If yes, what species were observed?**

Site Sketch

Draw an overhead sketch of crossing. Be sure to mark North on the map and to indicate the direction of flow. Include major features documented on form, such as erosion sites, multiple culverts, scour pool, impounded water, etc.

Form Date: February 28, 2011

APPENDIX B: Road Stream Crossing Inventory

There 310 road stream crossings within the Waishkey River watershed. All 310 were observed and ranked with a subjective prioritization method. Of these, 29 received some kind of priority score. Additionally, 9 of these same sites have been monitored for four years by BMIC using the Great Lakes Road Stream Crossing Inventory methodology. The figure below depicts survey sites.

Table B.1. Crossings surveyed.

Methodology	Number of Sites
Other subjective method	
High priority	7 sites
Moderate priority	12 sites
Low priority	10 sites
unranked	281 sites
GLRSCI methods	9 sites

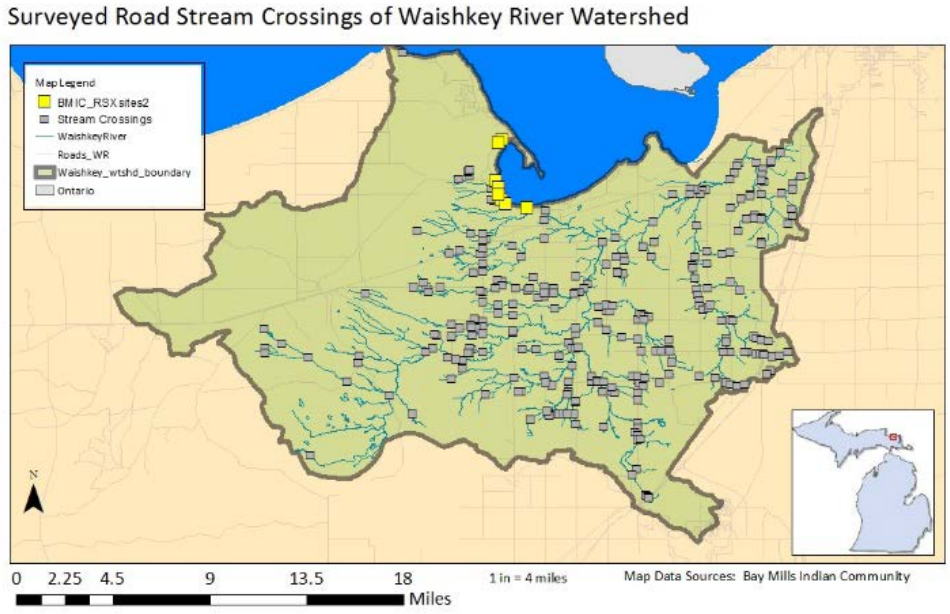


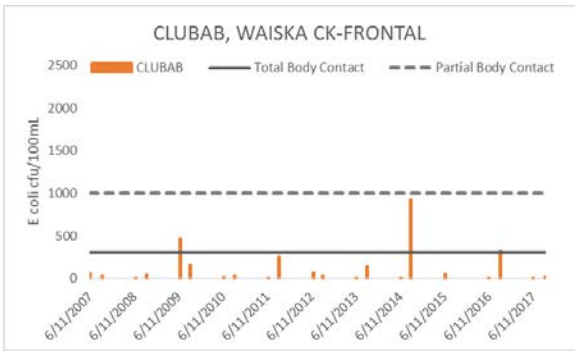
Figure B.1. All known road stream crossings in watershed.

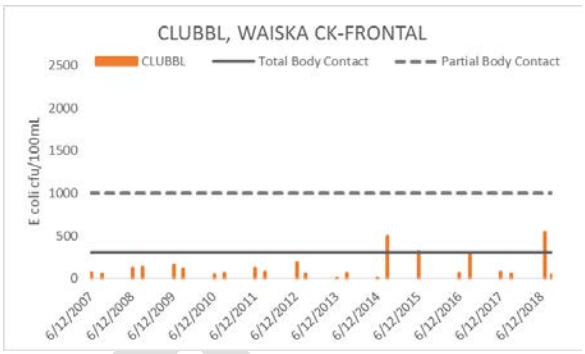
Work is steadily being done to survey all the road stream crossings using the Great Lakes Road Stream Crossing Inventory methodology. And implementation projects call for further work to be done. The Table B.2 below summarizes the most recent data on these crossings as of spring 2020.

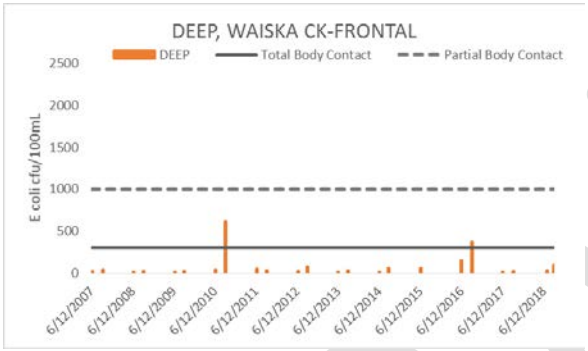
Table B.2. Road Stream Crossings recently surveyed with Great Lakes Road Stream Crossing Inventory.

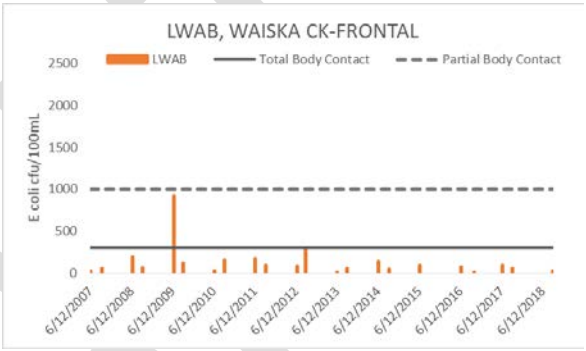
ID	Road	Subwatershed	Latitude	Longitude	Perch Culvert	Erosion Extent	Calculated Pollution	Priority Site (Erosion)	Priority Site (AOP)	Priority Site
RSC2	W 5 Mile Rd	East	46.4335500	-84.4295100	No	Moderate	S=3.9, P=4.4, N=8.9	No	No	NO
RSC3	W 5 Mile Rd	East	46.4334500	-84.4418500	yes	Minor	S=35.7, P=41.1, N=82.1	No	No	NO
RSC 12	White Rd	East	46.4257000	-84.4476400	No	Moderate	S= 47.6, P= 47.6, N= 95.2	Yes	Yes	YES
RSC 17/18	6 Mile Rd and Soo Line	East	46.419154	-84.426916		Moderate	Not surveyed	Yes	Yes	YES
RSC 29	6 Mile Rd, CCRC 1632	S of E	46.419,	-84.468	No	Moderate	Not surveyed	Yes	Yes	YES
RSC80	8 Mile Rd	East	46.3898000	-84.5003700	No	Moderate	S=6.7, P=7.7, N=15.4	Yes	No	YES
RSC 87	Hwy 221	Orrs Cr	46.398567	-84.572185		Moderate	Not surveyed	No	No	YES
RSC 99	6 Mile x 211	Hickler	46.411394	-84.571890		Minor	Not surveyed	No	No	YES
RSC 105	M28	Hickler	46.375,	-84.545			Not surveyed	No	No	YES
RSC113	Hwy 221	Hickler	46.371561	-84.572075	Yes	Moderate	S=111.6, P=128.3, N=256.6	Yes	Yes	YES
RSC 115	M28	Hickler	46.37524	-84.56621	Yes	Severe	S= 15.3, P= 15.3 N=30.6	Yes	Yes	YES
RSC 116	M221	Hickler	46.3767600	-84.5721900	No	Severe	S=13.6, P=13.6, N=27.2	Yes	No	YES
RSC119	S M-221	Hickler	46.3733000	-84.5720400	No	Minor	S=71.4, P=82.1, N=164.2			NO
RSC126	Goldade Rd.	Hickler	46.3735300	-84.6136600	No	Minor	S=0.4, P=0.5, N=1.0	No	AOP	undetrm
RSC 197	Lockhart Rd	South	46.3274100	-84.5564300	No	Severe	Not surveyed	Yes	No	YES
RSC 234	Goldade Rd	West	46.3587700	-84.6346700	No	Moderate	S= 3.1, P=3.1, N=6.3	Yes	yes	YES
RSC 252	Waishkey River Truck Trail	West	46.344354	-84.696781		Minor	Not surveyed	Yes	AOP	YES
RSC 253	Waishkey River Truck Trail	West	46.340862	-84.697197			Not surveyed	No	AOP	YES
RSC 254	snowmobile trail bridge/ Spile Dam Rd	West	46.3172300	-84.6607700		Moderate	S= 1.7, P= 1.7, N=5.0	Yes	No	YES
RSC 255	Waishkey River Truck Trail/ Forest Service Footpath. Spiles Dam	West	46.3258900	-84.6764200		Minor	S=0.3, P=0.3, N=0.6	No	AOP	YES
RSC 256	USFS RD 3352	West	46.332385	-84.705028		Minor	Not surveyed	No	AOP	YES
RSC 262	in Delirium Wilderness	West	46.297943	-84.729343		Minor	Not surveyed	No	AOP	YES
RSC 282 /283	Lakeshore Dr	Waiska	46.42100	-84.60500	No		S=0.8,P= 0.8, N=1.5	Yes	Yes	YES

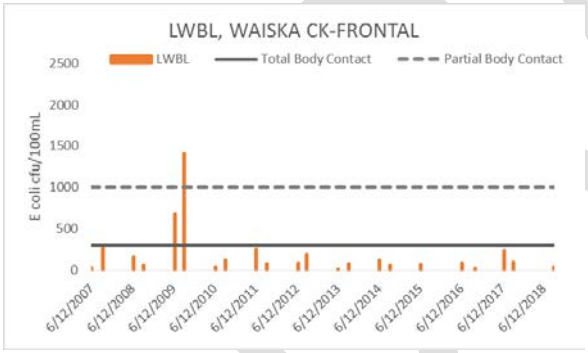
APPENDIX C: BMIC E coli and Nutrient Monitoring Results *(graphed with Water Quality Criteria)*

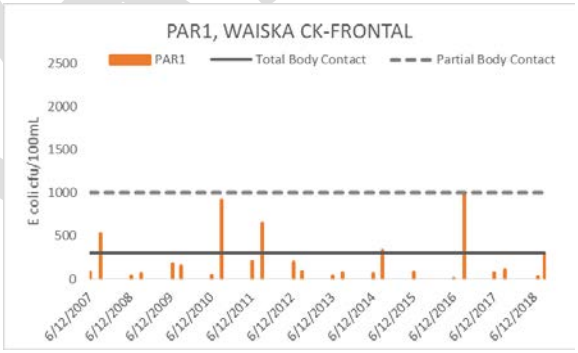


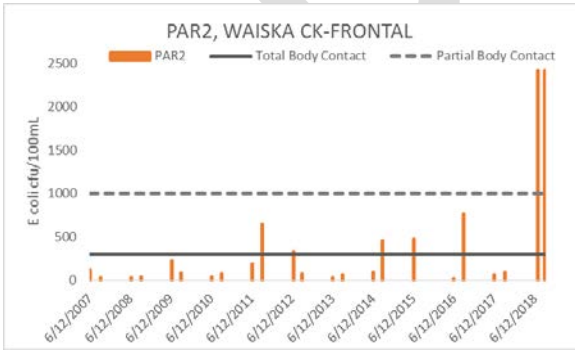


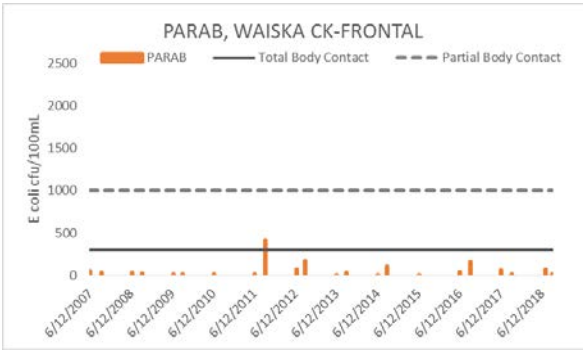


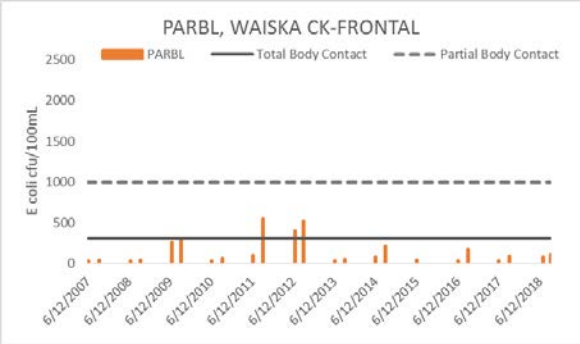


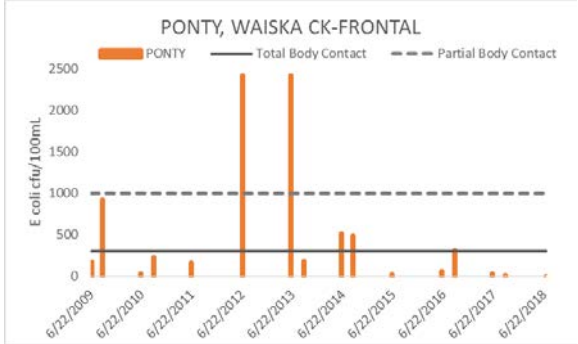


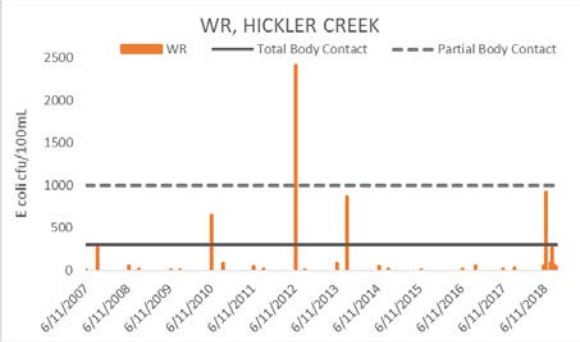







PARBL, WAISKA CK-FRONTAL
PARBL
Total Body Contact
Partial Body Contact
E coli cfu/100mL
2500
2000
1500
1000
500
0
6/12/2007
6/12/2008
6/12/2009
6/12/2010
6/12/2011
6/12/2012
6/12/2013
6/12/2014
6/12/2015
6/12/2016
6/12/2017
6/12/2018


PONTY, WAISKA CK-FRONTAL
PONTY
Total Body Contact
Partial Body Contact
E coli cfu/100mL
2500
2000
1500
1000
500
0
6/22/2009
6/22/2010
6/22/2011
6/22/2012
6/22/2013
6/22/2014
6/22/2015
6/22/2016
6/22/2017
6/22/2018


WR, HICKLER CREEK
WR
Total Body Contact
Partial Body Contact
E coli cfu/100mL
2500
2000
1500
1000
500
0
6/11/2007
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6/11/2009
6/11/2010
6/11/2011
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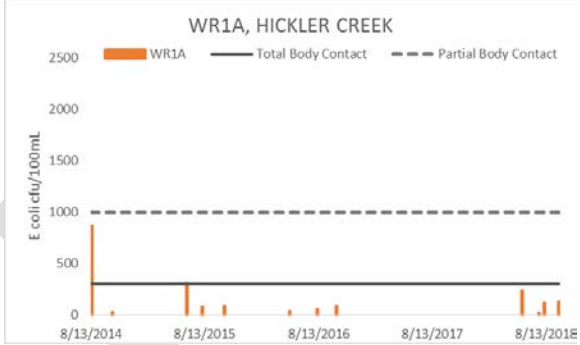
6/11/2016
6/11/2017
6/11/2018


WR1A, HICKLER CREEK
WR1A
Total Body Contact
Partial Body Contact
E coli cfu/100mL
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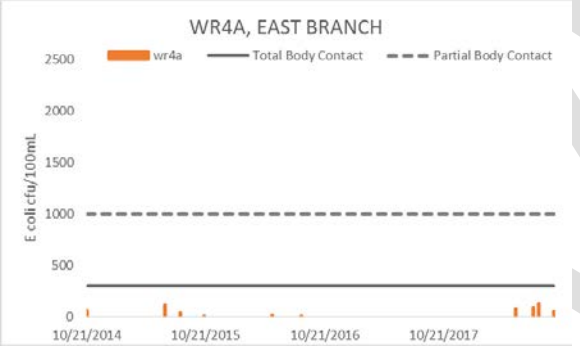
2000
1500
1000
500
0
8/13/2014
8/13/2015
8/13/2016
8/13/2017
8/13/2018


WR4A, EAST BRANCH
wr4a
Total Body Contact
Partial Body Contact
E coli cfu/100mL
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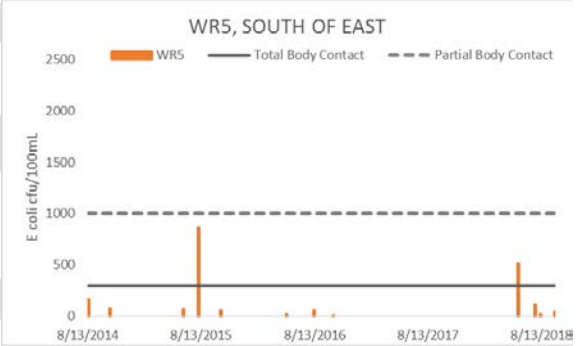
2000
1500
1000
500
0
10/21/2014
10/21/2015
10/21/2016
10/21/2017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WR5
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Partial Body Contact
E coli cfu/100mL
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2000
1500
1000
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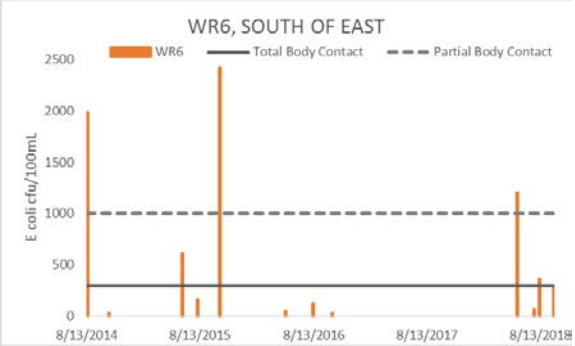
8/13/2015
8/13/2016
8/13/2017
8/13/2018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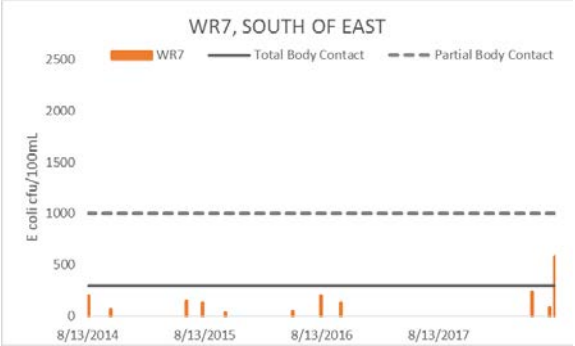
8/13/2018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WR7
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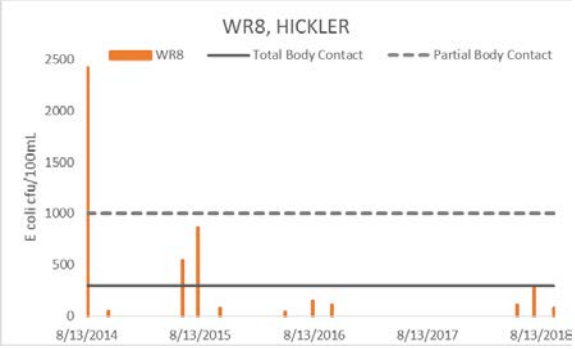
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WR8
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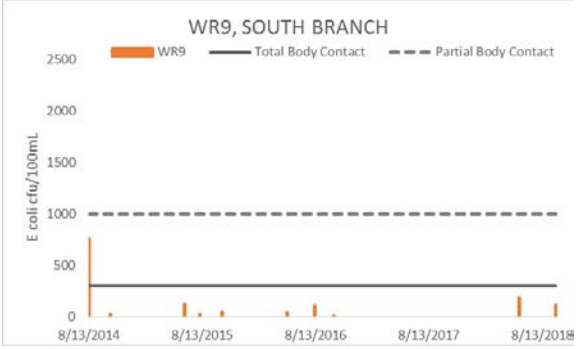
8/13/2018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WR9
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1500
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8/13/2015
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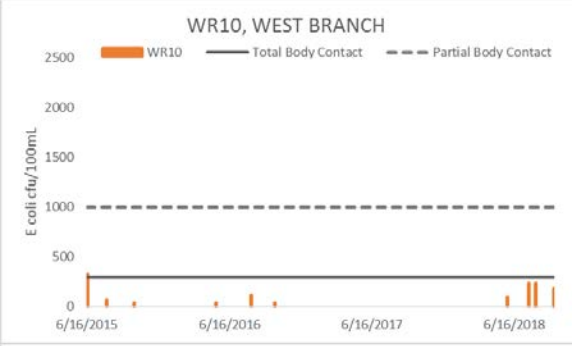
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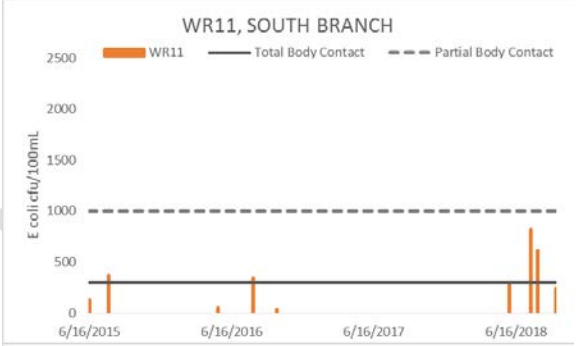
6/16/2018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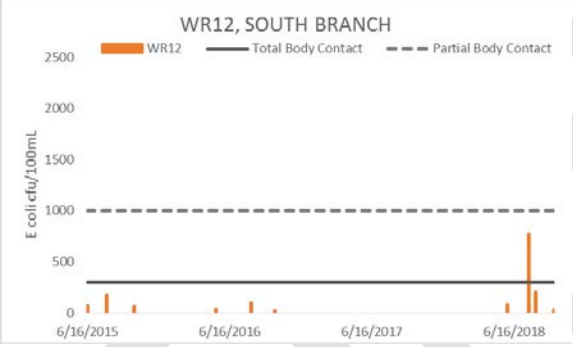
6/16/2018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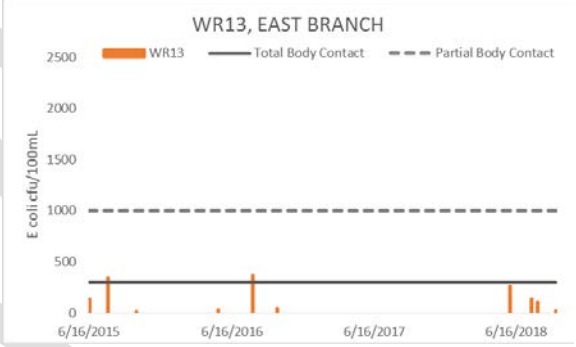
6/16/2018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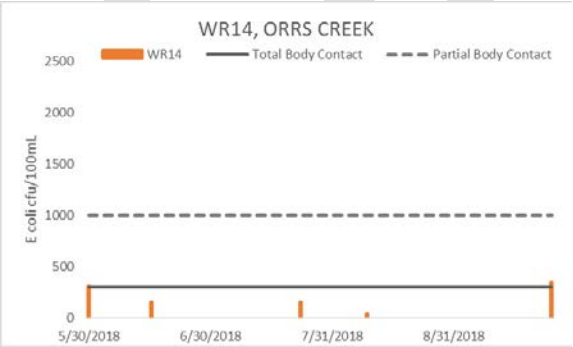
6/16/2016
6/16/2017
6/16/2018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WR14
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Partial Body Contact
E coli cfu/100mL
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2000
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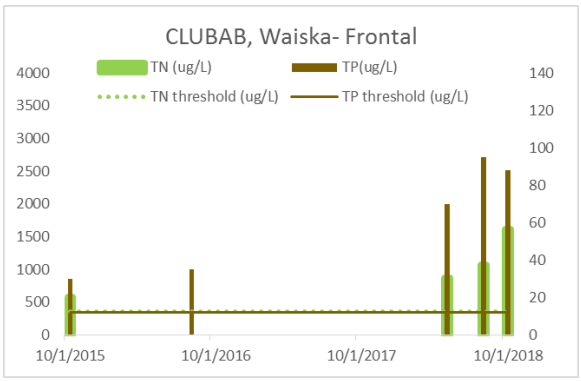
1000
500
0
5/30/2018
6/30/2018
7/31/2018
8/31/2018


CLUBAB, Waiska- Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
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3500
3000
2500
2000
1500
1000
500
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80
60
40
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0
10/1/2015
10/1/2016
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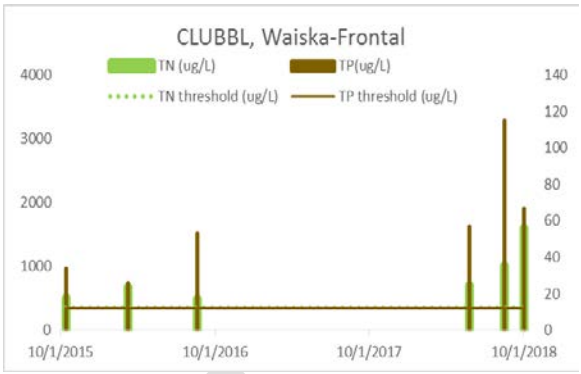
10/1/2018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TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
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3000
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10/1/2016
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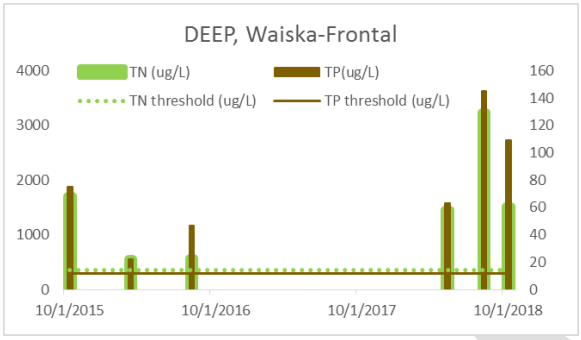
10/1/2018


DEEP, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
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3000
2000
1000
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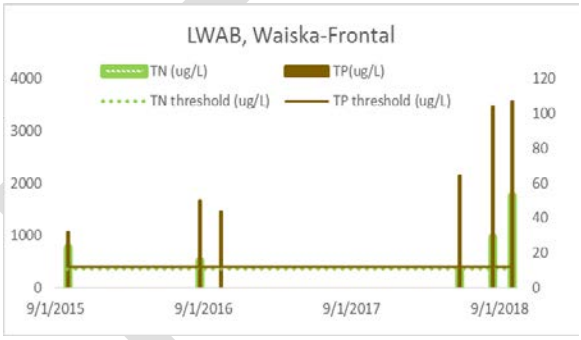
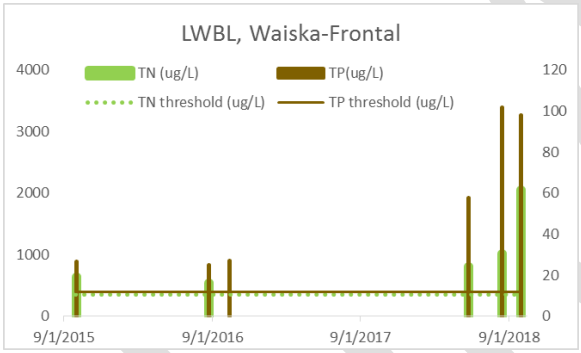
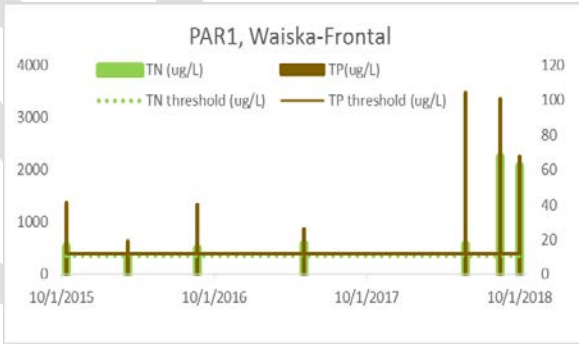
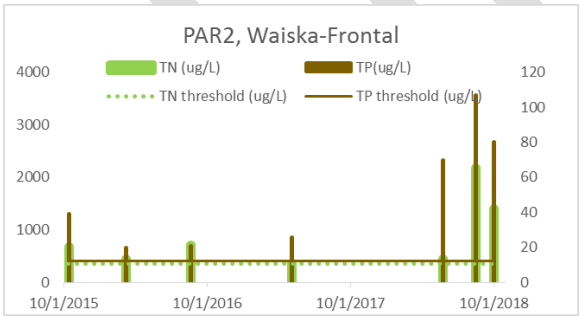
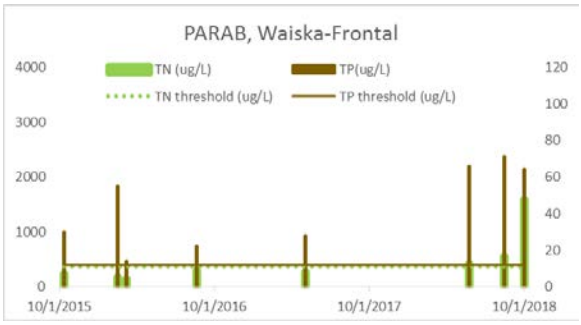
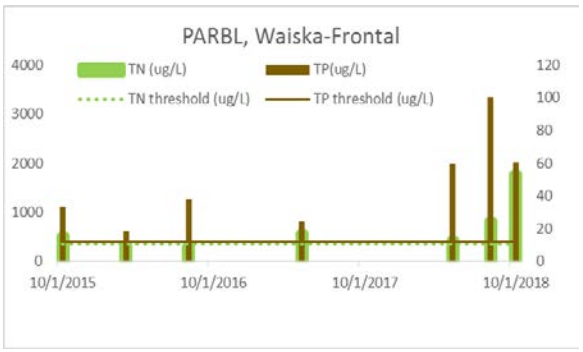

LWAB, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
9/1/2015
9/1/2016
9/1/2017
9/1/2018

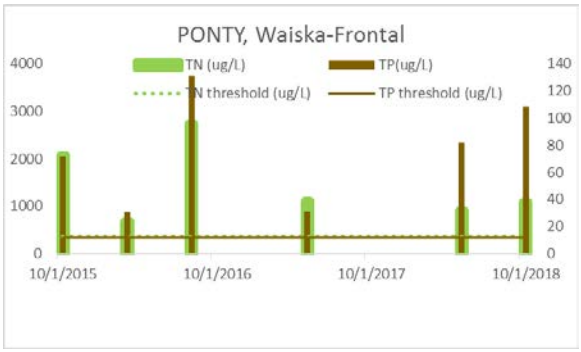

LWBL, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
9/1/2015
9/1/2016
9/1/2017
9/1/2018

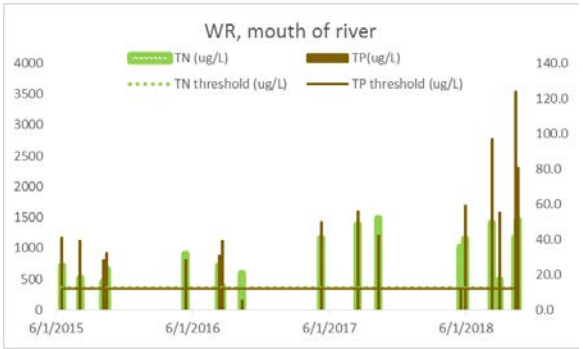

PAR1, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
10/1/2015
10/1/2016
10/1/2017
10/1/2018

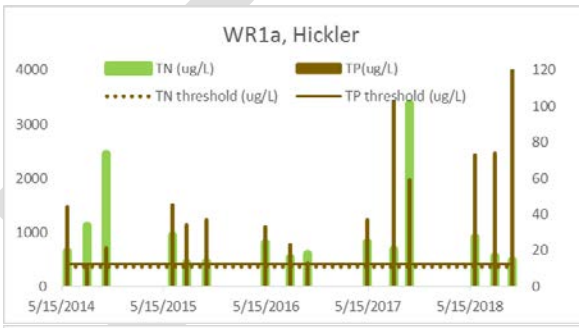

PAR2, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
10/1/2015
10/1/2016
10/1/2017
10/1/2018

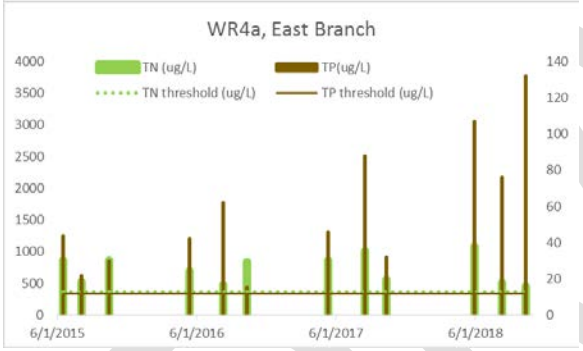

PARAB, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
10/1/2015
10/1/2016
10/1/2017
10/1/2018

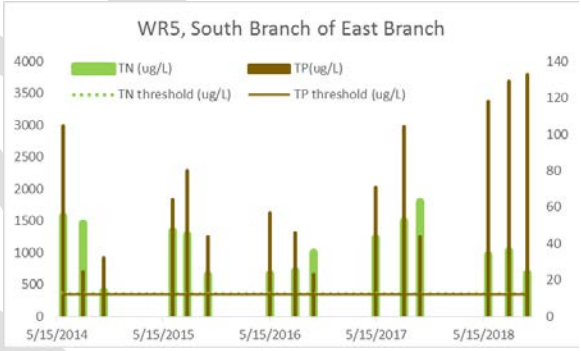

PARBL, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
10/1/2015
10/1/2016
10/1/2017
10/1/2018

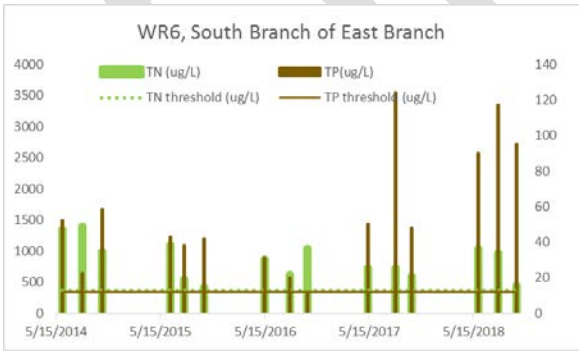

PONTY, Waiska-Frontal
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
140
120
100
80
60
40
20
0
10/1/2015
10/1/2016
10/1/2017
10/1/2018

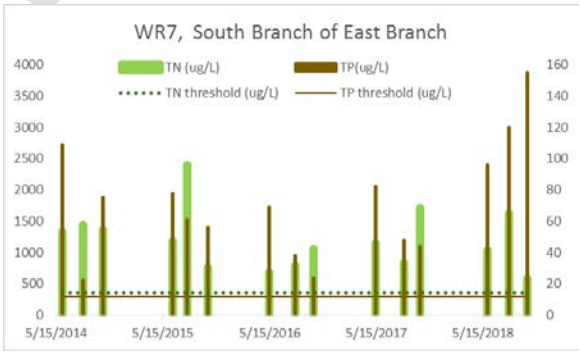

WR, mouth of river
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
0.0
6/1/2015
6/1/2016
6/1/2017
6/1/2018

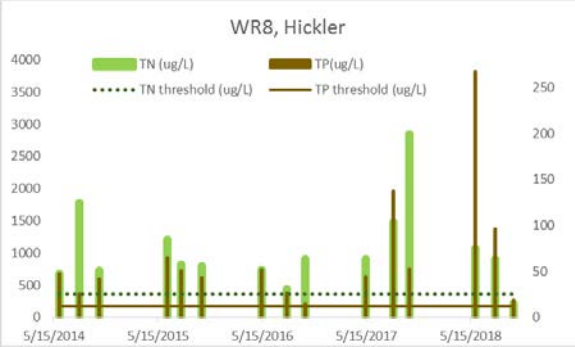

WR1a, Hickler
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3000
2000
1000
0
120
100
80
60
40
20
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018

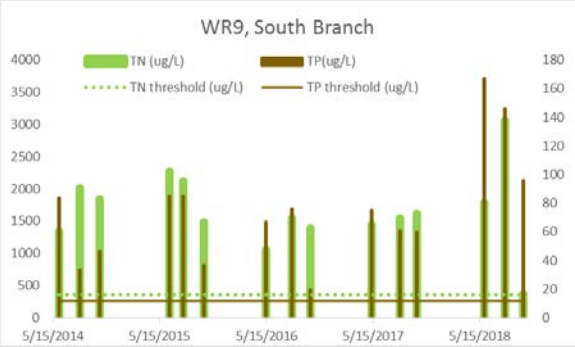

WR4a, East Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
140
120
100
80
60
40
20
0
6/1/2015
6/1/2016
6/1/2017
6/1/2018

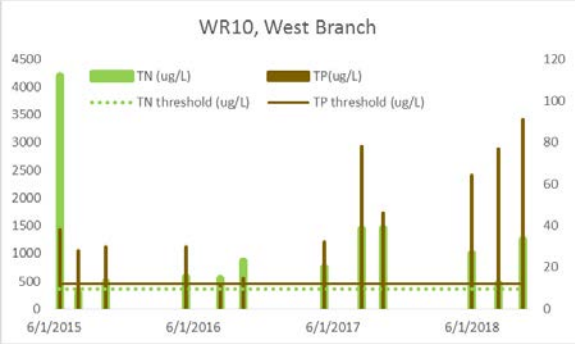

WR5, South Branch of East Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
140
120
100
80
60
40
20
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018

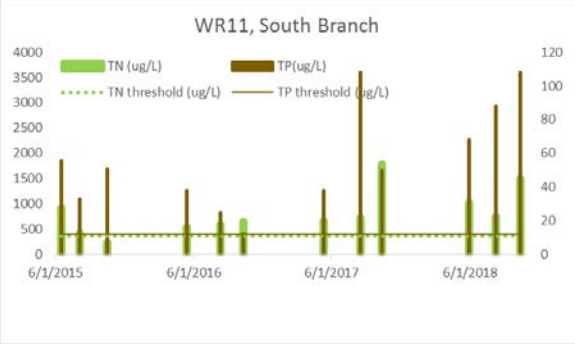

WR6, South Branch of East Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
140
120
100
80
60
40
20
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018

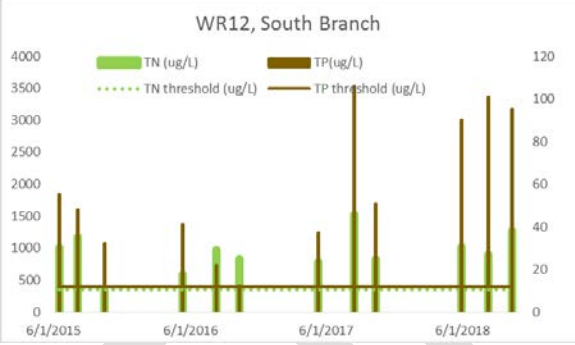

WR7, South Branch of East Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
160
140
120
100
80
60
40
20
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018

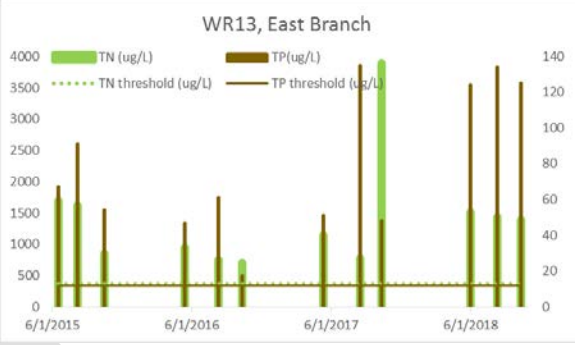

WR8, Hickler
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
250
200
150
100
50
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018

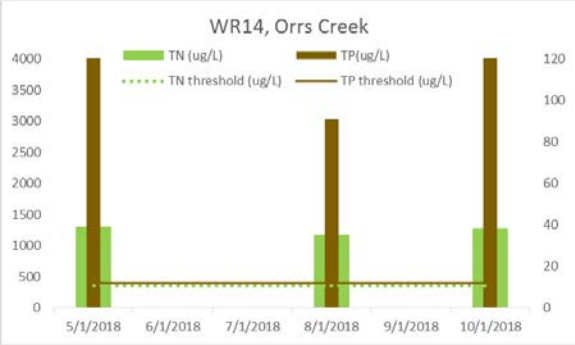

WR9, South Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
180
160
140
120
100
80
60
40
20
0
5/15/2014
5/15/2015
5/15/2016
5/15/2017
5/15/2018


WR10, West Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
120
100
80
60
40
20
0
6/1/2015
6/1/2016
6/1/2017
6/1/2018


WR11, South Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
120
100
80
60
40
20
0
6/1/2015
6/1/2016
6/1/2017
6/1/2018


WR12, South Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
120
100
80
60
40
20
0
6/1/2015
6/1/2016
6/1/2017
6/1/2018


WR13, East Branch
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
140
120
100
80
60
40
20
0
6/1/2015
6/1/2016
6/1/2017
6/1/2018


WR14, Orrs Creek
TN (ug/L)
TP(ug/L)
TN threshold (ug/L)
TP threshold (ug/L)
4000
3500
3000
2500
2000
1500
1000
500
0
120
100
80
60
40
20
0
5/1/2018
6/1/2018
7/1/2018
8/1/2018
9/1/2018
10/1/2018

APPENDIX D: Selected Monitoring Results and Recommendations from the Total Maximum Daily Load and Implementation Plan for E. coli

(USEPA 2012)

Table A1: St. Marys River Monitoring Project for TMDL Development
E. coli Monitoring Results Summary
All results reported as CFU/100 mL

< 1.0	Results below the reporting limit
300.0	Light grey shaded cell shows exceedance of total body contact daily maximum WQS (300 CFU/100 mL)
*1,000.0 **	Light grey shaded cell with asterisk shows exceedance of partial body contact daily maximum WQS (1,000 CFU/100 mL)
130.0	Dark grey shaded cell shows exceedance of total body contact 30-day geomean WQS (130 cfu/100 mL)
75.0	Underlined values indicate some or all flow at site observed to be in the upstream direction.

SAMPLE LOCATION	NAME	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14	Week 15	Week 16	Week 17	Week 18
Wa1	Wa1A	104.6	118.7	71.2	248.1	50.4	185.0	93.2	68.9	68.3	142.1	69.7	34.1	49.6	150.0	344.8	118.7	209.8	25.6
	Wa1B	101.7	118.7	66.3	135.4	53.8	105.0	102.5	52.9	48.7	142.1	52.1	23.3	65.7	214.2	488.4	79.8	190.4	38.3
	Wa1C	248.1	167.0	52.9	193.5	73.3	186.0	122.3	77.6	133.4	127.4	43.5	33.6	74.9	101.4	461.1	86.0	178.2	35.0
	Daily Geomean	*138.2*	*133.0*	*63.0*	*186.6*	*58.4*	*153.4*	*105.3*	*65.6*	*76.3*	*137.0*	*54.0*	*29.9*	*62.5*	*148.3*	*426.6*	*93.4*	*192.4*	*32.5*
	30-Day Geomean	--	--	--	--	**104.7**	**107.0**	**102.1**	**102.9**	**86.1**	**102.1**	**82.9**	**64.4**	**63.8**	**72.8**	**91.4**	**102.0**	**148.0**	**129.8**
Wa2	Wa2A	461.1	124.6	190.4	275.5	90.6	36.9	53.8	43.2	88.4	143.9	88.6	90.8	101.7	410.6	461.1	151.5	133.3	48.7
	Wa2B	613.1	214.3	165.8	290.9	111.9	77.6	48.8	51.2	78.0	137.6	70.6	151.5	86.2	307.6	517.2	148.3	123.6	48.0
	Wa2C	410.6	135.4	137.4	435.2	57.3	83.6	76.7	55.4	64.4	165.8	111.9	85.5	186.0	275.5	579.4	142.1	95.9	39.3
	Daily Geomean	*487.8*	*153.5*	*163.0*	*326.7*	*83.5*	*62.1*	*58.6*	*49.7*	*76.3*	*148.6*	*88.8*	*105.5*	*117.7*	*326.5*	*517.0*	*147.3*	*116.5*	*45.1*
	30-Day Geomean	--	--	--	--	**201.6**	**133.5**	**110.1**	**86.8**	**64.9**	**72.8**	**78.2**	**88.0**	**104.6**	**139.9**	**179.5**	**194.6**	**202.5**	**167.2**
Wa3	Wa3A	88.6	61.3	131.4	235.9	90.6	104.6	66.3	101.4	222.4	206.4	133.4	142.1	201.4	435.2	920.8	104.6	686.7	98.8
	Wa3B	53.8	67.0	114.5	248.9	85.5	135.4	103.9	125.9	155.3	108.1	131.4	110.6	105.4	344.8	1,046.2	86.0	238.2	78.0
	Wa3C	44.8	90.8	129.6	307.6	73.8	129.6	63.7	178.9	137.6	74.4	127.4	118.7	118.7	307.6	816.4	727.0	275.5	53.7
	Daily Geomean	*59.8*	*71.9*	*124.9*	*262.4*	*83.0*	*122.4*	*76.0*	*131.7*	*168.1*	*118.4*	*130.7*	*123.1*	*136.1*	*358.7*	*923.1*	*187.0*	*355.9*	*74.5*
	30-Day Geomean	--	--	--	--	**103.2**	**119.1**	**120.4**	**121.7**	**111.3**	**119.5**	**121.1**	**133.4**	**134.2**	**156.2**	**235.5**	**253.0**	**312.9**	**277.4**

Table 20: Most significant probable *E. coli* sources by watershed.

Watershed Name	HUC-12 subwatershed	Livestock	Urban wildlife and/or pets	OSDS	Sanitary Sewer Leaks	Illicit Connections	NPDES Permitted Waste Water Systems
South Branch of East Br. of Waishkey River	40202030201	✓					
South Branch of Waishkey River	40202030202	✓					✓
West Branch of Waishkey River	40202030203	✓					
East Branch of Waishkey River	40202030204	✓					
Orrs Creek	40202030205	✓					
Hickler Creek - Waishkey River	40202030206	✓					

Note: Illicit connections, failing OSDS, and pet and wildlife waste are potential sources in all watersheds.

Watershed Name & HUC-12 No.	Associated Sample ID(s)	Priority (Based on WQS Exceedance Rank)	Likely Sources Based on Source Assessment	Implementation Actions	Implementation in Progress
South Branch of East Br. of Waishkey River 40202030201	Wa3	19	Livestock	Grazing Practices Feedlot BMPs Wetland Restoration	Superior Environmental Health Code Conservation programs
			On-site systems	Regulatory Controls	
			Illicit Connections	Inspections	
South Branch of Waishkey River 40202030202	Wa2	18	Livestock	Grazing Practices Feedlot BMPs Wetland Restoration	NPDES permitted facilities Permitted biosolids spreading Superior Environmental Health Code Conservation programs
			On-site systems	Regulatory Controls	
			Illicit Connections	Inspections	
			Permitted Waste Water Facilities	Facility Operations & Management	
West Branch of Waishkey River 40202030203	Wa2	18	Livestock	Grazing Practices Feedlot BMPs Wetland Restoration	Permitted biosolids spreading Superior Environmental Health Code Conservation programs
			On-site systems	Regulatory Controls	
			Illicit Connections	Inspections	
East Branch of Waishkey River 40202030204	Wa3	19	Livestock	Grazing Practices Feedlot BMPs Wetland Restoration	Superior Environmental Health Code Conservation programs
			On-site systems	Regulatory Controls	
			Illicit Connections	Inspections	

APPENDIX E: Watershed Project Implementation Details

Refer to Chapter 9 of the Waishkey River Watershed Management Plan

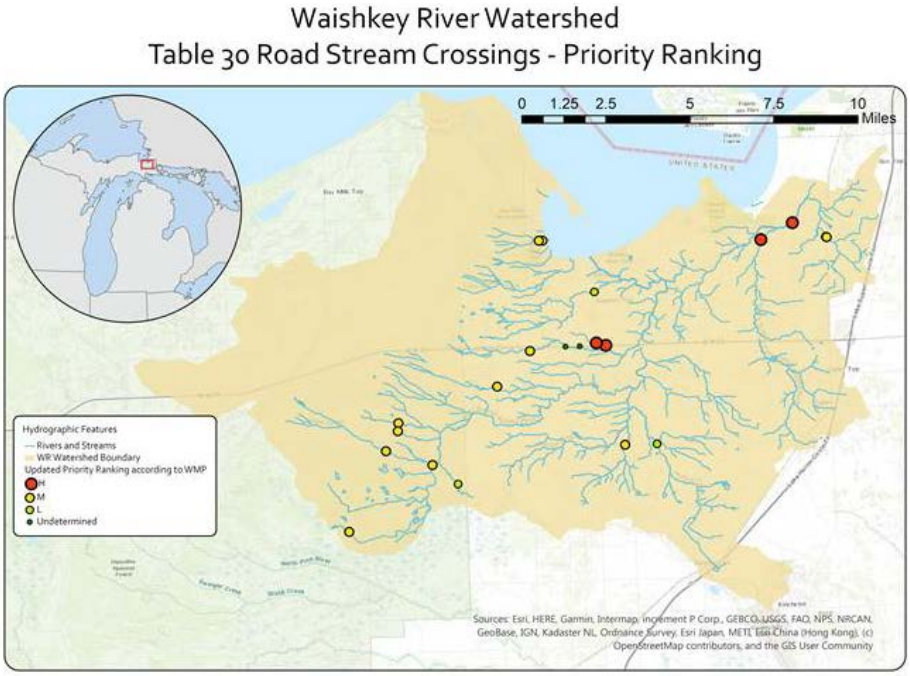


Figure E.1 Map of high, medium, and low priority road-stream-crossing projects as identified by the Table 30 in the watershed plan. Numerous sites are along Highway M28.

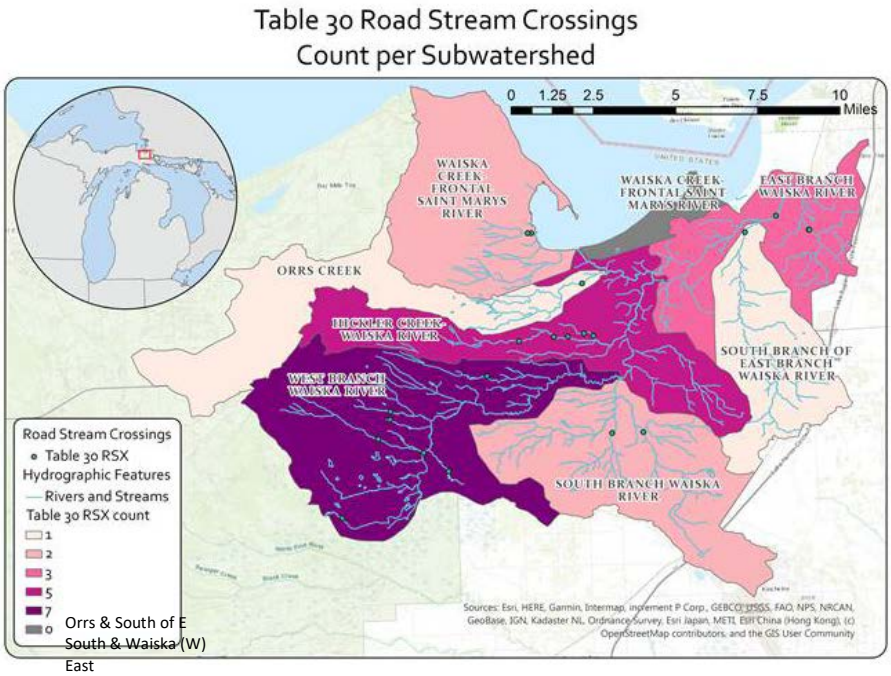


Figure E.2 Map of priority road-stream-crossing projects shown by subwatershed. Many sites identified as projects in the plan are within the West Branch and Hickler Creek subwatersheds.

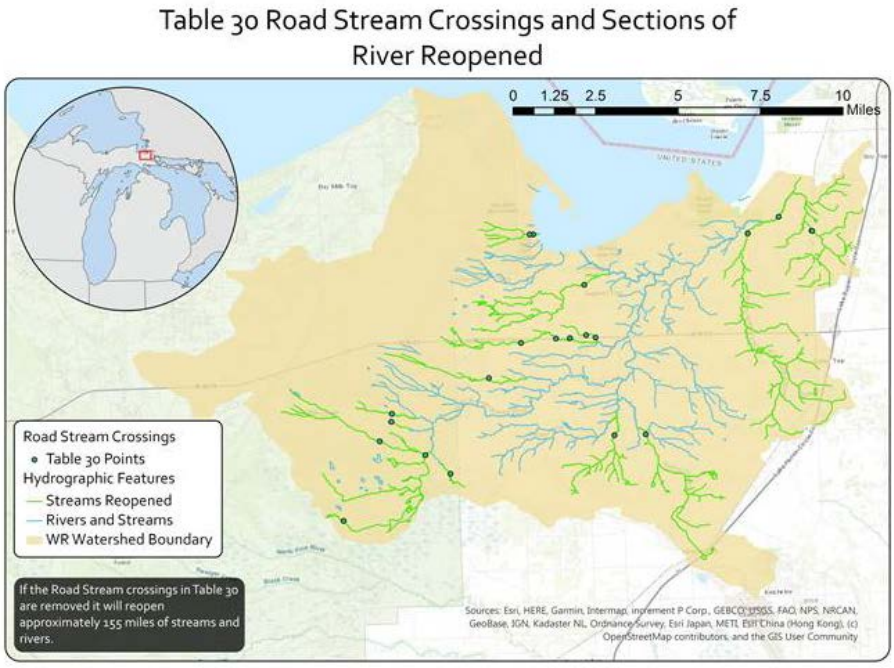


Figure E.3. Map identified road-stream-crossing projects in the plan and the miles of upstream river that would be improved if the projects are implemented. These identified sites may be experiencing fish passage issues, significant erosion, or another issue which degrade watershed function.

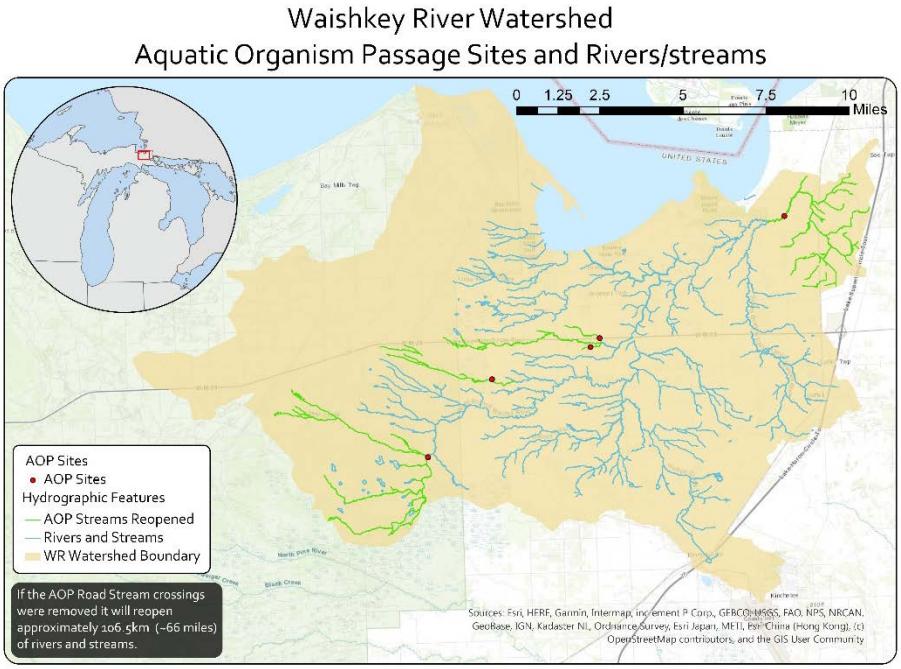
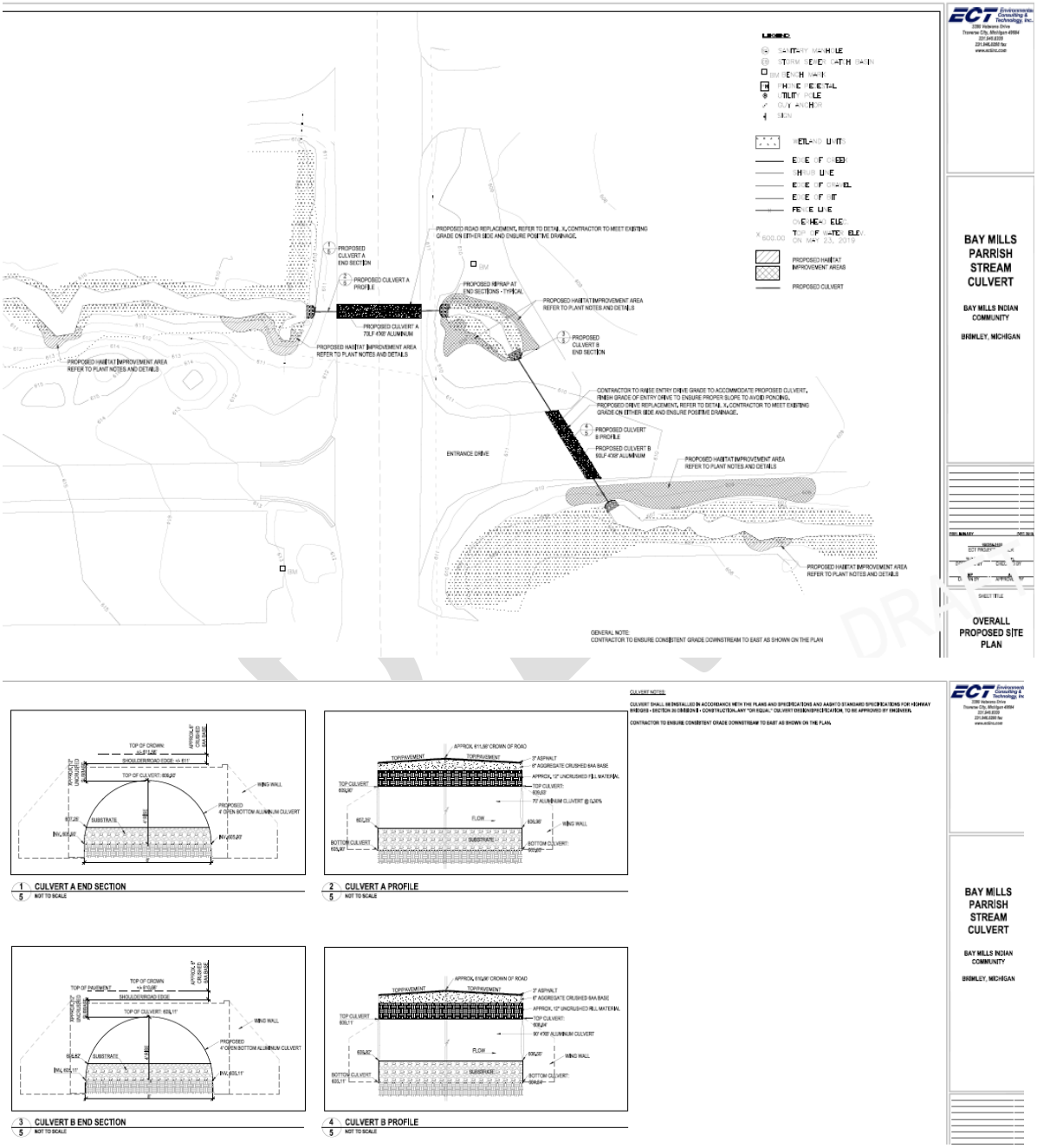


Figure E.4. Map identified road-stream-crossing/ fish passage projects in the plan and the miles of upstream river that would be improved if the projects are implemented. These crossings have a perched culvert or other barrier which inhibits fish and aquatic organisms from moving freely upstream. Approximately 106.5km or 66 miles would be reopened to fish if these projects are implemented.

RSX 282/283 Lakeshore Drive/ Bay Mills Resort and Casino: engineer's conceptual design. $250,000

This design will increase the size of culvert crossing Lakeshore Drive and daylight the stream by completely removing the driveway culvert.



6 Mile Road (WR7 crossing): engineer's conceptual design. $250,000

This design will remove the multi-culvert structure and replace it with a single structure.

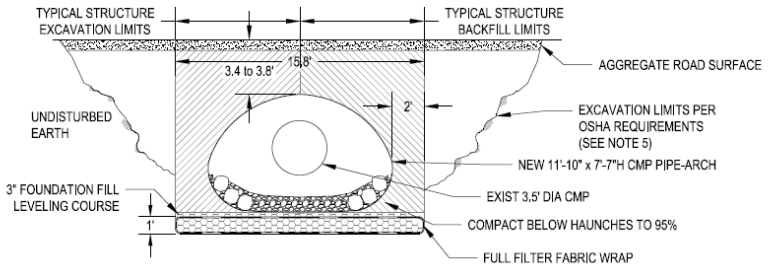
RSX 252 Bons Creek/ Waishkey River Truck Trail: engineer's conceptual design. $118,429

This design will increase the size of culvert and simulate Bons Creek characteristics inside the culvert ("stream simulation").

1. ROAD PROFILE IS SAME FOR EXISTING AND NEW CULVERT. MAINTAIN APPROXIMATE 1.6% LONGITUDINAL SLOPE.

ROAD PROFILE C3
SCALE: 1":40'

NOTES:
1. VERTICAL STRUCTURAL EXCAVATION SLOPES WERE USED TO ESTABLISH THE QUANTITY FOR PAYMENT. ACTUAL SLOPES MAY BE FLATTER, BUT NO ADJUSTMENT IN CONTRACT PRICE WILL BE MADE.
2. STRUCTURAL FOUNDATION FILL TO BE OPEN GRADED, CRUSHED DURABLE AGGREGATE CONFORMING TO ASTM D448 SIZE NO 4.
3. FILTER FABRIC TO BE TYPE I-C.
4. EXCAVATE DOWN PAST ANY SOFT CLAY LENSES. PLACE STRUCTURAL FOUNDATION FILL ON SAND LENSE OR STIFF CLAY LENSE.
5. BENCH INTO EXISTING SLOPES AS REQUIRED TO PROVIDE ADEQUATE WIDTH FOR COMPACTION EQUIPMENT. BLEND NEW MATERIAL WITH EXISTING MATERIAL. THE COST FOR BENCHING IS INCIDENTAL TO ITEM 20801.
6. CULVERT COVER VARIES FROM 3.4' AT UPSTREAM EDGE OF ROAD TO 3.8' AT CENTER TO 3.6' AT DOWNSTREAM EDGE OF ROAD.
7. SEE SHEET 8 FOR STREAM BED PLAN.
8. STEEL CMP PIPE ARCH TO BE GALVANIZED AND POLYMER COATED. SEE SPECIFICATION 603 FOR ADDITIONAL CULVERT MATERIAL AND DESIGN REQUIREMENTS.



CULV CROSS SECTION A3
SCALE: 1":5'

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE R-9 EASTERN REGION | Forest: HIAWATHA NATIONAL FOREST, ST IGNACE/SAULT STE MARIE RANGER DISTRICT | Design: PCL, Drawn: PCL, Checked:, Date: MAY 2017 | Sheet Title: ROAD PROFILE AND CULV SECTION, BONS CREEK CULVERT REPLACEMENT | Sub Sheet: | Project No: | Sheet 5 OF 12

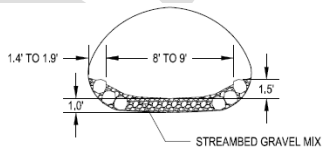
NOTES:
ELEVATIONS SHOWN IN THE DRAWINGS ARE THE TOP OF RECONSTRUCTED STREAM BED. REFER TO FSSS 705 ROCK. ALL STREAMBED MATERIAL WILL BE PLACED AT THE GRADE AND ELEVATIONS LISTED ON THE PLANS. ALL FORCING FEATURE MATERIALS PROTRUDE ABOVE THE STREAMBED SURFACE.

FORCING FEATURES ARE COMPRISED OF CLASS 1 AND 2 CHANNEL ROCK. USE BASE OF 5-7 CLASS 2 ROCKS. USE ADDITIONAL CLASS 1 ROCKS ON TOP OF BASE TO VARY HEIGHT OF PROTRUSION FROM ZERO NEAR MIDDLE OF STREAM TO 1.5 FEET AT BANK. TIE FORCING FEATURES INTO BANKS. ALL ROCKS WILL BE ARRANGED IN TIGHT CONTACT WITH EACH OTHER.

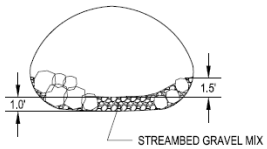
ALL CHANNEL ROCK WILL BE PLACED WITH THE LONG AXIS PARALLEL WITH THE LONGITUDINAL DIRECTION OF THE STREAM.

CONSTRUCT BANKS OUT OF CR CLASS 0 AND 1 ROCK, TIGHTLY KEYED TOGETHER BY HAND. LEAVE BANK ROUGH WITH LARGER ROCK PROTRUDING. FILL VOIDS WITH GRAVEL AND FINER MATERIAL.

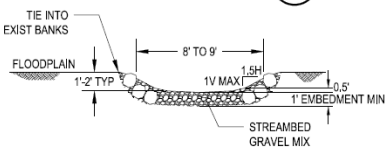
GRAVEL STREAMBED MIX COMPRISED OF GRADING DESIGNATION 'A' IN SPECIFICATION TABLE 703-7.



STREAMBED IN CULV D5
SCALE: 1":5'



FORCING FEATURE B5
SCALE: 1":5'



TYPICAL STREAMBED A5
SCALE: 1":5'

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE R-9 EASTERN REGION | Forest: HIAWATHA NATIONAL FOREST, ST IGNACE/SAULT STE MARIE RANGER DISTRICT | Design: PCL, Drawn: PCL, Checked:, Date: MAY 2017 | Sheet Title: STREAM NOTES AND DETAILS, BONS CREEK CULVERT REPLACEMENT | Sub Sheet: | Project No: | Sheet 9 OF

RSC 253. South Spile Dam. engineer's conceptual design. $250,000
This design will increase the size of culvert crossing ……

Currently with Enterprise TEAMS for design. Design not completed yet.

RSC 262 is in the Delirium Wilderness.

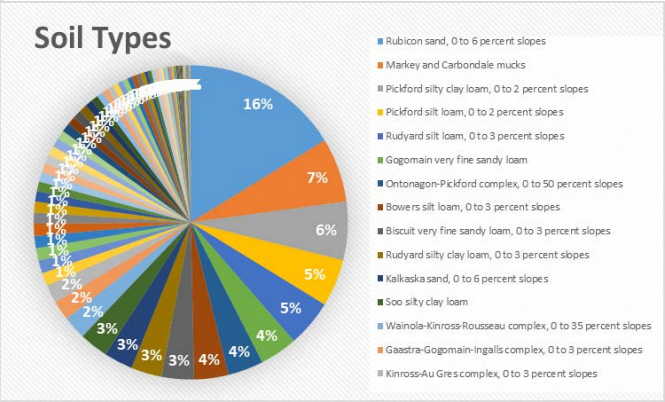
The road it is on has been decommissioned. A crew of 2 technicians for 1-2 days to pull it out.

APPENDIX F: Waishkey Watershed Soil Descriptions

Information is derived from the USDA Web Soil Survey
https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

10B—Ontonagon silt loam, 2 to 6 percent slopes
10D—Negwegon silt loam, 6 to 15 percent slopes
10F—Ontonagon silt loam, 25 to 50 percent slopes
11A—Rudyard silty clay loam, 0 to 3 percent slopes
12—Pickford silty clay loam, 0 to 2 percent slopes
13B—Alcona loamy very fine sand, 0 to 6 percent slopes
13D—Alcona loamy very fine sand, 6 to 15 percent slopes
13F—Alcona loamy very fine sand, 25 to 50 percent slopes
14A—Gaastra silt loam, 0 to 3 percent slopes
15B—Rousseau fine sand, dark subsoil, 0 to 6 percent slopes
15D—Rousseau fine sand, dark subsoil, 6 to 15 percent slopes
15E—Rousseau fine sand, dark subsoil, 15 to 35 percent slopes
15F—Rousseau fine sand, dark subsoil, 35 to 60 percent slopes
17D—Deer Park fine sand, 0 to 15 percent slopes
17F—Deer Park fine sand, 25 to 50 percent slopes
18B—Rubicon sand, 0 to 6 percent slopes
18D—Rubicon sand, 6 to 15 percent slopes
18E—Rubicon sand, 15 to 35 percent slopes
19B—Kalkaska sand, 0 to 6 percent slopes
19D—Kalkaska sand, 6 to 15 percent slopes
19E—Kalkaska sand, 15 to 35 percent slopes
19F—Kalkaska sand, 35 to 70 percent slopes
20A—Croswell sand, 0 to 3 percent slopes
21A—Au Gres sand, 0 to 3 percent slopes
22—Kinross muck, 0 to 2 percent slopes
25B—Guardlake loam, 0 to 6 percent slopes
25D—Guardlake loam, 6 to 15 percent slopes
27B—Emmet sandy loam, 1 to 6 percent slopes
28B—Longrie sandy loam, 1 to 6 percent slopes
29A—Solona fine sandy loam, 0 to 3 percent slopes
32A—Allendale loamy fine sand, 0 to 3 percent slopes
33—Pits, sand and gravel
34—Entisols, flooded
35—Histosols and Aquents, ponded
36—Markey and Carbondale mucks
37—Dawson and Loxley peats
38F—Deer Park-Kinross complex, 0 to 50 percent slopes
39D—Au Gres-Dawson-Rubicon complex, 0 to 15 percent slopes
40A—Rudyard-Allendale complex, 0 to 3 percent slopes
41D—Summerville-Rock outcrop complex, 1 to 15 percent slopes
41F—Summerville-Rock outcrop complex, 15 to 45 percent slopes
42D—Emmet-Kalkaska complex, 1 to 15 percent slopes
44B—Posen stony fine sandy loam, 1 to 6 percent slopes
44D—Posen stony fine sandy loam, 6 to 15 percent slopes
44E—Posen stony fine sandy loam, 15 to 35 percent slopes
46B—Pence sandy loam, 0 to 6 percent slopes
46D—Pence sandy loam, 6 to 15 percent slopes
46E—Pence sandy loam, 15 to 35 percent slopes
48E—Wainola-Kinross-Rousseau complex, 0 to 35 percent slopes
49A—Wainola fine sand, 0 to 3 percent slopes
50—Deford and Leafriver soils, 0 to 2 percent slopes
52A—Ingalls loamy sand, 0 to 3 percent slopes
53B—Menominee loamy sand, 0 to 6 percent slopes
56A—Ensign silt loam, 0 to 3 percent slopes, rocky
57B—Summerville-Longrie complex, 1 to 6 percent slopes, rocky
61A—Halfaday sand, 0 to 3 percent slopes
67B—Duel-Rock outcrop complex, 1 to 6 percent slopes
68—Pinconning mucky loamy sand
78B—Waiska sandy loam, 0 to 6 percent slopes
79B—Kalkaska-Manistee sands, 0 to 6 percent slopes
79D—Kalkaska-Manistee sands, 6 to 15 percent slopes
80B—Superior fine sandy loam, 1 to 6 percent slopes
83A—Allendale-Croswell complex, 0 to 3 percent slopes
84B—Rousseau, dark subsoil-Alcona complex, 0 to 6 percent slopes
84D—Rousseau, dark subsoil-Alcona complex, 6 to 15 percent slopes
84F—Rousseau, dark subsoil-Alcona complex, 25 to 50 percent slopes
85B—Kalkaska-Ocqueoc complex, 0 to 6 percent slopes
86A—Ingalls-Halfaday complex, 0 to 3 percent slopes
87B—Rousseau fine sand, moderately wet, 0 to 6 percent slopes
88A—Croswell-Au Gres sands, 0 to 3 percent slopes
89A—Kinross-Au Gres complex, 0 to 3 percent slopes
91B—Rousseau fine sand, 0 to 6 percent slopes
91D—Rousseau fine sand, 6 to 15 percent slopes
91E—Rousseau fine sand, 15 to 35 percent slopes
92A—Biscuit very fine sandy loam, 0 to 3 percent slopes
93F—Ontonagon-Pickford complex, 0 to 50 percent slopes

94A—Markey-Kinross-Au Gres complex, 0 to 3 percent slopes
95A—Bowers silt loam, 0 to 3 percent slopes
96B—Velvet-Westbury complex, 0 to 6 percent slopes
97A—Wega very fine sandy loam, 0 to 3 percent slopes
98—Ermatinger silt loam
99A—Westbury stony fine sandy loam, 0 to 3 percent slopes
101—Chippeny muck
102—Kinross-Dawson complex
103D—Velvet-Rockbottom complex, 6 to 15 percent slopes
103E—Velvet-Rockbottom complex, 15 to 35 percent slopes
104B—Amasa very fine sandy loam, 0 to 6 percent slopes
104D—Amasa very fine sandy loam, 6 to 15 percent slopes
104F—Amasa very fine sandy loam, 25 to 50 percent slopes
106A—Potagannissing-Rock outcrop complex, 0 to 3 percent slopes
107B—Oldman stony fine sandy loam, 2 to 6 percent slopes
108D—Shelter-Alpena complex, 0 to 15 percent slopes
111—Gutport muck
112—Soo silty clay loam
113—Ruse mucky fine sandy loam
114B—Velvet very stony loamy sand, 0 to 6 percent slopes
114D—Velvet very stony loamy sand 6 to 15 percent slopes
116—Udorthents, nearly level
117B—Manistee sand, 0 to 6 percent slopes
117D—Manistee sand, 6 to 15 percent slopes
117F—Manistee sand, 25 to 50 percent slopes
119—Gogomain very fine sandy loam
121B—Rockbottom stony silt loam, 2 to 6 percent slopes
122—Pits, quarry
123B—Ocqueoc fine sand, 0 to 6 percent slopes
124D—Alpena very cobbly sandy loam, 0 to 15 percent slopes
125B—Croswell-Markey complex, 0 to 6 percent slopes
126—Pickford silt loam, 0 to 2 percent slopes
127—Gay stony muck
128F—Alcona-Markey complex, 0 to 50 percent slopes
129A—Rudyard silt loam, 0 to 3 percent slopes
130A—Rudyard-Pickford silty clay loams, 0 to 3 percent slopes
132B—Sugar very fine sandy loam, 0 to 6 percent slopes
132F—Sugar very fine sandy loam, 25 to 50 percent slopes
133—Dora muck
135B—Longrie-Posen complex, 0 to 6 percent slopes
136A—Westbury-Gay complex, 0 to 3 percent slopes
137A—Kinross-Wainola complex, 0 to 3 percent slopes
138B—Rousseau, dark subsoil-Urban land complex, 0 to 4 percent slopes
139A—Rudyard-Urban land complex, 0 to 3 percent slopes
143—Burleigh loamy fine sand
144—Urban land-Udorthents complex, nearly level
145A—Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes
146A—Allendale-Fibre complex, 0 to 3 percent slopes
147B—Shelter very stony loam, 0 to 6 percent slopes
147D—Shelter very stony loam, 6 to 15 percent slopes
148B—Longrie-Rock outcrop complex, 1 to 6 percent slopes
149B—Kalkaska sand, 0 to 6 percent slopes, stony
150—Fibre muck
151—Beavertail muck
152—Grousehaven muck
153—Dumps, limestone
154F—Dawson-Deer Park-Wainola complex, 0 to 50 percent slopes
155B—Allendale-Posen-Pickford complex, 0 to 6 percent slopes
156A—Rockcut-Pinconning complex, 0 to 3 percent slopes
159B—Amasa-Sugar very fine sandy loams, 0 to 6 percent slopes
159F—Amasa-Sugar very fine sandy loam, 25 to 50 percent slopes
W—Water



Waishkey Watershed Soil Types	East	Hickler	Orrs	South	South of East	E St Marys	W St Marys	West	Total Acreage	Percent of Watershed
Rubicon sand, 0 to 6 percent slopes		2,975	8,970				4,188	2,154	18,286.40	16.3%
Markey and Carbondale mucks	302	482	244	2,504	135	274	690	2,808	7,439.90	6.6%
Pickford silty clay loam, 0 to 2 percent slopes	1,186	267	80	1,301	1,281	147	218	2,281	6,759.10	6.0%
Pickford silt loam, 0 to 2 percent slopes	424	1,942		1,484	1,399			234	5,482.30	4.9%
Rudyard silt loam, 0 to 3 percent slopes	297	1,223	153	1,741	1,751		34	251	5,449.40	4.8%
Gogomain very fine sandy loam	1,416	1,231	114	1,085	400		68	35	4,349.60	3.9%
Ontonagon-Pickford complex, 0 to 50 percent slopes	610	454	118	1,098	1,069		134	644	4,126.60	3.7%
Bowers silt loam, 0 to 3 percent slopes	10	1,176	769	429	994		79	500	3,956.00	3.5%
Biscuit very fine sandy loam, 0 to 3 percent slopes	1,405	843	142	436	436	12	467	42	3,782.00	3.4%
Rudyard silty clay loam, 0 to 3 percent slopes	1,922	460		102	842			204	3,530.20	3.1%
Kalkaska sand, 0 to 6 percent slopes			924	823			1,130	483	3,359.00	3.0%
Soo silty clay loam	71	1,342	437	109	356		3	1,004	3,322.80	3.0%
Wainola-Kinross-Rousseau complex, 0 to 35 percent slopes	95	180	200	88		124		2,025	2,710.50	2.4%
Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes	193	206	135	1,321	39	68	305		2,266.00	2.0%
Kinross-Au Gres complex, 0 to 3 percent slopes		161	13	875	596	218	193	68	2,125.00	1.9%
Croswell sand, 0 to 3 percent slopes	24	128	44	34	11		207	1,051	1,498.70	1.3%
Allendale-Fibre complex, 0 to 3 percent slopes	202	253		354	63	49		570	1,491.30	1.3%
Rousseau fine sand, dark subsoil, 0 to 6 percent slopes		116	142	149			299	737	1,443.10	1.3%
Pinconning mucky loamy sand	63	49	0	44		25		1,228	1,409.70	1.3%
Pence sandy loam, 0 to 6 percent slopes				204	80		1,002	118	1,403.80	1.2%
Deford and Leafriver soils, 0 to 2 percent slopes		143			57	16	250	817	1,282.90	1.1%
Ingalls loamy sand, 0 to 3 percent slopes	38	39	44	54	12	17	484	588	1,276.50	1.1%
Rudyard-Pickford silty clay loams, 0 to 3 percent slopes	203	637	81	128	17			123	1,189.10	1.1%
Kinross-Wainola complex, 0 to 3 percent slopes	674	157	51	41		201			1,123.90	1.0%
Rubicon sand, 6 to 15 percent slopes	6	43	547	32	4		159	325	1,115.10	1.0%

Ermatinger silt loam	264	247	55	30	69		312	89	1,066.20	0.9%
Deer Park fine sand, 0 to 15 percent slopes						16	1,049		1,065.30	0.9%
Wainola fine sand, 0 to 3 percent slopes	167	7		41		48	34	766	1,062.90	0.9%
Allendale loamy fine sand, 0 to 3 percent slopes	276	15		141	14	0		603	1,048.40	0.9%
Au Gres sand, 0 to 3 percent slopes		99	33	22		11	428	433	1,026.00	0.9%
Histosols and Aquents, ponded	109		163	531	30		134	53	1,020.70	0.9%
Dawson and Loxley peats	69	197	43	28		122	46	483	989.30	0.9%
Ontonagon silt loam, 2 to 6 percent slopes	431	83		59	362			17	951.60	0.8%
Kinross muck, 0 to 2 percent slopes	145	74	78	3	8		9	623	939.70	0.8%
Gaastra silt loam, 0 to 3 percent slopes	60	160		29	1		567	69	885.60	0.8%
Croswell-Au Gres sands, 0 to 3 percent slopes		24	13	589	13	152		28	817.80	0.7%
Sugar very fine sandy loam, 25 to 50 percent slopes	146	427	104	41	6	20			743.40	0.7%
Water	27	109	19	64	22	3	331	152	727.60	0.6%
Entisols, flooded	9						10	641	660.10	0.6%
Alcona loamy very fine sand, 0 to 6 percent slopes	29	12		46			84	466	636.30	0.6%
Rousseau fine sand, moderately wet, 0 to 6 percent slopes	45	105	25	67			40	342	622.70	0.6%
Markey-Kinross-Au Gres complex, 0 to 3 percent slopes		26	6	89	7	418	27		571.70	0.5%
Wega very fine sandy loam, 0 to 3 percent slopes	25	216	55		73		199		568.20	0.5%
Kalkaska sand, 6 to 15 percent slopes		8	150	70	2	10	301	2	543.20	0.5%
Rousseau, dark subsoil-Urban land complex, 0 to 4 percent slopes				502					501.90	0.4%
Ingalls-Halfaday complex, 0 to 3 percent slopes							428	39	467.00	0.4%
Kalkaska sand, 35 to 70 percent slopes	0			53		42	277	31	402.70	0.4%
Au Gres-Dawson-Rubicon complex, 0 to 15 percent slopes		57		156				179	391.20	0.3%
Halfaday sand, 0 to 3 percent slopes		10		108	1		133	134	386.70	0.3%
Ontonagon silt loam, 25 to 50 percent slopes	102	71		29	12		161	4	378.90	0.3%

Kalkaska-Ocqueoc complex, 0 to 6 percent slopes				6			184	156	346.40	0.3%
Rousseau fine sand, dark subsoil, 6 to 15 percent slopes			6	53			183	29	271.50	0.2%
Sugar very fine sandy loam, 0 to 6 percent slopes	174			17	37		15		243.40	0.2%
Alcona loamy very fine sand, 6 to 15 percent slopes				54			80	101	235.10	0.2%
Solona fine sandy loam, 0 to 3 percent slopes		3		7				198	207.40	0.2%
Negwegon silt loam, 6 to 15 percent slopes	55	23		47	49	12		15	199.20	0.2%
Rousseau, dark subsoil-Alcona complex, 0 to 6 percent slopes							191		190.70	0.2%
Allendale-Croswell complex, 0 to 3 percent slopes								159	158.50	0.1%
Pits, sand and gravel	5	12		62	3	12	41	6	140.30	0.1%
Posen stony fine sandy loam, 6 to 15 percent slopes		16			122				137.50	0.1%
Rubicon sand, 15 to 35 percent slopes		44	1	19	15		11	44	133.50	0.1%
Alcona-Markey complex, 0 to 50 percent slopes							132		131.70	0.1%
Posen stony fine sandy loam, 1 to 6 percent slopes		7		1	124				131.50	0.1%
Ocqueoc fine sand, 0 to 6 percent slopes	3			58	4			48	112.60	0.1%
Rudyard-Allendale complex, 0 to 3 percent slopes					111				110.80	0.1%
Fibre muck	16			80					95.80	0.1%
Udorthents, nearly level	39	19		19	11			2	89.70	0.1%
Burleigh loamy fine sand	87								86.90	0.1%
Rousseau fine sand, 0 to 6 percent slopes				43	7			30	79.80	0.1%
Amasa very fine sandy loam, 0 to 6 percent slopes	79								79.40	0.1%
Manistee sand, 25 to 50 percent slopes	61					8			68.90	0.1%
Waiska sandy loam, 0 to 6 percent slopes						36	33		68.80	0.1%
Dora muck					61				60.70	0.1%

Rousseau fine sand, 15 to 35 percent slopes		10	26			16	0		51.10	0.05%
Kinross-Dawson complex				50					50.40	0.04%
Manistee sand, 6 to 15 percent slopes	41							9	50.10	0.04%
Rousseau fine sand, 6 to 15 percent slopes			9	7				30	45.70	0.04%
Alcona loamy very fine sand, 25 to 50 percent slopes				26		19			45.10	0.04%
Velvet very stony loamy sand, 0 to 6 percent slopes					33				33.40	0.03%
Kalkaska-Manistee sands, 0 to 6 percent slopes								32	32.30	0.03%
Guardlake loam, 6 to 15 percent slopes				29					29.20	0.03%
Kalkaska sand, 15 to 35 percent slopes				4		19			22.40	0.02%
Manistee sand, 0 to 6 percent slopes	9	9			4				22.00	0.02%
Velvet very stony loamy sand 6 to 15 percent slopes					13				13.10	0.01%
Rousseau fine sand, dark subsoil, 15 to 35 percent slopes				11					11.30	0.01%
Guardlake loam, 0 to 6 percent slopes				7	2				8.70	0.01%
Emmet sandy loam, 1 to 6 percent slopes			3				4		6.10	0.01%
Croswell-Markey complex, 0 to 6 percent slopes	4								4.40	0.004%
Superior fine sandy loam, 1 to 6 percent slopes	2								2.40	0.002%
Menominee loamy sand, 0 to 6 percent slopes								2	2.30	0.002%
Pence sandy loam, 6 to 15 percent slopes				1					1.10	0.001%
Grand Total Acreage	**11,622**	**16,593**	**13,997**	**17,725**	**10,758**	**2,113**	**15,356**	**24,302**	112,465.20	100%

APPENDIX G: Watershed Desired Uses Survey Results

SUMMARY OF SURVEY RESULTS 2020

Watershed users were surveyed through an online survey, paper survey, or at the public engagement meeting. Additionally meetings with the steering committee, municipalities, local tribes, agencies, residents and one-on-one discussions with landowners determined similar themes.

Stakeholders in the Waishkey River Watershed Plan project identified many desired uses for the watershed. In the winter of 2020, the steering committee surveyed community members on their desired uses for the watershed. Forty-four people responded to the survey online or paper. Of those who responded to the survey, 80% indicated they recreate in the Waishkey River watershed. A total of 68% work in the watershed. Of all respondents, 50% have primary residences and another 4.5% have secondary residences.

One of the questions asked people to list their "top needs and/or values around the Waishkey River and watershed?" These could include tangible uses and activities or intangible feelings.
Respondents felt fisheries and fishing (20%) were very important, closely followed by clean water (14%). Beyond that, answers were diverse. Survey results shown in this word cloud (to the right) lumped into 31 categories; words mentioned more frequently are displayed in larger font. This importance of gathering traditional foods and value for the sacredness of water and ceremony was also evident in the results.

Figure G.1. Survey results for top needs or values *(frequently mentioned words displayed in larger font).*

When asked about the importance of the watershed to quality of life, survey results show that the importance of the Waishkey River and watershed to their quality of life is important. On a scale of 1-100, the mean score was 81 which indicated *very important* to *somewhat important* to those respondents. The median score was 93, indicating most respondents felt it was very important.
The survey then asked respondents to rank their top concerns for the watershed, the weighted average showed five top priorities. These included water quality, solid waste disposal (illegal dumping), quality and diversity of aquatic life, air quality, and quality and diversity of wildlife.

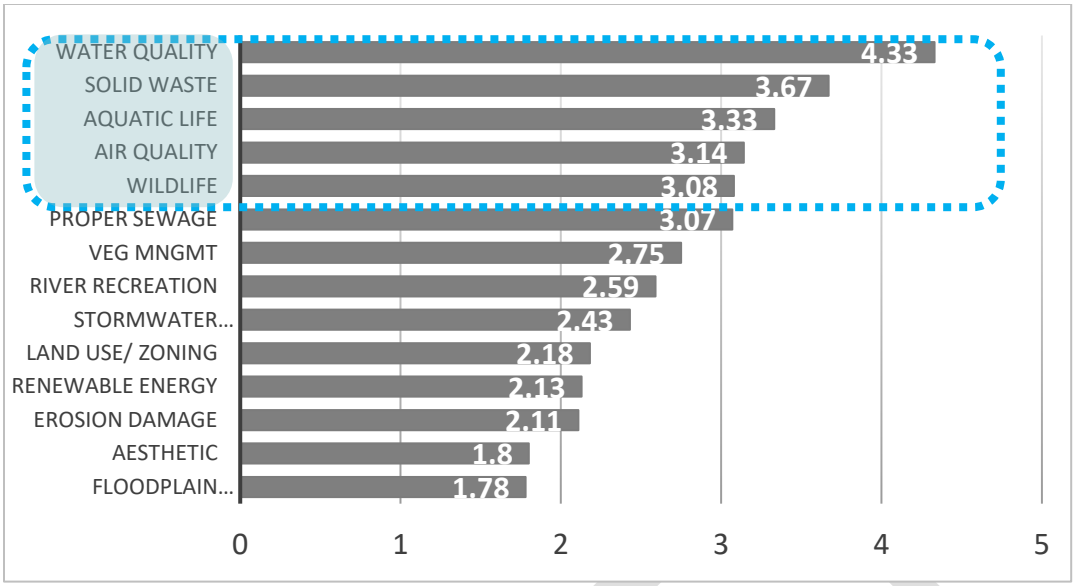


FIGURE G.2. Weighted average priority concerns.

Other questions posed in the survey were "how do you use the watershed NOW?" and "with improvements being made to the watershed, how would you like to use it in the FUTURE?" From a long list of activities, respondents generally felt they would use the river and the watershed more in the future (increases in use shown in green plusses). The most significant increases in future use are in the categories of Protecting Native Species and Sustainable Forestry. Followed next by Traditional/Spiritual/Cultural Uses, Trails for ATVs/ Snowmobiles, and Conserve Riparian Corridors/ Biodiversity.

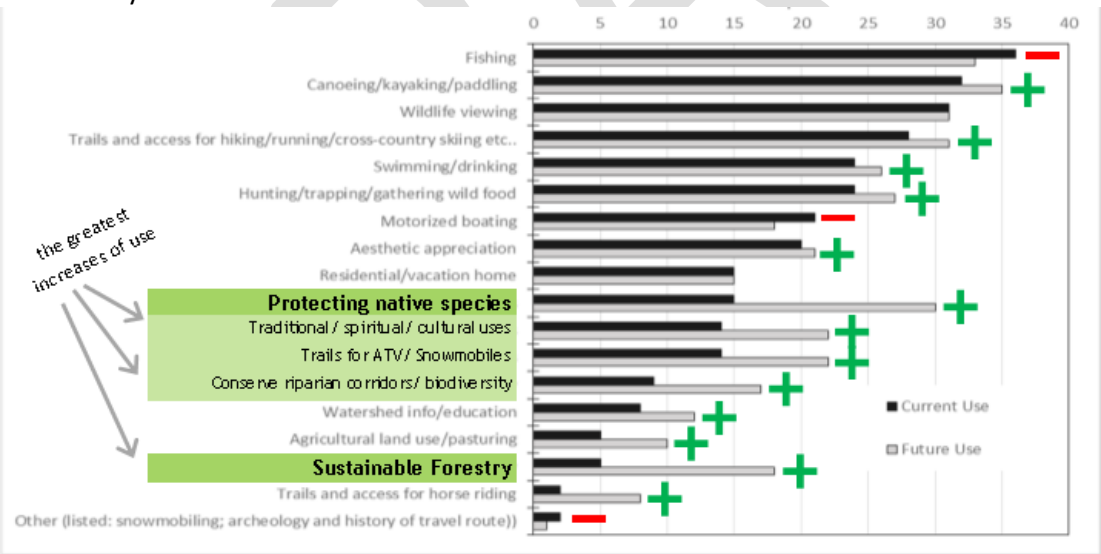


Figure G.3: Desired Uses (current and future)

Finally, respondents were asked about the fish and game they or their families consume from the watershed in a year. Generally, respondents eat more fish than game in a year, with most eating it fewer than 5 times per year.

To learn more about these survey results or the draft management plan, contact Bay Mills Biological Services.