Saxon Falls Hydroelectric Project
FERC Project No. 2610

Superior Falls Hydroelectric Project
FERC Project No. 2587

Applications for a Subsequent License for a Minor Water Power Project Less than 1.5 Megawatts
and
A New License for a Major Water Power Project Less than 5 Megawatts

Prepared for

Northern States Power Company
a Wisconsin Corporation

Prepared by

Mead & Hunt

meadhunt.com

Volume 3 of 4
Appendices

July 2022

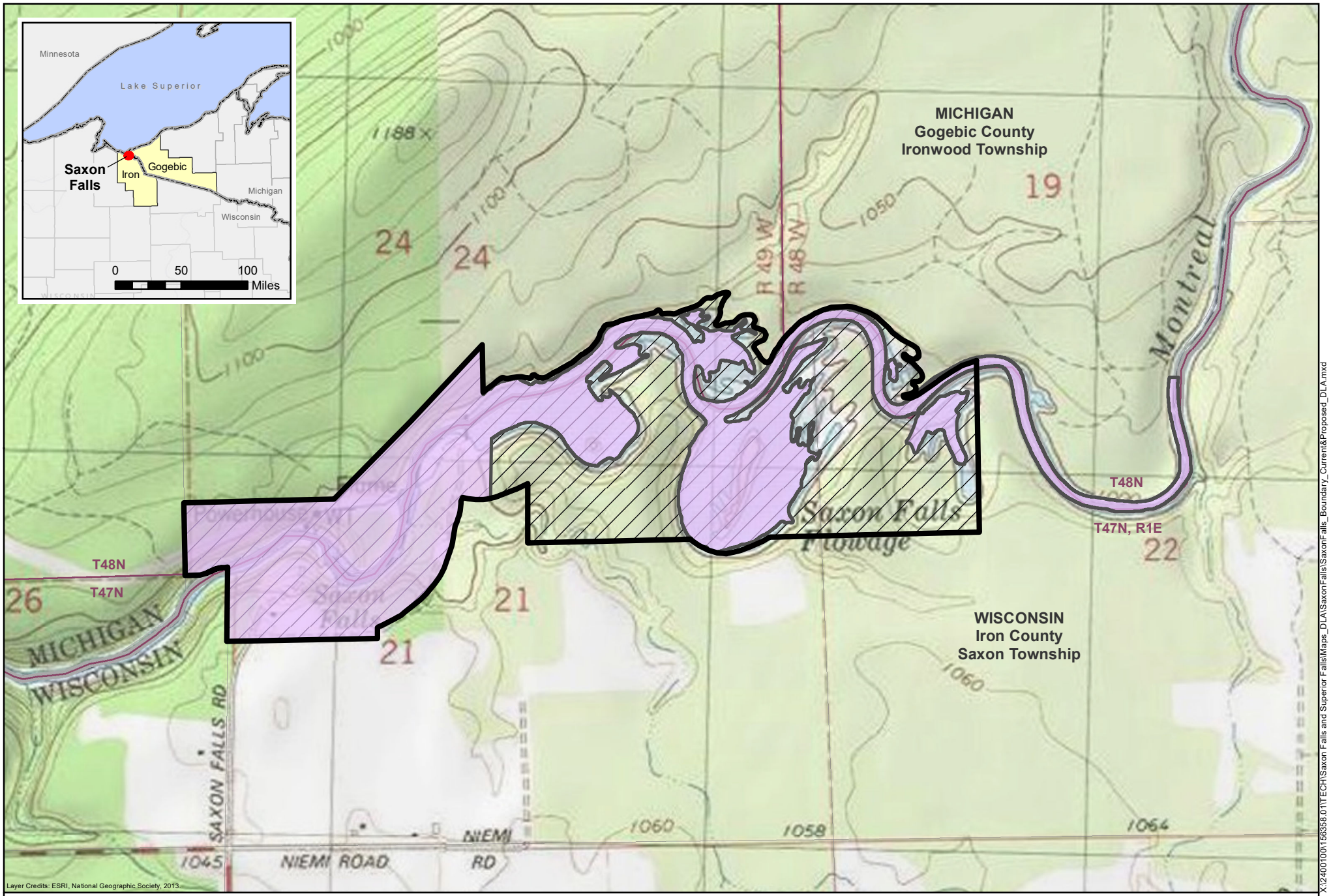
Volume 3 of 4
Appendices

Appendix

Appendices (cont'd):

Appendices (cont'd):

APPENDIX A-1 Saxon Falls Project Location



Xcel Energy®

Mead & Hunt

Current Project Boundary

Proposed Project Boundary

Township/Range Line

Section Line

N

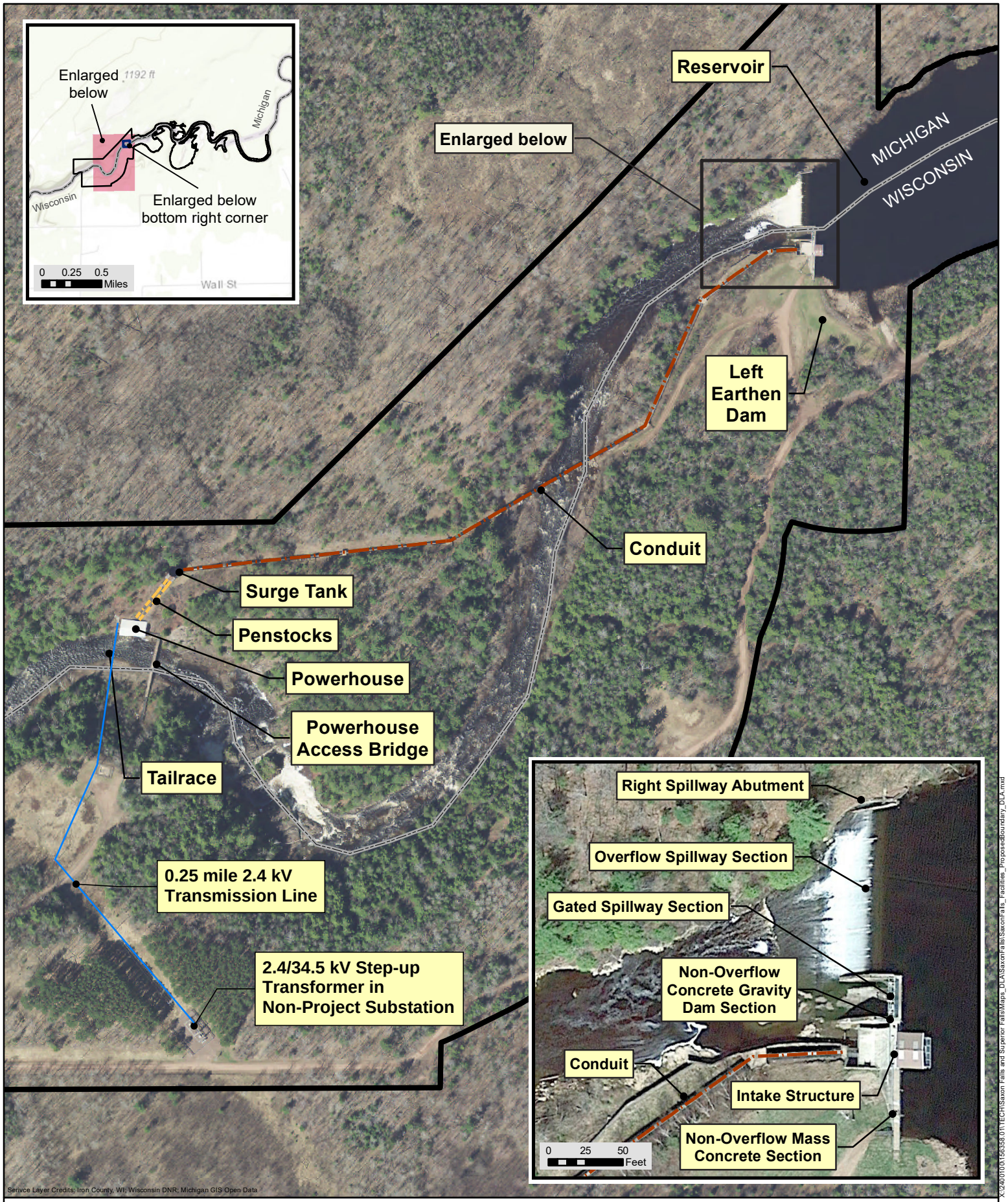
0 600 1,200 Feet

Saxon Falls Hydroelectric Project
Current and Proposed Boundary

FERC No. 2610

X:\2400100\156358.01\TECH\Saxon Falls and Superior Falls\Maps_DLA\SaxonFalls\SaxonFalls_Boundary_Current&Proposed_DLA.mxd

APPENDIX A-2 Saxon Falls Project Facilities



Xcel Energy®

Mead & Hunt

Proposed Project Boundary

State Boundary

Conduit

Penstock

N

0 150 300 Feet

Saxon Falls Hydroelectric Project
Project Facilities

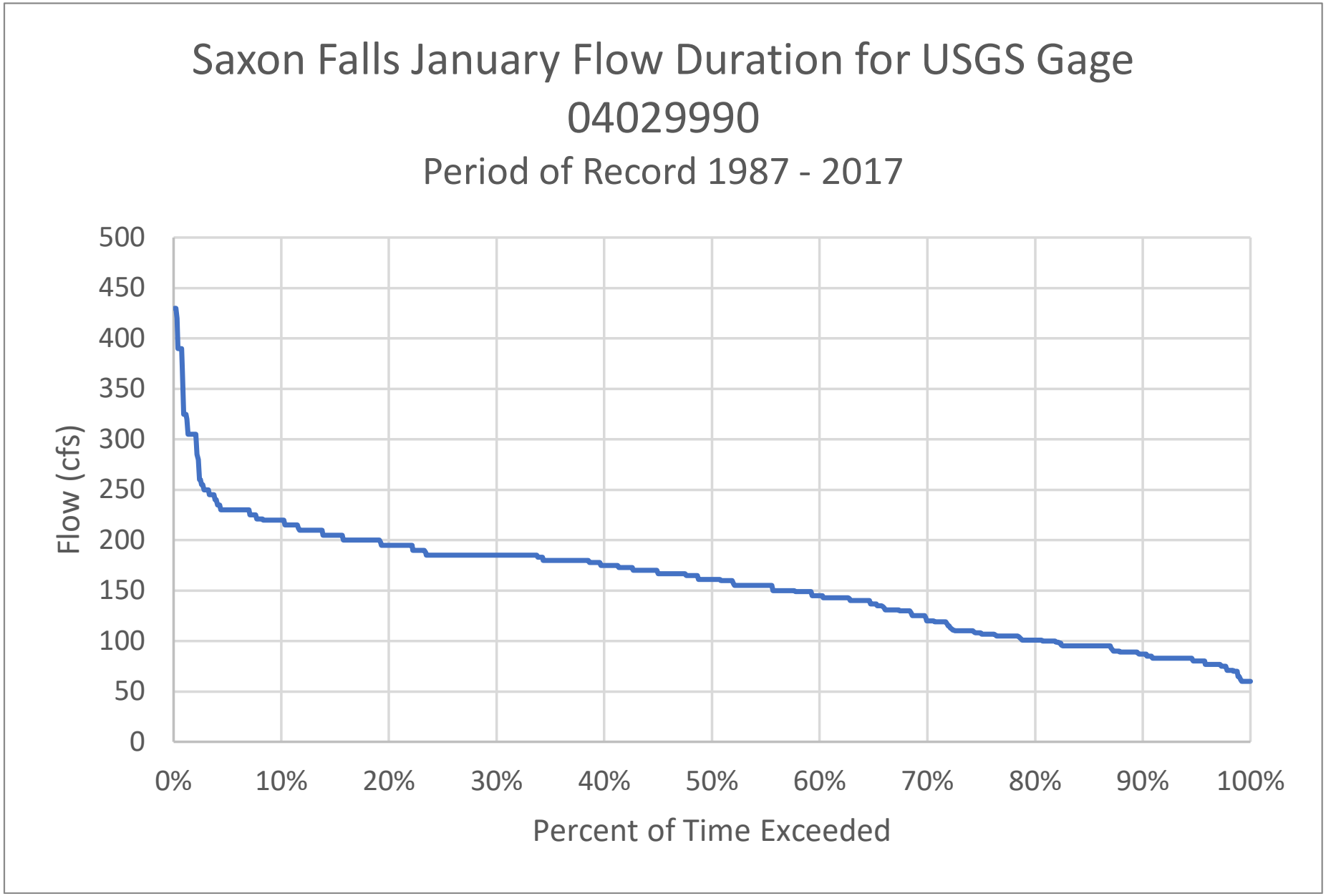
FERC No. 2610

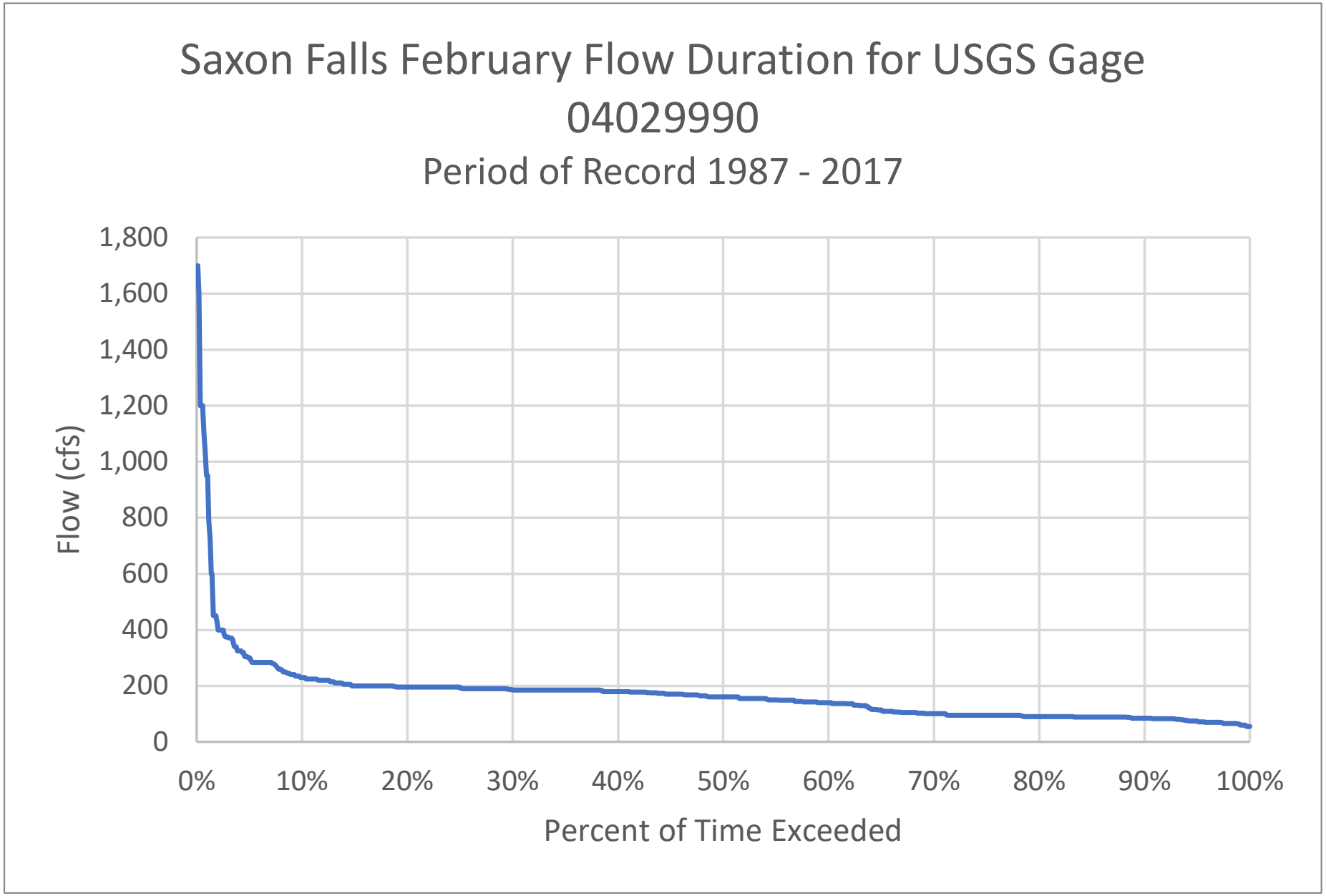
X:\240\0100\158358.01\ECH\Saxon Falls and Superior Falls\Maps_DLA\Saxonfalls\Saxonfalls_Facilities_ProposedBoundary_DLA.mxd

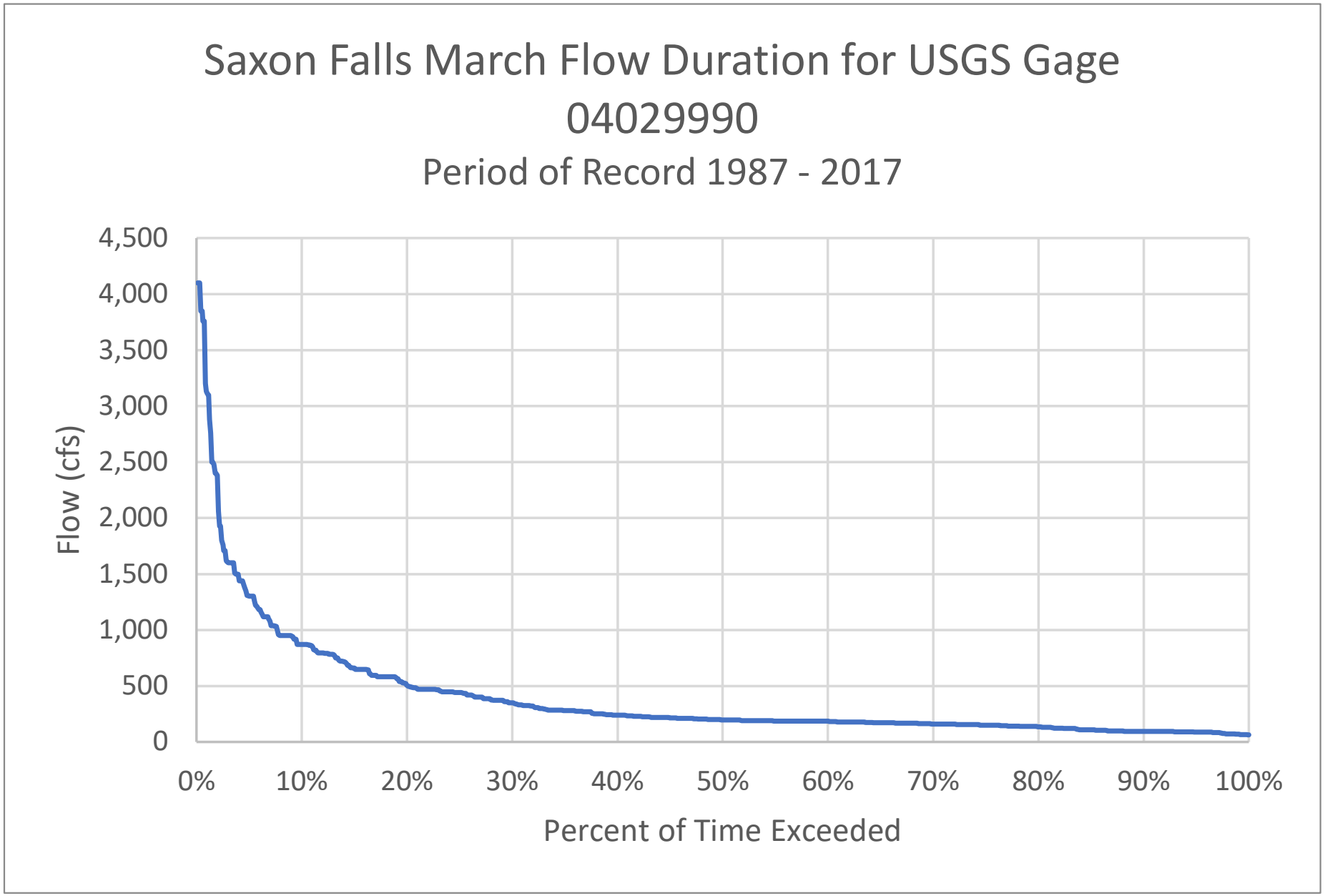
APPENDIX A-3 Saxon Falls Flow Duration Curves

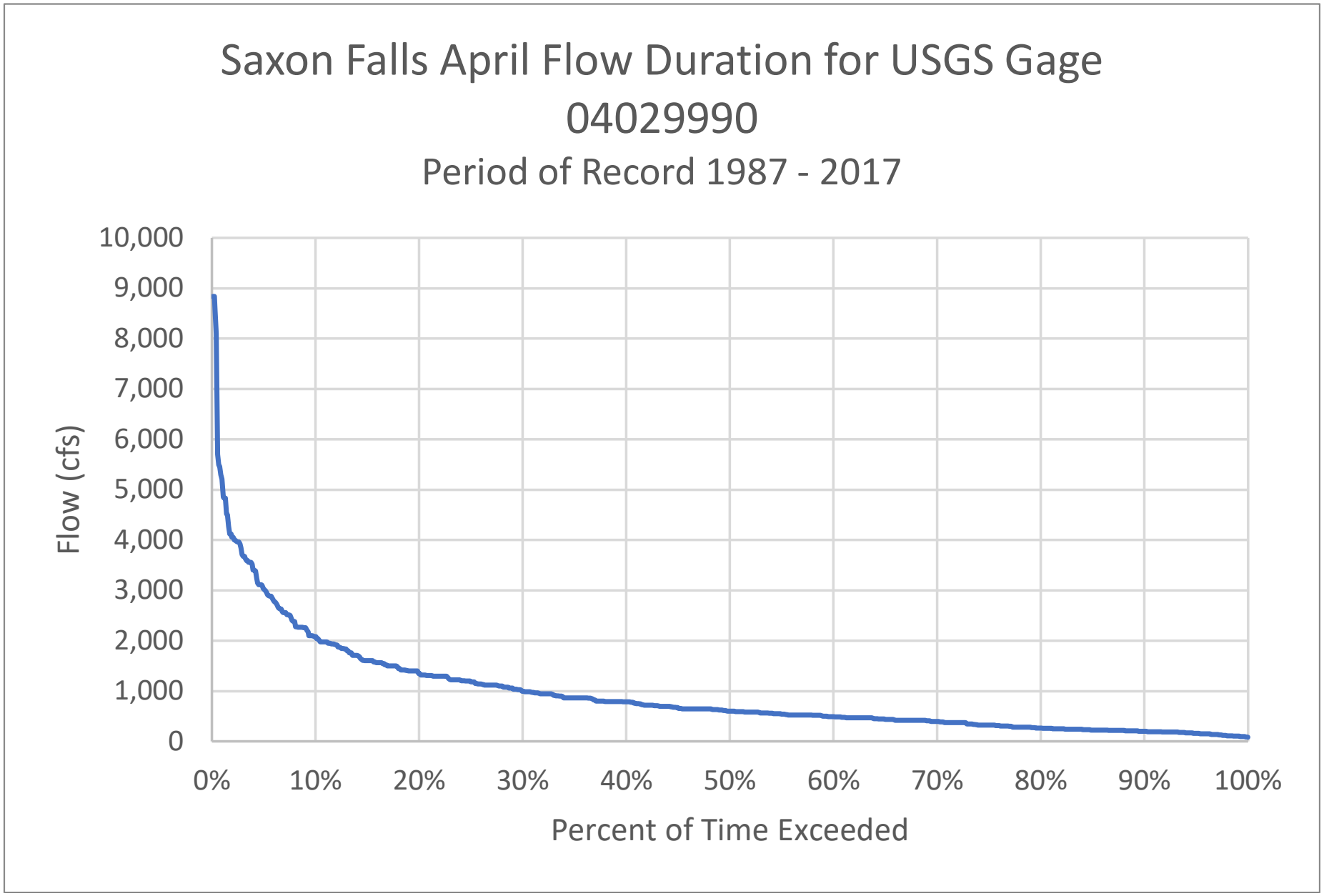
Saxon Falls Flow Duration for USGS Gage 04029990 (Period of Record 1986 - 2017)

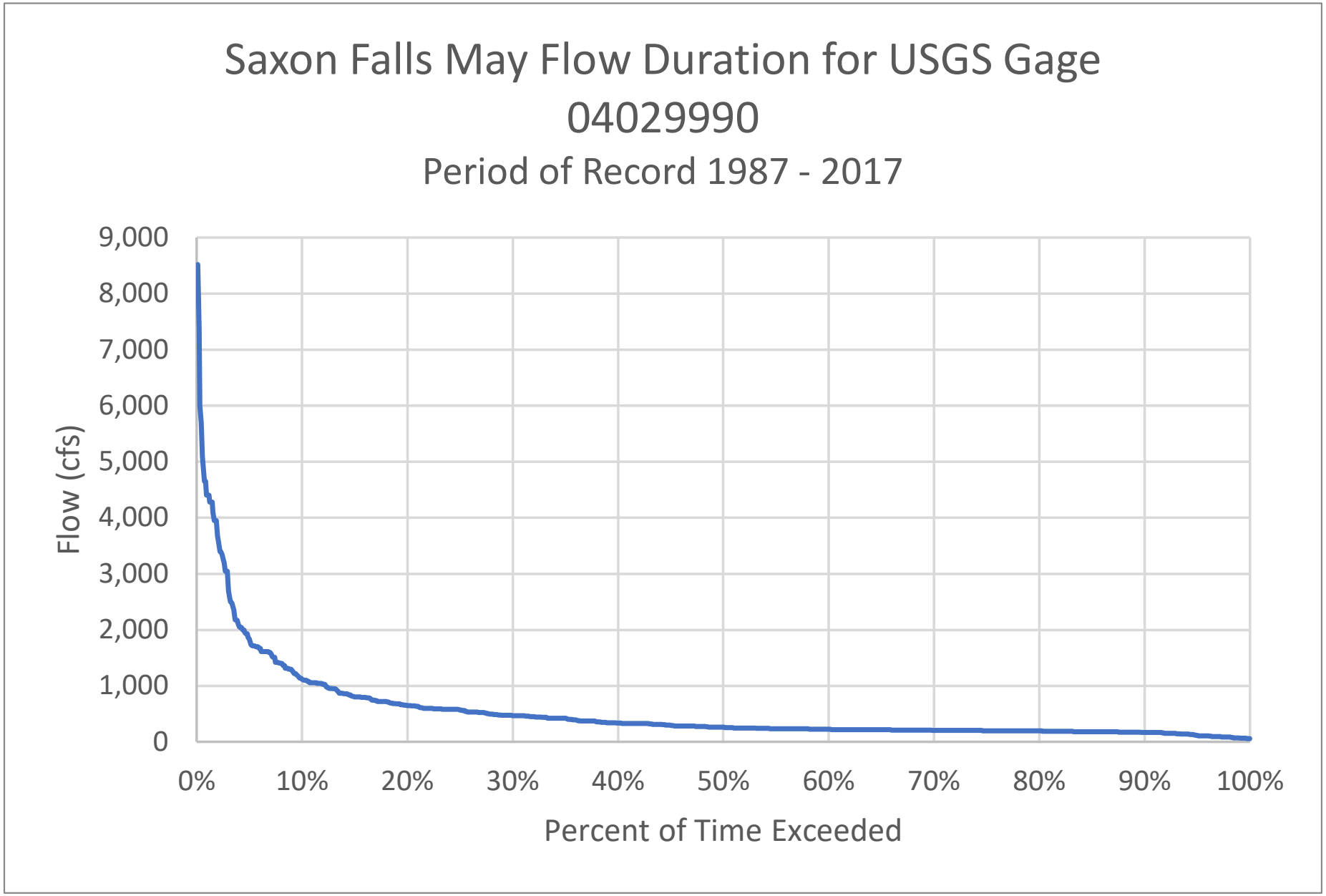
Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December
95	80	75	89	160	120	100	70	50	42	53	82	77
90	87	85	95	200	171	125	95	60	50	60	94	83
85	95	89	110	226	185	140	100	75	55	66	100	90
80	101	90	135	269	195	154	106	85	60	71	106	99
75	108	95	149	325	200	165	115	95	65	80	115	110
70	120	101	161	395	205	172	125	100	70	89	125	123
65	137	113	173	440	215	180	140	105	80	100	133	131
60	145	140	185	495	225	190	155	110	88	112	148	148
55	155	150	185	545	235	198	165	115	95	125	166	155
50	161	161	198	600	260	200	183	120	100	140	185	162
45	167	170	215	670	299	210	190	135	110	160	195	170
40	175	180	240	785	335	220	205	150	120	176	200	184
35	180	185	280	870	420	225	215	165	135	195	210	185
30	185	187	350	995	470	240	225	185	149	220	225	195
25	185	195	440	1180	570	260	235	205	180	240	250	205
20	195	195	510	1350	650	305	260	220	200	290	285	220
15	205	200	660	1600	805	400	286	235	232	340	326	235
10	220	230	870	2080	1120	500	375	265	255	420	415	300

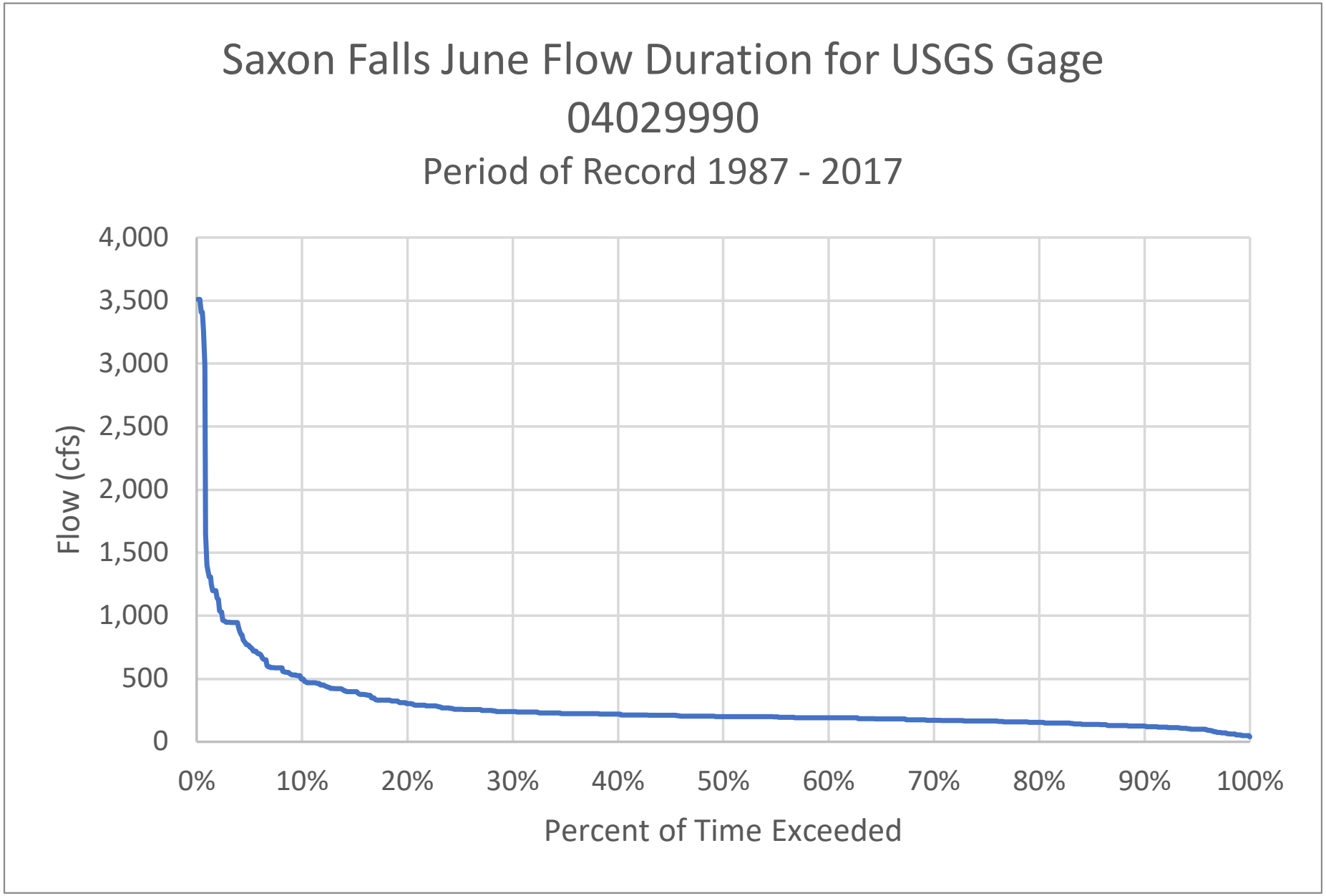

Saxon Falls January Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
500
450
400
350
300
250
200
150
100
50
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

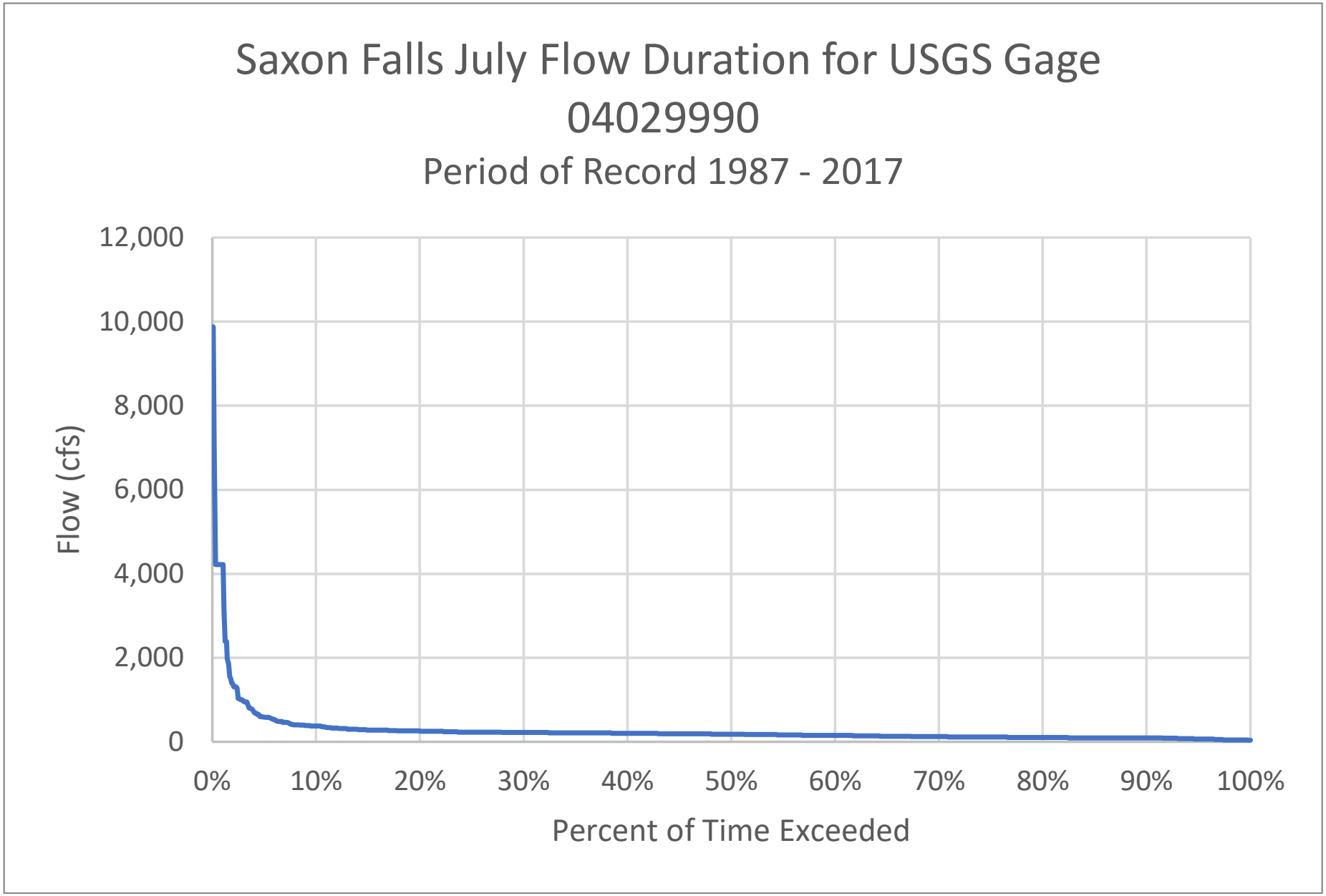

Saxon Falls February Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

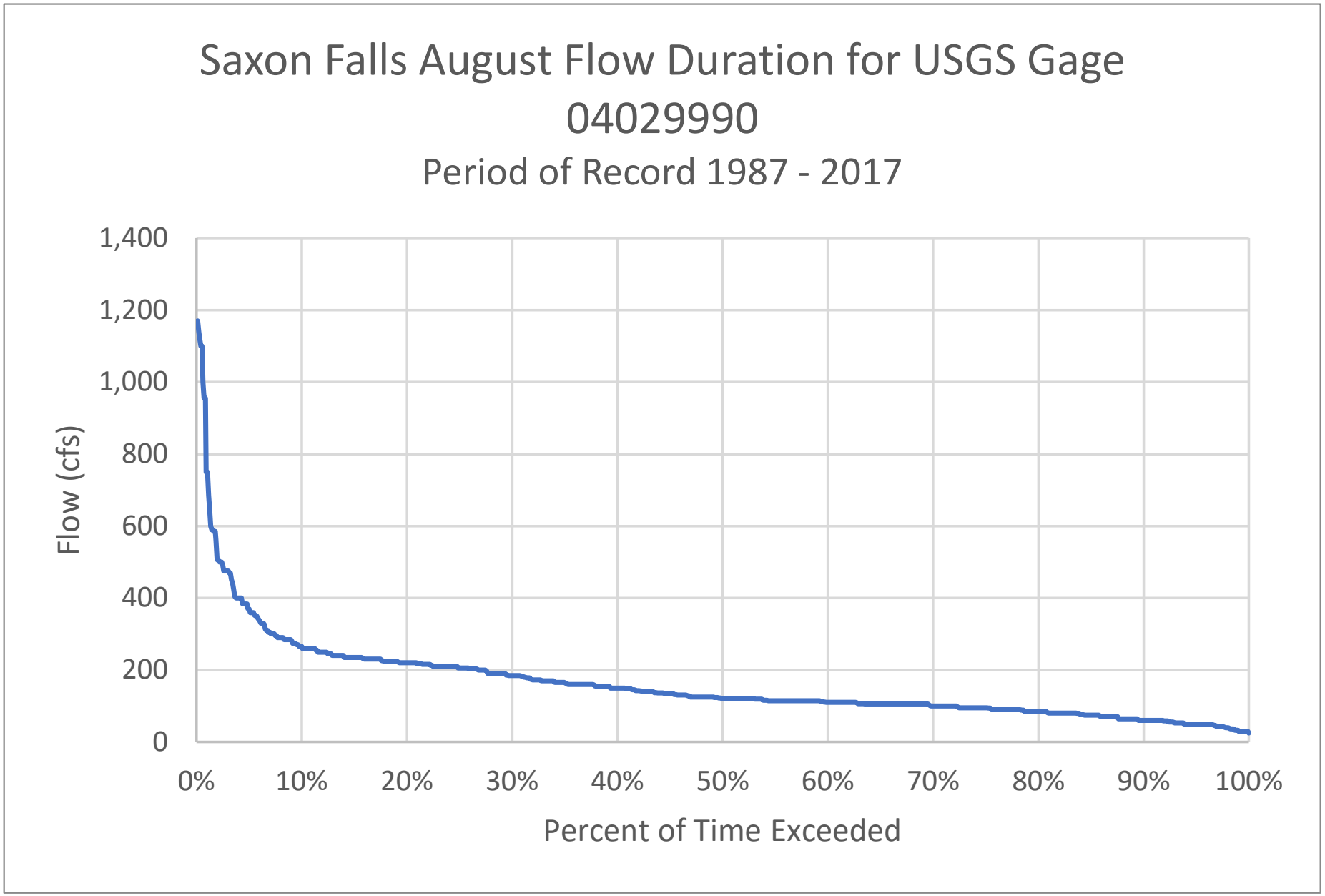

Saxon Falls March Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

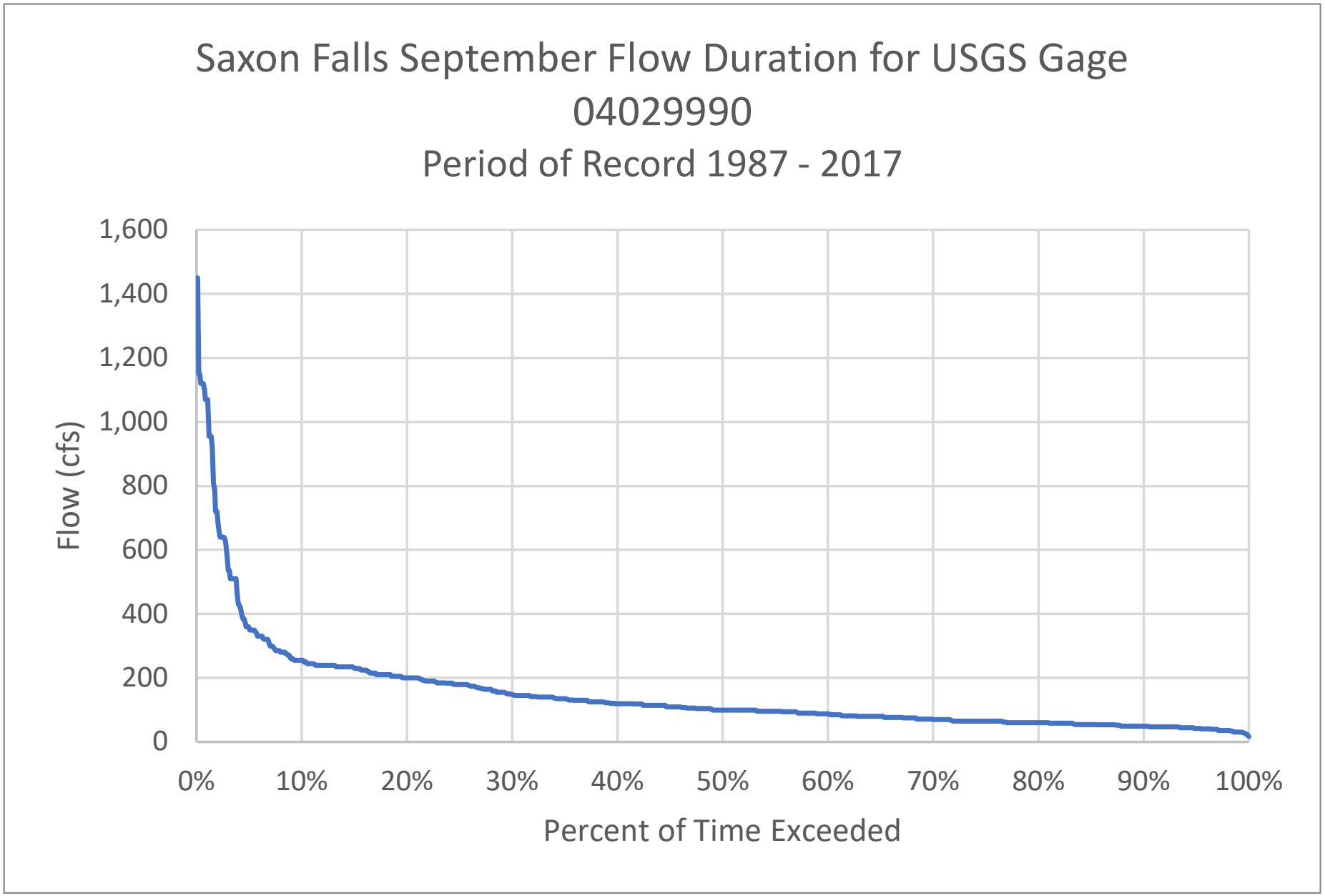

Saxon Falls April Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

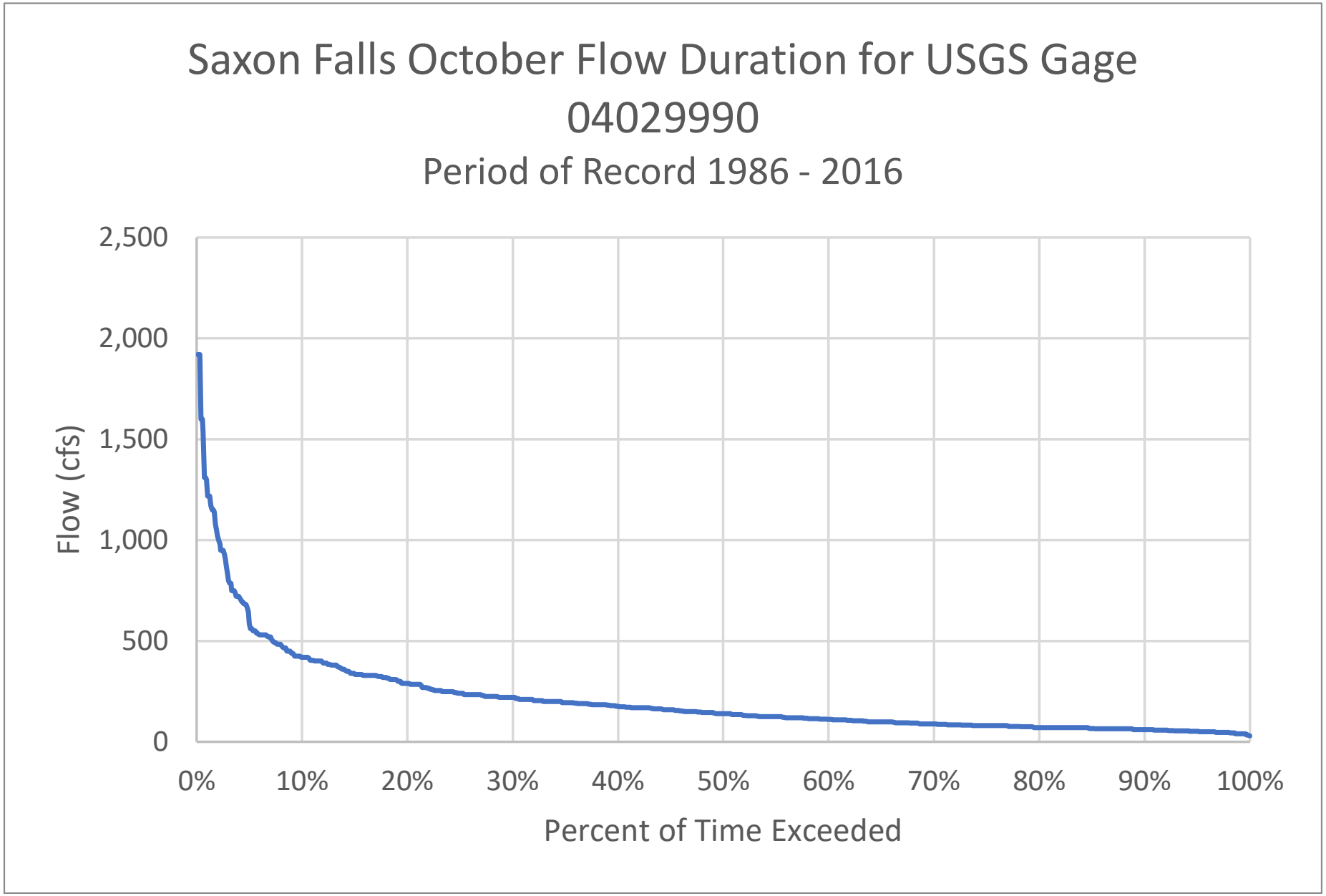

Saxon Falls May Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

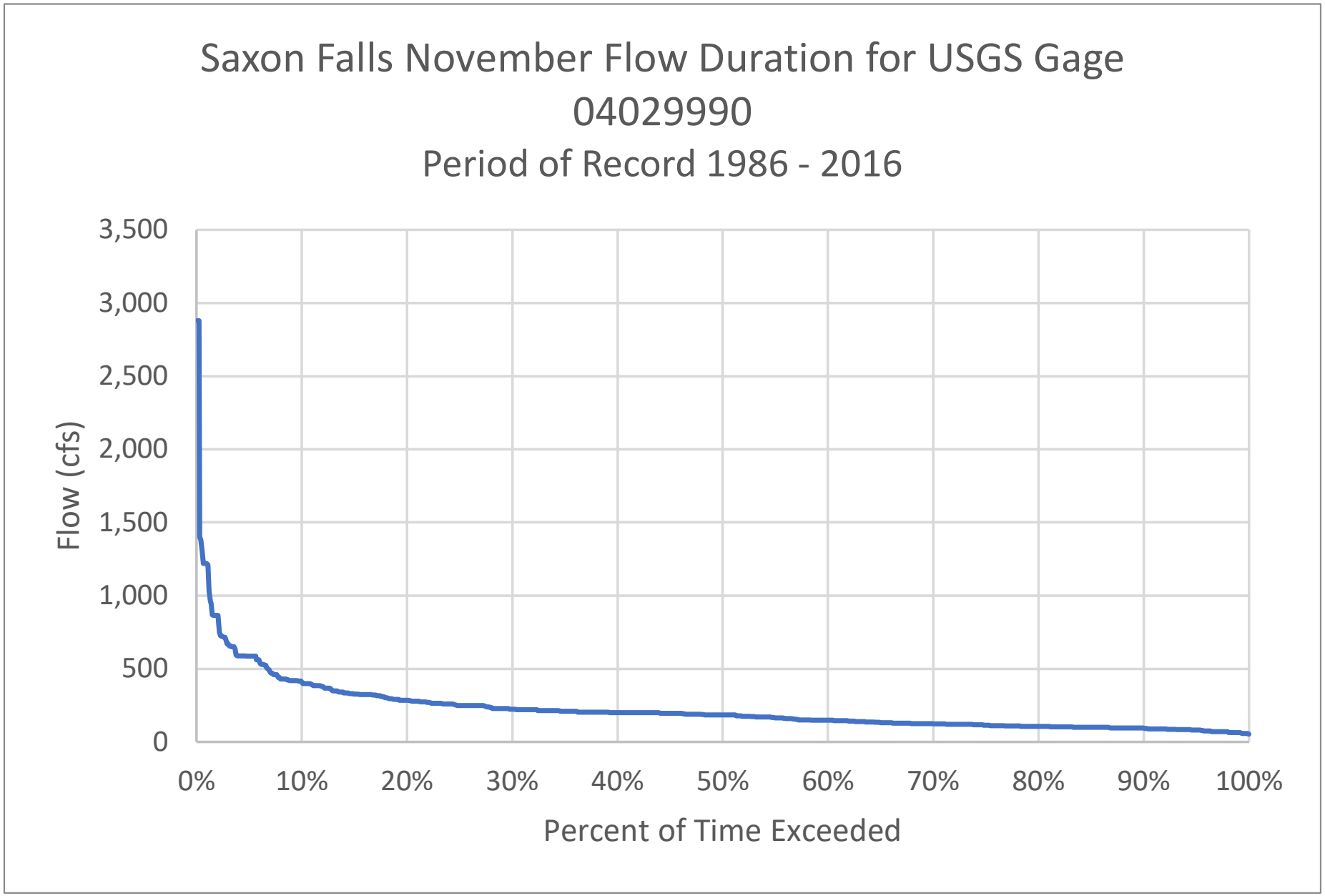

Saxon Falls June Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

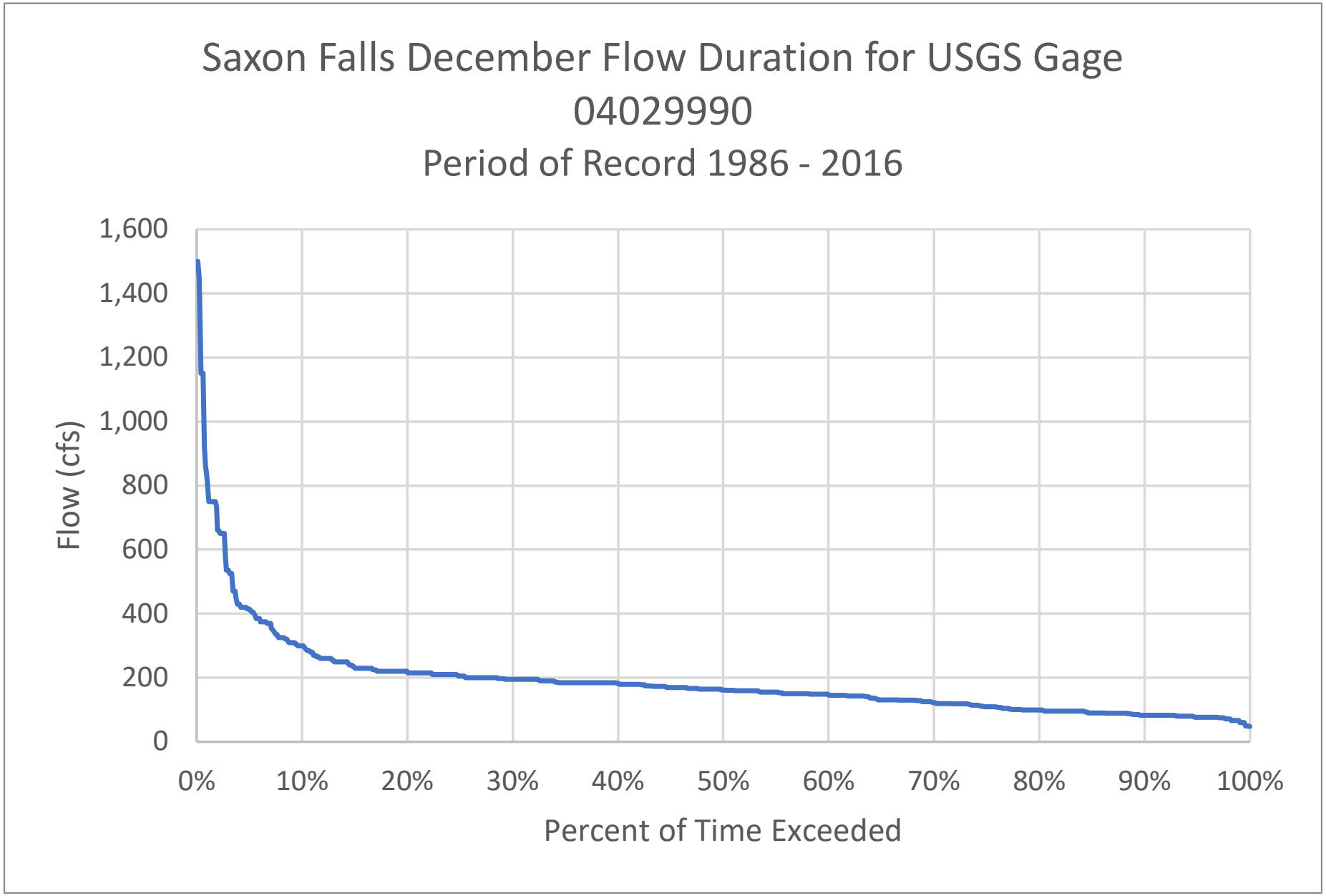

Saxon Falls July Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Saxon Falls August Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Saxon Falls September Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Saxon Falls October Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

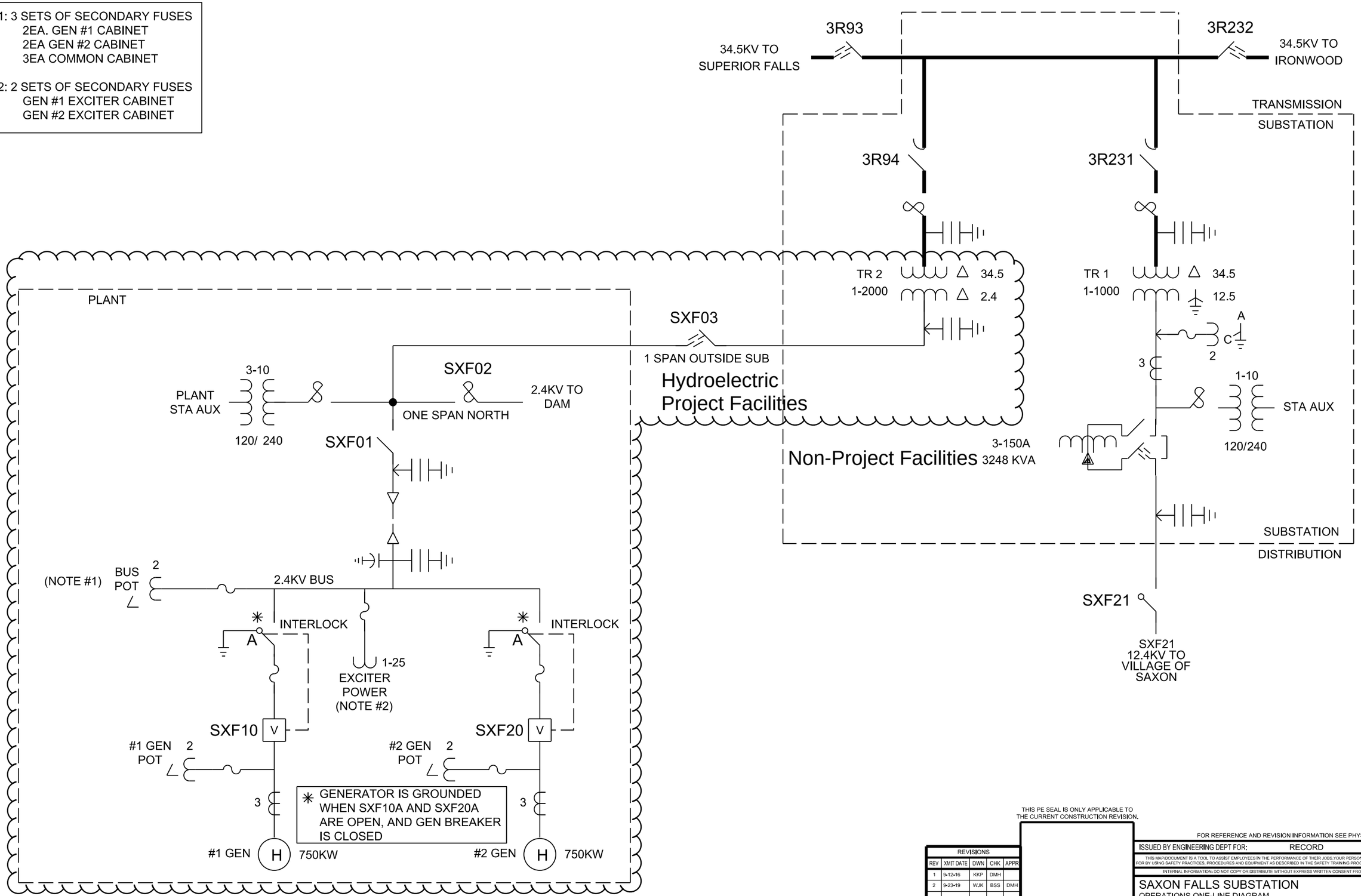

Saxon Falls November Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Saxon Falls December Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

APPENDIX A-4 Saxon Falls One-line Diagram of Electrical Circuits

NOTE #1: 3 SETS OF SECONDARY FUSES
2EA. GEN #1 CABINET
2EA GEN #2 CABINET
3EA COMMON CABINET

NOTE #2: 2 SETS OF SECONDARY FUSES
GEN #1 EXCITER CABINET
GEN #2 EXCITER CABINET



THIS PE SEAL IS ONLY APPLICABLE TO THE CURRENT CONSTRUCTION REVISION.

REVISIONS				
REV	XMIT DATE	DWN	CHK	APPR
1	9-12-16	KKP	DMH	
2	9-23-19	WJK	BSS	DMH

FOR REFERENCE AND REVISION INFORMATION SEE PHYSICAL INDEX SHEET.

ISSUED BY ENGINEERING DEPT FOR: RECORD

SAXON FALLS SUBSTATION SXF
OPERATIONS ONE-LINE DIAGRAM
34.5KV-12.5KV-2.4KV

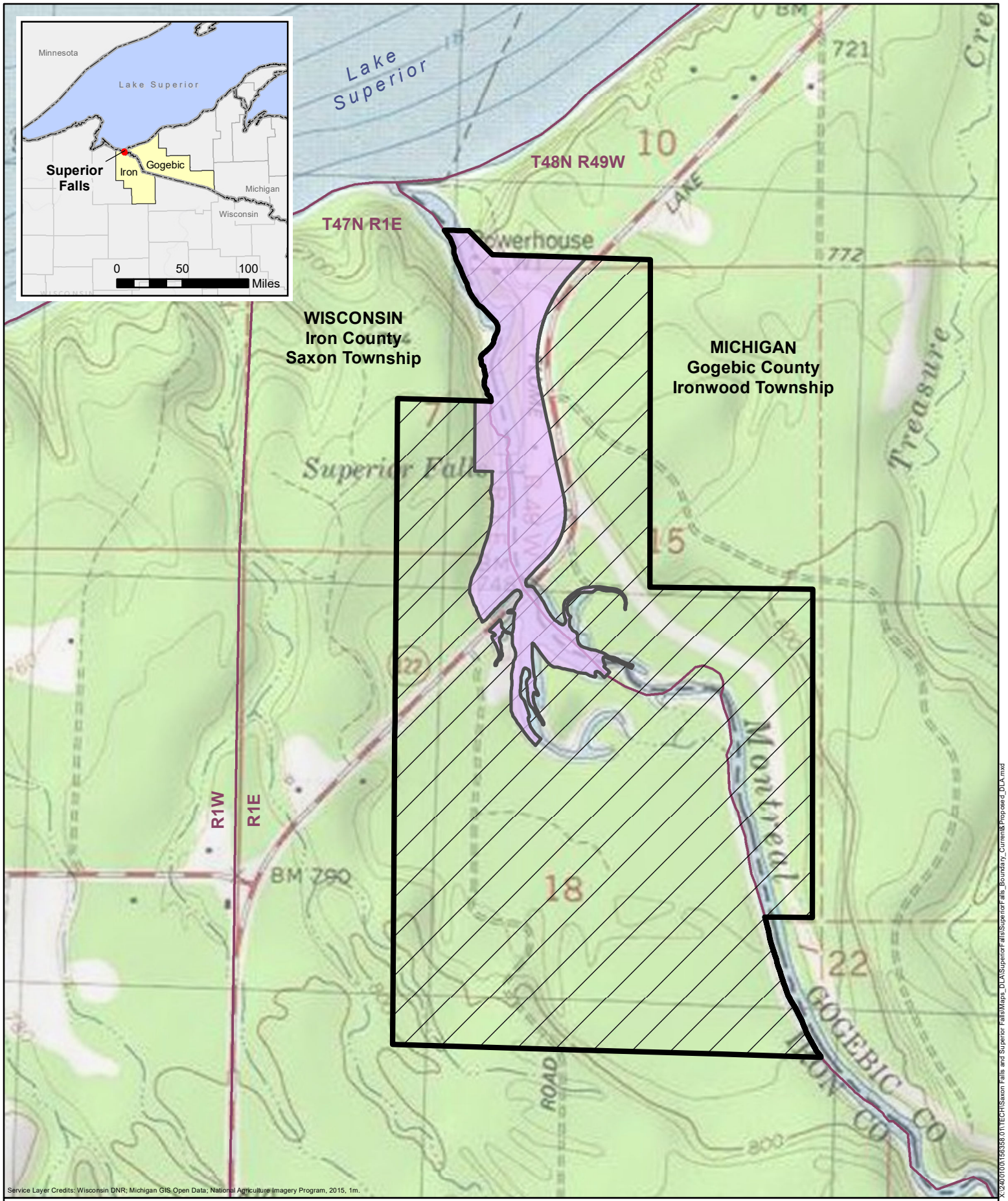
Xcel Energy® NE-162149 SCALE NONE REV 2

REV	DATE	WBS 4	REVISION DESCRIPTION
2A	08/20/2019	D.0005055.016.001.001	SXF - UPDATE OPERATIONS ONE-LINE FOR RECORD

NE-162149.DGN

8/20/2019 1:48:17 PM

APPENDIX A-5 Superior Falls Project Location



Xcel Energy®

Mead & Hunt

Current Project Boundary

Proposed Project Boundary

Township/Range Line

Section Line

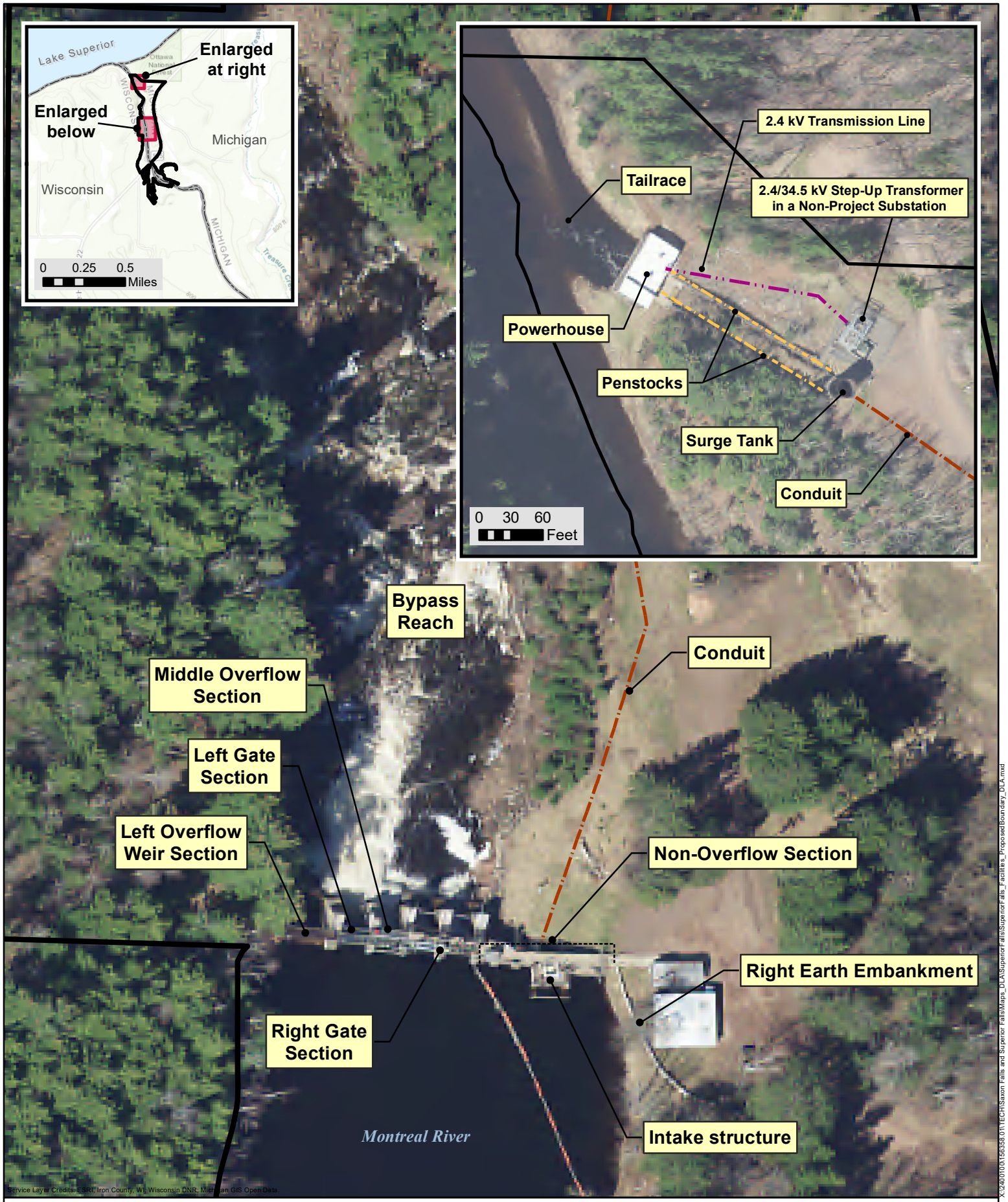
N

0 600 1,200 Feet

Superior Falls Hydroelectric Project
Current and Proposed Boundary

FERC No. 2587

APPENDIX A-6 Superior Falls Project Facilities



Proposed Project Boundary
State Boundary
Conduit
Penstock
Transmission Line

N

0 50 100 Feet

Xcel Energy®
Mead & Hunt

Superior Falls Hydroelectric Project
Project Facilities

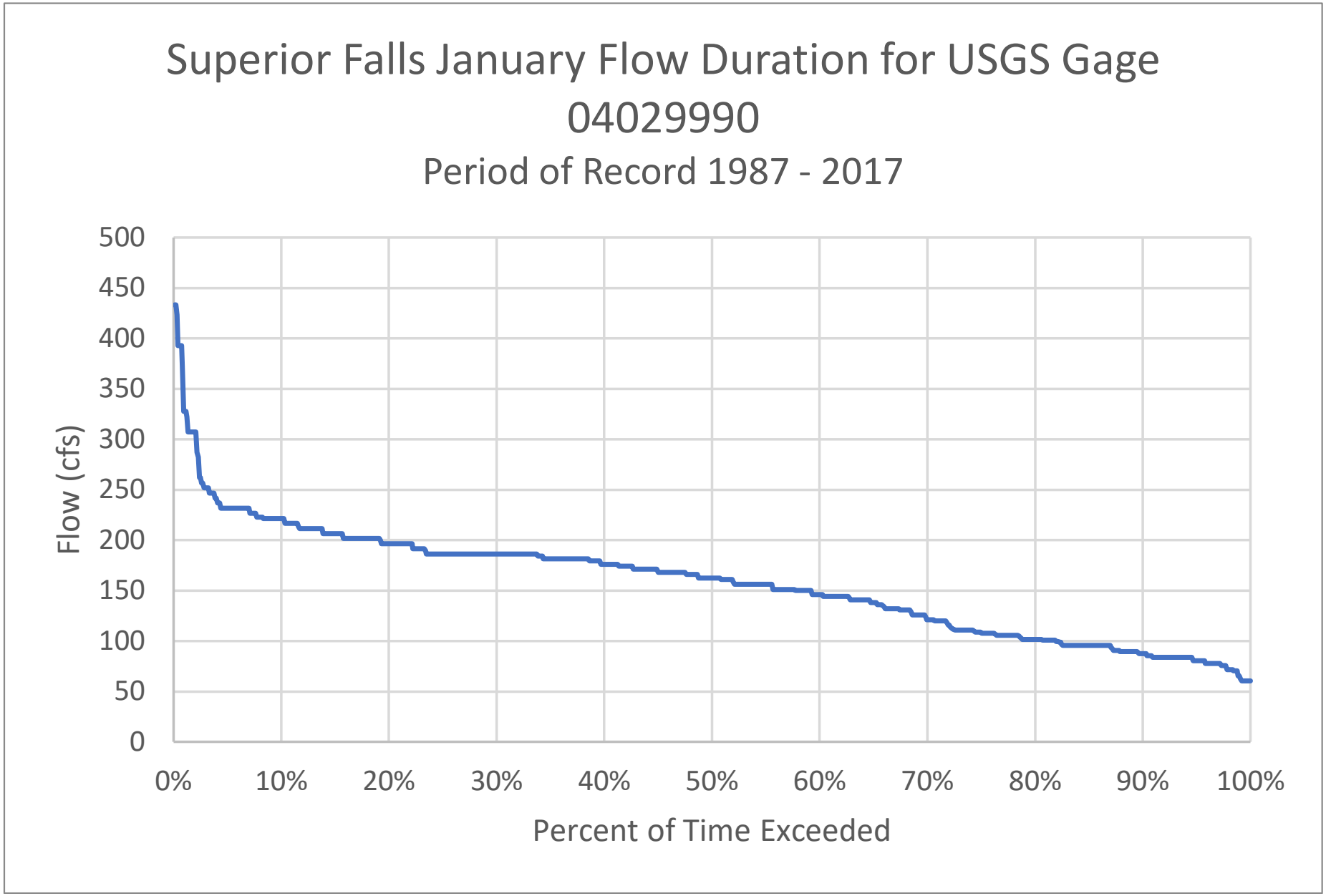
FERC No. 2587

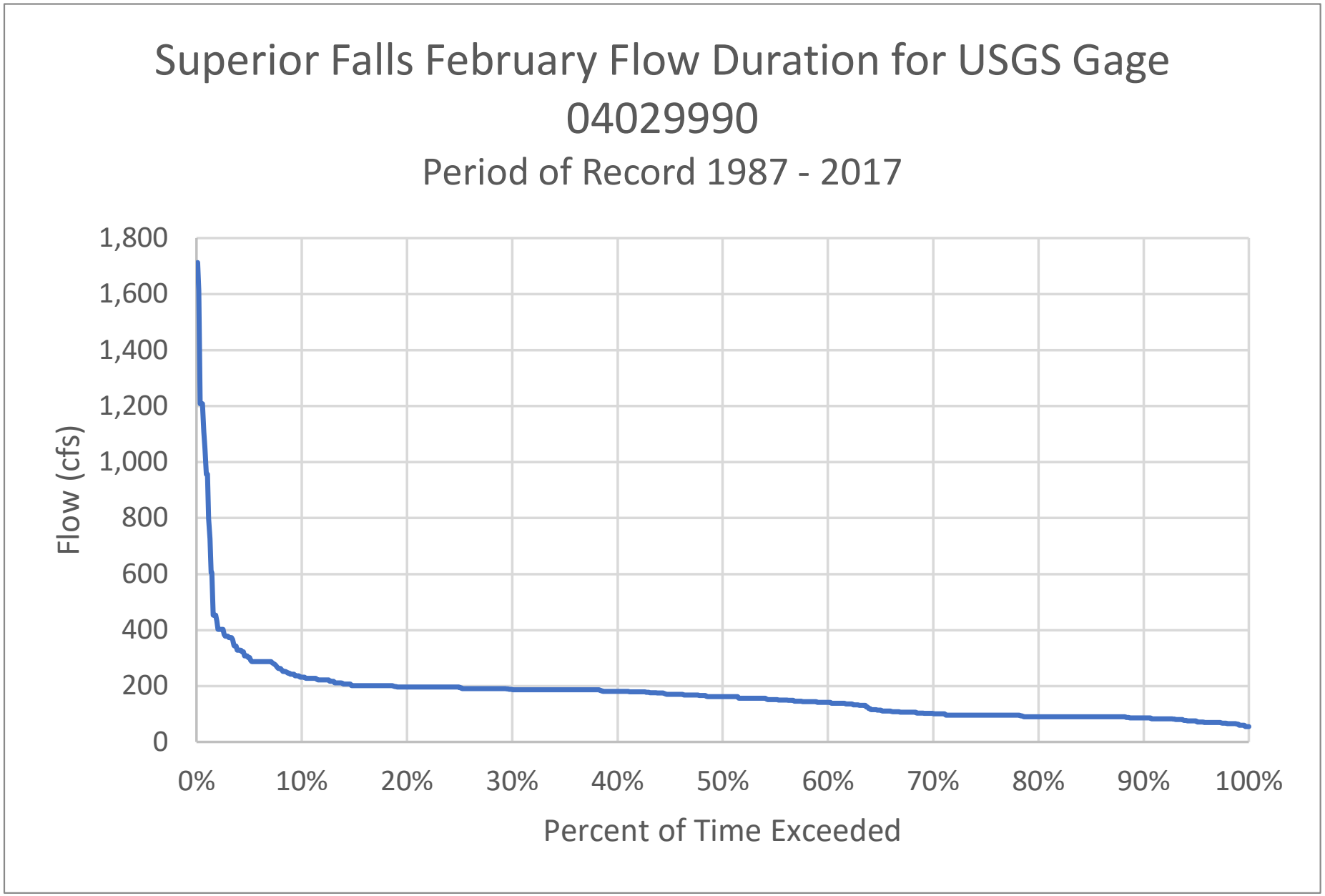
X:\240\010\158358.01\ECH\Saxon Falls and Superior Falls\Maps_DLA\SuperiorFalls\SuperiorFalls_Facilities_ProposedBoundary_DLA.mxd

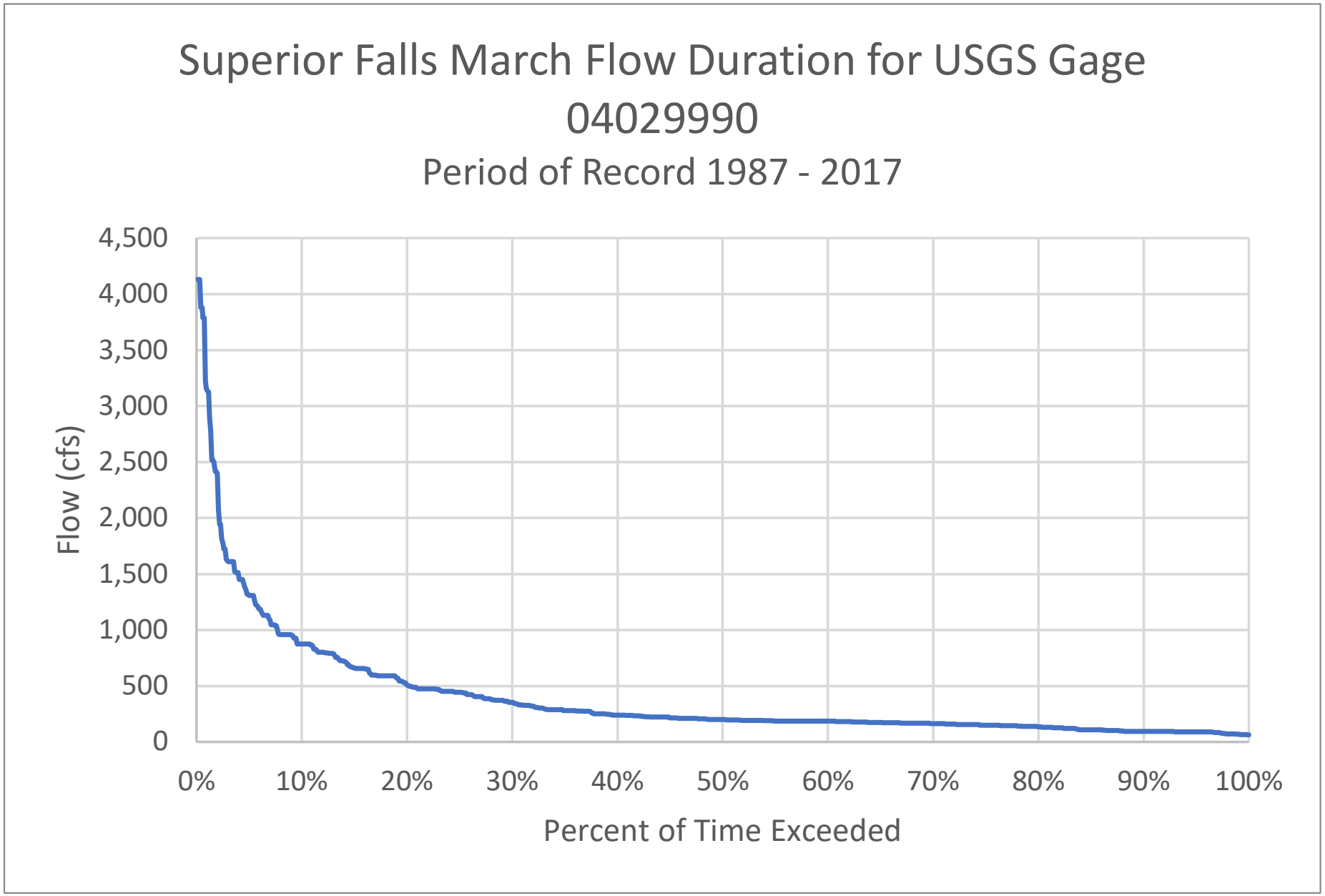
APPENDIX A-7 Superior Falls Flow Duration Curves

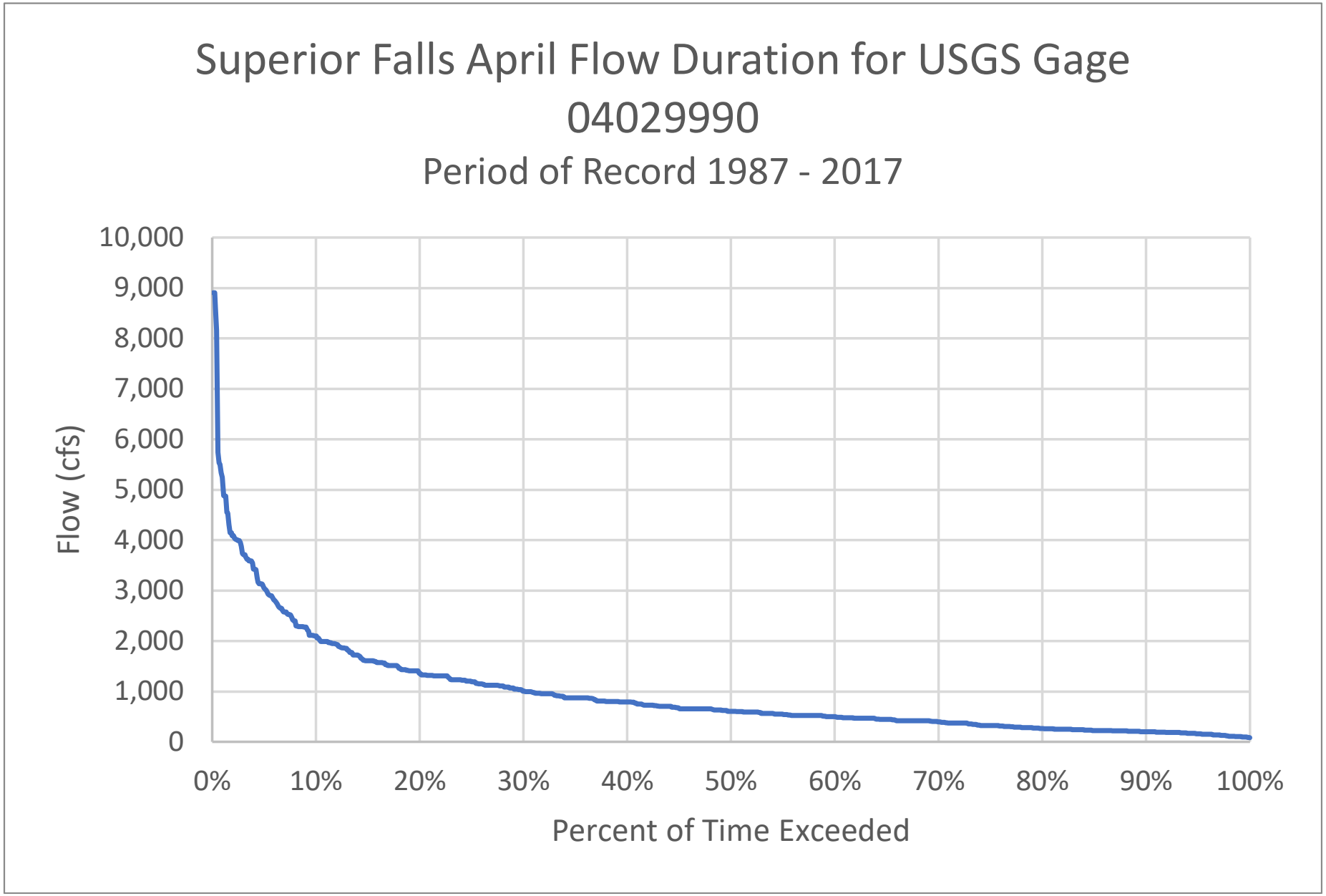
Superior Falls Flow Duration for USGS Gage 04029990 (Period of Record 1986 - 2017)

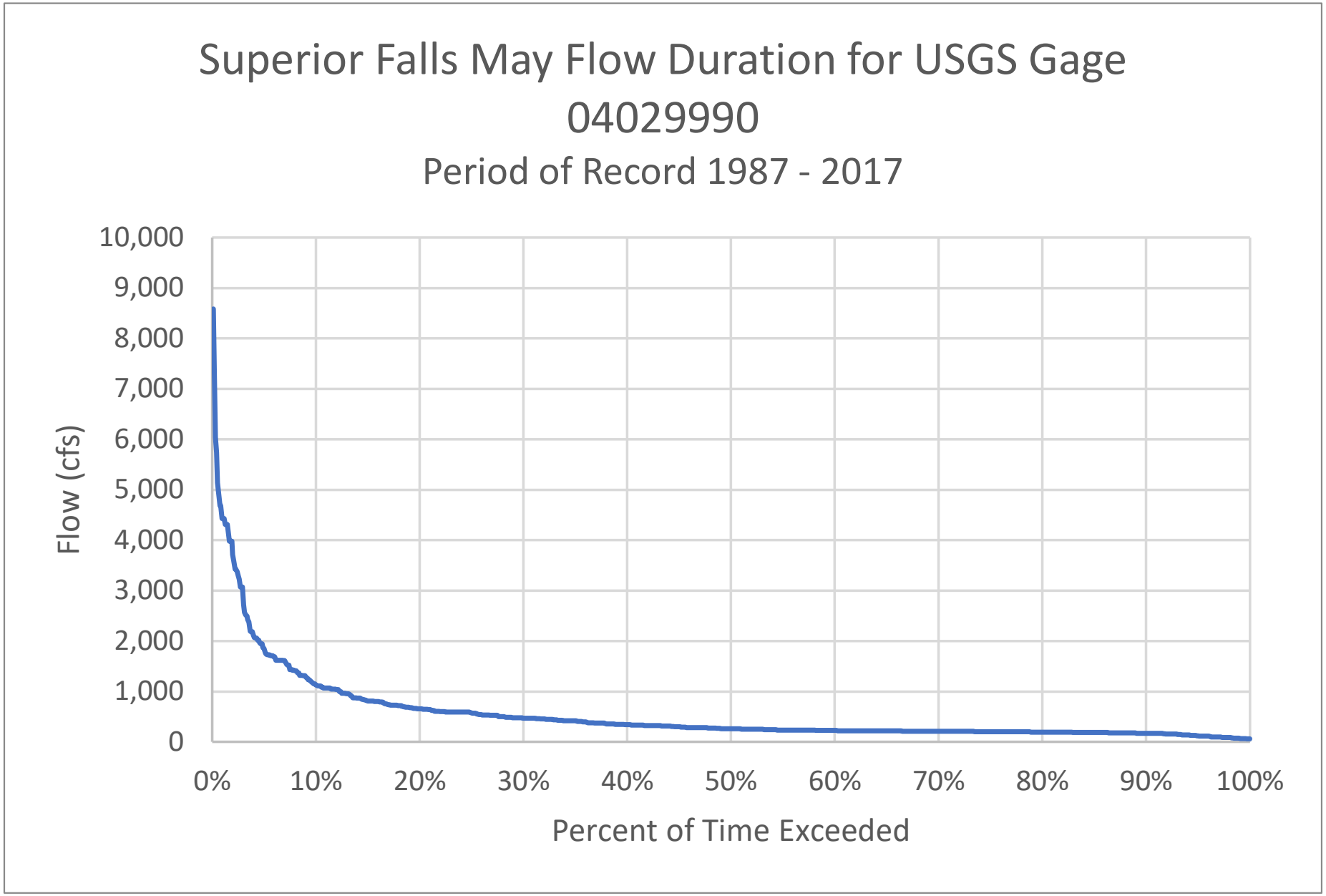
Percent of Time	January	February	March	April	May	June	July	August	September	October	November	December
95	81	76	90	161	121	101	71	50	42	53	83	78
90	88	86	96	202	172	126	96	60	50	60	95	84
85	96	90	111	228	186	141	101	76	55	67	101	91
80	102	91	136	271	196	155	107	86	60	72	107	100
75	109	96	150	327	202	166	116	96	65	81	116	111
70	121	102	162	398	207	173	126	101	71	90	126	124
65	138	114	174	443	217	181	141	106	81	101	134	132
60	146	141	186	499	227	191	156	111	89	113	149	149
55	156	151	186	549	237	200	166	116	96	126	167	156
50	162	162	200	605	262	202	184	121	101	141	186	163
45	168	171	217	675	301	212	191	136	111	161	196	171
40	176	181	242	791	338	222	207	151	121	177	202	185
35	181	186	282	877	423	227	217	166	136	196	212	186
30	186	188	353	1003	474	242	227	186	150	222	227	196
25	186	196	443	1189	574	262	237	207	181	242	252	207
20	196	196	514	1360	655	307	262	222	202	292	287	222
15	207	202	665	1612	811	403	288	237	234	343	328	237
10	222	232	877	2096	1129	504	378	267	257	423	418	302

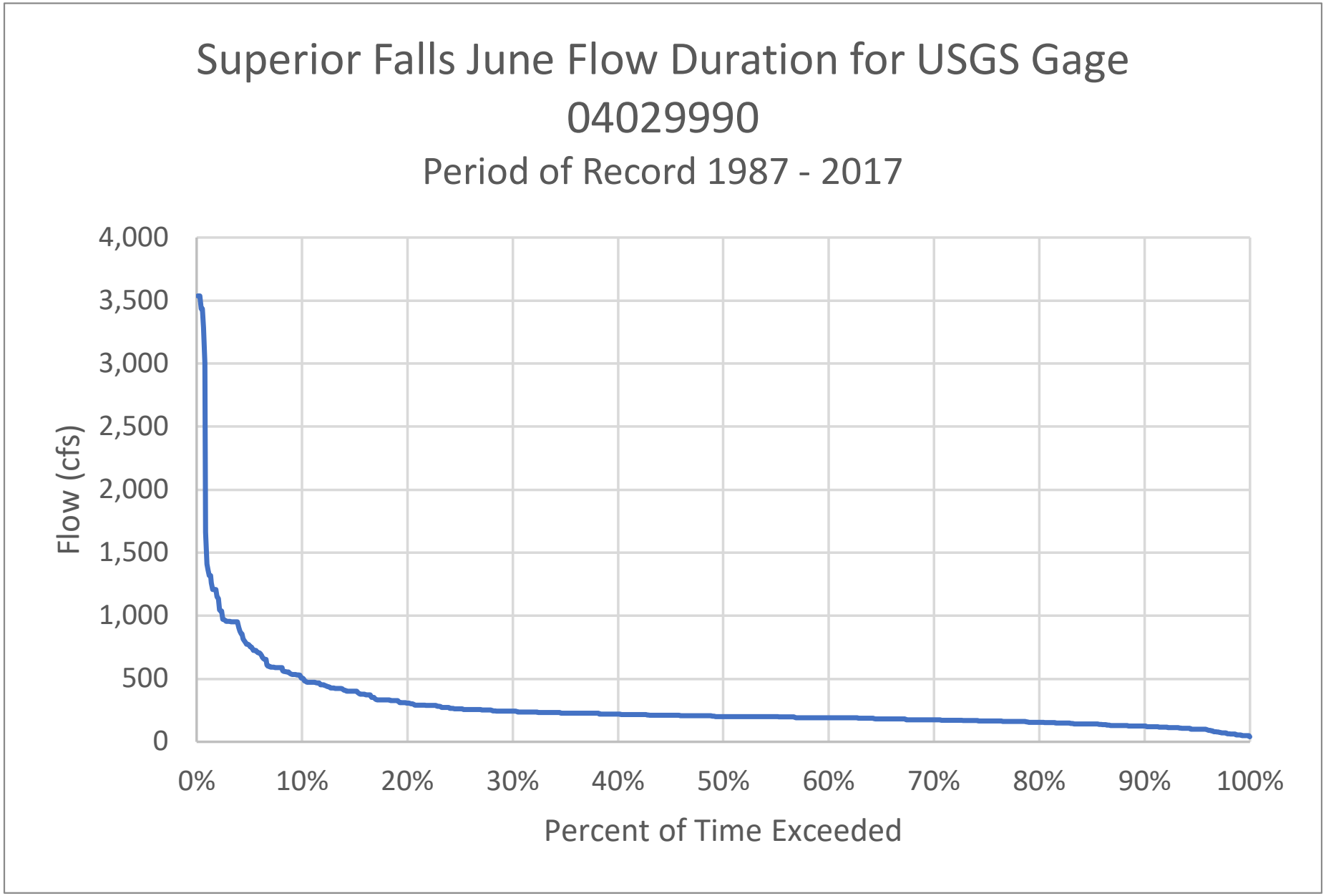

Superior Falls January Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
500
450
400
350
300
250
200
150
100
50
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

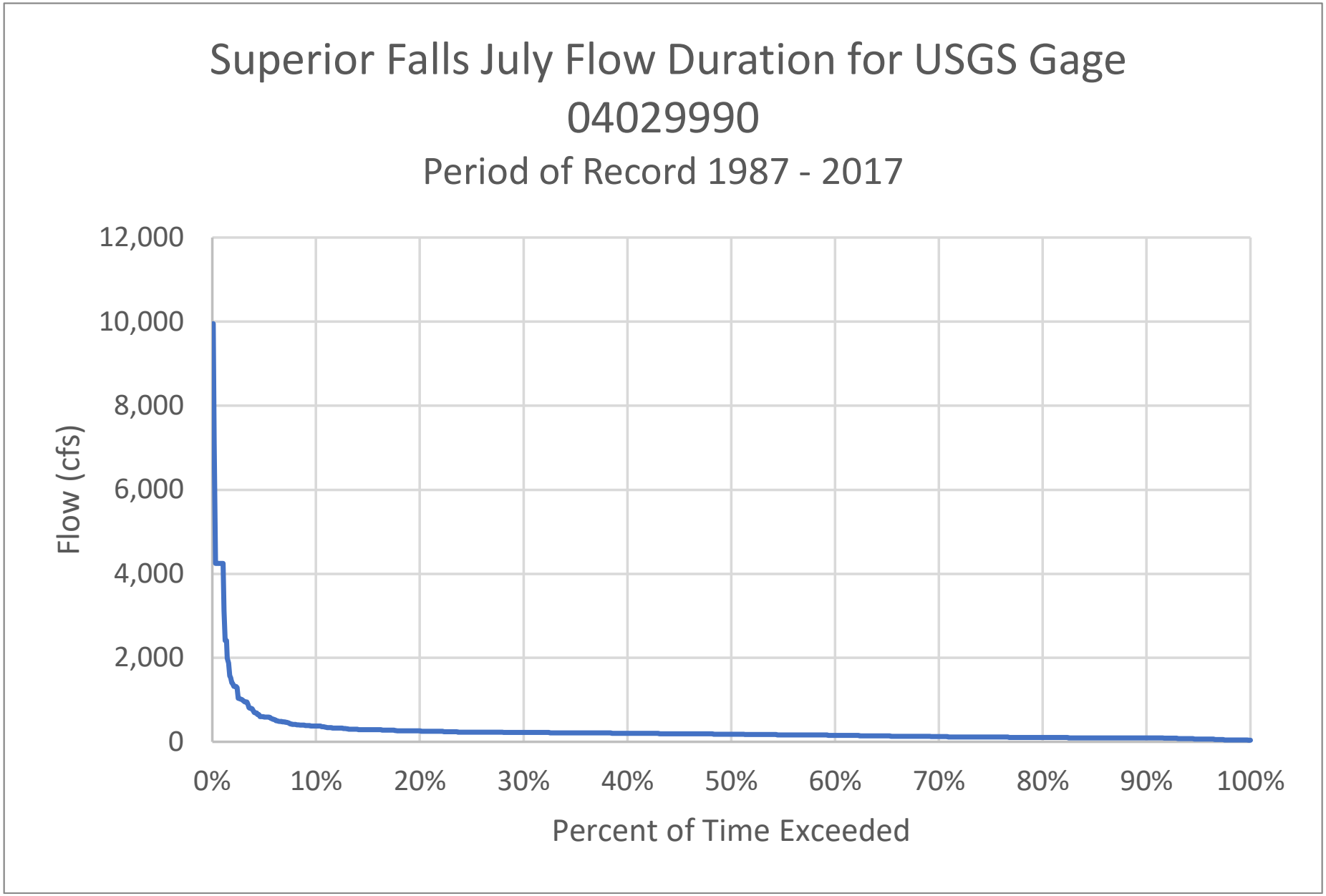

Superior Falls February Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

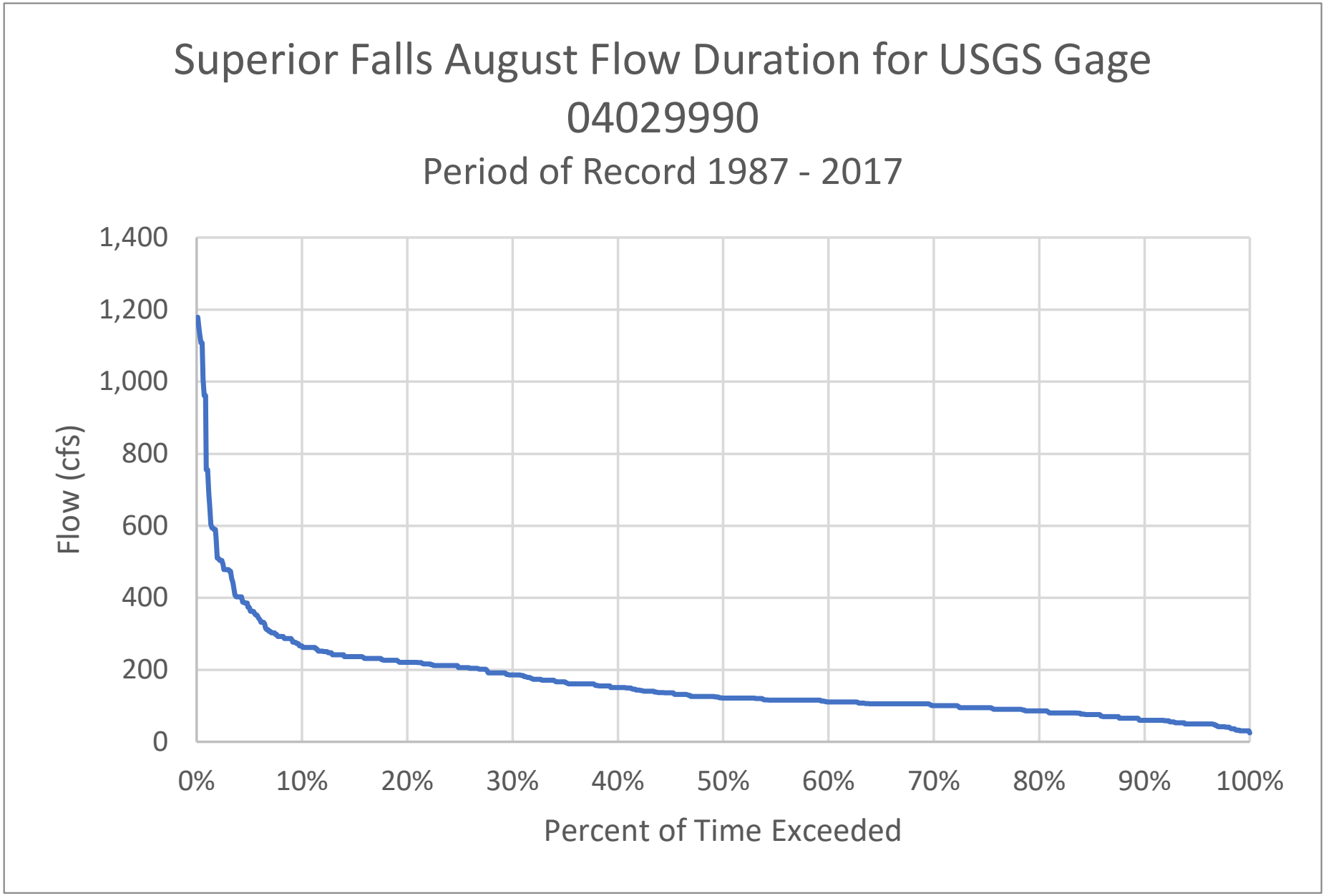

Superior Falls March Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

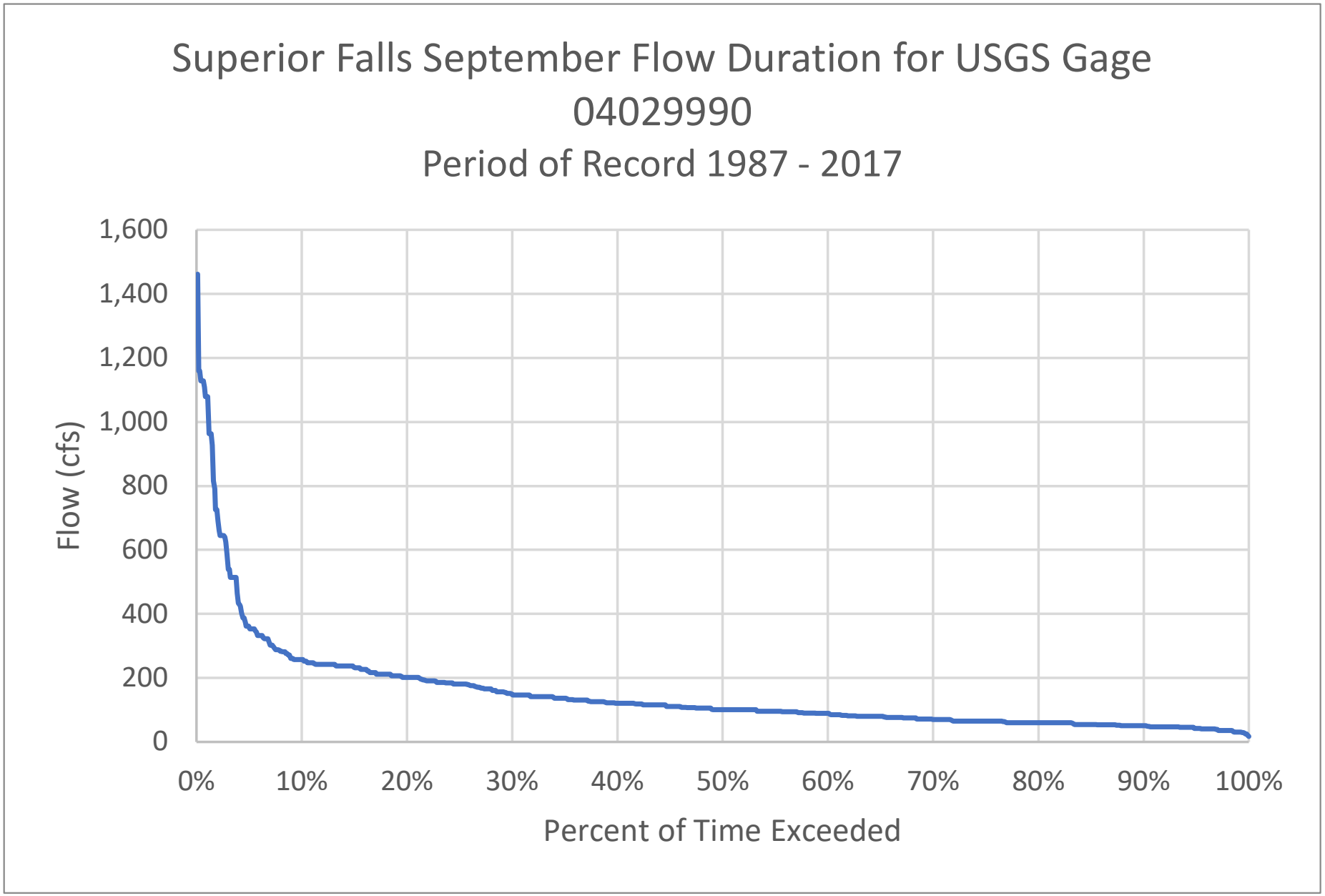

Superior Falls April Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

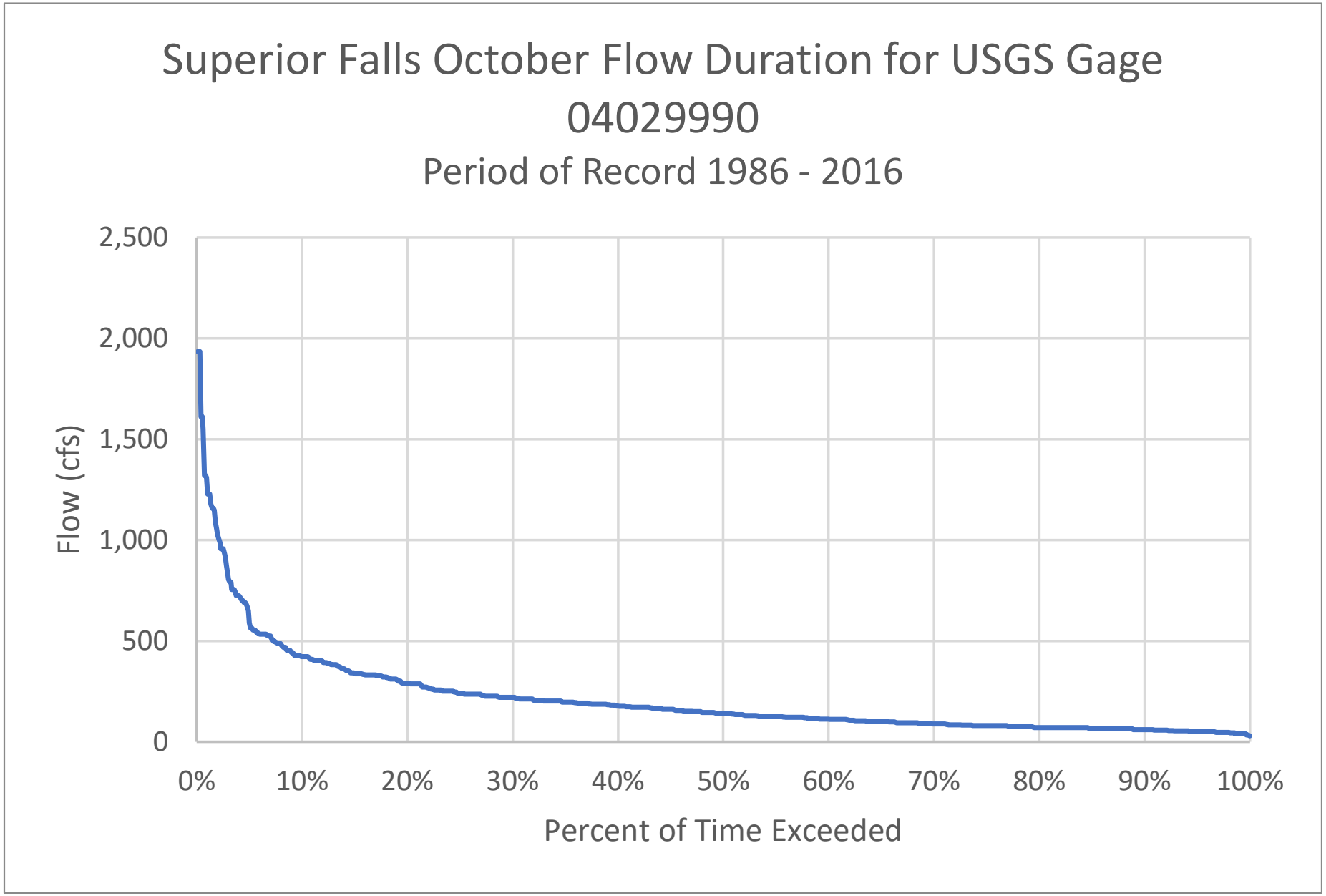

Superior Falls May Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

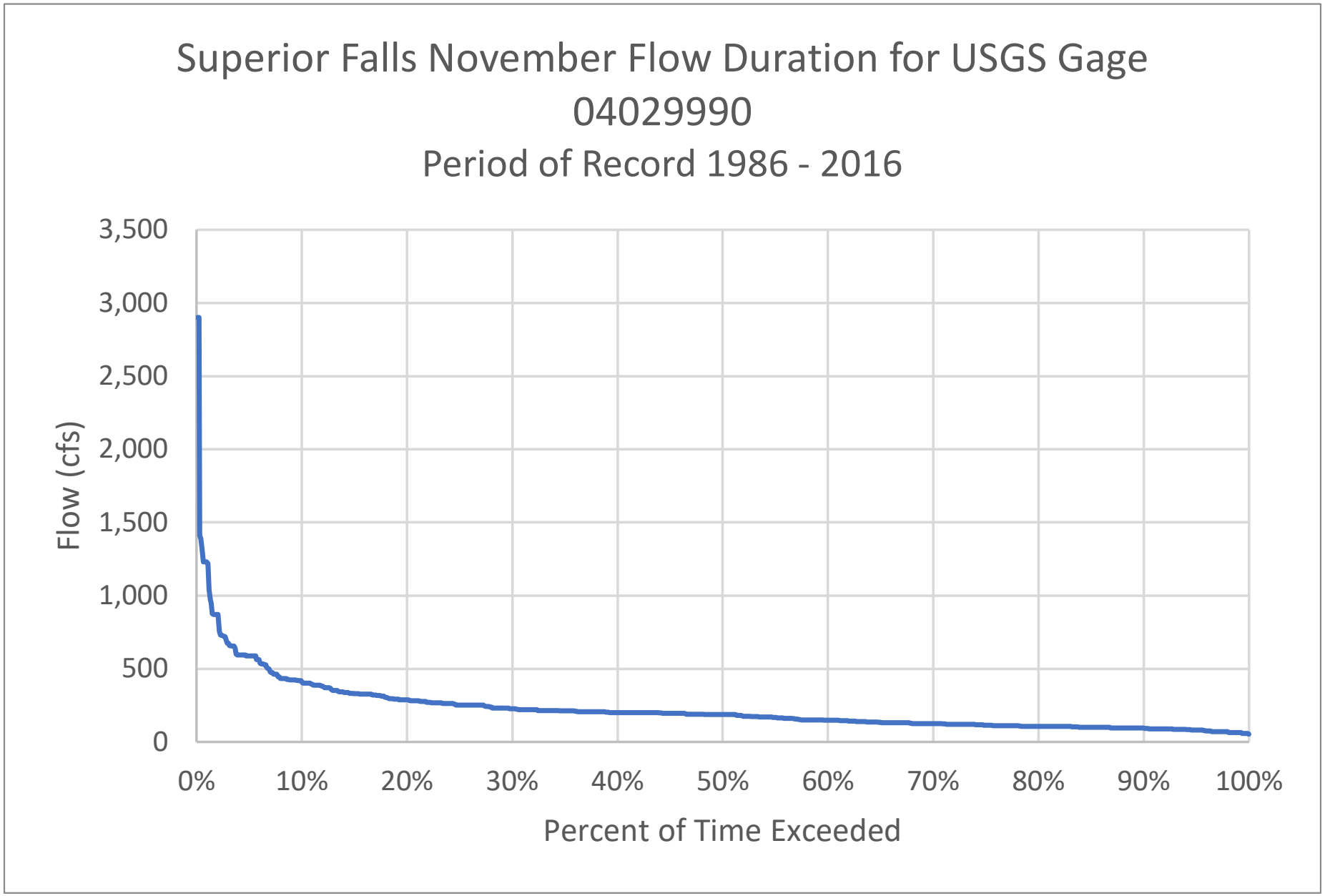

Superior Falls June Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

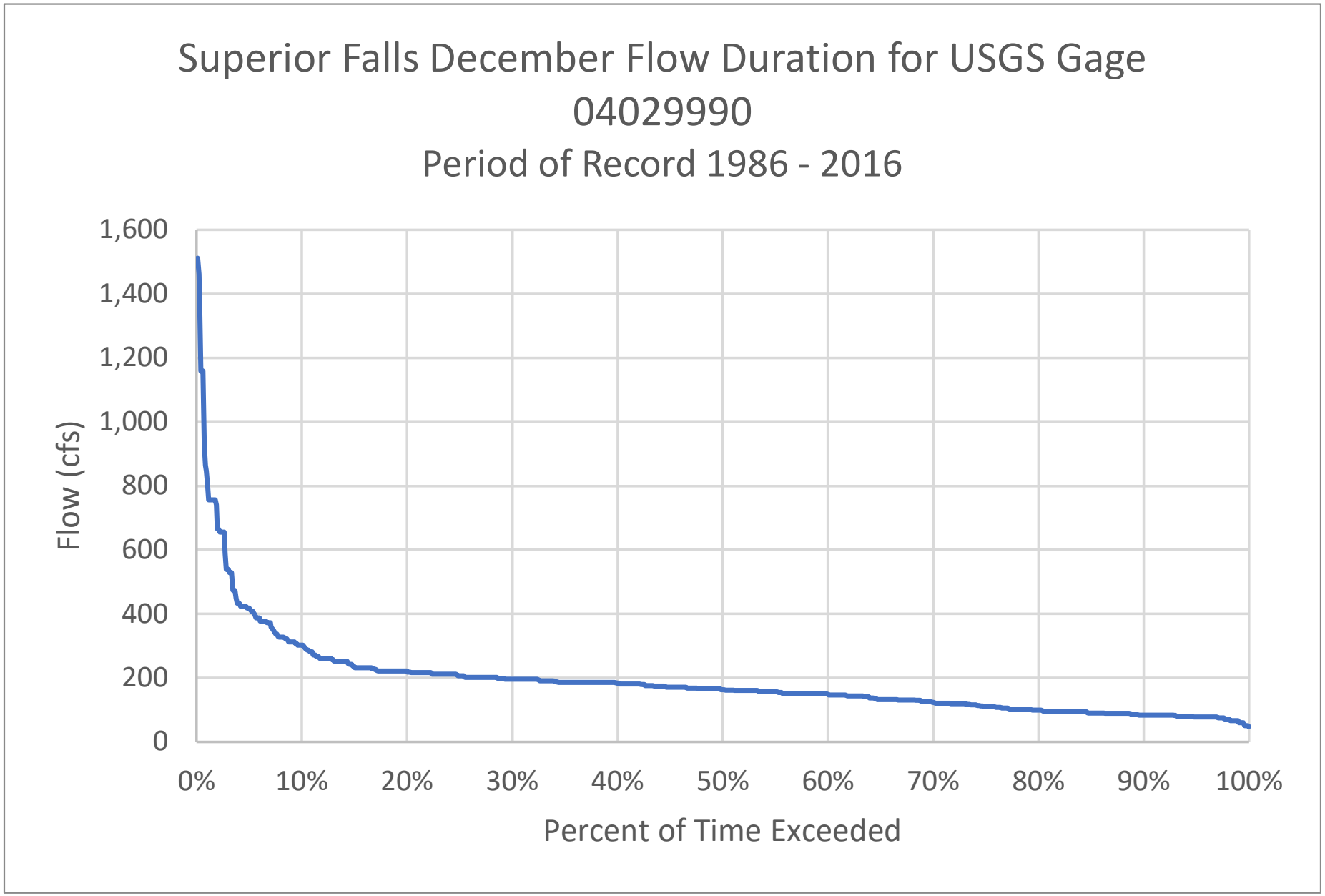

Superior Falls July Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
12,000
10,000
8,000
6,000
4,000
2,000
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Superior Falls August Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

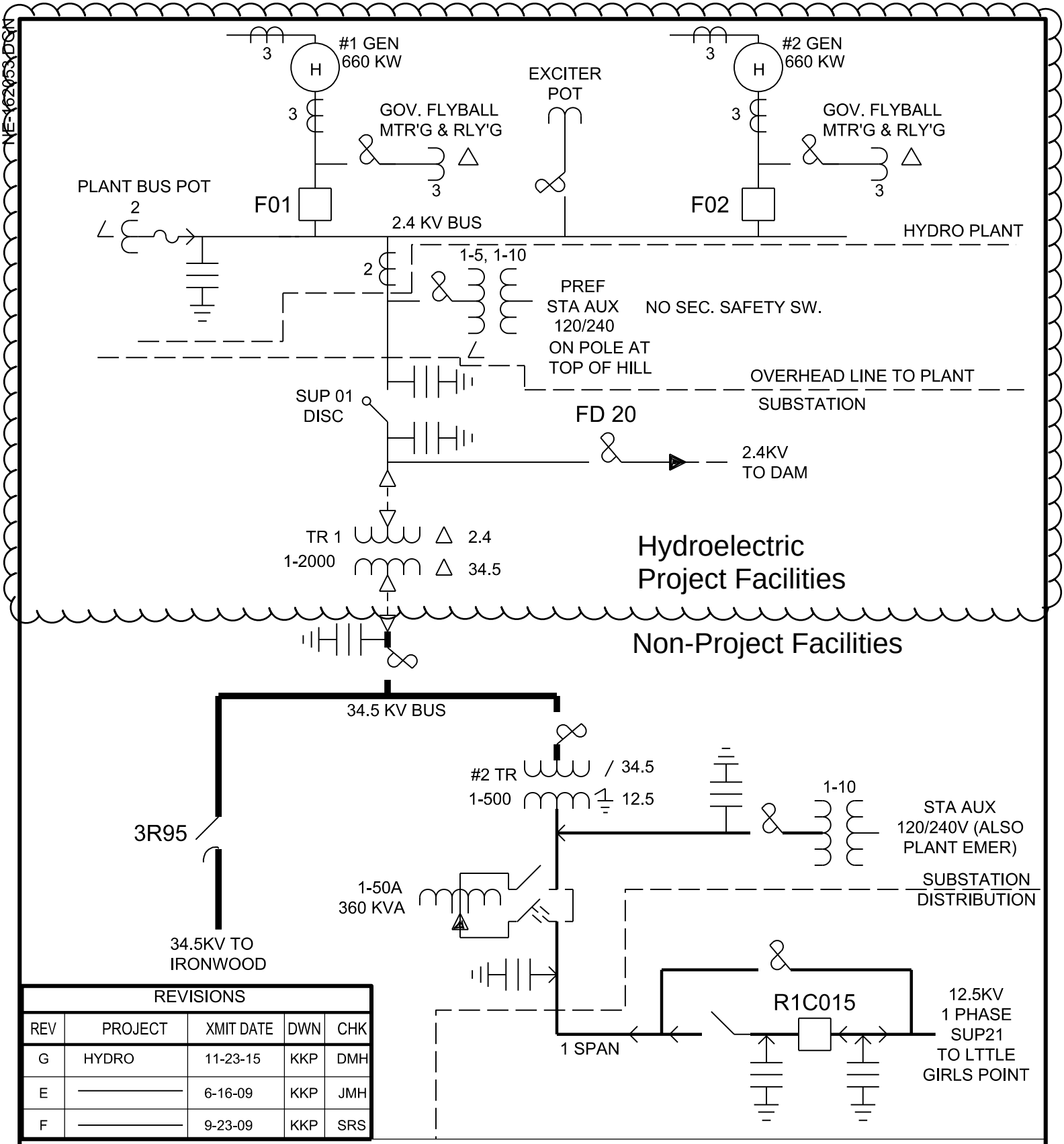

Superior Falls September Flow Duration for USGS Gage 04029990
Period of Record 1987 - 2017
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Superior Falls October Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Superior Falls November Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded


Superior Falls December Flow Duration for USGS Gage 04029990
Period of Record 1986 - 2016
Flow (cfs)
1,600
1,400
1,200
1,000
800
600
400
200
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent of Time Exceeded

APPENDIX A-8 Superior Falls One-line Diagram of Electrical Circuits



REVISIONS				
REV	PROJECT	XMIT DATE	DWN	CHK
G	HYDRO	11-23-15	KKP	DMH
E	———	6-16-09	KKP	JMH
F	———	9-23-09	KKP	SRS

SUPERIOR FALLS SUBSTATION

SUP

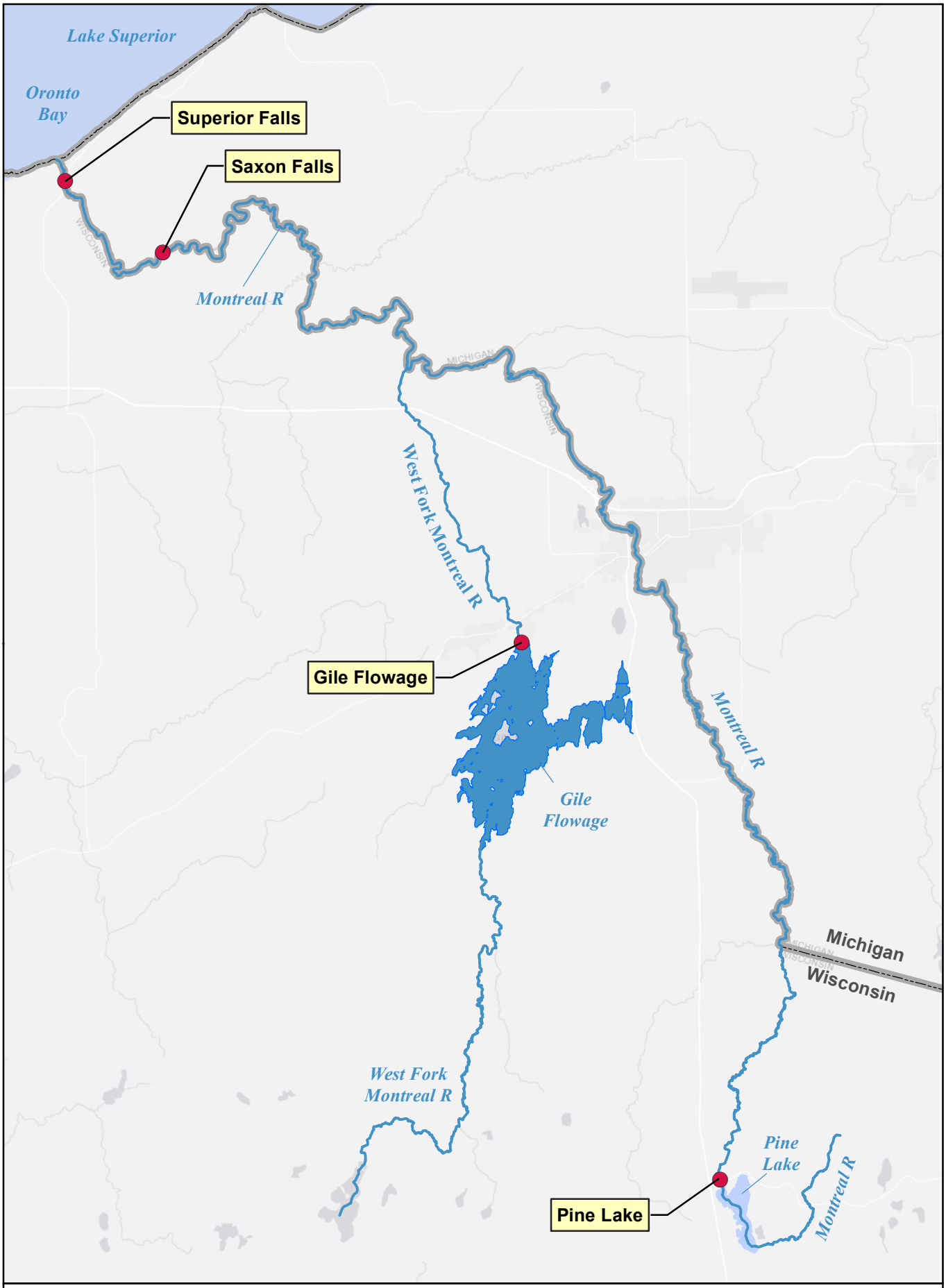
SUBSTATION OPERATING ONE-LINE DIAGRAM

Xcel Energy®

NE-162053

SCALE	REV
NONE	G

APPENDIX E-9 Regulated Dams on the Montreal River and West Fork of the Montreal River



Serivce Layer Credits: WDNR Surfae Water Data Viewer; Wisconsin DNR; Michigan GIS Open Data

Xcel Energy®

Mead & Hunt

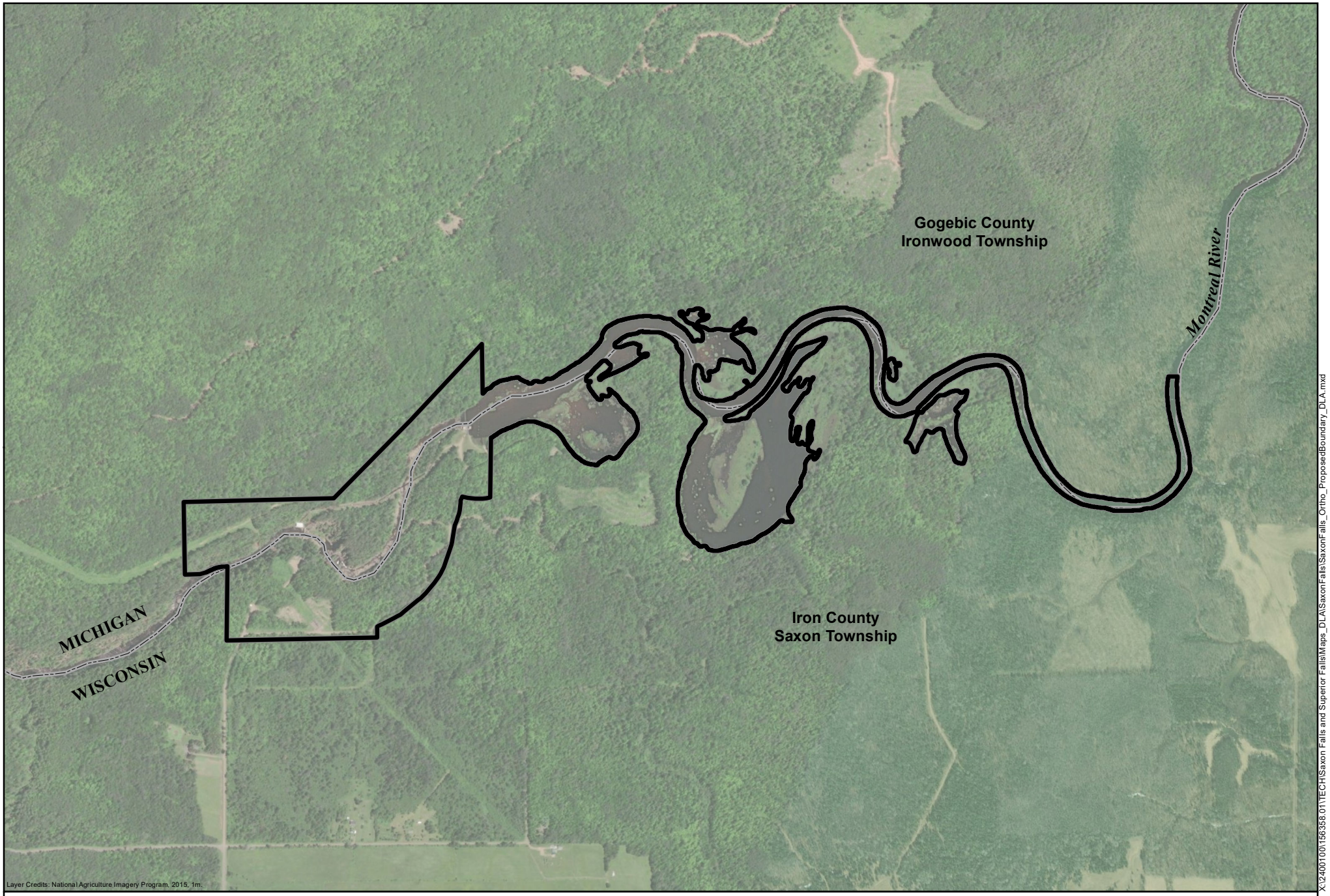
State Boundary
Dam Location
River

N

0 1.5 3 Miles

Dams along the Montreal River and the West Fork of the Montreal River

APPENDIX E-10 Orthophotographic Map of Saxon Falls Project Area



Xcel Energy®

Mead & Hunt

Proposed Project Boundary

State Boundary

N

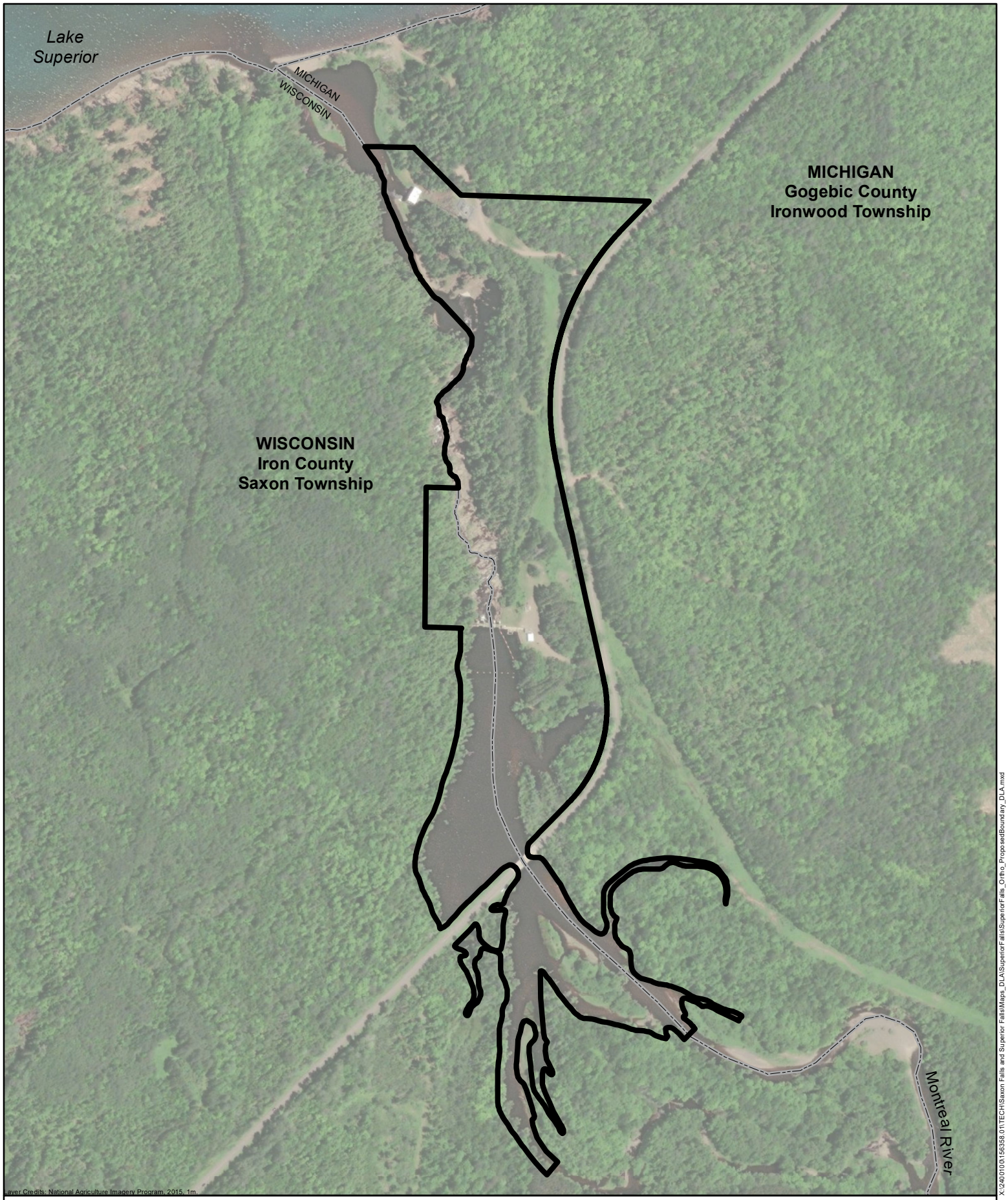
0 600 1,200 Feet

Saxon Falls Hydroelectric Project
Orthophotographic Map

FERC No. 2610

X:\2400100\156358.011\TECH\Saxon Falls and Superior Falls\Maps_DLA\SaxonFalls\SaxonFalls_Ortho_ProposedBoundary_DLA.mxd

APPENDIX E-11 Orthophotographic Map of Superior Falls Project Area



Xcel Energy®

Mead & Hunt

Proposed Project Boundary

State Boundary

N

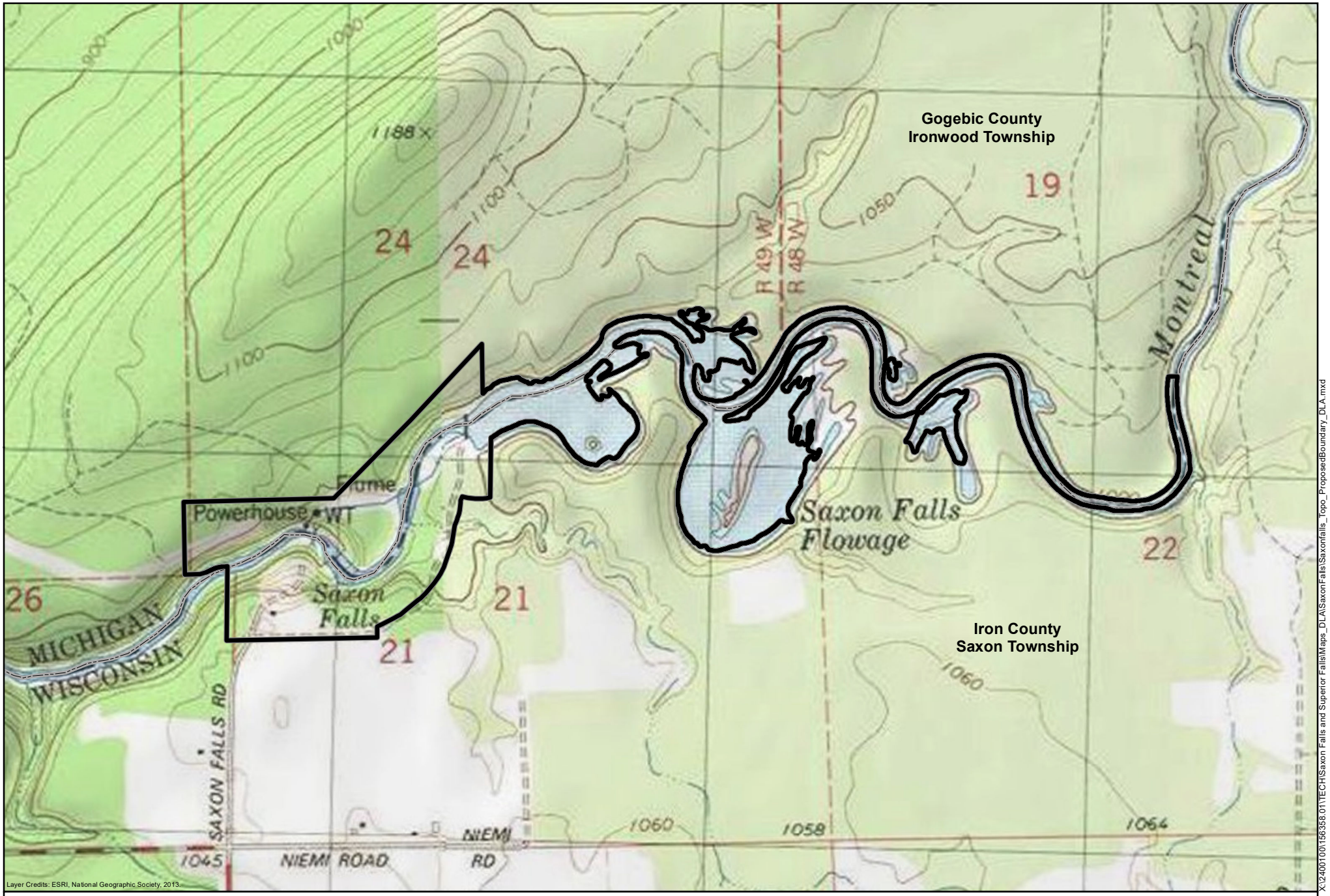
0 250 500 Feet

Superior Falls Hydroelectric Project
Orthophotographic Map

FERC No. 2587

X:\240\010\0156358.01\TECH\Saxon Falls and Superior Falls\Maps_DLA\SuperiorFalls\SuperiorFalls_Ortho_ProposedBoundary_DLA.mxd

APPENDIX E-12 Topographic Map of Saxon Falls Project Area



Xcel Energy®

Mead & Hunt

Proposed Project Boundary

State Boundary

N

0 600 1,200 Feet

Saxon Falls Hydroelectric Project
Topographic Map

FERC No. 2610

X:\2400100\156358.011\TECH\Saxon Falls and Superior Falls\Maps_DLA\SaxonFalls\Saxonfalls_Topo_ProposedBoundary_DLA.mxd

APPENDIX E-13 Topographic Map of Superior Falls Project Area

Xcel Energy®

Mead & Hunt

Proposed Project Boundary

State Boundary

N

0 250 500 Feet

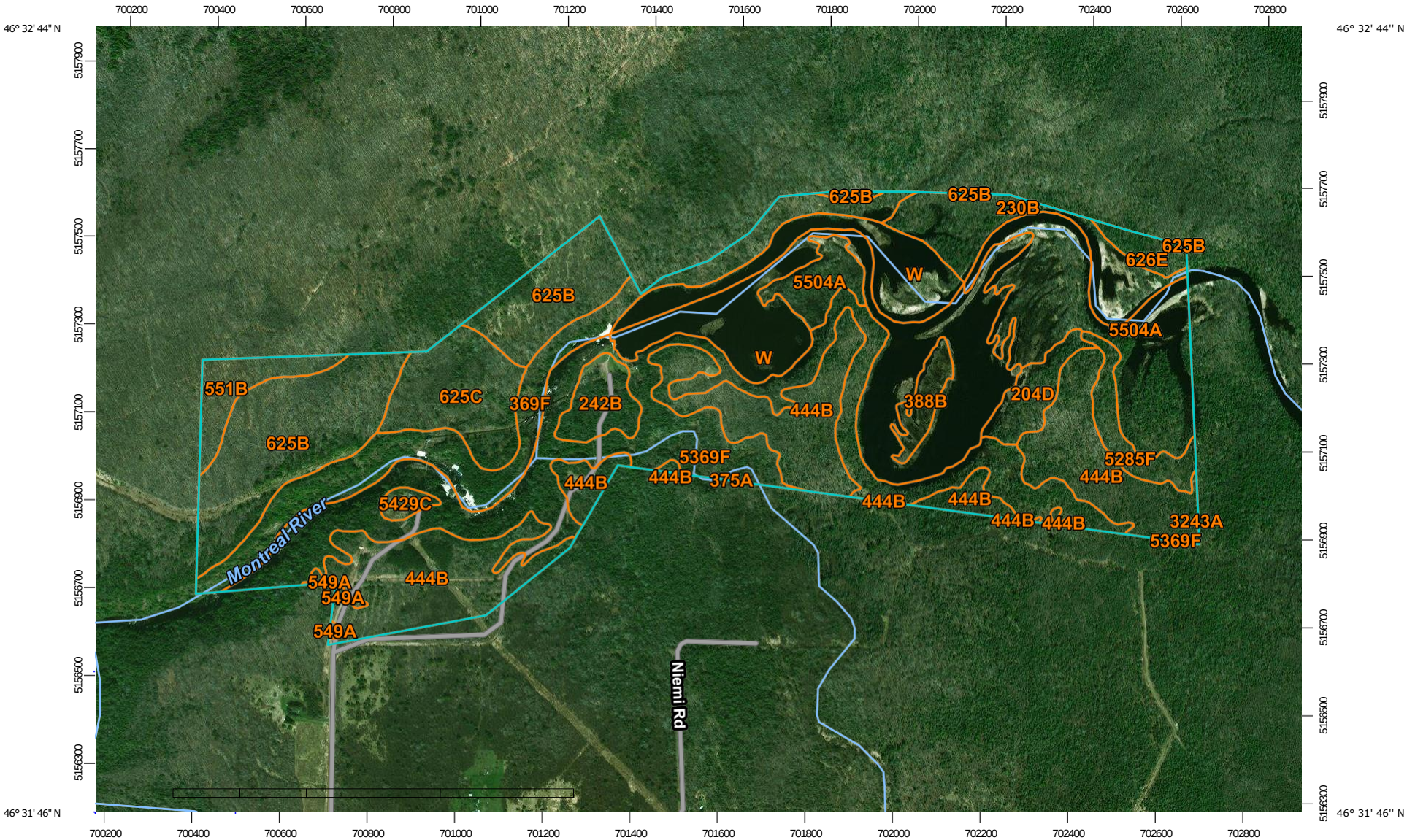
Superior Falls Hydroelectric Project
Topographic Map

FERC No. 2587

X:\240\010\156358.01\TECH\Saxon Falls and Superior Falls\Maps_DLA\SuperiorFalls\SuperiorFalls_Topo_ProposedBoundary_DLA.mxd

APPENDIX E-14 Saxon Falls Project Soil Report

Soil Map—Gogebic County, Michigan, and Iron County, Wisconsin
(Saxon Falls Vicinity Soils Report)



Map Scale: 1:12,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 150 300 600 900

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Gogebic County, Michigan
Survey Area Data: Version 10, Sep 11, 2018

Soil Survey Area: Iron County, Wisconsin
Survey Area Data: Version 14, Sep 11, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 28, 2014—Jul 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
230B	Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded	15.2	4.3%
369F	Michigamme-Schweitzer-Peshekee-Rock outcrop complex, 55 to 75 percent slopes, very stony	30.0	8.4%
551B	Gogebic-Dishno complex, 1 to 6 percent slopes, rocky, very stony	6.8	1.9%
625B	Fence very fine sandy loam, 0 to 6 percent slopes	41.9	11.7%
625C	Fence very fine sandy loam, 6 to 18 percent slopes	16.3	4.6%
626E	Sporley very fine sandy loam, 35 to 55 percent slopes	3.2	0.9%
W	Water	14.4	4.0%
Subtotals for Soil Survey Area		**127.9**	**35.7%**
Totals for Area of Interest		**357.7**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
204D	Denomie silt loam, 15 to 30 percent slopes	5.8	1.6%
242B	Fence silt loam, lake terrace, 0 to 6 percent slopes	6.3	1.8%
375A	Robago fine sandy loam, lake terrace, 0 to 3 percent slopes	0.0	0.0%
388B	Pelkie, occasionally flooded-Dechamps, frequently flooded complex, 0 to 4 percent slopes	3.9	1.1%
444B	Gichigami-Oronto complex, 0 to 6 percent slopes	65.7	18.4%
549A	Pickford-Oronto complex, 0 to 3 percent slopes	0.6	0.2%
3243A	Spear silt loam, lake terrace, 0 to 3 percent slopes	0.1	0.0%
5285F	Rockland-Arnheim, frequently flooded complex, 0 to 70 percent slopes	6.1	1.7%
5369F	Michigamme-Schweitzer-Peshekee-Rock outcrop complex, 55 to 75 percent slopes, very stony	61.2	17.1%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5429C	Gogebic-Peshekee complex, 6 to 18 percent slopes, very stony, very rocky	1.6	0.5%
5504A	Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded	36.7	10.3%
W	Water	41.9	11.7%
Subtotals for Soil Survey Area		**229.9**	**64.3%**
Totals for Area of Interest		**357.7**	**100.0%**

Gogebic County, Michigan								
Map symbol and soil name	**Pct. of map unit**	**Slope length (ft)**	**Hydrologic group**	**Kf**	**T factor**	**Representative value**		
						% Sand	**% Silt**	**% Clay**
230B—Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded								
Moquah, frequently flooded	55	295	A	.28	5	46.6	44.4	9.0
Arnheim, frequently flooded	30	426	B/D	.37	5	30.0	60.0	10.0
369F—Michigamme-Schweitzer-Peshekee-Rock outcrop complex, 55 to 75 percent slopes, very stony								
Michigamme, very stony	30	98	C	—	2	5.0	90.0	5.0
Schweitzer, very stony	25	98	C	.37	3	55.0	37.0	8.0
Peshekee, very stony	20	98	D	—	1	5.0	90.0	5.0
Rock outcrop	15	—	—	—	—	—	—	—
551B—Gogebic-Dishno complex, 1 to 6 percent slopes, rocky, very stony								
Gogebic, very stony	65	295	D	—	4	—	—	—
Dishno	30	246	C	—	3	—	—	—
625B—Fence very fine sandy loam, 0 to 6 percent slopes								
Fence	95	295	B/D	.49	5	53.9	41.1	5.0
625C—Fence very fine sandy loam, 6 to 18 percent slopes								
Fence	98	148	B/D	.49	5	53.9	41.1	5.0
626E—Sporley very fine sandy loam, 35 to 55 percent slopes								
Sporley	90	148	C	.37	5	53.9	41.1	5.0
W—Water								
Water	100	—	—	—	—	—	—	—

Iron County, Wisconsin								
Map symbol and soil name	**Pct. of map unit**	**Slope length (ft)**	**Hydrologic group**	**Kf**	**T factor**	**Representative value**		
						% Sand	**% Silt**	**% Clay**
204D—Denomie silt loam, 15 to 30 percent slopes								
Denomie	90	79	C	.37	5	34.3	51.7	14.0
242B—Fence silt loam, lake terrace, 0 to 6 percent slopes								
Fence	85	200	C	.49	5	14.2	74.8	11.0

Iron County, Wisconsin								
375A—Robago fine sandy loam, lake terrace, 0 to 3 percent slopes								
Robago	85	249	B/D	—	5	0.0	0.0	0.0
388B—Pelkie, occasionally flooded-Dechamps, frequently flooded complex, 0 to 4 percent slopes								
Pelkie	50	249	A	.37	5	83.0	9.0	8.0
Dechamps	30	249	A/D	.17	5	71.3	17.7	11.0
444B—Gichigami-Oronto complex, 0 to 6 percent slopes								
Gichigami	70	200	B/D	.32	5	34.3	51.7	14.0
Oronto	25	249	C/D	.28	5	17.5	51.5	31.0
549A—Pickford-Oronto complex, 0 to 3 percent slopes								
Pickford	60	249	D	.28	5	16.9	48.1	35.0
Oronto	30	249	C/D	.28	5	17.5	51.5	31.0
3243A—Spear silt loam, lake terrace, 0 to 3 percent slopes								
Spear	85	249	C/D	.49	5	30.1	57.4	12.5
5285F—Rockland-Arnheim, frequently flooded complex, 0 to 70 percent slopes								
Rockland	70	98	C	—	5	—	—	—
Arnheim	15	426	B/D	.43	5	36.0	54.0	10.0
5369F—Michigamme-Schweitzer-Peshekee-Rock outcrop complex, 55 to 75 percent slopes, very stony								
Michigamme, very stony	30	98	C	—	2	5.0	90.0	5.0
Schweitzer, very stony	25	98	C	.37	3	55.0	37.0	8.0
Peshekee, very stony	20	98	D	—	1	5.0	90.0	5.0
Rock outcrop	15	—	—	—	—	—	—	—
5429C—Gogebic-Peshekee complex, 6 to 18 percent slopes, very stony, very rocky								
Gogebic, very stony	79	148	D	—	4	—	—	—
Peshekee	15	98	D	—	1	—	—	—

Iron County, Wisconsin								
5504A—Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded								
Moquah, frequently flooded	55	295	A	.28	5	46.6	44.4	9.0
Arnheim, frequently flooded	30	426	B/D	.37	5	30.0	60.0	10.0

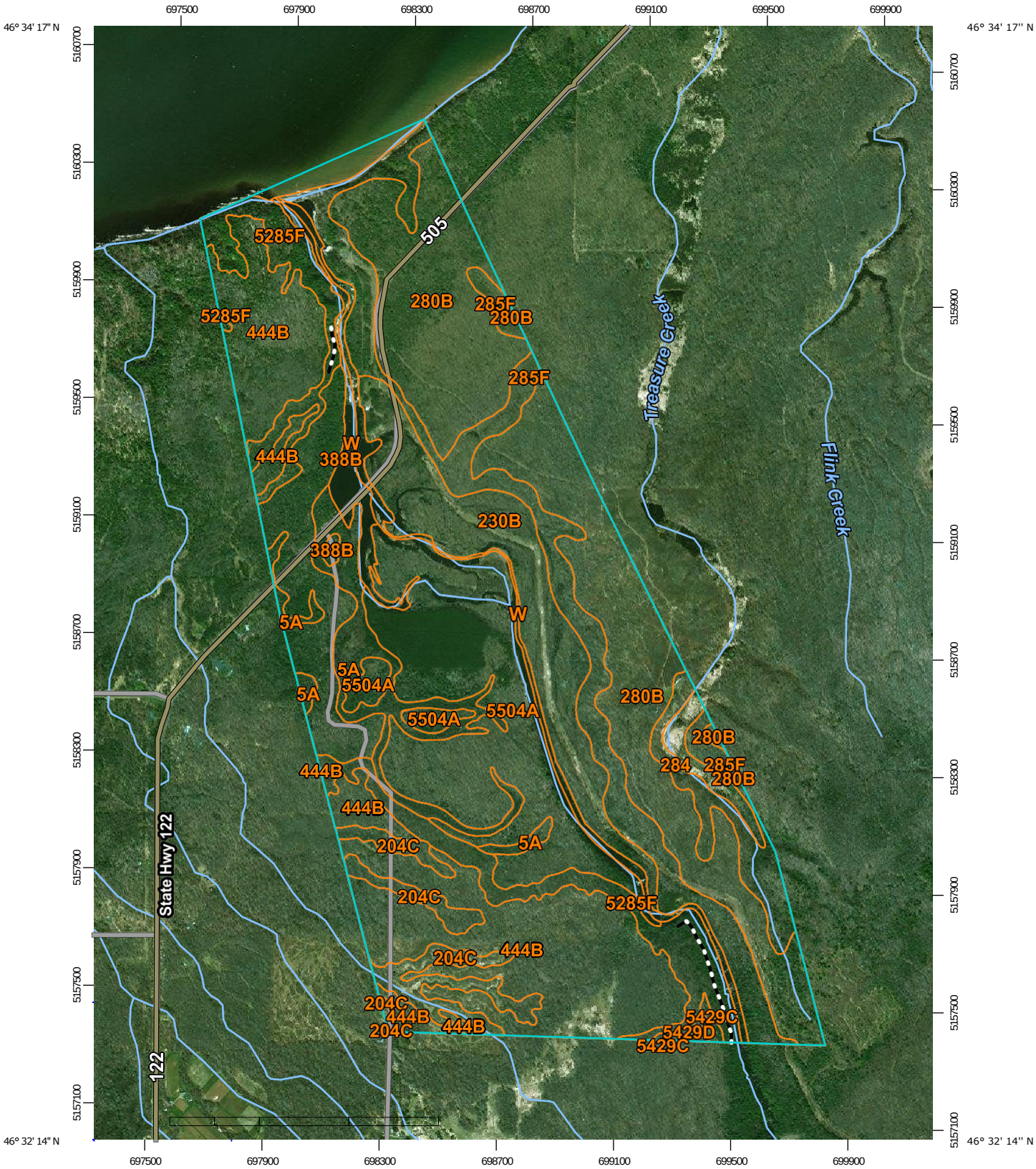
Description — RUSLE2 Related Attributes

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

APPENDIX E-15 Superior Falls Project Soil Report

Soil Map—Gogebic County, Michigan, and Iron County, Wisconsin
(Superior Falls Vicinity Soils Report)



Map Scale: 1:18,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 250 500 1000 1500

Feet: 0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:12,000 to 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Gogebic County, Michigan
Survey Area Data: Version 10, Sep 11, 2018

Soil Survey Area: Iron County, Wisconsin
Survey Area Data: Version 14, Sep 11, 2018

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Jul 27, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
230B	Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded	76.7	8.4%
280B	Flintsteel loam, 1 to 8 percent slopes	195.6	21.3%
284	Aquents, ponded-Gull Point, frequently flooded, complex, 0 to 1 percent slopes	8.5	0.9%
285F	Rockland-Arnheim, frequently flooded, complex, 0 to 70 percent slopes	114.9	12.5%
W	Water	17.8	1.9%
Subtotals for Soil Survey Area		**413.5**	**45.0%**
Totals for Area of Interest		**917.9**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5A	Arnheim mucky silt loam, 0 to 1 percent slopes, frequently flooded	39.3	4.3%
204C	Denomie silt loam, 6 to 15 percent slopes	29.6	3.2%
388B	Pelkie, occasionally flooded-Dechamps, frequently flooded complex, 0 to 4 percent slopes	49.4	5.4%
444B	Gichigami-Oronto complex, 0 to 6 percent slopes	164.0	17.9%
5285F	Rockland-Arnheim, frequently flooded complex, 0 to 70 percent slopes	63.1	6.9%
5429C	Gogebic-Peshekee complex, 6 to 18 percent slopes, very stony, very rocky	1.9	0.2%
5429D	Gogebic-Peshekee complex, 18 to 35 percent slopes, very stony, very rocky	2.9	0.3%
5504A	Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded	131.1	14.3%
W	Water	14.5	1.6%
Subtotals for Soil Survey Area		**495.9**	**54.0%**
Totals for Area of Interest		**917.9**	**100.0%**

Report — RUSLE2 Related Attributes

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed. Organic surface horizons are not displayed.

Gogebic County, Michigan

Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
230B—Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded								
Moquah, frequently flooded	55	295	A	.28	5	46.6	44.4	9.0
Arnheim, frequently flooded	30	426	B/D	.37	5	30.0	60.0	10.0
280B—Flintsteel loam, 1 to 8 percent slopes								
Flintsteel	85	295	C/D	—	3	5.0	90.0	5.0
285F—Rockland-Arnheim, frequently flooded, complex, 0 to 70 percent slopes								
Rockland	70	98	C	—	5	—	—	—
Arnheim	15	426	B/D	.43	5	36.0	54.0	10.0
W—Water								
Water	100	—	—	—	—	—	—	—

Iron County, Wisconsin

Map symbol and soil name	Pct. of map unit	Slope length (ft)	Hydrologic group	Kf	T factor	Representative value		
						% Sand	% Silt	% Clay
5A—Arnheim mucky silt loam, 0 to 1 percent slopes, frequently flooded								
Arnheim	85	249	B/D	.32	5	30.1	54.9	15.0
204C—Denomie silt loam, 6 to 15 percent slopes								
Denomie	85	151	C	.37	5	34.3	51.7	14.0
204D—Denomie silt loam, 15 to 30 percent slopes								
Denomie	90	79	C	.37	5	34.3	51.7	14.0
388B—Pelkie, occasionally flooded-Dechamps, frequently flooded complex, 0 to 4 percent slopes								
Pelkie	50	249	A	.37	5	83.0	9.0	8.0
Dechamps	30	249	A/D	.17	5	71.3	17.7	11.0

Iron County, Wisconsin								
444B—Gichigami-Oronto complex, 0 to 6 percent slopes								
Gichigami	70	200	B/D	.32	5	34.3	51.7	14.0
Oronto	25	249	C/D	.28	5	17.5	51.5	31.0
5285F—Rockland-Arnheim, frequently flooded complex, 0 to 70 percent slopes								
Rockland	70	98	C	—	5	—	—	—
Arnheim	15	426	B/D	.43	5	36.0	54.0	10.0
5504A—Moquah-Arnheim complex, 0 to 3 percent slopes, frequently flooded								
Moquah, frequently flooded	55	295	A	.28	5	46.6	44.4	9.0
Arnheim, frequently flooded	30	426	B/D	.37	5	30.0	60.0	10.0

Description — RUSLE2 Related Attributes

RUSLE2 Related Attributes

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factors Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic surface layer. .

APPENDIX E-16 Saxon Falls and Superior Falls Archaeological Survey Report (Public)

This appendix has been e-filed separately as privileged information.

APPENDIX E-17 **2021 Superior Falls Annual Erosion Survey & Wood Duck Nest Box Inspection**

1414 West Hamilton Avenue
PO Box 8
Eau Claire, WI 54702-0008

November 12, 2021

VIA Electronic Mail

Ms. Elle Gulotty
Michigan Dept. of Natural Resources
Marquette Service Center
1990 US-41 South
Marquette, MI 49855

Ms. Cheryl Laatsch
Wisconsin Dept. of Natural Resources
502 E. Mill Street
Beaver Dam, WI 54880

Subject: **Annual Shoreline Erosion Survey & Wood Duck Nest Box Inspection**
Superior Falls Hydro (FERC Project #2587)

Dear Ms. Gulotty and Ms. Laatsch:

This transmittal summarizes the results of the shoreline erosion survey and wood duck nest monitoring conducted at Superior Falls Flowage on August 16-17, 2021. Pursuant to Article 401, the licensee is required to monitor the shoreline for the presence of erosion. The survey was performed in conjunction with the wood duck nest monitoring (Article 410) and the invasive species monitoring (Article 409). The invasive species report was previously filed under separate cover.

There have been no discernable changes in the extent of the erosion over the last five years. **Attachment A** includes an aerial photograph of Superior Falls Flowage that depicts the approximate location of the three minor erosion sites. Corresponding photographs of the erosion from this year are included in **Attachment B**. Note that we do not have photographs of erosion site #2; however, there were no significant changes in the severity of the erosion at this location from the previous year. These erosion sites are the result of significant runoff events rather than from project operations. We will continue to monitor the sites for significant changes.

The wood duck nesting boxes were also inspected at the time of the shoreline erosion survey. Sites A, C and D showed no evidence of nesting while Site B featured a fully developed nest. See Attachment A for an aerial photograph depicting the locations of the nesting sites. **Attachment C** includes photographs that document the evidence of nesting. Note that predator guards were installed this year per the recommendation of the MDNR.

Should you have any questions regarding our findings, feel free to contact me by telephone at (715) 737-1353 or by e-mail at matthew.j.miller@xcelenergy.com.

Sincerely,

Matthew J. Miller

Digitally signed by Matthew J. Miller
DN: cn=Matthew J. Miller, o=Xcel Energy, ou=Energy Supply, email=matthew.j.miller@xcelenergy.com, c=US
Date: 2021.11.12 11:42:17 -06'00'

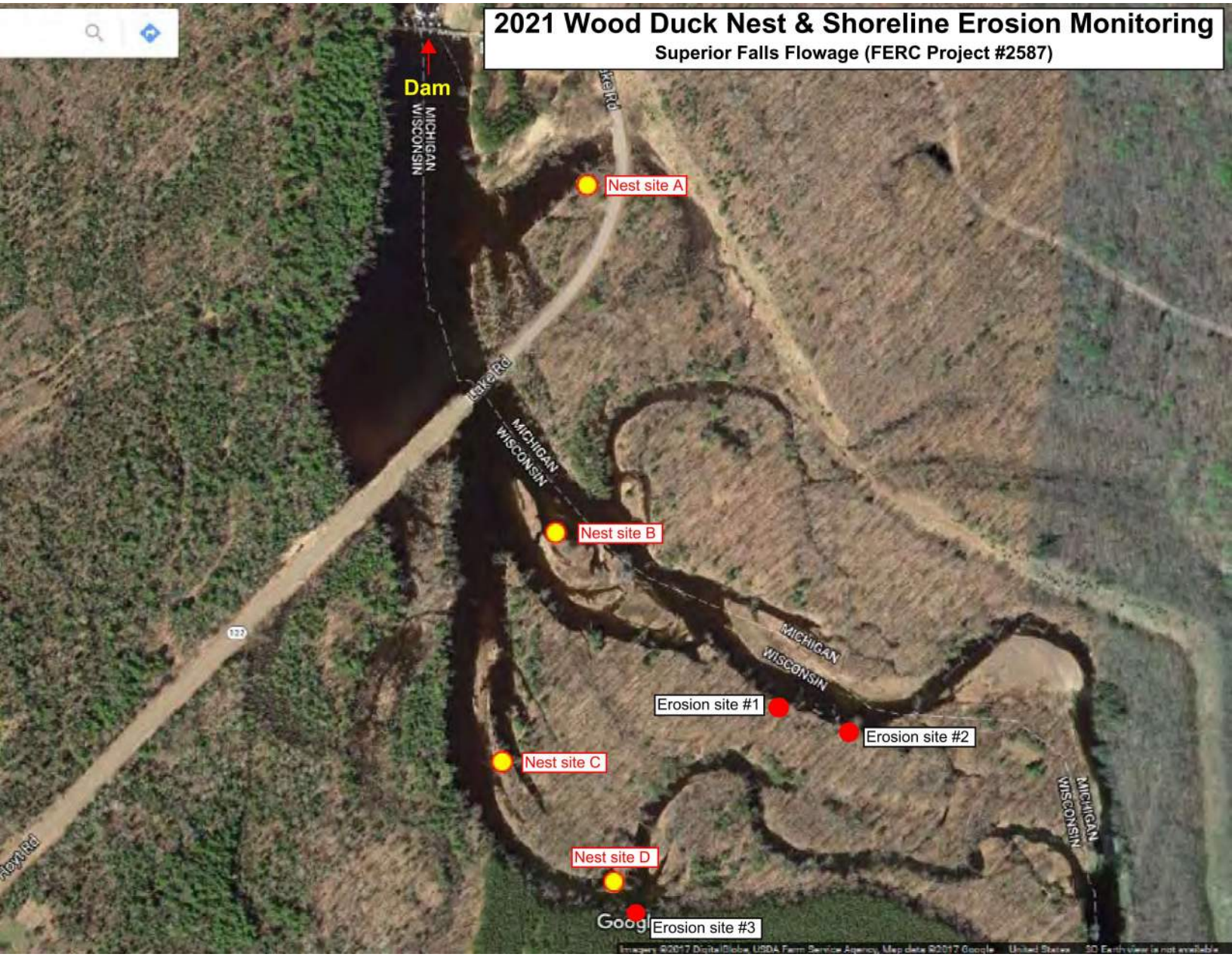
Matthew J. Miller
Hydro License Compliance Consultant

Attachments

c: Shawn Puzen, Darrin Johnson – Mead & Hunt (via e-mail)
Scott Crotty, Brey Maurer – Xcel Energy (via e-mail)
Project Files

Attachment A

Aerial Photograph of Superior Falls Flowage with Erosion and Wood Duck Box Nesting Sites


2021 Wood Duck Nest & Shoreline Erosion Monitoring
Superior Falls Flowage (FERC Project #2587)
Dam
MICHIGAN
WISCONSIN
Nest site A
Nest site B
Nest site C
Nest site D
Erosion site #1
Erosion site #2
Erosion site #3
122
Hoyt Rd

Attachment B

Photographs of Erosion Sites


Erosion Site #1


Erosion Site #3

Attachment C

Photographs of Wood Duck Nesting Boxes


Nest Site A


Nest Site B


Nest Site C


Nest Site C


Nest Site D


Nest Site D

APPENDIX E-18 Saxon Falls and Superior Falls ATIS Study Report

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Aquatic and Terrestrial Invasive Species Study Report

Xcel Energy
Saxon Falls and Superior Falls Hydroelectric Projects
Saxon, Wisconsin
GAI Project Number: R210322.00
| FERC Nos. 2610 and 2587
September 2021

Prepared by: GAI Consultants, Inc.
3313 S Packerland Drive, Suite E
DePere, Wisconsin 54115

Prepared on behalf of:
Mead & Hunt
1345 North Road B
Green Bay, Wisconsin 54313

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Mary Rohde
Senior Environmental Manager / Associate

Table of Contents

1.0 Project Overview

The Saxon Falls and Superior Falls Hydroelectric Projects (Projects), Federal Energy Regulatory Commission (FERC) Nos. 2610 and 2587, located on Montreal River in Iron County, Wisconsin is owned, operated, and maintained by Northern States Power Company – Wisconsin (Licensee), d/b/a Xcel Energy. The current license expires on December 31, 2024, and as part of relicensing, the Licensee completed an invasive species study to identify the presence and extent of aquatic and terrestrial invasive species. On the behalf of Mead & Hunt, GAI is pleased to submit the results of an Aquatic and Terrestrial Invasive Species (ATIS) Study conducted June 23, 24, and 25, and August 16, 17, and 18, 2021 (Study) to fulfill this request. This Study report provides baseline data on native species and aquatic and terrestrial invasive species and includes:

- Aquatic plant surveys – two sampling events conducted in June and August,
- Water samples – collected during the August survey,
- Sediment samples – collected during the August survey, and
- Terrestrial upland survey – conducted during the August survey.

2.0 Introduction

Forming the western border of the Upper Michigan Peninsula as it meets Wisconsin, the Montreal River is home to two of the tallest waterfalls in the Upper Midwest and is considered one of the premier, advanced whitewater runs in the area. It is one of only a few rivers in Wisconsin that flows north, emptying into Lake Superior at its mouth. Much of the watershed remains undeveloped, though historically it was strongly influenced by mining in the area. Water quality remains good, and the 226 square mile watershed supports several class I and II trout streams and excellent fish and aquatic life condition.

Invasive species pose one of the main threats to aquatic systems. They are defined as non-native species that, when introduced cause, or are likely to cause, harm to the environment, human health, or the economy. Invasive plant species can displace native populations, impair boating, reduce wildlife habitat, and cause nutrient imbalance. Once established within the Project boundary, invasive species can be transferred downstream through water releases or from areas outside of the Project boundary by recreationists and migrating wildlife.

This ATIS Study was conducted to assess the presence of known species and identify any new invasive species in the Project area. The Study encompassed portions of the Montreal River within the Saxon and Superior Hydroelectric Project boundaries and included aquatic and terrestrial plants and select aquatic invertebrates. The Project boundary is located within the Township of Saxon, Iron County, Wisconsin and Township of Ironwood, Gogebic County, Michigan (Figure 1). This report summarizes the results of the 2021 aquatic and terrestrial plant surveys, water samples, and sediment samples.

3.0 Methodology

Prior to performing the field work, GAI reviewed known species and historic status of the Project. Until this Study, only limited information was available regarding invasive species within the Project boundaries. WDNR indicated that banded mystery snails (*Vivaparus geogianus*), narrow leaf cattail (*Typha angustifolia*), and reed canary grass (*Phalaris arundinacea*) have been observed at the Saxon Falls Project in 2011. At Superior Falls, the impoundment is surveyed for purple loosestrife (*Lythrum salicaria*) annually by the Licensee, first being documented in 2020 (WDNR 2020).

3.1 Upstream and Downstream Inundated Areas

3.1.1 Aquatic Plant Survey

Aquatic plants were sampled approximating the WDNR Point-Intercept protocols as listed in *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin* (WDNR 2019). Two sample events were completed: one on June 23-25 and one on August 16-18, 2021. The WDNR provided a grid of sample points for each Saxon Falls and Superior Falls to follow for this method (Figures 2 and 3). The grid used within the Saxon Falls Project area had 167 sample points and the Superior Falls Project area had 162 points distributed evenly throughout the waterway. Each sampling point was located using a boat and a Trimble R1 GNSS Receiver and was assessed for sample ability (Attachments A, B, C, and D).

Points that could not be sampled were cataloged as following:

- Non-navigable (thick emergent plant growth, shallow water, or safety),
- Terrestrial (point intercept located in an upland area), and
- Obstacle (rocks or fallen trees).

Points were sampled using a double-sided rake, mounted on a pole, by lowering the rake to rest lightly on the river bottom, twisted twice, then raised straight up out of the water. At each sampled point aquatic plant species presence and density (Figures 4, 5, 6 and 7) were collected. Plant density was measured by rake fullness (Figure 8). Maximum depth of colonization (MDC) was determined by three empty rake retrievals in three different areas at the same depth. Once MDC was determined, points where water depth was greater than MDC were not sampled. Additional plants not collected on the rake sample but visible within 6 feet of the sample point were recorded as a visual sighting on the datasheets.

Areas not captured by the point intercept grid were monitored for the species listed in the WDNR aquatic invasive rapid response species list (WDNR 2016). No permanent vouchers were collected. Observation of one new species, yellow iris (*Iris pseudacorus*), was reported to the WDNR and Mead & Hunt via email using photos, GPS location, and WDNR form 3200-125 (Attachments E and F). Specimens were collected and held until verification was confirmed, due to positive verification using the photos and COVID contact restrictions, this sample did not need to be delivered to the WDNR ATIS coordinator and was therefore disposed of in a manner that would not spread the species.

3.1.2 Water Samples

To monitor for the presence of spiny and fishhook water fleas (*Bythotrephes longimanus* and *Cercopagis pengoi*) and zebra mussels (*Dreissena polymnorpha*), two water samples, one in both the reservoirs and one in both the tailwaters, were collected during the August survey approximating WDNR monitoring protocol for water fleas and zebra mussels (Figures 4 and 5, WDNR 2020). A 250-micron mesh zooplankton net was used to collect water samples for water fleas and a 64-micron mesh zooplankton net was used to collect water samples for zebra mussel veligers. For each sample in the reservoir, a horizontal tow was conducted by lowering the net into the water so that the top of the net was fully submerged, and the bottom of the net was not touching the bottom. With the net in this position, the boat was driven backwards slowly (about 2 miles per hour) for two minutes.

Shallow water and fast flows at the tailwater locations prevented the use of a boat, therefore the sampling method was adjusted for this sampling event. Each area was accessed on foot. The plankton net was positioned in the current, such that the top of the net was submerged while the bottom of the net did not touch the bottom substrate and was held in this position with water flowing through for two minutes to collect the water sample.

For each sample, as much water as possible was decanted from the collection cup. While raising the zooplankton net from the water the net was rinsed from the outside so that the whole sample would be washed into the collection cup. The final sample was poured into a 250 mL sample bottle and preserved in 95% ethanol at a 4:1 ethanol to sample ratio. The preserved water samples were sent to the Wisconsin State Laboratory of Hygiene, Madison, Wisconsin as requested by the WDNR invasive species coordinator to be analyzed for water fleas.

3.1.3 Sediment Samples

To monitor for invasive macroinvertebrates, sediment samples were collected at water access locations: the Saxon public boat landing, the Superior canoe take-out, and the private launch used by the Licensee (Figures 4 and 5). A shovel was used to scoop approximately six inches of sediment into a 10-inch Tetra Pond Planter Basket, with a 1/32nd inch mesh (Figure 9). Fine sediment was flushed out of the basket and the remaining materials were examined for Asian clam (*Corbicula fluminea*), faucet snail (*Bithynia tentaculata*), New Zealand mud snail (*Potamopyrgus antipodarum*), Malaysian trumpet snail (*Melanoides tuberculatus*), rusty crayfish (*Orconectes rusticus*), Chinese mystery snail (*Cipangopaludina chinensis*), and other invasive macroinvertebrates. The area around these launches were also visually examined for live snails, crayfish, or shells.

3.2 Terrestrial Upland Areas

Upland Shoreline and terrestrial areas in the Project were surveyed in August using two methods.

3.2.1 Upland Shorelines

Upland shoreline areas were studied by GAI on August 16, 17 and 18, 2021 (Attachment G). The upland shoreline was sampled from the boat, or on foot where the use of a boat was not feasible such as the Saxon bypass reach. While the boat was moving slowly an overall characterization of the terrestrial plant composition along the shoreline was made within a 10-meter riparian zone visible from open water. Both reaches of the river were comprised of undeveloped forested shorelines. The Saxon shoreline survey was broken up in two segments (Segments 1 and 2, Figure 10) to respectively capture the south and north shorelines. The Superior shoreline survey was broken up into six segments (Segments 3 to 8, Figure 11) to capture the various reaches and meanders of the river, some of which required access by foot due to low water and log jams. All six of the segments were undeveloped and forested and covered both sides of the shoreline. When plants included in the NR 40 list were observed, the species type, approximate relative abundance, and location on the shoreline (latitude and longitude) were identified. An estimate of relative abundance and the length of shoreline where each species was present was recorded in field notes. Areas present within the Project boundaries where access was not safe (i.e., waterfalls, large rapids, steep shorelines) were surveyed visually as completely as possible from a safe area. Relative abundance of each observed species within a segment was determined using the Daubenmire Classification Scheme Cover Ranking System to estimate the percent foliage cover as would be observed standing above, perpendicular to the ground. This ranking system was used to estimate relative abundance, as it reduces the influence of individual bias in estimating foliage cover and can be applied to the relative size and length of a given segment of study. See Table 1 below for an overview of the Daubenmire Classification Scheme Cover Ranking System.

Table 1

Daubenmire Classification Scheme Cover Ranking System

Percent Foliage Cover	Ranks
0-5	1
5-25	2
25-50	3
50-75	4
75-95	5
95-100	6

3.2.2 Upland Terrestrial Areas

Upland areas owned by the Licensee within the Project boundary were surveyed by GAI using a meander survey on August 17 and 18, 2021.The route traveled during the meander survey was recorded using a Trimble R1 GNSS Receiver with a GPS device. An overall characterization of the terrestrial plant community was made. When plants included in the NR 40 list were observed, the species and location (latitude and longitude) were recorded. An estimate of relative abundance, using the Daubenmire system, and the extent of area where the species were present were recorded, as was the route of travel during the meander.

4.0 Results and Discussion

4.1 Aquatic Plant Survey

4.1.1 June Survey

A total of 110 points were sampled during the June survey at Saxon Falls, completed on June 23, 2021 (Figure 4, Attachment A). Of the points not sampled, 11 were in areas greater than the MDC, 30 were terrestrial, 13 were too shallow, and three points were past the safety buoy of the dam. Of the sampled points, 110 were shallower than the maximum depth of plants of 7.5 feet and 73 sample points had vegetation. Eighteen species were found during the survey, four of which were observed visually, but not present on the rake: spatterdock (*Nuphar variegata*), reed canary grass (*Phalaris arundinacea*), common arrowhead (*Sagittaria latifolia*), and bur-reeds (*Sparganium* spp.). Predominant species were fern pondweed (*Potamogeton robbinsii*), sweet flag (*Acorus americanus*), common waterweed (*Elodea canadensis*), and coontail (*Ceratophyllum demersum*, Figure 12). The average rake fullness across the Study was 1.69 (Figure 8). Table 2 lists the species found during this survey.

A total of 108 points were sampled during the Superior Falls June survey completed on June 24 and 25, 2021 (Figure 5, Attachment B). Of the points not sampled, 4 points were not navigable, 19 were terrestrial, and 31 were past the safety buoys of the dam and past the dam in rocky rapids. Of the sampled points, 108 were shallower than the maximum depth of plants of 8.8 feet and 21 sample points had vegetation. Ten species were found during the survey, three of which were observed visually, but not present on the rake: large-leaf pondweed (*Potamogeton amplifolius*), white water crowfoot (*Ranunculus aquatilis*), and hardstem bulrush (*Schoenoplectus acutus*). Predominant species were fern pondweed, water star-grass (*Heteranthera dubia*), common bur-reed (*Sparganium eurycarpum*), and common arrowhead

(Figure 13). The average rake fullness across the Study was 1.38 (Figure 8). Table 2 lists species found during this survey.

No aquatic invasive species were identified on the rake during the June Saxon Falls or Superior Falls Studies. However, yellow iris (*Iris pseudacorus*) was flowering along the shoreline of Superior Falls outside of mapped sample points. Three yellow iris plants were observed growing sporadically along the west shoreline during the June survey. Figure 5 depicts the locations of yellow iris found during the Study.

4.1.2 August Survey

The late season Saxon Falls survey was completed on August 17, 2021. A total of 83 points were surveyed (Figure 6, Attachment C). Of the remaining points, 14 were in areas greater than the MDC, 55 were too shallow, 12 were terrestrial, and three were past the hydro dam safety barrier. Seventy-eight of the 83 sampled points were shallower than the MDC of 7.5 feet, and 56 sample points had vegetation. Fourteen species were found on the rake during this late season survey with another two plants as visual sightings (Table 2). The predominant species overall was fern pondweed with common waterweed, coontail, and various pondweeds being predominant in some rake samples (Figure 14). The average rake fullness across the Study was 2.29. No aquatic invasive species were observed during the August Study. Purple loosestrife observed along the shoreline was captured in the terrestrial survey.

The late season Superior Falls survey was completed on August 16 and 18, 2021. A total of 96 points were surveyed (Figure 7, Attachment D). Of the remaining points, 12 were in areas greater than the MDC, two points were too shallow, two points were not navigable, 18 were terrestrial, one was missed, and 31 were past the safety buoys of the dam and past the dam in rocky rapids. Ninety-one of the 96 sampled points were shallower than the MDC of 5.0 feet, and 20 sample points had vegetation. Seven species were found on the rake during this late season survey with another two plants as visual sightings (Table 2). The predominant species was fern pondweed, common waterweed, flat-stem pondweed, and one location of predominantly bur-reed (Figure 15). The average rake fullness across the Study was 1.47. Solitary purple loosestrife plants were observed, and locations were recorded, but no widespread populations were encountered (Figure 7).

Table 2

Aquatic Plant Species Abundance in the Montreal River

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Saxon Falls					
Acorus americanus	sweet flag	1.82	-	1.82	-
Ceratophyllum demersum	coontail	11.82	7.69	11.82	6.82
Chara sp.	muskgrass	0.91	2.56	0.91	2.27
Elodea canadensis	common waterweed	13.64	11.54	13.64	10.23
Lemna minor	small duckweed	0.91	-	0.91	-

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Myriophyllum heterophyllum	various-leaved milfoil	0.91	-	0.91	-
Najas flexilis	slender naiad	-	1.28	-	1.14
Nuphar variegata	spatterdock	visual	visual	visual	visual
Phalaris arundinacea	reed canary grass	visual	-	visual	-
Potamogeton alpinus	alpine pondweed	-	2.56	-	2.27
Potamogeton amplifolius	large-leaf pondweed	0.91	1.28	0.91	1.14
Potamogeton epihydrus	ribbon-leaf pondweed	-	1.28	-	1.14
Potamogeton foliosus	leafy pondweed	-	visual	-	visual
Potamogeton nodosus	long-leaf pondweed	4.55	6.41	4.55	5.69
Potamogeton obtusifolius	blunt-leaf pondweed	6.36	8.97	6.36	7.95
Potamogeton robbinsii	fern pondweed	48.18	60.26	48.18	53.41
Potamogeton vaseyi	Vasey's pondweed	4.55	2.56	4.55	2.27
Ranunculus aquatilis	white water crowfoot	1.82	2.56	1.82	2.27
Ranunculus flabellaris	yellow water crowfoot	2.73	2.56	2.73	2.27
Utricularia vulgaris	common bladderwort	-	1.28	-	1.14
Sagittaria latifolia	common arrowhead	visual	-	visual	-
Sparganium spp.	bur-reed	visual	-	visual	-
Typha spp.	Cattail	0.91	-	0.91	-
Superior Falls					
Ceratophyllum demersum	Coontail	0.93	1.10	3.70	2.86

Scientific Name	Common Name	Littoral Frequency of Occurrence[a]		Relative Frequency of Occurrence[b]	
		June	August	June	August
Elodea canadensis	common waterweed	0.93	6.59	3.70	17.14
Heteranthera dubia	water star-grass	5.56	-	22.22	-
Potamogeton amplifolius	large-leaf pondweed	visual	Visual	visual	visual
Potamogeton natans	floating-leaf pondweed	-	visual	-	visual
Potamogeton nodosus	long-leaf pondweed	0.93	2.20	3.70	5.71
Potamogeton robbinsii	fern pondweed	12.04	17.58	48.15	45.71
Potamogeton zosteriformis	flat-stem pondweed	-	8.79	-	22.86
Ranunculus aquatilis	white water crowfoot	visual	-	visual	-
Sagittaria latifolia	common arrowhead	0.93	-	3.70	-
Schoenoplectus acutus	hardstem bulrush	visual	-	visual	-
Sparganium eurycarpum	common bur-reed	3.7	-	14.81	-
Sparganium spp.	bur-reed species	-	1.10	-	2.86

[a]The littoral frequency of occurrence refers to the number of times the species was found divided by the total number of sample locations shallower than the MDC.

[b]The relative frequency of occurrence refers to the frequency at which one species was found in comparison to all species found (percentage).

4.1.3 Overall Aquatic Plant Survey Analysis and Observations

The aquatic plant community was diverse and well established in both Saxon Falls and Superior Falls areas of the Project. While fern pondweed was the dominant species across all surveys, plant community composition varied greatly and demonstrated robust composition and structure across habitat areas. Plants were primarily found growing in areas protected from the current of the river, for example in sheltered bays and near shorelines.

The Saxon Project area contained several areas protected from the main channel of flow. These areas are not exposed to scouring of high flow events and support most of the aquatic plant growth along the river. Some of these areas were accessible in June but had vegetation thick enough to impede navigation in August. Substrates within the main channel of the river were dominated by sand while protected areas that supported the bulk of the aquatic vegetation had predominantly fine organic substrates. Diverse wildlife was observed in the protected areas including a pair of nesting swans, turtles, and various waterfowl and smaller migratory birds.

While demonstrating a healthy ecosystem, overall Superior Falls had fewer sample points with vegetation and lower plant diversity (Table 4). Most of the substrate in the Superior Falls Project is cobble and bedrock, and water flow keeps the main channel scoured of softer sediments. The Montreal River in the upper Project area was shallow with riffles flowing over cobble. The central portion of the area was divided by an island. The north side of the island was rocky with fast, riffled flow. The south side of the island was shaded and had multiple log jams. The majority of aquatic plants were found in the protected bays just upstream of the hyrdo plant. Additional indicators of good water health were observed in the Superior Falls Project. Freshwater sponges and bryozoan were observed during both the June and August surveys. These aquatic organisms are indicators of a healthy ecosystem and good water quality.

Table 3

Overall Saxon Falls and Superior Falls Hydroelectric Projects Summary

Statistic	Saxon Falls		Superior Falls	
	June 2021	August 2021	June 2021	August 2021
Frequency of Occurrence	66.36	71.79	19.44	21.98
Maximum Depth of Plants	7.5 feet	7.5 feet	8.8 feet	5.0 feet
Species Richness	18	16	10	9
FQI	23.8	26.7	13.2	13.5

4.2 Water Samples

The samples for water fleas and zebra mussel veligers will be analyzed by the Wisconsin State Lab of Hygiene as requested by the WDNR invasive species coordinator. Because these samples can be preserved to extend shelf life, the samples are often not analyzed until the winter months. Water fleas are large enough to be observed without a microscope. No invasive water fleas or spines of the fleas were observed in the sample or on the net when the sample was collected in the field. Following the standard operating procedure, the Lab will provide results directly to the WDNR.

4.3 Sediment Samples

Boat launches are an ideal location to sample for aquatic invasive species because of a higher rate of traffic including boats launching and people shore-fishing. Public access locations can be a conduit for the introduction of aquatic invasive species through the dumping of bait buckets or emptying of boat bilges, live wells, or hulls holding water from other infested areas. Sediment samples collected at water access locations did not detect any invasive macroinvertebrates, and no species were observed when the areas were reviewed visually.

4.4 Terrestrial Upland Areas

Shoreline and terrestrial invasive surveys conducted by GAI along the portions of shoreline and terrestrial areas included within the study area found an undeveloped landscape supporting diverse native communities. Shorelines were observed from a boat where possible, or by walking up the river where navigability was limited. Upland areas were dominated by heavily wooded areas, with portions of open powerline rights-of-way, roadsides, and open scrub/shrub areas. The densely forested areas were often too thickly vegetated to access and also appeared to be unimpacted by human activities with limited opportunities for the introduction of invasive species populations.

4.4.1 Upland Shoreline Survey – Saxon

The Saxon survey was separated into two segments to respectively capture the north and the south shorelines of the river. Both shorelines were undeveloped and forested and were dominated by the same plant species, including: sugar maple (*Acer saccharum*), willows (*Salix* spp.), woolgrass (*Scirpus cyperinus*), green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), swamp milkweed (*Asclepias incarnata*), Joe pye weed (*Eupatorium maculatum*), balsam fir (*Abies balsamea (L.) Mill.*), white spruce (*Picea glauca*), ferns (*Pteridophyta* spp.), paper birch (*Betula papyrifera)*, tag alder (*Alnus serrulata*), yarrow (*Achillea millefolium*), jewelweed (*Impatiens capensis*), basswood (*Tilia americana*), white cedar (*Thuja occidentalis*), and Canada goldenrod (*Solidago canadensis*).

Invasive species identified during the terrestrial shoreline survey were limited to purple loosestrife (*Lythrum salicaria*) and narrowleaf/hybrid cattail (*Typha angustifolia and T. x glauca*). Previous occurrence of narrowleaf cattail has been documented. While purple loosestrife had not been previously identified, it is surveyed annually downstream. Populations of narrowleaf/hybrid cattail were limited to small populations of plants and did not rank higher than 2 using the Daubenmire system. Purple loosestrife populations observed were limited to individual plants or small populations and were not widespread throughout the segments; this species did not rank higher than 1 using the Daubenmire system. Purple loosestrife and narrowleaf/hybrid cattail are relatively common invasive species and well-established in many parts of northern Wisconsin and the Upper Peninsula of Michigan. Purple loosestrife was usually identified growing in open, wet areas of the study area while narrowleaf/hybrid cattail was observed growing in open water or normally inundated areas.

4.4.2 Upland Terrestrial Area – Meander Survey of Saxon

A meander survey was completed throughout the safely accessible areas owned by the licensee. The wooded portions of this area were dominated by balsam fir, white pine, red pine, white spruce, sugar maple, silver maple, ferns, reed canary grass, tag alder, riverbank grape, large-leaved aster (*Eurybia macrophylla*), winterberry (*Ilex verticillata*), paper birch (*Betula papyrifera*), and gooseberry (*Ribes uva-crispa*). The open and scrub/shrub areas were dominated by willow saplings, Canada goldenrod, reed canary grass, dogbane, Joe pye weed, trembling aspen saplings, and sumac (*Rhus* spp.). The meander area contained small populations of Canada thistle, aquatic forget-me-not, narrowleaf/hybrid cattail spp., wild parsnip (*Pastinaca sativa*), tansy (*Tanacetum vulgare*), and spotted knapweed.

4.4.3 Upland Shoreline Survey – Superior

The survey was separated into six segments (segments 3 through 8) to capture the various reaches and meanders of the river. All six segments captured data for both sides of the shoreline and were comprised of undeveloped and forested shoreline. The shores were dominated by: Joe pye weed, tag alder, silver maple, reed canary grass, ferns, riverbank grape (*Vitis riparia*), oaks, green ash, willows, Canada goldenrod, basswood, white spruce, red pine (*Pinus resinosa*), jewelweed, sedges (*Carex* spp.), sugar maple, dogbane (*Apocynum androsaemifolium*), blue vervain (*Verbena hastata*), and stinging nettle (*Urtica dioica*).

Invasive species identified during the terrestrial shoreline survey were limited to purple loosestrife, narrowleaf/hybrid cattail, spotted knapweed (*Centaurea stoebe*), yellow iris, and aquatic forget-me-not (*Myosotis scorpioides*). Previous occurrence of purple loosestrife has been documented, while the rest of the identified invasive species had not been previously identified. Populations of all invasive species were limited to individual plants or small populations of plants and did not rank higher than 1 using the Daubenmire system, except for spotted knapweed, which ranked 2 due to a patch growing in one portion of dry, sandy, and gravelly shoreline. All the identified invasive species are relatively common and well-established in many parts of northern Wisconsin and the Upper Peninsula of Michigan. Purple

loosestrife and yellow iris were identified growing in open, wet areas of the study area while narrowleaf/hybrid cattail was observed growing in open water or normally inundated areas.

4.4.4 Upland Terrestrial Area – Meander Survey of Superior

The wooded portions of the meander area were dominated by trembling aspen, balsam fir, white spruce, riverbank grape, ferns, Solomon's seal (*Polygonatum multiflorum*), poison ivy (*Toxicodendron radicans*), gray dogwood (*Cornus racemosa*), green ash, red maple (*Acer rubrum*), sugar maple, large-leaved aster, white pine, paper birch, gooseberry, white cedar, and tag alder. The open areas of the meander survey were dominated by Canada goldenrod, reed canary grass, sumac, dogbane, tag alder, gray dogwood, trembling aspen saplings, blackberry (*Rubus fruticosus*), poison ivy, boneset (*Eupatorium perfoliatum*), black-eyed Susan (*Rudbeckia hirta*), sunflowers (*Helianthus* spp.), lupine, woolgrass, sedges, and wild pea (*Lathyrus odoratus*). The meander area contained small populations of Canada thistle, tansy, common and glossy buckthorn (*Rhamnus cathartica* and *Frangula alnus*), wild parsnip, narrowleaf/hybrid cattail, and spotted knapweed.

Table 4

Terrestrial Shoreline Community Types Summary

Community Type	Saxon Falls		Superior Falls	
	Mileage of Observation	Percentage of Occurrence	Mileage of Observation	Percentage of Occurrence
Undeveloped Forest	3.62	100.0%	3.36	100.0%

Table 5

Shoreline and Terrestrial Invasive Species Summary

Species	Common Name	Saxon Falls		Superior Falls	
		Mileage of Observation	Percentage of Occurrence	Mileage of Observation	Percentage of Occurrence
Shoreline Meander					
Centaurea stoebe	Spotted Knapweed	-	-	0.42	5.0%
Iris pseudacorus	Yellow Iris	-	-	0.44	<1.0%
Lythrum salicaria	Purple Loosestrife	3.62	<1.0%	1.61	<1.0%
Myosotis palustris	Aquatic Forget-me-not	-	-	1.07	1.0%
Typha spp.	Invasive Cattail spp.	3.62	<5.0%	1.33	<1.0%
Terrestrial Meander					
Cirsium arvense	Canada thistle	0.01	<1.0%	0.05	<1.0%
Myosotis palustris	Aquatic Forget-me-not	0.19	5.0%	-	-

Species	Common Name	Saxon Falls		Superior Falls	
		Mileage of Observation	Percentage of Occurrence	Mileage of Observation	Percentage of Occurrence
Tanacetum vulgare	Tansy	0.14	5.0%	0.12	<1.0%
Rhamnus cathartica	Common buckthorn	-	-	0.37	5.0%
Frangula alnus	Glossy buckthorn	-	-	0.19	5.0%
Typha spp.	Invasive Cattail spp.	0.05	1.0%	0.12	<1.0%
Centaurea biebersteinii	Spotted knapweed	0.05	5.0%	0.27	1.0%
Pastinica sativa	Wild parsnip	0.01	<1.0%	-	-

5.0 References

Daubenmire, Rexford. 1959. A Canopy-coverage method of vegetational analysis. Northwest Science 33:43-64.

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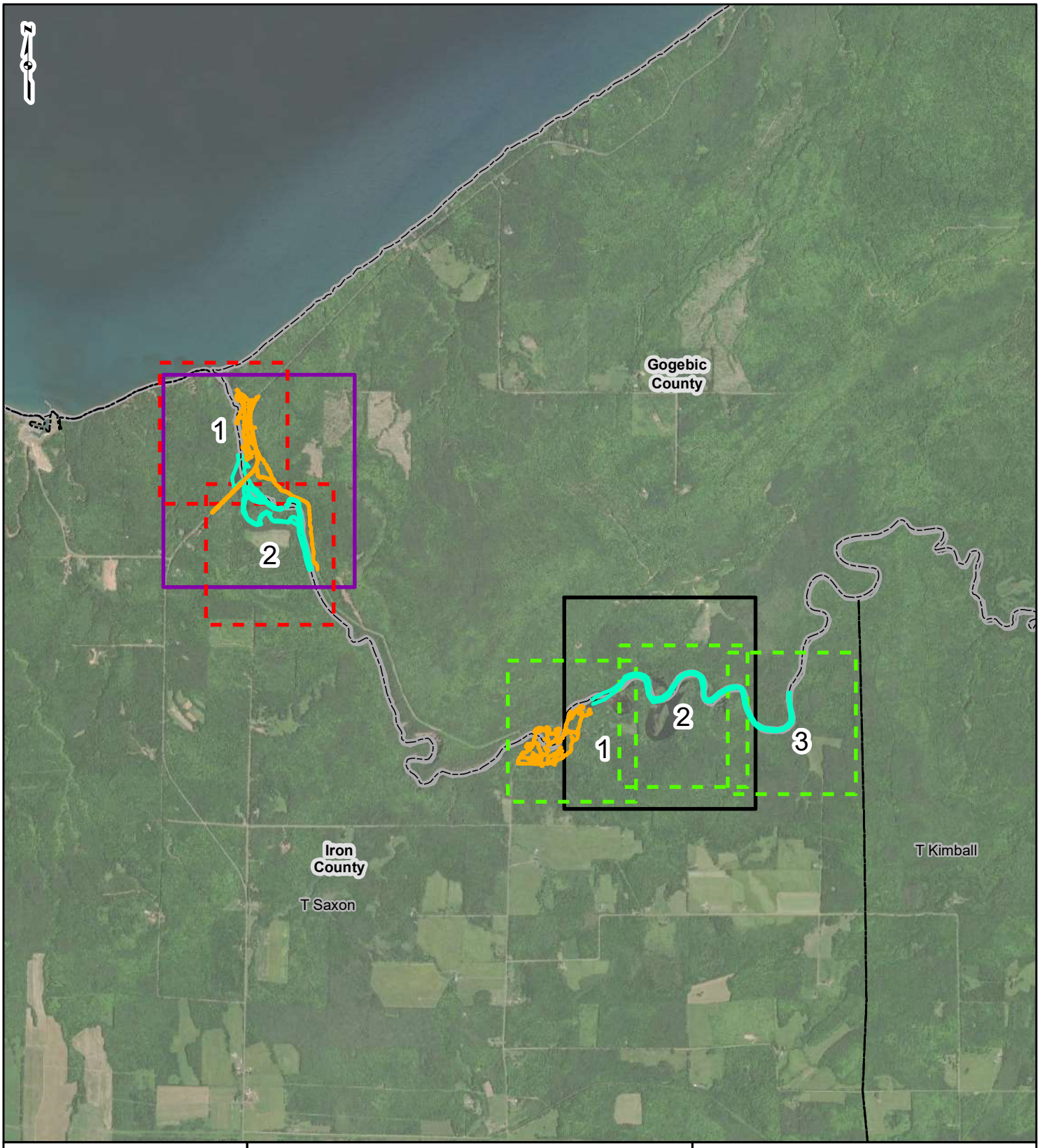
Wisconsin Department of Natural Resources. 2020. *Veliger Sampling Protocol; Standard Operating Procedures.* 16 pp.

Wisconsin Department of Natural Resources. 2020. Study Requests and Request for Information Relicense of Janesville Central P-2347 & Beloit (Blackhawk) P-2348. February 12, 2020.

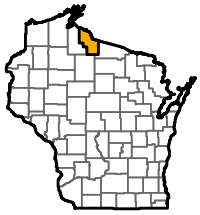
Wisconsin Department of Natural Resources. 2019. *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis,* and applications. PUB-SS-1068.

Wisconsin Department of Natural Resources. 2016. *Aquatic Invasive Rapid Response Species List*. PUB-SS-1162.

FIGURE 1
Project Location and Overview Map



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Shoreline Meanders
- Terrestrial Meanders
- Superior Falls Terrestrial
- Superior Falls Waterway
- Saxon Falls Terrestrial
- Saxon Falls Waterway
- Community Boundary
- County Boundary

0 2,000 4,000 8,000 Feet

FIGURE 1
PROJECT OVERVIEW

SAXON AND SUPERIOR FALLS POINT INTERCEPT 2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021. WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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FIGURE 2
Point Intercept Grid Provided by the WDNR: Saxon Falls

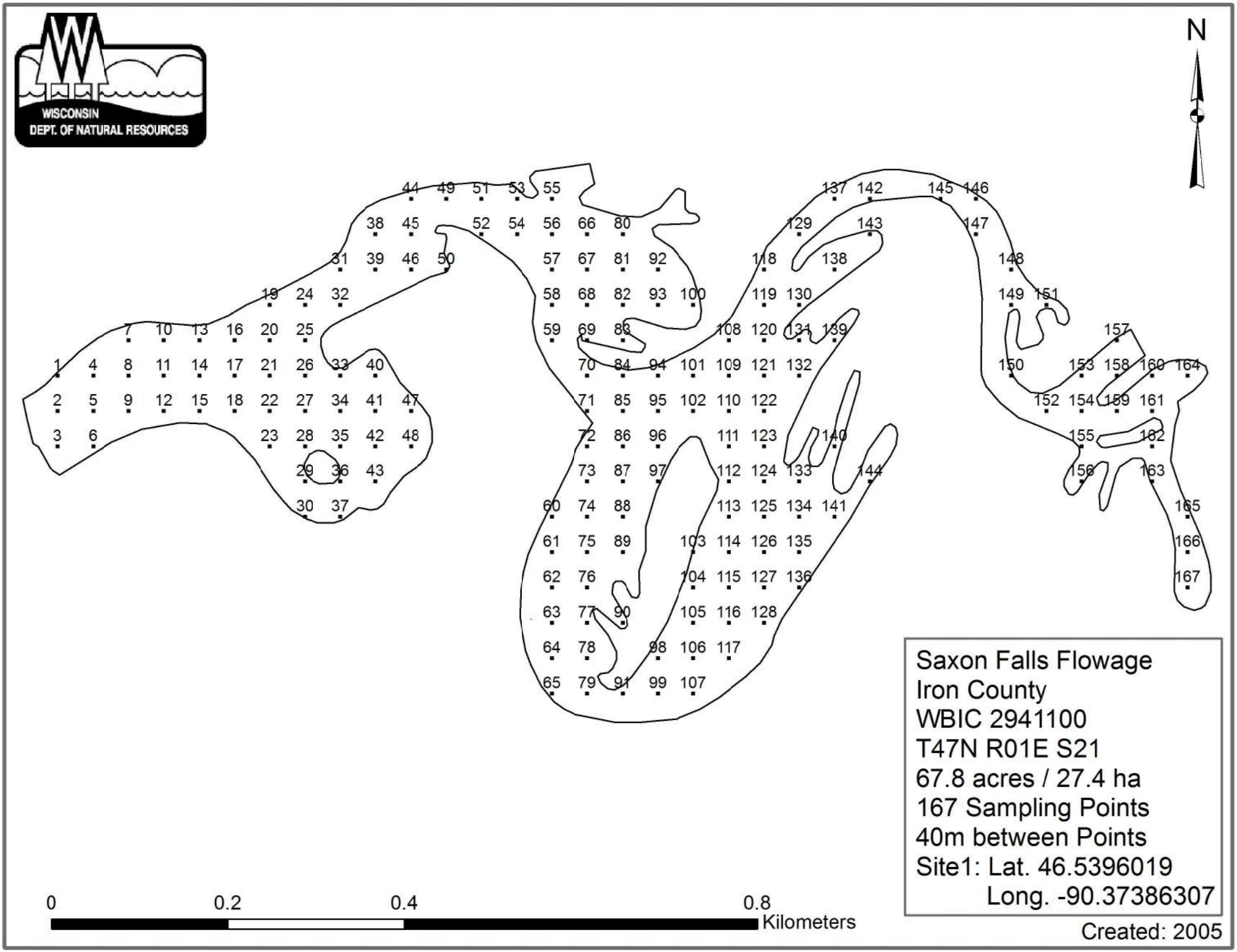

WISCONSIN
DEPT. OF NATURAL RESOURCES
N
Saxon Falls Flowage
Iron County
WBIC 2941100
T47N R01E S21
67.8 acres / 27.4 ha
167 Sampling Points
40m between Points
Site1: Lat. 46.5396019
Long. -90.37386307
0
0.2
0.4
0.8
Kilometers
Created: 2005

FIGURE 3
Point Intercept Grid Provided by the WDNR: Superior Falls

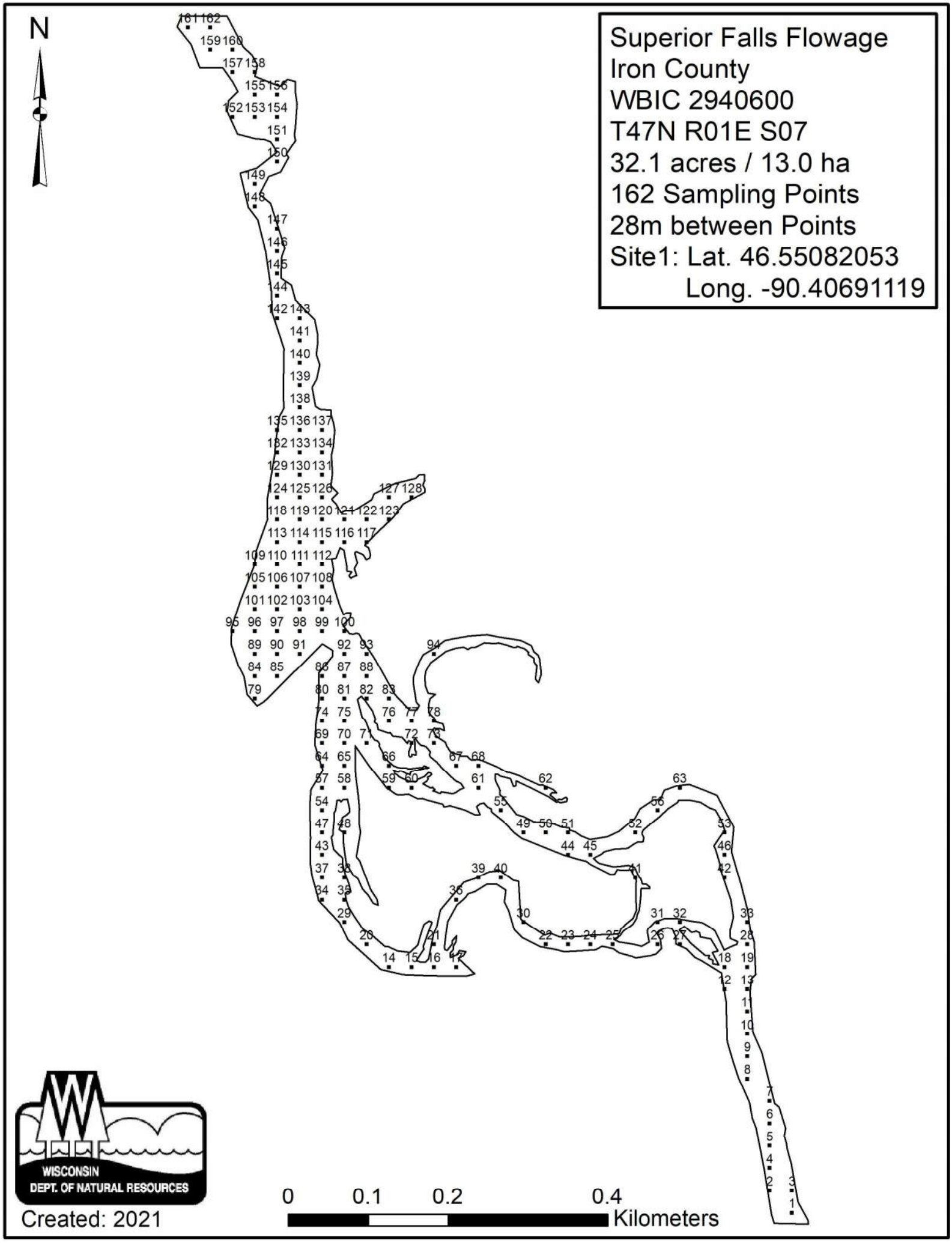
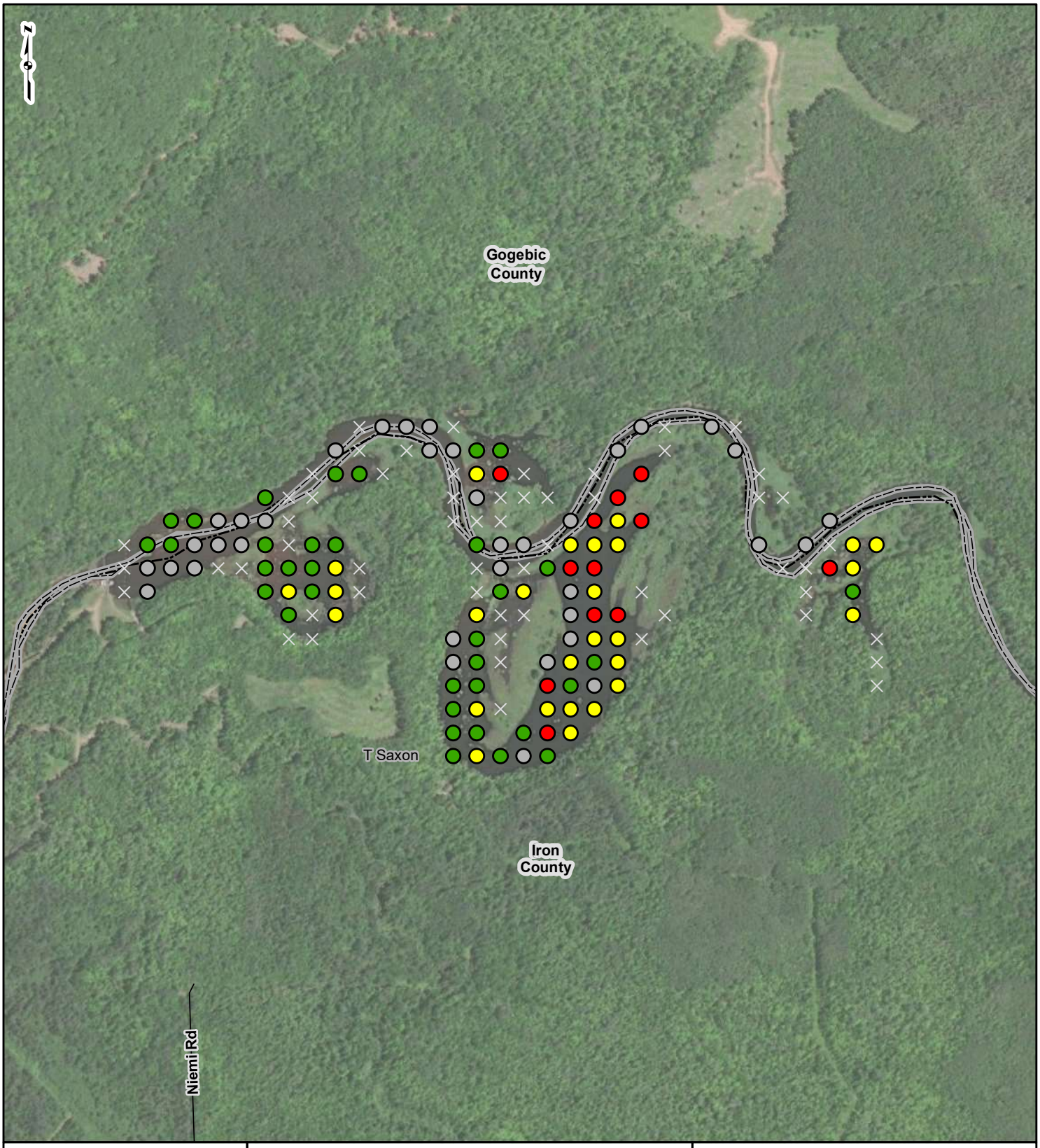
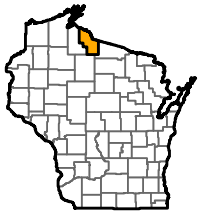

N
Superior Falls Flowage
Iron County
WBIC 2940600
T47N R01E S07
32.1 acres / 13.0 ha
162 Sampling Points
28m between Points
Site1: Lat. 46.55082053
Long. -90.40691119
0
0.1
0.2
0.4
Kilometers
WISCONSIN
DEPT. OF NATURAL RESOURCES
Created: 2021

FIGURE 4
June Point Intercept Survey: Saxon Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

Not Sampled

Rake Fullness

0

1

2

3

Road Centerline

Community Boundary

County Boundary

0 375 750 1,500 Feet

FIGURE 4
POINT INTERCEPT SURVEY

SAXON FALLS POINT INTERCEPT
JUNE 2021 SURVEYS

Xcel Energy

Mead & Hunt

DRAWN BY: EMW DATE: 9/29/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/29/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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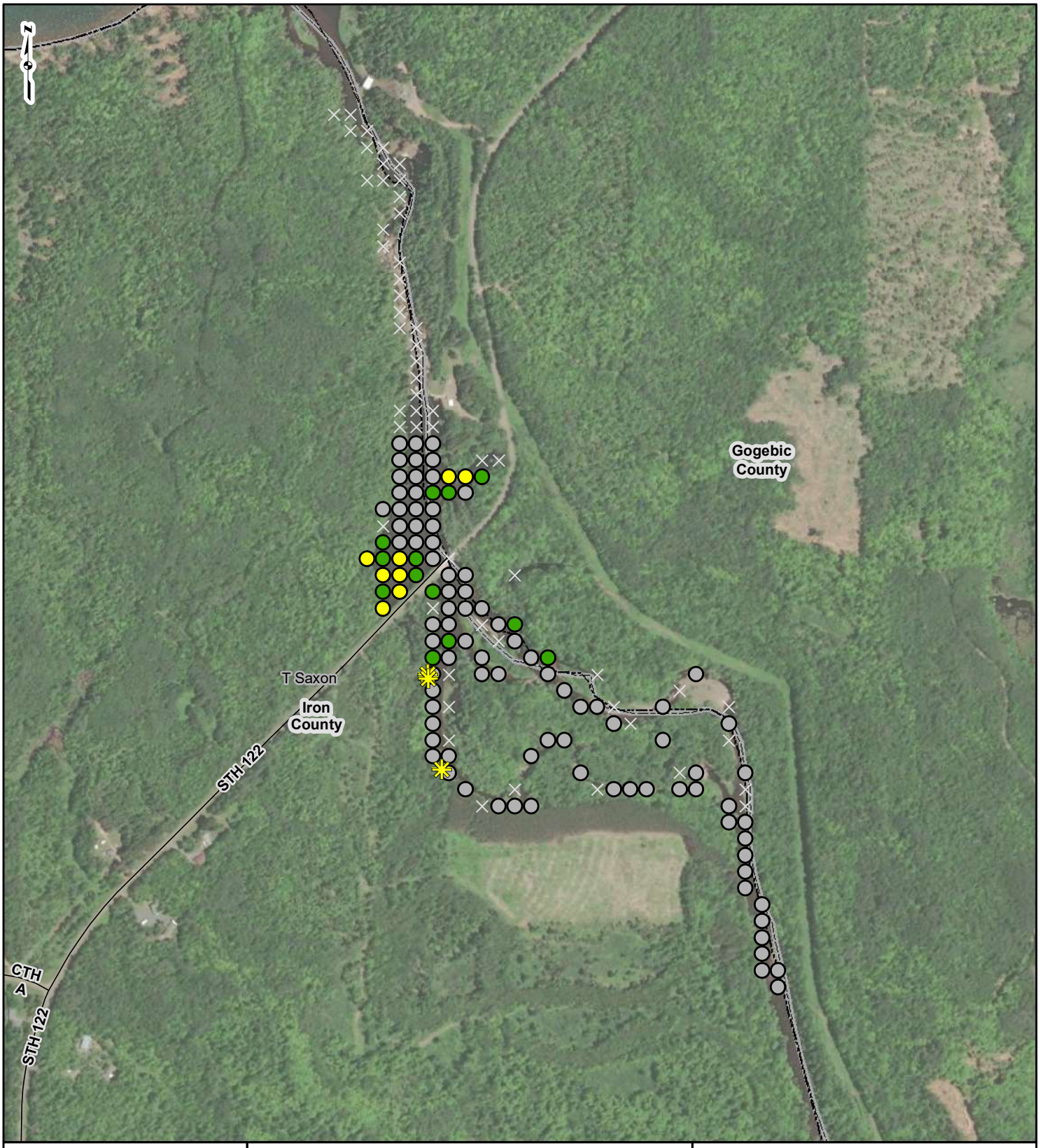
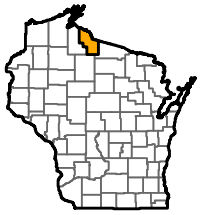
FIGURE 5
June Point Intercept Survey: Superior Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

Not Sampled

Yellow Iris

Rake Fullness

0

1

2

3

Road Centerline

Community Boundary

County Boundary

0 375 750 1,500 Feet

FIGURE 5
POINT INTERCEPT SURVEY

SUPERIOR FALLS POINT INTERCEPT
JUNE 2021 SURVEYS

Xcel Energy

Mead & Hunt

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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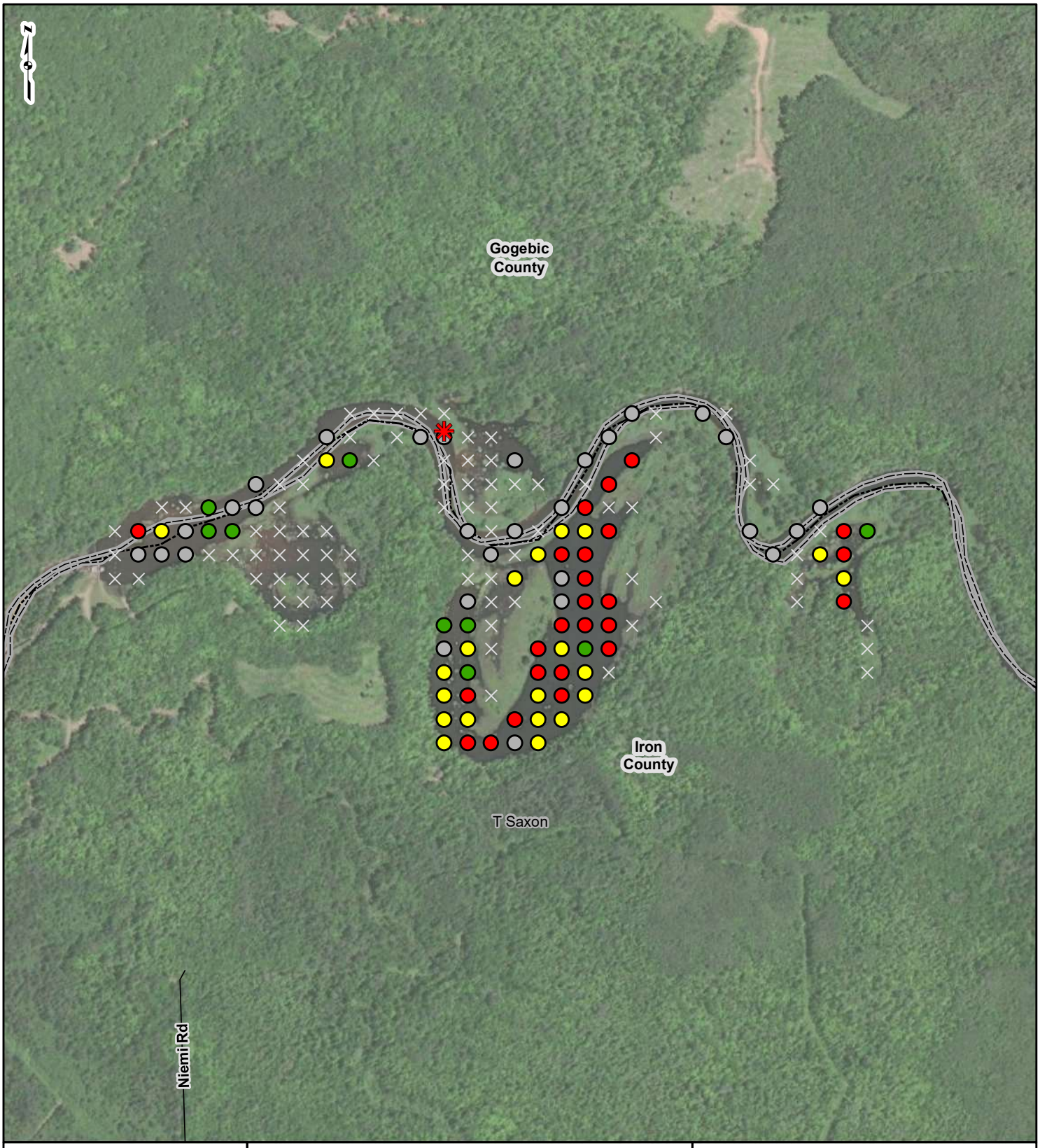
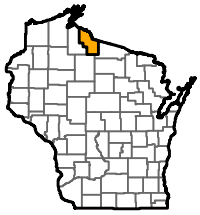
FIGURE 6
August Point Intercept Survey: Saxon Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

Not Sampled

Purple Loosestrife

Rake Fullness

0

1

2

3

Road Centerline

Community Boundary

County Boundary

0 375 750 1,500 Feet

FIGURE 6
POINT INTERCEPT SURVEY

SAXON FALLS POINT INTERCEPT
AUGUST 2021 SURVEYS

DRAWN BY: EMW DATE: 9/29/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/29/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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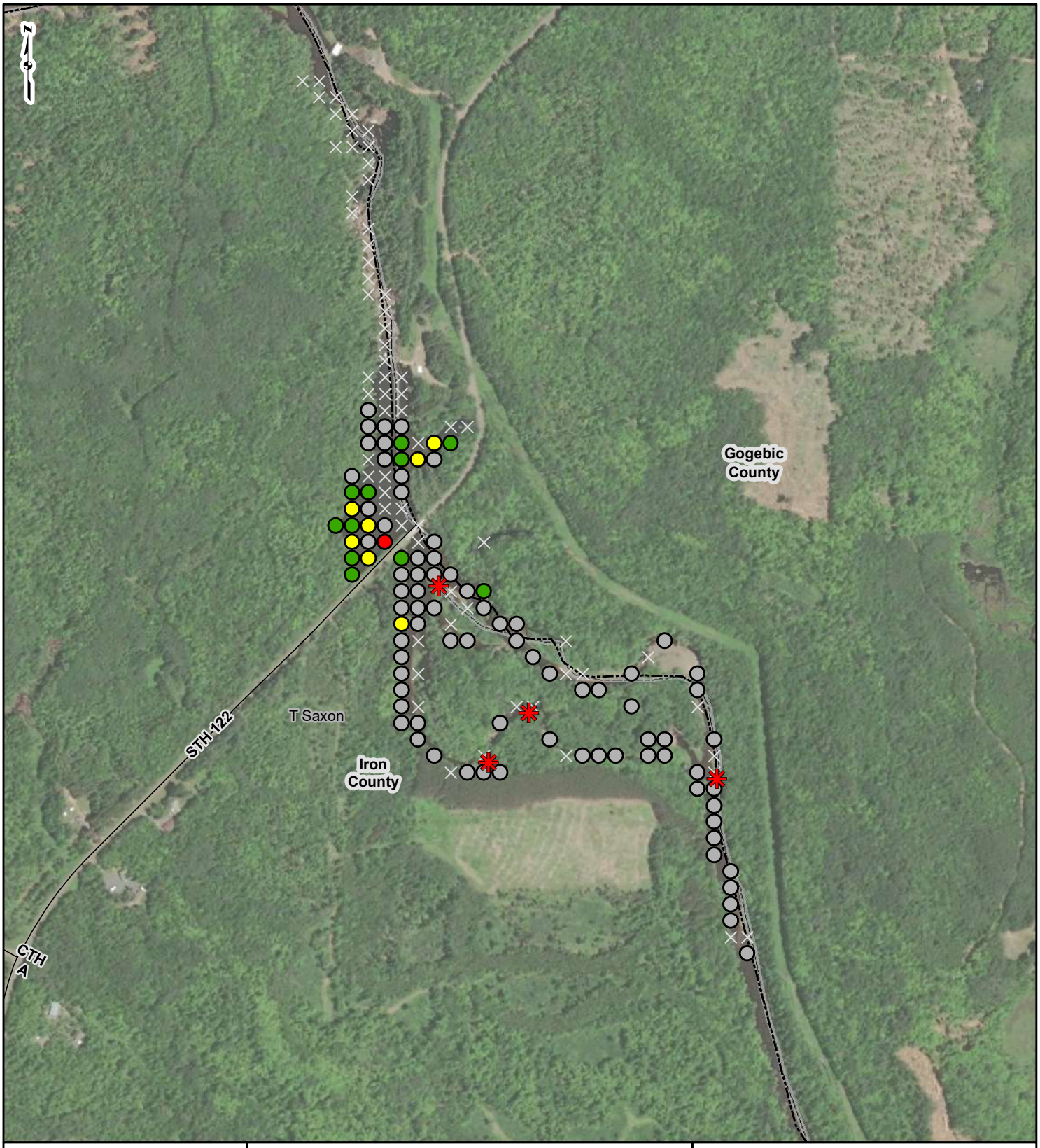
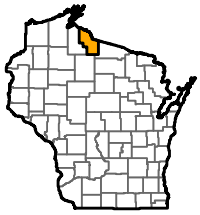
FIGURE 7
August Point Intercept Survey: Superior Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

Not Sampled

Purple Loosestrife

Rake Fullness

0

1

2

3

Road Centerline

Community Boundary

County Boundary

0 375 750 1,500 Feet

FIGURE 7
POINT INTERCEPT SURVEY

SUPERIOR FALLS POINT INTERCEPT
AUGUST 2021 SURVEYS

Xcel Energy

Mead & Hunt

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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FIGURE 8
Rake Fullness per WDNR Protocol

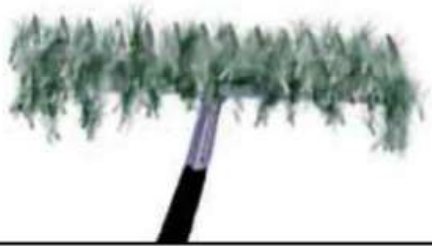
Fullness Rating	Coverage	Description
1		Only few plants. There are not enough plants to entirely cover the length of the rake head in a single layer.
2		There are enough plants to cover the length of the rake head in a single layer, but not enough to fully cover the tines.
3		The rake is completely covered and tines are not visible.

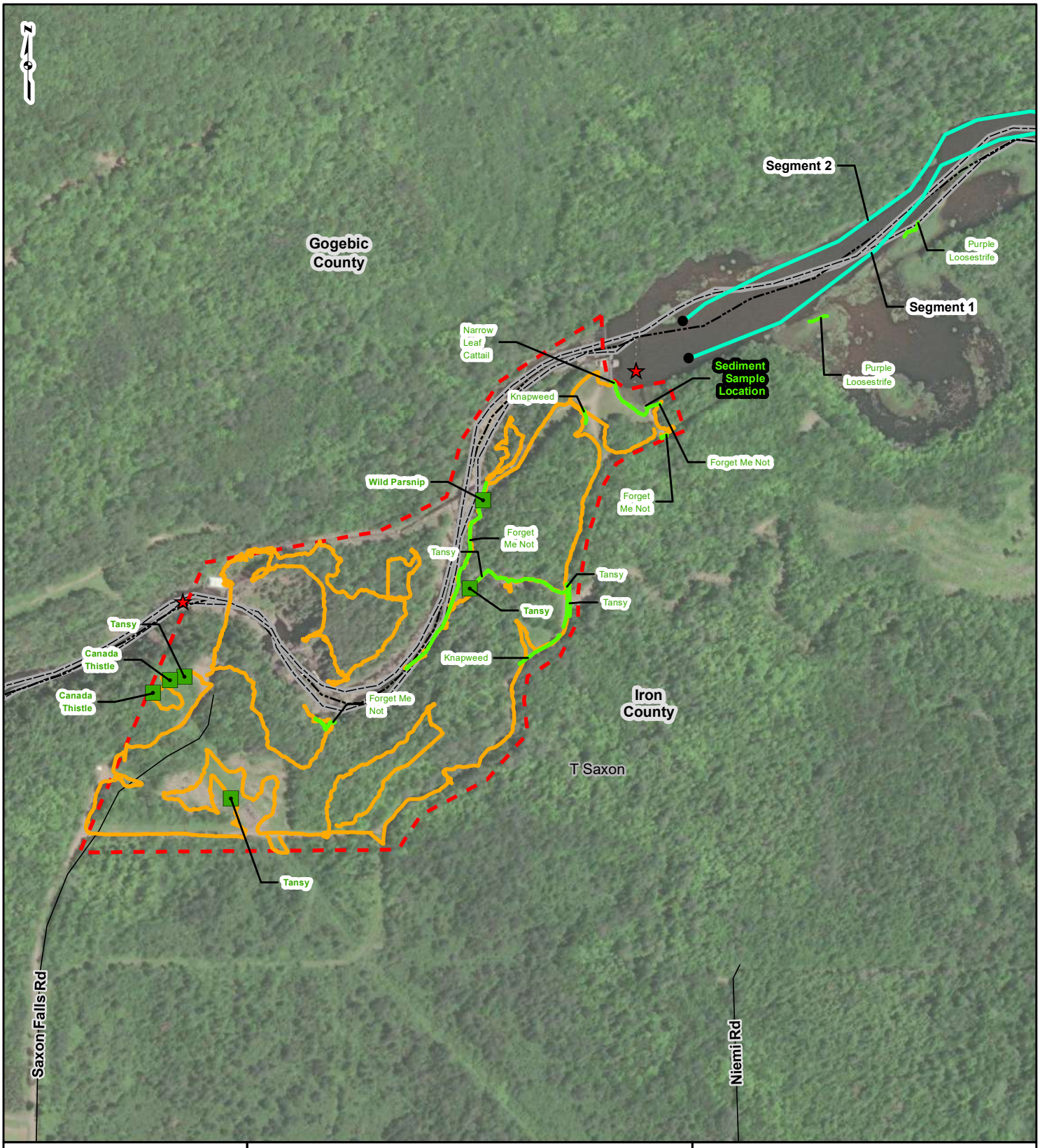
Figure 8. Rake Fullness per WDNR protocol.
Illustration of rake fulness rating used during the survey, photo used from *Recommended Baseline Monitoring of Aquatic Plants in Wisconsin: sampling design, field and laboratory procedures, data entry and analysis, and applications*. PUB-SS-1068,WDNR 2019.

FIGURE 9
Sediment Basket

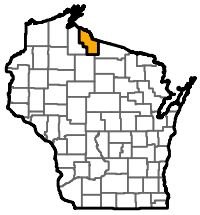
Figure 9. Sediment Basket.
Using a 10-inch Tetra Pond Planter Basket, with a 1/32nd inch mesh, a sample is being rinsed for examination.

FIGURE 10

Terrestrial and Shoreline Survey and Invasive Species: Saxon Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Start/Stop Points
- Invasive Points
- Invasive Line
- Saxon Shoreline Meander
- Saxon Terrestrial Meander
- Water Tow Location
- Terrestrial Study Area
- Road Centerline
- Community Boundary
- County Boundary

0 250 500 1,000 Feet

FIGURE 10
TERRESTRIAL AND INVASIVE SPECIES
SHEET 1 OF 3

SAXON FALLS POINT INTERCEPT
2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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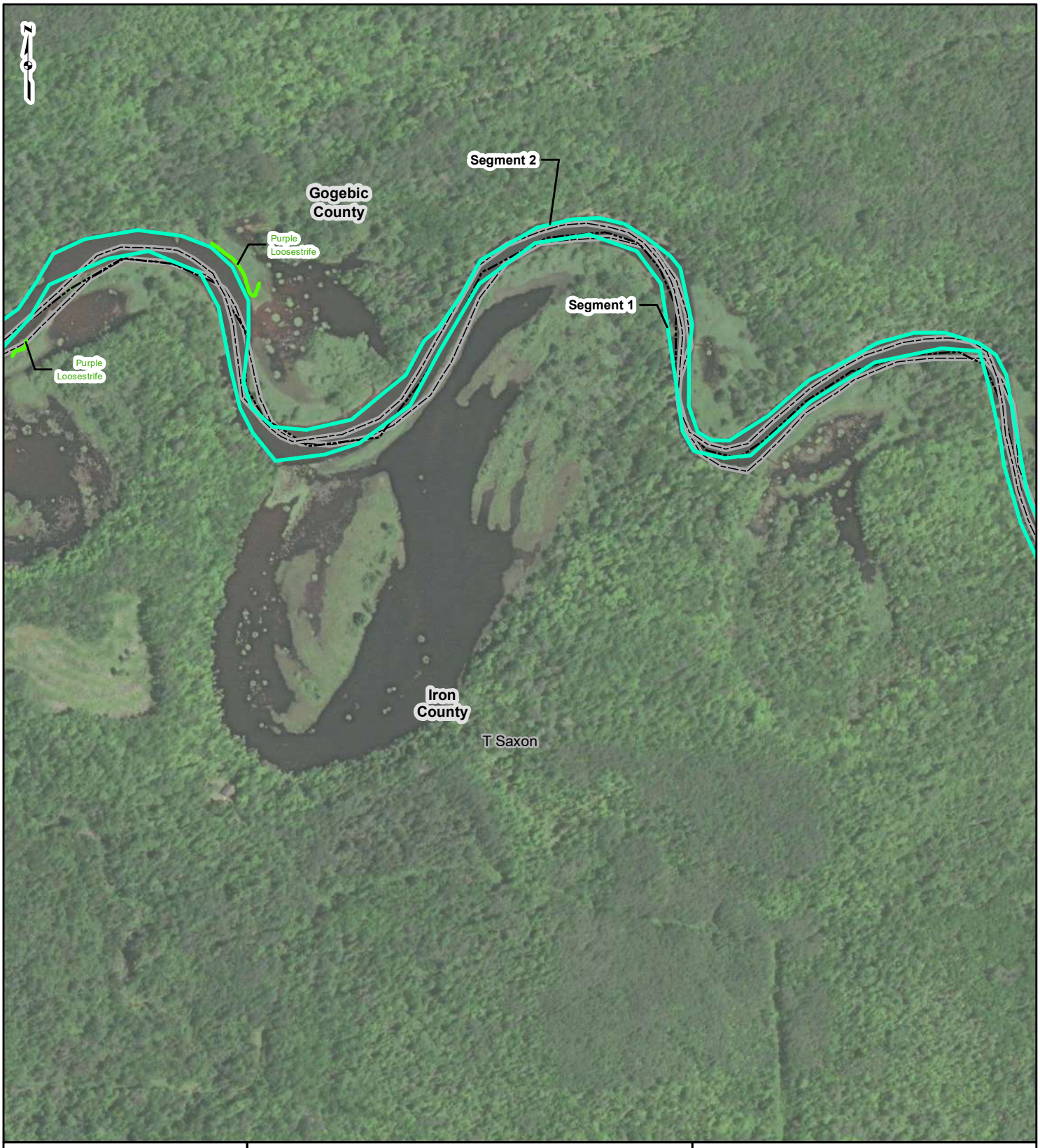
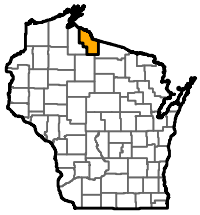


PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Start/Stop Points
- Invasive Points
- Invasive Line
- Saxon Shoreline Meander
- Saxon Terrestrial Meander
- Water Tow Location
- Terrestrial Study Area
- Road Centerline
- Community Boundary
- County Boundary

0 250 500 1,000 Feet

FIGURE 10
TERRESTRIAL AND INVASIVE SPECIES
SHEET 2 OF 3

SAXON FALLS POINT INTERCEPT
2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

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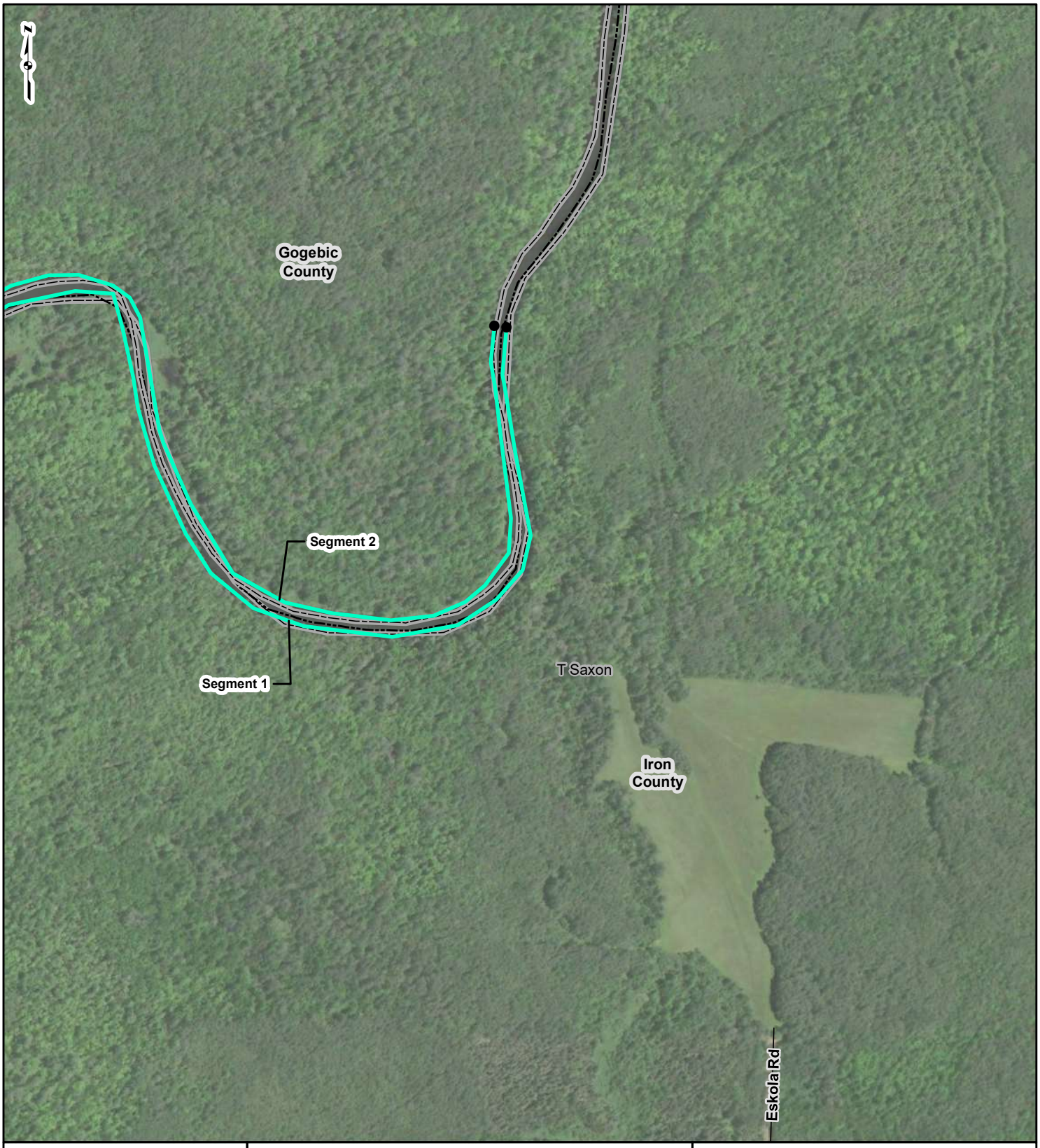
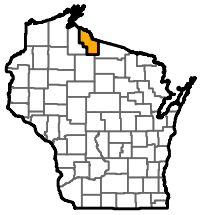


PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Start/Stop Points
- Invasive Points
- Invasive Line
- Saxon Shoreline Meander
- Saxon Terrestrial Meander
- Water Tow Location
- Terrestrial Study Area
- Road Centerline
- Community Boundary
- County Boundary

0 250 500 1,000 Feet

FIGURE 10
TERRESTRIAL AND INVASIVE SPECIES
SHEET 3 OF 3

SAXON FALLS POINT INTERCEPT
2021 SURVEYS

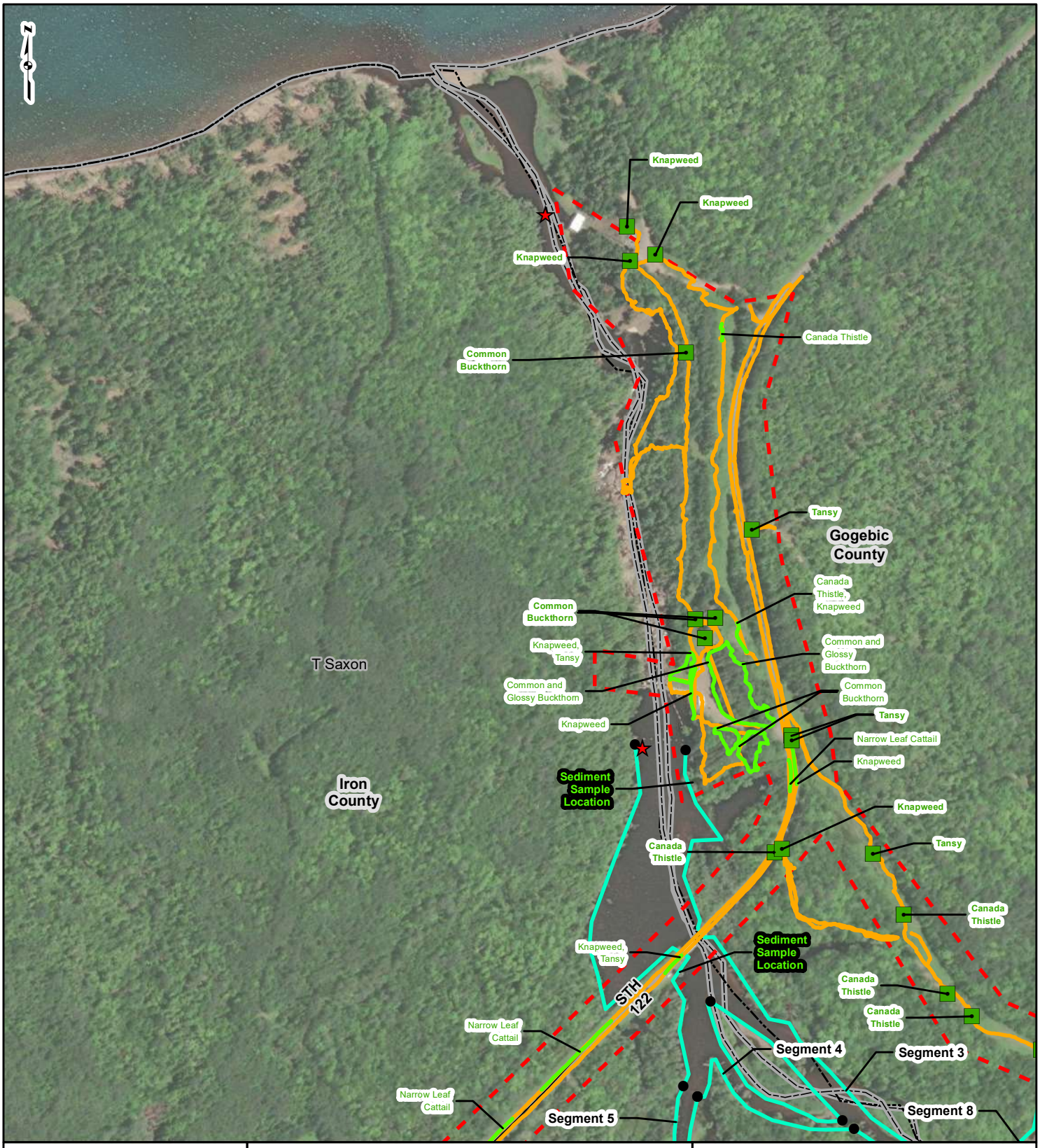
DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

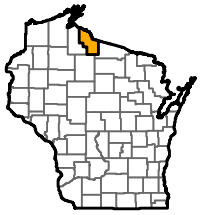
G:\R210322.00 - GIS\MXD\Point_Intercept_Survey\XCEL_Saxon_Falls_Fig10_Terrestrial_and_Shoreline_Survey_and Invasive_Species_2021_09_30.mxd

FIGURE 11

Terrestrial and Shoreline Survey and Invasive Species: Superior Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Start/Stop Points
- Invasive Points
- Invasive Line
- Superior Falls Shoreline Meander
- Superior Falls Terrestrial Meander
- Water Tow Location
- Terrestrial Study Area
- Road Centerline
- Community Boundary
- County Boundary

0 250 500 1,000 Feet

FIGURE 11
TERRESTRIAL AND INVASIVE SPECIES
SHEET 1 OF 2

SUPERIOR FALLS POINT INTERCEPT
2021 SURVEYS

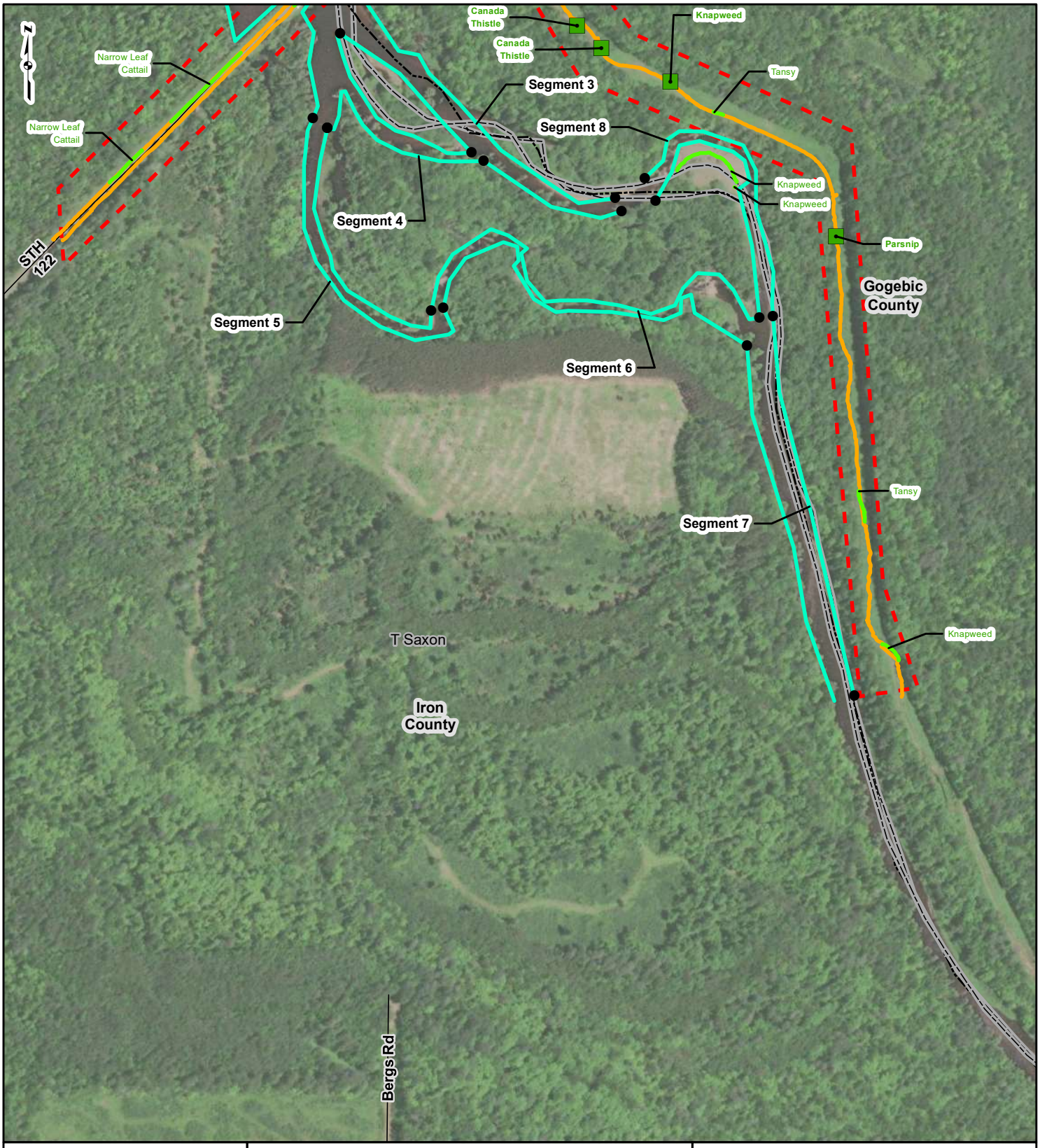
Xcel Energy

Mead & Hunt

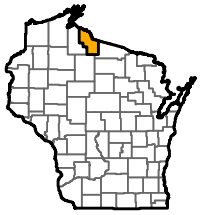
DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.01 - GIS\MXD\Point_Intercept_Survey\XCEL_Superior_Falls_Fig11_Terrestrial_and_Shoreline_Survey_and Invasive_Species_2021_09_30.mxd



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Start/Stop Points
- Invasive Points
- Invasive Line
- Superior Falls Shoreline Meander
- Superior Falls Terrestrial Meander
- Water Tow Location
- Terrestrial Study Area
- Road Centerline
- Community Boundary
- County Boundary

0 250 500 1,000 Feet

FIGURE 11
TERRESTRIAL AND INVASIVE SPECIES
SHEET 2 OF 2

SUPERIOR FALLS POINT INTERCEPT
2021 SURVEYS

Xcel Energy

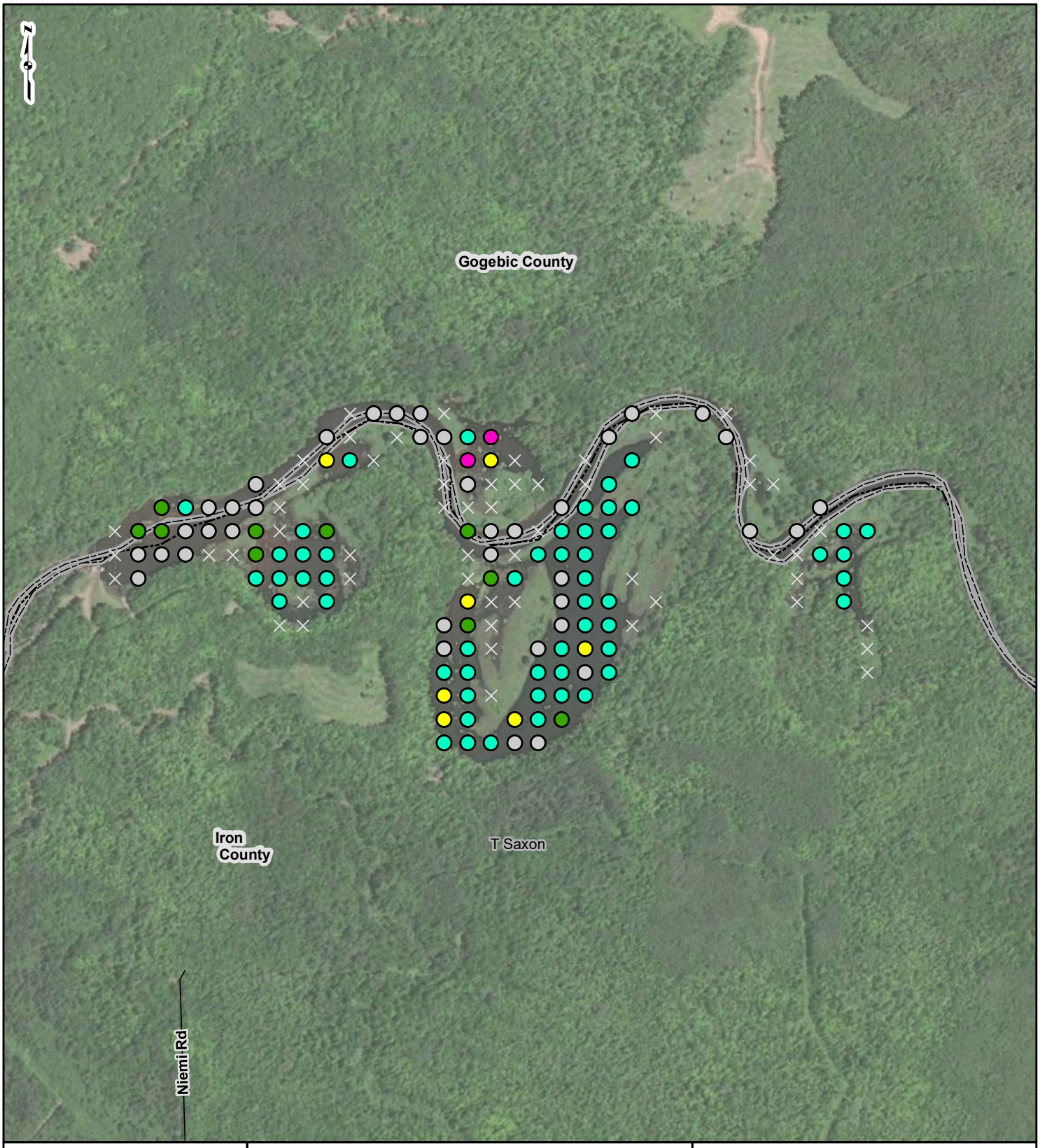
Mead & Hunt

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

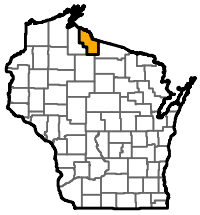
REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.01 - GIS\MXD\Point_Intercept_Survey\XCEL_Superior_Falls_Fig11_Terrestrial_and_Shoreline_Survey_and Invasive_Species_2021_09_30.mxd

FIGURE 12
June Predominant Species: Saxon Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Not Sampled
- **Predominant Species**
  - None
  - Acorus americanus
  - Ceratophyllum demersum
  - Elodea canadensis
  - Potamogeton robbinsii
- Road Centerline
- Community Boundary
- County Boundary

0 375 750 1,500 Feet

FIGURE 12
PREDOMINANT SPECIES

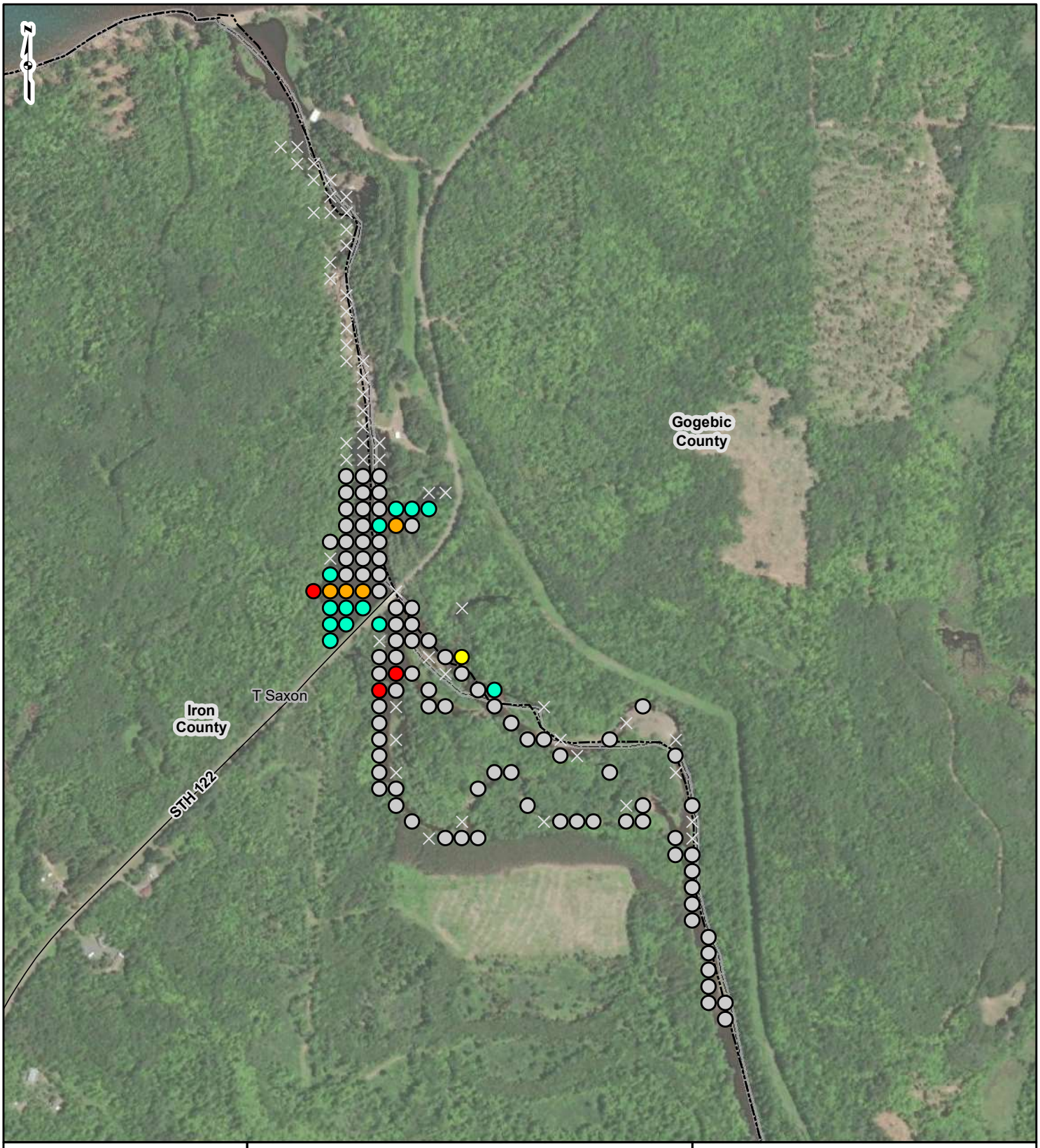
SAXON FALLS POINT INTERCEPT
JUNE 2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

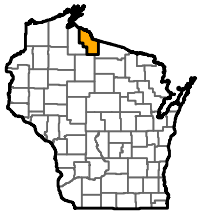
REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021. WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.00 - GIS\MXD\Point_Intercept_Survey\XCEL_Saxon_Falls_Fig12_June_Predominant_Species_2021_09_30.mxd

FIGURE 13
June Predominant Species: Superior Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

Not Sampled

Predominant Species

None

Heteranthera dubia

Potamogeton robbinsii

Sagittaria latifolia

Sparganium eurycarpum

Road Centerline

Community Boundary

County Boundary

0 375 750 1,500 Feet

FIGURE 13
PREDOMINANT SPECIES

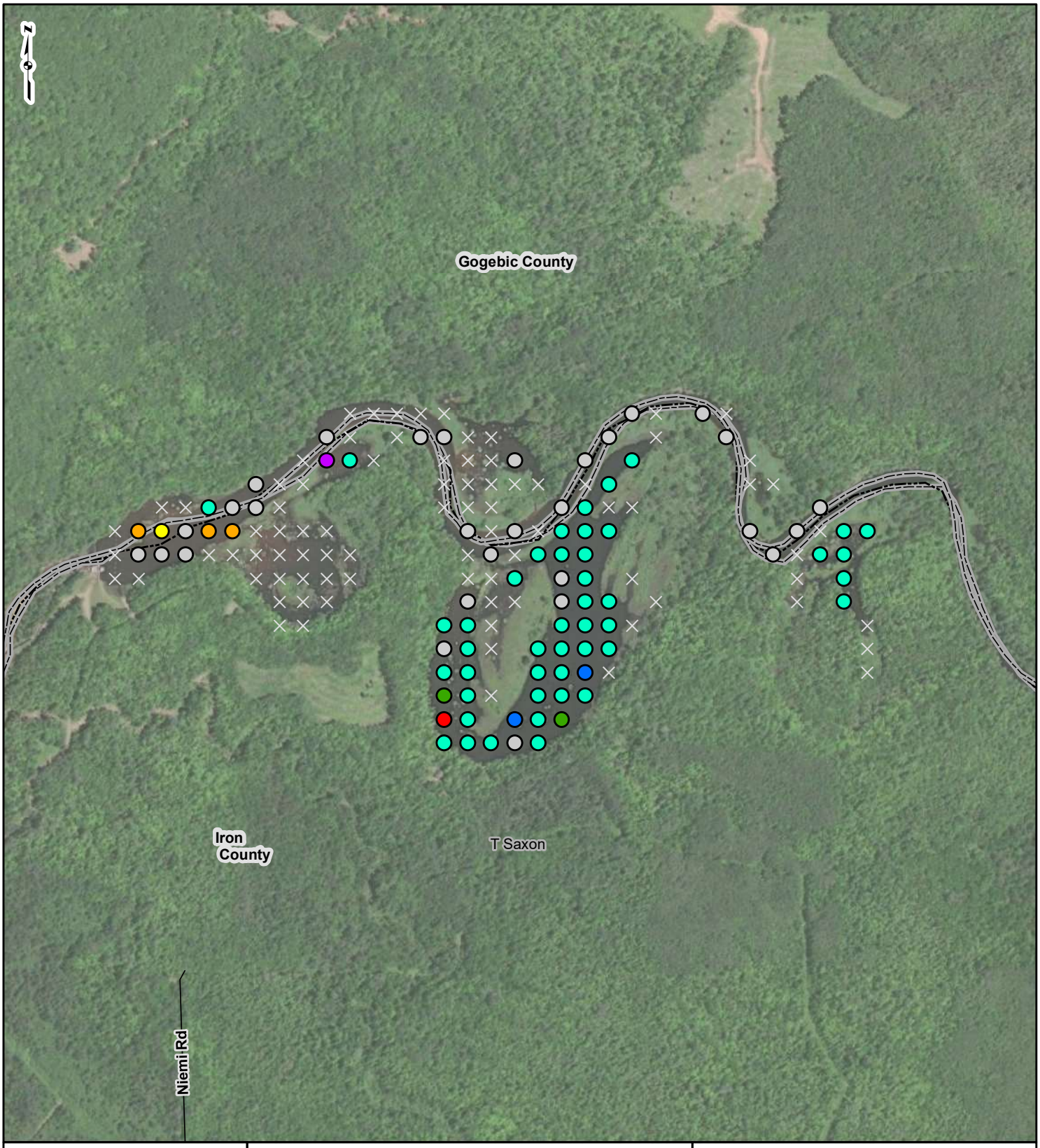
SUPERIOR FALLS POINT INTERCEPT
JUNE 2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

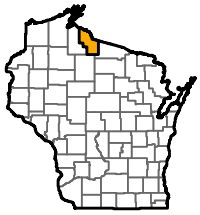
REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.01 - GIS\MXD\Point_Intercept_Survey\XCEL_Superior_Falls_Fig13_June_Predominant_Species_2021_09_30.mxd

FIGURE 14
August Predominant Species: Saxon Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Not Sampled
- **Predominant Species**
  - None
  - Ceratophyllum demersum
  - Elodea canadensis
  - Potamogeton alpinus
  - Potamogeton epihydrus
  - Potamogeton nodosus
  - Potamogeton obtusifolius
  - Potamogeton robbinsii
- Road Centerline
- Community Boundary
- County Boundary

0 375 750 1,500 Feet

FIGURE 14
PREDOMINANT SPECIES

SAXON FALLS POINT INTERCEPT
AUGUST 2021 SURVEYS

Xcel Energy

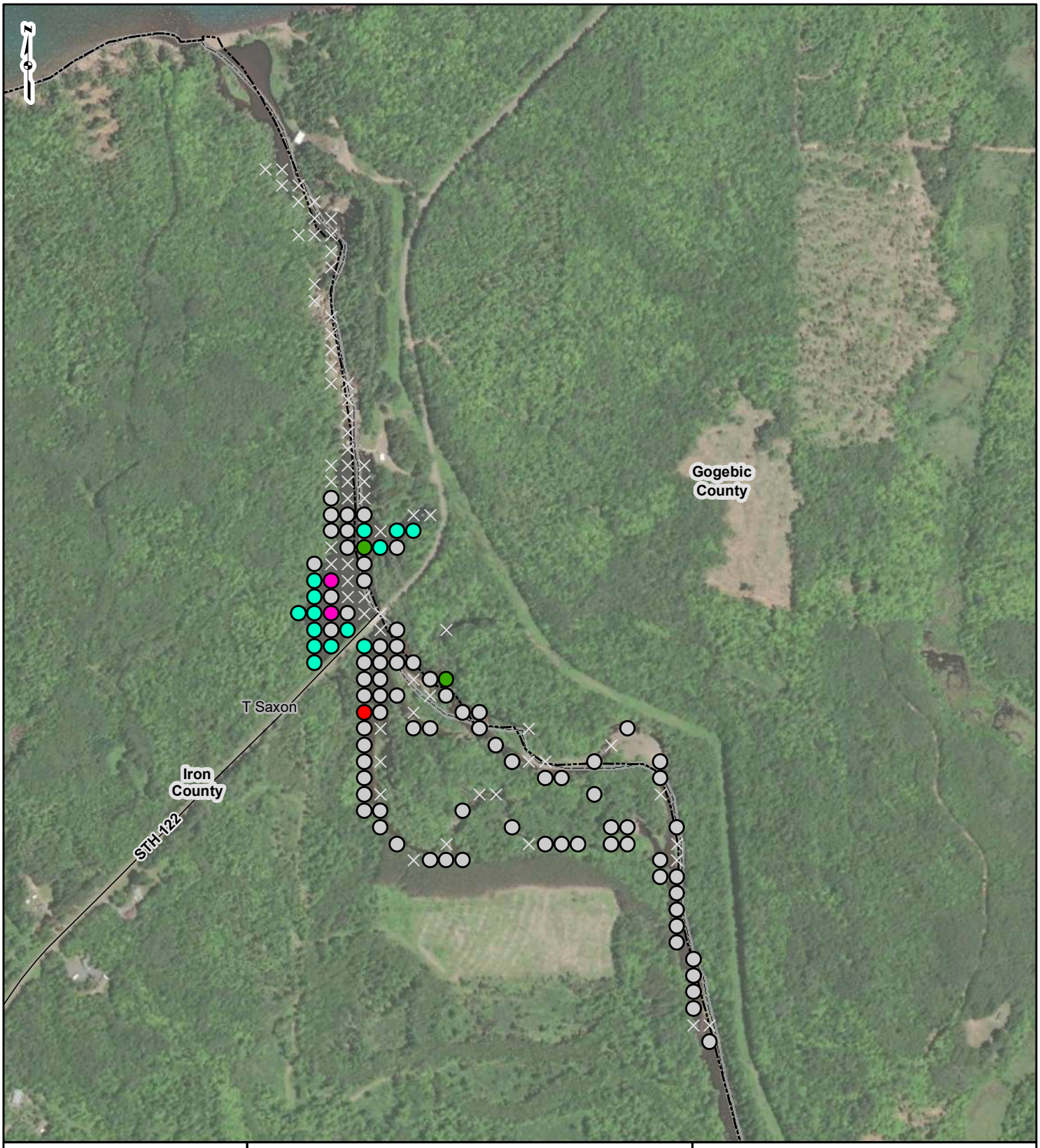
Mead & Hunt

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

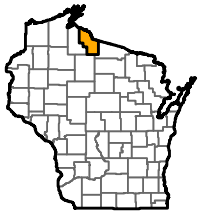
REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021.
WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.00 - GIS\MXD\Point_Intercept_Survey\XCEL_Saxon_Falls_Fig14_August_Predominant_Species_2021_09_30.mxd

FIGURE 15
August Predominant Species: Superior Falls



PROJECT LOCATION



IRON COUNTY, WISCONSIN

LEGEND

- Not Sampled
- **Predominant Species**
- None
- Elodea canadensis
- Potamogeton robbinsii
- Potamogeton zosteriformis
- Sparganium sp.
- Road Centerline
- Community Boundary
- County Boundary

0 375 750 1,500 Feet

FIGURE 15
PREDOMINANT SPECIES

SUPERIOR FALLS POINT INTERCEPT
AUGUST 2021 SURVEYS

DRAWN BY: EMW DATE: 9/30/2021
CHECKED: TDB APPROVED: LLS

REFERENCE: ESRI WORLD IMAGERY 2020, Accessed 9/30/2021. WDNR Counties, 2011. MGF Counties, 2021. WISLR Community Boundary 2018. WISDOT Road Centerlines, 2018.

G:\R210322.01 - GIS\MXD\Point_Intercept_Survey\XCEL_Superior_Falls_Fig15_August_Predominant_Species_2021_09_30.mxd

ATTACHMENT A

Aquatic Invasive Species Survey
Field Data Sheets – June: Saxon Falls

gai consultants
transforming ideas into reality

Waterbody/Project Saxon Date 6/23 WBIC 2941100

Crew Laura, Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	~~Myriophyllum spicatum - Eurasian water-milfoil~~ or Hybrid water-milfoil Cattail (hybrid)	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	R. Robinsii	Ranunculus aquatilis	Elodea canadensis	Potamogeton amplifolius (white stem pondweed)	P. obtusifolius	~~P. Epihydrus~~	Sweetflag (Acorus calamus)
120	5.0	M	P	ORG	3						3						
130	4.0	M	P	ORG	3						3						
138	4.5	M	P	ORG	3						3						
131	1.8	M	P	ORG	2						2	V					
139	1.5	M	P	ORG	3						3	V	V				
132	2.0	M	P	ORG	2						2						
121	1.5	M	P	ORG	2						2						
122	3.5	M	P	ORG	3						3						
110	4.8	M	P	ORG	3						3						
111	7.0	M	P	ORG	Ø												
123	3.2				2						2						
112	7.5				Ø												
124	3.0				3						3						
133	1.8				3						3						
134	2.0				2						2			1			
135	2.0				2						2						
126	7.5				1			1						1			
114	2.0				2						2						
103	1.5				Ø	V					V					V	
113	2.0				Ø												
125	4.0				2						2						
136	1.5				2	U		1			2			V			
127	6.5				Ø												
115	2.5				1						1						
104	3.8				3						3						
105	4.0				2						2						
116	2.8				2						2						
128	4.0				2						2						
117	4.5				2								2		1		

Waterbody/Project Saxon Date 6/23

Crew Laura + Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	*Myriophyllum spicatum*, Eurasian water-milfoil or Hybrid water-milfoil	*Potamogeton crispus*, Curly-leaf pondweed	*Ceratophyllum demersum*, Coontail	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	*Elodea*	*P. Robinsii*	[redacted]	*P. Nodosus*	*P. Nodosus*	*Chara*
51	8.0	S	P	SAND	Ø											
49	9.5	S	P	SAND	Ø											
44	too Deep															
38	4.0	M	P	ORG	Ø											
39	5.5	M	P	ORG	1			1								
46	2.0	M	P	ORG	1			1			1	1				
31	too Deep															
24	too deep															
19	6.5	M	P	ORG	1											
20	6.0	M	P	ORG	Ø											
16	5.5	S	P	SAND	Ø											
17	4.0	M	P	ORG	Ø											
21	3.5	M	P	ORG	1						1					
32	2.5	M	P	ORG	1							1				
40	2.0	M	P	ORG	1						1			1	1	
41	3.5	M	P	ORG	2							2				
42	3.5	M	P	ORG	2							2				
43	3.5	M	P	ORG	2							2				
29	2.5	M	P	ORG	1							1				
28	2.5	M	P	ORG	2							2				
35	3.5	M	P	ORG	1							1				
34	4.0	M	P	ORG	1							1		V		
27	3.5	M	P	ORG	1						1	1				
23	3.5	M	P	ORG	1				V			1				
22	1.5	M	P	ORG	1			1			1				1	
13	4.0	M	P	ORG	Ø											
14	5.0	M	P	ORG	Ø											
12	4.0	M	P	ORG	Ø											
11	5.4	M	P	ORG	Ø											

Waterbody/Project Saxon Date 6/23

Crew Laura Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	*Myriophyllum spicatum*, Eurasian water-milfoil or Hybrid water-milfoil	*Potamogeton crispus*, Curly-leaf pondweed	*Ceratophyllum demersum*, Coontail	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily	P. Robinsii	Elodea	P. Pusillus	P. Praelongus
10	2.0	M	P	ORG	1						1			
7	2.0	M	P	ORG	1							1	1	
8	4.3	M	P	ORG	1							1		
9	6.5	M	P	ORG	0									
4	3.0	M	P	ORG	1							1		1
5	4.5	M	P	ORG	0									
6	8.0	M	P	ORG	0									

Waterbody/Project Saxon Date 6/23

Crew Laura + Brett

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	P. Robinsii	P. Diversifolius	Ranunculus Flabellaris	Cotta. I - hybrid	Myriophyllum Heterophyllum	Potamogeton amplifolius	Elodea canadensis	P. Nodosus	Acorus Calamus
106	4.5	M	P	ORG	3						3								
98	6				1			1				1							
99	7.5				Ø														
107	6.5				1							1							
91	6.5				1						1								
79	4.8				2						2	1							
65	7.0				1						1		1						
64	5.8				1			1				1							
78	1.5				1						1			1					
77	2.5				2						2								
63	3.0				1			1							1				
62	3.3				1			1			1		1			1			
76	1.5				1						1								
75	2.5				1			1	V		1					1			
61	6.5				Ø														
60	5.5				Ø														
74	2.5				1			1					1			1	1		
73	4.5				2			2											
59	too deep																		
58	10	too deep																	
57	3.0	too deep																	
67	1.0				2									V	V		2		
68	7.0				Ø														
81	2.8				3	1		3	V						1				
80	3.5				1	1									1	1			
56	1.0				1						1								
56	7.5				Ø														
54	4.0	S		sand	Ø														
53	7.0	M	P	ORG	Ø														

P. Diversifolius

Yellow water crowfoot

Waterbody/Project Saxon Date 6/23

Crew Laura + Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	P. robbinsii	Lemna minor	Spirodella polyrhiza	Lemna trisulca	Ranunculus aquatilis	Elodea canadensis	Sparganium spp.	P. amplifolius	P. vaseyi	Cattail / Hyb
159	6.0	M	P	SILT	Ø															
158	Not nav - mostly Reed Canary																			
153	6.0	S	P	SAND	Ø															
163	2.0	M	P	ORG	2					2	1									
162	2.0	M	P	ORG	1															
164	2.3	M	P	ORG	2					2				1						
160	2.5	M	P	ORG	2					2										
161	3.5	M	P	ORG	2					2										
159	2.5	M	P	ORG	3					3										
154	Non nav					Vis on S, ~~lattifolia~~ red canary														
152	too deep >10'																			
150	2.0	M	P	SILT	Ø															
147	3.0	S	P	SAND	Ø															
146	Too Deep																			
145	3.5	M	P	SILT	Ø															
137	8.5	S	P	SAND	Ø															
129	5.0	S	P	SAND	Ø															
118	too Deep																			
108	9.5	M	P	ORG	Ø															
101	too Deep																			
94	3.0	S	P	SAND	Ø															
84	2.0	M	P	ORG	Ø	Vis on Cattail hybrid + Bureed														
70	2.0	M	P	ORG	1					V					1		V			
71	too deep																			
85	8.5	M	P	SILT	Ø															
86	1.8	M	P	ORG	1										1			1	1	
96	2.0	M	P	ORG	2					2				1						
102	2.0	M	P	SILT	1					1										
109	4.0	M	P	SILT	2					2					1					V

ATTACHMENT B

Aquatic Invasive Species Survey
Field Data Sheets – June: Superior Falls

gai consultants
transforming ideas into reality

Waterbody/Project Superior Date 6/24 WBIC 2940600

Crew Laura & Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Potamogeton Robbinsii	Heteranthera dubia	Elodea canadensis	P. Nodosus	Water crowfoot, White R. aquatilis	Coontail - Ceratophyllum demersum	Hardstem Bulrush - Schoenoplectus acutus
109	4	M	P	Organic	Q												
110	8.5				Q												
111	6	R		cobble	Q												
112	2.5	M		Organic	Q												
115	1.3				1						1	1	V	1			
116	2.8				1												
117	1.3				Q						V						
122	2.4				2						2						
123	0.8				1						1		V		V		
121	1.3				2						2		V			1	V
120	2.5				Q									V			
119	3.7	R		cobble	Q												
118	3	M		Organic	Q												
113	9.8	M			Q												
114	4.3	R		Gravel	Q												
124	1.3	M		Organic	Q												
129	2.8				Q												
130	7.6				Q												
131	8.5				Q												
125	3.5	R		cobble	Q												
126	4.3	M		Organic	Q												
6/25																	
63	1.0	R	P	cobble	Q												
53	0.1	R	P	cobble	Q												
41	0.5	M	P	ORG	Q												

Waterbody/Project Superior Date 6/24

Crew Laura, Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Elodea canadensis	Potamogeton robbinsii	Sagittaria latifolia	Potamogeton amplifolius	Sparganium eurycarpum	Sparganium eurycarpum
61	1.8	R	P	Cobble	0											
55	3.0				0											
49	4.5				0											
50	2.5				0											
44	3.4				0											
67	1.2				0											
68	1.5			Gravel	1						1	1				
73	2.8			Cobble	0											
78	1			Sand	1						V	V	1			
77	2.8			Cobble	0											
83	3.5			cobble	0											
82	1				0											
87	1				0											
93	2			Sand	0											
92	8.5			cobble	0											
87	4				0											
86	2	M		Organic	1							1		V	1	
81	3.8	R		Cobble	0											
75	4.4	M		Organic	0											
71	3	S		Sand	0											
66	0.5	M		Organic	0						V					
59	2	M		Organic	0											
60	0.7	R		cobble	0											
70	3.5	M		Organic	1										1	1
69	2.5				0											
74	3.4	M		Organic	0											
64	2.5				1										V	1
65	2				0											
57	3.5				0											

Waterbody/Project Superior Date 6/24

Crew Laura & Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Elodea canadensis	Potamogeton Robbinsii	Sagittaria latifolia	Potamogeton amplifolius	~~Sparganium fluctuans~~	Sparganium eurycarpum	Heteranthera dubia					
54	1.8	M	P	Organic	0																	
48	4	R		Cobble	0																	
43	3.5			cobble	0																	
~~37~~					0																	
34	1.5	M		Organic	0																	
35	0.5				0							V										
29	2	R		Cobble	0																	
20	2				0																	
15	2				0																	
16	3.8	M		Organic	0																	
17	1.5				0																	
99	9	R		cobble	0																	
98	8.8	M		Organic	1											1						
91	1.7	M			1							1										
85	1	M			2							2										
90	1	M			2							2										
89	2.3	M			1							2				V						
87	2.1				2							2				V						
90	2				2							2				V						
97	3.5				2											2						
96	3.1				1							V				1						
95	0.8				2										2							
61	3.5				1							1				1						
102	4.8				0																	
103	9	S		sand	0																	
104	9.3	R		Gravel	0																	
108	3.7	M		Organic	0																	
107	8.5	S		Sand	0																	
106	4.3	S			0																	

Waterbody/Project Superior Falls Date 6-25-21

Crew Laura & Brent

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	*Myriophyllum spicatum*, Eurasian water-milfoil or Hybrid water-milfoil	*Potamogeton crispus*, Curly-leaf pondweed	*Ceratophyllum demersum*, Coontail	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily
26	2	M	P	Organic	0					
36	2				0					
39	1.5	R		Cobble	0					
40	1				0					
30	0.5				0					
23	1.3				0					
24	1	M		Organic	0					
25	0.5	R		Cobble	0					
32	0.5				0					
27	3.5			Gravel	0					
1	0.5			Cobble	0					
3	0.5				0					
2	2				0					
4	1				0					
5	1				0					
6	0.5				0					
7	1				0					
8	1.1				0					
9	1.3				0					
10	2.5				0					
11	1.5				0					
13	1.5				0					
12	3.5				0					
18	2.5				0					
19	On Shore									
28	Bare rocks		no water							
33	1.0				0					
46	1.0				0					
53	in the riffle									

42-on shore

ATTACHMENT C

Aquatic Invasive Species Survey
Field Data Sheets – August: Saxon Falls

gai consultants
transforming ideas into reality

Waterbody/Project Saxon Date 8/17/21

Crew Laura Sass, Anna Cisar

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Pot. robbinsii	Elodea	Pot. vaseyi	Utr. vulgaris	Pot. alpinus	Pot. obtusifolius	Pot. vaseyi	Chara	Pot. nodosus
54	2.0	S	P	Sand	Ø						V	V							
53	TOO	DEEP																	
38	3.0	S		Sand	Ø							V							
39	4.0	M		Silt	2								1	1	1				
46	3.0	M		Silt	1			1			1	1			1	1	1	1	
20	6.0	S		Sand	Ø														
19	7.5	S		Sand	Ø						V								
16	6.0	S		Sand	Ø														
13	2.0	S		Sand	1						1	1					1	V	
17	3.0	S		Sand	1			V										1	
14	5.5	M		Clay	1													1	
11	5.0	M		Clay	Ø													1	
8	4.0	M		Clay	2			2											
4	2.0	M		Org.	3													3	
5	3.0	M		Clay	Ø														
9	5.0	M		Clay	Ø														
12	7.0	M		Clay	Ø														

Waterbody/Project Saxon Date 8/17/21

Crew Laura Sass, Anna Cisar

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Pot. natansii	Elodea	Pot. amplifolius	Ranunculus flabellaris	Pot. epihydrus	Pot. obtusifolius
106	5.0	M	P	Silt	2						2		✓			
105	4.0	M		Silt	2						2			1		
104	5.0	M		Silt	2			✓			2					
103	3.0	M		Silt	2						2					
128	4.0	M		Silt	2						2					
136	non-nav			on land	—											
135	2.0	M		Silt	3						3					
134	3.5	M		Silt	3			✓			3					
133	2.0	M		Silt	3						3					
124	3.5	M		Silt	3						3					
125	5.0	M		Silt	3						—		✓			
126	7.5	M		Silt	—									✓		
127	4.5	M		Silt	2										2	
123	3.0	M		Silt	2											
122	4.5	M		Silt	3						3					
132	2.0	M		Silt	3						3					
131	non-nav			vegetation	—											
139	↓			↓												
121	2.0	M		Silt	2						2					
120	5.0	M		Silt	3						3				1	
130	4.0	M		Silt	3						3					
138	3.5	M		Silt	3			✓			3		✓			
143	non-nav			vegetation												
7D	2.0	S		Sand	Ø						✓	✓				
59	TOO DEEP				—											
58																
57	↓			↓												
92	7.5	M		Silt	Ø											
56	8.0	TOO	DEEP		—											

Waterbody/Project Saxon Date 8/17/21

Crew Laura Sass Anna Cisar

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Pot. robinsii, Fern pondweed	Ranunculus aquatilis, white water crowfoot	algae (root filamentous)	Elodea	Pot. obtusifolius, blunt leaf	Pot. nodosus	Pot. amplifolius, large leaf	Yellow water crowfoot - R. flabellaris	Najas flexilis, slender naiad	Pot. epihydrus	Pot. nodosus
72	non-nav		P	Shallow																	
96	2.0	M		Silt	2					2	V	1									
102	1.5	M		Silt	2		V			2		1									
109	2.5	M		Silt	2					2	1	1	1								
110	3.0	M		Silt	3					3				V							
111	7.0	M		Silt	Ø		V								V						
112	7.5	M		Silt	Ø																
113	3.5	M		Silt	3					3											
114	1.5	M		Silt	2					2											
115	3.0	M		Silt	3					3											
116	3.0	M		Silt	3					3						V					
117	5.0	M		Silt	2					2			2	1							
107	5.0	M		Silt	Ø		V			Ø											
99	8.0	M		Silt	Ø																
91	5.0	M		Silt	3					3											
79	5.0	M		Silt	3					3		1					1				
66	3.0	M		Silt	2					2	1		V								
64	6.0	M		Silt	2													1	2		
63	4.0	M		Silt	2		1	V					1			1					
62	4.0	M		Silt	2		1			2		1	1		V						
61	7.0	M		Silt	Ø																
60	4.5	M		Silt			V			1											
73	7.0	M		Silt	Ø		V	V													
74	3.0	M		Silt	1		1			1			1	1						V	
75	3.0	M		Silt	2		1	V		1			1							1	
76	2.0	M		Silt	2																
77	2.0	M		Silt	2					3											
78	1.5	M		Silt	2					2		1									
98	6.0	M		Silt	3								2	3							

B.S. ~~Slender naiad (Najas flexilis) ~~

Waterbody/Project Saxon Date 8/17/21

Crew Laura Sass, Anna Cisar

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Pot. robinsii, Fern pondweed	Ranunculus aquatilis, white water crowfoot	Elodea canadensis, common waterweed	Pot. foliosus, leafy pondweed
157	8.0	R	P	Grav.	Ø									
158	non-nav			on-land	—									
153	6.5	R		Grav	Ø									
159	2.5	M		Silt	3			✓						
160	3.0	M		Silt	3						✓			
164	1.5	M		Silt	1									
162	2	M		Silt	2					3/2 – 3/2				
163	2.5	M		Silt	3									
161	3.5	M		Silt	3							✓	✓	
152	6.5	M		Silt	Ø									
150	6.5	S		Sand	Ø									
151	non-nav			on land	—									
148		↓		↓										
149														
147	4.0	S		Sand	Ø									
146	TOO DEEP				—									
145	3.5	S		Sand	Ø									
142	non-nav			on land	—									
137	7.5	S		Sand	Ø									
129	5.5	S		Sand	Ø									
118	10	S		Sand	Ø									
119	non-nav			on land	—									
108	9.5	M		Silt	Ø									
101	TOO DEEP				—									
94	3.5	M		Silt	Ø									
84	non-nav			on land	—									
95		↓		↓										
85	8.0	M		Silt	Ø									
86	non-nav			shallow	—									

ATTACHMENT D

Aquatic Invasive Species Survey
Field Data Sheets – August: Superior Falls

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Waterbody/Project Superior Date 8/16/2021 water's up a bit since last time

Crew Laura + Kellen

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	*Myriophyllum spicatum*, Eurasian water-milfoil or Hybrid water-milfoil	*Potamogeton crispus*, Curly-leaf pondweed	*Ceratophyllum demersum*, Coontail	*Nuphar variegata*, Spatterdock	*Nymphaea odorata*, White water lily
21	Log									
36	2.5	R	P	GRAV	0					
39	too deep/Logs				0	channel flow				
40	too deep				0	" " "				
30	0.2	R	P	Cobble	0					
23	1.0	R	P	Cobble	0					
24	2.0	R	P	Cobble	0					
25	0.5	R	P	Cobble	0					
26	3.5	R	P	Boulder	0					
27	2.0	M	P	Mg	0					
32	2.5	R	P	GRAV	0					
31	3.0	R	P	Cobble	0					
18	2.5	R	P	Cobble	0					
12	3.5	R	P	Cobble	0					
11	1.5	R	P	Cobble	0					
10	2.0	R	P	Cobble	0					
9	1.0	R	P	Cobble	0					
8	0.6	R	P	Cobble	0					
7	1.3	R	P	Cobble	0					
6	0.5	R	P	Cobble	0					
5	0.5	R	P	Cobble	0					
4	1.0	R	P	Cobble	0					
3	Log Jam									
2	Shore/grass									
1	0.5	R	P	Cobble	0					
13	1.0	R	P	Cobble	0					
33	0.5	R	P	Cobble	0					
42	shore									
46	1.2	R	P	Cobble	0					

Waterbody/Project Superior Date 8/17 + 8/18

Crew Laura + Kellen / Laura - Anna

	sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Myriophyllum spicatum, Eurasian water-milfoil or Hybrid water-milfoil	Potamogeton crispus, Curly-leaf pondweed	Ceratophyllum demersum, Coontail	Nuphar variegata, Spatterdock	Nymphaea odorata, White water lily	Pot. zosteriformis	Pot. nodosus	Pot. robbinsii	Najas flexilis	Elodea canadensis	Pot. natans	Algae (not filament.)
8/17 Laura + Kellen	53	0.5	R	P	Cobble	Ø												
	63	1.0	R	P	Cobble	Ø												
	52	1.0	R	P	Cobble	Ø												
	41	1.0	R	P	GRAV	Ø												
8/18/21 Laura Sass + Anna Cisar	129	4.0	R	P	Cobble	Ø												
	124	7.0	R		Cobb.	Ø												
	125	3.5	R		Grav	Ø												
	126	6.5	M		Clay	Ø												
	120	2.5	M		Clay	1				1	1	1						
	116	2.5	M		Clay	2				1		1	✓	✓				
	117	2.0	S		Sand	Ø						✓						
	122	3.0	M		Silt	2				1		2						
	123	1.5	M		Silt	1		1				1		1				
	119	5.0	S		Sand	Ø												
	118	4.0	S		Sand	Ø												
	114	5.5	S		Sand	Ø												
	115	3.0	M		Silt	1					1			1				
	112	5.0	M		Clay	Ø												
	108	4.0	S		Sand	Ø								✓				
	109	3.5	S		Sand	Ø				✓		1		✓				
	105	2.0	S		Sand	1				1					✓			
	106	4.0	M		Silt	1				✓								
	102	5.0	M		Clay	Ø												
	101	4.5	M		Silt	2				1		1		1				
	95	2.5	S		Sand	1		✓				1		✓				
	96	5.0	M		Clay	1				1		1		✓		1		
	[illegible]	4.0	M		Clay	2				2		1						

Waterbody/Project Superior Date 8/18/21

Crew Laura + Anna

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Sparganium spp
69	3.0	M	P	Clay	Ø	
70	3.5	M		Clay	Ø	
65	3.5	M		Clay	Ø	
64	2.5	M		Clay	2	2
57	5.0	M		Wood	Ø	
54	5.0	R		Grav	Ø	
47	5.0	R		Cob	Ø	
43	4.5	R		Cob	Ø	
37	3.0	R		Cob	Ø	
34	3.0	R		Cob	Ø	
35	1.5	S		Sand	Ø	
29	3.5	R		Cob	Ø	
20	2.5	R		Cob	Ø	
15	2.0	R		Cob	Ø	
16	2.5	R		Cob	Ø	
17	3.5	M		Wood	Ø	

Partly cloudy, 85°F

Waterbody/Project Superior Date 8/18/21

Crew Laura Sass, Anna Cisar

sampling point	Depth (ft)	Dominant sediment type (M=muck, S=Sand, R=Rock)	Sampled holding rake pole (P) or rake rope (R)?	Additional Info - Dominant Substrate type (Clay, Silt, Sand, Gravel, Cobble, Boulder, Bedrock, Wood, Organic)	Total Rake Fullness	Pot. Robbinsii	Pot. zosteriformis	Najas flexilis	Elodea canadensis	Coontail - Ceratophyllum demersum	Algae (not filamentous)	Pot. amplifolius
98	5.0	M	P	Silt	Ø							
91	3.5	M		Clay	3	3	V	1				
85	3.0	M		Clay	2	2	V	V	1			
79	1.5	M		Clay	1	1			1			
84	2.5	M		Clay	1	1	1			V	1	
89	3.5	M		Clay	2	2	V					
90	3.0	M		Clay	3	3						
86	2.5	M		Clay	1	1					V	
87	6.0	R		Cobb.	Ø							
88	2.0	R		Cobb	Ø							
93	2.5	S		Sand	Ø							
82	1.5	R		Cobb	Ø							
83	4.5	R		Cobb	Ø							
77	3.5	R		Cob.	Ø							
78	1.5	S		Sand	1	V			1			
73	2.5	S		Sand	Ø							
67	2.0	R		Grav	Ø							
68	2.0	R		Grav	Ø							
61	3.0	R		Grav	Ø							
55	3.5	R		Grav	Ø							
49	4.0	R		Cob	Ø							
44	3.5	R		Cob	Ø							
45	4.0	R		Cob	Ø							
60	2.0	R		Grav	Ø							
59	2.5	R		Grav	Ø							
71	4.0	S		Sand	Ø							
81	5.0	R		Grav	Ø							
80	4.0	R		Grav	Ø							
75	4.5	M		Clay	Ø							
74	3.5	M		Clay	Ø	V						

B.S.: small amounts of wild rice noted upstream of the bridge

ATTACHMENT E
WDNR 3200-125 Forms

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State of Wisconsin
Department of Natural Resources
Wisconsin Lakes Partnership

Aquatic Invasive Plant Incident Report

Form 3200-125 (R 2/10)

The purpose of this form is to notify DNR of a new species of AIS in a waterbody. Only use if you found an aquatic invasive plant on a lake where it hasn't been found previously.

To find where aquatic invasives have already been found, visit: http://dnr.wi.gov/lakes/ais.

Notice: Information on this voluntary form is collected under ss. 33.02 and 281.11, Wis. Stats. Personally identifiable information collected on this form will be incorporated into the DNR Surface Water Integrated Monitoring System (SWIMS) Database. It is not intended to be used for any other purposes, but may be made available to requesters under Wisconsin's Open Records laws, ss. 19.32 - 19.39, Wis. Stats.

Primary Data Collector

Name	Phone Number	Email
Laura Sass	920-328-0980	l.sass@gaiconsultants.com

Monitoring Location

Waterbody Name	Township Name	County
Montreal River	Saxon, WI	Iron

Boat Landing (if you only monitor at a boat landing)

Date and Time of Monitoring or Discovery

Monitoring Date	Start Time	End Time
6/23/2021		

Information on the Aquatic Invasive Plant Found (Fill out one form for each species found.)

Which aquatic invasive plant did you find?:
- ☐ Curly-leaf Pondweed
- ☐ Eurasian Water-milfoil
- ☐ Purple Loosestrife
- ☐ Brittle Naiad
- ☐ Hydrilla
- ☐ Brazilian Waterweed
- ☐ Yellow Floating Heart

Where did you find the invasive plant?
Rooted along the shore line

x Yellow Iris

Latitude: 46.554133 Longitude: -90.414406

Approximately how large an area do the plants occupy?
- ☒ A Few Plants
- ☐ One or a few beds
- ☐ Many beds
- ☐ A Whole Bay or Portion of Lake
- ☐ Widespread, covering most shallow areas of lake
- ☐ Don't know (e.g. didn't check the whole lake)

Was the plant floating or rooted?
- ☐ Floating
- ☒ Rooted

Estimated percent cover in the area where the invasive was found (optional)

Substrate cobble, %	Substrate muck, %	Substrate boulders, %	Substrate sand, %	Bottom covered with plants, %
100%				1%

Voucher Sample

Did you collect a sample of the plant (a voucher specimen) and bring it to your local DNR office? If so, which office?

- ☐ Rhinelander
- ☐ Spooner
- ☐ Green Bay
- ☐ Oshkosh
- ☒ Did not take plant sample to a DNR office
- ☐ Fitchburg
- ☐ Waukesha
- ☐ Eau Claire
- ☐ Superior
- ☐ Other Office _____

Please collect up to 5-10 intact specimens. Try to get the root system, all leaves as well as seed heads and flowers when present. Place in ziplock bag with no water. Place on ice and transport to refrigerator. Bring samples, a copy of this form, along with a map showing where you found the suspect plants to your regional AIS or Citizen Lake Monitoring Coordinator at the DNR.

For DNR AIS Coordinator to fill out

AIS Coordinator(s) or qualified field staff who verified the occurrence: _____

Statewide taxanomic expert who verified the occurrence: _____
(for list see http://dnr.wi.gov/invasives/aquatic/whattodo/staff/AisVerificationExperts.pdf)

Was the specimen confirmed as the species indicated above? ☐ Yes ☐ No If no, what was it?

Herbarium where specimen is housed: _____ Herbarium Specimen ID: _____

Have you entered the results of the voucher in SWIMS? ☐ Yes ☐ No

AIS Coordinator: Please enter the incident report in SWIMS under the Incident Report project for the county the AIS was found in. Then, keep the paper copy for your records.

ATTACHMENT F
Photo Log

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ATIS Study Photographs

	
Laura Sass holding a healthy bryozoan growing around native coontail Saxon Falls, 46.540725, -90.368775 August 17, 2021	Superior Falls canoe take-out and sediment sample location Superior Falls, 46.556850, -90.414519 August 18, 2021
	
Purple loosestrife growing along the shoreline of Superior Falls (1) Superior Falls, 46.5545472, -90.411748 August 16, 2021	Purple loosestrife growing along the shoreline of Superior Falls (2) Superior Falls, 46.553487, -90.407654 August 16, 2021

ATIS Study Photographs

	
Purple loosestrife growing along the shoreline of Saxon Falls Saxon Falls, 46.541061, -90.366611 August 16, 2021	View of the Saxon Falls boat launch Saxon Falls, 46.538326, -90.373453 August 16, 2021
	
View of the Saxon Falls hydro plant Saxon Falls, 46.536327, -90.379418 July 20, 2021	The floating leaves of native Vasey's pondweed (*Potamogeton vaseyi*) Saxon Falls, 46.539129, -90.370213 June 23, 2021
	
View of the top of the Superior Falls project area Superior Falls, 46.555194, -90.408125 June 25, 2021	Yellow iris growing along the shoreline of Superior Falls Flowage (1) Superior Falls, 46.554133, -90.414406 June 25, 2021

ATIS Study Photographs

	
Yellow iris growing along the shoreline of Superior Falls Flowage (2) Superior Falls, 46.555521, -90.414717 June 25, 2021	Yellow iris growing along the shoreline of Superior Falls Flowage (3) Superior Falls, 46.555589, -90.414728 June 25, 2021

ATTACHMENT G
Terrestrial Survey Field Data Sheets

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SAXON TERRESTRIAL SHORELINE INVASIVE SURVEY

8/16/21

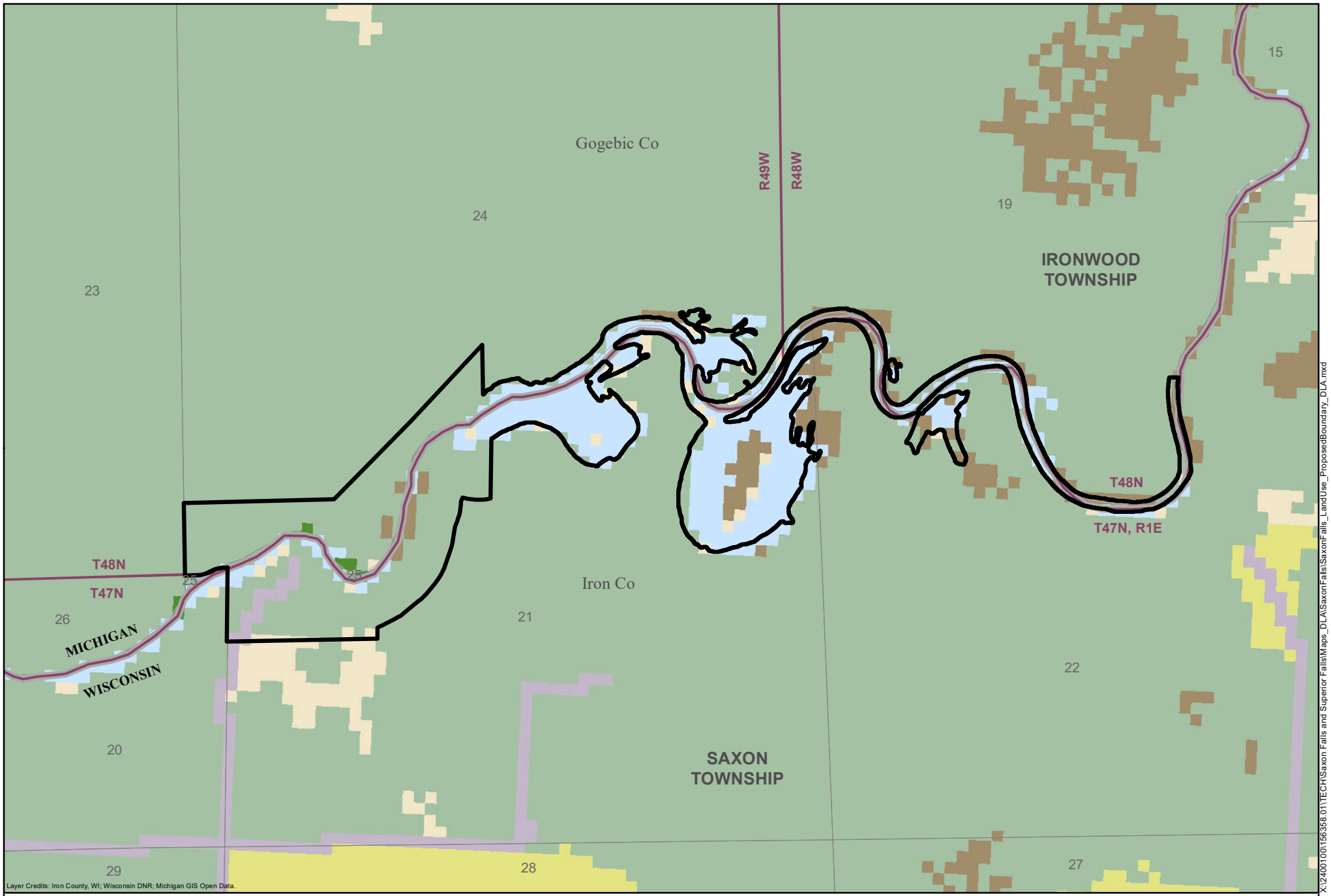
SEGMENT #	SPECIES	RELATIVE ABUNDANCE
1	NARROWLEAF CATTAIL	2
	PURPLE LOOSESTRIFE	1
2	NARROWLEAF CATTAIL	2
	PURPLE LOOSESTRIFE	1

SUPERIOR FALLS SHORELINE INVASIVE SURVEY

8/16/21

SEGMENT #	SPECIES	RELATIVE ABUNDANCE
3	NARROWLEAF CATTAIL	1
4	NARROWLEAF CATTAIL	1
5	PURPLE LOOSESTRIFE	1
	AQUATIC FORGET ME NOT	1
	YELLOW IRIS	1
6	PURPLE LOOSESTRIFE	1
	AQUATIC FORGET ME NOT	1
7	PURPLE LOOSESTRIFE	1
8	SPOTTED KNAPWEED	2

APPENDIX E-19 Major Land Uses in the Saxon Falls Project Vicinity



X:\240010\156358.011\TECH\Saxon Falls and Superior Falls\Maps_DLA\SaxonFalls_LandUse_ProposedBoundary_DLA.mxd

Xcel Energy®

Mead & Hunt

Proposed Project Boundary
State Boundary
Township/Range Line
Section Line

Land Use

Agriculture
Barren Land
Development
Forest
Shrubland
Water
Wetland

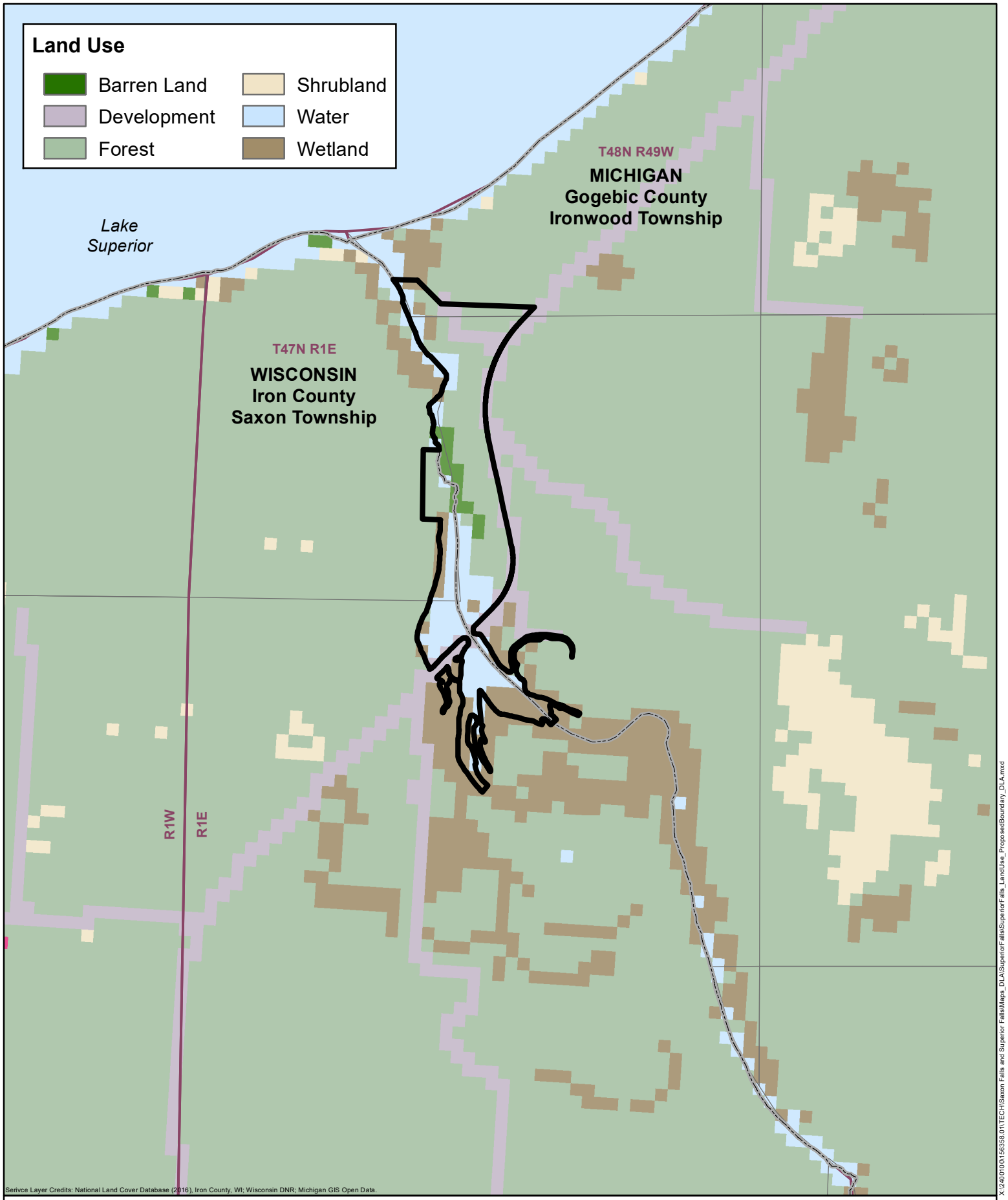
N

0 600 1,200 Feet

Saxon Falls Hydroelectric Project
Project Vicinity Major Land Use

FERC No. 2610

APPENDIX E-20 Major Land Uses in the Superior Falls Project Vicinity



Xcel Energy®

Mead & Hunt

Proposed Project Boundary
State Boundary
Township/Range Line
Section Line

N

0 500 1,000 Feet

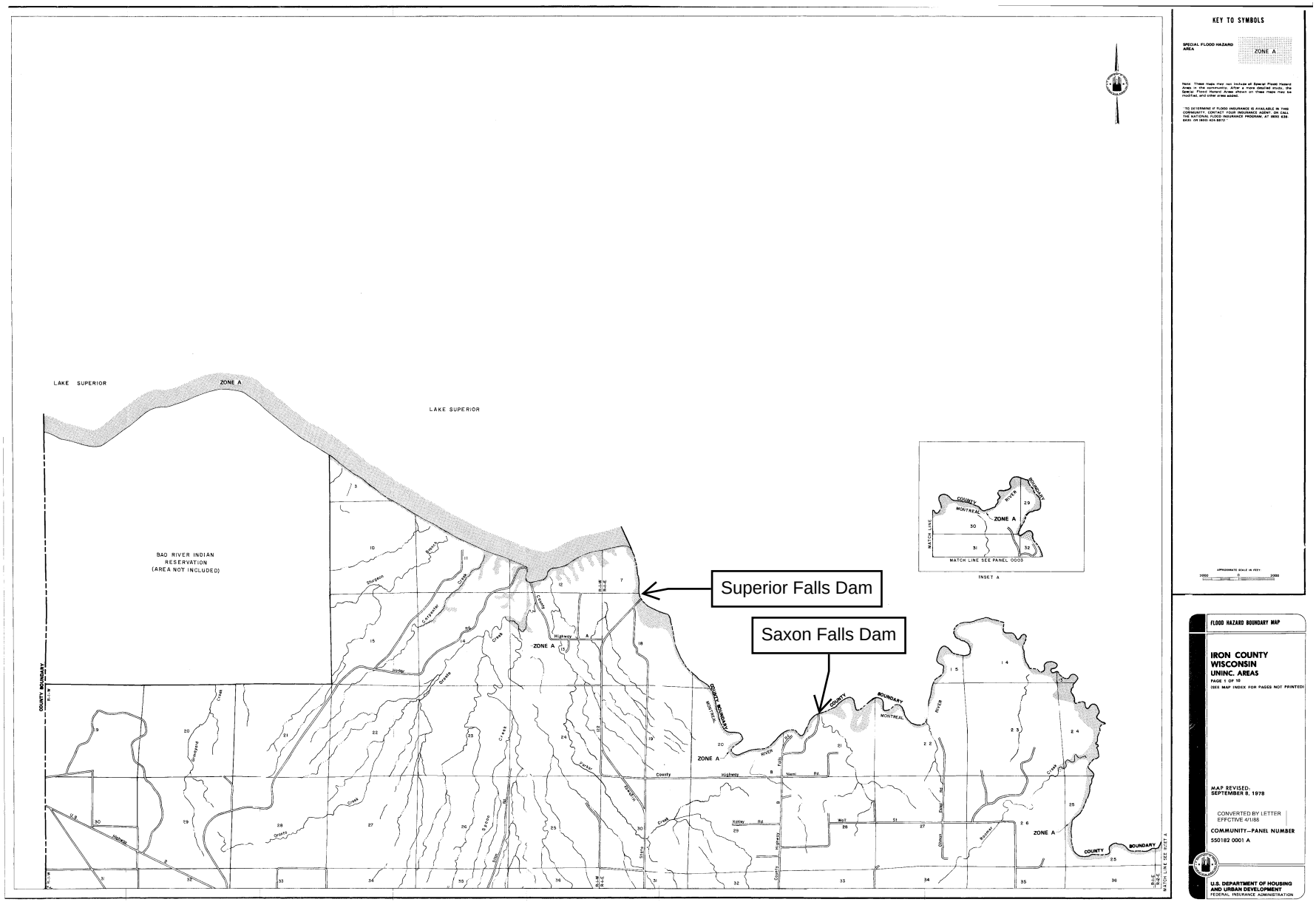
Superior Falls Hydroelectric Project
Project Vicinity Major Land Use

FERC No. 2587

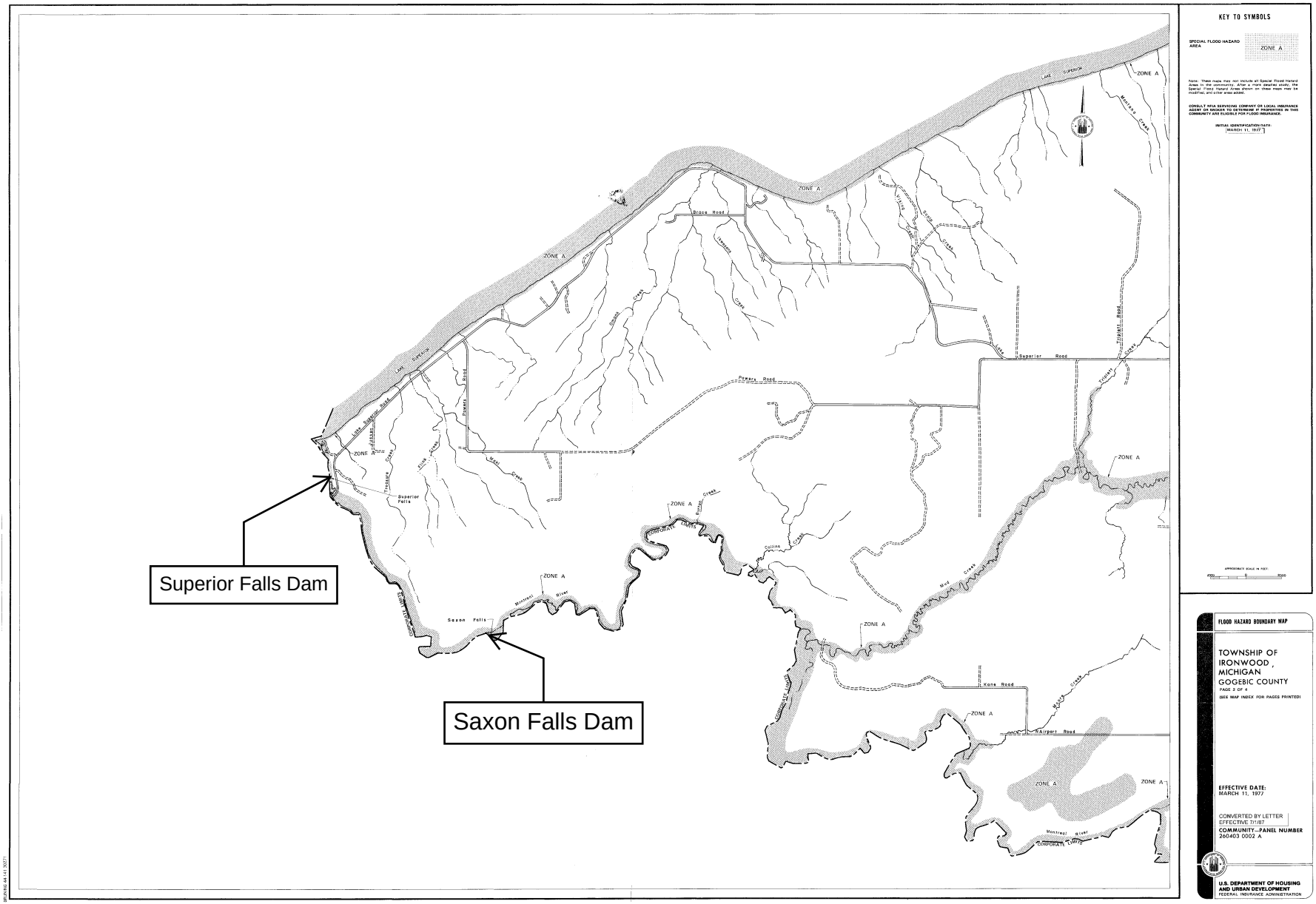
X:\240\010\0156358.01\TECH\Saxon Falls and Superior Falls\Maps_DLA\SuperiorFalls\SuperiorFalls_LandUse_ProposedBoundary_DLA.mxd

APPENDIX E-21 Flood Zone Maps

Iron County WI Unincorporated Areas



Township of Ironwood Floodplain Map



APPENDIX E-22 Chapter NR102 Water Quality Standards

Chapter NR 102

WATER QUALITY STANDARDS FOR WISCONSIN SURFACE WATERS

Note: Chapter NR 102 as it existed on September 30, 1973 was repealed and a new chapter NR 102 was created, effective October 1, 1973. Corrections made under s. 13.93 (2m) (b) 7., Stats., Register, August, 1997, No. 500.

Subchapter I — General

NR 102.01 Purpose. (1) The purpose of this chapter is to establish, in conjunction with chs. NR 103 to 105, water quality standards for surface waters of the state pursuant to s. 281.15, Stats. This chapter describes the designated use categories for such waters and the water quality criteria necessary to support these uses. This chapter and chs. NR 103 to 105 constitute the water quality standards for the surface waters of Wisconsin.

(2) The long−range goal of Wisconsin water quality standards is to protect the use of water resources for all lawful purposes. Water quality standards shall protect the public interest, which includes the protection of public health and welfare and the present and prospective uses of all waters of the state for public and private water supplies, propagation of fish and other aquatic life and wild and domestic animals, domestic and recreational purposes, and agricultural, commercial, industrial, and other legitimate uses. In all cases where the potential uses are in conflict, water quality standards shall protect the general public interest.

(3) Water quality standards serve as a basis for developing and implementing control strategies to achieve legislative policies and goals. Water quality standards are the basis for deriving water quality based effluent limitations and the limitations shall be determined to attain and maintain uses and criteria, unless more stringent effluent limitations are established to protect downstream waters. Water quality standards also serve as a basis for decisions in other regulatory, permitting or funding activities that impact water quality.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; CR 07−111: am. (1), (2) and (3) Register September 2010 No. 657, eff. 10−1−10.

NR 102.02 Applicability. The provisions of this chapter are applicable to surface waters of Wisconsin.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89.

NR 102.03 Definitions. In this chapter, the following definitions are applicable to terms used:

(1) "Ambient temperature" means the typical existing temperature of a surface water outside the direct influence of any point source discharge, which may include daily and seasonal changes.

(2) "Mixing zone" means a region in which a discharge of different characteristics than the receiving water is in transit and progressively diluted from the source to the receiving system.

(3) "Natural conditions" means the normal daily and seasonal variations in climatic and atmospheric conditions, and the existing physical and chemical characteristics of a water or the course in which it flows.

(4) "Natural temperature" means the normal existing temperature of a surface water including daily and seasonal changes outside the zone of influence of any artificial inputs.

(5) "Resource management" means the application of control techniques to enhance or preserve a surface water in accordance with statutory provisions and in the general public interest.

(6) "Sanitary survey" means a thorough investigation and evaluation of a surface water including bacteriological sampling to determine the extent and cause of any bacterial contamination.

(7) "Surface waters" means all natural and artificial named and unnamed lakes and all naturally flowing streams within the boundaries of the state, but not including cooling lakes, farm ponds and facilities constructed for the treatment of wastewaters (the term waters as used in this chapter means surface waters).

(8) "Unauthorized concentrations of substances" means pollutants or other chemicals introduced into surface waters without prior permit or knowledge of the department, but not including accidental or unintentional spills.

History: Cr. Register, September, 1973, No. 213, eff. 10−1−73; r. (1), renum. from NR 102.01, Register, February, 1989, No. 398, eff. 3−1−89; cr. (10), Register, May, 1993, No. 449, eff. 6−1−93; CR 07−111: cr. (intro.) and (1), r. (8) to (10), renum. (1) to (7) to be (2) to (8) Register September 2010 No. 657, eff. 10−1−10.

NR 102.04 Categories of surface water uses and criteria. (1) GENERAL. To preserve and enhance the quality of waters, surface water uses and criteria are established to govern water management decisions. Practices attributable to municipal, industrial, commercial, domestic, agricultural, land development or other activities shall be controlled so that all surface waters including the mixing zone meet the following conditions at all times and under all flow and water level conditions:

(a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to interfere with public rights in waters of the state.

(b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to interfere with public rights in waters of the state.

(c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to interfere with public rights in waters of the state.

(d) Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts which are acutely harmful to animal, plant or aquatic life.

(2) REVISED USES AND CRITERIA. The following uses and criteria may be revised as new information or advancing technology

indicate that revisions are in the public interest. Water used for hydropower and commercial shipping depends mainly on quantity, depth and elevation; consequently, no specific quality criteria for these uses have been prepared.

(3) FISH AND OTHER AQUATIC LIFE USES. All surface waters shall belong in one of the fish and other aquatic life subcategories described in this subsection. Only those use subcategories identified in pars. (a) to (c) shall be considered suitable for the protection and propagation of a balanced fish and other aquatic life community as provided in the federal water pollution control act amendments of 1972, P.L. 92−500; 33 USC 1251 et seq.

(a) *Cold water communities.* This subcategory includes surface waters capable of supporting a community of cold water fish and other aquatic life, or serving as a spawning area for cold water fish species. This subcategory includes, but is not restricted to, surface waters identified as trout water by the department of natural resources (Wisconsin Trout Streams, publication 6−3600 (80)).

(b) *Warm water sport fish communities.* This subcategory includes surface waters capable of supporting a community of warm water sport fish or serving as a spawning area for warm water sport fish.

(c) *Warm water forage fish communities.* This subcategory includes surface waters capable of supporting an abundant diverse community of forage fish and other aquatic life.

(d) *Limited forage fish communities.* (Intermediate surface waters). This subcategory includes surface waters of limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of forage fish and other aquatic life.

(e) *Limited aquatic life.* (Marginal surface waters). This subcategory includes surface waters of severely limited capacity and naturally poor water quality or habitat. These surface waters are capable of supporting only a limited community of aquatic life.

(4) CRITERIA FOR FISH AND AQUATIC LIFE. Except for natural conditions, all waters classified for fish and aquatic life shall meet the following criteria:

(a) *Dissolved oxygen.* Except as provided in par. (b) and s. NR 104.02 (3), the dissolved oxygen content in surface waters may not be lowered to less than 5 mg/L at any time.

(b) *Dissolved oxygen for cold waters.* Water bodies classified as trout waters by the department (Wisconsin Trout Streams, publication 6−3600 (80)) or as great lakes or cold water communities may not be altered from natural background dissolved oxygen levels to such an extent that trout populations are adversely affected. Additionally, all of the following conditions shall be met:

1. Dissolved oxygen in classified trout streams shall not be artificially lowered to less than 6.0 mg/L at any time, nor shall the dissolved oxygen be lowered to less 7.0 mg/L during the spawning season.

2. The dissolved oxygen in great lakes tributaries used by stocked salmonids for spawning runs shall not be lowered below natural background during the period of habitation.

(c) *pH.* The pH shall be within the range of 6.0 to 9.0, with no change greater than 0.5 units outside the estimated natural seasonal maximum and minimum.

(d) *Other substances.* Unauthorized concentrations of substances are not permitted that alone or in combination with other materials present are toxic to fish or other aquatic life. Surface waters shall meet the acute and chronic criteria as set forth in or developed pursuant to ss. NR 105.05 and 105.06. Surface waters shall meet the criteria which correspond to the appropriate fish and aquatic life subcategory for the surface water, except as provided in s. NR 104.02 (3).

(e) *Temperature.* Water quality criteria for temperature shall be determined and applied pursuant to subch. II. Heated effluent shall not cause lethality, inside or outside of the mixing zone, to animal, plant or other aquatic life.

(5) RECREATIONAL USE. (a) *General.* All surface waters shall be suitable for supporting recreational use and shall meet the criteria specified in sub. (6). A sanitary survey or evaluation, or both to assure protection from fecal contamination is the chief criterion for determining the suitability of a water for recreational use.

(b) *Exceptions.* Whenever the department determines, in accordance with the procedures specified in s. NR 210.06 (3), that wastewater disinfection is not required to protect recreational uses, the criteria specified in par. (a) and in chs. NR 103 and 104 do not apply.

(6) CRITERIA FOR RECREATIONAL USE. As bacteriological guidelines, the membrane filter fecal coliform count may not exceed 200 colonies per 100 ml as a geometric mean and may not exceed 400 colonies per 100 ml in more than 10% of all samples during any month. Samples shall be required at least 5 times per month.

(7) PUBLIC HEALTH AND WELFARE USE. (a) *General.* All surface waters shall be suitable for supporting public health and welfare.

(b) *Exceptions.* Whenever the department determines a discharge of heated effluent is not exposed or situated in a manner that may pose a realistic potential for scalding of humans, the criterion specified in sub. (8) (c) does not apply.

(8) CRITERIA FOR PUBLIC HEALTH AND WELFARE USE. (a) *General.* The criteria developed pursuant to ss. NR 105.08 and 105.09 shall be met regardless of whether the surface water is used for public drinking water supply or the applicable fish and aquatic life subcategory.

(b) *Taste and odor criteria.* All surface waters providing public drinking water supplies or classified as cold water or warm water sport fish communities as described in sub. (3) shall meet the taste and odor criteria specified or developed pursuant to s. NR 102.14.

(c) *Temperature criteria.* To protect humans from being scalded, the water temperature of a discharge may not exceed 120°F unless specifically authorized under provisions in subchs. V or VI of ch. NR 106.

(9) WILDLIFE USE AND CRITERIA. (a) *Use.* All surface waters shall be suitable for supporting wildlife.

(b) *Criteria.* The criteria specified in or developed pursuant to s. NR 105.07 shall be met.

History: Cr. Register, September, 1973, No. 213, eff. 10−1−73; am. (3), Register, December, 1977, No. 264, eff. 1−1−78; renum. from NR 102.02, r. (3) (d) 1. to 3., and (5), renum. (3) (intro.) to (d) (intro.) and (e) and (4) to be (4) (intro.) to (e) and (5) and am. (4) (a), (d), (e) (intro.) and (5), cr. (6) and (7), Register, February, 1989, No. 398, eff. 3−1−89; am. (3) (intro.), (6), (7), r. (3) (a), renum. (3) (b) to (f) to be (3) (a) to (e) and am. (3) (a), Register, August, 1997, No. 500, eff. 9−1−97; CR 07−111: am. (title), (1) (intro.), (2), (3) (intro.), (4) (title) and (a), r. (4) (b), (e) 1. and (5) to (7), renum. (4) (e) (intro.), 2. and 3. to be (4) (b) and am. (4) (b) (intro.), cr. (4) (e) and (5) to (9) Register September 2010 No. 657, eff. 10−1−10; correction in (8) (c) made under s. 13.92 (4) (b) 7., Stats., Register September 2010 No. 657.

NR 102.05 Application of standards. (1) ANTIDEGRADATION. (a) No waters of the state shall be lowered in quality unless it has been affirmatively demonstrated to the department that such a change is justified as a result of necessary economic and social development, provided that no new or increased effluent interferes with or becomes injurious to any assigned uses made of or presently possible in such waters.

(b) *Classification system.* For the purposes of this subsection, all surface waters of the state, or portions thereof, shall be classified as one of the following:

1. Outstanding resource waters as listed in s. NR 102.10,

2. Exceptional resource waters as listed in s. NR 102.11,

3. Great Lakes system waters as listed in s. NR 102.12 (1),

4. Fish and aquatic life waters as described in s. NR 102.13, or

5. Waters listed in tables 3 through 8 in ss. NR 104.05 to 104.10.

(2) STREAMFLOW. Water quality standards will not be maintained under all natural occurrences of flow, temperature, or other water quality characteristics. The determination of water quality based effluent limitations or other management practices shall be based upon the following conditions except as provided in ch. NR 106 for toxic and organoleptic substances and whole effluent toxicity:

(a) The average minimum 7−day low streamflow which occurs once in 10 years (7−day Q_{10}); or,

(b) In the case of dissolved oxygen and wherever sufficient data on streamflow and temperature are available, by application of a 0.274% level of nonattainment. This is equivalent to an expected nonattainment of the dissolved oxygen criterion of one day per year.

(3) MIXING ZONES. Water quality standards shall be met at every point outside of a mixing zone. The size of the mixing zone shall be based on such factors as effluent quality and quantity, available dilution, temperature, current, type of outfall, channel configuration and restrictions to fish movement. For toxic and organoleptic substances with water quality criteria or secondary values specified in or developed pursuant to chs. NR 102 and 105, allowable dilution shall be determined as specified in ch. NR 106 in addition to the requirements specified in this subsection. As a guide to the delineation of a mixing zone, the following shall be taken into consideration:

(a) Limiting mixing zones to as small an area as practicable, and conforming to the time exposure responses of aquatic life.

(b) Providing passageways for fish and other mobile aquatic organisms.

(c) Where possible, mixing zones being no larger than 25% of the cross–sectional area or volume of flow of a flowing water body and not extending more than 50% of the width.

(d) Final acute criteria and secondary values specified in or developed pursuant to s. NR 105.05 for the fish and aquatic life subcategory for which the receiving water is classified not being exceeded at any point in the mixing zone.

(e) Mixing zones not exceeding 10% of an inland lake's total surface area.

(f) Mixing zones not adversely impacting spawning or nursery areas, migratory routes, nor mouths of tributary streams.

(g) Mixing zones not overlapping, but where they do, taking measures to prevent adverse synergistic effects.

(h) Restricting the pH to values greater than 4.0 s.u. and to values less than 11.0 s.u. at any point in the mixing zone for the protection of indigenous fish and fish food organisms.

(5) RESOURCE MANAGEMENT EXEMPTIONS. Application of chemicals for water resource management purposes in accordance with statutory provisions is not subject to the requirements of the standards except in case of water used for public water supply.

(6) ANALYTICAL PROCEDURES. (a) The criteria in the Radiation Protection Code, s. DHS 157.44, shall apply to the disposal and permissible concentrations of radioactive substances.

(b) Methods used for analysis of samples shall be as set forth in ch. NR 219 unless alternative methods are specified by the department.

History: Cr. Register, September, 1973, No. 213, eff. 10−1−73; renum. (5) and (6) to be (6) and (7), cr. (5), Register, July, 1975, No. 235, eff. 8−1−75; r. and recr. (3), Register, August, 1981, No. 308, eff. 9−1−81; correction in (7) made under s. 13.93 (2m) (b) 7., Stats., cr. (4) (h), Register, September, 1984, No. 345, eff. 10−1−84; renum. from NR 102.03, r. (1), cr. (1) (b), renum. (2) to (7) to be (1) (a) to (6) and am. (2), (3) (intro.) and (d) and (6), Register, February, 1989, No. 398, eff. 3−1−89; am. (1) (b) 3., (3) (intro.) and (d), Register, August, 1997, No. 500, eff. 9−1−97; correction in (6) (a) made under s. 13.93 (2m) (b) 7., Stats. Register July 2006 No. 607, eff. 8−1−06; correction in (6) (a) made under s. 13.92 (4) (b) 7., Stats., Register July 2010 No. 655; CR 07−111: am. (3) (intro.), (b), (c), (e) and (f), r. (4) Register September 2010 No. 657, eff. 10−1−10.

History: Cr. Register, July, 1975, No. 235, eff. 8−1−75; am. Register, October, 1986, No. 370, eff. 11−1−86; renum. from NR 102.04, Register, February, 1989, No. 398, eff. 3−1−89; am. Register, November, 1992, No. 443, eff. 12−1−92.

NR 102.06 Phosphorus. (1) GENERAL. This section identifies the water quality criteria for total phosphorus that shall be met in surface waters.

(2) DEFINITIONS. In this section:

(a) "Drainage lake" means a lake with an outlet stream that continually flows under average summer conditions based on the past 30 years.

(b) "Ephemeral stream" means a channel or stream that only carries water for a few days during and after a rainfall or snowmelt event and does not exhibit a flow during other periods, and includes, but is not limited to, grassed waterways, grassed swales, and areas of channelized flow as defined in s. NR 243.03 (7).

(c) "Mean water residence time" means the amount of time that a volume of water entering a waterbody will reside in that waterbody.

(d) "Nearshore waters" means all waters of Lake Michigan or Lake Superior within the jurisdiction of the State of Wisconsin in the zone extending from the shore to a depth of 10 meters, based on the long−term mean elevation for Lake Superior of 183.4 meters (601.7 feet) and for Lake Michigan of 176.5 meters (579.0 feet).

(e) "Open waters" mean all waters of Lake Michigan or Lake Superior within the jurisdiction of the State of Wisconsin with depths greater than nearshore waters.

(f) "Reservoir" means a waterbody with a constructed outlet structure intended to impound water and raise the depth of the water by more than two times relative to the conditions prior to construction of the dam, and that has a mean water residence time of 14 days or more under summer mean flow conditions using information collected over or derived for a 30 year period.

(fm) "Seepage lake" means a lake that does not have an outlet stream that continually flows under average summer conditions based on the past 30 years.

(g) "Stratified lake or reservoir" means a lake or reservoir where either of the following equations results in a value of greater than 3.8:

$$\frac{\text{Maximum Depth (meters)} - 0.1}{\text{Log}_{10}\text{Lake Area (hectares)}}$$

$$\frac{\text{Maximum Depth (feet)} * 0.305 - 0.1}{\text{Log}_{10}\text{Lake Area (acres)} * 0.405}$$

(i) "Stratified two−story fishery lake" means a stratified lake which has supported a cold water fishery in its lower depths within the last 50 years.

(j) "Total phosphorus" means all of the phosphorus in a water sample analyzed using the methods identified under the provisions of s. NR 219.04 (1).

(3) STREAMS AND RIVERS. To protect the fish and aquatic life uses established in s. NR 102.04 (3) on rivers and streams that generally exhibit unidirectional flow, total phosphorus criteria are established as follows:

(a) A total phosphorus criterion of 100 ug/L is established for the following rivers or other unidirectional flowing waters:

1. Apple River from the outlet of the Apple River Flowage in Amery to the St. Croix River, excluding Black Brook Flowage.

2. Bad River from confluence with the Marengo River within the Bad River Indian Reservation downstream to Lake Superior.

3. Baraboo River from highway 58 in La Valle to the Wisconsin River.

4. Bark River from confluence with Scuppernong River near Hebron to the Rock River.

5. Black River from confluence with Cunningham Creek near Neillsville to Mississippi River, excluding Lake Arbutus.

6. Brule River from state highway 55 in Forest County downstream to Menominee River.

7. Buffalo River from confluence with Harvey Creek near Mondovi to Mississippi River.

8. Chippewa River from Lake Chippewa in Sawyer County to Mississippi River, excluding Holcombe Flowage, Cornell Flowage, Old Abe Lake, Lake Wissota and Dells Pond.

9. Crawfish River from confluence with Beaver Dam River to Rock River.

10. East Branch Pecatonica River from confluence with Apple Branch Creek near Argyle to Pecatonica River.

11. Eau Claire River from confluence with Bridge Creek near Augusta to Chippewa River, excluding Altoona Lake.

12. Embarrass River from confluence with Pigeon River near Clintonville to Wolf River.

13. Flambeau River from outlet of Turtle−Flambeau Flowage in Iron County to Chippewa River, excluding Pixley Flowage, Crowley Flowage and Dairyland Flowage.

14. Fox River from outlet of Lake Puckaway near Princeton to Green Bay, excluding Lake Butte des Morts and Lake Winnebago.

15. Fox River from confluence with Mukwonago River near Mukwonago to state line, excluding Tichigan Lake.

16. Grant River from confluence with Rattlesnake Creek near Beetown to Mississippi River.

17. Jump River from confluence with the North Fork and the South Fork of the Jump rivers in Price County to Holcombe Flowage.

18. Kickapoo River from confluence with Weister Creek near La Farge to Wisconsin River.

19. Kinnickinnic River from confluence with Wilson Park Creek in Milwaukee to Milwaukee River.

20. La Crosse River from confluence with Fish Creek near Bangor to Mississippi River, excluding Neshonoc Lake.

21. Lemonweir River from outlet of New Lisbon Lake in New Lisbon to Wisconsin River, excluding Decorah Lake.

22. Little Wolf River from confluence with South Branch Little Wolf River near Royalton to Wolf River.

23. Manitowoc River from confluence of North Branch and South Branch Manitowoc rivers to the opening at the end of the piers at Lake Michigan.

24. Menominee River from confluence with Brule River to the opening at the end of the piers at Green Bay.

25. Menomonee River from confluence with Little Menomonee River to Milwaukee River.

26. Milwaukee River from confluence with Cedar Creek downstream to the openings of the breakwaters at Lake Michigan.

27. Mississippi River main channels and side channels.

28. Namekagon River from outlet of Trego Lake near Trego to St. Croix River.

29. Oconto River from confluence with Peshtigo Brook to the opening at the end of the piers at Green Bay.

30. Pecatonica River from confluence with Vinegar Branch near Darlington to state line.

31. Pelican River from confluence with Slaughterhouse Creek near Rhinelander to Wisconsin River.

32. Peshtigo River from confluence with Brandywine Creek downstream to Green Bay, excluding Cauldron Falls Flowage and High Falls Flowage.

33. Pine River from confluence with Popple River in Florence County to Menominee River, excluding Pine River Flowage.

34. Red Cedar River from confluence with Brill River to Chippewa River, excluding Rice Lake, Tainter Lake and Lake Menomin.

35. Rock River from outlet of Sinissippi Lake downstream to the state line, excluding Lake Koshkonong.

36. St. Croix River from confluence with Namekagon River downstream to Mississippi River, excluding Lake St. Croix near Hudson.

37. St. Louis River from state line to the opening between Minnesota Point and Wisconsin Point at Lake Superior.

38. Sheboygan River from outlet of Sheboygan Marsh to the opening at the end of the piers at Lake Michigan.

39. South Fork of Flambeau River from state highway 13 near Fifield to Flambeau River.

40. Sugar River from outlet of Albany Lake to state line, excluding Decatur Lake.

41. Tomahawk River from outlet of Willow Reservoir to Lake Nokomis.

42. Trempealeau River from confluence with Pigeon Creek near Whitehall to Mississippi River.

43. White River from outlet of White River Flowage in Ashland County to Bad River.

44. Wisconsin River from the Rhinelander Dam to Mississippi River, excluding Lake Alice, Lake Mohawksin, Alexander Lake, Lake Wausau, Mosinee Flowage, Lake Dubay, Wisconsin River Flowage, Biron Flowage, Petenwell Flowage, Castle Rock Flowage and Lake Wisconsin.

45. Wolf River from confluence with Hunting Creek in Langlade County to Lake Poygan.

46. Yahara River from outlet of Lake Kegonsa to Rock River.

(b) Except as provided in subs. (6) and (7), all other surface waters generally exhibiting unidirectional flow that are not listed in par. (a) are considered streams and shall meet a total phosphorus criterion of 75 ug/L.

(4) RESERVOIRS AND LAKES. Except as provided in sub. (1), to protect fish and aquatic life uses established in s. NR 102.04 (3) and recreational uses established in s. NR 102.04 (5), total phosphorus criteria are established for reservoirs and lakes, as follows:

(a) For stratified reservoirs, total phosphorus criterion is 30 ug/L. For reservoirs that are not stratified, total phosphorus criterion is 40 ug/L.

(b) For the following lakes that do not exhibit unidirectional flow, the following total phosphorus criteria are established:

1. For stratified, two−story fishery lakes, 15 ug/L.

2. For lakes that are both drainage and stratified lakes, 30 ug/L.

3. For lakes that are drainage lakes, but are not stratified lakes, 40 ug/L.

4. For lakes that are both seepage and stratified lakes, 20 ug/L.

5. For lakes that are seepage lakes, but are not stratified lakes, 40 ug/L.

(c) Waters impounded on rivers or streams that don't meet the definition of reservoir in this section shall meet the river and stream criterion in sub. (3) that applies to the primary stream or river entering the impounded water.

(5) GREAT LAKES. To protect fish and aquatic life uses established in s. NR 102.04 (3) and recreational uses established in s. NR 102.04 (5) on the Great Lakes, total phosphorus criteria are established as follows:

(a) For both open and nearshore waters of Lake Superior, 5 ug/L.

(b) For both open and nearshore waters of Lake Michigan, excluding waters identified in par. (c), 7 ug/L.

(c) For the portion of Green Bay from the mouth of the Fox River to a line from Long Tail Point to Point au Sable, the water clarity and other phosphorus−related conditions that are suitable for support of a diverse biological community, including a robust and sustainable area of submersed aquatic vegetation in shallow water areas.

(6) EXCLUSIONS. The following waters are excluded from subs. (3) (b), (4) and (5):

(a) Ephemeral streams.

(b) Lakes and reservoirs of less than 5 acres in surface area.

(c) Wetlands, including bogs.

(d) Waters identified as limited aquatic life waters in ch. NR 104. Limited aquatic life waters are those subject to the criteria in s. NR 104.02 (3) (b) (2).

(7) SITE–SPECIFIC CRITERIA. A criterion contained within this section may be modified by rule for a specific surface water segment or waterbody. A site−specific criterion may be adopted in place of the generally applicable criteria in this section where site−specific data and analysis using scientifically defensible methods and sound scientific rationale demonstrate a different criterion is protective of the designated use of the specific surface water segment or waterbody.

Note: Reservoirs, two−story fishery lakes and water bodies with high natural background phosphorus concentrations are the most appropriate water bodies for site−specific criteria.

Note: When placing a water body on the 303 (d) list as impaired for phosphorus, the department considers factors such as frequency and duration of criterion exceedances, the time of year of the exceedance and the magnitude of each exceedance above the applicable criterion. The department may also choose to consider other factors such as the concentration of suspended algae and floating plants; density of benthic algae; macrophyte density; minimum and daily change in dissolved oxygen levels due to diurnal swings; water clarity; and natural background phosphorus concentrations. The 303 (d) list is a list of impaired waters established by the department and approved by US EPA pursuant to 33 USC 1313 (d) (1) (A) and 40 CFR 130.7. Information on frequency and duration is contained in the department's impaired waters listing guidance, "Wisconsin Consolidated Assessment and Listing Methodology."

History: Cr. Register, July, 1975, No. 235, eff. 8−1−75; am. Register, October, 1986, No. 370, eff. 11−1−86; renum. from NR 102.04, Register, February, 1989, No. 398, eff. 3−1−89; am. Register, November, 1992, No. 443, eff. 12−1−92; **CR 10−035: r. and recr. Register November 2010 No. 659, eff. 12−1−10; renumbering of (2) (fm) made under s. 13.92 (4) (b) 1., Stats., Register November 2010 No. 659.**

NR 102.07 Lake Michigan and Lake Superior thermal standards. History: Cr. Register, September, 1973, No. 213, eff. 10−1−73; r. and recr. Register, July, 1975, No. 235, eff. 8−1−75; renum. from NR 102.05, Register, February, 1989, No. 398, eff. 3−1−89; CR 07−111: r. Register September 2010 No. 657, eff. 10−1−10.

NR 102.08 Mississippi river thermal standards. History: Cr. Register, July, 1975, No. 235, eff. 8−1−75; renum. from NR 102.06, Register, February, 1989, No. 398, eff. 3−1−89; CR 07−111: r. Register September 2010 No. 657, eff. 10−1−10.

NR 102.09 Review of thermal standards. History: Cr. Register, July, 1975, No. 235, eff. 8−1−75; am. Register, February, 1977, No. 254, eff. 3−1−77; renum. from NR 102.07, Register, February, 1989, No. 398, eff. 3−1−89; CR 07−111: r. Register September 2010 No. 657, eff. 10−1−10.

NR 102.10 Outstanding resource waters. (1) The following surface waters are designated as outstanding resource waters:

(a) *National wild and scenic rivers.* All rivers designated under the national wild and scenic rivers act, as amended, 16 USC 1271 to 1287, except those portions flowing through Indian reservations, including:

1. St. Croix river between the northern boundary of the Hudson city limits and the St. Croix flowage dam in Douglas county except that the portion of the St. Croix river from the northern boundary of the St. Croix Falls city limits to a distance one mile below the STH 243 bridge at Osceola shall be classified exceptional resource waters under s. NR 102.11.

2. Namekagon river between its confluence with the St. Croix river and the outlet of Lake Namekagon in Bayfield county.

(b) *State wild and scenic rivers.* All state wild and scenic rivers designated under s. 30.26, Stats., including:

1. Pike river and its headwater branches in Marinette county.

2. Pine river and its headwater branches in Florence and Forest counties.

3. Popple River and its headwater branches in Florence and Forest counties.

4. The portion of the Brunsweiler River (Martin Hanson Wild River) from the point in Ashland County at which it leaves T44N R4W S22 QSW QQSW downstream to the point at which it crosses the boundary of the Chequamegon−Nicolet National Forest at T45N R4W S22 QNW.

5. Portions of the Totagatic River in Bayfield, Sawyer, Washburn, Douglas, and Burnett Counties as described in the following table:

SEG 1: From the outlet of Totogatic Lake located in Bayfield County to the upstream end of Nelson Lake at the southern edge of the walleye spawning refuge located in Sawyer County.

SEG 2: From a point 500 feet below the dam in the Totogatic Wildlife Area located in Washburn County to the upstream end of the Colton Flowage located in Washburn County.

SEG 3: From a point 500 feet below the dam that forms the Colton Flowage located in Washburn County to the point where the river crosses the Washburn−Douglas County line immediately above the upstream end of the Minong Flowage.

SEG 4: From the bridge on CTH "I" that crosses the river located in Washburn County to the confluence of the river with the Namekagon River located in Burnett County.

Note: Section NR 302.02 (1) contains a detailed description of the extent of the Pike, Pine, and Popple river systems designated as Wild Rivers.

(c) Wolf river upstream of the northern Menominee county line.

(d) The following Class I trout waters:

1. Adams county — Big Roche−a−Cri creek

2. Barron county — Yellow river

3. Bayfield county — Flag river, Sioux river

4. Burnett county — North Fork Clam river, South Fork Clam river

5. Chippewa county — Duncan creek, Elk creek, McCann creek

6. Dane county — Black Earth creek above the easternmost CTY KP crossing

7. Door county — Logan creek

8. Douglas county — Bois Brule river and its tributaries including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth

9. Dunn county — Elk creek

10. Florence county — Brule river including Montagne creek and Riley creek tributaries; tributaries to the Pine−Popple rivers including Chipmunk, Cody, Haley, Haymarsh, Lamon Tangue, Lepage, Lunds, Martin, Olson, Patten, Pine, Riley, Rock, Simpson, Seven Mile, Wakefield and Woods creeks; Little Popple river (T38N R19E S3)

11. Forest county — Brule river

13. Kewaunee county — Little Scarboro creek

14. Langlade county — Clearwater creek, Drew creek, Evergreen river, South Branch Oconto river

15. Lincoln county — Center fork New Wood creek, Little Pine creek, Prairie river

16. Marathon county — Holt creek, Spranger creek, Plover river

17. Marinette county — Cedarville creek, Otter creek, Holmes creek, East Thunder creek, North fork Thunder river, Eagle creek, Little Eagle creek, Plumadore creek, Meadow brook, Upper Middle Inlet creek, Middle Inlet creek, Wausaukee river, Little Wausaukee creek, Coldwater brook, Medicine brook, South Branch Miscauno creek, Miscauno creek, Swede John creek, South Branch Pemebonwon river, Spikehorn creek, Silver creek, Little Silver creek, Sullivan creek; tributaries to the Pike river including Little South Branch Pike river, Camp D creek, Camp F creek, Camp 9 creek, Cole creek, Glen creek, Harvey creek, North Branch Harvey creek, South Branch Harvey creek, Hemlock creek, Holloway creek, K.C. creek, Little Harvey creek, Lost creek, MacIntire creek, Phillips creek, Sackerson creek, Shinns branch, Sidney creek, Smeesters creek, Springdale brook, Whiskey creek

18. Marquette county — Chaffee creek, Lawrence creek, Tagatz creek

19. Monroe county — Rullands Coulee creek

20. Oconto county — First South Branch Oconto river, Second South Branch Oconto river, South Branch Oconto river, Hills Pond creek

21. Polk county — Clam river, McKenzie creek

22. Portage county — Emmons creek, Radley creek, Sannes creek, Tomorrow river, Nace (Trout) creek

23. Richland county — Camp creek

24. Sheboygan county — Nichols creek

25. St. Croix county — Kinnickinnic river above STH "35"

26. Vernon county — Rullands Coulee creek, Spring Coulee creek, Timber Coulee creek

27. Vilas county — Deerskin river, Plum creek

28. Walworth county — Bluff creek, Potawatomi creek, Van Slyke creek

29. Waupaca county — Emmons creek, Griffin creek, Jackson creek, Leers creek, Peterson creek, Radley creek, Sannes creek, Spaulding creek, Trout creek, Whitcomb creek, Little Wolf river (North Branch Little Wolf river)

30. Waushara county — Chaffee creek, Willow creek north of Redgranite, Mecan river north of Richford, Little Pine creek, West Branch White river

(e) The following Class II trout waters:

1. Barron county — Yellow river

2. Burnett county — North Fork Clam river

3. Forest county — Brule river, Peshtigo river

4. Grant county — Big Green river, Castle Rock creek

5. Marinette county — Peshtigo river

6. Polk county — McKenzie creek

7. Vilas county — Plum creek

(f) The following cold or warm water streams and rivers or portions thereof:

1d.	Ashland	Bad River	SEG 1: Origin to Outfall in Mellen at NW¼SW¼ S6 T44N R2W
		Brunsweiler River	SEG 1: Origin to Inlet of Spider Lake
			SEG 2: Outlet of Moquah Lake to origin of Wild River designation under par. (b) 4. at T44N R4W S22 SW ¼ of SW ¼
			SEG 3: All portions included as Wild River under par. (b) 4.
			SEG 4: End of Wild River segment under par. (b) 4. at the boundary of the Chequamegon−Nicolet National Forest (T45N R4W S22 ¼ NW) to the Bad River Indian Reservation Boundary
1h.	Ashland & Bayfield	Marengo River	SEG 1: Origin to Inlet of Marengo Lake
			SEG 2: Outlet of Marengo Lake to Bad River Indian Reservation Boundary
1p.	Ashland & Sawyer	E. Fork Chippewa River	SEG1: T42N R1E S17/18 Line to Ashland County Highway "N" in Glidden
			SEG 6: Outlet of Barker Lake to Confluence with Chippewa Flowage
			SEG 3: Outlet of Pelican Lake to Inlet of Blaisdell Lake
			SEG 4: Outlet of Blaisdell Lake to Inlet of Hunter Lake
			SEG 5: Outlet of Hunter Lake to Inlet of Barker Lake
1t.	Barron	Engle Creek	Class I & II Portions
		Hickey Creek	Class I & II Portions
		Red Cedar River	SEG 1: Outlet of Red Cedar Lake to Inlet of Rice Lake
		Rock Creek	SEG 2: All within Barron County
		Upper Pine Creek	Above Dallas Flowage
2.	Bayfield	Bark River	All−Class I Portions including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth
		Big Brook	All
		Cranberry River & Tribs.	All−Class I Portion including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
		East Fork Iron River & Tribs.	All−Class I Portion

East Fork White River	All−Class I Portion
Eighteen Mile Cr. & Tribs.	All−Class I Portion
Fish Creek (Main)	All including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
Long Lake Branch & Tribs.	From below Drummond Lake to White River
	All−Class I Portions
No. Fork Fish Creek & Tribs.	All−Class I & II Portions
Onion River & Tribs.	All−Class I Portions including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
Pikes Creek & Tribs.	All−Class I Portion including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
Sioux River & Tribs.	All−Class I & II Portions including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
So. Fork White River	All−Class I Portion
Thompson Creek	All−Class I Portion
Twenty Mile Creek	All−Class I & II Portions
White River	All−Class I Portion
Whittlesey Creek & Tribs.	All−Class I Portions including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.

2d.	Bayfield & Ashland	Beartrap Creek	SEG 1: Origin to Bad River Indian Reservation Boundary
2h.	Bayfield, Ashland & Sawyer	West Fork Chippewa River	SEG 1: Origin (Outlet of Chippewa Lake) to Inlet of Day Lake
			SEG 2: Outlet of Day Lake to Inlet of Upper Clam Lake
			SEG 3: Outlet of Upper Clam Lake to Inlet of Lower Clam Lake
			SEG 4: Outlet of Lower Clam Lake to Inlet of Cattail Lake
			SEG 5: Outlet of Cattail Lake to Inlet of Meadow Lake
			SEG 6: Outlet of Meadow Lake to Inlet of Partridge Crop Lake
			SEG 7: Outlet of Partridge Crop Lake to Inlet of Moose Lake
			SEG 8: Outlet of Moose Lake to Sawyer County Highway “B”
2p.	Bayfield, Sawyer, Washburn, Douglas & Burnett	Totagatic River	SEG 1: All portions included as Wild River under SEG 1 of par. (b) 5.
			SEG 2: All portions included as Wild River under SEG 2 of par. (b) 5., and the 500 feet immediately downstream of the dam in the Totagatic Wildlife Area in Washburn County

			SEG 3: All portions included as Wild River under SEG 3 of par. (b) 5., the 500 feet immediately downstream of the dam that forms the Colton Flowage, and from the end of the Wild River designation at the Douglas/Washburn County line to the inlet of Minong Flowage
			SEG 4: All portions included as Wild River under SEG 4 of par. (b) 5.
3.	Burnett	North Fork Clam River	County Highway "H" to Confluence with Clam River
		Tributaries to the N. & S. Forks of the Clam River	All−Class I & II Portions

4.	Dane	Mt. Vernon Creek	All−Class I Portion
5.	Door	Mink River	All
5m.	Douglas	Amnicon River	SEG 1: Origin (Outlet of Amnicon Lake) to Inlet of Lyman Lake
			SEG 2: Outlet of Lyman Lake to mouth at Lake Superior, including the waters of Lake Superior within a ¼ mile semi−circular arc centered at the middle of the river mouth.
		Moose River	All
		Spruce River	All
		St. Croix River	SEG 1: Outlet of Upper St. Croix Lake to Inlet of St. Croix Flowage
6.	Forest	Allen Creek	All
		Brule Creek	All
		Elvoy Creek	All
		Jones Creek	Class I & II portions
		Otter Creek (T37N R14E S23, North Otter Creek)	All
6m.	Forest & Langlade	Swamp Creek	SEG 1: Outlet of Lake Lucerne to Mole Lake Indian Reservation Boundary
			SEG 3: All below Mole Lake Indian Reservation Boundary to Confluence of Wolf River
7.	Grant	Little Green River	All
7m.	Iron & Ashland	Tyler Forks	SEG 1: Origin in Iron County to Bad River Indian Reservation Eastern Boundary in Ashland County
			SEG 3: From Bad River Indian Reservation Southern Boundary to Confluence with Bad River
		Potato River	SEG 1: Origin to Bad River Indian Reservation Boundary

8.	Iron, Ashland & Price	Flambeau River	SEG 1: Turtle−Flambeau Flowage (Outlet @ Turtle−Flambeau Dam) to Inlet of Upper Park Falls Flowage
9.	LaCrosse	Berge Coulee Creek	All
10.	Langlade	Elton Creek	Class I Portion
		Evergreen Creek	All
		Mayking Creek	All
		Michelson Creek	All
		Mid Branch Embarrass River	Class I Portion
10m.	Lincoln	New Wood River	Origin (T33N R4E S14) to Confluence with Wisconsin River
11.	Marathon	Falstad Creek	Class II Portion
		So. Branch Embarrass River	Class I Portion
12.	Marinette	No. Branch Beaver Creek	Entire River & tributaries
13.	Oneida	Noisy Creek	Class II Portion
		Squirrel River	Outlet of Squirrel Lake to Confluence with Tomahawk River
		Tomahawk River	SEG 2: Outlet of Willow Flowage Dam to Inlet of Lake Nokomis
14.	Pierce	Kinnickinnic River	From Powell Dam to St. Croix River
15.	Polk	Sand Creek & Tribs	All−Class I & II Portions
15e.	Polk & Burnett	Clam River	SEG 1: Outlet of Clam Falls Flowage to Inlet of Clam Lake
			SEG 2: Outlet of Lower Clam Lake to Section Line @ T39N R16W S21/22
15m.	Price	Elk River	SEG 1: Headwaters to Inlet of Musser Lake
	Price & Lincoln	Spirit River	Outlet of Spirit Lake to Inlet of Spirit River Flowage
16.	Price, Rusk & Sawyer	So. Fork Flambeau River	All−Round L. Dam downstream to Jxn with No. Fork Flambeau R.
17.	Richland	Elk Creek	All
18.	Rusk	Devils Creek	All−Class I & II Portions
		Soft Maple Creek	SEG 1: Origin to Rusk County Highway "F"
		So. Fork Main Creek	Class I & II Portions (T35N R3W S28 downstream to T34N R4W S11)
		Swift Creek	Outlet of Island Lake to Inlet of Fireside Lake
19.	Sauk	Otter Creek	From headwaters to southern section line of T11N R6E S33
		Parfrey's Glen	From headwaters to CTH DL
20.	Sawyer	Benson Creek	All−Class I Portion
		Couderay River	SEG 1: Origin at Outlet of Billy Boy Flowage to Inlet of Grimh Flowage (Including Waters within Lac Courte Oreilles Indian Reservation)
		Eddy Creek	All−Class I Portion
		Grindstone Creek	All−Class I Portion
		Knuteson Creek	SEG 1: Outlet of Wise Lake to Inlet of Knuteson Lake
			SEG 2: Outlet of Knuteson Lake to Inlet of Lake Chetek
		Little Weirgor Creek & Tribs	All−Class I & II Portions
		McDermott Brook	All
		Mosquito Brook	All−Class I Portion
		Teal River	Outlet of Teal Lake to Confluence with West Fork Chippewa River
20m.	Sawyer & Rusk	Thornapple River	SEG 1: Origin to Rusk County Highway "J"
		Chippewa River	SEG 1: Dam at Chippewa Flowage to Inlet of Radisson Flowage (T38N R7W S13)

21.	Shawano	Middle Br. Embarrass R.	Origin to but not including Homme Pond
		No. Br. Embarrass R.	Origin to CTH J
		So. Br. Embarrass R.	Origin to but not including Tigerton Pond
21g.	Taylor & Chippewa	Yellow River	SEG 1: Confluence with South Fork Yellow River to Inlet of Chequamegon Waters Flowage
			SEG 2: Outlet of Chequamegon Waters Flowage (at Miller Dam) to State Highway 64/73
21r.	Taylor & Price	Silver Creek	SEG 1: Origin to Westboro Sanitary District Outfall
22.	Vilas	Allequash Creek & Springs	Class I & II Portions
		Brule Creek	All
		East Br. Blackjack Cr.	All
		Elvoy Creek & Springs	Class I & II Portions
		Manitowish River	SEG 1: Adjacent to Dam Road Downstream to Inlet of Boulder Lake
			SEG 2: Outlet of Boulder Lake to Inlet of Island Lake
		Mishonagon Creek	Class I & II Portions
		Siphon Creek	All
		Spring Meadow Creek	Class I Portion
		Tamarack Creek	All
		Trout River	SEG 1: Outlet of Trout Lake to Lac Du Flambeau Indian Reservation Eastern Boundary
22m.	Vilas & Oneida	Wisconsin River	SEG 1: Origin (Outlet of Lac Vieux Desert) to Inlet of Watersmeet Lake
23.	Washburn	Beaver Brook	All−Class I Portion
		Sawyer Creek	All−Class I & II Portions
		So. Fork Bean Brook	All−Class I Portion
		Stuntz Brook	Origin to Confluence with Namekagon River
23m.	Washburn & Barron	Bear Creek	SEG 1: Outlet of Kekegama Lake to Inlet of Bear Lake
			SEG 2: Outlet of Bear Lake to Inlet at Stump Lake

(1m) (a) The following lakes are designated as outstanding resource waters:

1.	Ashland	Bad River Slough
		Kakagon Slough
		Lake Superior within ¼ mile of the shoreline of the islands within the Apostle Island National Lakeshore
2.	Barron	Bear Lake (T36N R12W S2; also in Washburn County)
		Red Cedar Lake (also in Washburn County)
		Sand Lake
		Silver Lake
3.	Bayfield	Bark Bay Slough
		Diamond Lake
		Lake Owen
		Lake Superior within ¼ mile of the shoreline of the islands within the Apostle Island National Lakeshore
		Lower Eau Claire Lake (also in Douglas County)
		Middle Eau Claire Lake
		Namekagon Lake
		Pike Chain of Lakes (Pike, Millicent, Buskey Bay, Hart, Twin Bear, Eagle, Flynn and Hildur Lakes)
		Star Lake
		Upper Eau Claire Lake
4.	Burnett	Big Sand Lake
		McKenzie Lake (also in Washburn County)
		Middle McKenzie Lake (also in Washburn County)
		Sand Lake (T40N R15W S25)
4m.	Chippewa	Chain Lake (also in Rusk County)
5.	Columbia	Crystal Lake (T12N R10E S1)
6.	Douglas	Bardon Lake (Whitefish Lake)
		Bond Lake
		Lake Nebagamon
		Lower Eau Claire Lake (also in Bayfield County)
		St. Croix (Gordon) Flowage
		Upper St. Croix Lake

7.	Florence	Edith Lake
		Keyes Lake
		Lost Lake
		Perch Lake
		Riley Lake, South
8.	Forest	Butternut Lake
		Franklin Lake
		Lucerne Lake (Stone)
		Metonga Lake
9.	Iron	Catherine Lake
		Cedar Lake
		Gile Flowage
		Hewitt Lake
		Owl Lake
		Trude Lake
		Turtle−Flambeau Flowage
9m.	Marinette	Caldron Falls Flowage (also in Oconto County)
10.	Oconto	Archibald Lake
		Bass Lake (T32N R15E S9)
		Bear Paw Lake
		Boot Lake
		Caldron Falls Flowage (also in Marinette County)
		Chain Lake
11.	Oneida	Big Carr Lake
		Clear Lake (T39N R7E S16)
		Little Tomahawk Lake
		Tomahawk Lake
		Two Sisters Lake
		Willow Flowage
12.	Polk	Pipe Lake
13.	Price	Cochran Lake
		Tucker Lake
14.	Rusk	Bass Lake (T34N R9W S16)
		Fish Lake
		Island Chains of Lakes (Chain {also in Chippewa County}, Clear, McCann, and Island Lakes)
		Three Lakes No. 1 (T36N R9W S25)
15.	St. Croix	Bass Lake (T30N R19W S23)
		Perch Lake
16.	Sauk	Devils Lake
17.	Sawyer	Barker Lake
		Blaisdell Lake
		Evergreen Lake
		Grindstone Lake
		Lac Court Oreilles
		Lake Chippewa (Chippewa Flowage)
		Nelson Lake
		Osgood Lake
		Perch Lake (T42N R6W S25)
		Round Lake (Big Round)
		Sand Lake
		Smith Lake
		Spider Lake
		Teal Lake
		Whitefish Lake
18.	Vilas	Black Oak Lake
		Crab Lake
		Crystal Lake (T41N R7E S27)
		Lac Vieux Desert
		North Twin Lake
		Pallette Lake (Clear)
		Partridge Lake
		Plum Lake
		South Twin Lake
		Star Lake
		Stormy Lake
		Trout Lake
		White Sand Lake (T42N R7E S26)
19.	Walworth	Lulu Lake
20.	Washburn	Bass Lake (T40N R10W S17)
		Bear Lake (T36N R12W S2; also in Barron County)
		Long Lake
		McKenzie Lake (also in Burnett County)
		Middle McKenzie Lake (also in Burnett County)
		Red Cedar Lake (also in Barron County)
		Shell Lake
		Stone Lake (T39N R10W S24)
21.	Waukesha	Spring Lake (T5N R18E S9)
22.	Waupaca	Graham Lake (Nelson)
		North Lake
23.	Waushara	Gilbert Lake
		Lucerne Lake (Egans)
		Norwegian Lake
		Pine Lake (Springwater)

(2) The waters in sub. (1) and (1m) may not be lowered in quality.

(3) Surface waters, or portions thereof, may be added to, or deleted from, the outstanding resource waters designation through the rule making process under the provisions of ch. 227, Stats., and s. NR 2.03.

History: Cr. Register, February, 1989, No. 398, eff. 3−1−89; am. (1) (d), cr. (1) (e), Register, July, 1989, No. 403, eff. 8−1−89; cr. (1) (f) and (1m), am. (2), Register, May, 1993, No. 449, eff. 6−1−93; am. (1m) 6., 9. and 11., cr. (1m) 9m., Register, February, 1998, No. 506, eff. 3−1−98; CR 05−089: am. (1) (d) 8., (f) 2., (1m) 1. and 3. Register July 2006 No. 607, eff. 8−1−06; CR 05−105: renum. (1) (f) 1. to be 1t. and am., cr. (1) (f) 1d., 1h., 1p., 2d., 2h., 2p., 5m., 6m.,. 7m., 10m., 15e., 15m., 15s., 20m., 21g., 21r., 22m., and 23m., am. (1) (f) 3., 8. 13., 18., 20., 22., and 23., Register November 2006 No. 611, eff. 12−1−06; reprinted to correct error in (1) (d) 6. Register March 2008 No. 627; CR 09−123: am. (1) (b) 1., 2., (d) 10., 17., 22., 29., 30., (f) 1d., 2p., 6., 8., 10., 20., 22., 22m., (1m) (a) 2. to 6., 9m., 10., 13., 14., 17., 18., 20., cr. (1) (b) 3. to 5. and (1m) (a) 4m. Register July 2010 No. 655, eff. 8−1−10; renumber of (1m) to (1m) (a) made under s. 13.92 (4) (b) 1., Stats., Register July 2010 No. 655.

NR 102.11 Exceptional resource waters. (1) Surface waters which provide valuable fisheries, hydrologically or geologically unique features, outstanding recreational opportunities, unique environmental settings, and which are not significantly impacted by human activities may be classified as exceptional resource waters. All the following surface waters are designated as exceptional resource waters:

(a) Class I trout waters listed in Wisconsin Trout Streams publication 6−3600 (80) that are not listed in s. NR 102.10.

(b) Other Class I trout waters:

1. Abraham Coulee creek in section 29, township 20 north, range 8 west from its headwaters to the upstream crossing of Oak Ridge Drive in Trempealeau county.

2. Bear creek originating in section 3, township 20 north, range 7 west in Trempealeau county.

3. Biser creek originating in section 19, township 12 north, range 3 west in Sauk county.

4. Bostwick creek from CTH M upstream 6.2 miles to the headwaters in LaCrosse county.

5. Bufton Hollow creek originating in section 19, township 12 north, range 2 west in Richland county.

6. Columbus creek originating in section 29, township 20 north, range 6 west in Jackson county.

7. Dutch creek originating in section 12, township 19 north, range 8 west in Trempealeau county.

8. Joe Coulee creek originating in section 1, township 20 north, range 7 west in Trempealeau county.

9. Little creek originating in section 21, township 20 north, range 6 west in Jackson county.

10. Marble creek originating in section 30, township 10 north, range 3 east in Sauk county.

11. Marshall creek originating in section 4, township 11 north, range 1 west in Richland county.

12. Martin creek originating in section 23, township 6 north, range 2 east in Iowa county.

13. South Bear creek originating in section 2, township 12 north, range 2 west in Richland county.

14. Spring brook downstream from CTH Y south of Antigo to its confluence with the Eau Claire river in Marathon county.

15. Spring Valley creek from the headwaters to SE 1/4, SE 1/4, section 33, township 16 north, range 1 east in Monroe county.

16. Unnamed creek 2−12 originating in section 36, township 20 north, range 7 west in Trempealeau county.

17. Unnamed creek 4−9 originating in section 4, township 11 north, range 1 west in Richland county.

18. Unnamed creek 5−6 originating in section 6, township 19 north, range 8 west in Trempealeau county.

19. Unnamed creek 7−4 originating in section 6, township 20 north, range 7 west in Trempealeau county.

20. Unnamed creek 8−9 originating in section 5, township 20 north, range 7 west in Trempealeau county.

21. Unnamed creek 8−14 originating in section 1, township 20 north, range 8 west in Trempealeau county.

22. Unnamed creek 9−13 originating in section 4, township 20 north, range 6 west in Jackson county.

23. Unnamed creek 10−8 originating in section 3, township 11 north, range 1 west in Richland county.

24. Unnamed creek 10−10 originating in section 14, township 20 north, range 6 west in Jackson county.

25. Unnamed creek 11−4 originating in section 1, township 20 north, range 7 west in Trempealeau county.

26. Unnamed creek 11−7 originating in section 2, township 20 north, range 7 west in Trempealeau county.

27. Unnamed creek 13−3a originating in section 19, township 20 north, range 6 west in Jackson county.

28. Unnamed creek 13−3b originating in section 6, township 20 north, range 6 west in Trempealeau county.

29. Unnamed creek 15−13 originating in section 1, township 20 north, range 8 west in Trempealeau county.

30. Unnamed creek 15−4 originating in section 3, township 20 north, range 6 west in Trempealeau county.

31. Unnamed creek 16−2 originating in section 22, township 20 north, range 6 west in Jackson county.

32. Unnamed creek 17−5 originating in SE 1/4, section 5, township 20 north, range 6 west in Jackson county.

33. Unnamed creek 24−3a originating in section 18, township 11 north, range 1 west in Richland county.

34. Unnamed creek 26−7 originating in section 2, township 21 north, range 5 west in Jackson county.

35. Unnamed creek 34−2 originating in section 17, township 20 north, range 8 west in Trempealeau county.

36. Unnamed creek 34−15 originating in section 27, township 20 north, range 7 west in Trempealeau county.

37. Unnamed stream originating in section 33, township 10 north, range 3 east in Sauk county.

38. Washington Coulee creek originating in section 29, township 20 north, range 6 west in Jackson county.

(c) The following Class II trout waters:

1. Ashland county — White river above the Bad River Indian reservation

2. Bayfield county — White river

3. Dane county — Mt. Vernon creek

4. Forest county — North Branch Oconto river

5. Grant county — Blue river

6. Iowa county — Blue river

7. Langlade county — Prairie river, South Branch Oconto river

8. Lincoln county — Prairie river

9. Marquette county — Mecan river

10. Oconto county — North Branch Oconto river, South Branch Oconto river

11. Pierce county — Rush river

12. Portage county — Tomorrow river

13. Richland county — Willow creek

14. St. Croix county — Willow river, Race Branch

15. Waushara county — Mecan river

(d) The following cold or warm water streams and rivers or portions thereof:

1g.	Ashland	Bad River	SEG 2: Outfall in Mellen at NE¼SW¼ S6 T44N R2W to Bad River Indian Reservation Boundary
1r.	Ashland & Sawyer	East Fork Chippewa River	SEG 2: Ashland County Highway "N" to Confluence of Rocky Run Creek (Includes Glidden POTW)
1t.	Barron	Brill River	All−Class II Portion
2.	Crawford	Copper Creek	All
		Plum Creek	All
		Sugar Creek	From headwaters to T10N R6W S10
		Tainter Creek	From Vernon County Line to CTH B

3.	Dane	Blue Mounds Branch	All
		Deer Creek	All
		Dunlap Creek	All
		Elvers Creek (Bohn Cr.)	All
		Flynn Creek	All
		Fryes Feeder Creek	All
		Garfoot Creek	All
		Milum Creek	All
		Rutland Branch	All
		Ryan Creek	All
		Schalpbach Creek	All
		Sixmile Creek	All
		Spring Creek (Lodi)	All
4.	Dane, Sauk, Iowa, Grant, Richland, Crawford	Wisconsin River	From below Prairie du Sac to Prairie du Chien
5.	Dane & Green	Little Sugar River	Above New Glarus
		Story Creek (Tipperary)	All
		Sugar River	All
6.	Dunn	Sand Creek	From Chippewa County Line to mouth
7.	Eau Claire	Lowes Creek	From Hwy 37 & 85 upstream to headwaters
8.	Fond du Lac	Feldner's Creek	From headwaters to Mischo's Millpond
		Auburn Lake Creek (Lake Fifteen Creek)	Entire Creek above & below Auburn Lake
9.	Forest	Armstrong Creek	All
		Middle Br. Peshtigo R.	All
		North Br. Peshtigo R.	All
		North Br. Popple R.	All
		West Br. Armstrong Creek	Class II Portion
10.	Grant	Doc Smith Branch	All
		Little Platte River	From Arthur downstream to Platte River
11.	Grant & Iowa	Big Spring Branch	From Springhead to Blue River
12.	Green	Burgy Creek	All
		Gill Creek	All
		Hefty Creek, North Branch	All
		Hefty Cr., Center Branch	All
		Liberty Creek	All
		Norwegian Creek	All
		Richland Creek	All
		Ross Crossing	All
		Sylvester Creek	All
		Spring Valley Creek	All
		Ward Creek	All
13.	Green & Rock	Allen Creek	Below Evansville
14.	Iowa	Harker−Lee−Martin System	From headwaters to T6N R2ES10
15.	Iron	Manitowish River	All
15m.	Iron & Ashland	Vaughn Creek	SEG 1: Origin to Bad River Indian Reservation Boundary
16.	Jackson	Trempealeau River	From STH 95 at Hixton to CTHP at Taylor
17.	Jefferson & Rock	Allen Creek	All
18.	Kewaunee	Casco Creek	From T24N R24E S19 downstream of Rock Ledge to Kewaunee River
19.	La Crosse	Bostwick Creek	From headwaters to County Hwy 'O'
		Coon Creek	All
		Dutch Creek	From headwaters to Russian Coulee Road (section 8)
20.	Lafayette	Galena River	From headwaters to Buncombe Road
21.	Langlade	East Br. Eau Claire R.	From STH 64 upstream to firelane crossing in T33N R11E S35 SW1/4
		Hunting River	From Fitzgerald Dam Road downstream to T33N R11E S1
22.	Lincoln	North Br. Prairie River	From headwaters to CTHJ to T33N R8E
		Silver Creek	All
23.	Manitowoc	Branch River	All
24.	Monroe	Big Creek	From headwaters to Acorn Rd (S7)
		Farmers Valley Creek & Tribs	From headwaters to I−90 (S19)
		Soper Creek	All

25.	Oneida	Bearskin Creek	From Tomahawk River to Little Bearskin Lake
25m.	Oneida & Lincoln	Wisconsin River	SEG 2: Hat Rapids Dam to Lincoln County A crossing
			SEG 4: Grandfather Dam to Inlet of Alexander Lake
26.	Pierce	Big River	Class I Portion
		Cady Creek	From CTH P upstream
		Trimbelle River	All
26b.	Polk	St. Croix River	From the northern boundary of the St. Croix Falls city limits to a distance one mile below the STH 243 bridge at Osceola
26c.	Polk & Burnett	Clam River	SEG 3: Section Line @ T39N R16W S21/22 to Inlet of Clam River Flowage
			SEG 4: Outlet of Clam River Flowage to Confluence with St. Croix River
26g.	Price	North Fork Jump River	SEG 1: Origin (outlet of Cranberry Lake) to Inlet of Spring Creek Flowage
			SEG 2: Outlet of Spring Creek Flowage to Confluence with South Fork Jump River
26n.	Price, Rusk & Taylor	Jump River	SEG 1: Confluence of the North Fork Jump River and South Fork Jump River to the Village of Jump River
26r.	Price, Sawyer, Rusk	Flambeau River	SEG 2: Crowley Dam to Inlet of Big Falls Flowage
26w.	Price & Taylor	South Fork Jump River	Origin to Confluence with North Fork Jump River
27.	Richland	Babb Hollow	All–Trib to Mill Creek
		Hanzel Creek (Hansell)	All–Trib to Melancthon Cr.
		Melancthon Creek	Class II Section
		Coulter Hollow Creek	All–Trib to Mill Creek
		E. Branch Mill Creek	All
		Happy Hollow Creek	All–Trib to Willow Creek
		Higgins Creek	All–Trib to Mill Creek
		Hood Hollow Creek	All–Trib to Mill Creek
		Jacquish Hollow Creek	All–Trib to Willow Creek
		Kepler Branch	All–Trib to Mill Creek
		Mill Creek	From headwaters to above Boaz
		Miller Branch	All–Trib to Mill Creek
		Pine Valley Creek	All–Trib to Mill Creek
		Ryan Hollow	All–Trib to West Branch Mill Creek
		Wheat Hollow Creek	All
		W. Branch Mill Creek	All
28.	Rock	Bass Creek	All
		East Fork Raccoon Cr.	All
		Little Turtle Creek	All
		Raccoon Creek	All
		Spring Brook (T2N R14E S27)	All
		Turtle Creek	All
		Unnamed Creek T2N R14E S31	All
29.	Rusk	Big Weirgor Creek	All–Class III Portion
		Main Creek	Rusk County Highway P to Inlet of Holcombe Flowage
		Soft Maple Creek	SEG 2: Rusk County Highway "F" to Confluence with Chippewa River
30.	Rusk, Taylor & Chippewa	Jump River	From Village of Jump River downstream to Holcombe Flowage
31.	Sauk	Beaver Creek (Trib to Dell Creek)	All
		Camels Creek (Trib to Dell Creek)	All
		Dell Creek	All
31m.	Sawyer	Couderay River	SEG 2: Dam at Grimh Flowage to Confluence with Chippewa River

32.	Shawano	Kroenke Creek	Class II Portion
		Red River	From Lower Red Lake Dam to Wolf River
		West Br. Red River	Class II Portion
33.	Sheboygan	Ben Nutt Creek	Class II Portion to Junction with Mill Creek
34.	St. Croix	Apple River	From NSP plant below CTH I to Mouth
		Cady Creek	All
		Willow River	Extend Class II Portion into Delta in Lake Mallilieu
35.	St. Croix & Pierce	St. Croix River	From No. Boundary of Hudson City limits to the river mouth in Pierce Co.
35m.	Taylor & Price	Silver Creek	SEG 2: Westboro Sanitary District Outfall to Confluence with South Fork Jump River
36.	Trempealeau	Buffalo River	From Hwy 53 to Strum Pond
37.	Vernon	Bishop Branch	All
		Cheyenne Valley Creek	All
		Coon Creek	From La Crosse county line to Chaseburg
		Frohock Valley Creek	All
		Hornby Creek	All
		Reads Creek	All
		Tainter Creek	All
38.	Vilas	Manitowish River	From Rest Lake Dam downstream to Iron County line
38m.	Vilas & Oneida	Wisconsin River	SEG 2: State Highway 70 to Inlet at Rainbow Flowage (Oneida County Line)
			SEG 3: Outlet of Rainbow Flowage (Oneida County Highway "D" to Inlet of Rhinelander Flowage (T37N R8E S8 SE¼NE¼)
39.	Washington & Fond du Lac	E. Branch Milwaukee R.	From Long Lake outlet to STH 28
40.	Waukesha	Genesee Creek	Above STH 59
		Mukwonago River	From Eagle Springs Lake to Upper Phantom Lake
		Oconomowoc River	From below North Lake to Okauchee Lake
41.	Waupaca	Blake Brook & Branches	Class II Portion
		Little Wolf River	From junction with Wolf River upstream to Manawa Dam
		Waupaca River	Class II portion
42.	Waupaca, Outagamie, & Shawano	Embarrass River	From Wolf River upstream to dam at Pella
43.	Waushara	Lower Pine River	From below Wild Rose Mill pond to dam at Poy Sippi

(2) The waters identified in sub. (1) may not be lowered in quality except as provided in ch. NR 207.

(3) Surface waters, or portions thereof, may be added to, or deleted from, the exceptional resource waters designation through the rule making process under the provisions of ch. 227, Stats., and s. NR 2.03.

History: Cr. Register, February, 1989, No. 398, eff. 3–1–89; cr. (1) (c), Register, July, 1989, No. 403, eff. 8–1–89; cr. (1) (d), Register, May, 1993, No. 449, eff. 6–1–93; CR 05–105: renum. (1) (d) 1. to be 1t., cr. 1g., 1r., 15m., 25m., 26c., 26n., 26r., 26w., 31m., 35m., and 38m., am. 29., Register November 2006 No. 611, eff. 12–1–06; CR 09–123: am. (1) (b) 1., 5., 12., 15., 16., 23., 27., 33., 34., 37., (d) 5., 8., 15., 17., 28., 34., 39. and 42., cr. (1) (d) 26b. Register July 2010 No. 655, eff. 8–1–10.

NR 102.12 Great Lakes system. (1) The Great Lakes system includes all the surface waters within the drainage basin of the Great Lakes.

(2) For the purpose of administering ch. NR 207 and consistent with chs. NR 105 and 106, the waters identified in sub. (1) are to be protected from the impacts of persistent, bioaccumulating toxic substances by avoiding or limiting to the maximum extent practicable increases in these substances.

(3) The waters of the Lake Superior basin shall be managed to prevent any new or increased discharges of the following pollutants: DDT, DDE and metabolites, chlordane, toxaphene, hexachlorobenzene, 2,3,7,8 TCDD, octachlorostyrene, mercury and PCB's. For purposes of administering ch. NR 207, new or increased discharges of these pollutants shall be prohibited unless the applicant certifies at time of application, that the new or increased discharge is necessary after utilization of best technology in process or control using waste minimization, pollution prevention, municipal pretreatment programs, material substitution or other means of commercially available technologies which have demonstrated capability for similar applications.

History: Cr. Register, February, 1989, No. 398, eff. 3–1–89; r. and recr. (1), am. (2), Register, August, 1997, No. 500, eff. 9–1–97; CR 05–089: cr. (3) Register July 2006 No. 607, eff. 8–1–06.

NR 102.13 Fish and aquatic life waters. All surface waters not included in s. NR 102.05 (1) (b) 1., 2., 3. or 5. are fish and aquatic life waters.

History: Cr. Register, February, 1989, No. 398, eff. 3–1–89.

NR 102.14 Taste and odor criteria. (1) At certain concentrations, substances may not be toxic to humans, but may impart undesirable taste or odor to water or aquatic organisms

ingested by humans. The taste and odor criterion is derived to prevent substances from concentrating in surface waters or accumulating in aquatic organisms to a level which results in undesirable tastes or odors to human consumers.

(2) The taste and odor criterion is derived as follows:

(a) For substances which impart tastes and odors to waters, the taste and odor criterion shall equal that threshold concentration (TC_w) below which objectionable tastes or odors to human consumers do not occur. Threshold concentrations for substances imparting tastes and odors to water are listed in Table 1.

Table 1

Threshold Concentrations (TC_w) for Substances Causing Taste and Odor in Water

Substance	Threshold Concentration (ug/L)1
Acenaphthene	20
Chlorobenzene	20
2–Chlorophenol	0.1
3–Chlorophenol	0.1
4–Chlorophenol	0.1
Copper	1000
2,3–Dichlorophenol	0.04
2,4–Dichlorophenol	0.3
2,5–Dichlorophenol	0.5
2,6–Dichlorophenol	0.2
3,4–Dichlorophenol	0.3
2,4–Dimethylphenol	400
Hexachlorocyclopentadiene	1
2–Methyl–4–Chlorophenol	1800
3–Methyl–4–Chlorophenol	3000
3–Methyl–6–Chlorophenol	20
Nitrobenzene	30
Pentachlorophenol	30
Phenol	300
2,3,4,6–Tetrachlorophenol	1
2,4,5–Trichlorophenol	1
2,4,6–Trichlorophenol	2
Zinc	5000

[1] A threshold concentration expressed in micrograms per liter (ug/L) can be converted to milligrams per liter (mg/L) by dividing the threshold concentration by 1000.

(b) For substances which impart tastes or odors to aquatic organisms, the taste and odor criterion shall be calculated as follows:

$$TOC = \frac{TC^1}{BAF}$$

Where:

TOC = Taste and odor criterion in milligrams per liter (mg/L).

TC = Threshold concentration in milligrams of substance per kilogram of wet tissue weight (mg/kg) of the aquatic organism being consumed below which undesirable taste and odor is not detectable to human consumers as derived in par. (d).

BAF = Aquatic life bioaccumulation factor with units of liter per kilogram (L/kg) as derived in s. NR 105.10.

(c) The lower of the taste and odor criteria derived as specified in pars. (a) and (b) is applicable to surface waters classified as public water supplies. The taste and odor criteria derived as specified in par. (b) are applicable to cold water and warm water sport fish communities.

(d) Threshold concentrations for substances imparting tastes or odors to water (TC_w) other than those listed in Table 1 and threshold concentrations for substances imparting tastes or odors to aquatic organisms (TC_f) shall be selected by the department using its best professional judgment.

History: Cr. Register, February, 1989, No. 398, eff. 3–1–89; am. (2) (b) and (c), Register, August, 1997, No. 500, eff. 9–1–97.

Subchapter II — Water Quality Standards For Temperature

NR 102.20 Purpose. The purpose of this subchapter is to establish water quality standards for temperature pursuant to s. 281.15 (1), Stats. Water quality standards for temperature shall protect fish and other aquatic life from mortality, immobilization, loss of equilibrium, impaired growth, adverse reproductive effects, and other sub–lethal effects.

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.22 Definitions. In this subchapter, the following definitions are applicable to terms used:

(1) "Acute effects" means any effect resulting in death or immobilization. For temperature, the acute criteria of this subchapter are based on Upper Incipient Lethal Temperature (UILT) values that are not representative of immediate lethality.

(2) "cfs" means cubic feet per second, usually pertaining to stream or effluent flow.

(3) "Cold shock" means exposure of aquatic organisms to a rapid decrease in temperature and a sustained exposure to low temperature that induces abnormal behavioral or physiological performance and may lead to death.

(4) "Daily maximum temperature" means the highest allowed water temperature for a calendar day, outside a mixing zone allowed in this subchapter.

(5) "Great Lakes" means the open Wisconsin waters of Lake Superior, Lake Michigan, Green Bay and Chequamegon Bay, as well as adjoining open waters that exhibit characteristics of Lake Superior, Lake Michigan, Green Bay or Chequamegon Bay, or in other ways are determined by the department to be equivalent to these waters.

(6) "Maximum weekly average temperature" means the highest allowed arithmetic mean of all daily maximum temperatures during a calendar week, outside mixing zone allowed in this subchapter.

(7) "mgd" means million gallons per day.

(8) "Sub–lethal effects" means effects resulting in inadequate gonad development, gamete production and viability, spawning or growth.

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.23 Categories of standards applicable to temperature. The department shall establish water quality standards for temperature to protect the following:

(1) Public health and welfare uses, as established in s. NR 102.04 (7) and (8).

(2) Fish and other aquatic life uses as established in s. NR 102.04 (3). For exclusive purpose of the application of water quality standards for temperature, the warm water sport fish and warm water forage fish communities, as defined in s. NR 102.04 (3) (b) and (c), are treated together as warm water communities.

(3) Great Lakes communities as defined in s. NR 102.22 (6). This use exists only for the regulation of discharges of heat.

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.24 General water quality criteria for temperature. (1) There may be no temperature changes that may adversely affect aquatic life.

(2) Natural daily and seasonal temperature fluctuations shall be maintained.

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.245 Temperature criteria for limited aquatic life communities. (1) For the purposes of temperature criteria, all surface waters classified as diffused surface waters, wetlands and wastewater effluent channels, as defined in s. NR 104.02 (1), shall be characterized as limited aquatic life communities.

(2) The department may, as appropriate, characterize other surface waters not identified in sub. (1) as limited aquatic life communities.

(3) The temperature in waters classified as limited aquatic life shall be restricted as follows:

(a) Temperatures at any point in waters classified as wastewater effluent channels may not exceed 120°F.

(b) Temperatures at any point in waters classified as wetlands shall not exceed the standards in ch. NR 103.

(c) Temperatures at any point in waters not identified in par. (a) or (b) may not exceed 86°F. Additionally, all conditions of ch. NR 103 shall be met.

Note: The department recognizes there are legitimate concerns that not all wetlands and ephemeral streams are the biological equivalents of other limited aquatic life waters, and is in the process of re–evaluating the wetland and ephemeral stream classifications to determine if and when full fish and aquatic life conditions should be applied.

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.25 Ambient temperatures and water quality criteria for the protection of fish and other aquatic life. (1) GENERAL. In the absence of site–specific ambient temperature data or water quality criteria as determine in s. NR 102.26 or 102.27, respectively, the applicable ambient temperatures, sub–lethal water quality criteria, and acute water quality criteria shall be as specified in subs. (2) to (5). For determinations made in subs. (2) to (5), all of the following conditions shall apply:

(a) The ambient temperature, sub–lethal water quality criterion, and acute water quality criterion specified for any calendar month shall be applied simultaneously to establish the protection needed for each identified fish and other aquatic life use.

(b) Sub–lethal water quality criteria are to be applied as maximum weekly average temperatures.

(c) Acute water quality criteria are to be applied as daily maximum temperatures.

(d) Water quality criteria for temperature shall be applied in accordance with the mixing zone provisions of s. NR 102.05 (3).

(e) Final acute and sub–lethal water quality criteria for temperature specified in or developed pursuant to ss. NR 102.24 to 102.26 shall not be exceeded at any point outside the mixing zone. Additionally, site–specific mixing zone studies may be required when deemed appropriate by the department.

(2) NON–SPECIFIC WATERS. The values listed in Table 2 shall be the applicable ambient temperatures, sub–lethal and acute water quality criteria for temperature for the protection of fish and aquatic life unless other values specified in subs. (3) to (5) are applicable or approved by the department pursuant to s. NR 102.26 or 102.27.

Table 2
Ambient Temperatures and Water Quality Criteria for Temperature for Non–Specific Waters
(All values are expressed as degrees Fahrenheit)

	Cold[4]			Warm — Large[5]			Warm — Small[6]			LFF[7]		
Month	Ta[1]	SL[2]	A[3]	Ta	SL	A	Ta	SL	A	Ta	SL	A
JAN	35	47	68	33	49	76	33	49	76	37	54	78
FEB	36	47	68	33	50	76	34	50	76	39	54	79
MAR	39	51	69	36	52	76	38	52	77	43	57	80
APR	47	57	70	46	55	79	48	55	79	50	63	81
MAY	56	63	72	60	65	82	58	65	82	59	70	84
JUN	62	67	72	71	75	85	66	76	84	64	77	85
JUL	64	67	73	75	80	86	69	81	85	69	81	86
AUG	63	65	73	74	79	86	67	81	84	68	79	86
SEP	57	60	72	65	72	84	60	73	82	63	73	85
OCT	49	53	70	52	61	80	50	61	80	55	63	83
NOV	41	48	69	39	50	77	40	49	77	46	54	80
DEC	37	47	69	33	49	76	35	49	76	40	54	79

1 Ta = ambient temperature
2 SL = sub–lethal criteria
3 A = acute criteria
4 Cold = waters with a fish and aquatic life use designation of "cold water community"
5 Warm – Large = waters with a fish and aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows ≥ 200 cfs (129 mgd)
6 Warm – Small = waters with a fish and aquatic life use designation of "warm sport fish community" or "warm water forage fish community "and uni–directional 7Q10 flows < 200 cfs (129 mgd)
7 LFF = waters with a fish and aquatic life use designation of "limited forage fish community"

(3) SPECIFIC LARGE RIVERS. The values listed in Table 3 shall be the applicable ambient temperatures, sub–lethal and acute water quality criteria for temperature for the protection of fish and aquatic life for the identified water segments unless other values are approved by the department pursuant to s. NR 102.26 or 102.27.

Table 3

Ambient Temperatures and Water Quality Criteria for Temperature for Specific Large Rivers

(All values are expressed as degrees Fahrenheit)

	Mississippi River[4]			Rock River[5]			Upper Wisconsin River[6]			Lower Wisconsin River[7]			Lower Fox River[8]		
Month	**Ta[1]**	**SL[2]**	**A[3]**	**Ta**	**SL**	**A**	**Ta**	**SL**	**A**	**Ta**	**SL**	**A**	**Ta**	**SL**	**A**
JAN	32	49	75	33	49	76	33	49	76	32	49	75	35	49	76
FEB	33	50	76	35	50	76	33	50	76	32	50	75	35	50	76
MAR	36	52	76	38	52	77	35	52	76	37	52	77	38	52	77
APR	47	55	79	49	55	79	44	55	78	48	55	79	50	55	80
MAY	60	65	82	64	65	84	60	65	82	61	65	83	62	65	83
JUN	72	75	85	71	75	85	70	75	85	71	75	85	73	76	85
JUL	76	80	86	74	79	86	75	80	86	75	80	86	77	81	87
AUG	76	79	86	73	79	85	73	79	85	74	79	86	76	80	86
SEP	67	73	84	66	72	84	65	72	84	67	72	84	68	73	85
OCT	54	61	81	54	61	81	51	61	80	53	61	80	53	61	80
NOV	40	50	77	40	50	77	39	50	77	40	50	77	42	50	78
DEC	33	49	76	34	49	76	33	49	76	33	49	76	35	49	76

1 Ta = ambient temperature
2 SL = sub–lethal criteria
3 A = acute criteria
4 Mississippi River = applies to any portion of Wisconsin's Mississippi River reach
5 Rock River = applies to waters downstream of Lake Koshkonong
6 Upper Wisconsin River = applies to waters upstream of Petenwell Dam
7 Lower Wisconsin River = applies to waters downstream of Petenwell Dam to the confluence with the Mississippi River
8 Lower Fox River = applies to waters downstream of the Lake Winnebago outlet

(4) INLAND LAKES AND IMPOUNDMENTS. The values listed in Table 4 shall be the applicable ambient temperatures, sub–lethal and acute water quality criteria for temperature for the protection of fish and aquatic life for inland lakes and impoundments unless other values are approved by the department pursuant to s. NR 102.26 or 102.27.

Table 4

Ambient Temperatures and Water Quality Criteria for Temperature for Inland Lakes and Impoundments

(All values are expressed as degrees Fahrenheit)

	Northern[4]			Southern[5]		
Month	**Ta[1]**	**SL[2]**	**A[3]**	**Ta**	**SL**	**A**
JAN	35	49	76	35	49	77
FEB	34	52	76	39	52	78
MAR	35	55	76	41	55	78
APR	41	60	78	49	60	80
MAY	55	67	81	58	68	82
JUN	67	75	85	70	75	86
JUL	72	79	86	77	80	87
AUG	71	79	86	76	80	87
SEP	63	72	84	67	73	85
OCT	52	61	80	54	61	81
NOV	43	50	78	42	50	78
DEC	35	49	76	35	49	77

1 Ta = ambient temperature
2 SL = sub–lethal criteria
3 A = acute criteria
4 Northern = applicable for those lakes and impoundments north of State Highway 10
5 Southern = applicable for those lakes and impoundments south of State Highway 10

(5) GREAT LAKES WATERS. The values listed in Table 5 shall be the applicable ambient temperatures, sub–lethal and acute water quality criteria for the protection of fish and aquatic life for Great Lakes waters identified in s. NR 102.22 (5) unless other values are approved by the department pursuant to s. NR 102.26 or 102.27.

Table 5
Ambient Temperatures and Water Quality Criteria for Temperature for Great Lakes Waters of Wisconsin
(All values are expressed as degrees Fahrenheit)

	Green Bay						Lake Michigan											
	Southern[4]			Northern[5]			Northern[6]			Southern[7]			Lake Superior[8]			Chequamegon Bay[9]		
Month	Ta[1]	SL[2]	A[3]	Ta	SL	A	Ta	SL	A	Ta	SL	A	Ta	SL	A	Ta	SL	A
JAN	35	49	75	35	43	69	34	43	69	35	43	69	35	41	69	35	41	69
FEB	35	52	75	35	47	69	33	47	69	34	46	69	34	46	69	35	46	69
MAR	41	54	77	36	52	70	35	52	69	37	52	70	34	51	69	35	51	69
APR	47	58	79	40	57	71	39	58	70	43	59	70	35	57	69	38	57	69
MAY	56	64	81	48	63	72	44	64	71	48	65	72	41	63	70	50	63	72
JUN	66	70	83	57	68	75	48	69	72	54	70	73	49	69	72	59	69	74
JUL	70	75	83	62	71	77	53	71	73	59	71	74	55	72	73	62	72	75
AUG	70	75	83	64	71	78	56	69	73	63	70	76	57	71	73	64	71	76
SEP	65	70	83	61	66	77	53	64	73	60	64	74	57	64	73	60	66	74
OCT	54	60	80	54	58	74	48	55	72	53	57	73	50	55	72	49	57	72
NOV	39	49	76	44	49	71	42	47	70	45	49	71	43	45	70	39	48	70
DEC	37	46	75	37	44	70	36	44	69	38	44	70	38	42	69	35	43	69

1 Ta = ambient temperature
2 SL = sub–lethal criteria
3 A = acute criteria
4 Southern Green Bay = waters south of the Brown County line to the Fox River mouth
5 Northern Green Bay = waters north of the Brown County line to the northernmost point on Washington Island
6 Northern Lake Michigan = waters north of the Milwaukee River mouth (downtown Milwaukee)
7 Southern Lake Michigan = waters south of the Milwaukee River mouth (downtown Milwaukee)
8 Lake Superior = waters in Lake Superior except those in Chequamegon Bay
9 Chequamegon Bay = waters within the region enclosed by Chequamegon Point and a straight line west to the mainland

History: CR 07–111: cr. Register September 2010 No. 657, eff. 10–1–10.

NR 102.26 Site–specific ambient temperatures. **(1)** DEVELOPMENT OF SITE–SPECIFIC AMBIENT TEMPERATURES. An owner or operator of a facility with a discharge subject to regulation under this chapter may submit a request to the department for the determination of a site–specific ambient temperature. The department may approve, disapprove or approve with modifications the request for the site–specific ambient temperature. The request for site–specific ambient temperatures shall include all of the following:

(a) A demonstration that the data used to derive the ambient temperatures in s. NR 102.25 do not apply to the specific water segment or body in question.

(b) Site–specific water temperature that represents the ambient temperature of the site. For purposes of this paragraph, data must be:

1. Collected daily using a continuous recorder or similar device that takes measurements at least hourly, except as follows:

a. Monthly data sets may be missing no more than 10 days of temperature data for the months of December through February,

b. Monthly data sets may be missing no more than 5 days of temperature data for the months of March through November.

2. Collected for each month in which the request for site–specific ambient temperatures is requested,

3. Collected at any time since October 1987,

4. Collected for at least 2 consecutive years.

(c) Calculated daily average temperatures from the data from par. (b).

(d) Calculated monthly average temperatures from the daily average temperatures in par. (c) for each individual month that data has been collected. Alternatively, calculated monthly average temperatures directly from the data from par. (b) for each individual month.

(e) All individual monthly averages organized by month.

(f) A determination of the monthly site–specific ambient temperatures by calculating the geometric mean of all monthly averages for each given month.

(g) Alternative methods for developing site–specific ambient temperatures, if the department approves the method as representative of ambient temperatures as those in pars. (a) to (d).

(2) USE OF SITE–SPECIFIC AMBIENT TEMPERATURES TO ESTABLISH ACUTE CRITERIA. Once site–specific ambient temperatures have been approved by the department in accordance with sub. (1), the acute water quality criteria listed in Table 6 will be applicable for the protection of fish and other aquatic life.

(3) USE OF SITE–SPECIFIC AMBIENT TEMPERATURES TO ESTABLISH SUB–LETHAL CRITERIA. Once site–specific ambient temperatures have been approved by the department in accordance with sub. (1), the sub–lethal water quality criteria applicable for the protection of fish and other aquatic life shall be calculated as follows:

(a) Use Table 7 to determine the appropriate sub–lethal criteria for the fish and other aquatic life use.

(b) Modify the sub–lethal criteria as follows:

1. If a sub–lethal criterion from par. (a) is less than the site–specific ambient temperature from sub. (1) for a given month, increase the sub–lethal criterion to be equal with the site–specific ambient temperature.

2. If a sub–lethal criterion from par. (a) is greater than an acute criterion for a given month from sub. (2) decrease the sub–lethal criterion to be equal with the acute criterion.

(c) Perform a fifth order polynomial regression of the 12 monthly sub–lethal criteria resulting from par. (b). Using the resulting equation of the regression, calculate the final sub–lethal criteria for each month by replacing the "x" variables in the equation with a numeric representation for each month, where January "x" = 1, for February "x" = 2, … and for December "x" = 12.

(d) The final sub–lethal criteria from par. (c) shall be used in combination with the site–specific ambient temperatures developed in sub. (1) and the acute criteria determined in sub. (2).

Table 6
Acute Criteria Across All Ambient Temperatures
(All values are expressed as degrees Fahrenheit)

	Inland Waters					Great Lakes Waters					
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Ta	**Cold**	**Warm**	**LFF**	**N Lake**	**S Lake**	**SGB**	**NGB**	**NLKMI**	**SLKMI**	**LKSUP**	**CB**
32	68	75	77	75	76	74	69	69	69	68	68
33	68	76	77	76	76	74	69	69	69	69	69
34	68	76	77	76	76	75	69	69	69	69	69
35	68	76	77	76	77	75	69	69	69	69	69
36	68	76	78	76	77	75	70	69	69	69	69
37	69	77	78	77	77	75	70	70	70	69	69
38	69	77	78	77	77	76	70	70	70	69	69
39	69	77	79	77	78	76	71	70	70	70	70
40	69	77	79	77	78	76	71	70	70	70	70
41	69	78	79	78	78	77	71	70	70	70	70
42	69	78	79	78	78	77	71	70	70	70	70
43	69	78	80	78	78	77	71	70	70	70	70
44	70	78	80	78	79	78	71	71	71	71	71
45	70	79	80	79	79	78	71	71	71	71	71
46	70	79	80	79	79	78	72	72	72	71	71
47	70	79	81	79	80	79	72	72	72	71	71
48	70	79	81	79	80	79	72	72	72	72	72
49	70	79	81	80	80	79	73	72	72	72	72
50	70	80	81	80	80	79	73	73	73	72	72
51	71	80	82	80	81	80	73	73	73	72	72
52	71	80	82	80	81	80	73	73	73	72	72
53	71	80	82	81	81	80	74	73	73	72	72
54	71	81	82	81	81	80	74	73	73	73	73
55	71	81	83	81	82	81	74	73	73	73	73
56	72	81	83	81	82	81	75	73	73	73	73
57	72	82	83	82	82	81	75	73	73	73	73
58	72	82	83	82	82	81	75	74	74	73	73
59	72	82	84	83	83	81	76	74	74	74	74
60	72	82	84	83	83	82	76	74	74	74	74
61	72	83	84	83	83	82	77	75	75	74	74
62	72	83	84	83	84	82	77	75	75	75	75
63	73	83	85	84	84	82	78	76	76	75	75
64	73	84	85	84	85	82	78	77	77	76	76
65	73	84	85	84	85	83	78	77	77	76	76
66	73	84	85	85	85	83	79	78	78	77	77
67	74	84	86	85	85	83	79	78	78	77	77
68	74	85	86	85	85	83	80	79	79	78	78
69	74	85	86	85	86	83	80	79	79	78	78
70	74	85	86	86	86	83	81	80	80	79	79
71	74	85	87	86	86	84	81	81	81	79	79
72	75	85	87	86	86	84	82	81	81	80	80
73	75	85	87	86	86	84	82	82	82	80	80
74	75	86	87	86	87	84	82	82	82	81	81
75	75	86	88	87	87	85	83	83	83	81	81
76		86	88	87	87	85	83	83	83	82	82
77		87	88	87	87	85	84	84	84	83	83
78		87	88	87	88	86	84	84	84	83	83
79		87	89	88	88	86	84	84	84	83	83
80		87	89	88	88	86	84	84	84	83	83
81		88	89	88	88	86	84	84	84	83	83

	Inland Waters					Great Lakes Waters					
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Ta	**Cold**	**Warm**	**LFF**	**N Lake**	**S Lake**	**SGB**	**NGB**	**NLKMI**	**SLKMI**	**LKSUP**	**CB**
82		88	89	88	89	87	84	84	84	84	84
83		88	90	89	89	87	84	84	84	84	84
84		88	90	89	89	88	85	85	85	84	84
85		89	90	89	89	88	85	85	85		
86		89	90	89	90	89					
87		89	91	90	90	89					
88		90	91	90	90	89					
89		90	91	90	91	89					
90		91	91	91	91						
91		91	92	91	92						
92			92		92						

1 Ta = ambient temperature
2 Cold = waters with a fish and other aquatic life use designation of "cold water community"
3 Warm = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community"
4 LFF = waters with a designation of "limited forage fish community"
5 N Lake = applicable for those lakes north of State Highway 10
6 S Lake = applicable for those lakes south of State Highway 10
7 SGB = Green Bay waters south of the Brown County line to the Fox River mouth
8 NGB = Green Bay waters north of the Brown County line to the northernmost point on Washington Island
9 NLKMI = Lake Michigan waters north of the Milwaukee River mouth (downtown Milwaukee)
10 SLKMI = Lake Michigan waters south of the Milwaukee River mouth (downtown Milwaukee)
11 LKSUP = waters in Lake Superior except those in Chequamegon Bay
12 CB = Chequamegon Bay waters within the region enclosed by Chequamegon Point and a straight line west to the mainland

Table 7
Raw Monthly Sub−Lethal Criteria for Use In Determining Final Sub−Lethal Criteria with Site−Specific Ambient Temperatures
(All values are expressed as degrees Fahrenheit)

Month	C	W−L	W−S	LFF	NIL	SIL	MR	RR	UWR
January	47	50	50	54	50	50	50	50	50
February	45	50	50	54	50	50	50	50	50
March	53	54	54	54	54	54	54	54	54
April	59	65	65	64	63	64	65	65	65
May	59	70	70	75	70	70	70	70	70
June	67	72	72	75	72	72	72	72	72
July	68	74	74	75	75	74	74	74	74
August	68	78	78	77	77	77	78	78	78
September	52	87	87	92	87	87	87	87	87
October	52	54	54	54	54	54	54	54	54
November	50	50	50	54	50	50	50	50	50
December	46	50	50	54	50	50	50	50	50

Month	LWR	LFR	SGB	NGB	SLM	NLM	LS	CB
January	50	50	50	44	44	44	42	42
February	50	50	50	43	43	43	43	43
March	54	54	54	54	52	54	52	52
April	65	65	60	59	61	60	58	58
May	70	70	66	64	67	65	65	65
June	72	72	70	67	68	67	67	67
July	74	74	70	68	68	68	69	69
August	78	78	71	67	67	67	69	69
September	87	87	83	79	79	79	79	79
October	54	54	50	50	50	50	45	54
November	50	50	47	47	47	47	44	46
December	50	50	47	45	45	45	43	44

C = Cold = waters with a fish and other aquatic life use designation of "cold water community"
W−L = Warm −Large = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows ≥ 200 cfs (129 mgd)

W−S = Warm − Small = waters with a fish and other aquatic life use designation of "warm water sport fish community" or "warm water forage fish community" and unidirectional 7Q10 flows < 200 cfs (129 mgd)
LFF = waters with a designation of "limited forage fish community"
NIL = Northern Inland Lakes = applicable for those lakes north of State Highway 10
SIL = Southern Inland Lakes = applicable for those lakes south of State Highway 10
MR = Mississippi River = applies to any portion of Wisconsin's Mississippi River reach
RR = Rock River = applies to waters downstream of Lake Koshkonong
UWR = Upper Wisconsin River = applies to waters upstream of Petenwell Dam
LWR = Lower Wisconsin River = applies to waters downstream of Petenwell Dam to the confluence with the Mississippi River
LFR = Lower Fox River = applies to waters downstream of the Lake Winnebago outlet
SGB = Green Bay waters south of the Brown County line to the Fox River mouth
NGB = Green Bay waters north of the Brown County line to the northernmost point on Washington Island
SLM = Lake Michigan waters south of the Milwaukee River mouth (downtown Milwaukee)
NLM = Lake Michigan waters north of the Milwaukee River mouth (downtown Milwaukee)
LS = Lake Superior = waters in Lake Superior except those in Chequamegon Bay
CB = Chequamegon Bay = waters within the region enclosed by Chequamegon Point and a straight line west to the mainland

History: CR 07−111: cr. Register September 2010 No. 657, eff. 10−1−10; renumbering of (1) (b) 1. a. and b. made under s. 13.92 (4) (b) 1., Stats., Register September 2010 No. 657.

NR 102.27 Site−specific water quality criteria. (1) GENERAL. A water quality criterion developed pursuant to this subchapter may be modified by the department for a particular surface water segment or waterbody. The site−specific water quality criterion shall only be applicable to the identified surface water segment or body. The development of a site−specific water quality criterion shall include all of the following:

(a) Information showing data used to derive the water quality criterion do not apply to the specific water segment or body.

(b) Consideration of the guidance provided in Chapter 3.7 of the Water Quality Standards Handbook, Second Edition, U.S. EPA, 8/15/1994.

(c) Information showing the site−specific water quality criterion is consistent with the guidelines provided in sub. (2).

(d) Any additional information necessary to derive site−specific water quality criterion.

Note: Site−specific water quality criteria are subject to U.S. Environmental Protection Agency approval under federal regulations.

(2) SITE−SPECIFIC WATER QUALITY CRITERIA DEVELOPMENT. (a) The department may promulgate site−specific water quality criteria for temperature when it determines that the data used to derive the water quality criteria published in this subchapter do not apply to the specific water segment or body in question. In making the determination, the same approach used to develop the water quality criteria in s. NR 102.25 may be used to develop site−specific water quality criteria by recalculating the water quality criteria based upon the actual species that are associated with the specific site.

(b) Alternative methods for developing site−specific water quality criteria may be used if it is determined that those alternative methods will protect against sub−lethal and acute impacts in the fish and aquatic life community of a specific site.

(c) A water quality criterion developed via alternative methods shall be reviewed by the department and shall be adopted as a rule under this chapter before it can be applied on a site−specific basis.

(3) Any water quality criterion modified for site−specific conditions shall be promulgated by the department and approved by the U.S. Environmental Protection Agency before it is applied on a site−specific basis.

History: CR 07−111: cr. Register September 2010 No. 657, eff. 10−1−10.

NR 102.28 Cold shock standard. Water temperatures of discharges shall be controlled in a manner as to protect fish and aquatic life uses from the deleterious effects of cold shock.

History: CR 07−111: cr. Register September 2010 No. 657, eff. 10−1−10.

NR 102.29 Rate of temperature change standard. Temperature of a water of the state or a discharge to a water of the state may not be artificially raised or lowered at such a rate that it causes detrimental health or reproductive effects to fish or aquatic life of the water of the state.

History: CR 07−111: cr. Register September 2010 No. 657, eff. 10−1−10.

NR 102.30 Variances to water quality standards for temperature. The provisions of ss. 283.15 and 283.17, Stats., are applicable to the water quality standards in this subchapter.

History: CR 07−111: cr. Register September 2010 No. 657, eff. 10−1−10.