Key River Walleye Spawning Rehabilitation Update - 2018

Eastern Georgian Bay Stewardship Council

July 2018

Project Background

In 2014, the Eastern Georgian Bay Stewardship Council (EGBSC) partnered with the Key River Area Association (KRAA) and the Ministry of Natural Resources and Forestry's Upper Great Lakes Management Unit (UGLMU) to enhance two walleye spawning sites on the Key River. In September 2015, 400 square metres of new habitat was created between the two sites, 250 square metres of habitat at the lower site and 150 square metres at the upper site. The goals of the project were to:

- Increase the amount of spawning area available and improve the quality of habitat
- Vary depths of rock placement to help ensure adequate water levels over the spawning beds throughout walleye spawning and egg incubation
- By improving fish habitat, make a positive contribution towards a well-balanced and productive fish community and aquatic ecosystem
- Promote a healthy and naturally sustainable walleye population

For further background details on the rehabilitation work, the *Key River Walleye Spawning Bed Rehabilitation Summary Report* can be found at http://georgianbaystewardship.ca/documents-to-download/.

As part of this project, EGBSC monitored both spawning areas each spring from 2016-2018 to assess the number of walleye using the spawning habitat and the amount of egg deposition. Site visits included observations of newly created habitat, egg collection using egg mats, and visual observations of spawning walleye. Basic water chemistry (dissolved oxygen, pH, temperature, and conductivity) and flow velocity measurements were also collected.

The 2016 update report is available at http://georgianbaystewardship.ca/documents-to-download/. This report provides an update based on monitoring in 2017 and 2018.

Monitoring Results

Water Chemistry

Water temperature, dissolved oxygen, pH, and conductivity were measured using a YSI probe in 2017 (see Tables 1 and 2). Temperature was measured in 2018 (see Figure 1). All measurements were within the expected range for Canadian Shield waters and would not have limited spawning or egg incubation success.

Table 1. Water chemistry parameters measured at the upper spawning site in 2017

Date	Time	Temp (°C)	DO (mg/L)	DO (%)	pH	Conductivity
18-Apr-17	12:55	6.7	12.53	102.4	6.58	50.5
22-Apr-17	12:27	8.1	12.04	102.0	6.15	53.3
25-Apr-17	11:55	8.9	11.48	99.1	6.46	56.4
27-Apr-17	10:30	10.4	10.98	98.2	6.82	61.7
02-May-17	12:20	9.3	10.45	91.2	11.01	61.1
04-May-17	1:55	9.1	11.08	96.3	6.70	58.9
09-May-17	10:20	9.2	11.00	95.7	6.83	60.0
11-May-17	9:55	10.3	10.95	97.7	6.87	58.2
14-May-17	2:26	13.2	10.47	100.0	7.06	57.9
17-May-17	9:49	14.7	10.15	99.7	7.11	64.4
22-May-17	10:20	13.9	9.71	96.9	7.09	67.3
24-May-17	11:05	15.7	9.58	95.2	7.22	68.0
28-May-17	2:05	16.8	8.51	87.7	6.99	70.1
31-May-17	1:50	19.3	8.62	94.0	7.14	68.2
05-Jun-17	11:10	17.5	7.99	83.5	7.24	73.5
08-Jun-17	1:50	21.0	9.03	100.7	7.21	73.6
20-Jun-17	9:55	20.9	8.49	96.6	7.54	82.7

Table 2. Water chemistry parameters measured at the lower spawning site in 2017

Date	Time	Temp (°C)	DO (mg/L)	DO (%)	pH	Conductivity
18-Apr-17	11:09	6.8	12.00	98.6	6.30	40.2
22-Apr-17	11:57	8.1	10.30	87.3	6.70	41.1
25-Apr-17	11:03	9.6	10.04	87.8	7.26	50.4
27-Apr-17	10:50	10.8	9.56	86.2	6.90	49.3
02-May-17	11:20	8.6	12.20	88.4	4.31	38.6
04-May-17	2:35	9.7	10.41	91.5	6.74	44.2
09-May-17	10:50	9.1	9.89	86.5	6.34	40.7
11-May-17	10:27	10.4	8.20	73.4	6.97	48.8
14-May-17	2:55	13.4	9.39	90.1	7.07	47.3
17-May-17	10:13	14.7	9.30	91.4	7.12	51.6
22-May-17	10:45	14.9	8.47	83.9	7.19	35.3
24-May-17	11:30	15.5	7.61	76.0	7.15	54.6
28-May-17	2:30	13.7	7.61	81.4	7.07	53.7
31-May-17	2:10	19.4	8.04	87.4	7.14	59.6
05-Jun-17	11:30	17.1	7.32	76.2	7.04	61.4
08-Jun-17	2:22	20.9	7.59	94.5	6.87	64.0
20-Jun-17	10:25	21.0	8.10	91.0	7.58	68.9

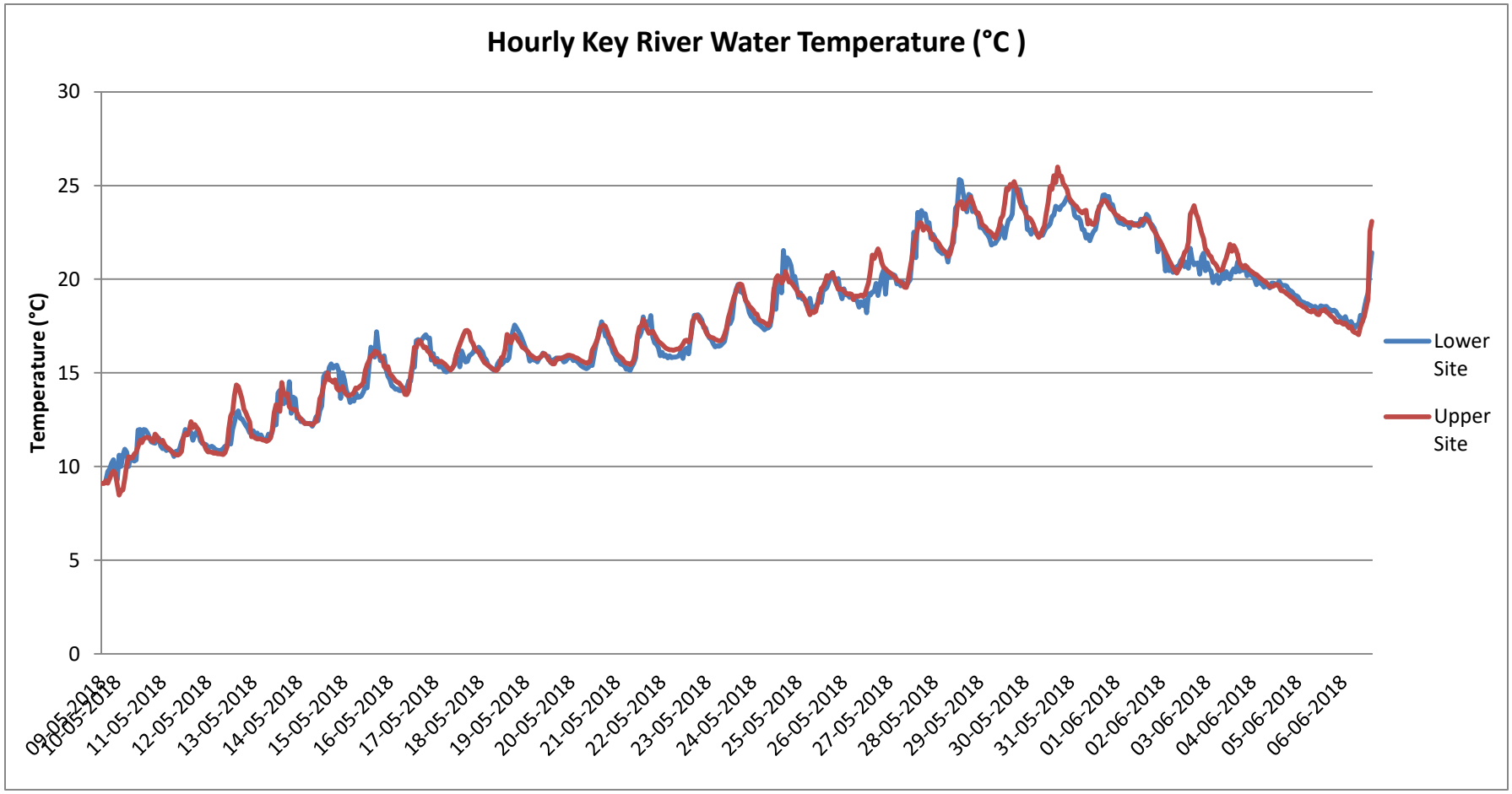

Figure 1. Hourly water temperature at the upper and lower spawning sites from May 9, 2018 to June 6, 2018.

Flow Velocity

In 2017 and 2018, flow was measured at two locations per spawning site (Figures 2 and 3). Results are presented in Tables 3 and 4.

Figure 2. Flow station locations at the upper spawning site

Figure 3. Flow station locations at the lower spawning site

Table 3. Flow velocity measurements for 2017 and 2018 at the upper spawning site

2017			2018		
Date	**Benchmark**	**Velocity (m/s)**	**Date**	**Benchmark**	**Velocity (m/s)**
18-Apr-17	1	0.94	9-May-18	1	1.44
22-Apr-17	1	0.84	12-May-18	1	0.97
25-Apr-17	1	0.17	15-May-18	1	0.85
27-Apr-17	1	0.62	18-May-18	1	0.75
02-May-17	1	0.4	21-May-18	1	0.65
04-May-17	1	0.8	24-May-18	1	0.61
09-May-17	1	0.45	28-May-18	1	0.51
11-May-17	1	3.51	30-May-18	1	0.53
14-May-17	1	0.34	6-Jun-18	1	0.37
17-May-17	1	0.58	9-May-18	2	1.31
22-May-17	1	0.72	12-May-18	2	1.26
24-May-17	1	0.37	15-May-18	2	0.95

2017			2018		
Date	Benchmark	Velocity (m/s)	Date	Benchmark	Velocity (m/s)
28-May-17	1	0.32	18-May-18	2	0.68
31-May-17	1	0.41	21-May-18	2	0.86
05-Jun-17	1	0.21	24-May-18	2	0.42
08-Jun-17	1	0.31	28-May-18	2	0.20
18-Apr-17	2	0.28	30-May-18	2	0.32
22-Apr-17	2	1.56	6-Jun-18	2	-
25-Apr-17	2	1.48			
27-Apr-17	2	1.48			
02-May-17	2	1.36			
04-May-17	2	1.65			
09-May-17	2	1.92			
11-May-17	2	1.51			
14-May-17	2	1.26			
17-May-17	2	1.28			
22-May-17	2	1.2			
24-May-17	2	1.12			
28-May-17	2	1.12			
31-May-17	2	0.93			
05-Jun-17	2	1.36			
08-Jun-17	2	0.93			

Table 4. Flow velocity measurements for 2017 and 2018 at the lower spawning site

2017			2018		
Date	Benchmark	Velocity (m/s)	Date	Benchmark	Velocity (m/s)
18-Apr-17	1	0.75	9-May-18	1	0.52
22-Apr-17	1	0.36	12-May-18	1	0.17
25-Apr-17	1	0.24	15-May-18	1	0.16
27-Apr-17	1	0.14	18-May-18	1	-
02-May-17	1	0.82	21-May-18	1	0.13
04-May-17	1	0.59	24-May-18	1	0.05
09-May-17	1	0.39	28-May-18	1	0.09
11-May-17	1	0.17	30-May-18	1	0.06
14-May-17	1	0.19	6-Jun-18	1	0.08
17-May-17	1	0.17	9-May-18	2	0.13
22-May-17	1	0.20	12-May-18	2	0.26
24-May-17	1	0.15	15-May-18	2	0.18
28-May-17	1	1.07	18-May-18	2	-
31-May-17	1	0.11	21-May-18	2	0.05

2017			2018		
Date	Benchmark	Velocity (m/s)	Date	Benchmark	Velocity (m/s)
05-Jun-17	1	0.14	24-May-18	2	0.02
08-Jun-17	1	0.14	28-May-18	2	0.06
18-Apr-17	2	1.27	30-May-18	2	0.06
22-Apr-17	2	0.60	6-Jun-18	2	0.08
25-Apr-17	2	0.06			
27-Apr-17	2	0.16			
02-May-17	2	0.91			
04-May-17	2	1.26			
09-May-17	2	0.71			
11-May-17	2	0.35			
14-May-17	2	0.24			
17-May-17	2	0.21			
22-May-17	2	0.22			
24-May-17	2	0.26			
28-May-17	2	0.29			
31-May-17	2	0.17			
05-Jun-17	2	0.21			
08-Jun-17	2	0.18			

Spawning Bed Observations

Prior to restoration at the upper spawning site, there was a lack of spawning substrate at locations where water levels could be sustained during egg incubation. During the spring freshet, water flows from Portage Lake, through a narrow outlet until it widens at the base into the larger Key River. Walleye are able to spawn in the rapids at the Portage Lake outlet, but water levels drop after the spawning period, and any walleye eggs deposited in the outlet would be stranded out of water. At the base of the outlet, there is a large pool and a back eddy that provides a location with sufficient water depth and flow during spawning and egg incubation, where the spawning habitat was created in 2015 (Figure 4). EGBSC confirmed that the restored habitat was functioning as designed each year of monitoring (2016-2018).

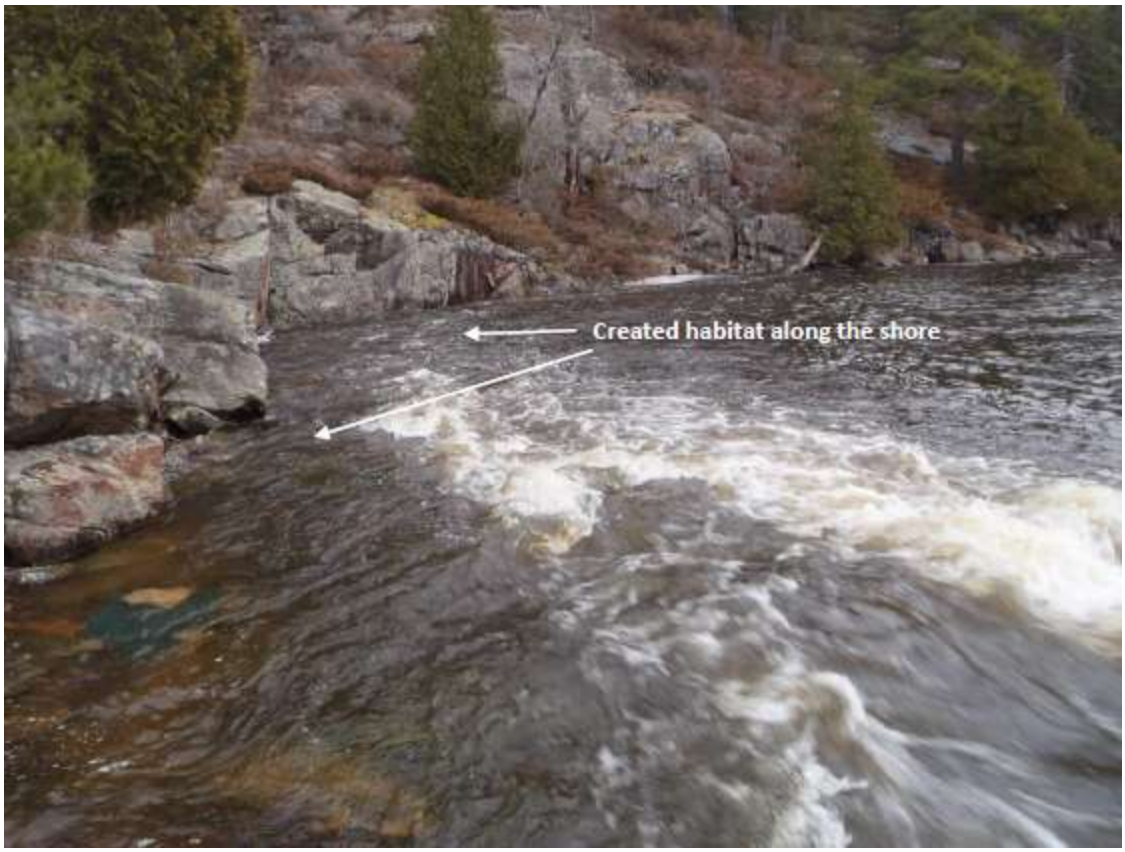

Figure 4. Flow is concentrated along the back eddy, over the created habitat.

Water depth over the newly created habitat at the lower spawning site was sufficient each spring (2016-2018). Because of the site characteristics, there is not a high amount of flow at this site, and most walleye would continue upstream to the upper spawning site. However, the created habitat provides an improvement in the quality and amount of spawning habitat at that site for walleye that do not move beyond it. This site will provide important spawning habitat during years of low water levels when walleye may not be able to access the upper spawning site. It will take multiple years to better assess the success of the created habitat at the lower site.

Spawning Observations & Egg Mat Counts

No night surveys were conducted on the Key River in 2017 and 2018. Species observed during regular monitoring were recorded. In 2017, two walleye were observed at the upper spawning site on April 18 around noon. In 2018, several fish believed to be walleye were seen at the lower spawning bed site on May 9 and May 12 in the early afternoon.

At each site, egg mats were used to help assess the number of walleye eggs deposited. Egg mat locations are shown in Figure 5 and egg count totals for each egg mat are presented in Tables 5 and 6.

Figure 5. Egg mat locations 1-4 at both the upper and lower sites were sampled in 2017. Egg mat locations 1-3 at both sites were sampled in 2018.

Table 5. Walleye egg counts at the upper spawning site

2017		2018	
Egg mat	Total eggs	Egg mat	Total eggs
1	15	1	17
2	6594	2	2294
3	408	3	912
4	0	Total	3223
Total	7017		

Table 6. Walleye egg counts at the lower spawning site

2017		2018	
Egg mat	Total eggs	Egg mat	Total eggs
1	722	1	502
2	863	2	803
3	225	3	198
4	0	Total	1503
Total	1810		

Community Participation and Outreach

Over the course of the 2017 field work season, two volunteers assisted in monitoring activities, including a high school student. During the summer of 2017, EGBSC presented findings from that year's spring field work at the KRAA Annual General Meeting. By being present at the AGM, residents and cottagers were able to ask questions and learn more about the walleye spawning population in the Key River, as well as the ongoing monitoring at the upper and lower spawning sites.

During the 2018 field work season, a total of five volunteers helped out with monitoring activities.

Discussion

Based on visual observations, there appears to be a low number of walleye spawning at the Key River. Although it is still too early to make conclusions about the impact on walleye, both rehabilitated spawning beds were functioning as intended in the spring of 2016, 2017, and 2018. It was a positive sign to see that the overwhelming majority of observed egg deposition at the upper site occurred in the newly created habitat, where there would be sufficient water depth for eggs to successfully incubate. While egg mat totals were lower in 2018 than 2017, the 2018 totals may not be an accurate representation of spawning activity in that year. Ice cover on the Key River persisted much later in spring 2018 than spring 2017. As such, access to the upper and lower sites in 2018 was delayed which resulted in egg mats being set later in the spring. It is entirely possible that a portion of the spawning period was missed due to this delay and that more eggs would have been deposited on the egg mats had they been installed earlier in the season.

The field work completed in 2018 marked the third consecutive year of monitoring at the two Key River spawning bed sites. EGBSC recommends further monitoring in the future on a three to five year basis.

Acknowledgements

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