



**The Appleton Wetland;
Its Decline, Cause and Recommended Action**

Appendix I: Rock Ridge Levels

Report prepared by

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of the
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Rock Ridge Level

A feature of the Mississippi River just above the Almonte Fair Grounds is a small island and a large, flat rock ridge that extends from it for some distance in a north-easterly direction. During the 1970s to 1990s, and probably long before, the presence of the ridge during the usual summer low-flow period was well known to the boating, canoeing and kayaking community. Since the water over the ridge was so shallow (10 cm more or less) that they could not pass over it without grounding, a detour in deeper water at the north end of the ridge was necessary. Although known and remembered by many, the rock ridge has never been measured, nor has the river level that permits passage over the ridge been documented.

This provides the possibility of a more quantitative means of reconstructing what the likely summer water levels were in that period. Simply create an elevation profile of the ridge in terms of metres above sea level (masl) and add 10 cm to it. To that end, on October 11, 2013, a survey by canoe of the ridge area was undertaken by a member of the Research Group (Al Seaman).

The process was simple:

- paddle to a sample point,
- anchor,
- measure precise location with a GPS unit, and
- measure the depth of water at that point with a metre stick.

The GPS position was measured with a Garmin eTrex Vista HCx unit, WAAS enabled, and averaged over 1.5 to 2 minutes. The GPS unit typically indicated a probable accuracy of 2 to 3 metres. The sampling did not follow a uniformly defined grid, the result of the lack of close reference points and the perturbations of river currents and erratic breezes. In spite of that, the random points collected do provide a useful result.

The sample locations or waypoints (WP) as recorded by the GPS unit, were saved to a computer file "RiverRidge.gpx" and are available for further analysis. A text version of the data was extracted from that file and is reproduced below. That file was also imported to Excel and is the basis for the data analysis spreadsheet available on file "RiverRidge.xls".

RiverRidge.txt file

Lat	Long	Elev	WP	Date	Time
45.22536541	-76.18578028	122.693	278	11-OCT-13	15:05:56
45.22527245	-76.18551105	116.444	279	11-OCT-13	15:08:54
45.22422865	-76.18591229	118.607	280	11-OCT-13	15:21:34
45.22422949	-76.18583426	109.715	281	11-OCT-13	15:28:53
45.22422061	-76.18584113	110.436	282	11-OCT-13	15:32:23
45.22424433	-76.18590374	112.599	283	11-OCT-13	15:42:32
45.22418339	-76.18552756	113.320	284	11-OCT-13	15:49:09
45.22417275	-76.18556268	113.561	285	11-OCT-13	15:53:28
45.22418985	-76.18558850	114.041	286	11-OCT-13	15:57:12
45.22440342	-76.18578539	112.119	287	11-OCT-13	16:04:04
45.22441415	-76.18557584	097.939	288	11-OCT-13	16:12:15
45.22440912	-76.18558607	100.583	289	11-OCT-13	16:16:38
45.22441398	-76.18561331	103.226	290	11-OCT-13	16:20:20
45.22441708	-76.18564491	106.110	291	11-OCT-13	16:24:27
45.22443627	-76.18571859	118.848	292	11-OCT-13	16:27:02
45.22448757	-76.18550778	121.972	293	11-OCT-13	16:31:32
45.22449126	-76.18552102	121.491	294	11-OCT-13	16:35:19
45.22453099	-76.18563158	118.367	295	11-OCT-13	16:37:59
45.22451942	-76.18545472	116.685	296	11-OCT-13	16:42:17
45.22452102	-76.18545766	117.166	297	11-OCT-13	16:45:16
45.22454323	-76.18552220	118.848	298	11-OCT-13	16:48:26
45.22403612	-76.18591732	122.212	299	11-OCT-13	16:56:16
45.22404132	-76.18593224	121.972	300	11-OCT-13	17:00:07
45.22405138	-76.18594439	121.732	301	11-OCT-13	17:03:12

```
<bounds minlat="45.22403612" minlong="-76.18594439"  
maxlat="45.22536541" maxlong="-76.18545472"/>
```

As a first indicator of sample locations, the "RiverRidge.gpx" file was imported to a Google Earth image of that area of the river, and this shows the position of each waypoint from 278 through 301. Versions of this image at two different scales are included below. As is common with Google Earth images, these are subject to small position errors that become more visible at larger magnifications. In this particular case, the images seem shifted about 12 metres to the east of the real position. WP279 should actually be where the nearby dock joins dry land. WP280 is actually at the waterline on the north side of the small island.

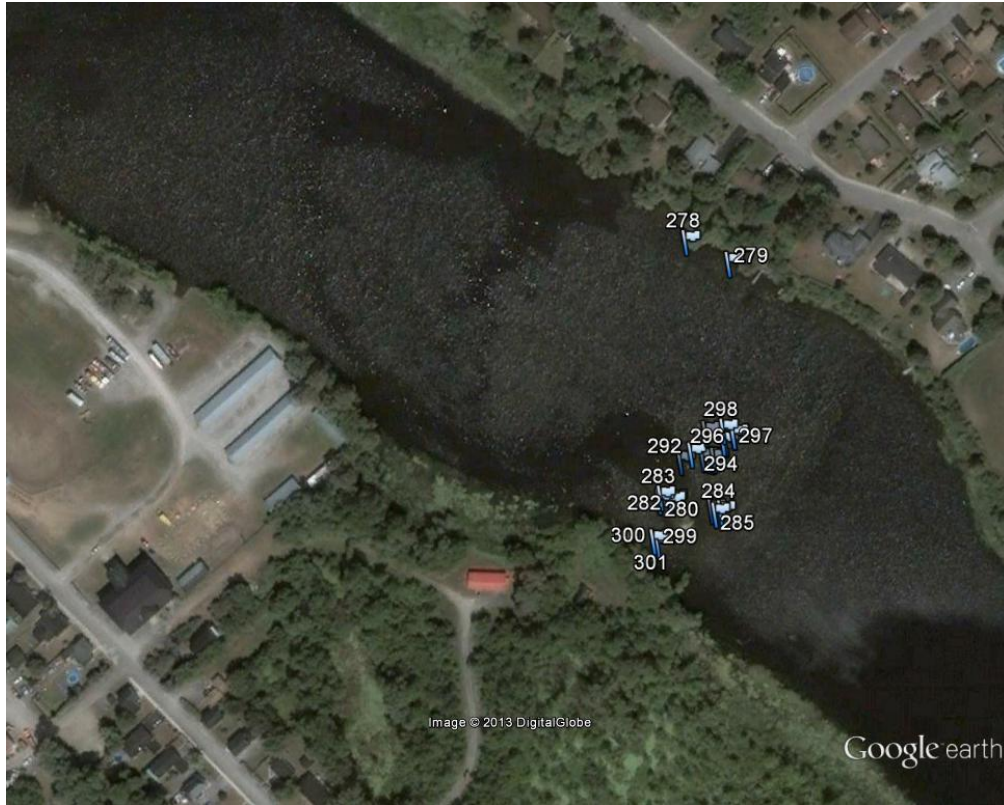


Figure I-1 Google Earth view of river area with waypoints added



Figure I-2 Google Earth view enlarged to show waypoints for elevation measurement

Relative positions of the waypoints are shown more accurately in the chart below derived from the spreadsheet data. The origin is arbitrary and was chosen only to optimize the view of waypoint positions. The chart gives an accurate presentation of distances between sampling points. In addition, from the measured levels of the ridge, the waypoints on the flat top surface at 117.10 masl have been coloured red. This provides a partial outline of the shape and location of this ridge.

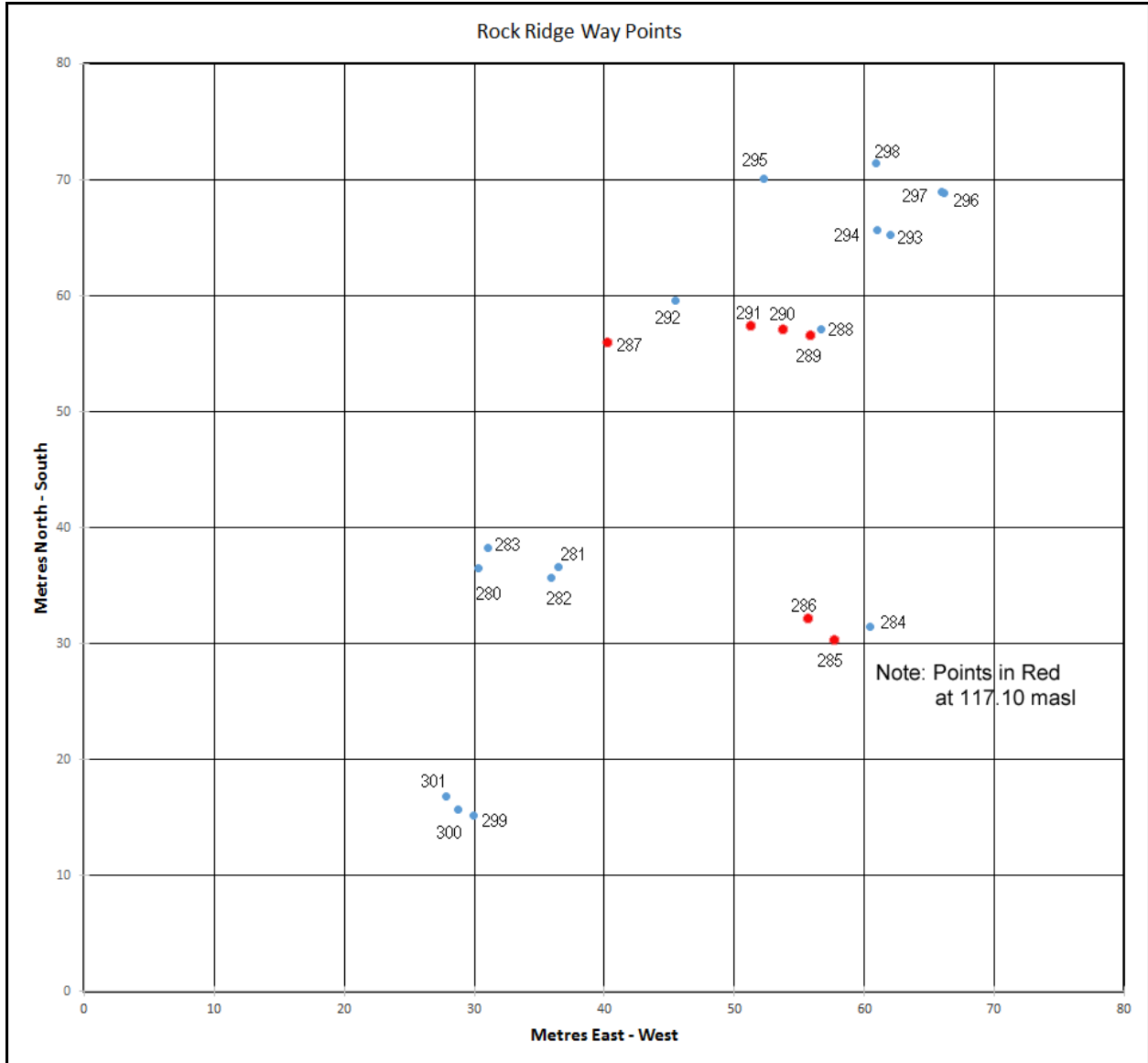


Figure I-3 A plot of waypoint positions on N-S and E-W grid

The water depth at each waypoint was measured with a metre stick and later transcribed to the spreadsheet. The water depth at the 222 Spring Street reference point was measured before and after the observations, and held steady at 28 cm over this period. We have subsequently arrived at a level of 117.36 masl for the reference point (see Appendix H), and this yields a water level of 117.64 masl for the river during the sampling period. As a further reference, the staff gauge on the Almonte bridge at the end of observations was in close agreement at 117.63 masl. In the spreadsheet, the measured water depth at each waypoint was subtracted from the water surface level of 117.64 masl to provide the rock ridge level. The chart below is a plot of these level readings by waypoint number.

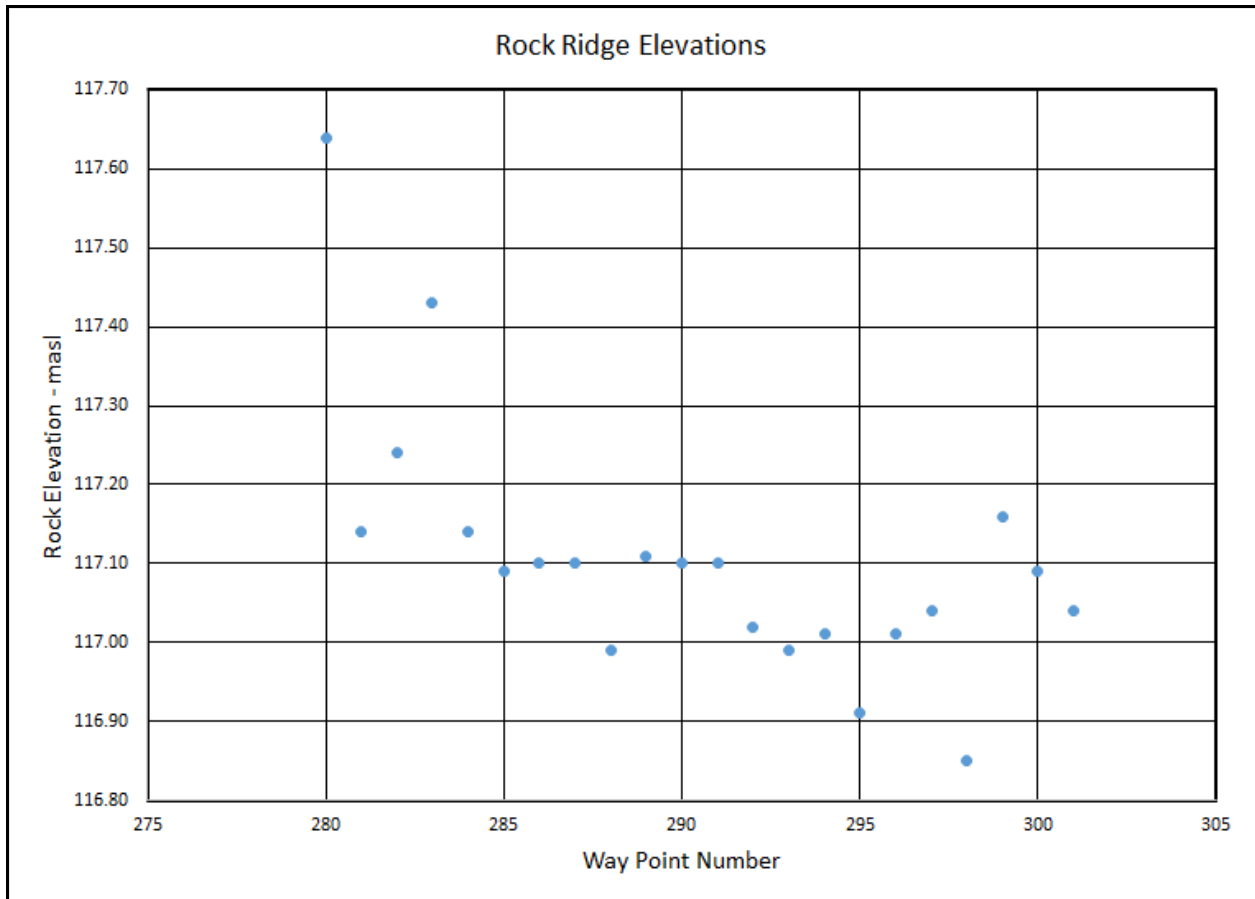


Figure I-4 Plot of rock elevation for each waypoint

Waypoints 280, 282 and 283 are fairly close to the island and show higher levels.

Waypoints 285, 286, 287, 289, 290 and 291 are all very close to 117.10 masl and define the flat top surface of the ridge.

The cluster of waypoints 293, 294, 296, 297 and 298 are closer to the buoy marking the north channel around the ridge and start to show increasing depth.

To complete the information on the data analysis, a printout of the spreadsheet referred to previously is included below. The LAT, LONG, DATE-TIME and waypoint data are imported from the .gpx file from the GPS unit. X and Y values are converted from the LAT and LONG values. Depth is as entered from field notes on measured water depth at each waypoint. Elev is computed by subtracting Depth from the Water Level constant (117.64 masl) at the bottom of the spreadsheet.

Rock Ridge Data Analysis									
LAT	LONG	DATE-TIME	Way Point	X	Y	Depth	Way Pt	Elev	
45.22536541	-76.18578028	11-OCT-13 15:05:56	278	40.68	162.85	0	278	117.64	
45.22527245	-76.18551105	11-OCT-13 15:08:54	279	61.75	152.52	0	279	117.64	
45.22422865	-76.18591229	11-OCT-13 15:21:34	280	30.35	36.52	0	280	117.64	
45.22422949	-76.18583426	11-OCT-13 15:28:53	281	36.46	36.62	50	281	117.14	
45.22422061	-76.18584113	11-OCT-13 15:32:23	282	35.92	35.63	40	282	117.24	
45.22424433	-76.18590374	11-OCT-13 15:42:32	283	31.02	38.27	21	283	117.43	
45.22418339	-76.18552756	11-OCT-13 15:49:09	284	60.46	31.49	50	284	117.14	
45.22417275	-76.18556268	11-OCT-13 15:53:28	285	57.71	30.31	55	285	117.09	
45.22418985	-76.1855885	11-OCT-13 15:57:12	286	55.69	32.21	54	286	117.10	
45.22440342	-76.18578539	11-OCT-13 16:04:04	287	40.28	55.95	54	287	117.10	
45.22441415	-76.18557584	11-OCT-13 16:12:15	288	56.68	57.14	65	288	116.99	
45.22440912	-76.18558607	11-OCT-13 16:16:38	289	55.88	56.58	53	289	117.11	
45.22441398	-76.18561331	11-OCT-13 16:20:20	290	53.75	57.12	54	290	117.10	
45.22441708	-76.18564491	11-OCT-13 16:24:27	291	51.28	57.46	54	291	117.10	
45.22443627	-76.18571859	11-OCT-13 16:27:02	292	45.51	59.60	62	292	117.02	
45.22448757	-76.18550778	11-OCT-13 16:31:32	293	62.01	65.30	65	293	116.99	
45.22449126	-76.18552102	11-OCT-13 16:35:19	294	60.97	65.71	63	294	117.01	
45.22453099	-76.18563158	11-OCT-13 16:37:59	295	52.32	70.12	73	295	116.91	
45.22451942	-76.18545472	11-OCT-13 16:42:17	296	66.16	68.84	63	296	117.01	
45.22452102	-76.18545766	11-OCT-13 16:45:16	297	65.93	69.02	60	297	117.04	
45.22454323	-76.1855222	11-OCT-13 16:48:26	298	60.88	71.48	79	298	116.85	
45.22403612	-76.18591732	11-OCT-13 16:56:16	299	29.95	15.13	48	299	117.16	
45.22404132	-76.18593224	11-OCT-13 17:00:07	300	28.79	15.71	55	300	117.09	
45.22405138	-76.18594439	11-OCT-13 17:03:12	301	27.84	16.82	60	301	117.04	
45.2239	-76.1863					0			
Earth Mean Radius		6367.44	Km						
SurfaceDist per Degree Lat		111132.6991	m						
SurfaceDist per Degree Long		78274.87185	m						
Ref Pt Elev	117.36 masl			Staff Gauge		117.63 masl			
	0.28 metres								
Water Level	117.64 masl								

Figure I-5 Spreadsheet from Excel file "RiverRidge.xls"

Conclusion

The measurement of the top profile of the rock ridge puts the level of that ridge at 117.10 masl. Adding the 10 cm water depth typically observed over the ridge in the 1970s through to the early 1990s would yield a historic water level of 117.20 masl, and this is the most probable number for normal summer water levels in that period. It is also the level of the concrete weir above the former Flour Mill.

This suggests that the summer levels were set by the concrete weir and that flashboards were probably missing or in a state of poor repair. Alternately, water demand by the mill may have been such that all of the available water in the summer low-flow period went straight to the mill and there was no buildup of water behind the flashboards. Any records of what may have been happening at the weir have not been found.

Regardless of the cause, the evidence indicates that much of the time in the summer water levels at the weir were around 117.20 masl, and would have ensured that water levels in the Appleton Wetland were in the range for healthy tree growth.