



The Appleton Wetland; Its Decline, Cause and Recommended Action

Appendix K: Wetland Inspection

Report prepared by

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August 11, 2014

Wetland Inspection

With the rapid encroachment of winter looming, it was decided that we should do an on-the-ground exploration of the wetland to provide a measure of the river water level relative to the ground level and tree bases in the Appleton Wetland with a view to determining the proper river level for healthy tree growth. On the morning of November 6, 2013, the exploration was undertaken by Joachim Moenig and Al Seaman. The equipment used included chest waders, life jackets, shovel, metre stick, tape measure, camera, handheld GPS unit and note paper. We went to the initial starting point, WP304 by boat. This location is actually that of Tree 1 from the 2011 MVFN Tree Project (see Appendix G).

The path followed in the exploration was documented by GPS readings taken at observation points along the way. 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 3 metres or less. Our initial intent was to cover a more or less straight line due north for 200 metres to a point at the northern boundary of the wetland. That projected target is defined by WP305. The reality was that it was extremely difficult to travel through the wetland due to the very rough surface, and the presence of water, sometimes very deep, in every hollow. The result was the reduction of the planned route to a smaller circle ending back at the starting point – waypoints 304, 306, 307, 308, 309 and back to 304.

We then moved westward along the shore by boat and started another circuit from waypoint 310 through waypoints 311, 312, 313, 314 and back to 310. Subsequently, waypoint 305 was accessed overland from the fields to the north to take several pictures. Two further points, waypoints 315 and 316 were located approximately 100 metres west and east of waypoint 305, and further pictures taken.

The table below is the result of downloading a .gpx file from the GPS unit, and editing it to make it more readable. It provides a quick summary of position data and a time reference as to when each waypoint was visited.

Table of Waypoint Positions and Time

Lat	Long	Elev	Waypoint	Date	Time
45.18758356	-76.12660295	125.817	316	08-NOV-13	14:59:58
45.18837532	-76.12883530	130.143	315	08-NOV-13	14:50:14
45.18688174	-76.12959143	124.135	314	06-NOV-13	12:15:57
45.18724409	-76.12956797	119.569	313	06-NOV-13	12:01:29
45.18715416	-76.13012478	130.143	312	06-NOV-13	11:40:29
45.18687655	-76.12975446	117.646	311	06-NOV-13	11:28:08
45.18676222	-76.12963661	119.328	310	06-NOV-13	11:19:04
45.18678518	-76.12756662	120.049	309	06-NOV-13	10:58:41
45.18678418	-76.12759394	121.491	308	06-NOV-13	10:54:18
45.18668594	-76.12790894	122.693	307	06-NOV-13	10:41:38
45.18654395	-76.12778262	129.422	306	06-NOV-13	10:28:48
45.18799997	-76.12768329	121.491	305	06-NOV-13	10:19:42
45.18643331	-76.12768329	121.972	304	06-NOV-13	10:08:23

bounds minlat="45.18643331" minlong="-76.13012478"
maxlat="45.18799997" maxlong="-76.12756662"

The .gpx file from the GPS unit was added to a Google Earth image of the portion of the wetland covered in this excursion, and the result is shown below.

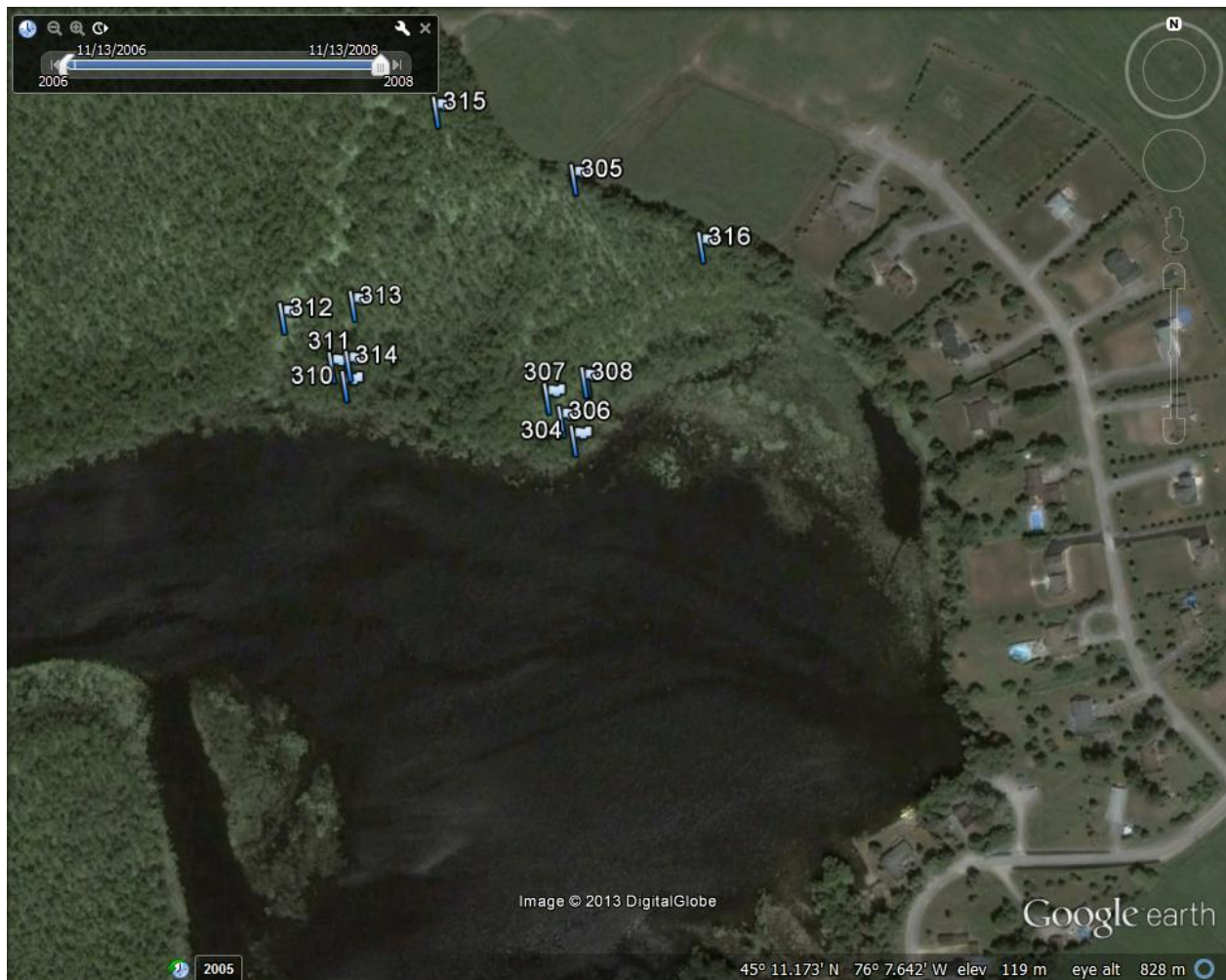


Figure K-1 Google Earth image of wetland with waypoints added

To provide a clearer view of the distances between waypoints, the GPS data was converted to a grid chart 300 metres square. The origin of the chart has been selected to display all waypoints conveniently. It is shown below.

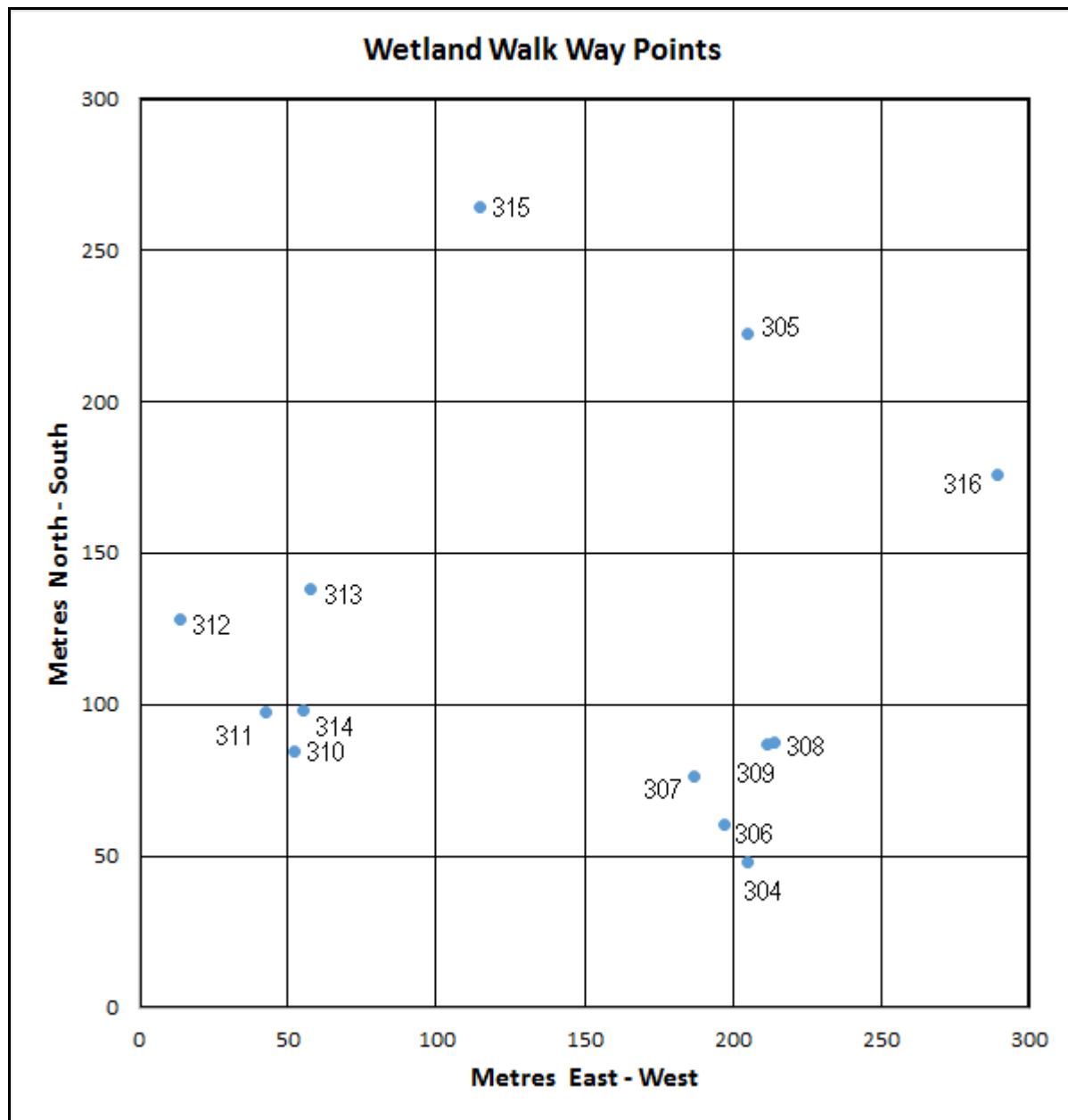


Figure K-2 Chart of waypoint relative positions

The pages that follow record the observations and selected photos taken at each of the waypoints. The information for each location has a heading identifying the waypoint (e.g. WP304). All locations followed the same pattern of terrain.

- There were many fairly widely separated small hummocks where the last surviving trees remain fighting for life. The hummocks were typically 20 to 50 metres apart and were somewhat above the prevailing water level of 117.80 masl.
- The hummocks showed a pattern of clumps of two to five trees, with one or two dead or dying, and one or two struggling to survive. The crowns on the survivors had only a few short branches. Although this was November and the leaves had all fallen, the fine tips of the viable branches distinguished them from dead branches.
- Where trees had died there was considerable evidence of regrowth of new shoots from still viable root systems. It is suspected that the rate of shoot growth is considerably restricted by the high water levels.
- Between the hummocks the ground is much lower (20 - 60 cm), and these areas were filled with water.
- Under the water was a layer of water-logged dead tree trunks in a crisscrossed random pattern. As we waded from mound to mound through the water filled hollows the smell of hydrogen sulphide was evident, the result of disturbing anaerobic decay on the bottom.
- There is a heavy growth of assorted long grasses on the hummocks and adjacent areas above the water line, the result of the loss of tree canopy and an increase of light at ground level. This is in contrast to the almost bare ground between trees in the Lavallee Wetland.

WP304

This is actually the position of Tree 1 from the 2011 MVFN Tree Project, and was the point of departure for the first series of measurements. The only data recorded at this location was the reading of water level on the stake gauge. At 10:20 AM it read an average of 56.5 cm (there was a slight ripple in the water, about ± 1 cm). The level is equivalent to 117.80 masl.



Figure K-3 WP304 - Tree 1

WP306

Hummock with stressed trees. Open water was some distance from trees, but we dug a small hole near trees. The water in the hole was about 15 cm below ground level, and about 23 cm below the base of the tree.



Figure K-4 Dead and stressed trees along drainage channel near WP306



Figure K-5 Dead trees and ground vegetation near WP306

WP307

Hummock with stressed trees. Nearby ground level was 14 cm below water level. Base of roots was 18 cm above water.



Figure K-6 Base of trees with water below



Figure K-7 Thin crown of stressed trees

WP308

Hummock with dead trees. Nearby ground level was 18 cm below water level. Base of roots was 20 cm above water.



Figure K-8 Hummock with tree bases

WP309

Hummock with one dead tree and one stressed. Nearby ground level was 10 cm below water level. Base of roots was 18 cm above water.



Figure K-9 Hummock with trees – note new shoots



Figure K-10 Dead trunks and surviving tree with stressed crown

WP304

Returned to the boat at the starting point. Before leaving WP304, the water level was checked again, giving a reading about 57.0 cm on the stake gauge, essentially unchanged from the 117.80 masl level an hour earlier.

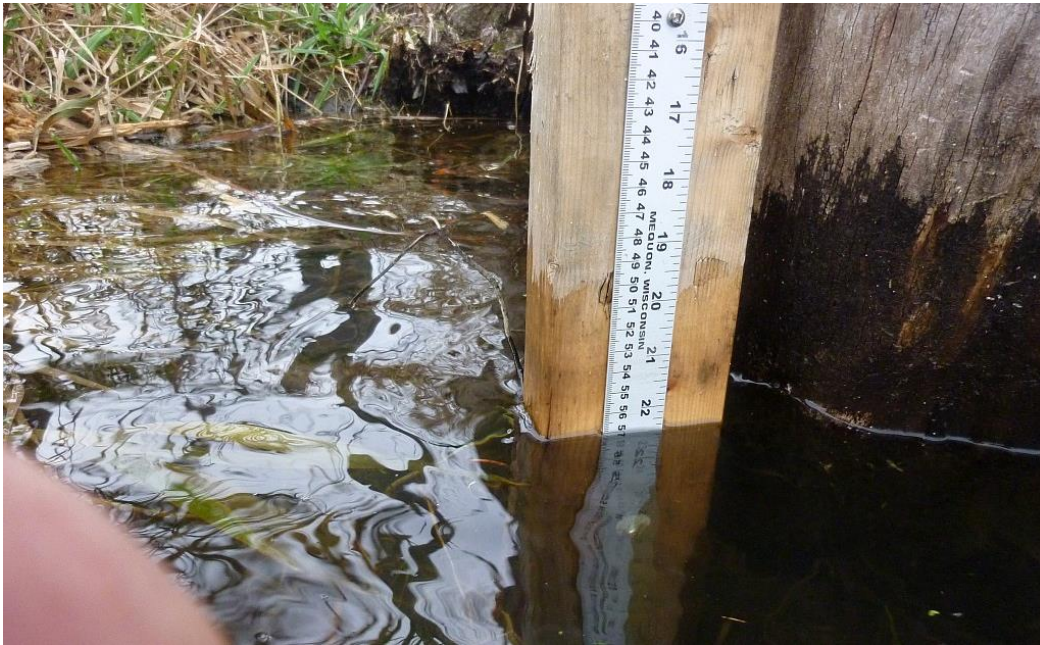


Figure K-11 Recording water level at stake gauge



Figure K-12 General view of wetland at WP304

WP310

This location marked the starting point for a second circle walk about 11:00 AM. It was selected only as an easy point to land a boat, and is actually fairly close to the Tree 2 of the MVFN 2011 Tree Project.



Figure K-13 Arriving at WP310



Figure K-14 View of shoreline at WP310

WP311

Hummock with dead tree. Nearby ground level was 8 cm below water level. Base of roots was at water level. Ground uneven and these measures are subject to error.



Figure F-15 Dead tree at WP311



Figure F-16 Stressed tree crown – some of it looks dead

WP312

Hummock with live tree. Nearby ground level was 19 cm below water level. Base of roots was 20 cm above water.



Figure K-17 Hummock with tree base – note new shoots on right



Figure K-18 Near WP312 – many new shoots starting

WP313

Hummock with live and stressed trees and also new shoots. Nearby ground level was 10 cm below water level. Base of roots was 18 cm above water.



Figure K-19 Large hummock at WP313



Figure K-20 Tree crowns at WP313 – dead on left, stressed on right

WP314

Hummock with stressed trees. Nearby ground level was 12 cm below water level. Base of roots of edge tree was 12 cm above water.



Figure K-21 Tree at WP314

WP310

Return to starting point of second loop around 12:20 PM and subsequently return to the 521 River Road property. Did a water level check at this point at 1:05 PM yielding 117.785 masl. This is within reasonable agreement of earlier levels given the uncertainty due to the light chop in the water. Further level checks showed 117.78 masl at Spring Street at 1:25 PM and 117.78 masl at the Bridge Street bridge in Almonte at 1:40 PM.



Figure K-22 On return trip – Tree 6 with water at tree base



Figure K-23 Taking water level at BM – note laser spot on scale

WP305

This waypoint was entered into the GPS unit to provide a target end point for the first walk. As previously noted, the terrain encountered made it impractical to travel through the wetland to WP305. On November 8, Al Seaman returned via the fields to the north of the wetland to take some photos here, and at WP315 and WP316, locations 100 metres west and 100 metres east of WP305. From the vantage point of dry land, the wetland here looked essentially the same as found the previous day; a mix of dead trees and trees having a stressed appearance surviving on scattered hummocks.



Figure K-24 At WP305 looking eastward



Figure K-25 At WP305 looking westward

WP315

Location approximately 100 metres northwest of WP305. Photos show high water, stressed, and dead trees on hummocks.



Figure K-26 At WP315 looking westward



Figure K-27 At WP315 looking southward

WP316

Further images from November 8 approximately 100 metres southeast of WP305. Similar appearance to earlier photos, except the view point is now a fairly high bank above the wetland.



Figure K-28 At WP316 looking westward



Figure K-29 At WP316 looking southward

Conclusions

Although the water depth at the edge of the hummocks was typically in the 10 to 20 cm range, in the space between the hummocks water was considerably deeper, with typical depths ranging from 30 to 45 cm, and in some places of the order of 60 cm. In these flooded areas there were no standing trees, dead or alive. Under the water there were many water logged tree trunks and branches, the evidence of trees long dead and gone.

The very uneven ground profile is in sharp contrast to what is seen in the nearby Lavallee Wetland, where the ground is relatively flat, and during the summer low-water season, there are few water filled depressions, and the ground is easy to walk over. What has caused the difference in the Appleton Wetland is not clear. It has been suggested that it has been caused by accelerated decay in the flooded low spots that in turn causes further ground slumping. Another possible cause suggested is increased erosion as a result of the rapid cycling of water levels in the summer with constant inflow and outflow throughout the wetland.

Regardless of the cause of the rough ground profile, it remains difficult to estimate what an average ground level would be in the wetland. As a first approximation it seems reasonable to take an average of the level difference from tree base to the water, and from the water to the ground level at the edge of the hummock for each of the way points recorded. The diagram below illustrates the result.

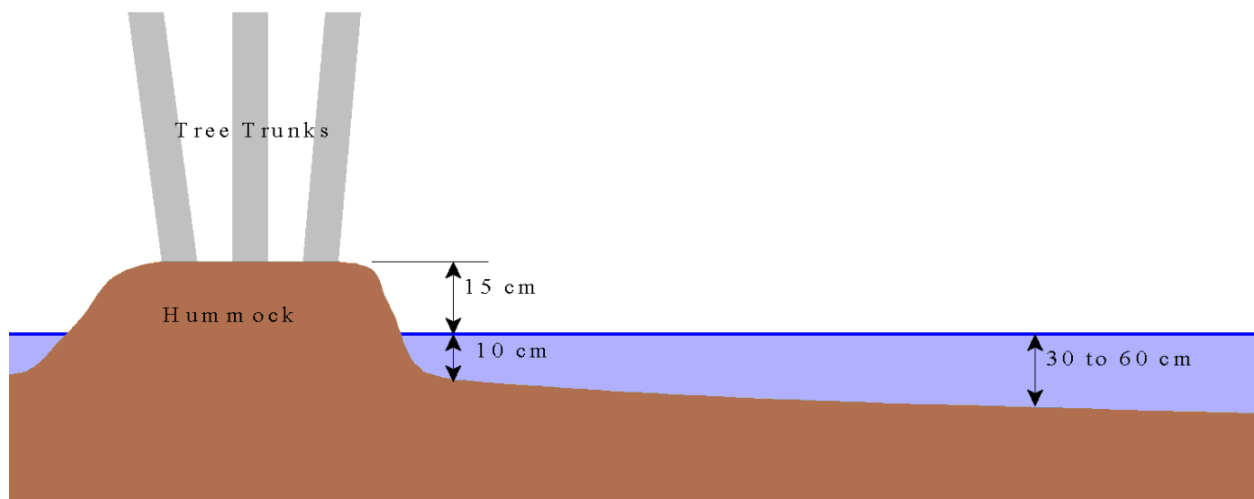


Figure K-30 Sketch of typical hummock profile and water level

Faced with the irregular ground profile at the hummock, the question is just what should be considered as “ground level”? Certainly, from the point of view of the tree root system, the narrow top of the hummock is not the right place. It seems rather that it should be at the bottom of the steep sided hummock where the ground changes to the gently sloping pond bottom between hummocks – that is, about 10 cm below the water level at the time of 117.80 masl. Based on discussion with Dr. Paul Keddy, for healthy tree growth, water level should be at least 25 cm below ground level. (See Section 3.5 of this report, *Characteristics of Maple Swamps*.) Applying that to the above measurements would give a desirable water level of 117.45 masl or less. We recommend rounding that number to the level of 117.40 masl as measured at the wetland to ensure the restoration of tree growth in the Appleton Wetland.