The Decline in the Silver Maple Wetlands of Appleton in Mississippi Mills, Ontario

An Environmental Problem Analysis by: Mississippi Valley Field Naturalists

2014-03-11

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MVFN Research Committee

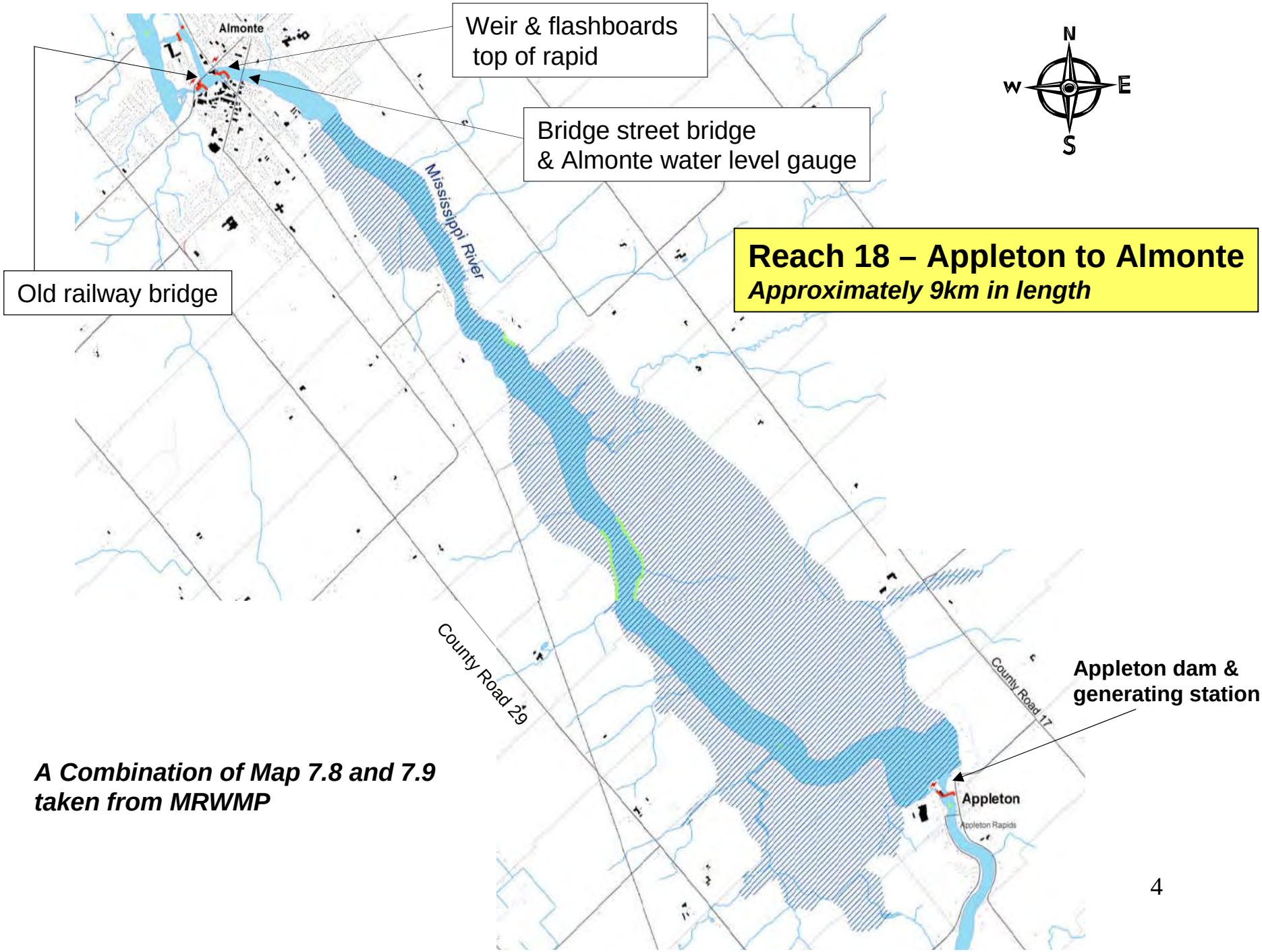
Formed 30 July 2013

Members are:

Cliff Bennett, Joachim Moenig, Al Seaman,
Mike O'Malley, Howard Robinson

Objectives:

- Research changes in the Appleton wetland.
- compile relevant data as to cause
- produce a presentation overview
- Provide a report of the committee findings and recommendations for best riverine management.



Reach 18 – Appleton to Almonte

Approximately 9km in length

Appleton dam & generating station

A Combination of Map 7.8 and 7.9 taken from MRWMP

Silver Maple Swamps Background

- They are wetlands subject to seasonal spring and late autumn flooding dominated by Silver Maple trees (***Acer saccharinum)***.
- Regardless of the spring flood, trees thrive if subsequent levels allow their base and top roots to dry out and breathe during the season of growth from late April to late October.
- Although flood-tolerant, Silver Maples will die if continually inundated for 2 or more years.

Value of the Silver Maple Wetland

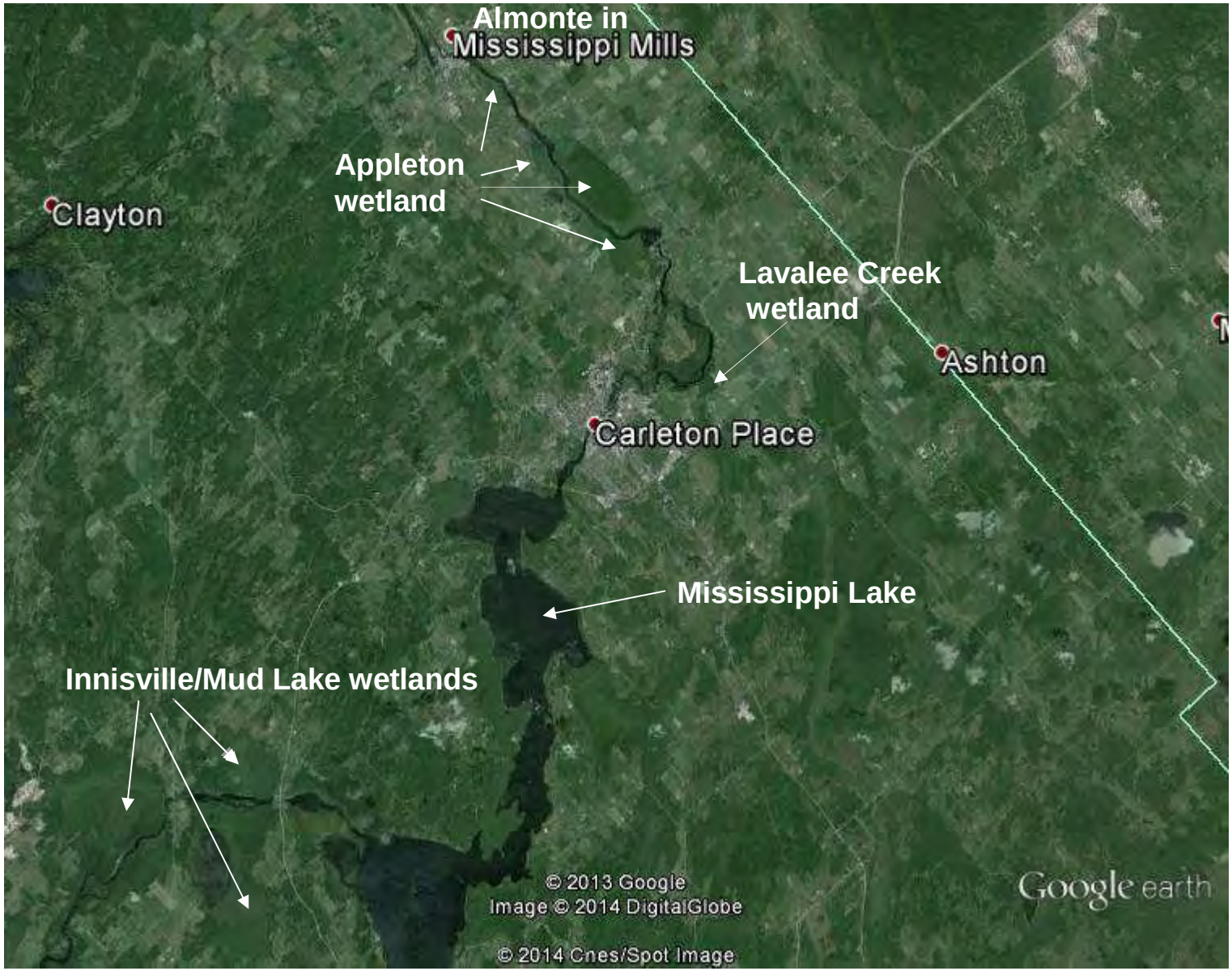
As an important part of the Mississippi riverine system, the Appleton Wetland:

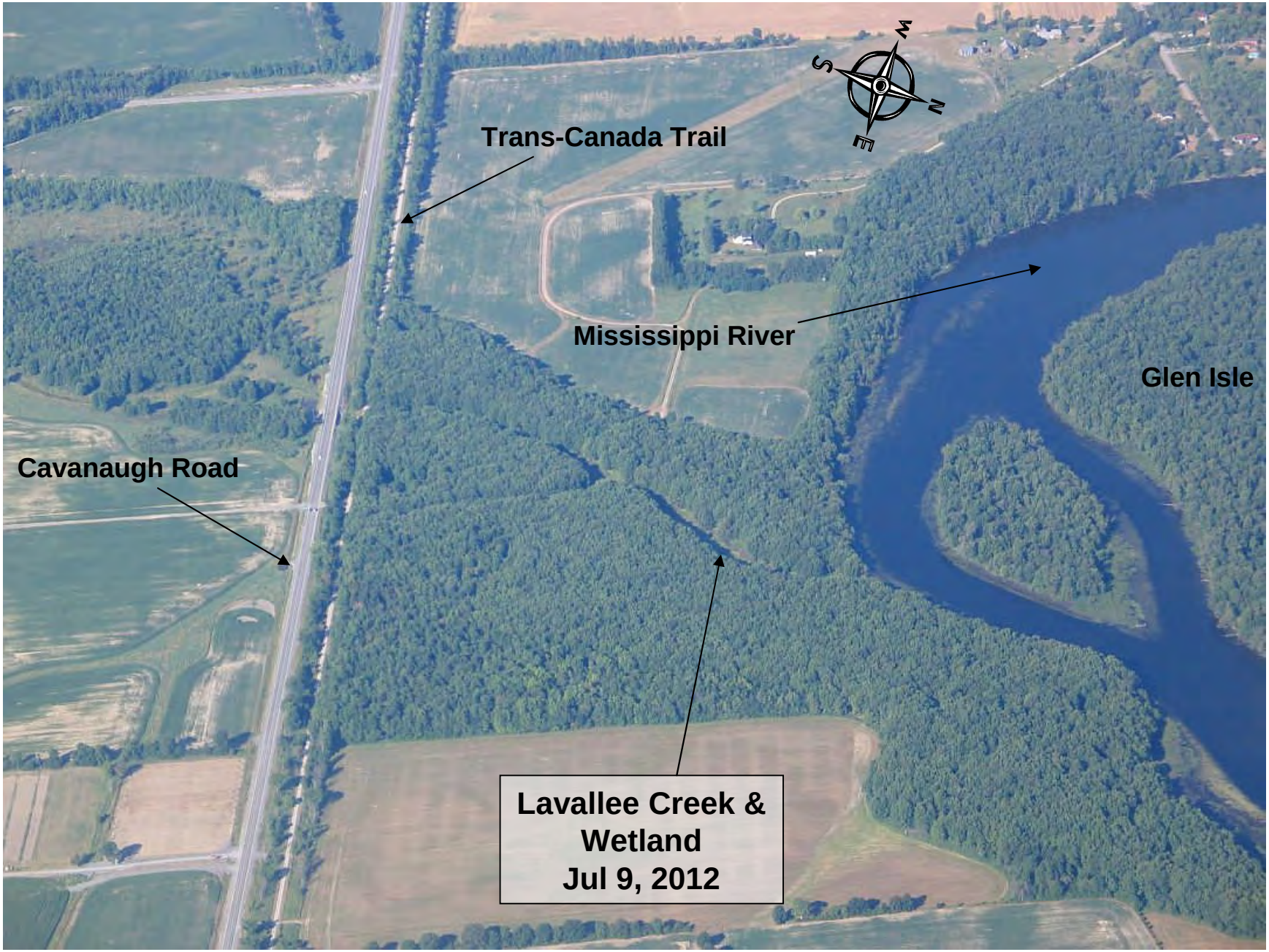
- helps to moderate climate;
- size of the wetland assists with flood prevention;
- acts as a sediment trap;
- provides habitat and a variety of required foods for flora and fauna;
- cleanses the air, produces oxygen and basic nutrient supply to the river and downstream plants and animals
- Absorbs carbon dioxide from the air.
- affects water clarity, pH, and temperature.

Comparable Mississippi River Silver Maple Swamps

- Innisville and Mud Lake Silver Maple Swamps
  - up river from Innisville and Ferguson Falls area
  - designated a PSW (*Provincially Significant Wetland)* & ANSI (*Area of Natural and Scientific Interest*)
  - no evidence of die-back.
- Lavallee Creek Silver Maple Swamp
  - between Carleton Place and Appleton, adjacent to Glen Isle
  - smaller and not provincially designated
  - no evidence of die-back.

Mississippi River Silver Maple Swamps




Trans-Canada Trail
Mississippi River
Glen Isle
Cavanaugh Road
Lavallee Creek &
Wetland
Jul 9, 2012

Lavallee Creek Wetland

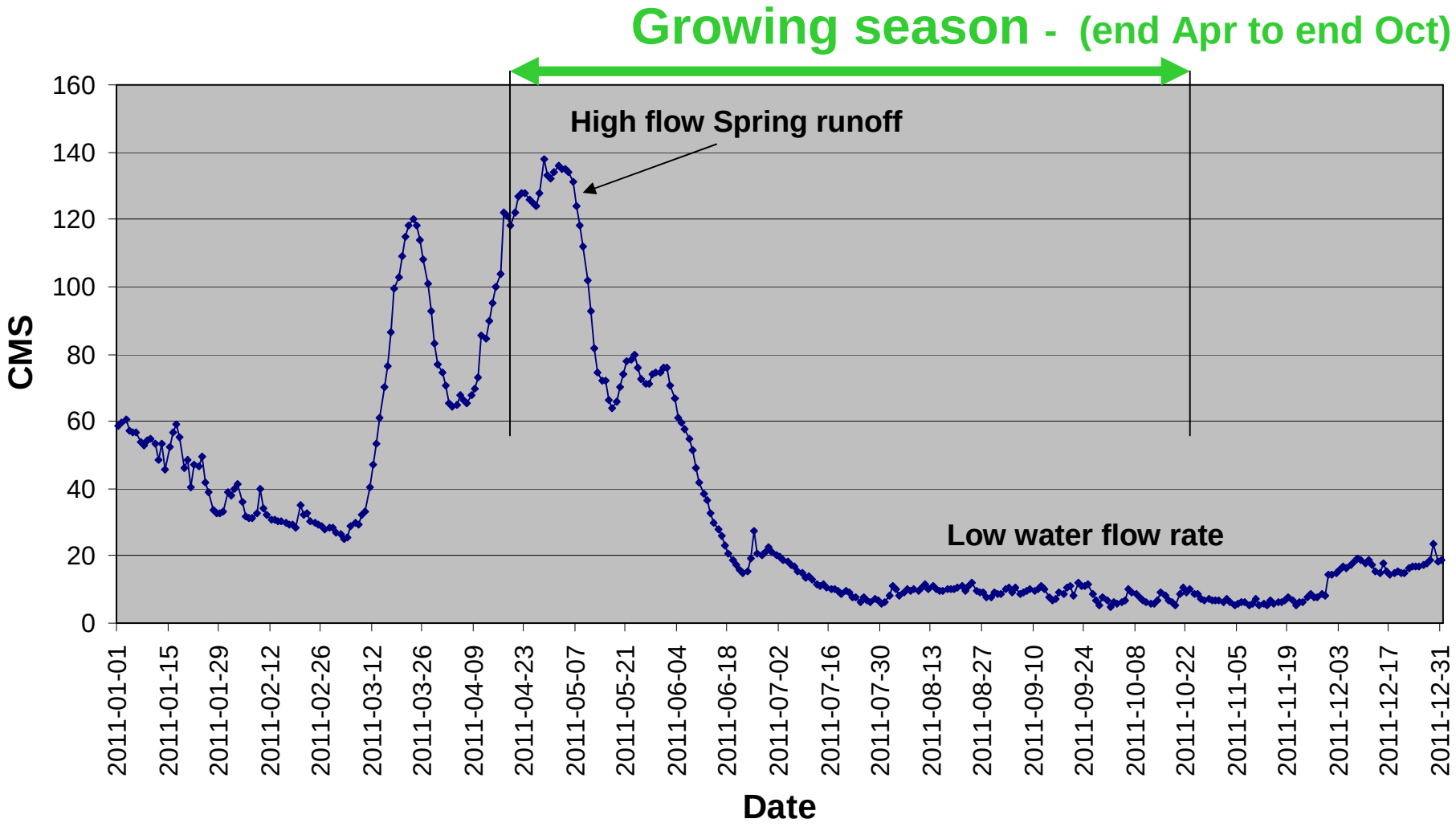
Same area

June 30 2011
Dry - No surface water

June 2 2011
Flooded

Appleton Stream Flow Gauge 2011

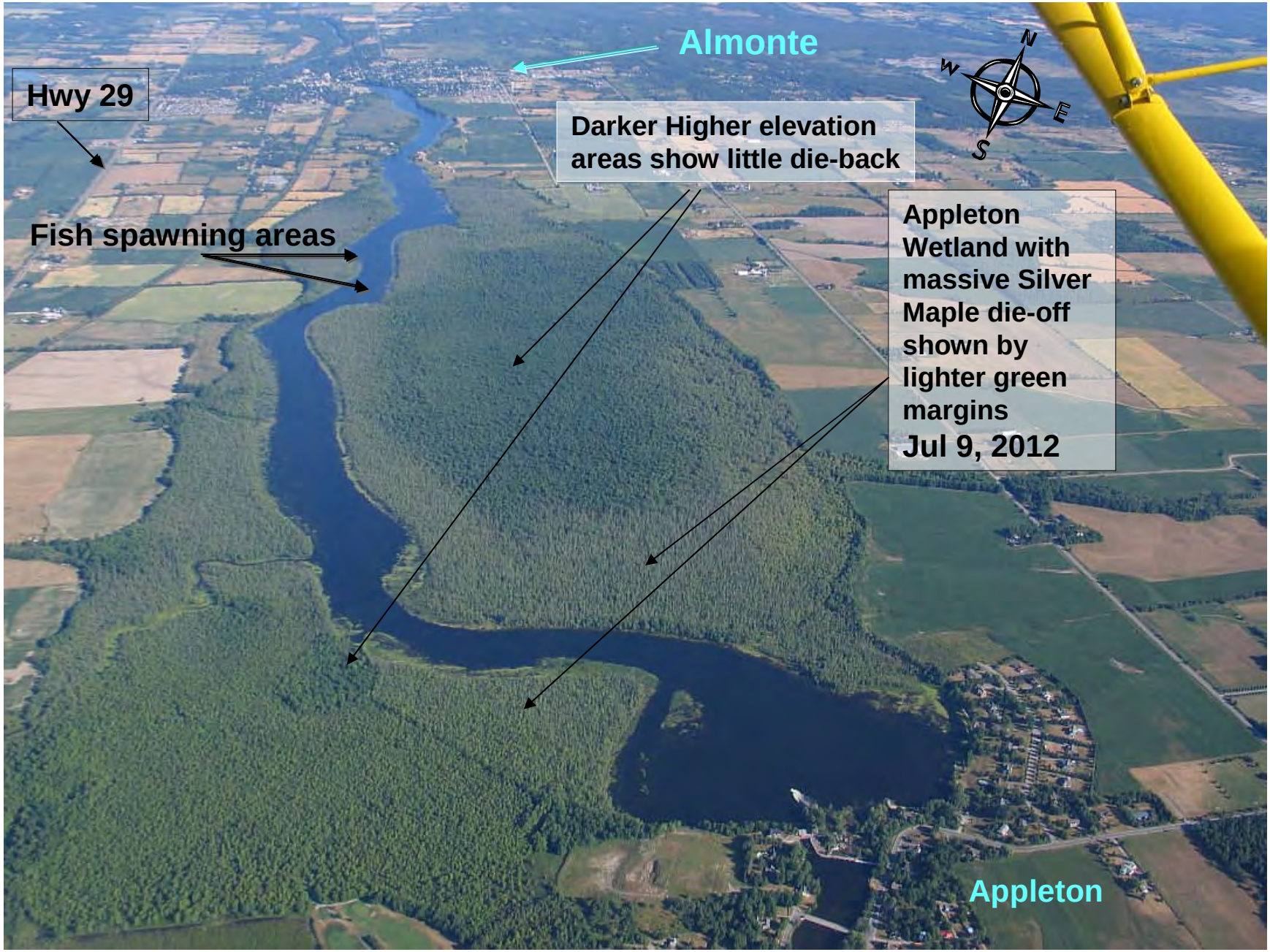
Applicable to Lavalee Creek Swamp above the Appleton dam



- Stream flow Data from MVC CMS = cubic metres/second
- Growing season (Toner & Keddy 1997)

Appleton Wetland Background & Status

- Silver Maple Swamp
- designated as an ANSI (Area of Natural & Scientific Interest) and PSW (Provincially Significant Wetland) since 1984
- current status: estimated 60% of trees are dead or dying
- die-back became obvious in 2006
- Wetland map and die-back illustrated in the following three slides.


Almonte
Hwy 29
Darker Higher elevation areas show little die-back
Fish spawning areas
Appleton Wetland with massive Silver Maple die-off shown by lighter green margins
Jul 9, 2012
N
W
E
S
Appleton

Depicts toppled trees with lifted roots, thin canopy and dead branches

Silver Maple die-back with some growth and suckering roots

Why is the Appleton Wetland Dying?

Cause A: Disease and/or Insects

- MVC Staff report, dated May 29, 2012 states:

"The MNR Forest Health Specialist did not see any evidence of insect or disease damage which would contribute to the dieback (in Reach 18)."

- Other wetlands upstream and Silver maples at higher elevations within the wetland Staff report were also not affected.

We conclude that disease and/or insects is not the cause of the die-back.

Cause B: Increased water flow in the river

- Higher flows should also affect upper reaches.
- The Innisville and Mudlake wetlands appear to be unaffected.
- The nearby Lavallee wetland is also OK.

We conclude that increased flow is not the cause of die-back.

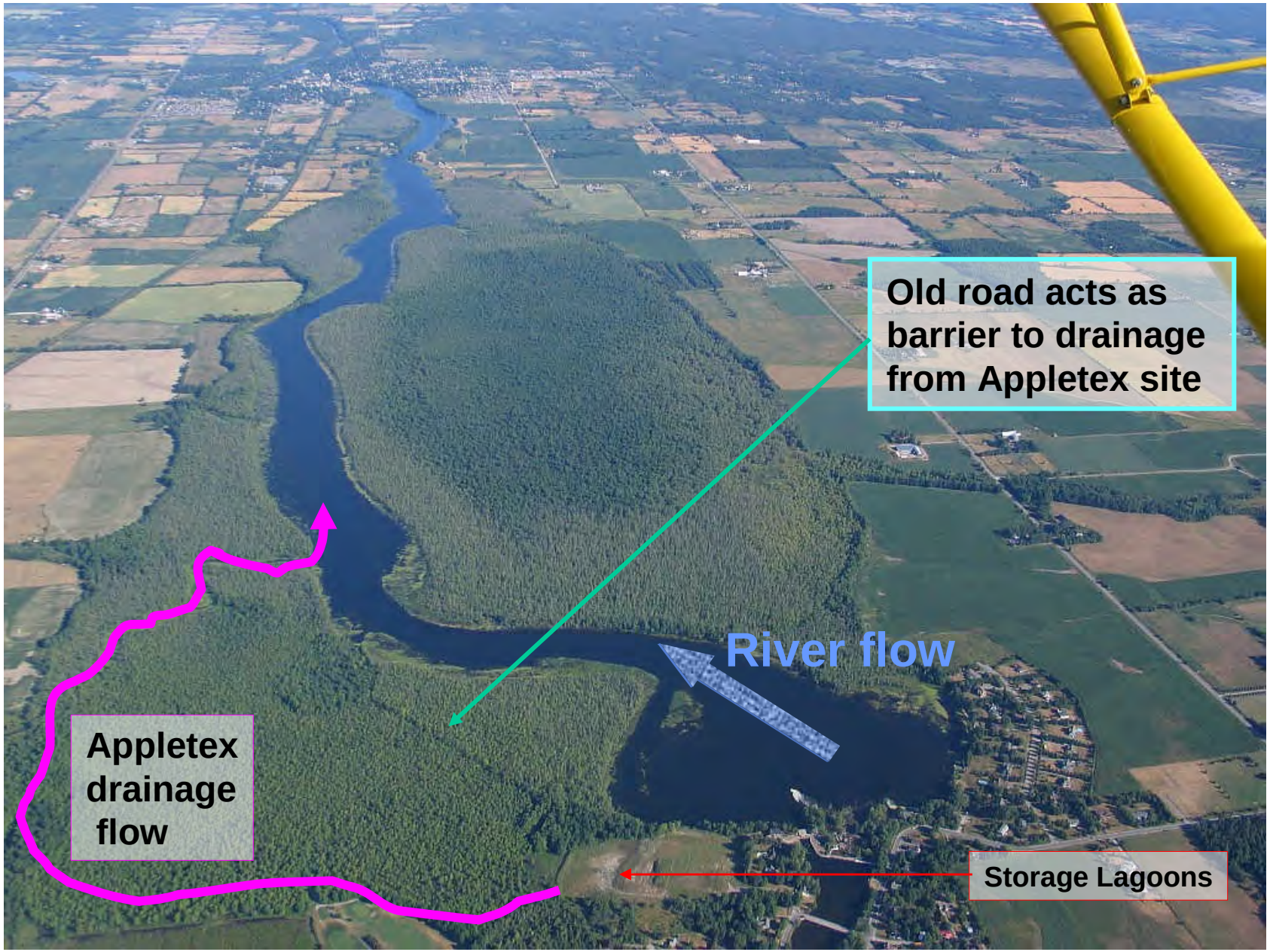
Cause C: Toxic Run-off from Appletex Site?

- Drainage from the Appletex site took a path west of the Mississippi River and entered farther downstream from most of the Appleton wetland.
- The silver maple die-back is also up river from where the drainage entered.
- Trees in the direct drainage path were unaffected.

We conclude that toxic run-off is not the cause of die-back.

Note: Appletex was the name of an industrial site at Appleton that had discharges of effluent from storage lagoons to the marsh adjacent to the river occurred respectively in the fall of 1989 and in the spring of 1990.

Appletex Lagoon Overflow



Cause D: Flooding due to Reach 18 water management regime.

- Prior to 2000 the Appleton wetland was healthy and compatible with historic water level management at Almonte.
- Higher water levels were reported in June 2004 and remained much above normal throughout the summer and autumn of subsequent years to the present day.
- Tree damage was very visible in 2006.

Our field observations and data indicate that increased water levels **<u>are</u>** the cause of the dieback. The trees are drowning.

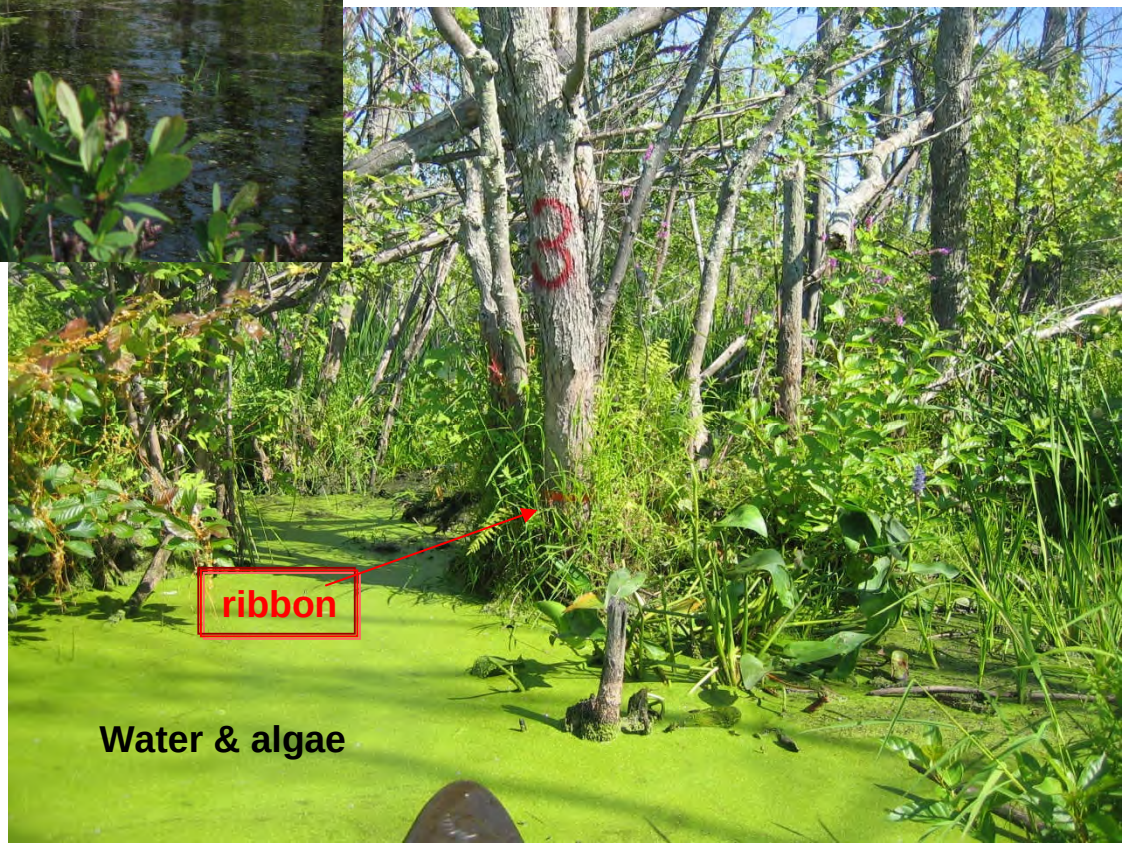
Appleton Wetland Study

Observation of water
Levels by ribbon tree markers
during 2011 growing season

Station #3 of 6

May 31, 2011

Aug 16, 2011

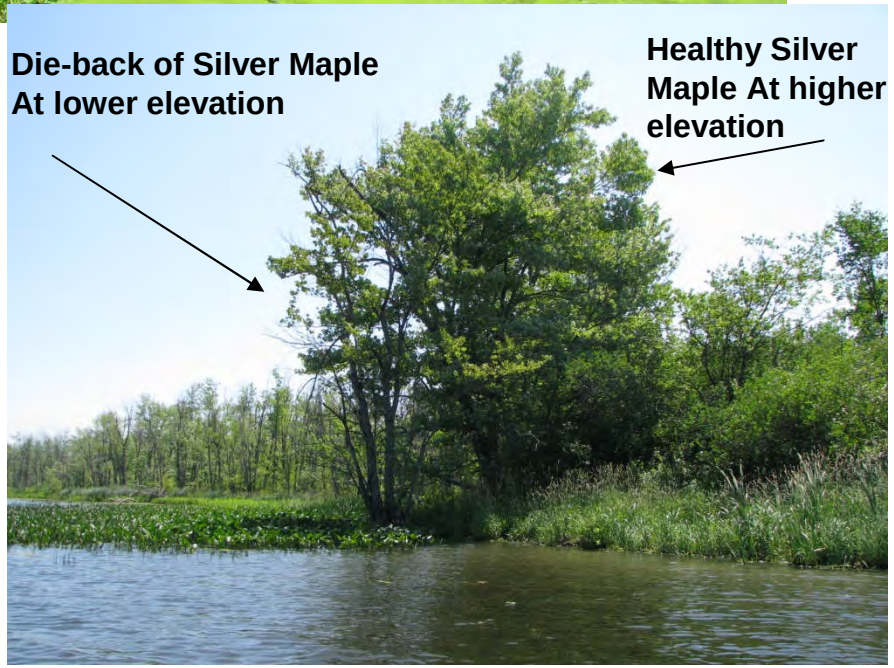


Project first day pictures from MVFN Ribbon Project showing <u>May 31 2011</u> water Levels

Almonte Bridge gauge at 117.82 MASL Appleton at 118.00 MASL

Dead & dying Silver Maples

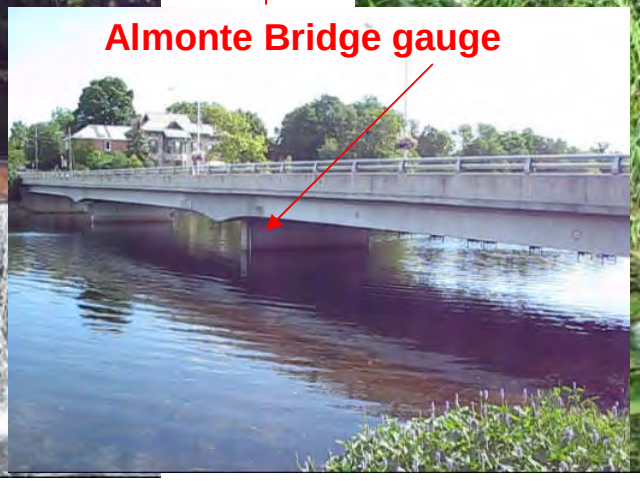
Pictures of MVFN Ribbon Project for June 30 2011 Water Levels
Almonte Bridge gauge at 117.76 MASL Appleton at 117.80 MASL



Pictures of MVFN Ribbon Project for Jul 28 2011 Levels

Almonte Bridge gauge at 117.70 MASL **Appleton at 117.70 MASL**

Note: Flat MASL with Appleton. CMS was at 7.15



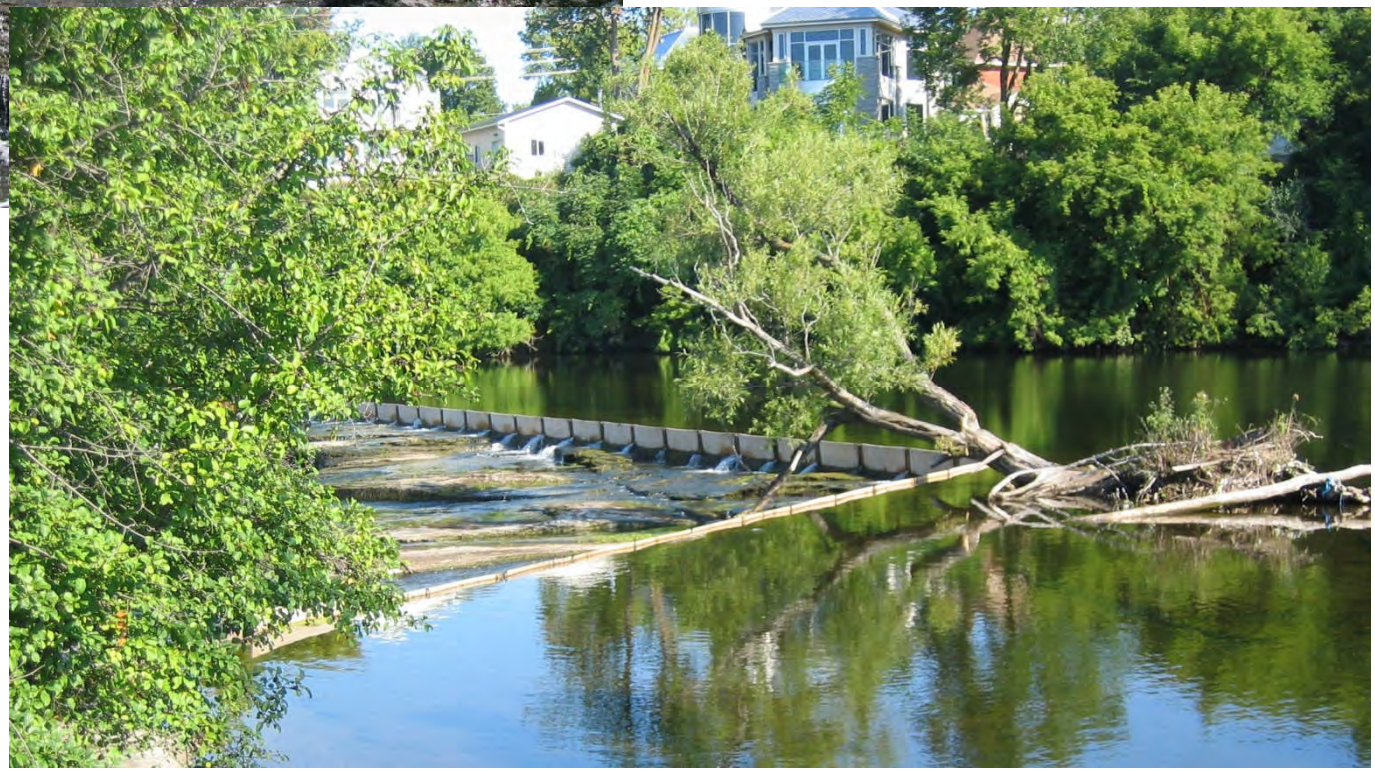
Pictures of MVFN Ribbon Project for Aug 16 2011 Levels

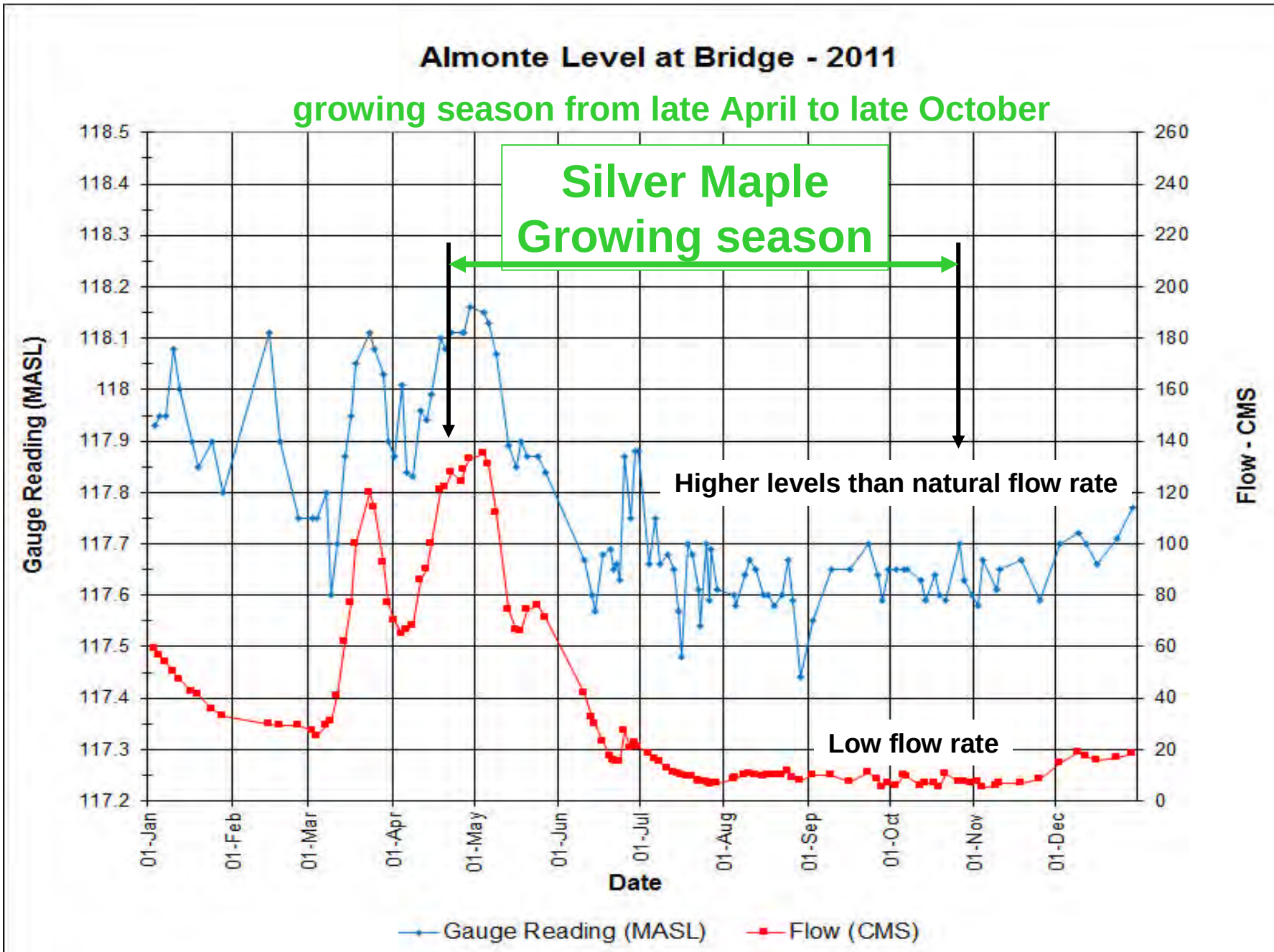
Almonte Bridge gauge at 117.62 MASL **Appleton at 117.62 MASL**

Part of water level management at Almonte

June 30, 2011
117.76 MASL

Aug 16 2011
117.62 MASL



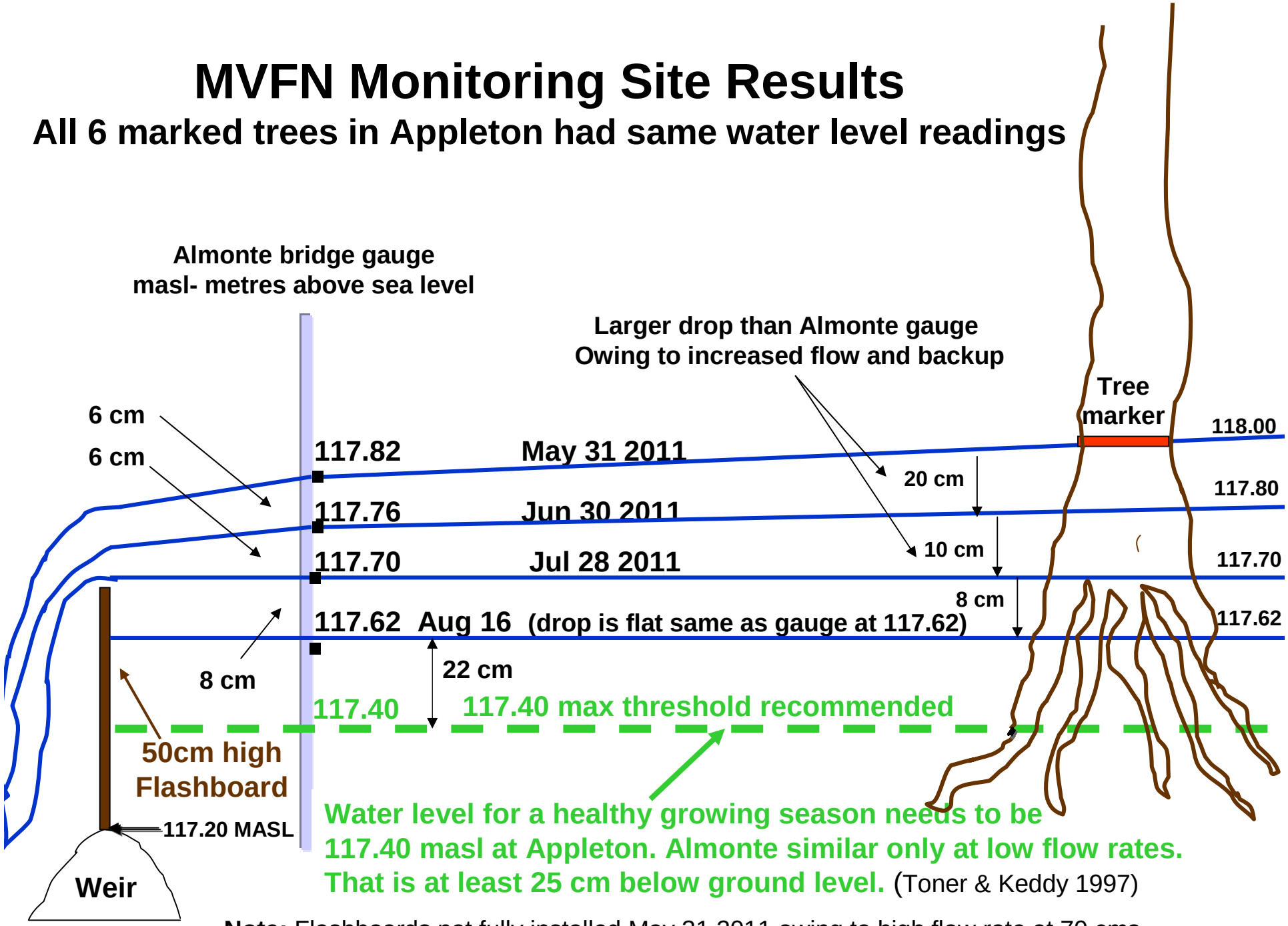


Growing season per Toner & Keddy 1997

Stream Data from MVC

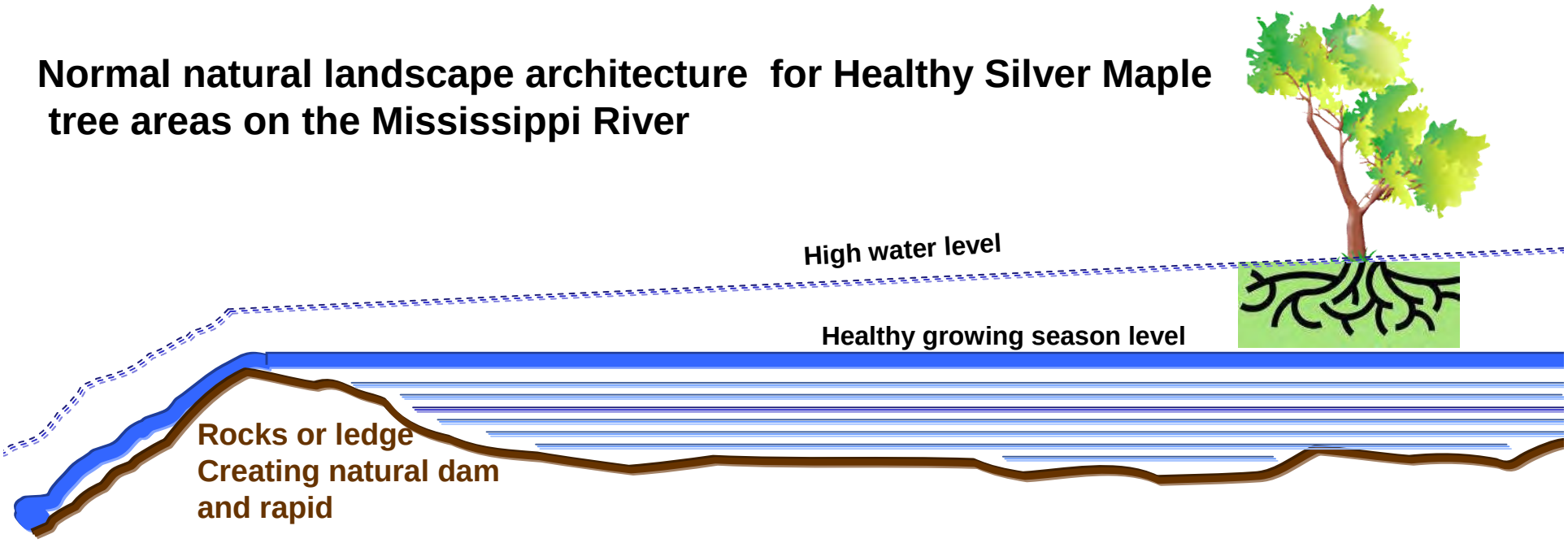
MVFN Monitoring Site Results

All 6 marked trees in Appleton had same water level readings

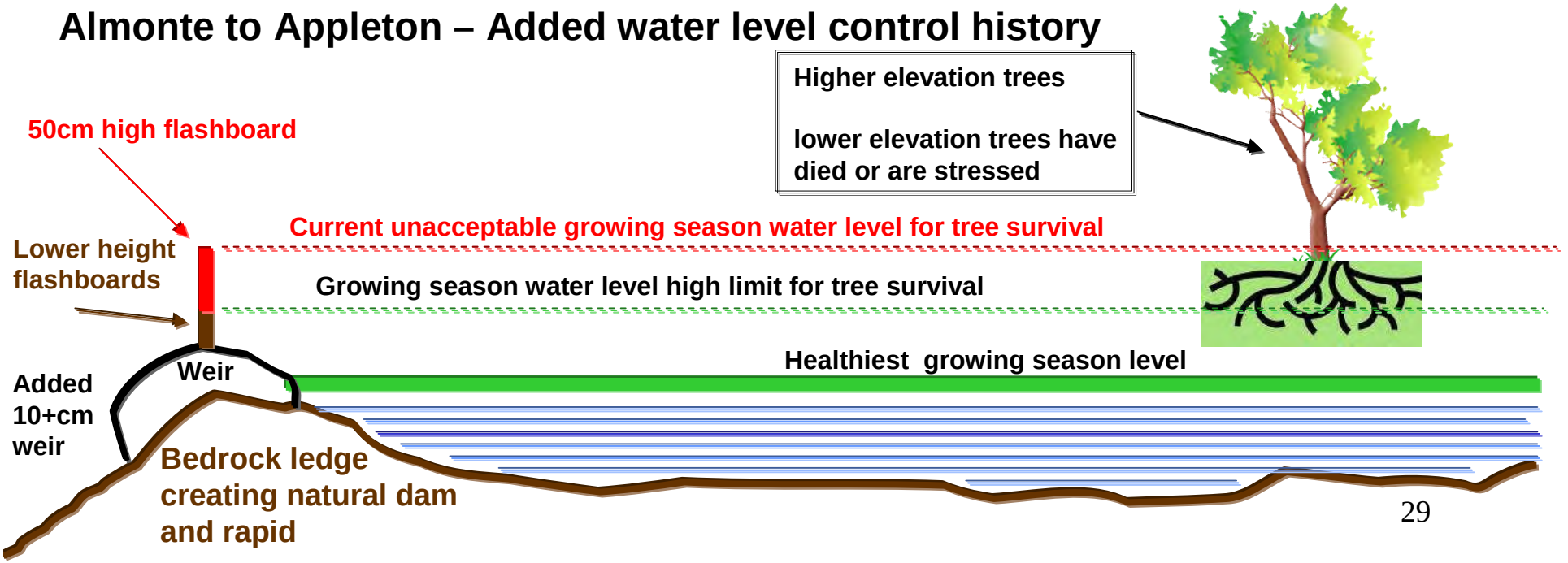


Note: Flashboards not fully installed May 31 2011 owing to high flow rate at 70 cms.

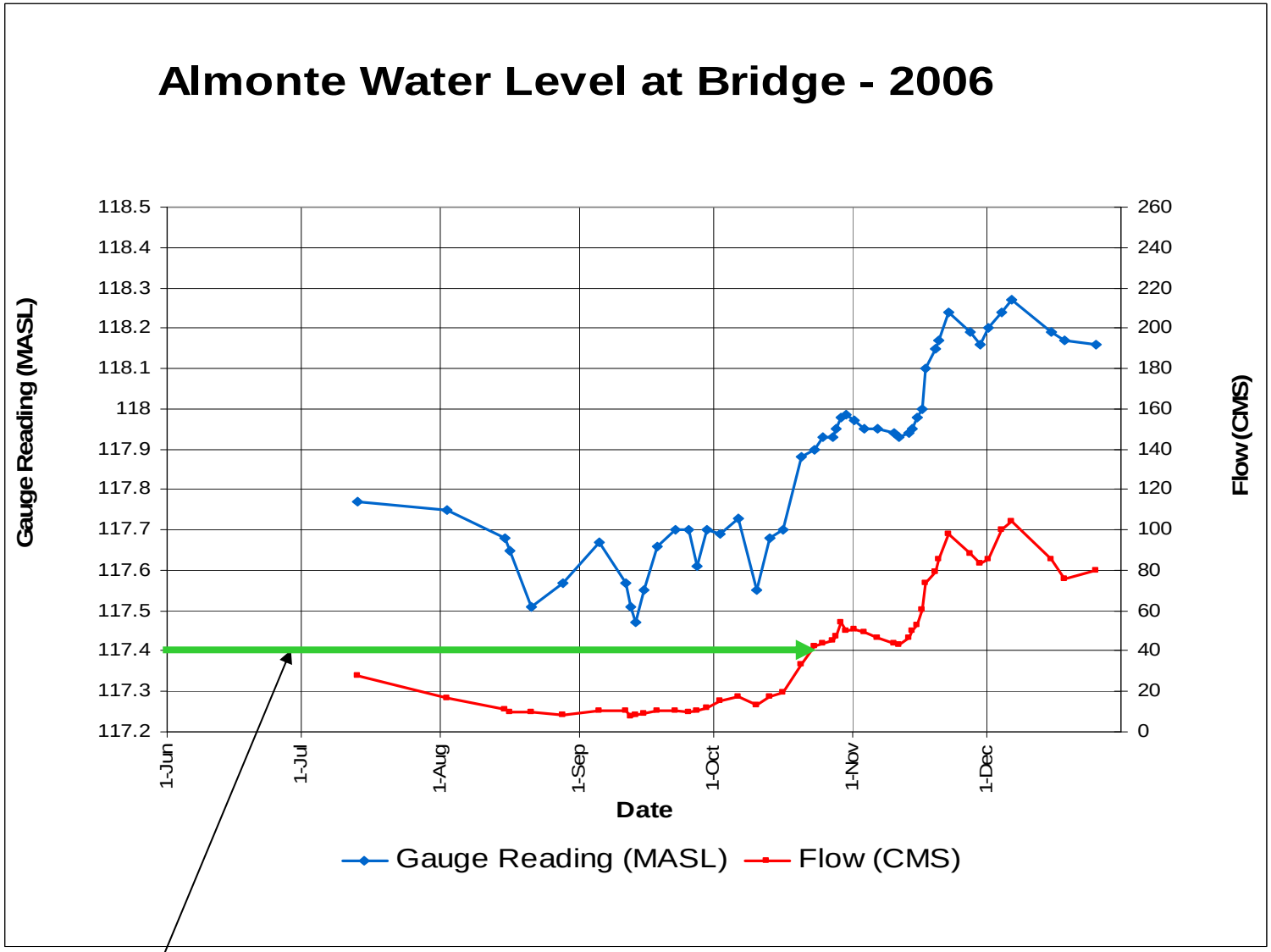
Normal natural landscape architecture for Healthy Silver Maple tree areas on the Mississippi River



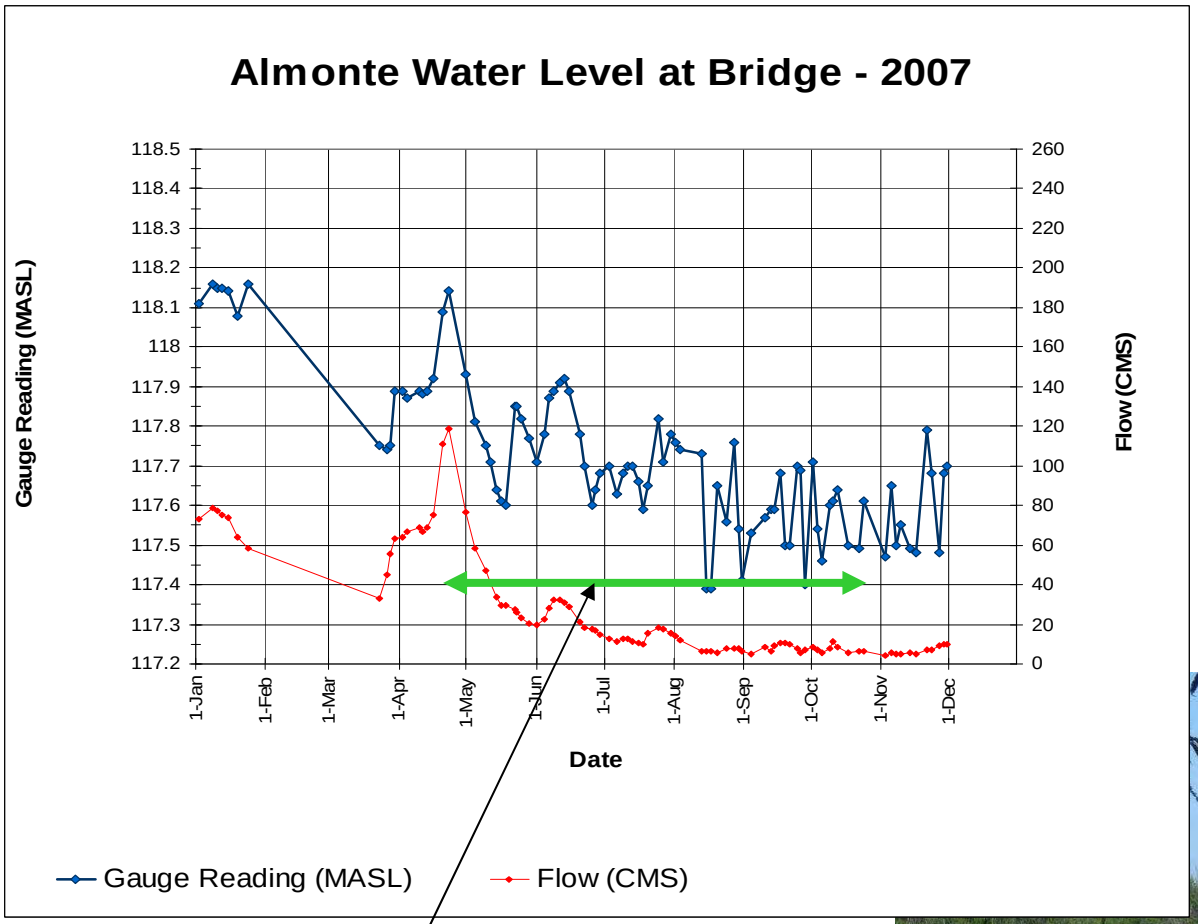
Almonte to Appleton – Added water level control history



Almonte Gauge installed 2006 by MVC



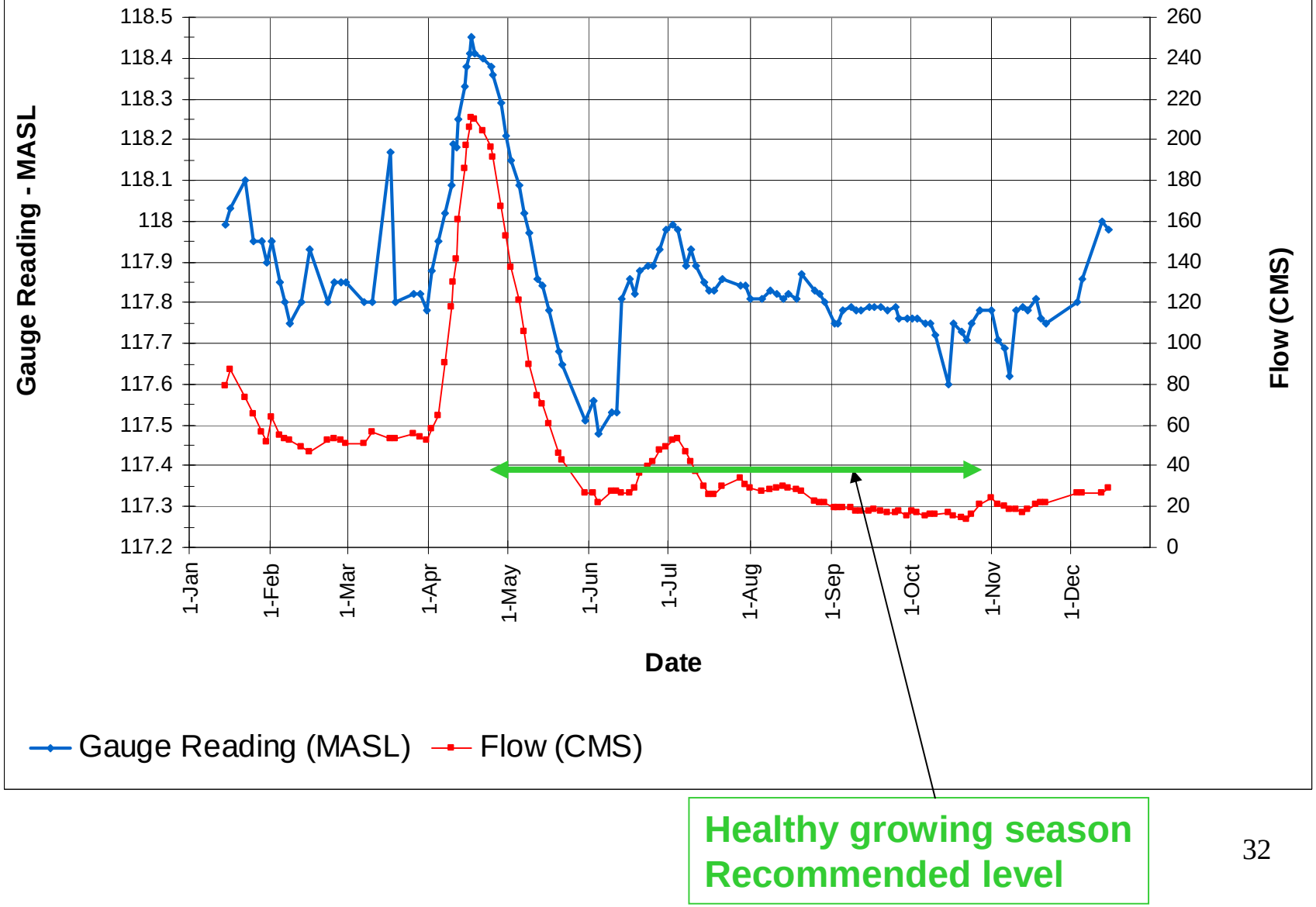
Healthy growing season
Recommended level

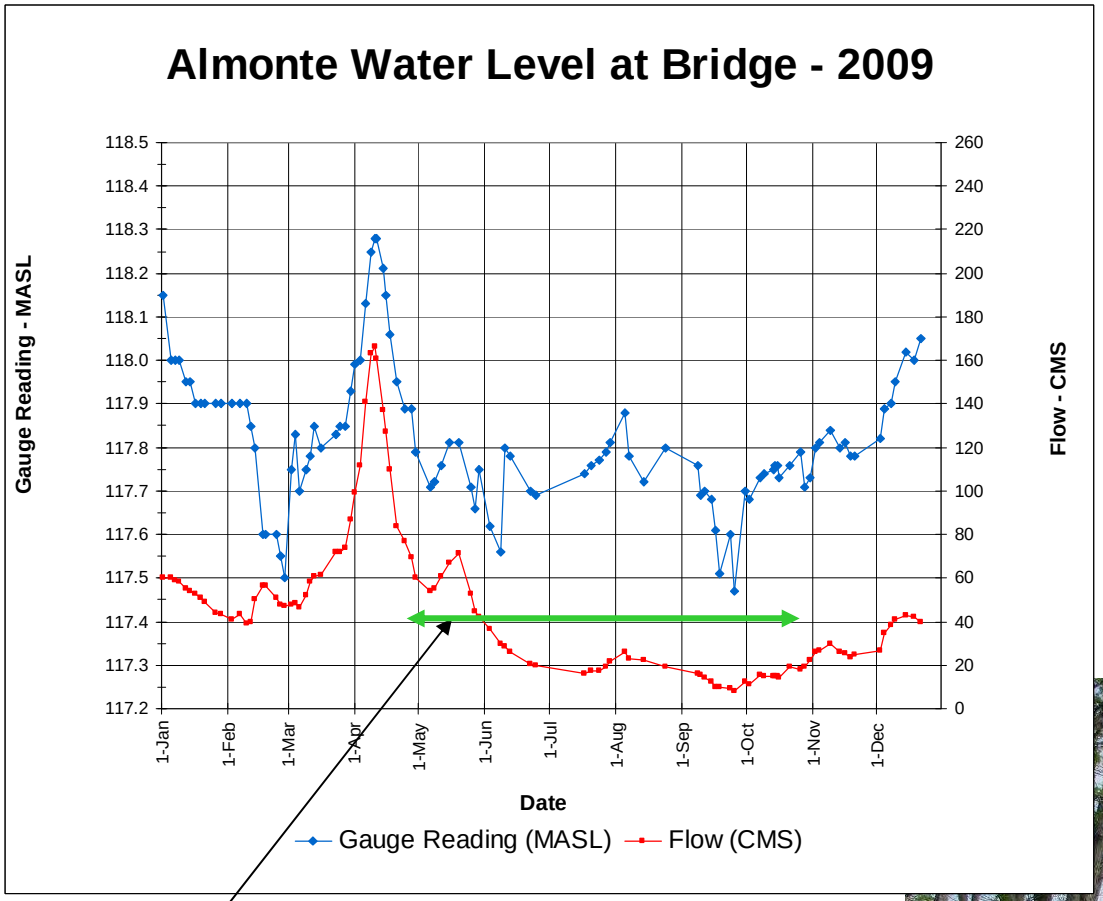


Healthy growing season
Recommended level

17 July 2007 →

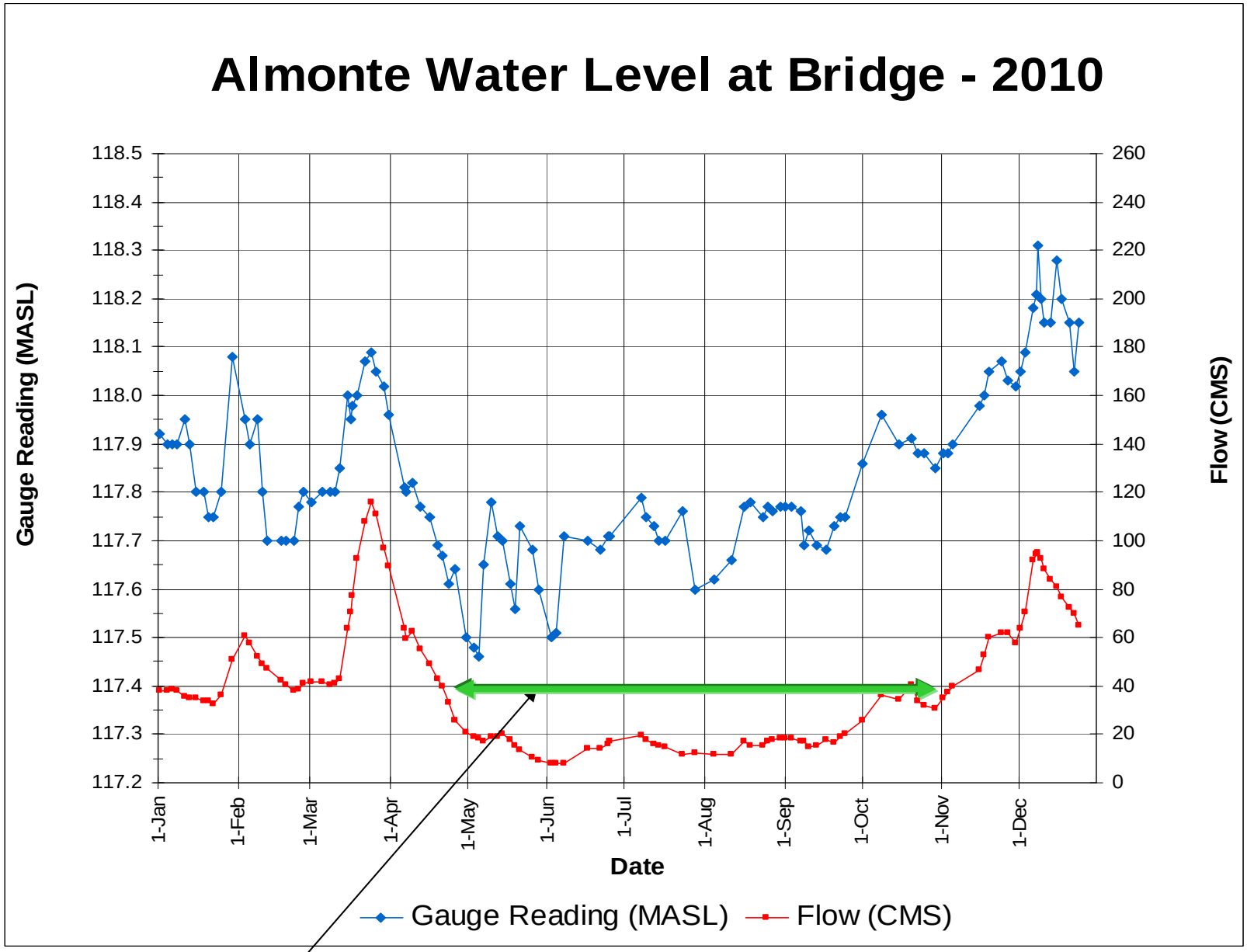
Almonte Water Level at Bridge - 2008



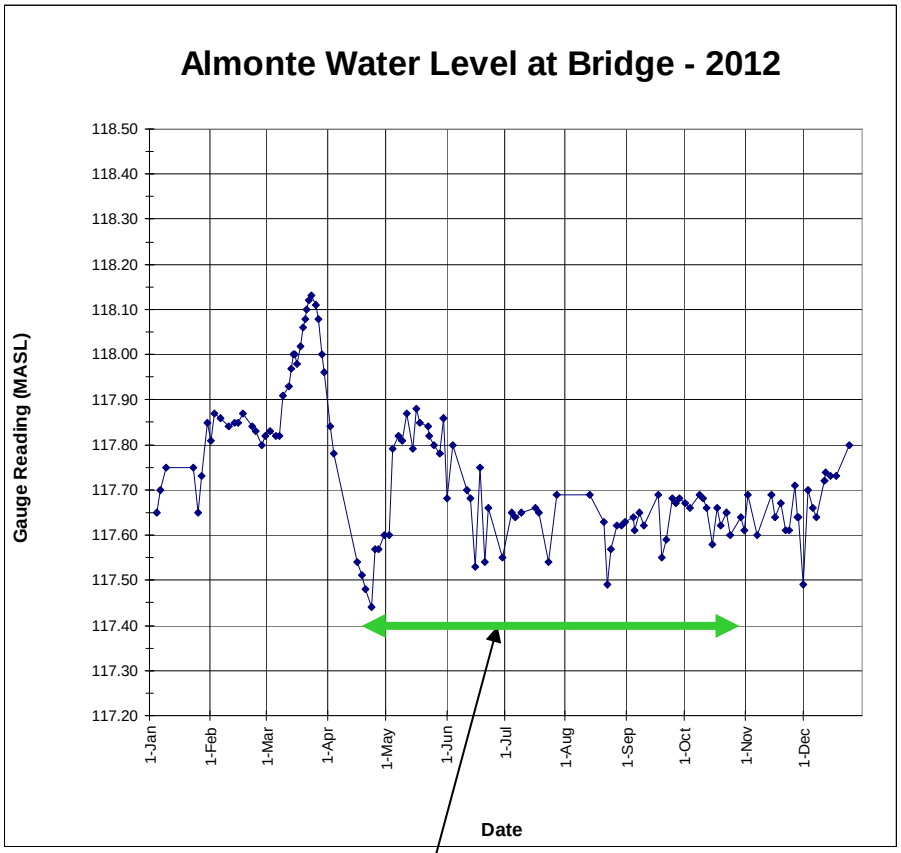


Healthy growing season
Recommended level

7 Jun, 2009 →

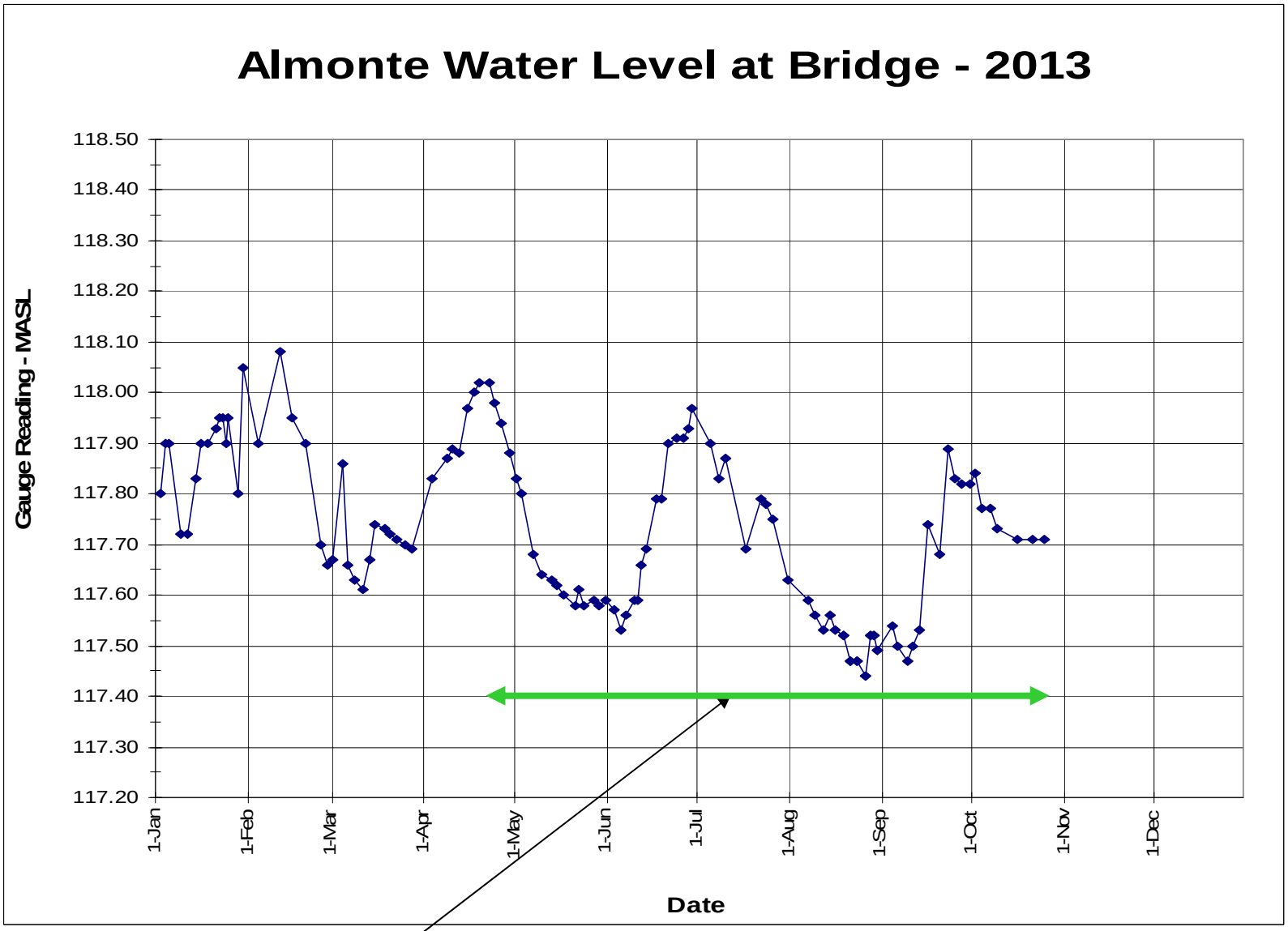


Healthy growing season
Recommended level



Healthy growing season
Recommended level

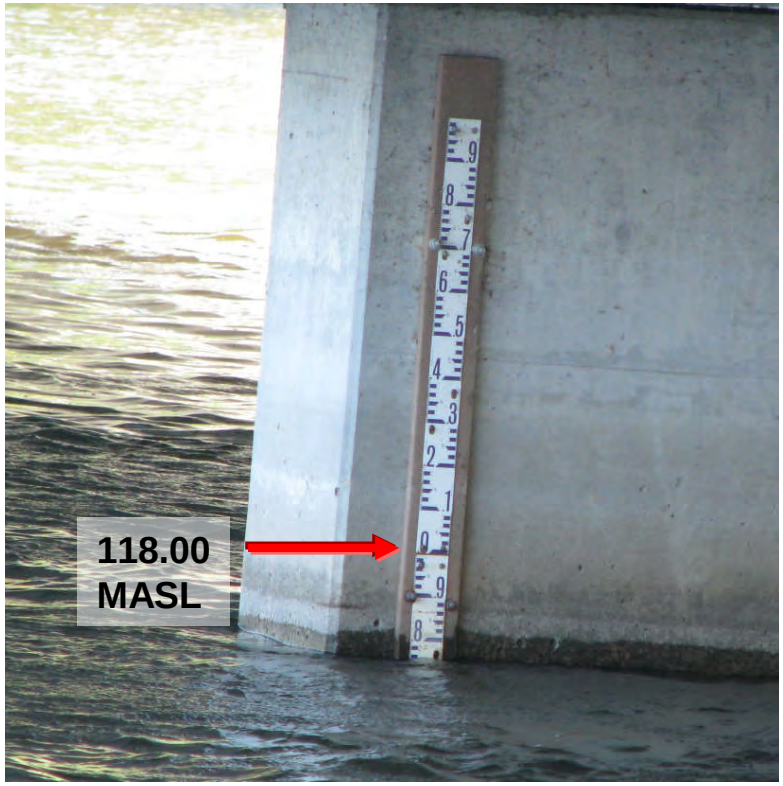
16th Jun, 2012 →



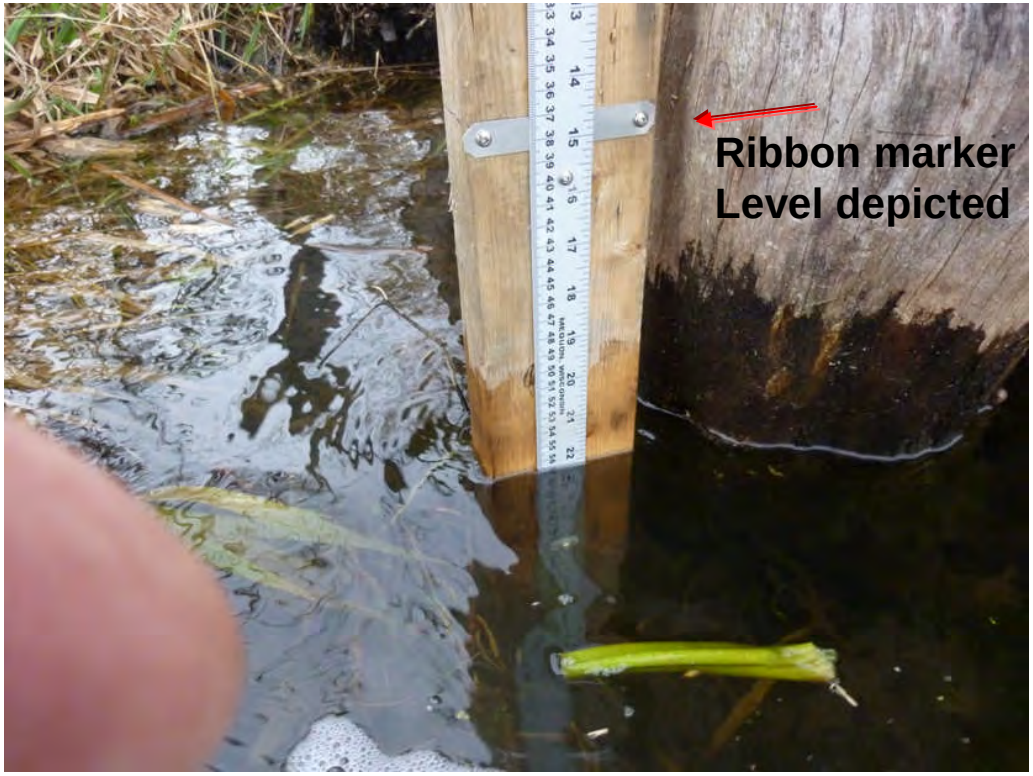
Healthy growing season
Recommended level

Comparative Water Level Project
Almonte to Appleton

- In July 2013 the MVFN monitoring station levels were calibrated to a geodetic bench mark at the Appleton museum.
- The Almonte gauge levels can now be compared to Appleton levels since they both use the same geodetic datum.

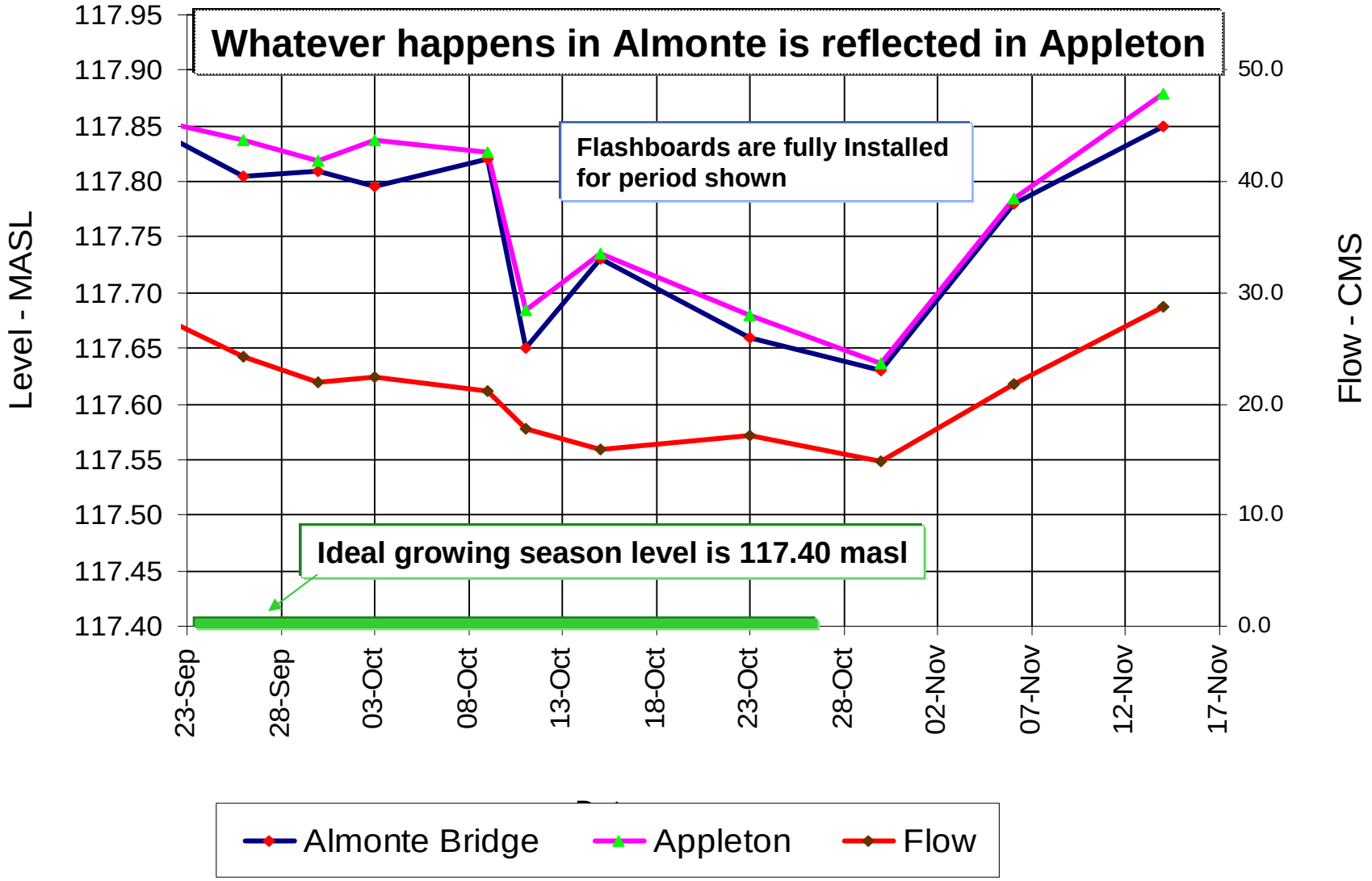


Almonte Bridge gauge at 117.76 MASL Established in 2006 by MVC



New gauge established by MVFN at Appleton tree station #1 in 2013

Comparative Water Level - Almonte to Appleton
Sept 23 to Nov 17, 2013



Conclusions

- Our conclusion, based on clear research data, is that a change in water management levels prior to 2006 is the cause of the die-back of Silver Maples in the Appleton wetland.

- To avoid further forest destruction, the current water management regime for Reach 18 must be revised to lower the water levels during the wetland growing season.

- If action is taken now, we believe that it is possible to revive the wetland as an important silver maple swamp.

Recommendations

Therefore, on behalf of MVFN, it is hereby proposed:

- That the MRWMP amending process as detailed in section 10.1, p.120 of the Plan, be opened now to reconsider management strategies for water levels in Reach 18, prior to the 2014 growing season.

- That the MRWMP establish, for five consecutive years beginning 2014, a max water level of 117.40 masl at Appleton during the growing season, to allow for soft maple tree recovery.

- That conditions in the wetland be monitored closely throughout the five year test period with the possibility of amending water levels further if warranted during that trial.

- That after the five year period the results be thoroughly evaluated to establish a final water management plan for Reach 18.

Professional References

Dr. Paul Keddy	Professor Emiratis, University of Ottawa and University of Louisiana; Biologist and wetlands authority
Cathy Keddy	Biologist
Dr. Jim Bendell	Professor Emiratis, University of Toronto, Forestry and Forest Ecology
Dr. Ted Mosquin	General Naturalist; ecologist; coordinator of Ontario's Southern & Northern Wetland Evaluation Systems published by Ontario MNR.
Dr. Tinika Kuiper	Ottawa University; biologist
David White	Biologist Wetland Life Science Study
Steve Miller	NRCan, Forest Pathologist
Neil Carleton	Educator; Naturalist; Citizen Scientist; Arboreal Columnist.
Dale Kimmett	P.Eng; hydrologist
Ken Allison	Naturalist
Theresa Peluso	Chair, MVFN Environmental Issues Committee (EIC); Citizen Scientist
Tom Coleman	Member, EIC; Citizen Scientist
Peter Moller	Member, EIC; Citizen Scientist

Appleton Wetland Research Group

Cliff Bennett	Chair; Naturalist and Citizen Scientist
Howard Robinson	Citizen Scientist
Al Seaman	Engineer; Citizen Scientist
Mike O'Malley	Researcher
Joachim Moenig	Biologist.

Glossary

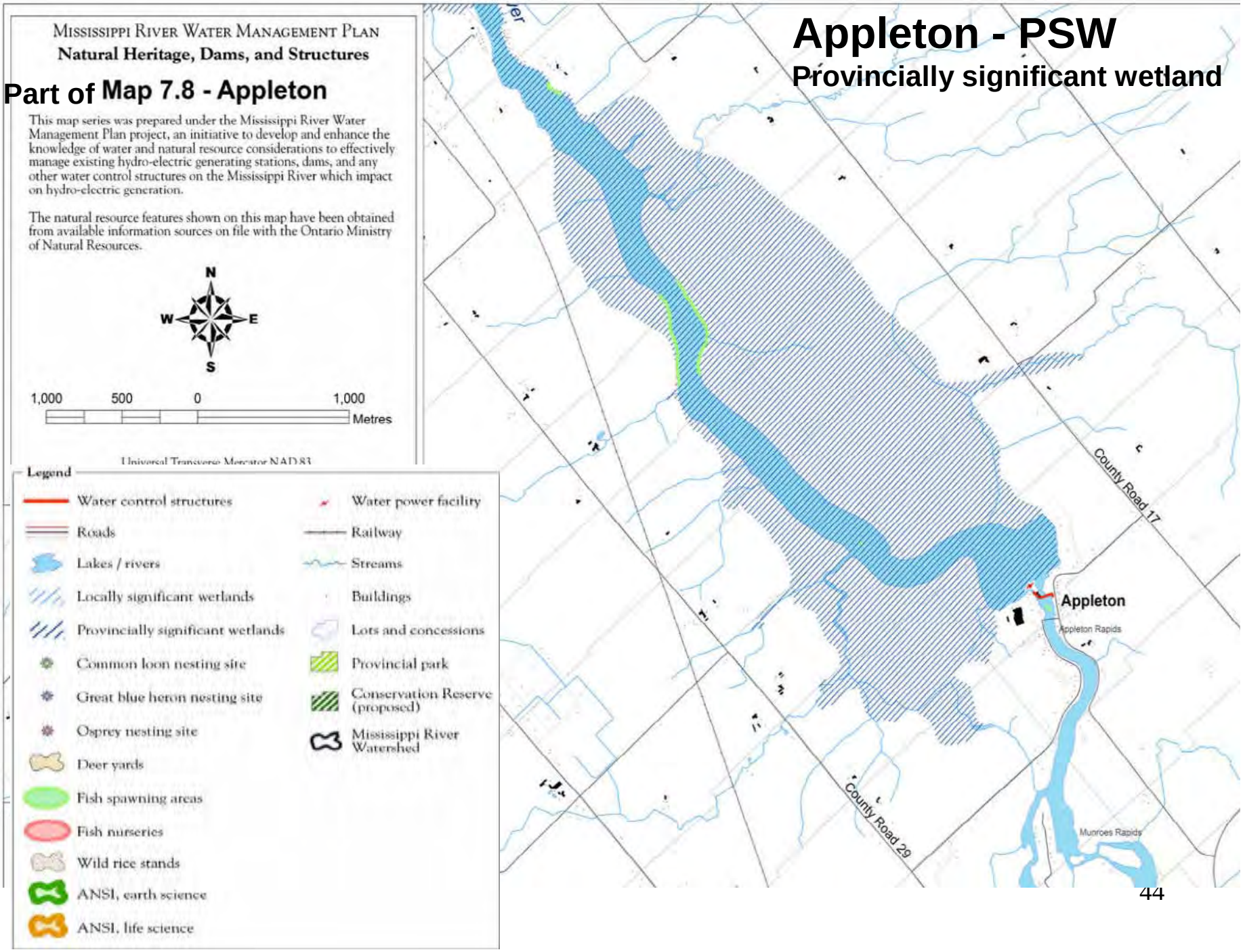
- **MRWMP** – The Mississippi River Water Management Plan.
- **Reach 18** – The numbered section of the river in the MRWMP between Appleton & Almonte.
- **MVC** – Mississippi Valley Conservation Authority.
- **MASL** – The water level defined as Metres Above Sea Level.
- **CMS** – Water flow rate defined as Cubic Metres per Second.
- **Appleton Stream Gauge** – above the Appleton dam this gauge measures water flow in CMS.
- **Almonte Water Level Gauge** – located under the bridge on Bridge Street in Almonte it measures water level in MASL.

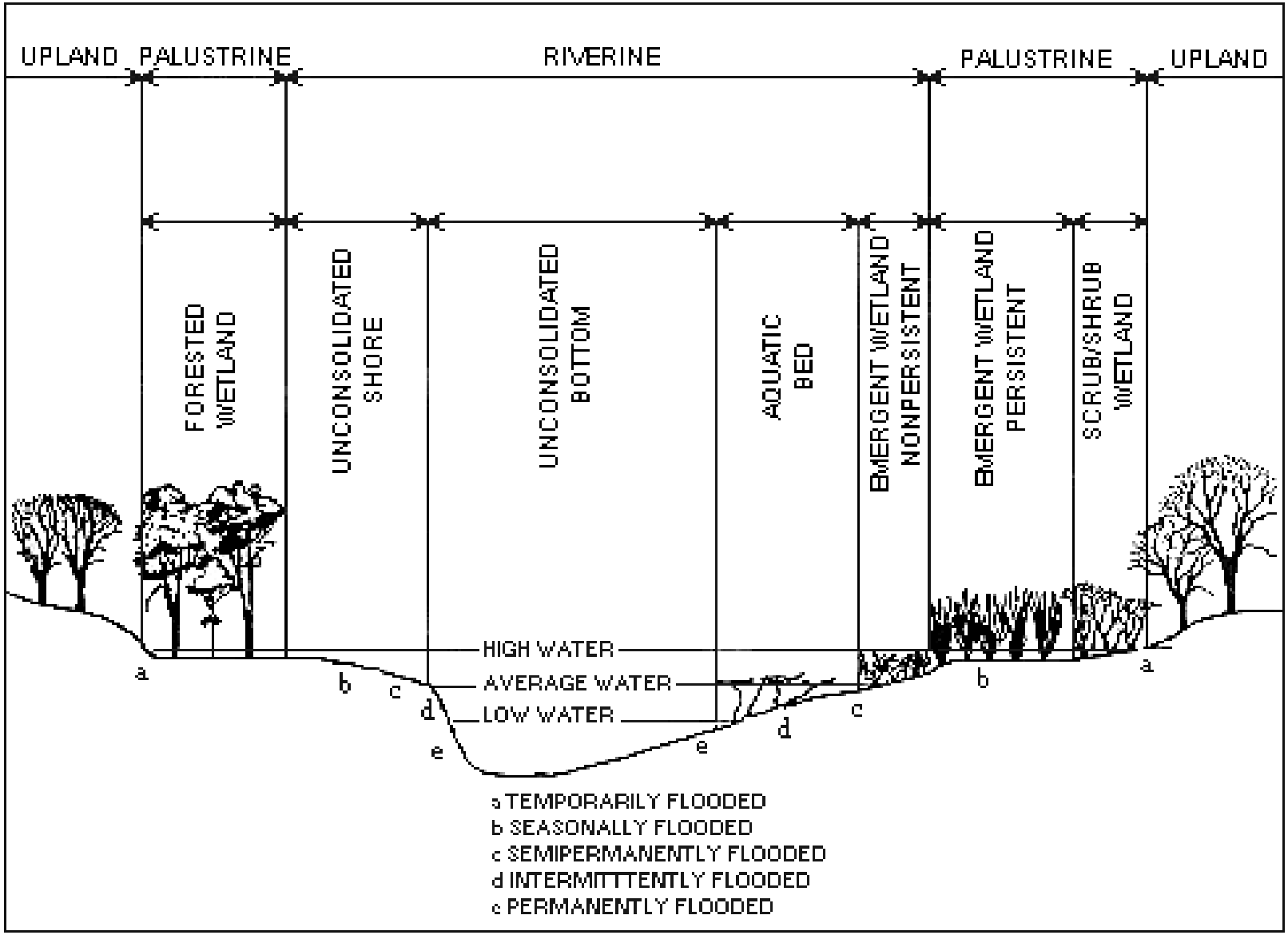
Backup Slides

- Key to Appleton Wetland map P44
- Riverine System diagram P45
- Water management cause & effects P46

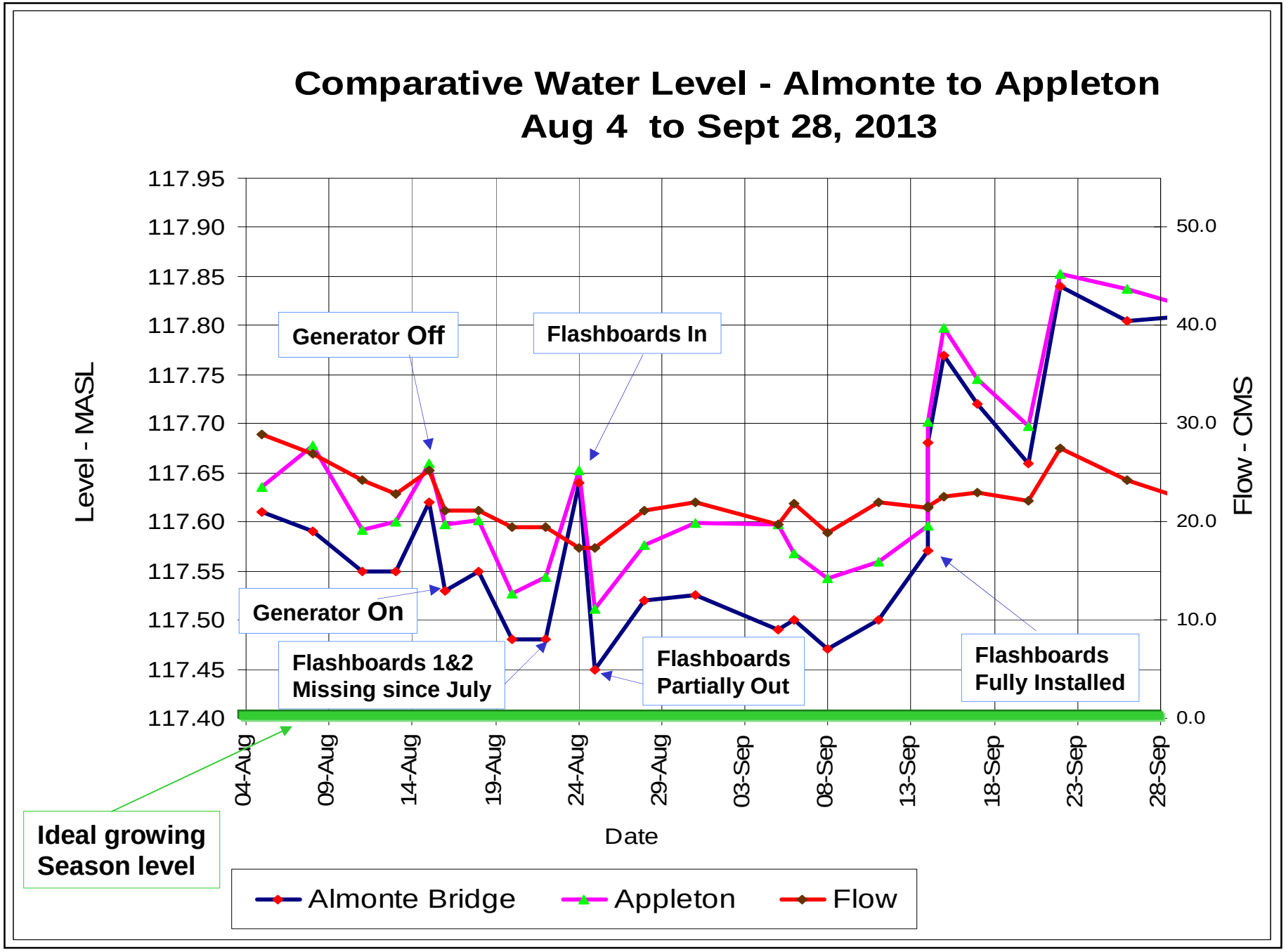
Appleton - PSW

Provincially significant wetland





Distinguishing features and examples of habitats in the Riverine System.
From Ontario's Southern Wetland Evaluation System


Comparative Water Level - Almonte to Appleton
Aug 4 to Sept 28, 2013
Level - MASL
Flow - CMS
117.95
117.90
117.85
117.80
117.75
117.70
117.65
117.60
117.55
117.50
117.45
117.40
50.0
40.0
30.0
20.0
10.0
0.0
04-Aug
09-Aug
14-Aug
19-Aug
24-Aug
29-Aug
03-Sep
08-Sep
13-Sep
18-Sep
23-Sep
28-Sep
Date
Generator Off
Flashboards In
Generator On
Flashboards 1&2
Missing since July
Flashboards
Partially Out
Flashboards
Fully Installed
Ideal growing
Season level
Almonte Bridge
Appleton
Flow