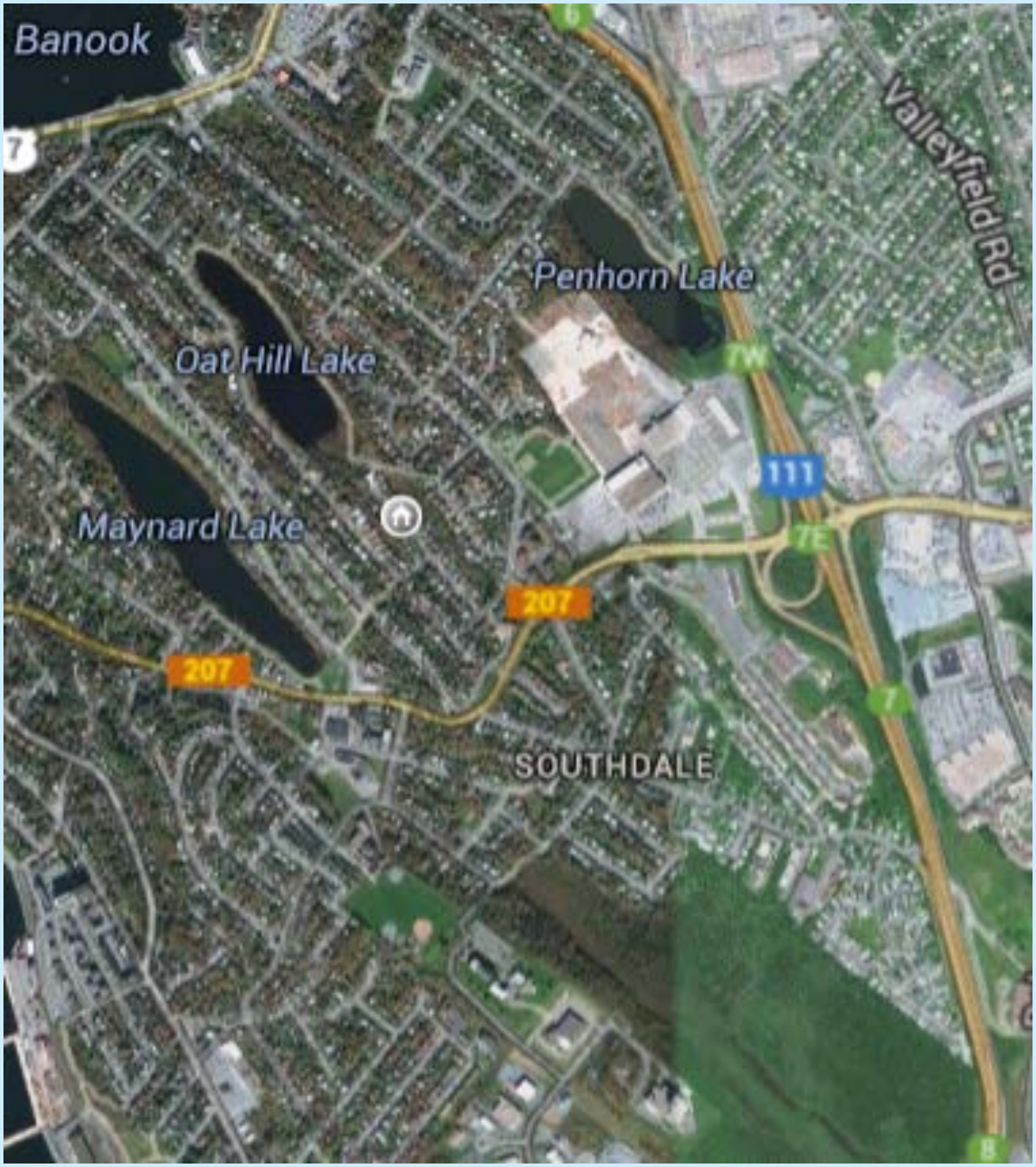

NSLC
adopt
a stream
Oathill Lake
Lake Restoration
Oathill Lake
CONSERVATION SOCIETY
CURA H2O
Community-Based Water
Monitoring and Management

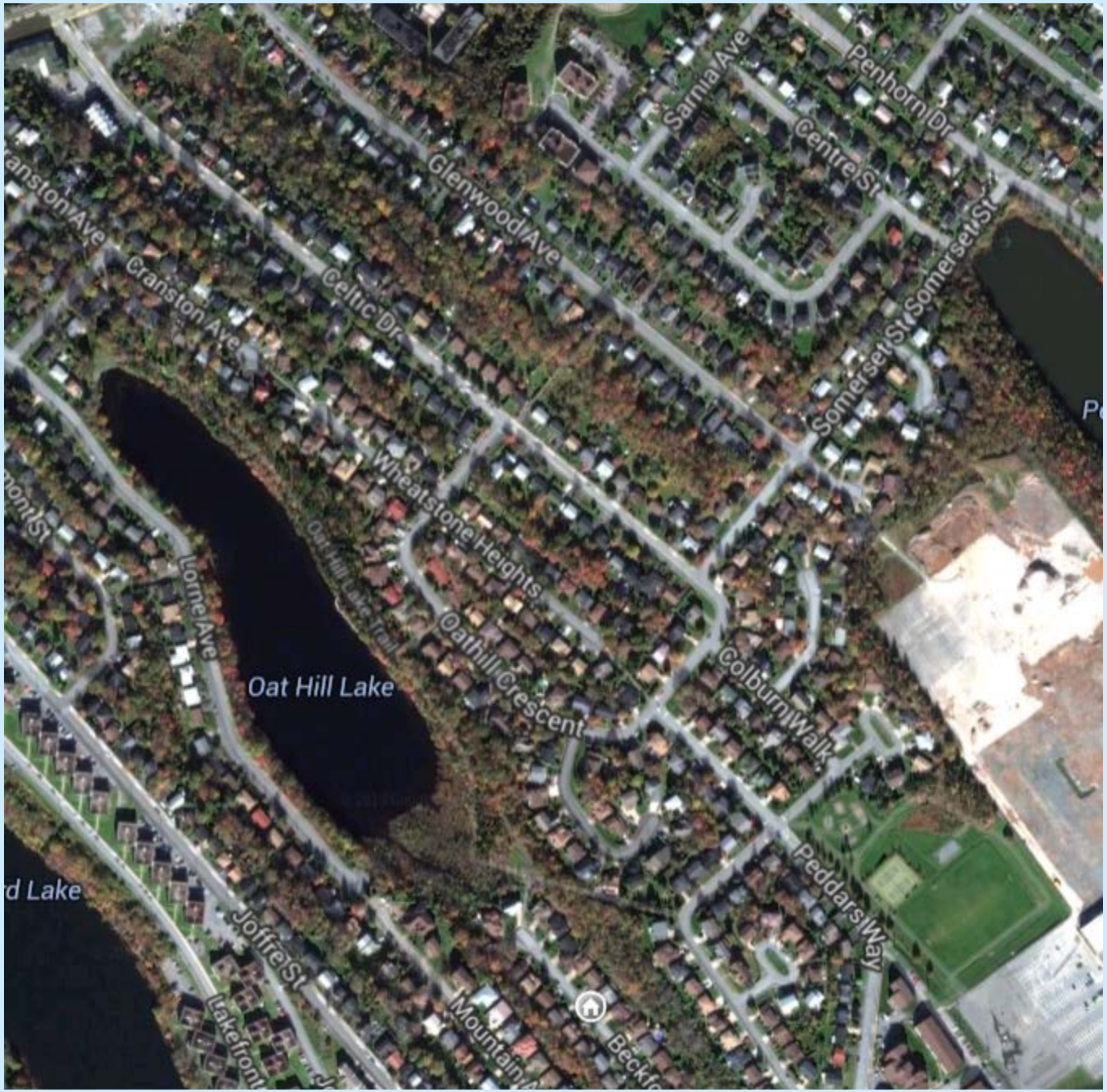
Oathill Lake Society Objectives

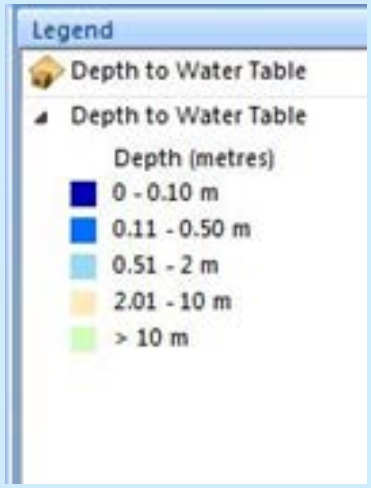
- Membership is comprised of volunteers – dedicated to improving and maintaining the health of the lake and its parkland as a resource for walking, swimming, boating, skating, skiing and fishing.
- Restore the ecosystem health of the Lake and riparian area – issues: coliform – invasive species – low natural trout pop'n– loss of amphibians – zooplankton blooms – high P levels - low oxygen
- Trigger for action was a 2010 -- 10,000 coliform count and muddy brown colour in the water.
- 87% of the households represented as members

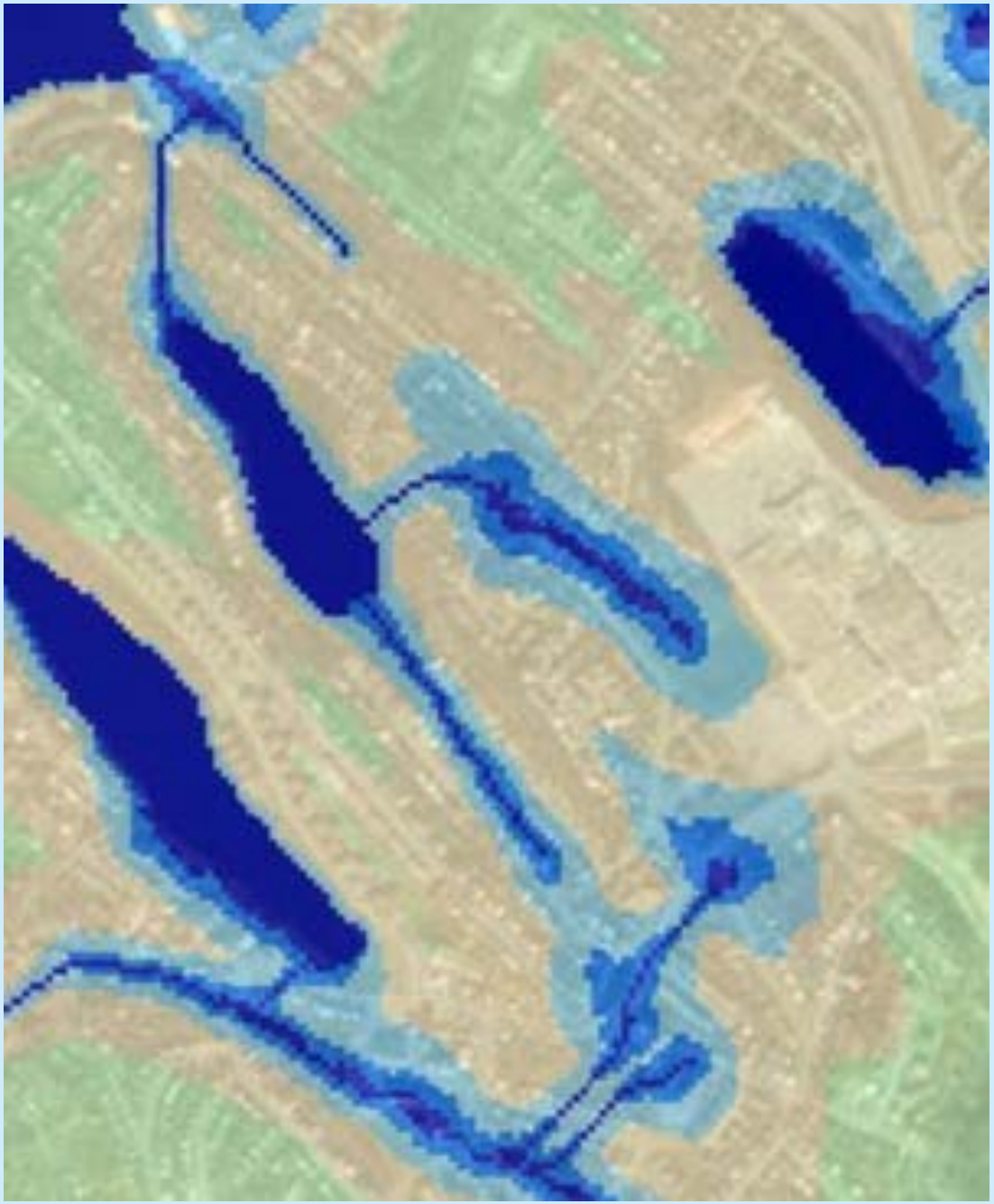
The Watershed/ Sewershed

- Long history of farming ending with a pig farm
- Sub division development in stages over the 1960’s, 1970’s, 1980’s
- Drained wetlands and buried streams
- Left a greenbelt
- Now all housing
- Lots of sources of nutrient loading past and on going.


Banook
Penhorn Lake
Oat Hill Lake
Maynard Lake
Valleyfield Rd
SOUTHDALE
207
207
111
7
7E
7W


Glenwood Ave
Sarnia Ave
Penhorn Dr
Centre St
Somerset St
Somerset St
Celtic Dr
Cranston Ave
Cranston Ave
Wheatstone Heights
Oathill Crescent
Oathill Crescent
Lorne Ave
Oat Hill Lake
Colburn Walk
Peddars Way
Joffre St
Mountain
Beckf
d Lake


Legend
Depth to Water Table
Depth to Water Table
Depth (metres)
0 - 0.10 m
0.11 - 0.50 m
0.51 - 2 m
2.01 - 10 m
> 10 m



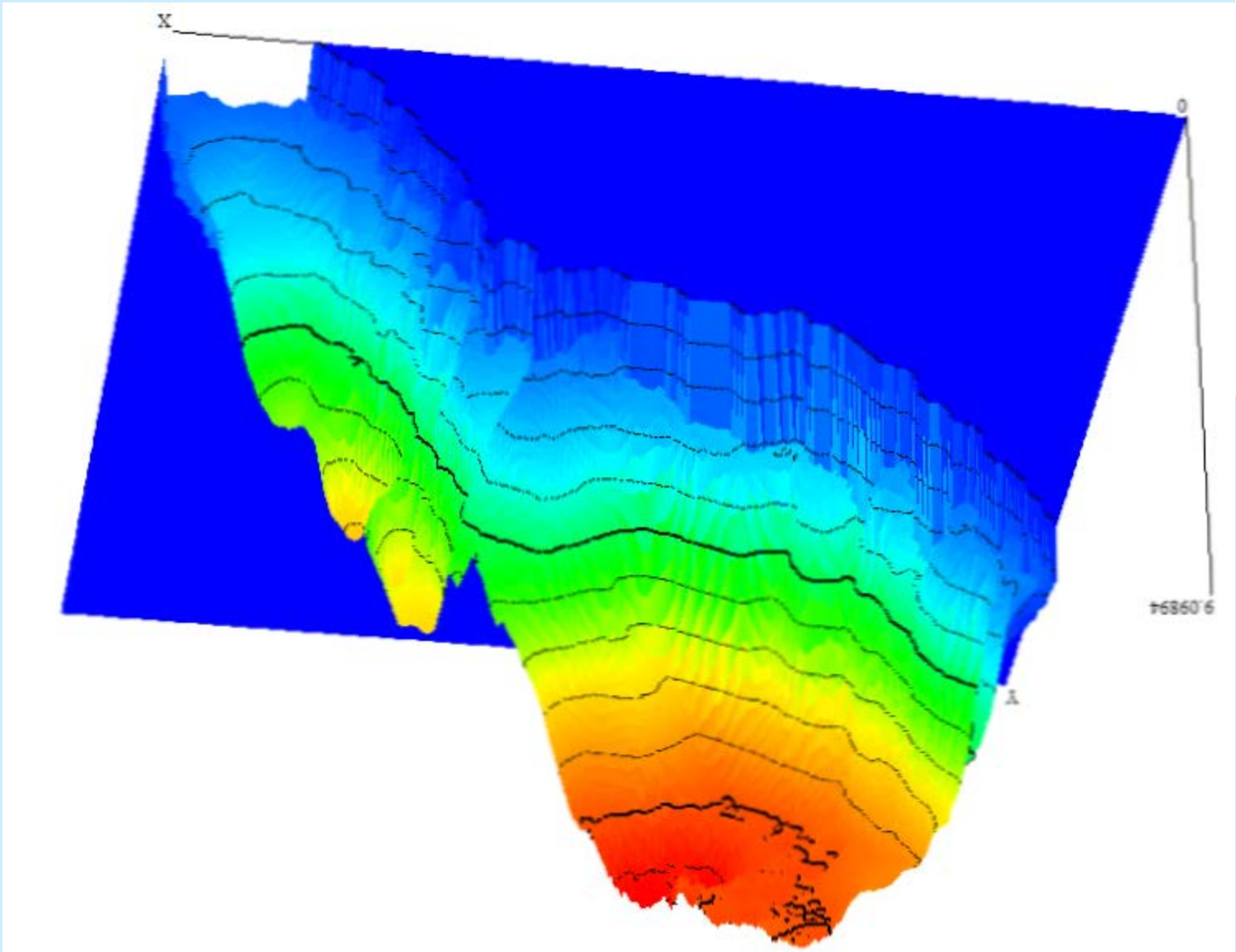
History

- Long history of water quality sampling
- NS Fisheries
- DFO synoptic survey
- HRM lake sampling
- Several universities
- General trend toward eutrophication
- Nothing dramatic and a lot of variability claims of oligotrophic to hyper-eutrophic
- The Society is focused on monitoring limiting WQ factors and **fixing** the problems

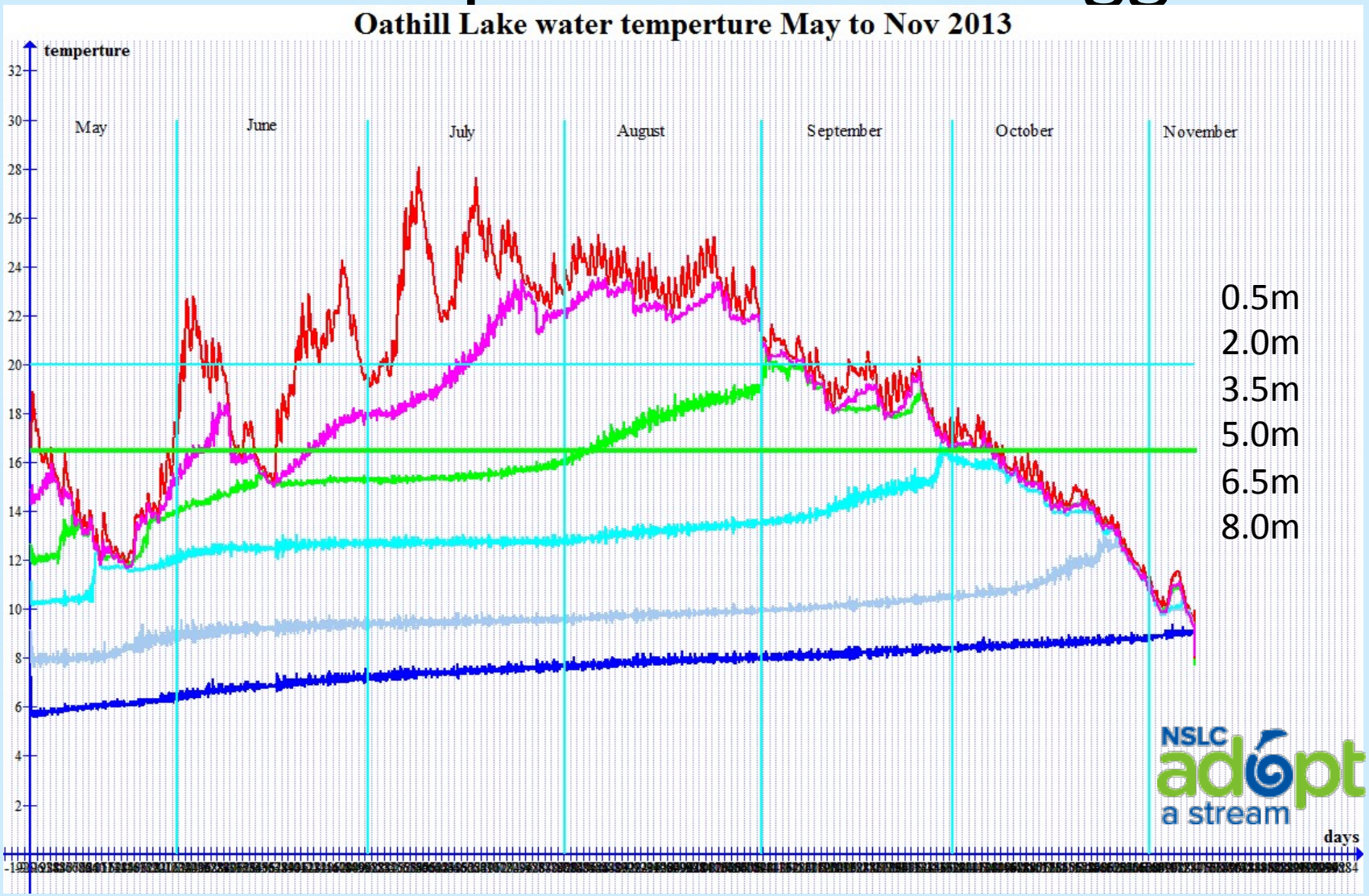
Types of water sampling

- Water temperature data loggers @ 1.5m depths – May to November - 20 minute readings
- Beckfoot storm sewer outfall data logger for temperature and conductivity November 2012 to November 2013 – 20 minute readings
- Water temperature, conductivity, oxygen, and pH on random dates 2010 to 2012 then at one site in May 2013 and 3 sites bi-weekly from mid August 2013 to October 2014 on going - WetPro
- Water samples to the lab for analysis of a range of parameters. At critical times.

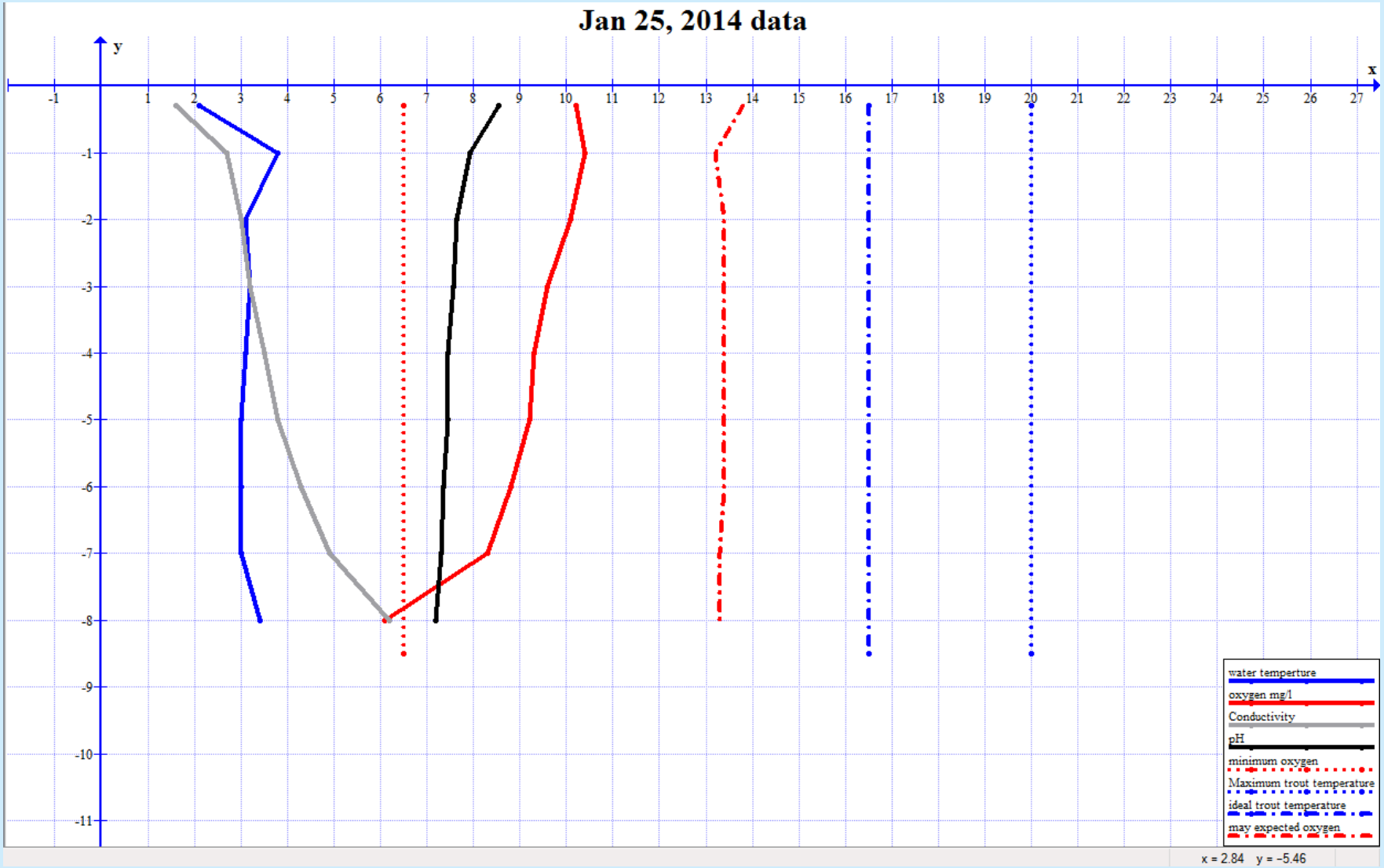
Oathill bathymetry



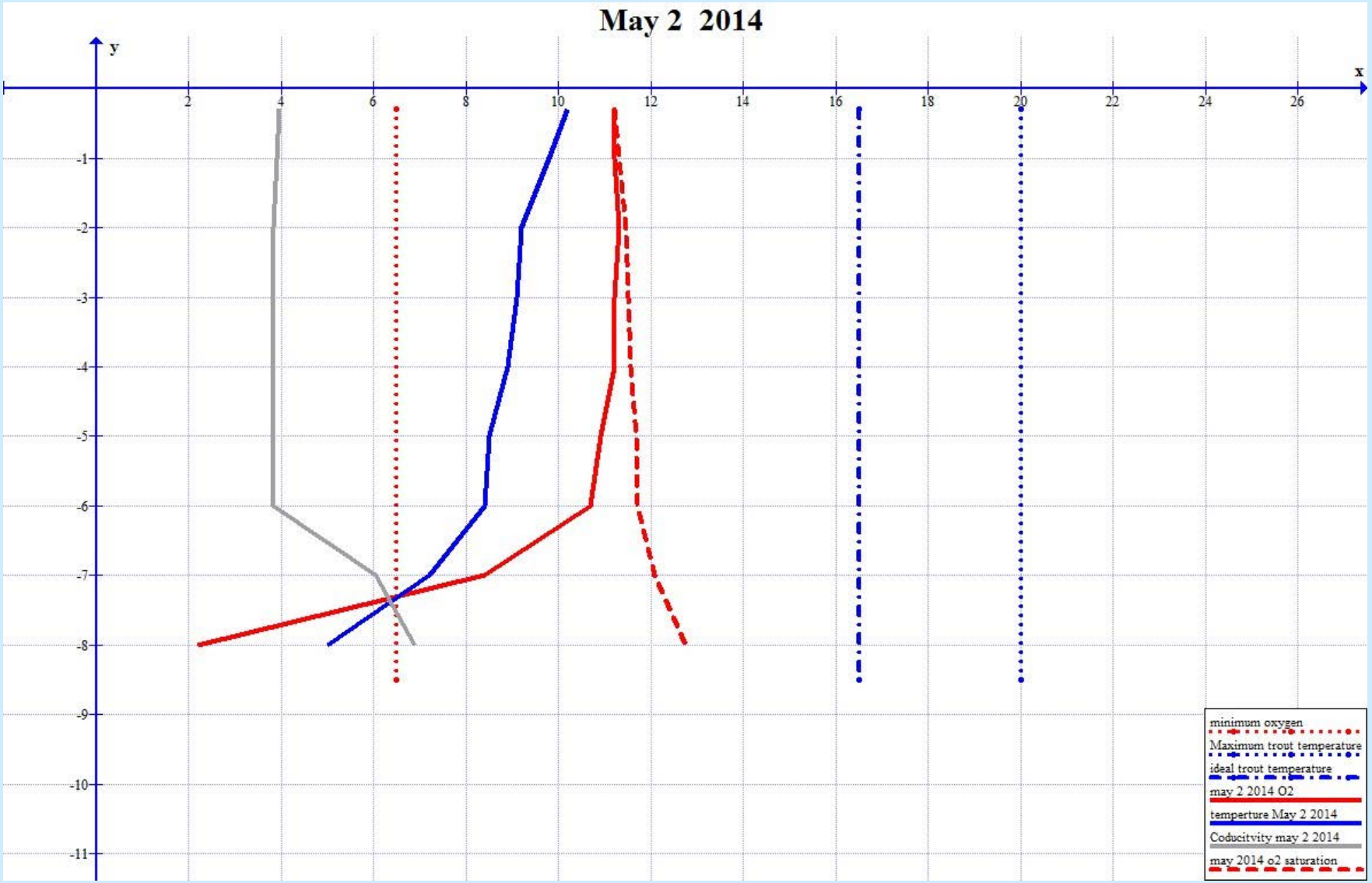
Water temperature data loggers.



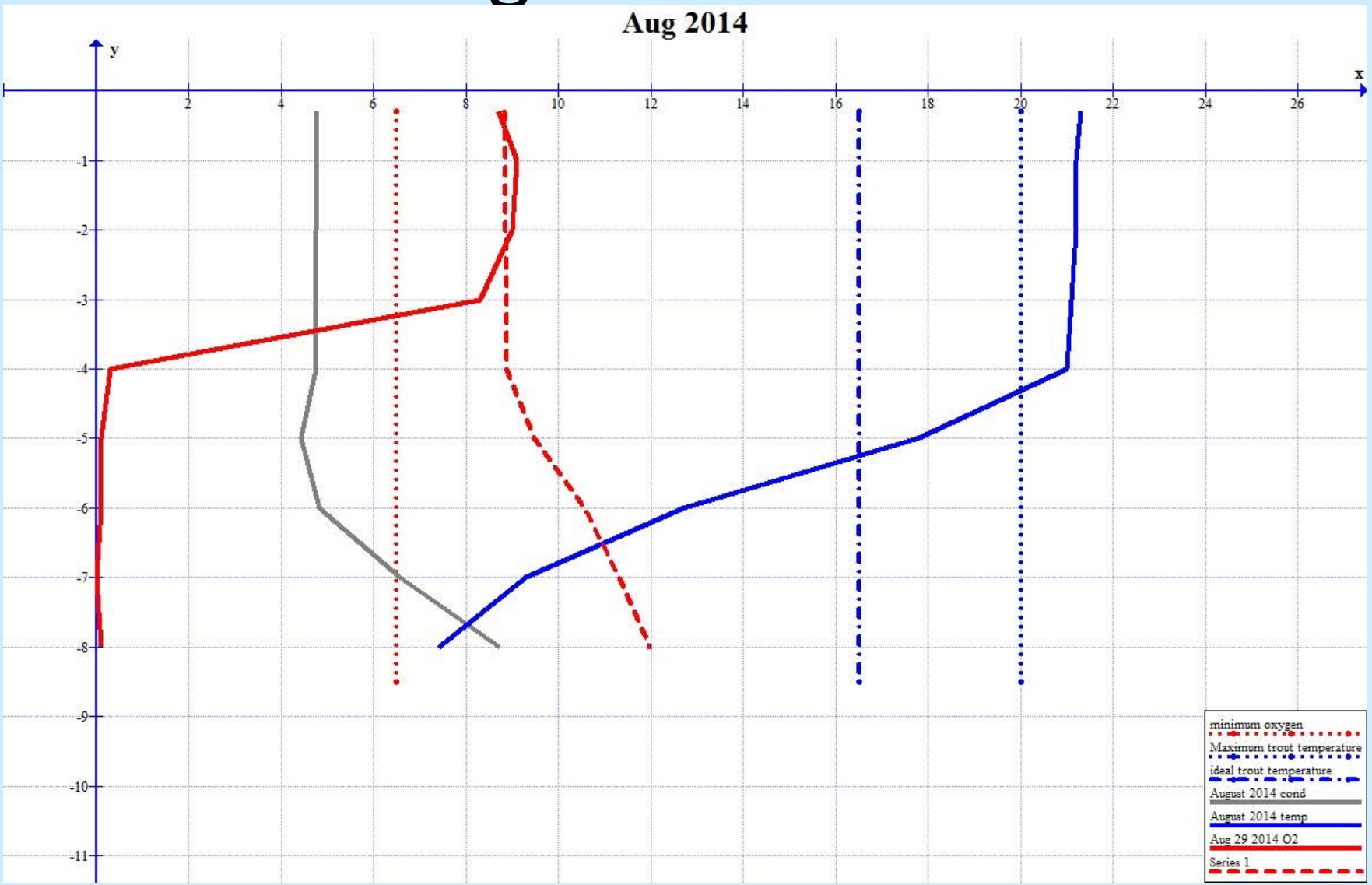
Jan 25, 2014


Jan 25, 2014 data
y
x
water temperture
oxygen mg/l
Conductivity
pH
minimum oxygen
Maximum trout temperature
ideal trout temperature
may expected oxygen
x = 2.84 y = -5.46

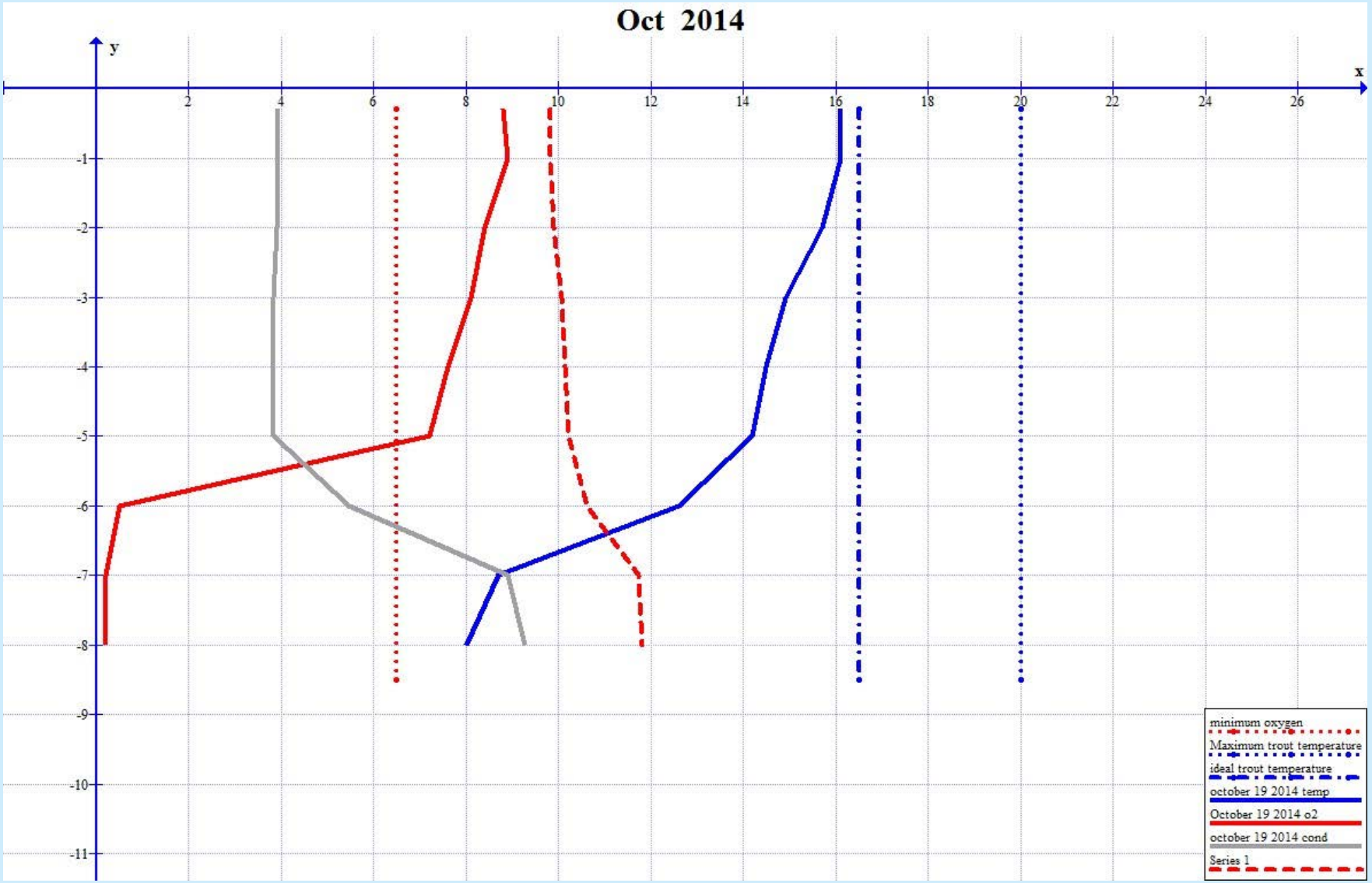
May 2, 2014


May 2 2014
y
x
2
4
6
8
10
12
14
16
18
20
22
24
26
-1
-2
-3
-4
-5
-6
-7
-8
-9
-10
-11
minimum oxygen
Maximum trout temperature
ideal trout temperature
may 2 2014 O2
temperture May 2 2014
Coducitvity may 2 2014
may 2014 o2 saturation

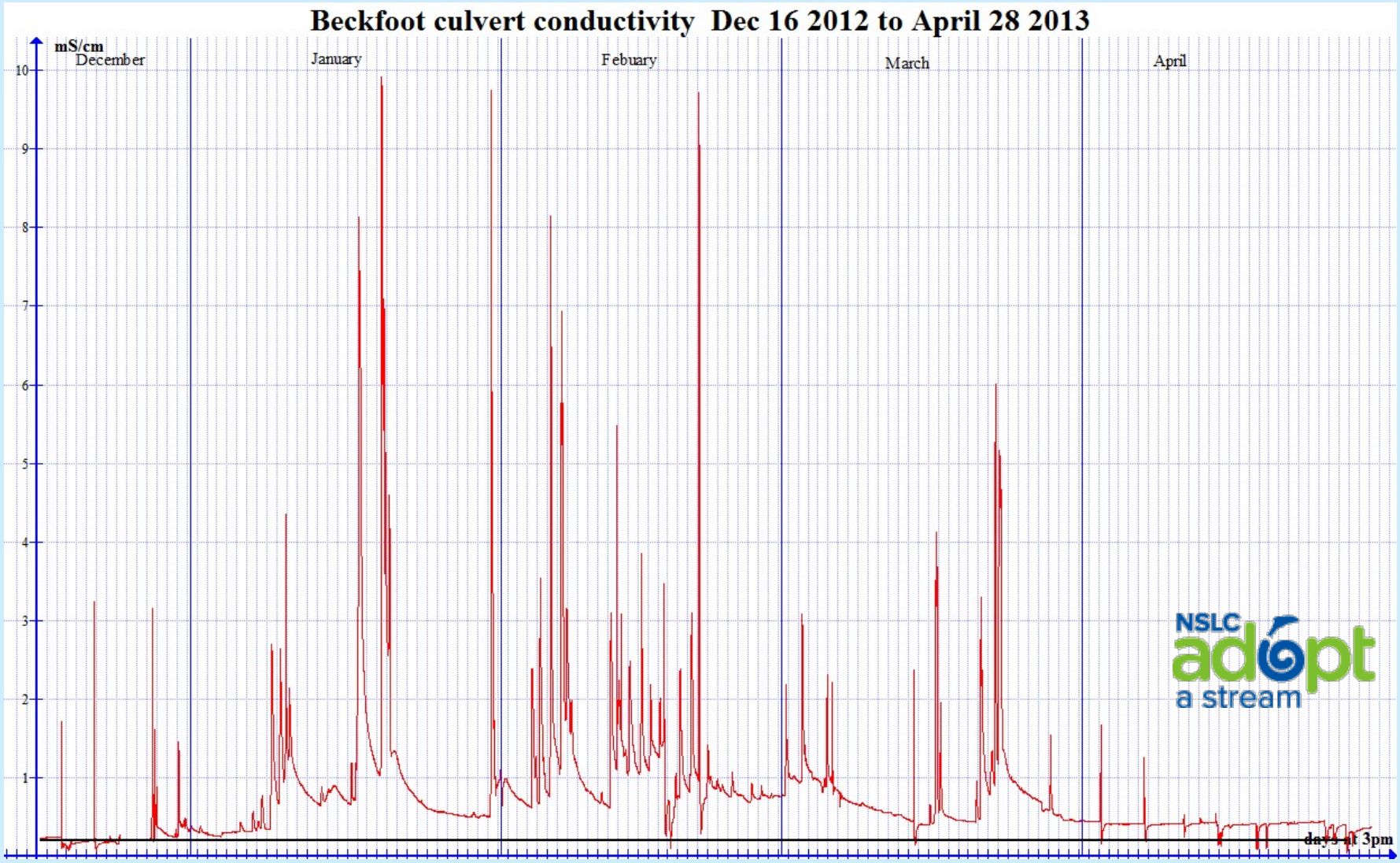
August 19 2014



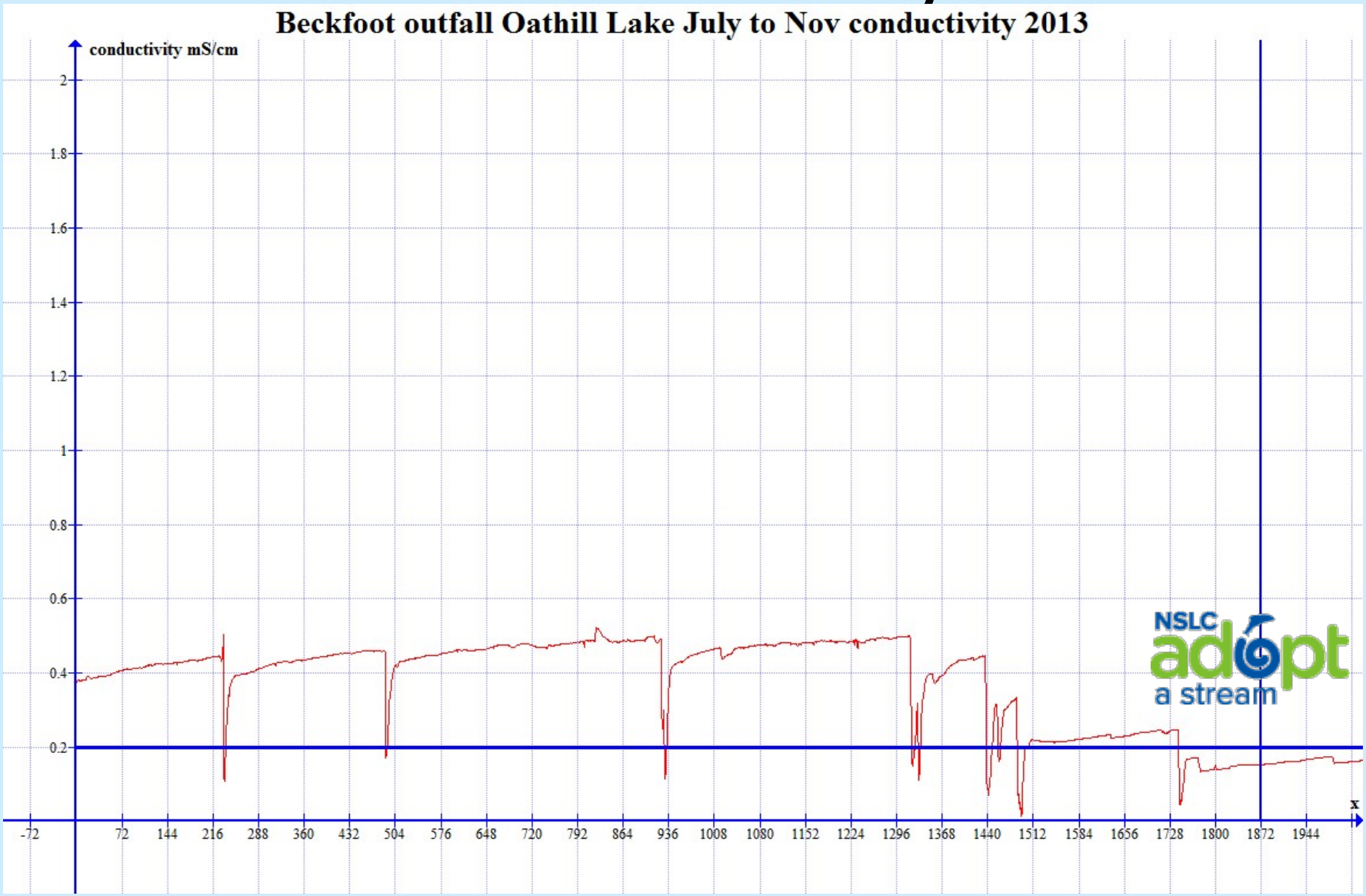
October 19 2014



Beckfoot outfall Conductivity



Beckfoot outfall July 2013



Issue Temperature

- Some times no clear thermocline even drop through water column
- Spring and fall turn over @ 7^{o}C
- Critical summer temperature levels for trout when combined with low oxygen.
- Sm Bass habitat is maintained in the shallow areas of the lake
- Good recreational swimming temperatures

Issue Oxygen

- Declines with depth over the summer due to organic decomposition
- Zero oxygen in bottom waters releases metals from the substrate
- Metal levels are high but not a problem due to high pH
- Depressed in winter due to cooling water with no access to oxygen due to ice.
- Winter levels stay up for fish
- Summer levels critical for fish when combined with temperature.

Issue Conductivity

- Lake
  - Rises in summer due to zero O_2 -- Fe & Mn & P release from sediments
  - Rises in winter deep water due to road salt NaCl
  - Generally very high -- double mean level of local lakes
  - Same top to bottom in spring and fall turnovers

Issue pH

- Very high ranging from mid 7's to 8
- Almost too high for Trout.
- Tends to stay much the same top to bottom
- Reason is for high levels is not clear

Fish stocking issue

- Stocked with smallmouth bass in the 1960's
- Massive stocking 3 times a year with Rainbow trout for a put and take fishery
- Year round fishery
- Changed in 2012 to Brook trout yearlings once a year at grow out levels.
- Good Rec fishery maitained
- Return of the amphibians, herons, and even loons

Issues Bottom Line

- The trout habitat in the lake has good temperatures below 4m but is limited by low/ no oxygen in the late summer forcing the trout into warmer that ideal temperatures.
- Salinity levels are to high to divert into the wetland area in winter would affect amphibians
- We have a nutrient loading problem resulting in low oxygen

So what are the solutions

- We do not have a solution to the road salt issue it comes via storm sewers from the entire watershed
- We are working to divert storm sewer flow into wetland vegetation to capture nutrients in summer flow. Done one site.
- We do have a solution for reducing nutrient loading/ organic decay cycling within the lake which leads to the oxygen problem

Divert storm sewer flow into wetland vegetation

- Could not use in-lake wetland harvest of plants to remove nutrients
- Water testing shows highest nutrients in low summer flows – easy for small area of plants to remove.
- Diverted storm sewer into built wetland
- HRM & Hfx Water contracted Dillon for a design build
- Plan is to harvest plants each fall

A Solution for O_2 within the Lake

- The installation of an Aquago
- Funding support NSLC AAS, CURA H_2O, DFO via RFCPP, HRM Councilor, and the Oathill Lake Conservation Society.
- Project management & monitoring OLCS

An Aquago

Aquago

- Solar powered water circulator
- 56 cm impeller draws water to the surface during the daylight
- The nutrients are taken up quickly by phytoplankton during the day when they are producing oxygen – not at night when they are consuming.
- Draws from above the thermocline so as not to break down summer stratification. So about 3m down.
- Spring and fall cycling will raise O_2 to the bottom

Aquago

- Over time the biological cycling of nutrients (P) will come under control and the O_2 levels at the bottom will be maintained above 2mg/l
- This will prevent the release of P from Fe and Mn compounds in the sediments.
- Thus lowering the trophic level
- Time line 3 to 4 years of operation
- Mixing of summer water will lower the overall temperature above the thermocline by 3 to 4 degrees

Permitting

- Wish I had data to show
- Originally planned installation for August 2014
- NSE requested a permit and that held things up
- Changes to NSE regulations this fall means no permit required
- Will be installed on Saturday.


Questions

Thank you!