Muriel Lake Basin Management Society

Annual General Meeting

July 20, 2019

Agenda

- Call to Order
- Introductions
- Minutes of 2018 AGM
- Financial Statement
- Status of the lake
- Review of MLBMS projects and activities
- Election of Directors for 2019/20
- Comments and Questions from the floor
- Adjourn
- 4:30 Guest Speaker: Andrea Woods from Lakeland Industry & Community Ass.
- PotLuck Dinner

Introductions

- Distinguished Guests
- Directors
    - Jeff Hlewka, Richard Bourgeois, Peter Crown, Jan Ramful, Peter Cordingley, Don Midgely, Cheramie Barbazuk, Kevin Roth
    - Lyall Kortzman resigned May 2019

Introductions – the facility

- Washrooms
- Fire exits
- Fund raising
  - Print Raffle
  - Donations (tax deductible)
- Handouts & Displays
  - Financial Statement & Volunteer signup
  - Membership list – check your email address
- Kitchen – Pot Luck Dinner

Minutes of 2018 Annual General Meeting

Cue minutes

Available as handout

Motion to accept minutes of July 15, 2018 AGM

2018 Financial Statement

- Formal copy of statement available as handout
- Opening Bank Balance $11,261.79

  receivable G.of C. $ 516.99

- Income

	2016	2017	2018
Donations	$1,740.00	$1,405.00	$ 485.00
Bottle Returns	$2,073.65	$1,838.95	$1,597.65
Raffle	$ 175.00	$ 200.00	$ 130.00
Grant	$3,822.77	$7,775.22	$4,815.57
Fund Raisers	$1,512.90	$1,720.00	$2,185.00
Total Income	$9,324.32	$13,251.17	$9,213.22

2018 Financial Statement (continued)

Disbursements	2016	2017	2018
Administration	$ 57.00	0.00	0.00
Bank Fees	$ 111.02	$ 208.19	$ 106.62
BBQ	$ 309.49	$ 312.00	$ 0.00
Meeting Expenses	$ 0.00	$ 100.00	$ 190.00
Projects & Professional Fees	$ 5,147.61	$8,434.70	$10,102.17*
Total	$ 5,625.12	$9,054.89	$10,398.79
Net Gain (Loss)$	$3,699.20	$4196.28	($1,185.57)
Closing Balance (adjusted)	$7,582.50	$11,778.78	$10,593.21

→ 2.9% of 2018 spending on administrative, fundraising etc., >97% on direct project expenses → Responsible spending

Financial statement has been audited

Call for MOTION TO APPROVE

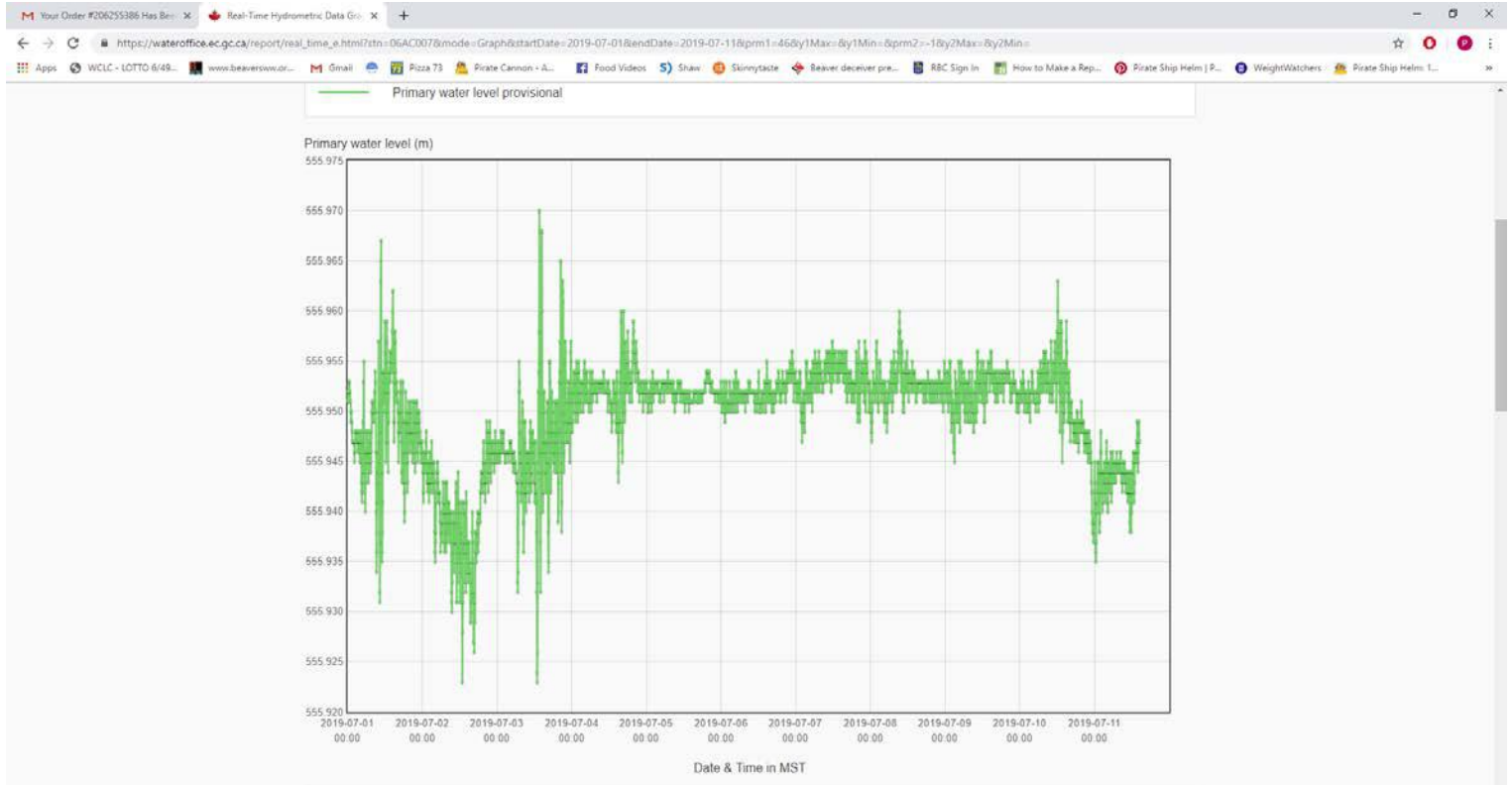
* Includes $5000 pledge to MLRT (as yet unspent)

2019 Budget

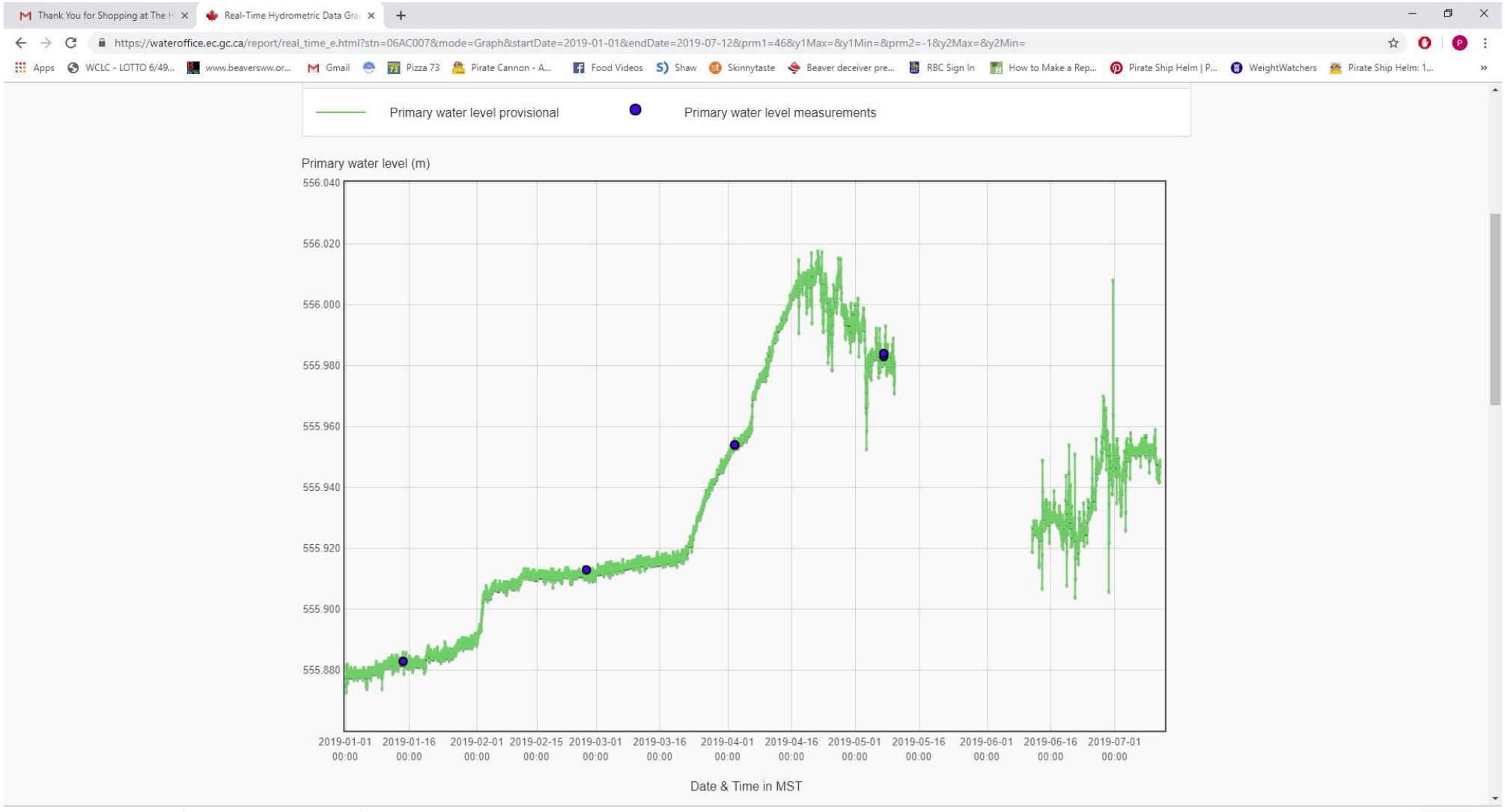
Opening Balance		$10,593.21	
Income		Disbursements	
Bottles	$ 1,500	Admin	$ 50
Grant	$25,500	Meetings	$ 200
Donations	$ 500	Bank Fees	$ 110
Raffle	$ 100	Web site	$ 150
Fund raising	$ 2,185	Projects: digital elevation study	$36,000
Total	$29,785		$36,510
Net Gain (loss)		$ (6,725)	
Closing Balance		$3,868.21 (projected)	

Status of Muriel Lake

- Lake level is up! now about 555.95 masl
  - Available online at wateroffice.ec.gc.ca , station number 06AC007
  - Up from 555.85 this time last year

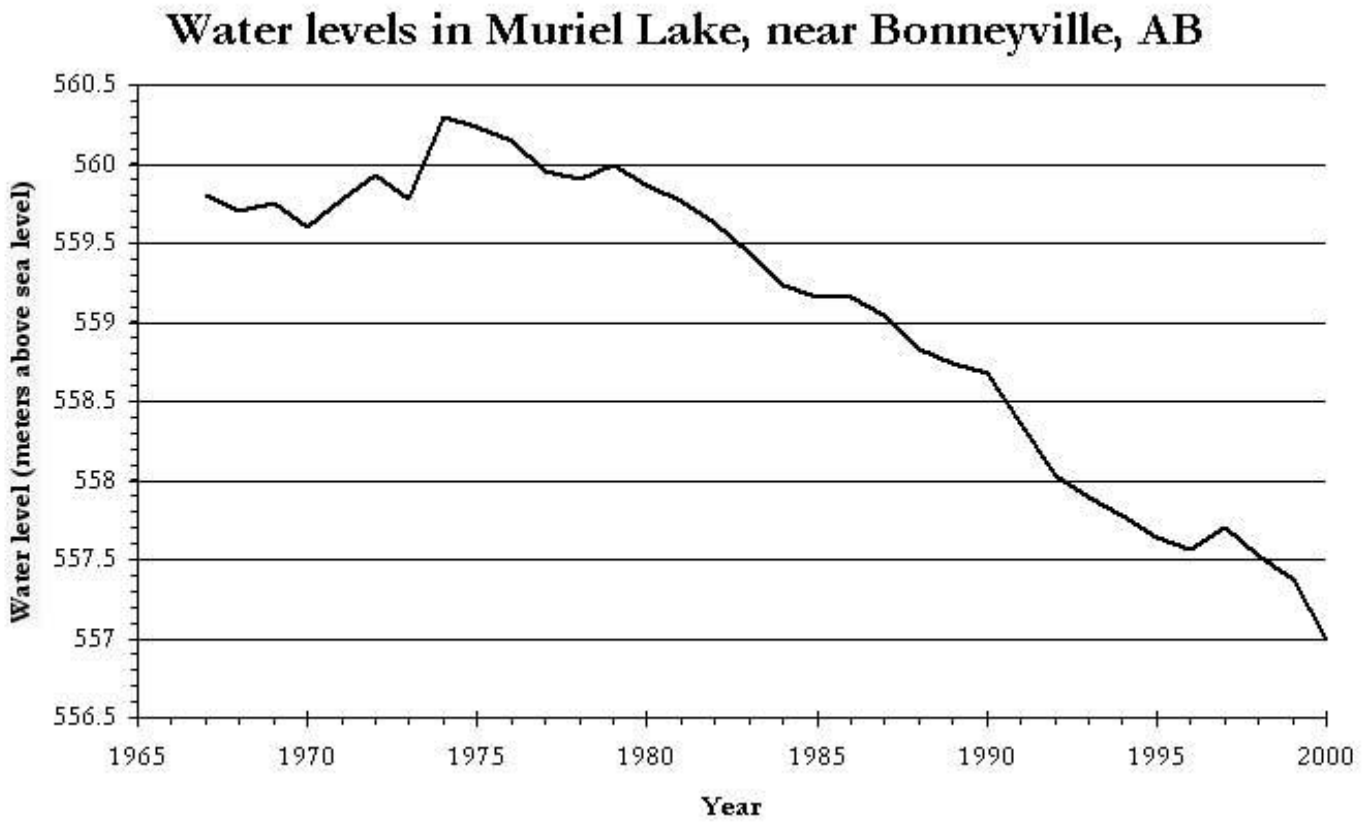


Lake level since January 1, 2019

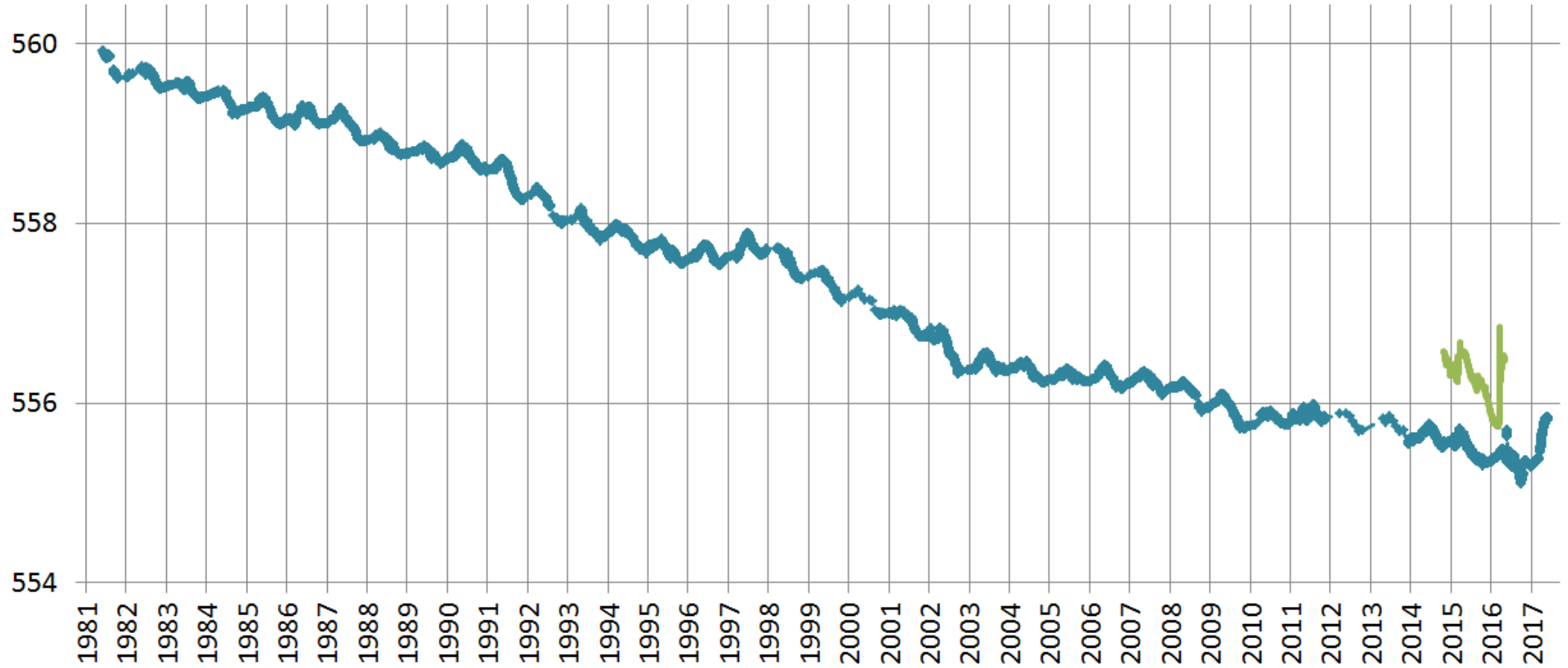


40 Year Trend of Declining Water Level

Current level is 555.95 masl



Lake Level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Why the lake level dropped

- Numerous studies over the year conclude major reason is
  - Changing climate has reduced water available to the lake
- With some additional contribution by
  - Natural and land use changes that have interrupted the flow of water to the lake
- Possible change in groundwater contribution
  - AEP winter lake level study (2010) shows Muriel lake continues to gain water from groundwater aquifers
  - It is unknown if groundwater flow lower than historical

Climate Change – Pengrowth report (2012)

- The Millenium-NHC study commissioned by Pengrowth Energy Corp. in 2012 compiled weather data, stream flow data, a water balance and groundwater data
- Our climate has changed:

	Avg. Annual Precipitation	Avg. Annual Evaporation	Avg. Annual Evapotranspiration
	mm	mm	mm
To 1950	362		
1940's	378		
1970's	490		
1951-1980	459	606	350
1981 -2010	422	635	362

Evaporation Exceeds Precipitation

- AESRD (AEP) letter to MLBMS (February 19, 2015):

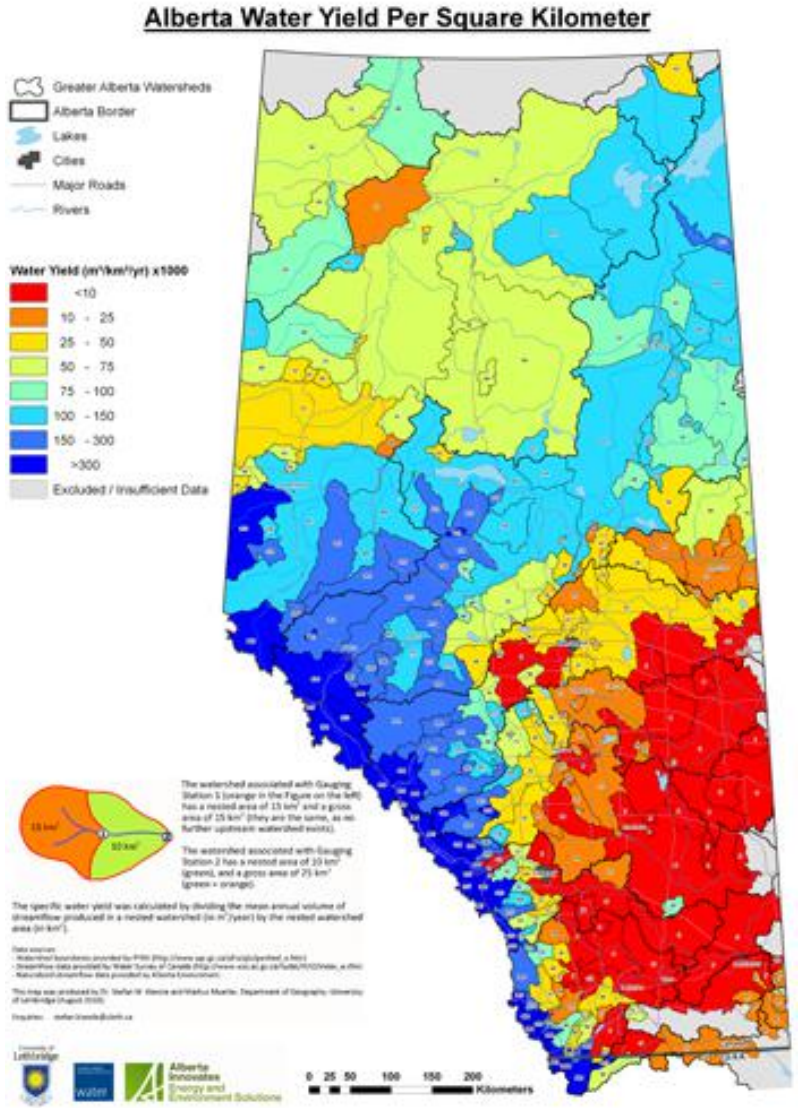
Annual precipitation	421 mm		
Annual evaporation from lake	647 mm	=>	15,400 dam^3
Area of lake	68 km^2		
Land Drainage Area	276 km^2		
Regional average runoff yield	22 mm (5.2% of precipitation)		= 6,100 dam^3
Annual Deficit (Precipitation-Evaporation+Runoff)	9,300 dam^3		

- Runoff yield required to balance

  15,400 dam^3 => 55.6 mm => 13.2% of precipitation

- AEP balance ignores AEP winter level study of 2008-2011
  - groundwater flow into lake averaged 0.14mm/d => 3,400 dam^3
  - recalculated average runoff 2,700 dam^3 or only 9.7 mm (2.3% of precipitation)

Expected Water Yield



Summary

- Climate Change (lower precipitation, increased temperature, increased evaporation) is the major cause of loss of lake level
- Studies suggest other factors may have also contributed
  - Disruptions to drainage network - less precipitation is making its way to the lake
  - Groundwater contribution reduced?
- Opportunity to mitigate effect of climate change by addressing these anthropogenic and natural causes
  - Anthropogenic
    - Industrial and public development
  - Natural
    - Beaver dams

Water Quality: Lakewatch (ALMS)

- Lakewatch is a volunteer-based community water testing program which collects scientific data on the health of Alberta lakes
- MLBMS volunteers provide ALMS with access to the lake
- Sampled every few years since 1988, recently in 2012, 2015 and 2017
- 2015 results were alarming but 2017 results improved
- 2019 sampling campaign in progress
  - 2 of 4 sample dates completed so far this summer

Water Quality: Data

- Average Annual Analysis

Year	1988	2015	2017	2019
Phosphorus (ug/L)	35.7	100	48.3	t.b.d.
Chlorophyll-a (ug/L)	6.7	31.7	20.9	t.b.d.
TKN (mg/L)	1.5	3.9	3.4	t.b.d.
Conductivity (uS/cm)	1142	2475	2200	t.b.d.
Secchi Depth (m)	2.16	0.75	1.03	t.b.d

Water Quality: metals

- 2017 ALMS results showed unusually high levels of some metals
- Recheck by Alberta Environment shoed normal levels

							2017 recheck	
Element	Unit	Guideline	2003	2006	2015	2017	0.1m	3.5m
Arsenic	ug/L	5	7.6	8.54	10.7	54.8	10.9	10.8
Boron	ug/L	5000	319	290	441	1760	368	376
Cadmium	ug/L	0.085	0.01	0.0088	0.006	0.025	<0.01	<0.01
Selenium	ug/L	1	0.07	1.41	0.055	12.8	1.9	2

- Arsenic and Selenium levels are high relative to guidelines
  - As, Se CCME Guideline for Protection of Freshwater Aquatic Life
  - B Canadian Drinking Water Quality Guidelines

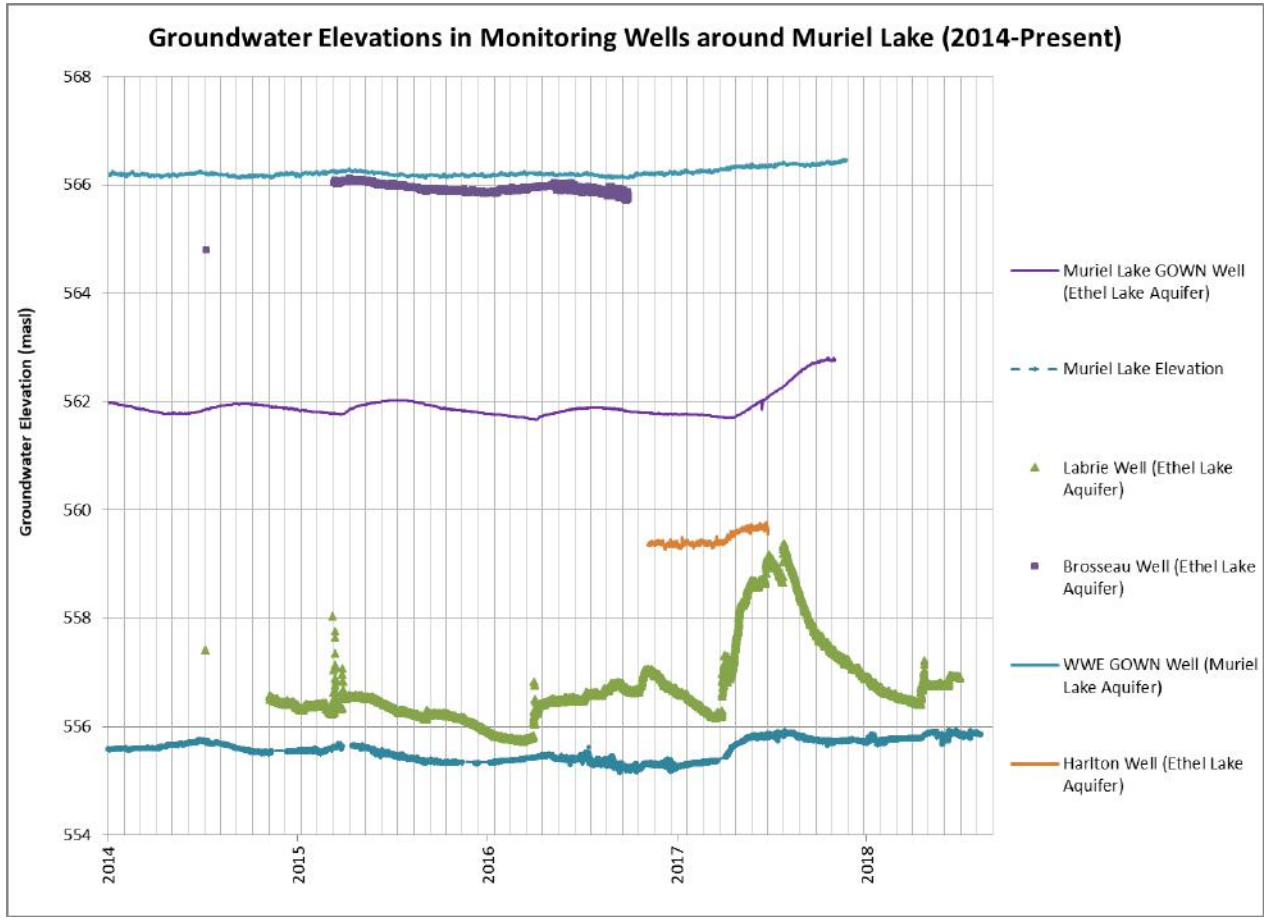
Review of MLBMS Projects & Activities

- Groundwater Monitoring
- Projects
  - Beaver Deceiver
  - Digital Elevation Model
- Muriel Lake Restoration Team
- Communication
  - Web site, Facebook and Twitter

Groundwater Monitoring

- In 2014 MLBMS installed monitoring equipment (donated by Baytex) in two existing but no longer used wells in the Muriel Lake area:
  - the Labrie well – on the north point of the lake and completed into deeper portion of Ethel Lake or Bonnyville Sand aquifer
  - The Brosseau well – east side of lake and completed into Ethel Lake aquifer, relocated to the north side (Harlton) in 2016,
- Two existing Alberta Government wells of interest
  - The Muriel Lake GOWN well - located west of the lake, Ethel Lake Aquifer
  - The WWE GOWN well – Muriel Lake aquifer

Groundwater Elevations in Monitoring Wells around Muriel Lake (2008 to present)



Groundwater Monitoring

- Observations:
  - Aquifer water levels continue to be higher than lake elevation, supporting the conclusion that the lake is receiving discharge from the Ethel Lake Aquifer
  - The monitoring wells in the Ethel Lake aquifer continue to respond on a similar frequency as the Lake levels; most of them saw a response from the same large spring runoff in 2017
  - Concern that Labrie Well may have a leaky casing because it seems to be over-responding; historically confident that that Brosseau and Harlton wells were good monitoring points and were observing a true aquifer response

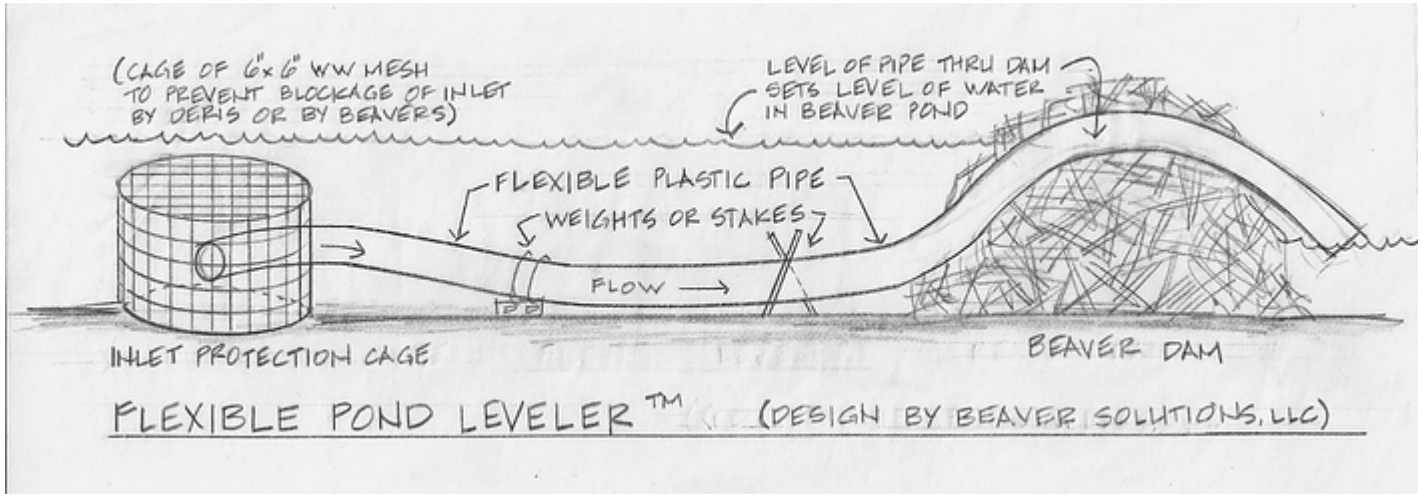
- Long term benefit
  - To track the water level in the aquifer vs. the lake and relative trends
  - To provide data for future modelling studies

Beaver Deceiver Project

- Increasing beaver activity may be decreasing the flow of fresh water into the lake. Beaver dams store and slowly release runoff. A portion of this stored water is lost by evapo-transpiration (evaporation, use by plants, seepage into the ground).
- Beavers are “stakeholders” in the environmental management of the region. Eliminating beaver population is not a desirable option.
- This project involved installation of beaver dam level control devices to maintain a constant water level in the pond. Any new precipitation flows through the beaver dam directly to the lake. The beaver and associated ecosystem are not harmed.

Beaver Dam Level Control Device

- Simple device with no moving parts. Specialized design to deceive the beaver – mask the noise and velocity of flowing water
- Elevated inlet maintains existing pond, safe environment for the beaver



Grant for Beaver Project

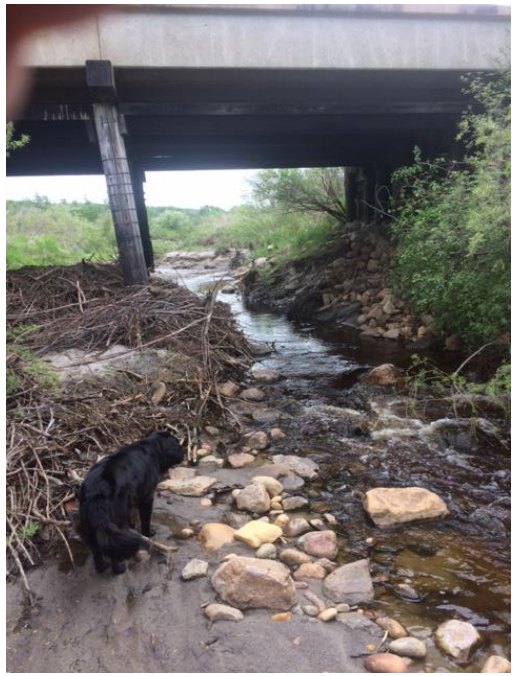
- In April 2016 MLBMS obtained a grant for $39,235 over 3 years to install devices in beaver dams from the Environmental Damages Fund (Environment Canada)
  - “This project was undertaken with the financial support of the Government of Canada. Ce projet a été réalisé avec l’appui financier du government du Canada”
- MLBMS contracted beaver expertise from technical consultant
  - Dr. Dee Patriquin of Solstice Canada
    - PhD in Biology, P. Biol., R.P. Biol., beaver project experience with Dr. Glynnis Hood of UofA
    - Alberta experience – Beaver County, Blackfoot/Cooking Lake

Beaver Dams on Creek from Garnier Lake to Muriel Lake (2016)

South East Muriel Lake

- High spring runoff washed out the dams at the selected sites
  - 2016

2017



Lower section of creek from Garnier Lake is clear – no beaver dams

Beaumieux North

- Multiple beaver dams on this creek between Hwy 657 and the lake
- Two deceivers installed in August 2017
  - Both these dams, plus a third dam, failed during spring 2018 runoff
  - Both deceivers are intact and will work when beavers rebuild
- Two deceivers installed in July 2018
  - Both these dams failed during spring 2019 runoff
- This creek now clear from Highway 657 to the lake
  - Beavers have not begun rebuilding

Installation at Beaumieux North - 2017

Deceiver downstream Discharge

Dam washed out April 2018

Installation at Beaumieux North - 2018

Dam washed out spring 2019

Beaumieux South – Lemieux Drive

- Culvert and screen box dammed by beavers

Beaumieux South

1972:

2011:

Installation at Beaumieux South June 2018

Digital Elevation Model – Drainage & Runoff

- Develop a runoff model of the basin
  - digital elevation model using airborne light detection and ranging (“lidar”) data
  - model surface water flow
  - Recommended in the Pengrowth study of 2012
- Detailed understanding of runoff and drainage in the basin
  - model surface water flow “as-is” terrain and with anthropogenic barriers (eg. roads) removed. Locations of concern, such as roadside ditches and low lying, water bogged areas would be plotted.
  - assess the locations and impact of disruptions to surface water flow
- Identify opportunities to increase surface water flow to the lake.

Alberta Ecotrust

- Alberta Ecotrust Foundation builds partnerships throughout Alberta between environmental organizations, corporations and others who support environmental action to fund and support effective grassroots environmental projects, build capacity and sustainability in the voluntary sector, and promote the environment as the foundation of a healthy community. Since 1992, Alberta Ecotrust has invested more than 8.3 million dollars in the people and projects that protect the natural systems that provide Albertans with life and prosperity.

Alberta Ecotrust Grant

- Grant approved for $34,000 Digital Elevation Study
  - $25,500 from Alberta EcoTrust with matching 25% from MLBMS
  - Paperwork signed off as of July 15, 2019
- Reviewing three bids from environmental service companies
- Project elements
  - Generate Drainage model and identify locations of concern
  - Field Verification by MLBMS volunteers
  - Final Report expected by end of 2019.
- Followup with MLRT and site specific stakeholders

Muriel Lake Restoration Team

- MLBMS explored common interest with Alberta fish enthusiasts
  - guest speaker Ray Makowecki spoke at our 2018 AGM
- Formed Muriel Lake Restoration Team
  - members include MLBMS, 4 Fish& Game groups, M.D. Bonnyville, LICA, CNRL, ALMS, Kehewin Nation, with others on mailing list
- Fundraising - $22,000 (includes $5,000 from MLBMS)
- Examining restoration activities
  - Pumping Groundwater – issue regarding water quality
  - Aeration to enhance Dissolved Oxygen
  - Piping Plover

Piping Plover

- Possibly Alberta's most Endangered bird species
  - 6000 birds worldwide, Alberta population about 75
  - Nesting areas protected by federal "SARA" legislation
- Surveyed annually by AEP
  - High of 46 birds in 2006 but has since declined
  - Only exceeded 10 birds twice since 2012
  - 3 birds sighted in 2018
- Population declined due to "low, and stable water conditions that have allowed vegetation to encroach on the shoreline"
  - Need fluctuating water levels to periodically cleanse the gravel beaches of vegetation
- Higher Lake level should not adversely affect the plovers as long as level fluctuates naturally

Dissolved Oxygen

- Dissolved Oxygen level of >4 ppm required for a healthy lake
- Oxygen levels lowest during winter
  - Ice formation prevents oxygen absorption from above
- The last of the large sportfish died in winter of 2011/12
  - Water levels just under 556 masl
- Would Muriel lake sustain fish today?
  - Should we consider stocking the lake?

Winter Dissolved Oxygen Monitoring

- MLBMS volunteers tested the oxygen levels in the lake 4 times last winter
  - Using YSI Probe lent to us by LICA
- Test location was what is believed to be the deepest area of the lake (south-east, 4.5 m), measurements taken at 0.5 m intervals
- Dissolved oxygen declined through the winter to levels too low for fish survival by February
- Will repeat in future years as lake level rises, to determine when fish stocking would be effective

Dissolved Oxygen Measurements

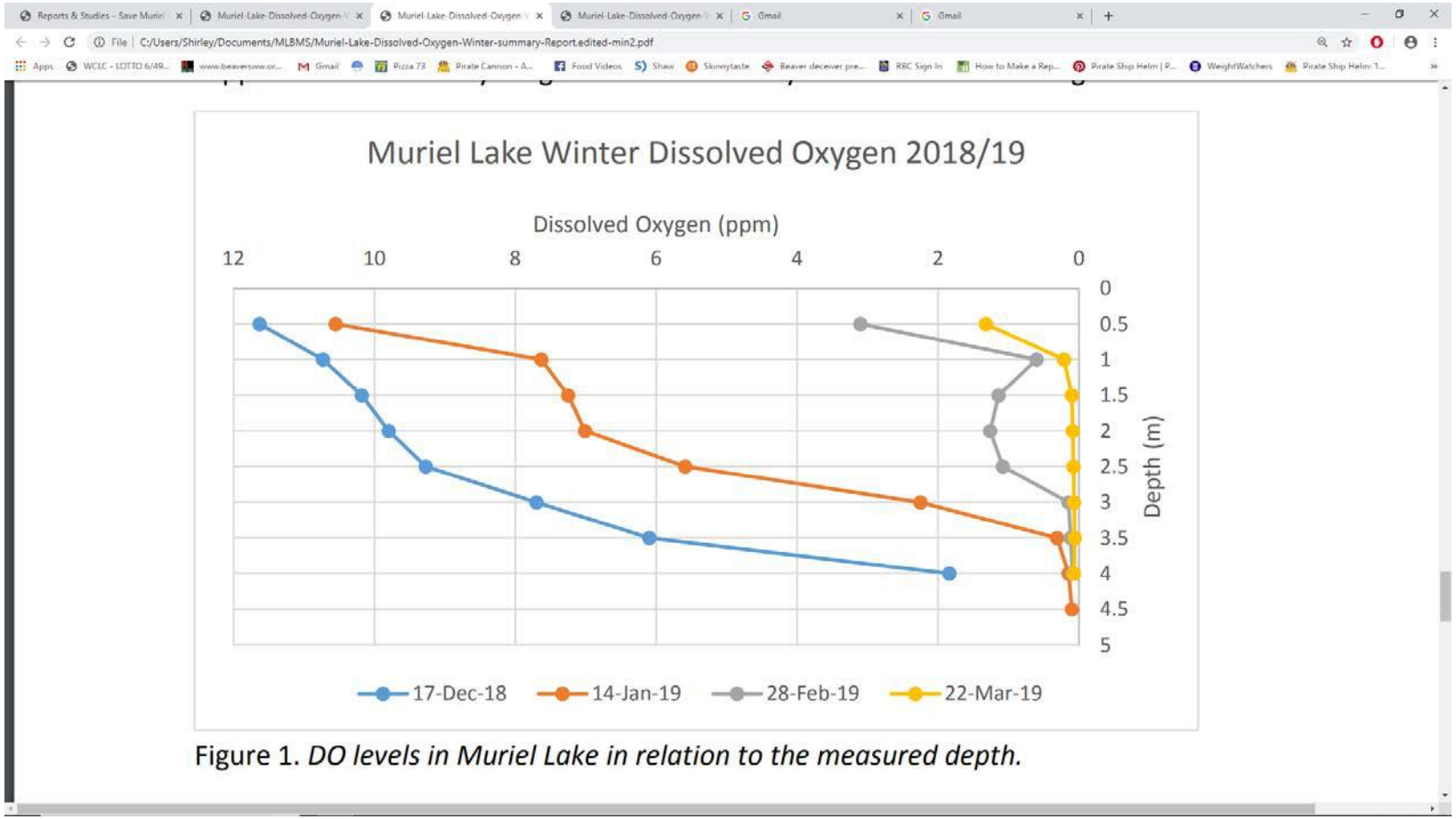


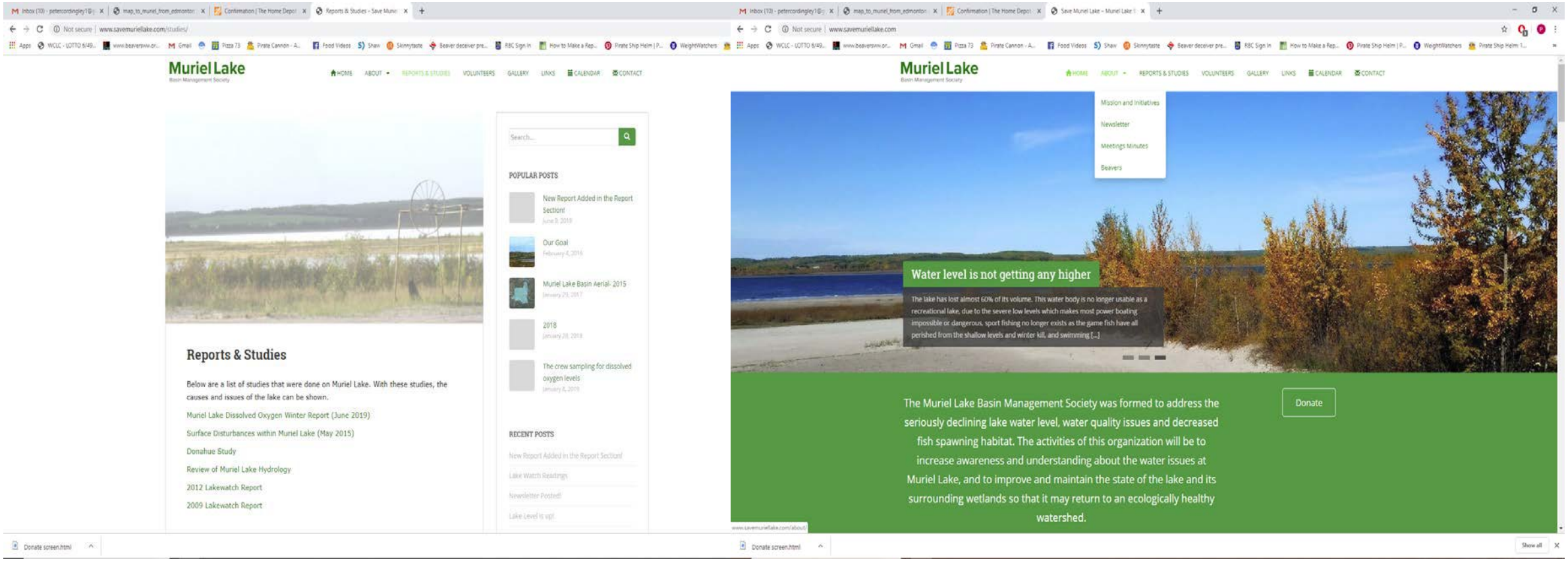
Figure 1. *DO levels in Muriel Lake in relation to the measured depth.*

MLBMS volunteers measuring Oxygen levels

Communications

- Website
  - Lots of additions — wwww.savemuriellake.com
- Facebook — @savemuriellake
  - Follow us on Facebook!
  - 739 followers!
- Twitter — @SaveMuriel
- Email
  - Make sure we have your email address – see list

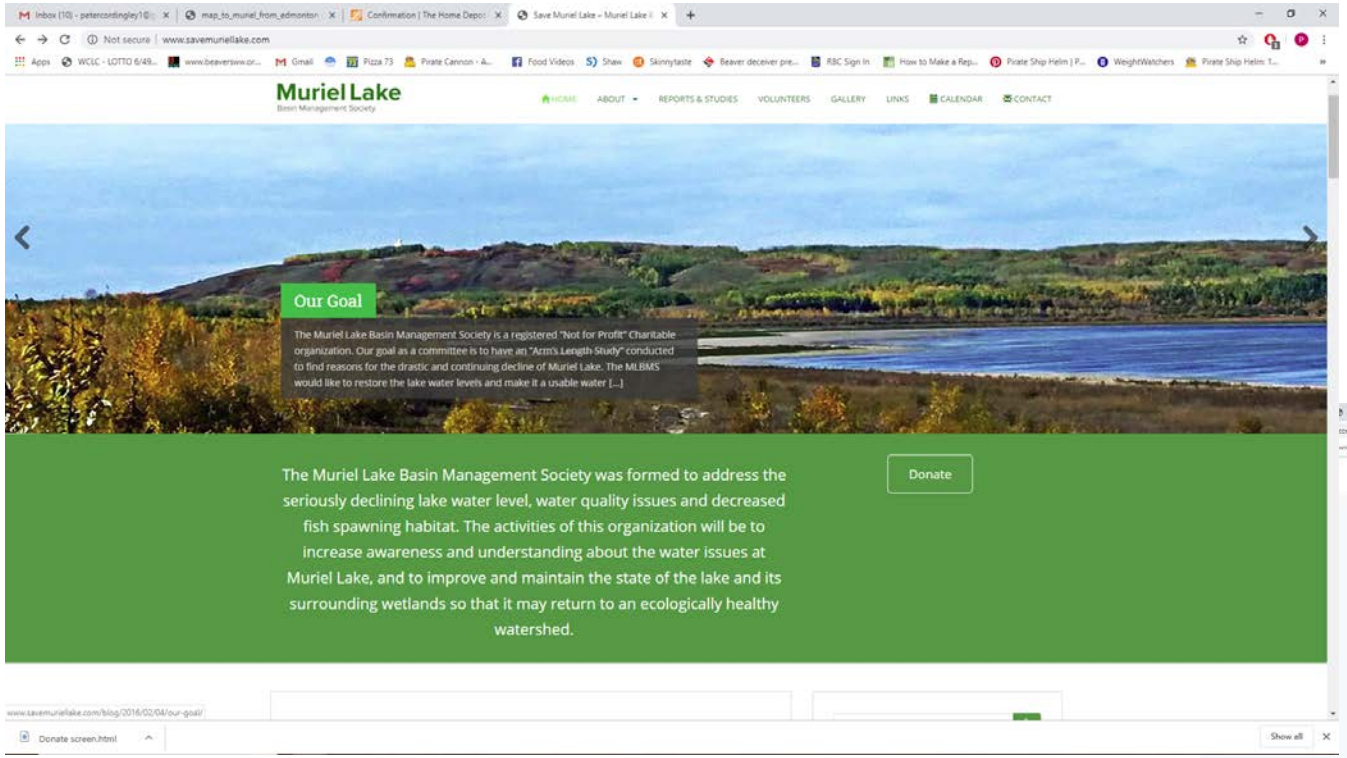
Website contains About MLBMS, Reports & Studies, Volunteer, Gallery, Links, Calendar, Contact Us sections

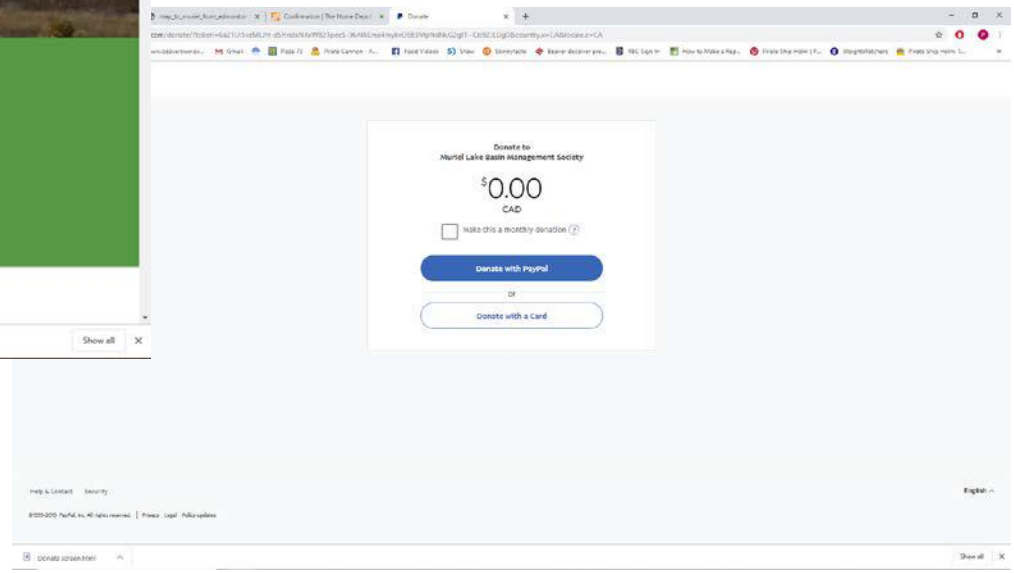


Fundraising

- Bottle and can deposit
  - Drop off at South east waste Transfer Station
  - Drop off at Dove Centre in Bonnyville
- Highway Cleanup
  - 2019 event completed May 18
  - Next year - May 16 2020
- Donations
  - Tax receipts available

Donate to MLBMS via website





Election of Directors for 2019/2020

- Existing Directors (two year term – thru 2020)
  - Peter Cordingley
  - Richard Bourgeois
  - Jan Ramful
  - Don Midgley
  - Kevin Roth
  - Peter Crown
  - Jeff Hlewka
  - Cheramie Barbazuk
- New directors
  - Call for volunteers from the floor
- Motion to elect directors

2019 Budget

Approval Requested for 2019 Budget:

Opening Balance $10,593.21

Income		Disbursements	
Bottles	$ 1,500	Admin	$ 50
Grant	$25,500	Meetings	$ 200
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Net Gain (loss) $ (6,725)

Closing Balance $3,868.21 (projected)

- Motion to approve 2019 budget

Comments and Questions

- From the floor

Closing

- Final comments
- Call for volunteers for committees
- 2020 AGM – July 2020, date to be set by Directors
  - In the meantime: web site, Facebook, Twitter, email
- Raffle draw
- Motion to adjourn meeting
- Next up: Andrea Woods – all about LICA
- Anybody hungry? Dinner to follow