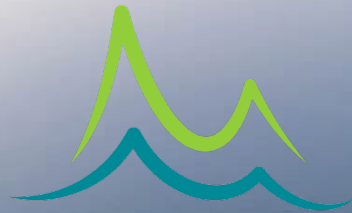


GULL LAKE
WATERSHED SOCIETY

GLWS 2023 ANNUAL MEETING



GULL LAKE
WATERSHED SOCIETY

NORVAL HORNER

GLWS PRESIDENT



Gull Lake Watershed Society

2023 Annual meeting. August 26th at 10 AM to noon

Summer Village of Gull lake hall

29 Lakeview avenue - South side of the lake.

Minutes of the 2022 annual meeting are posted on our website.

Draft Agenda:

- Introduction, history of Society, lake level update 10 Norval
- Approval of agenda and last year's minutes 5 Norval
- Progress on filtration to restore stabilization - 10 Paul A.
- Final report on stream bed, settling pond projects 5 Craig
- Regional Sewage collection 10 R. Assinger/Glenn F.
- Potential aquifer and other sources for stabilization 10 Lon K.
- Treasurers report and financial report approval 5 Doug B
- Membership and Communications report 10 Henry B/Jeremy C.
- Other reports if any
- Presidents report incl. Alberta health on beaches 10 Norval
- New business

"Protecting Gull Lake for the Future"

Gull Lake Watershed Society

RR 3, Box 21, Site 1

Lacombe, Alberta T4L 2N3



Gull Lake Watershed Society

- Nomination and possibly election of officers and board for the coming year.
- Motion to change signing officers
- We will also appoint committees probably related to
 - Charitable status
 - Communication with the key ministers .
 - fundraising for the stabilization filter.
 - ALMS and RDRW liason

Norval Horner - norval1@shaw.ca
President GLWS

"Protecting Gull Lake for the Future"



Gull Lake Watershed Society

A brief history of the Gull lake Watershed Society “GLWS” and our activities

- formed in 1998 by volunteers that worked with Alberta Environment to identify and sample the streams that flow into the lake.
- Originally “Gull lake Water Quality Management Society”
- Incorporated as a nonprofit in 2000.
- name changed to GLWS in 2014
- we have continued to assist AEP/ALMS sampling of the lake every couple of years and so have a long term history of the water quality in the lake.
- One of the puzzles of Gull lake is that the water quality stays surprisingly constant through the last 40 years in spite of nutrients flowing in.
- In 2010 then AEP minister Renner decided that he couldn't afford to pay for the power for stabilization. Gov't study suggested that pumping didn't really help the lake and we found their study had major flaws
- Our society asked HCL the premier hydrological consultants in Alberta to review the provincial study and they reached the opposite conclusions.
 - Would resume its old rate of decline
- Four municipalities around the lake agreed to pay for the power.

“Protecting Gull Lake for the Future”



Gull Lake Watershed Society

- Our society undertook major projects that included things like
 - Mapping all the aquifers around the lake
 - improving stream beds and adding settling ponds to reduce the flow of sediment and nutrients
 - contributing to Gull lake plans, commenting on developments
- however our major thrust lately has been work that we've undertaken to prove up pressurized filtration to allow the restart of stabilization without a risk of Prussian carp being pumped into the lake

“Protecting Gull Lake for the Future”

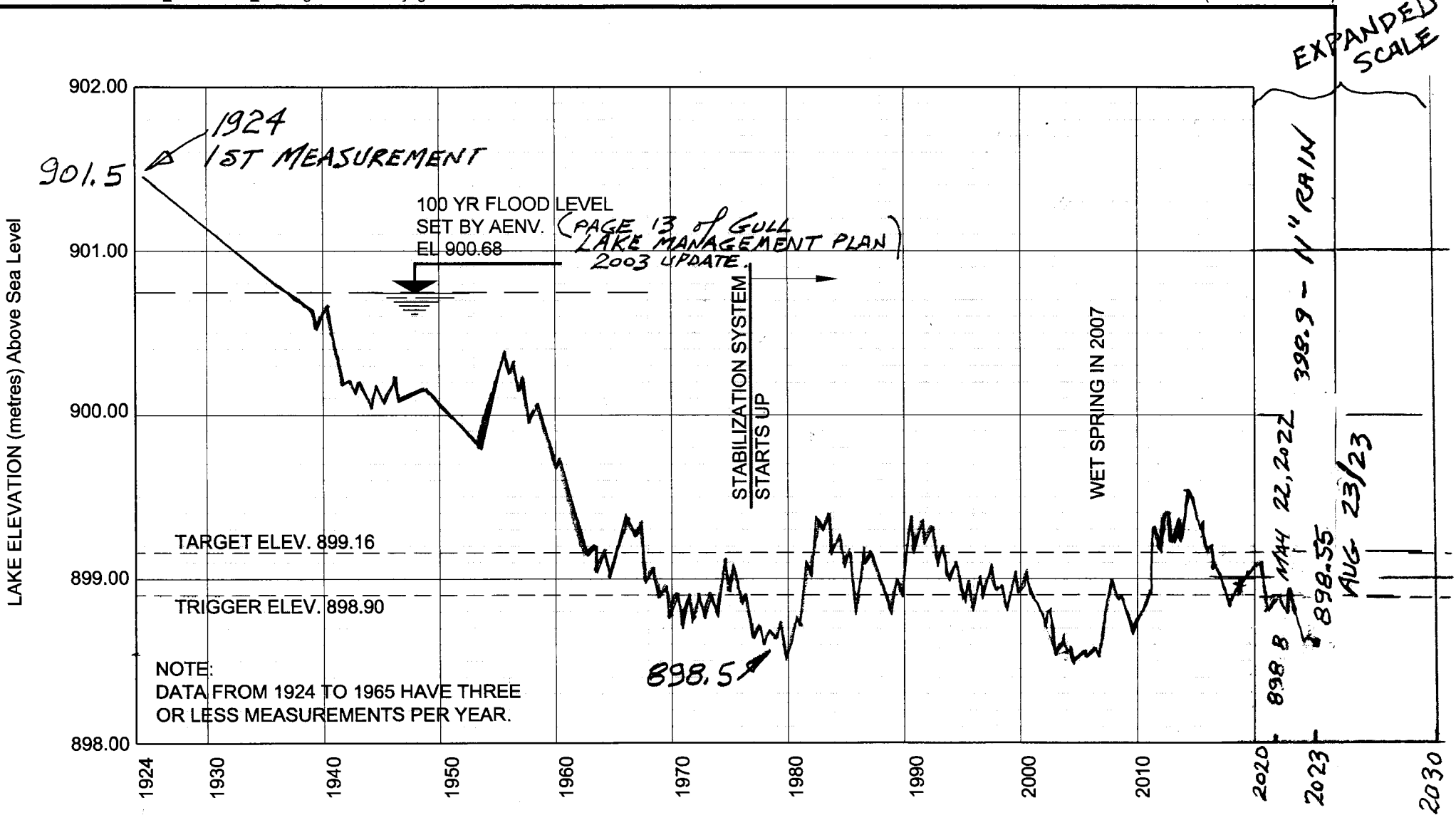
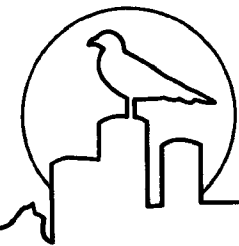


Figure 1

Historical Monthly Mean Lake Levels For Gull Lake

Gull Lake Watershed Society



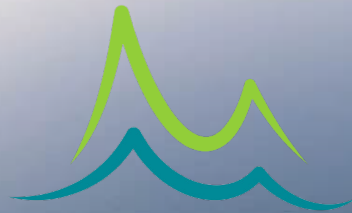


Gull Lake Watershed Society

Presidents report. -- Norval Horner

- Long term involvement in lake sampling and monitoring of lake water quality
- Completion of the stream bed and settling pond projects
- Progress on the filtration although slow
- May require major fundraising but a relatively small amount of money given the valuation of properties around the lake
- major thrust on membership and communication
- membership increased from around 60 with 30 coming to the annual meeting now up to 1800.
- Looking to get more representation from some communities around the lake
- What's ahead
 - get Carp filtration approved funded and installed
 - Fund studies on other sources of stabilization water
 - seek another grant for stream bed/settling ponds
 - update constating docs and charitable status
 - Coordinate with ALMS and the RDRWS
 - Continue lake water sampling
 - other suggestions and ideas

"Protecting Gull Lake for the Future"



GULL LAKE
WATERSHED SOCIETY

GLWS 2022 AGM MINUTES

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

1. The meeting was held at the Meridian beach community hall and discussion was opened at 10:00 AM by president Paul Anderson. approximately 35 members of the society attended
2. the minutes of the 2021 meeting and an agenda for the meeting had been sent out in advance to the membership.
3. President Paul Anderson opened the meeting with a request for discussion of the agenda and two items were added and then the agenda was moved by Rick Assinger and Kent Coleman.
4. the minutes of last year's meeting were approved by motion from a Lance and Les.
5. Past president Craig McLeod reviewed the progress on our settling pond project and told us about three completed projects and that the final project in our grant was going to be done near Doef's green houses where an additional settling pond would be built to handle runoff that comes into that area and off the roofs of the green houses etc. this will involve about \$11,000 of expenditure by our society and \$100,000 expenditures by Doef's. Craig also described the progress had been made in removing the Buffalo from the stream-bed there and allowing the natural vegetation to flourish and act as a filter on the water going to Gull lake. It was agreed that this had been a very successful project for our society and made a difference to several major streams that flow into the lake and improve their quality by reducing the amount of sediment that reaches the lake. Members congratulated Craig for having led this project and completed it.

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

6. We then preceded to review prepared materials which are attached to these notes and involve the following.
7. A president report by Paul Anderson
8. a review of the lake level chart . we were fortunate in nearly 11 inches of summer rain falling in our area and so the lake is at pretty much the same level as last fall. Annual evaporation is something like 17 inches a year end the long term rate of decline of the lake before stabilization was two inches a year. when there's sufficient water in the river the lake can be raised up to four inches by the stabilization system which was built in the mid 70s. The winter runoff has been weak in the last two years due to unusually low snowfalls.
9. A detailed review with photographs of our testing project to prove up pressurized filtration to allow the restart of our stabilization system without transferring Prussian carp to the lake. we felt that our project and the associated report by Stantec engineering clearly demonstrated that carp and their eggs could be reliably filtered out. Unfortunately Alberta Environment "AEP" has not responded to the report yet in spite of having had it for over six months and been prodded numerous times. it was agreed that we were probably going to have to use political influence to get AEP to respond.
10. Norvel Horner will write a letter to the current minister of environment and previous minister Jason Nixon outlining our frustration with AEP not responding to our detailed technical reports.

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

11. we will likely follow this up with a number of letters from members and interested parties to put some pressure on the government to act on this issue.

12. Members suggested that we should point out in our letter that the lakes health is important to a range of society, not just property owners and that we should also be sure to mention the importance of this technology to other stabilization systems particularly Buffalo lake.

13. we had a couple of volunteers to help with a social media campaign to put pressure on the government if they did not respond positively to this letter being Les Laroque and Marc Godin.

14. It was pointed out that the cost of a filter would be approximately \$400,000 and that AEP minister Nixon had said they did not want to fund it so that it will probably be necessary for the society to work with the municipalities around the lake to raise the \$400,000 and get the system installed.

15. The point was made that AEP has fallen down on the maintenance at the provincial park and Ebeling day use area on the South end of the lake and it seems that they reduced their maintenance of the park.

16. It was pointed out that when the AEP redid the boat launch at the South end of the lake that they had a program to fence off the area with silt curtains and that they sampled for fish and apparently took DNA testing and found no evidence of carp present- our Belief is that carp are not yet in lake and we certainly do not want them here. Apparently they are sometimes transmitted by birds ingesting the eggs and then excreting

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

17. Secretary Norval advised that our society had been invited to make a presentation at the next meeting of the stabilization committee which will take place October 28 th . since norval is likely to be out of the country at that time it was agreed that Paul Anderson and Keith Nesbitt would represent our society at the stabilization meeting of the municipalities around the lake.

18. Secretary Norval reviewed emails (see attached) From Alberta Health Services related to their monitoring of beach water quality. There were no exceedances at Gull this year and no closures of any beaches but the only beach they were testing was Ebeling.

19. Alberta Health advised that they adopted more stringent standards for beaches with the lowering in the allowable content of microsystem and the lowering of the cell count. this latter might be a concern for gull as we have previously had Ebeling beach closed due to a high cell count and then also later for an enterococcus exceedance.

20. We then reviewed the potential targets for the society which are covered in the attachment

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

21. One of the items added to the agenda was an update by Rick Assinger on their committee work to look at the extension of sewers around the lake. Rick said this was controversial on the South end of the lake where some community members have spent up to \$30,000 building a new sewage handling system on site for their own property and so they would not be too interested in spending significant money to connect to a sewer system. However the point was also made that some of those old systems at the South end put septic tank effluent right into sand where there's really no treatment that occurs and nutrients eventually get into the groundwater and into the lake. Rick's committee will continue with the work as the sewers that have been built around both Pigeon Lake and Sylvan Lake are probably an example for where it's likely to end up for Gull Lake. It was also pointed out that this is a priority of Lacombe County. It is likely to take very significant government money to make this happen as installing sewers into an existing community where the roads are paved is expensive. Apparently the old council at the Summer Village of Gull Lake (SVGL) was not in favor of this project but the new council is interested. Bentley may have some capacity in their sewage treating system or it's possible that like Sylvan sewage could be piped to Red Deer.

22. One member from the South side of the lake pointed out that she had spent \$28,000 installing what is called a Class B system which actually processes the sewage pretty significantly before releasing it to a field. Director Kent Coleman was familiar with systems of that type which are required at BC lakes and do significant treating of the sewage almost like a tiny municipal plant.

23. It was pointed out that there were no beach closures at Pigeon Lake this year which may be in part due to the installation of the sewers around the lake and the fact that people's septic tank fields no longer feed right into the lake. The reduction in nutrients in the lake is probably reducing the level of blue-green algae.

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

24. Secretary Norval provided an update on the activities of the Alberta Lake Management Society "ALMS" which is an important resource. ALMS completed water testing on 26 lakes in Alberta in 2021 of which Gull was one and showed excerpts from their report which shown which indicate that Gull Lake's water quality was actually steady or improving since first testing was conducted in the 1980's. Our society provided the volunteer boat operators for the testing as we have always done and we have been involved in the testing of the water at Gull Lake since the 1980s. The full ALMS reports are available on their website

25. a motion was proposed by Craig McCloud and Rick Asinger that we should put signage on the various settling pond projects that our society had done so that people recognize them as an important contributor to the water quality of the lake. Craig undertook to proceed with the project using society funds.

26. Election of directors, Paul advised that he was stepping down as president of the society due to other commitments. We decided that we would elect to board of directors and that they would then choose who would serve as officers

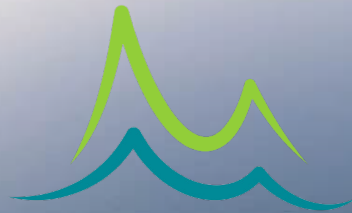
27. The following were nominated to serve as directors Paul Anderson as past president, Other continuing directors were, Norval Horner, Doug Bradley, Lon Kasha, Kent Coleman, Keith Nesbitt, Lance Dzaman, Craig MacCloud and Glenn Fraser, we had two new directors step forward being Mark Godin and Brad Turner. Ray Prins has been very effective in our political efforts to move filtration forward and we expect will continue but did not seem keen on continuing on the board so we did not continue his nomination. Francis Savile was willing to serve but also quite willing to step aside if we had a full slate. In light of having two new directors we did not add he or Ray to the list. Les Larocque and Henry Brander moved that this slate be elected as our directors and the motion was passed.

GLWS 2022 AGM MINUTES

Minutes of the 2022 meeting of the Society. Sept 10, 2022

28. Paul entertained a motion for adjournment approximately noon and thanked everyone for attending and for their interest in this society and their suggestions for the future

29. Attached presentation materials should be considered as part of the minutes.



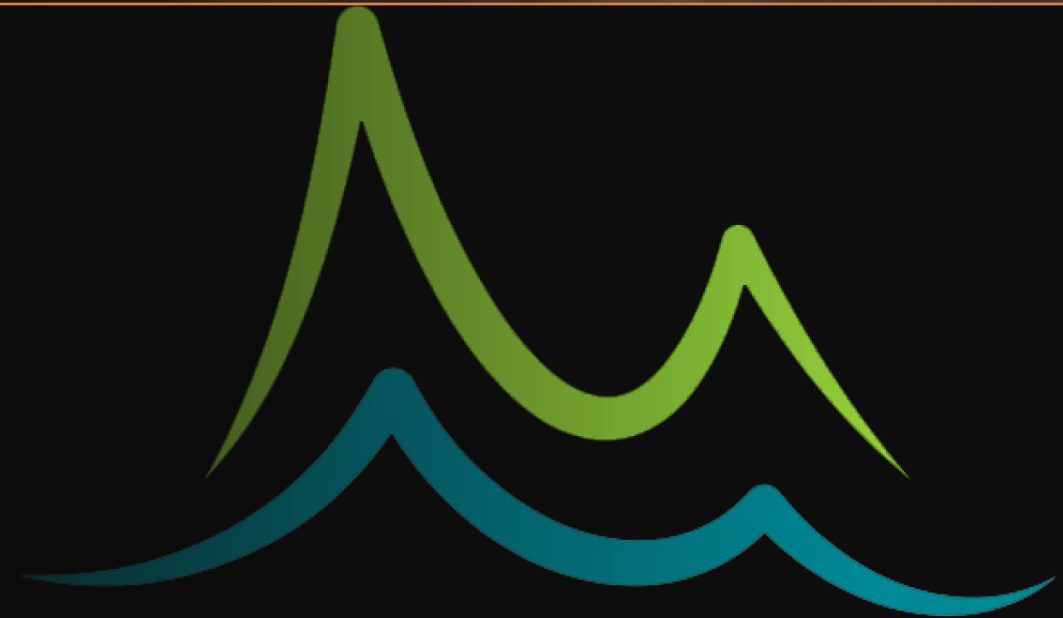
GULL LAKE
WATERSHED SOCIETY

PAUL ANDERSON

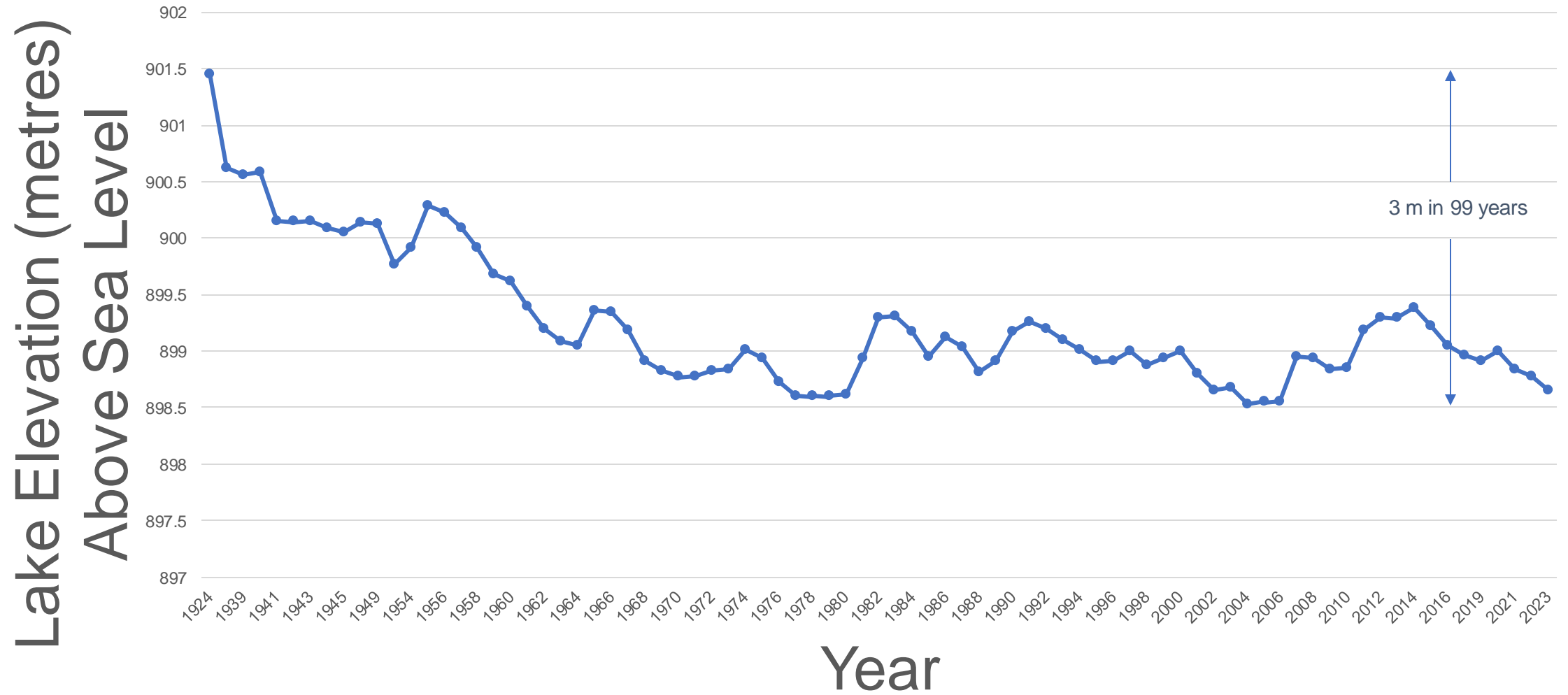
GLWS DIRECTOR

The Stabilization of Gull Lake Filtration System Evaluation

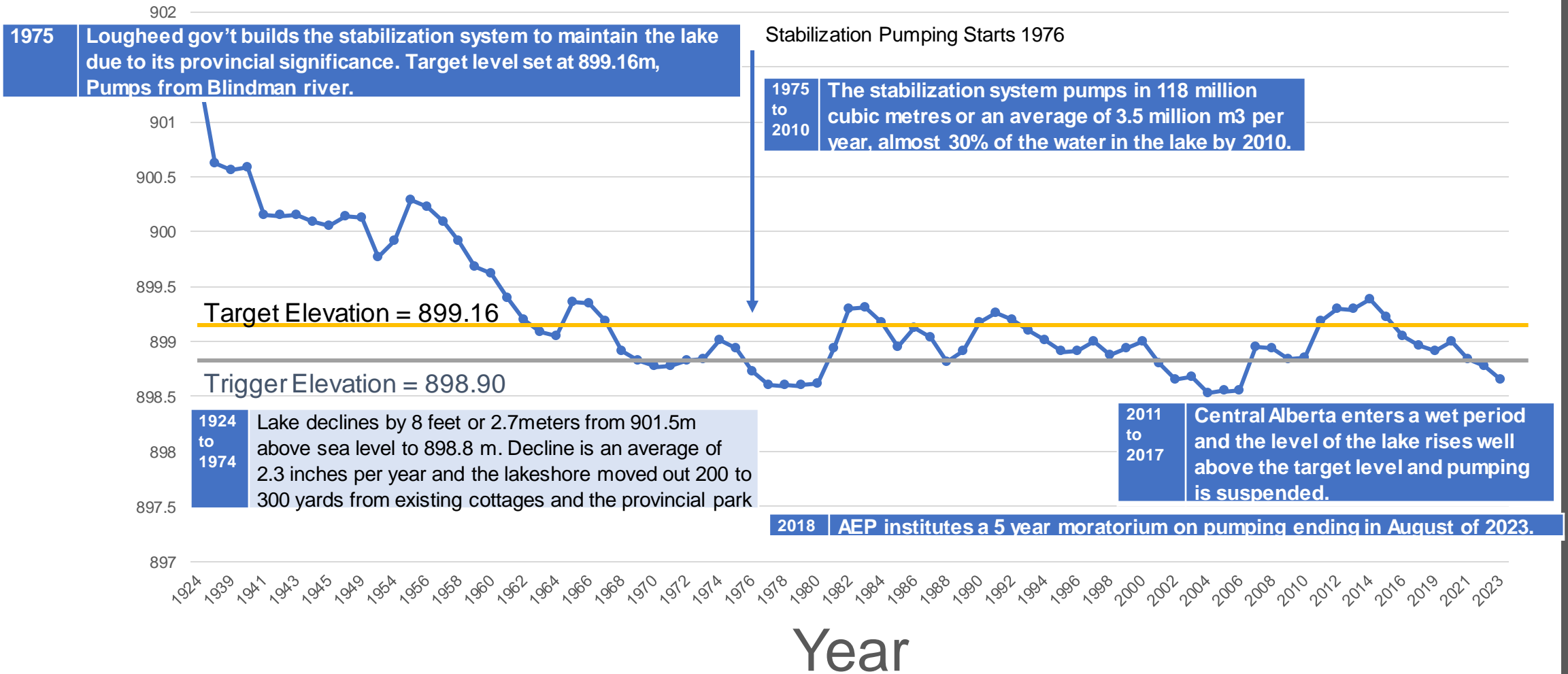
Paul G. Anderson, M.Sc.
Past President
Gull Lake Watershed Society



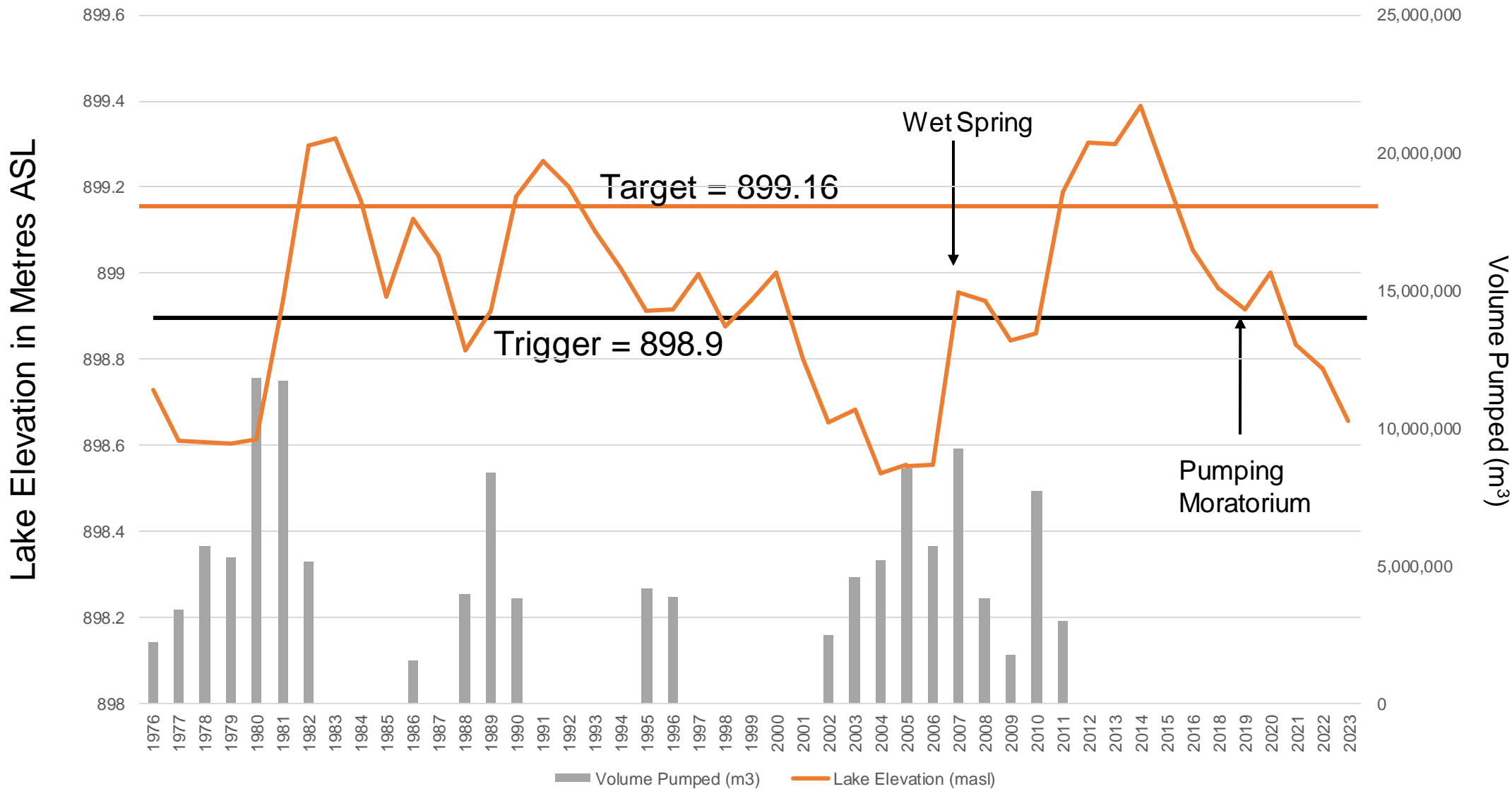
Historical Mean Lake Levels for Gull Lake



Historical Mean Lake Levels for Gull Lake



Water Levels of Gull Lake and Volume Pumped Since Stabilization Began



Invasion of Prussian Carp

Invasive Prussian carp spread from SE irrigation canals to Red Deer and Blindman rivers.

First documented in Red Deer River Watershed in 2017

Incredibly invasive species especially well evolved for invading new areas

Modifies its habitat, making it unsuitable to native species

AEP commissions a study to exclude Carp. The study fails to look at pressurized filtration.

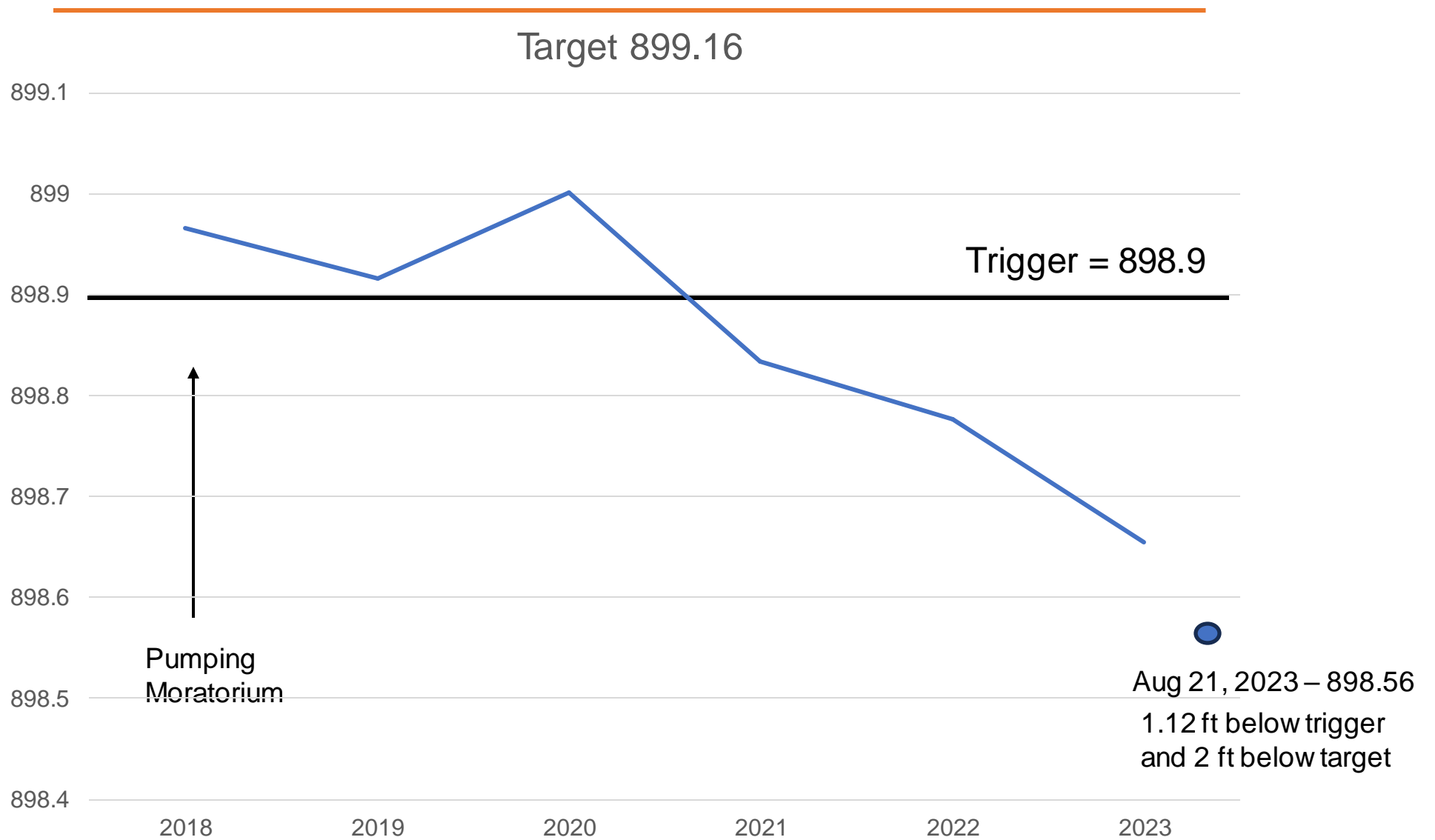
AEP institutes a 5 year moratorium on pumping ending in August of 2023.



Gull Lake Watershed Society urging action on falling lake levels

Filter available to ensure invasive species not pumped into Gull Lake from Blindman River

Lake Elevation in Metres ASL



Historical Monthly Mean Lake Levels for Gull Lake

The History of Lake Stabilization Pumping

For 50 years the lake declined 6 cm per year

Since 1976 the system has pumped 118 million m^3 – 30% of total lake volume

Capacity of pumping system is 11 MM m^3 per year

Average pumped is < 4 MM m^3

Wet period 2011-2016 raised lake 1 foot above target level

Decline since 2016, now 0.60 m below target = 2 feet



Photography by Jeremy Crawford from APPKITT

Impact of Pumping



Photography by Jeremy Crawford from APPKITT

Impact of Pumping – HCL Hydrogeological Consultants 2011

2003-2010 Pumped 46 Mm³, over 94% was still in the lake, raising lake by 2ft.

The AENV model was flawed, overstating evaporation by >70%

New equilibrium 5 m below (~894masl). 1km from boat launch to water's edge.

Benefits of the Diversion Pumping to Gull Lake
Gull Lake, Alberta
Tp 040 to 043, R 27 and 28, W4M and Tp 040 to 043, R 01 and 02, W5M

Prepared for
Gull Lake Water Quality Management Society


Prepared by
hydrogeological consultants ltd. (HCL)
1.800.661.7972


March 2011

Our File No.: 11-105.00

PERMIT TO PRACTICE
HYDROGEOLOGICAL CONSULTANTS LTD.
Signature _____
Date _____ March 21, 2011
PERMIT NUMBER P 385
The Association of Professional Engineers,
Geologists and Geophysicists of Alberta

© 2011 hydrogeological consultants ltd.

 **HCL** groundwater consulting
environmental sciences



Impact of Pumping on Water Quality

Levels of total phosphorus and chlorophyll-a in Gull Lake have not increased significantly since monitoring began thirty years ago, nor has the general mineral content of the lake changed.

The four large streams that enter the southeast side of the lake represent 70% of the external watershed supply of phosphorus, based on 1999 data.

Concentrations in these streams are very high compared with streams elsewhere in the province, contributing higher total phosphorus on a mass load basis.

AN ASSESSMENT OF WATER QUALITY IN GULL LAKE (1999-2000)

Prepared by:

P. Mitchell, M.Sc. P.Biol.
Patricia Mitchell Environmental Consulting

and

Doreen LeClair, B.Sc.
Technologist

Environmental Monitoring and Evaluation
Alberta Environment

May 2003

W0206

Cost Benefit

Gull Lake is major amenity to the area and key driver to development

Approximately 3000 lake properties with total property values exceeding \$1 Billion

Property values and assessments now much higher but are at risk

A 10% decline in property value could easily occur with low lake levels

Lost value translates to reduced taxes and severely reduced tourism



Impacts of Low Water Levels

- Impacts to recreation
 - 2000 Camping Spots
 - Plus > 2000 day use users
 - Beaches
 - Boat launches
 - Marinas
- Impacts to fishery
 - Dewater spawning and nursery beds
 - Loss of habitat
- Impacts to wildlife
 - Loss of nesting habitat for waterfowl



Filtration Project Feasibility

Based on support from previous Env. Minister Nixon and MLA Ron Orr

GLWS undertook pilot testing of various filtration types in 2020

GLWS conducted a demonstration scale project of Forsta Filter in 2021

Many visitors to both Pilot and Demonstration scale projects

Pilot Project demonstrated geofilter was not viable, but backwash filter was effective



Forsta Filter Pilot and Demonstration Project



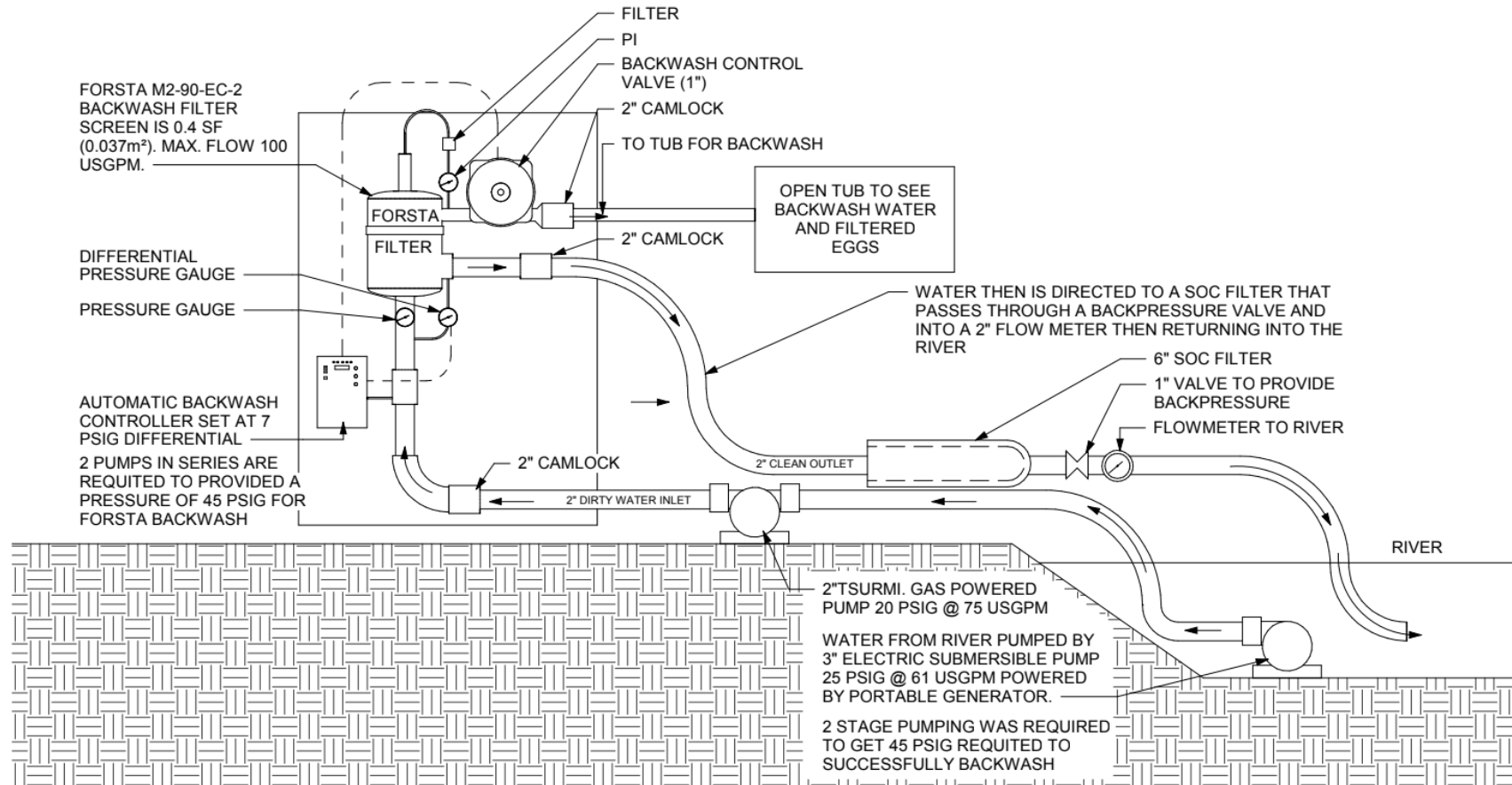
2020 Pilot Scale
Capacity of 100 usgpm or 0.38 m³/min



2021 Demonstration Scale
Capacity of 1000 usgpm or 3.8 m³/min

Forsta Filter Pilot and Demonstration Project

FORSTA TEST FILTER APPARATUS



Filtration Project Feasibility

Projects run by GLWS volunteers including engineers and fisheries biologist

GLWS produced a report of the results of pilot project to AEP

GLWS retain Stantec involvement in testing and production of report

AAI concludes that filtration is viable and passes the report on to other parts of AEP.

AAI would need to submit a formal regulatory application to lift the license suspension



Filtration Project Efficacy

“It is Stantec’s opinion that a properly designed pressurized filtration system operated with the failure mitigation methods outlined will be 100% successful in avoiding the transference of Prussian Carp or their eggs to Gull lake through the stabilization pumping system”.

Stantec Report – February 2022

Stantec also suggests modernization of the pumping station to reduce power cost.



Gull Lake Watershed Society
Filtration System Evaluation and
Conceptual Design

Final Report

February 1, 2022

Prepared for:

Gull Lake Watershed Society
“GLWS”

Prepared by:

Stantec Consulting Ltd



Forstra Filter Full Scale Design

- Full scale filter capacity is 5,000 usgpm (19 m³/min)
- In our case we would expect to use a triple filter on a single header built by Forsta to handle the 15,000 usgpm (53 m³/min) pumping capacity
- >\$165,000 for filtration equipment
- ~\$500,000 total project costs



Full Scale Filter
Capacity of 5,000 usgpm or 19 m³/min per filter

Timeline of the Gull Lake Stabilization System

History of Lake Stabilization Pumping at Gull Lake

1924 to 1974	Lake declines by 8 feet or 2.7meters from 901.5m above sea level to 898.8 m. Decline is an average of 2.3 inches per year and the lakeshore moved out 200 to 300 yards from existing cottages and the provincial parks.
1975	Lougheed gov't builds the stabilization system to maintain the lake due to its provincial significance. Target level set at 899.16m, Pumps from Blindman river.
1975-2010	The stabilization system pumps in 118 million cubic meters or an average of 3.5 million m ³ per year, almost 30% of the water in the lake by 2010.
1998	Gull lake Water Quality Management Society formed, name later changed to GLWS- works with AEP on sampling streams and studying lake water quality
2010	AEP advises that due to budget cuts they will no longer fund the power for pumping although they will maintain the system.
2011	GLWS Funds report by Hydrological Consultants Ltd. which concludes that without stabilization the lake will resume its old level of decline. The four municipalities around the lake agree that they will pick up the power cost.
2011 to 2017	Central Alberta enters a wet period and the level of the lake rises well above the target level and pumping is suspended.
2012 to 2022	GLWS completes a number of projects with partners to reduce the flow of nutrients into Gull Lake, such as settling ponds and stream bed protection.
2017	Invasive Prussian carp spread from SE irrigation canals to Red Deer and Blindman rivers.
2018	AEP commissions a study by ISL Engineering to exclude Carp from the suction of the stabilization pumps. The study looks at various methods but fails to look at pressurized filtration downstream of the pumps which is used elsewhere.
2018	AEP institutes a 5 year moratorium on pumping ending in August of 2023.

Timeline of the Gull Lake Stabilization System - GLWS - WNH July 2023

Recent Summary of GLWS Activities to Lift Suspension of License for Lake Stabilization Pumping at Gull Lake

2020	Lambourne Environmental suggests that pressurized filtration could prevent transference of Carp. GLWS presentation to minister Nixon who directs his staff to work with us pilot testing pressurized filtration at the stabilization site. Pilot testing carried out of two filtration systems and the Forsta filter succeeds. AEP staff, MLA Orr, AEP Minister Nixon and Premier Kenny witness some of the successful tests.
2021	In cooperation with AEP operations GLWS carries out large scale testing of the Forsta pressurized backwash filter and it passes with flying colors. Tests are witnessed by several AEP staff. GLWS retain Stantec engineering to participate in the testing and provide a report on the reliability of pressurized filtration.
2022	February - Stantec Engineering issues their report and concludes that. "It is Stantec's opinion that a properly designed pressurized filtration system operated with the failure mitigation methods outlined will be 100% successful in avoiding the transference of Prussian Carp or their eggs to Gull lake through the stabilization pumping system". Stantec also suggests modernization of the pumping station to reduce power cost.
2022	In the next few months AEP operations concludes that filtration is viable and passes the report on to other parts of AEP. However no formal response has been received from the regulatory branch of AEP.
2022	GLWS writes to then new AEP minister Issik and MLAs Orr and Nixon about moving ahead with pressurized filtration.
2022	October - without stabilization the lake declines to 898.64 meters or nearly 20 inches below target level and beaches move out more than 100 meters at the provincial park.
2023	March - former MLA Ron Orr advises AEP will not approve filtration but did not provide significant reasons. Our impression is that AEP, like many organizations, suffers from the "not invented here syndrome" or perhaps they're concerned about being blamed as it's likely the carp will get in the lake eventually through a careless boater or a gull or duck excreting viable eggs.
2023	MLA Orr Advises that stabilization operations has been transferred to Alberta Agriculture and Irrigation. GLWS writes to Min. Horner who asks staff to look at it.
2023	June - Agriculture Operations suggest they are considering applying to AEP regulatory side for lifting of the suspension and installation of filtration.
2023	August 31 - GLWS to meet with Agriculture Operations to finalize content of AEP regulatory application to lift suspension by installation of filtration.

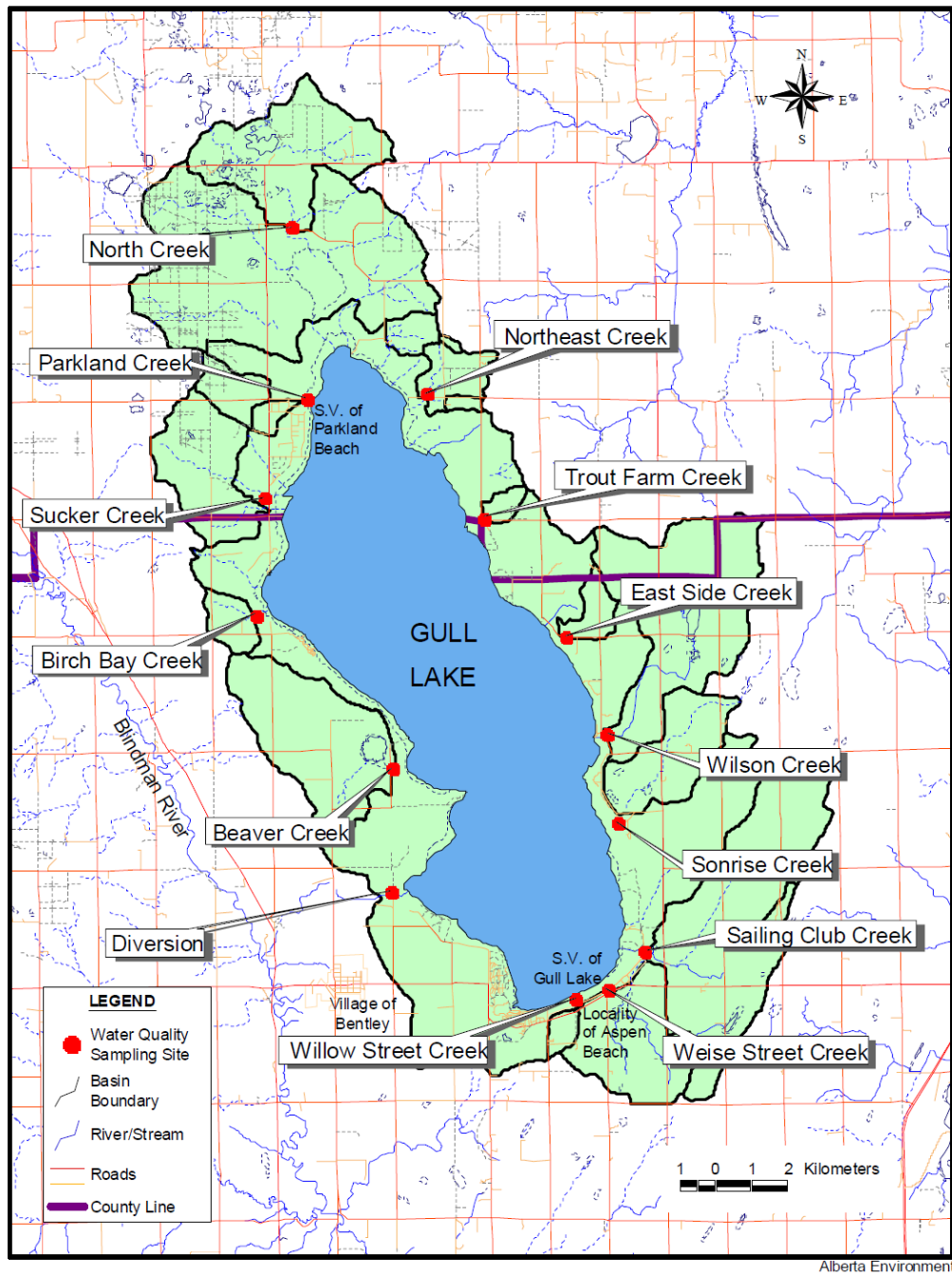


Figure 1 Location of water quality sampling sites on streams in the Gull Lake study area, 1999-2000

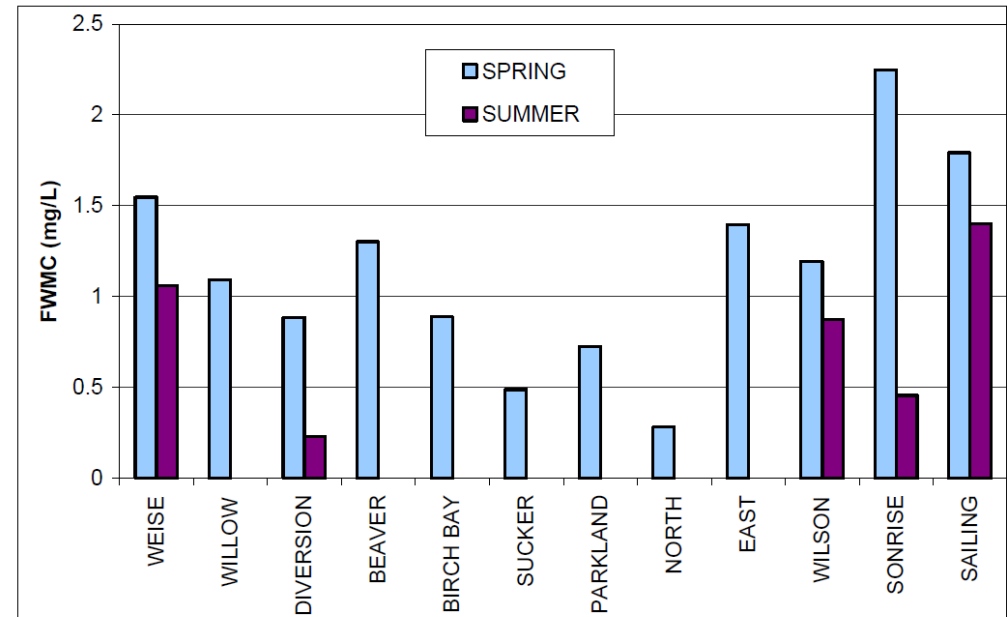
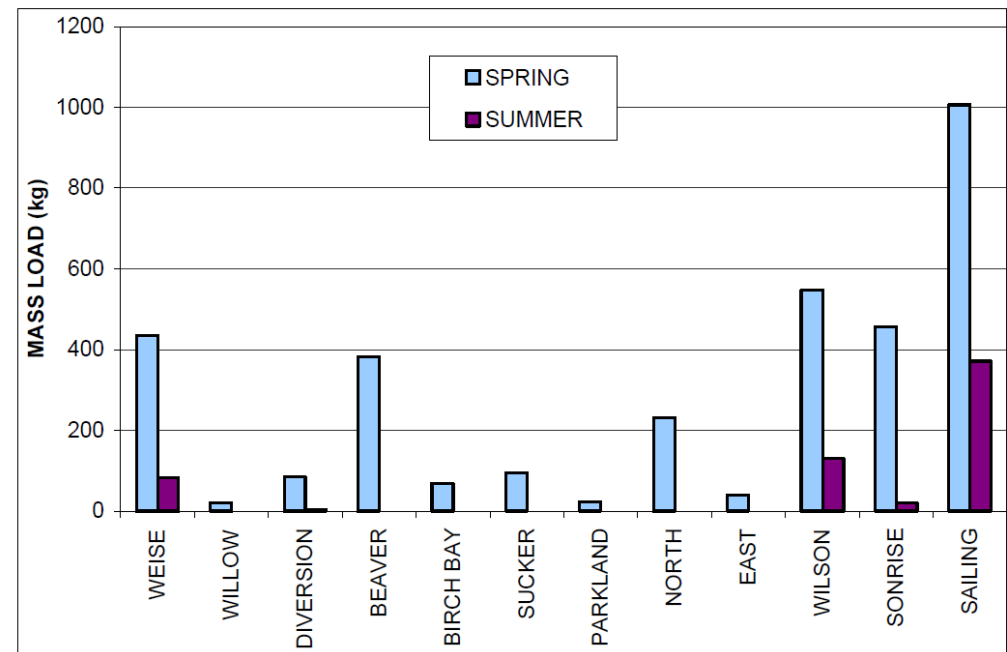


Figure 7 Mass loads and flow-weighted average concentrations of total phosphorus in Gull Lake streams monitored during 1999

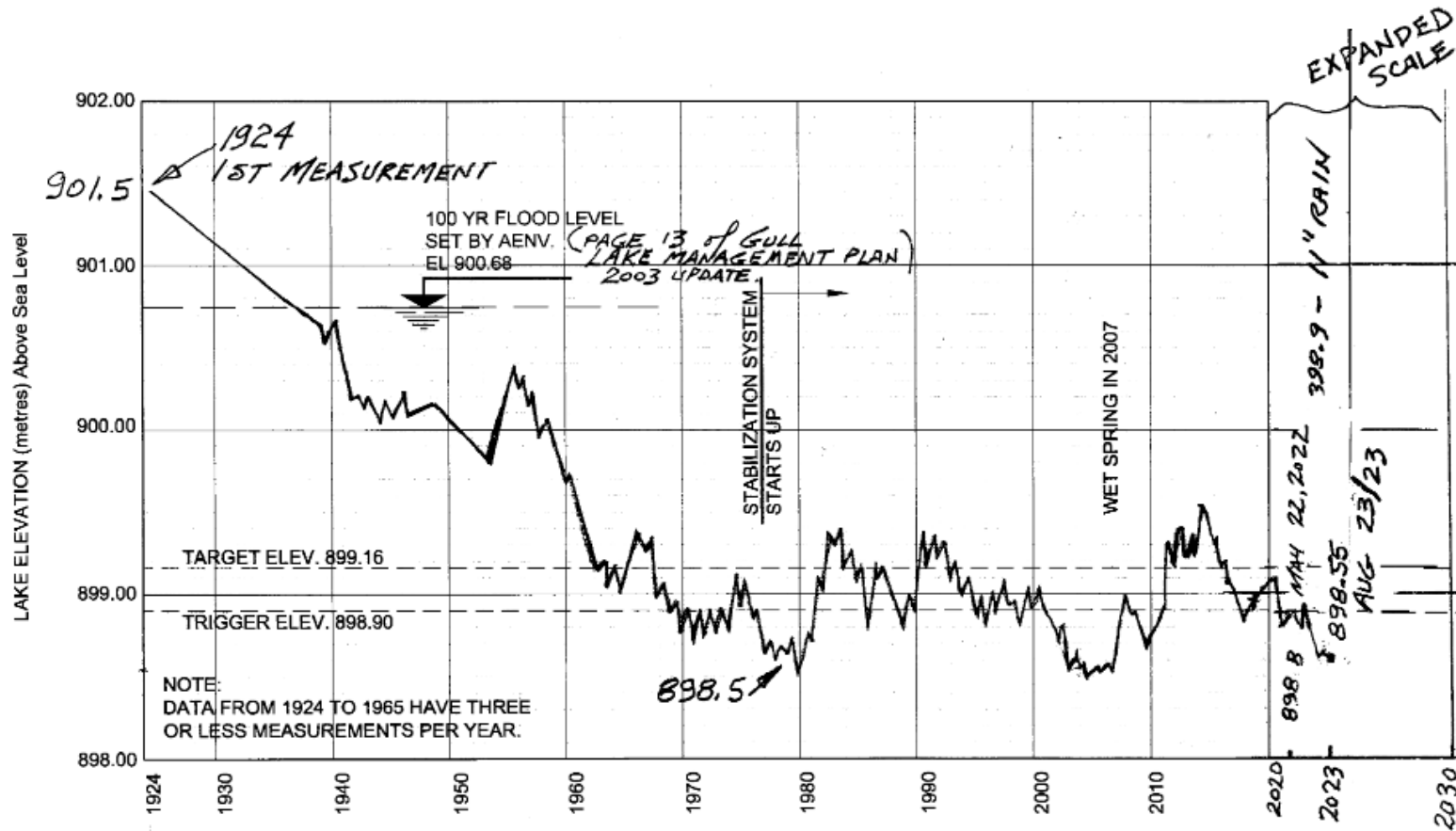
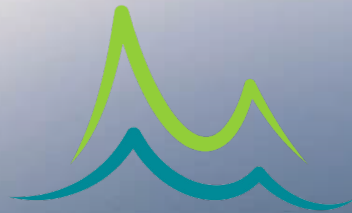


Figure 1

**Historical Monthly Mean Lake Levels
For Gull Lake**



Gull Lake Watershed Society



GULL LAKE
WATERSHED SOCIETY

CRAIG MACLEOD

GLWS SECRETARY

PROJECT #1. Meridian Beach Flood control/settling pond:

Purpose and Outcome of Project:

This project will help alleviate flooding that has historically happened in the community of Meridian Beach due high and unpredictable flows in spring runoff and provide a renewed natural area of filtration and settling of suspended solids (carrying very high amounts of nutrients) coming into Gull Lake.

Norval Horner, the Landholder has agreed to use this land for this purpose instead of agricultural for the common good of the community and lake

- The land is not on a defined stream bed or historical wetlands therefore no approvals necessary for expedient construction on project
- This overland water flow that this settling pond is designed to intercept has a poor water quality as evidenced in our April of 2018 water sampling where it tested over 2 mg/L phosphorus. (***this is over 42* the historical recommended limit up to 2014 of 0.05 mg/L from Alberta Environment and the EPA in the US***)
- This is a very large overland water flow from spring runoff which in the past has overwhelmed our Meridian Beach ditch and culvert system and led to serious flooding damage to 3 cottages at 221, 225 and 229 canal street. This happened in 2016 and very nearly again in the next two years.

Meridian Beach Settling natural area:

Cost Estimate \$48,169.80

ACTUAL

Total Estimates

Contributions to Project:

Norval Horner est.

(\$3000)

Northside Construction in kind est.

(\$5000)

Total Cash Cost

\$31,202.82



Prins Stream and Wetlands restoration continued;



Above: Map of fenced and now protected creek; *Below:* Harvey Prins standing beside new fence along protected creek and restored approx. **4 acres of wetlands.** This will result in lower phosphorus and nitrogen loading into Gull Lake and allow the water to be filtered by natural grasses and reeds in this set aside area. No agriculture will be done in this area going forward.



3.) Gull Lake South Project

Est. of project

\$40,250+GST

Actual Cost

\$43,303.70

Contribution Northside Construction

(\$3053.70)

Construction cost

\$42,262.50

Survey/Engineering etc

\$3184.27

TOTAL CASH COST

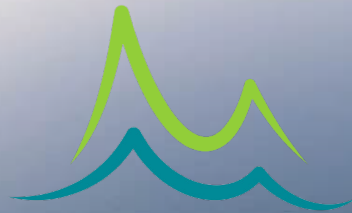
\$45,446.77

Purpose and Outcome:

A settling area was established for high nutrient water flowing from the SE Gull Lake watershed to help settle suspended solids and slow down the flow into the lake this highly sensitive area. The Summer Village of Gull Lake owns this land and designated it entirely for this project.

Below: New settling pond to slow down flow of nutrient rich water into Gull Lake and help settle suspended solids (Bottom: permit from Alberta Transportation)

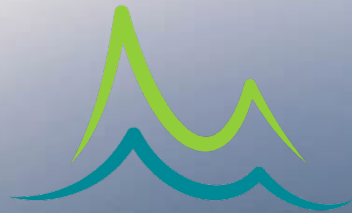




GULL LAKE
WATERSHED SOCIETY

GLENN FRASER

GLWS DIRECTOR



GULL LAKE
WATERSHED SOCIETY

LON KASHA
GLWS DIRECTOR

Paskapoo Fresh Water Aquifer

- **The objective is to identify and confirm a deep fresh water aquifer (lower Paskapoo) for source water to feed into Gull Lake.**
- The Paskapoo is a renowned fresh water resource and has been intensively researched by several provincial and federal agencies.
- The Paskapoo formation is the top of bedrock beneath much of west central and southwest Alberta.
- The Paskapoo covers an area more than 65,000 km².
 - The Geological Survey of Canada estimates the Paskapoo at over 100,000 km² and the “most significant source of ground water in Alberta”.
 - Comparatively, the surface area of Lake Superior is 82,100 km².
- The Paskapoo has constant recharge in western Alberta and is sustainable over the long term.
- The upper Paskapoo is the primary source of potable well water over a large area of Alberta.

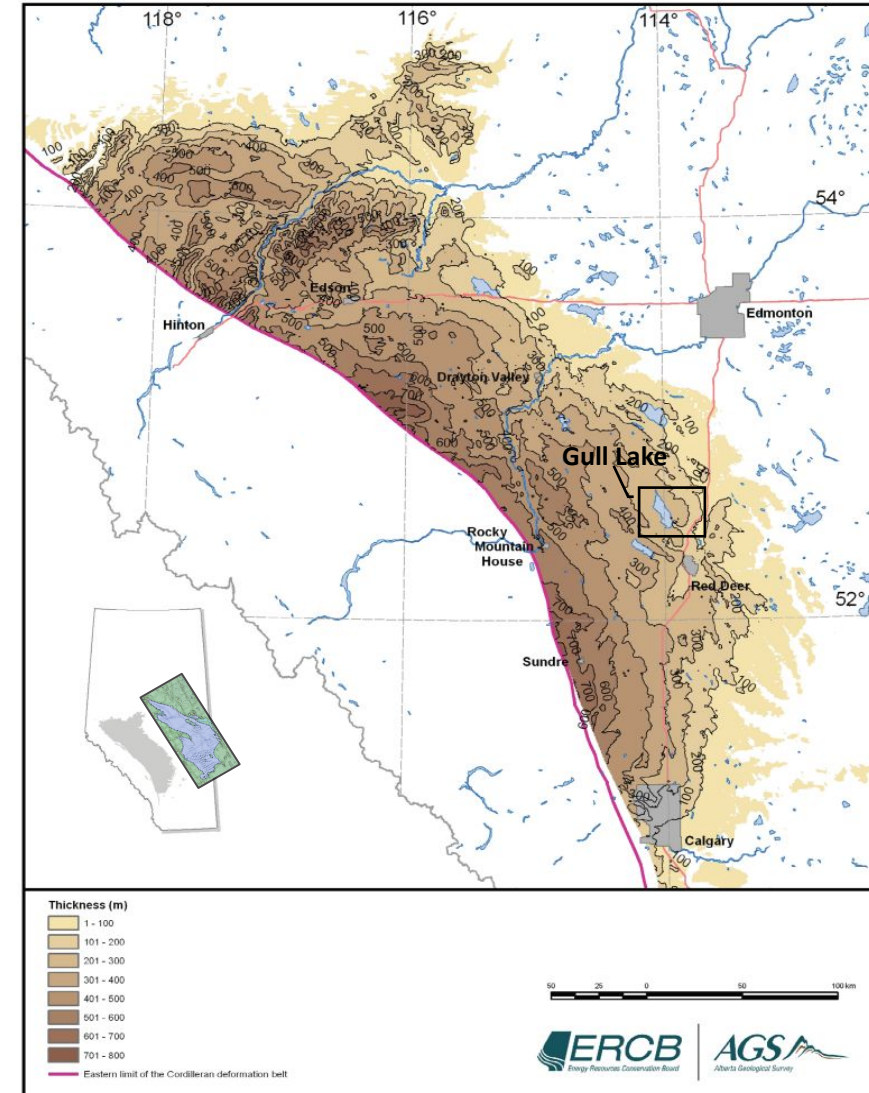


Figure 4. Thickness (isopachs) of the Paskapoo Formation, central Alberta.

Paskapoo Formation Layers

- The Paskapoo formation is segregated into two groups, the upper Paskapoo and the lower Paskapoo.
- The upper Paskapoo contains the Dalehurst member and Lacombe member.
- The upper Paskapoo is the top of bedrock from Lacombe west to the mountains.
- +99% of all water wells are producing from the upper Paskapoo.
- The lower Paskapoo contains the Haynes member.
- The lower Paskapoo is the top of bedrock from east of Lacombe to the Alix area.

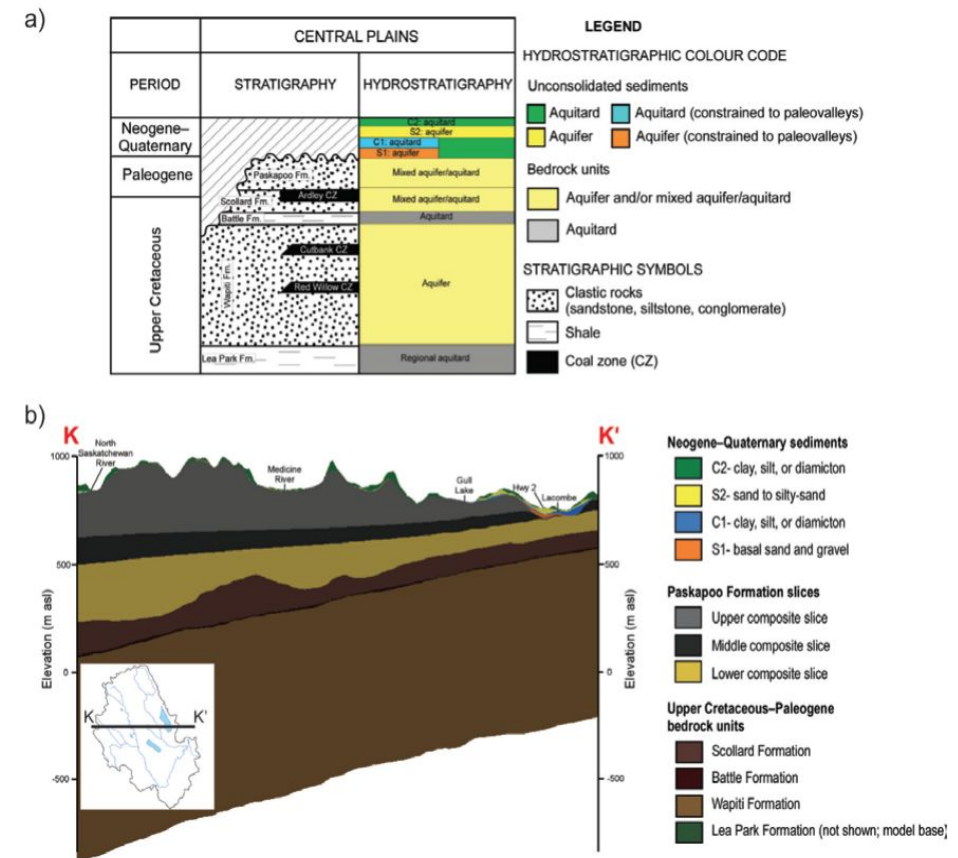


Figure 4. Hydrostratigraphy of the Sylvan Lake sub-basin (SLSB), central Alberta, from Atkinson and Glombick (2015a): a) hydrostratigraphic column and b) cross-section through the SLSB showing dipping bedrock and overlying Neogene-Quaternary sediments. The Paskapoo Formation was divided into three hydrostratigraphic units based on sandstone abundance.

Paskapoo Water Well Information

- The upper Paskapoo is the main fresh water aquifer for the lakes, rivers, springs and well water supply in the area of Gull Lake.
- The Haynes depth is ~200 meters and is +50 meters thick of clean sand.
- The Haynes has proven high volume sustainable wells.
- The Haynes has minimal competitive usage around Gull Lake.
- Per Well Cost estimates are ~\$150,000 - \$200,000 equipped

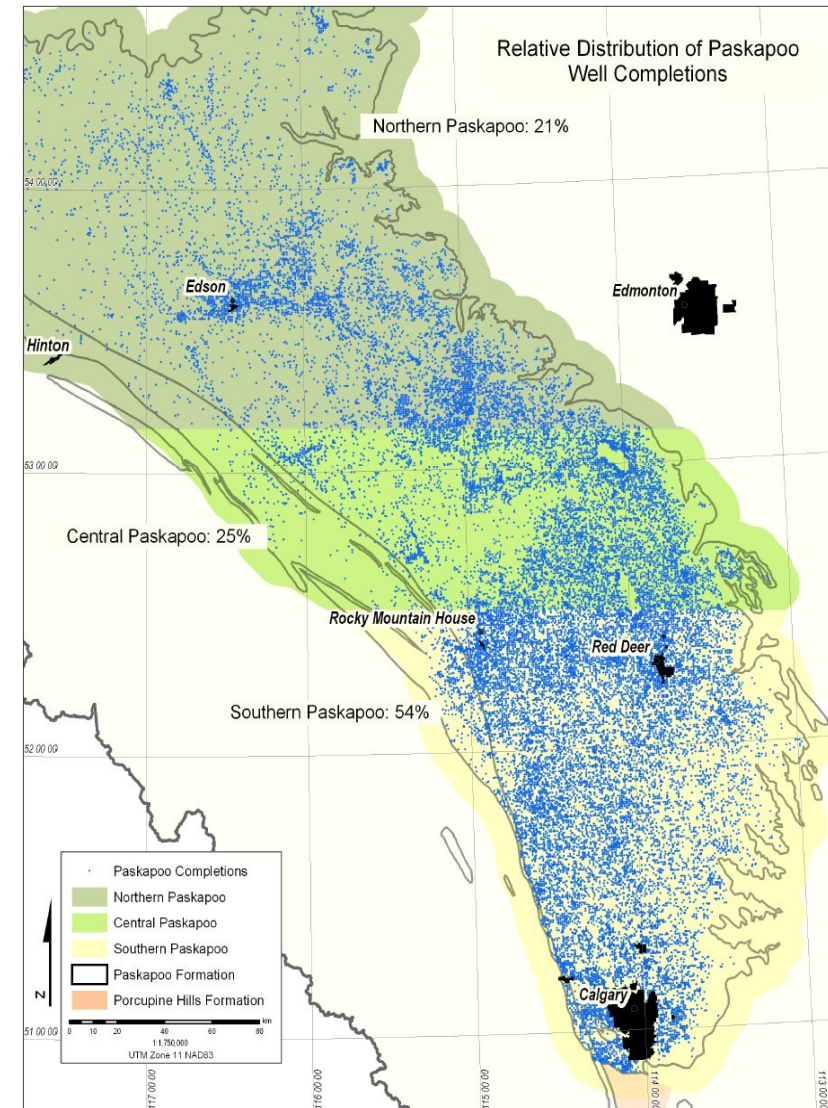


Figure 1a. The Relative distribution of well completions in the Paskapoo Formation indicates a higher density of wells to the south.

Paskapoo Well Data

- The Haynes has high quality fresh water with low TDS 500-1000 ppm in the Gull Lake area.
- The Haynes appears to be a different pressure system compared to the upper Paskapoo based on static fluid level measurements.
- Potential for multiple wells around Gull Lake
- Water wells could be strategically placed
 - discharge points near the lake to eliminate pipelines.
 - water wells can be placed near power sources.
 - near roads with year round access.
- Engage Hydrogeological Consultants
 - Map aquifer from water well and gas well data
 - Confirm area aquifer quality from existing well data.
 - Obtain water samples from existing Haynes sources.
 - Perform chemical analyses
 - compatibility studies
 - fish mortality study

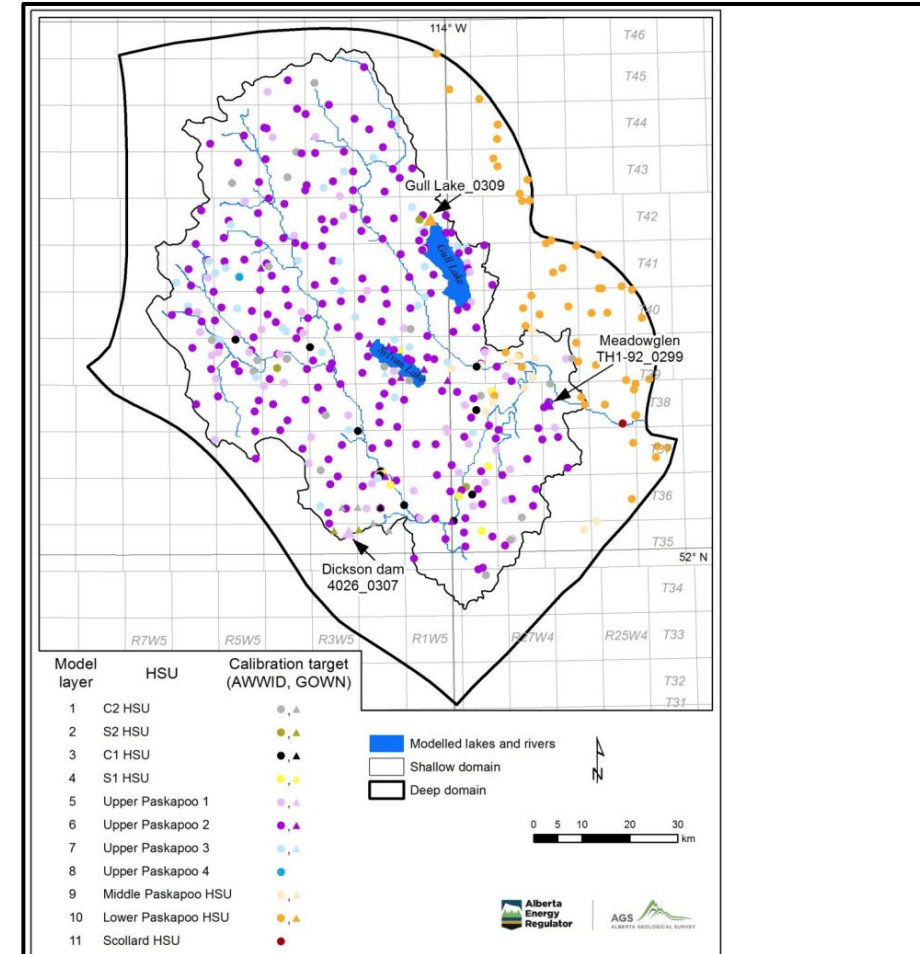


Figure 12. Steady-state calibration targets for the Sylvan Lake sub-basin, central Alberta. The three labelled Groundwater Observation Well Network (GOWN) wells are also used as observation points in the transient model. Abbreviations: AWWID, Alberta Water Well Information Database; HSU, hydrostratigraphic unit.

Initial Well Locations

- Meridian Beach
 - Three phase power
 - Existing Upper Paskapoo observation well
 - Year round access
 - Discharge into canals
- Raymond Shores
 - Three phase power
 - Existing Upper Paskapoo observation well
 - Year round access
- Summer Village Parkland Beach
 - Three phase power
 - Roads near the lake.
 - Discharge into Marinas.
- Birch Bay
 - Three phase power proximity
 - Roads near the lake.
 - Existing Upper Paskapoo observation well
 - Discharge into Marinas.
- Range Road 284 Aspen Beach Provincial Park
 - Three phase power
 - Road near the lake.
 - Discharge into wetland within Provincial Park
- Original Blindman Pumping Canal
 - Three phase power
 - Road near the lake.
 - Discharge into existing canal
- Sandy Point
 - Three phase power proximity
 - Roads near the lake.
 - Discharge into Marina.



Benefits and Risks Sourcing Haynes Water for Gull Lake.

HAYNES BENEFITS

- Massive fresh water resource.
 - Massive in size and constantly being recharged (sustainable).
 - Volumes required are insignificant to the overall aquifer size.
- Comparable to the upper Paskapoo water sources for population use, aquifer for lakes, rivers and wetlands.
 - Low nutrient pristine fresh water.
 - Dilution of nutrient rich surface water.
 - Crystal clear potable water source (original lake water pre-1900).
- Potential to recharge the water table in proximity to Gull Lake.
 - Benefit to the area water wells.
 - Potential future irrigation.
 - The water stays in the hydrological cycle.
- Non competitive as a source for potable water
 - Non competitive with natural water body source supplies
 - Sylvan Lake, Gull Lake, Blindman River, natural wetlands.
- Wells can be located adjacent to county roads
 - Year round access.
 - Water hydrant loading connections could be installed at water wells
 - emergency and potable water supply.
 - rapid water loading capability.

RISKS and MITIGATIONS

- Low deliverability (low risk)
 - Utilize technology for optimum well locations
 - Maximize formation exposure
 - Drill additional smaller bore wells
 - move locations and drill new test well
- Non compatible water (low risk)
 - Indicates areal contamination
 - Abandon test well and move locations
- Limited extent to reservoir sand bodies (low-medium risk)
 - Utilize technology for optimum well locations identification
 - Obtain adequate flow data from initial test wells to determine reservoir quality and extent
- Ice Complications in winter months (medium risk)
 - Seasonal Flow (from April to December)
 - Strategically place lake entry points (marinas).
 - Adequate warning with signage
- Coal seams could produce methane gas (low risk).
 - Isolate coal seams in producing wells

Strategic Planning

Initial Phase

- Engage Hydrogeological Consultants
 - Map aquifer from water well and gas well data.
 - Confirm area aquifer quality from existing well data.
 - Identify existing water licenses around Gull Lake area.
 - Obtain water samples from existing Haynes sources
 - Perform chemical analyses.
 - compatibility studies.
 - fish mortality study.
 - Identify well locations
 - Roads near the lake.
 - Three phase power adjacent to locations for +1000 m³/day pumping.
 - Natural drainages flowing into the lake, the closer to the lake the better.
 - Marinas / canals.
 - Confirm locations with geology and geophysics if available.
 - Cost estimated for study \$15,000 - \$20,000.
 - Cost for geophysics to be determined.

Well Pair Configuration

- Drill 177mm (7 inch cased) wells
 - Cost estimated \$70/foot.
 - Surface casing set to approx. 200 meters to isolate upper Paskapoo
 - Drill main hole to base of Haynes formation
 - Obtain geological information during drilling
 - Obtain water sample for chemistry and compatibility confirmation
 - Test well for sustainable deliverability
- Possibly drill large diameter (222mm – 406mm) producer well based on test well inflow.
- Observation well deliverability potential and power source for producer well determines producer casing size.
 - 3 phase power allows for +3000 m³/day, requires 273 mm (10³/₄"") production casing
 - Single phase power allows up to 1000 m³/day, requires 177 mm (7") production casing
- Cost estimate \$200,000 - \$400,000 per well pair
 - Producer equipped with pump \$150,000 - \$300,000 (size dependent).
 - Observation well with monitoring equipment.

Supplemental Slide – Haynes Member Mapping

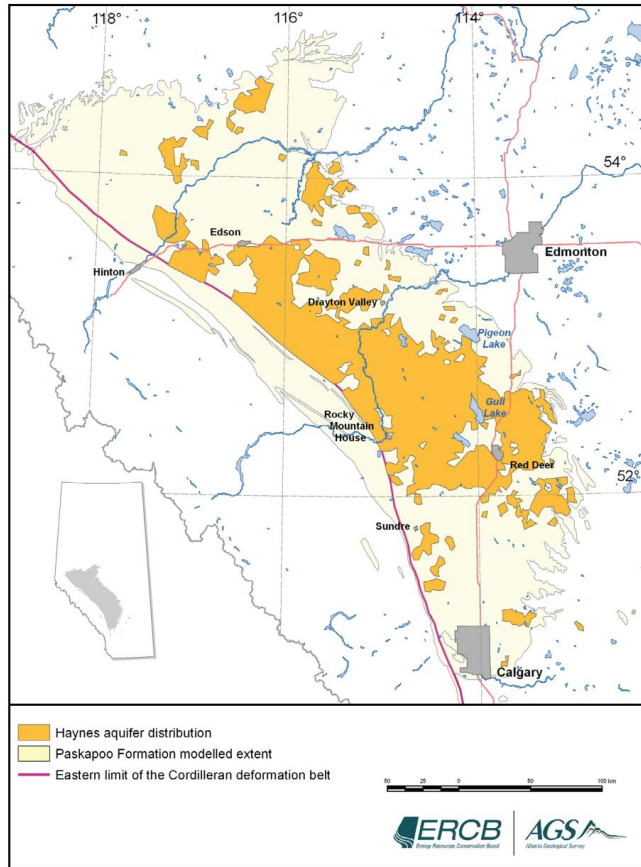


Figure 50. Distribution of the Haynes aquifer. The figure is a composite of the >55% sandstone distribution of the first five 25 m thick slices above the base of the Paskapoo Formation.

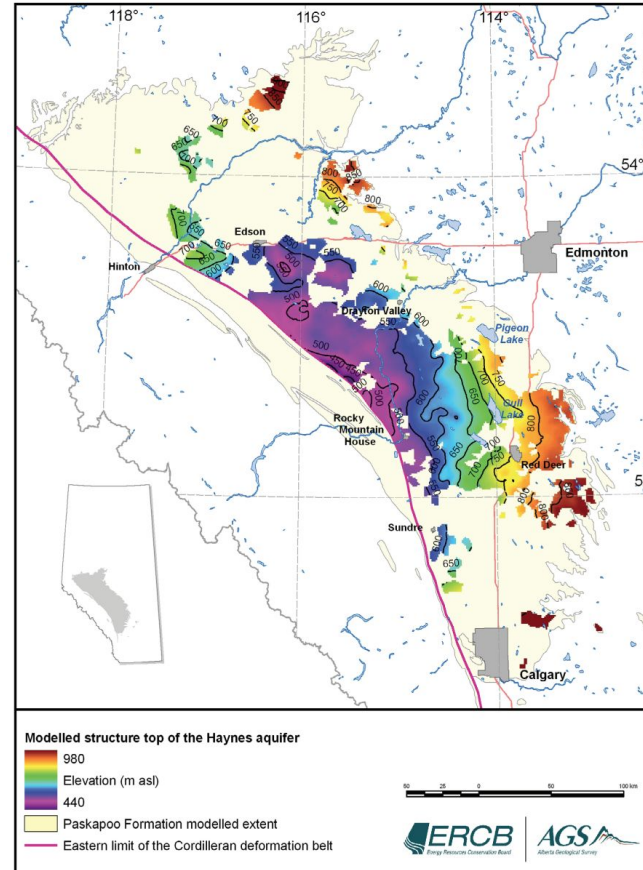


Figure 53. Elevation of the upper surface of the Haynes aquifer.

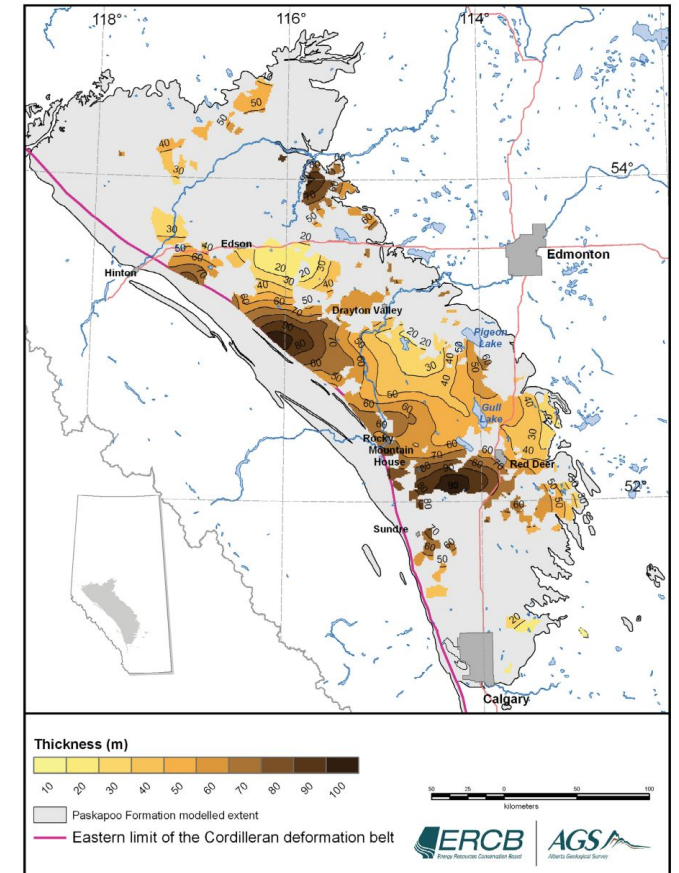


Figure 54. Thickness (isopachs) of the Haynes aquifer.

Supplemental Slide – Hydrogeological Consultants Paskapoo Study

5.3.8 Haynes Aquifer

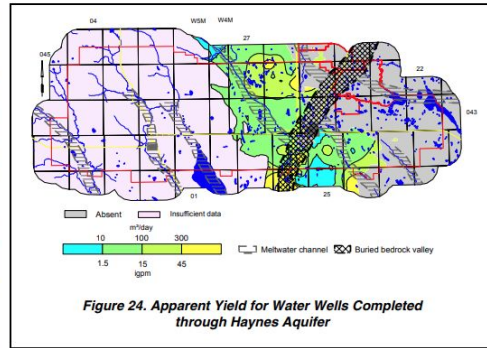
The Haynes Aquifer comprises the permeable parts of the Haynes Member, as defined for the present program. Structure contours have been prepared for the top of the Haynes Member. The structure contours show that the Haynes Member ranges in elevation from less than 600 to more than 880 metres AMSL and has a maximum thickness of 50 metres.

5.3.8.1 Depth to Top

The depth to the top of the Haynes Member ranges from less than 20 metres below ground surface at the eastern extent to more than 400 metres in the western part of the County (page A-43). The non-pumping water level in the Haynes Aquifer is downgradient to the northeast and southwest toward the Battle River (see CD-ROM).

5.3.8.2 Apparent Yield

The apparent yields for individual water wells completed through the Haynes Aquifer are mainly in the range of 10 to 100 m³/day. Nearly 50% (55) of the 115 water wells completed in the Haynes Aquifer have apparent yield values that are greater than 100 m³/day. There are no dry water test holes that are completed in the Haynes Aquifer.



There are 63 non-exempt groundwater users that have water wells completed through the Haynes Aquifer, for a total authorized groundwater diversion of 775 m³/day.

The highest allocations total 226 m³/day for two water source wells in NW 10-044-26 W4M licensed to divert groundwater for agricultural purposes. Of the 63 non-exempt authorizations, 35 could be linked to water wells in the AENV groundwater database.

An extended aquifer test conducted with a water source well completed in the Haynes Aquifer in NE 28-043-26 W4M indicated a long-term yield of 200 m³/day, based on an effective transmissivity of 41.3 m²/day and a corresponding storativity of 0.0001 (HCL, Jun-2002).

5.3.8.3 Quality

The groundwaters from the Haynes Aquifer are mainly a sodium-bicarbonate type (see Piper diagram on CD-ROM), with 75% of the values having TDS concentrations ranging from 500 to 1,000 mg/L (page A-45). The sulfate concentrations in groundwaters from the Haynes Aquifer are mainly less than 250 mg/L. The chloride concentrations from the Haynes Aquifer are mainly less than ten mg/L. There is only one analysis where the fluoride concentration exceeds 1.5 mg/L.

7) Haynes Aquifer

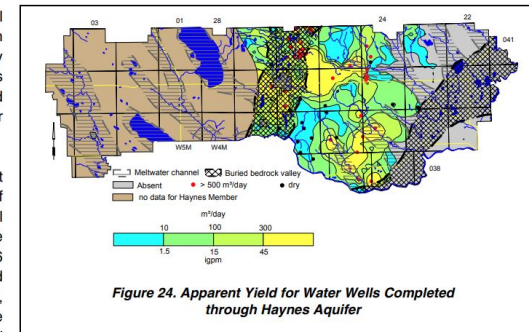
The Haynes Aquifer comprises the porous and permeable parts of the Haynes Member that underlies the Lower Lacombe Member. The Haynes Member subcrops under the surficial deposits in a small part of the Buried Red Deer River Valley, and further west in range 24, W4M in the County. Structure contours have been prepared for the top of the Member, which underlies most of the County. The structure contours show the Haynes Member having an average thickness of in the order of 40 metres.

i) Depth to Top

The depth to the top of the Haynes Member ranges from less than ten metres below ground level where the Member subcrops in the eastern part of the County to more than 300 metres in the western part of the County.

ii) Apparent Yield

The apparent yields for individual water wells completed through the Haynes Aquifer mainly exceed 100 m³/day. Water wells with higher yields are expected mainly in areas where linear bedrock lows are present.



An extended aquifer test conducted with the Town of Lacombe Water Supply Well (WSW) No. 5A completed in the Haynes Aquifer in 12-19-040-26 W4M indicated a long-term yield of more than 1,100 m³/day, based on an effective transmissivity of 50 m²/day and corresponding storativity coefficient of 9.4×10^{-4} (HCL, 1994). However, since this water well was a replacement well for WSW No. 5, and the Town's groundwater supply needs did not require an increase, the existing licence authorizing 460 m³/day was transferred to WSW No. 5A.

In the County, there are 63 licensed water wells that are completed in the Haynes Aquifer, with a total authorized groundwater diversion of 6,050 m³/day. Of the 6,050 m³/day authorized to be diverted from the Haynes Aquifer, the Town of Lacombe has seven water supply wells that are authorized to divert 4,532 m³/day. The Town of Blackfalds has a water supply well completed in the Haynes Aquifer authorized to divert 187 m³/day.

iii) Quality

The groundwaters from the Haynes Aquifer are mainly a sodium-bicarbonate-type (see Piper diagram on CD-ROM). Total dissolved solids concentrations are expected to range mainly from 500 to 1,000 mg/L, with lower concentrations expected near the Town of Blackfalds and at the northeastern edge of the Aquifer. The sulfate concentrations are mainly below 500 mg/L, with lower concentrations expected near the towns of Lacombe and Blackfalds. The chloride concentrations in the Haynes Aquifer are expected to be mainly less than ten mg/L. There are 11 out of 59 analyses where fluoride concentrations exceed 1.5 mg/L.

Groundwaters from the Town of Lacombe WSW No. 5A have a TDS concentration of 580 mg/L, a sulfate concentration of 3 mg/L, and a chloride concentration of 10 mg/L. The groundwater from this water supply well is a sodium-bicarbonate-type (HCL, 1994).

Supplemental Slide - Structural Cross-Section of the Paskapoo near Gull Lake

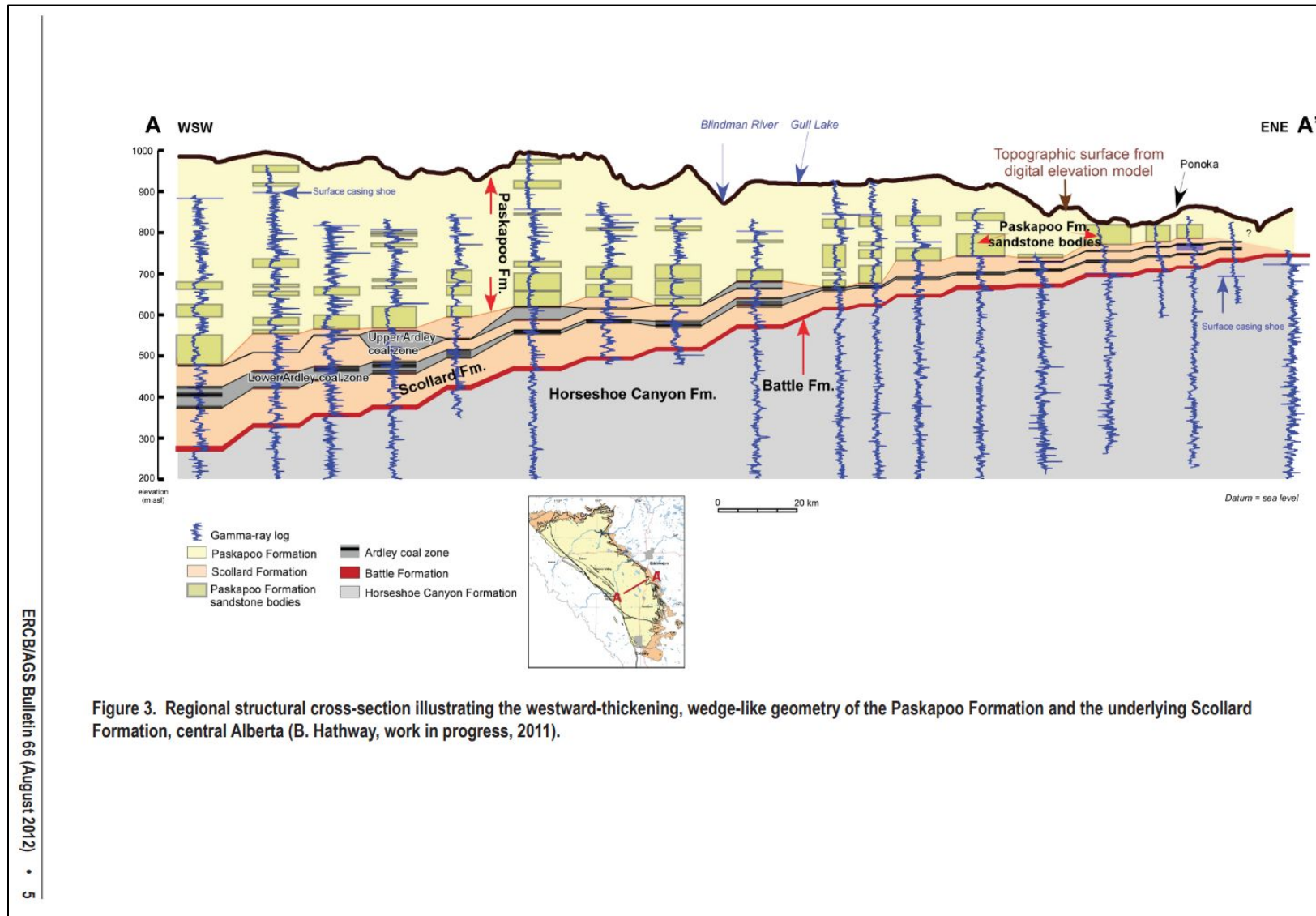


Figure 3. Regional structural cross-section illustrating the westward-thickening, wedge-like geometry of the Paskapoo Formation and the underlying Scollard Formation, central Alberta (B. Hathway, work in progress, 2011).

Supplemental Slide - Structural Cross-Section of the Paskapoo near Gull Lake Identifying Well Source for Information

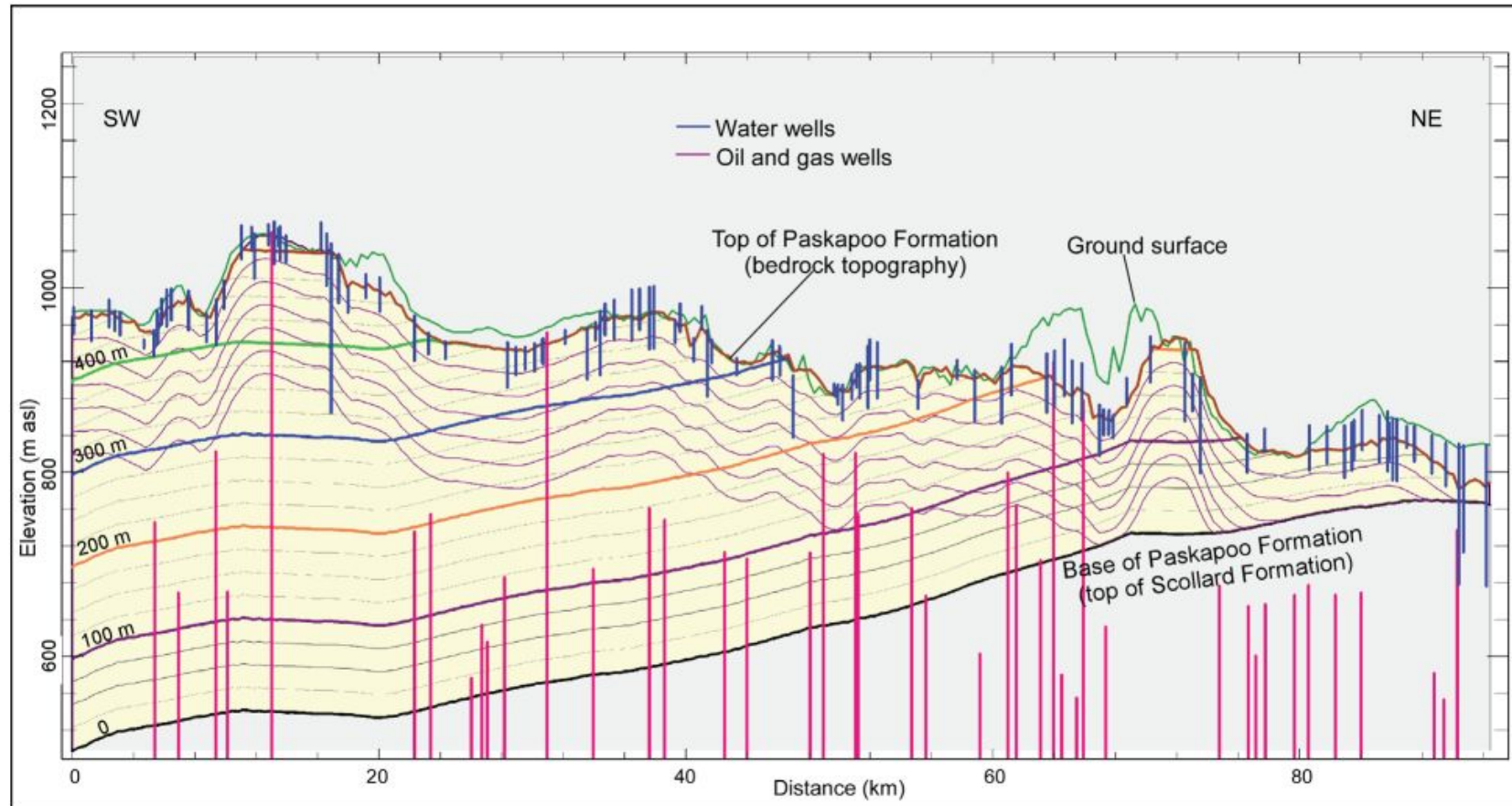
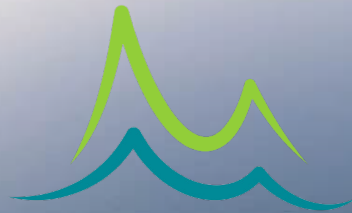


Figure 11. Structural cross-section illustrating both 25 m thick slices (thin grey, and thicker 100 m interval coloured lines) constructed parallel to the base of the Paskapoo Formation for analysis of sandiness from oil and gas gamma-ray logs, and 25 m thick slices (thin purple lines) constructed parallel to the bedrock topography for analysis of sandiness from water-well lithologs.



GULL LAKE
WATERSHED SOCIETY

DOUG BRADLEY

GLWS TREASURER

Treasurers prelim. report to the GLWS annual meeting August 2023

Information provided by Doug Bradley to Norval Horner

this report is not quite final as our year end is not till the end of August and so we haven't received a final bank statements.

Incoming bank balance Sept 1, 2023	\$16,030.03
------------------------------------	-------------

Expenditures on watershed resiliency projects	\$10,452.75
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this was all spent on one remaining settling pond project which was done in cooperation with Doefs greenhouses where they spent over \$100,000 and the GLWS paid the above share.

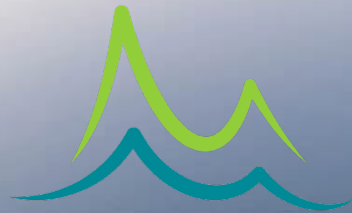
There were some other small expenditures and interest

Bank balance as of June 30, 2023	\$5344.67
----------------------------------	-----------

The society has no other assets other than our bank balance and at this point no other liabilities. Our watershed resiliency grant has been spent and the reports have been provided to the agency that provided the funding.

In the interest of full disclosure the society also incurred expenses for a study by Stantec on the viability of the filtration but these costs (approx. \$14,000) have been covered directly by Inshore Developments Ltd. on behalf of the GLWS. We will decide prior to our year end if we will include them in the Society's statements or not.

For simplicity probably not as they did not go through our accounts.

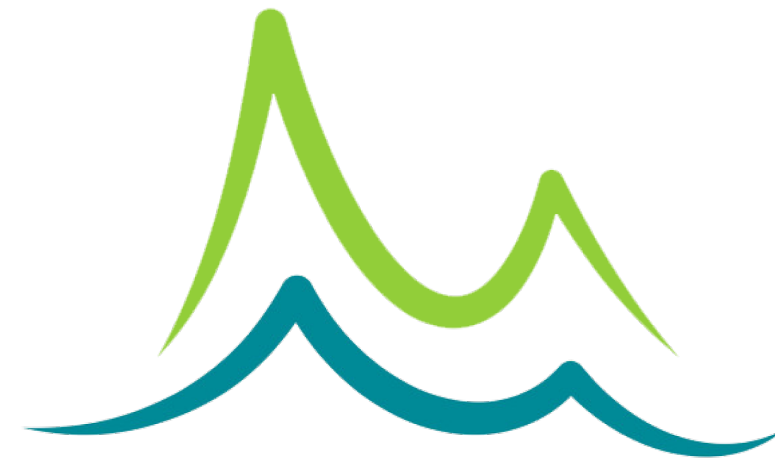


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JEREMY CRAWFORD

GLWS DIRECTOR OF COMMUNICATIONS

NEW GLWS LOGO + BRANDING



GULL LAKE
WATERSHED SOCIETY



HEX: 93ce39



HEX: 008a97



HEX: 13132b

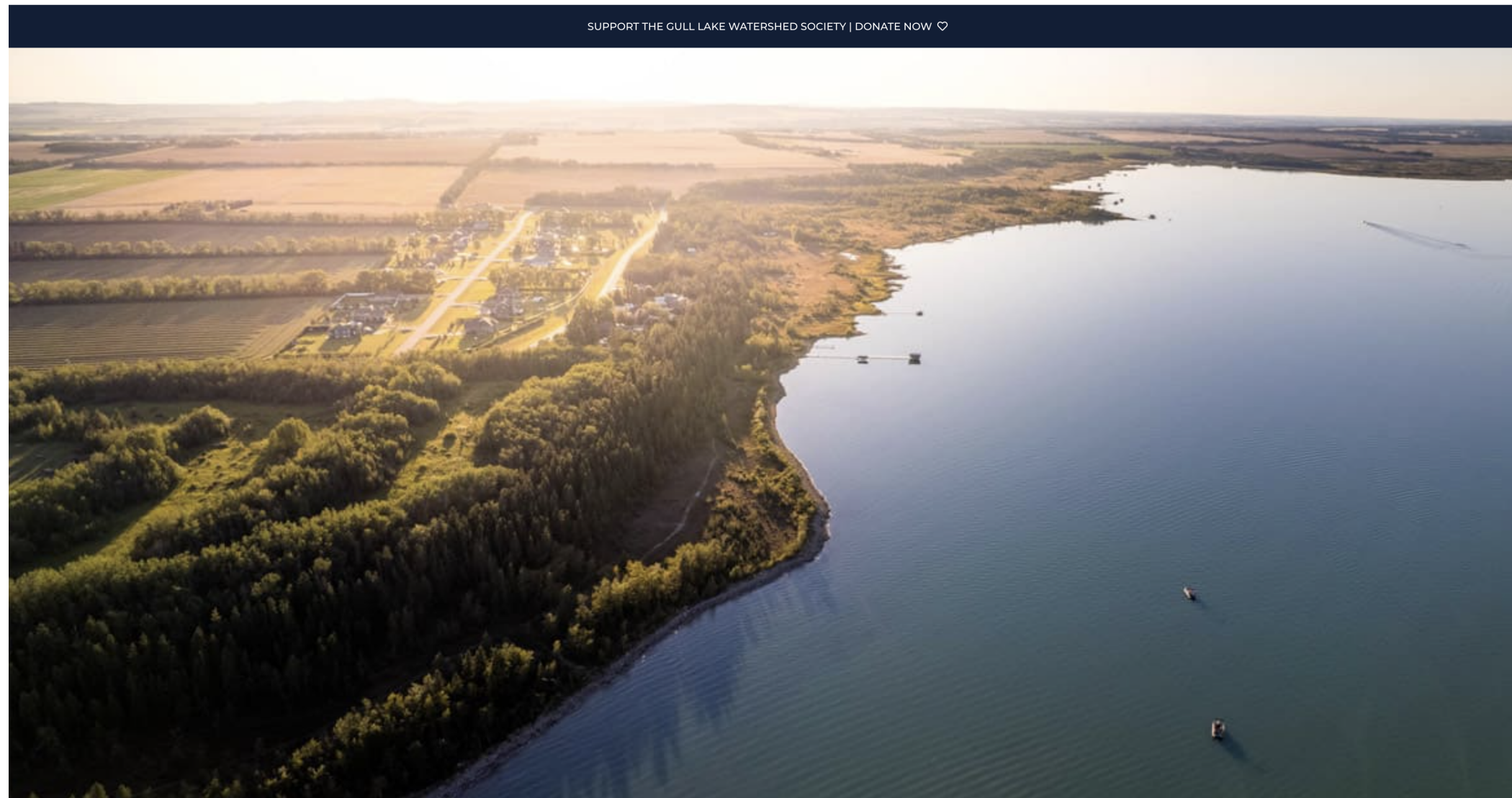
NEW GLWS WEBSITE

www.GullLakeWatershed.ca



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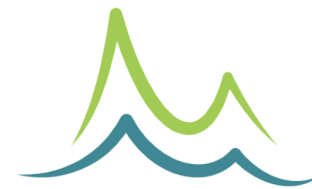


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Zoom Meeting Invitation for GLWS 2023 Annual Meeting

August 21, 2023 /// No Comments

Join the GLWS 2023 Annual Meeting online with Zoom Topic: GLWS 2023 Annual Meeting Time: Aug 26, 2023 10:00 AM Mountain Time (US and Canada) Join

[Read More »](#)



GLWS 2023 Annual Meeting

August 19, 2023 /// No Comments

GLWS 2023 Annual Meeting August 26th from 10 AM to 12 PM Noon at the Summer Village of Gull Lake Hall: 29 Lakeview Avenue –

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GLWS 2022 AGM Minutes | September 10, 2022

August 11, 2023 /// No Comments

Minutes of the 2022 meeting of the Society. Sept 10, 2022 1. The meeting was held at the Meridian beach community hall and discussion

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Letter from the GLWS President | August 11, 2023

August 11, 2023 /// No Comments

President's Letter to Society Members Our membership director Henry Brander and Communications Officer Jeremy Crawford have continued active in signing new members and the GLWS

[Read More »](#)



Greeting Letter to GLWS Members | July 31, 2023

July 31, 2023 /// No Comments

Hello and greetings to all of our Gull Lake Watershed Society (GLWS) members Membership We report that our GLWS membership has now grown from:

[Read More »](#)



Letter from the GLWS President

July 6, 2023 /// No Comments

President's Letter to Society Members Our membership director Henry Brander and communications officer Jeremy Crawford have been very active in signing new members and Henry

[Read More »](#)

GLWS COMMUNICATIONS

NEWS + EVENTS VIA EMAIL



Join us tomorrow morning in person for the 2023 GLWS Annual General Meeting at the Gull Lake Hall

Tomorrow morning, August 26th, 2023, from 10:00 AM to 12:00 PM we will be hosting our 2023 GLWS Annual General Meeting for all GLWS Members in the Summer Village of Gull Lake Hall located at [29 Lakeview Avenue in Gull Lake](#) (south side of the lake). Please join us in person if you can - or online via Zoom Meeting if you can't attend in person.

[*Directions to the Summer Village of Gull Lake Community Hall](#)

Join the GLWS 2023 Annual Meeting online with Zoom

Topic: GLWS 2023 Annual Meeting

Time: Aug 26, 2023, 10:00 AM Mountain Time (US and Canada)

Join Zoom Meeting

<https://us02web.zoom.us/j/82724501928?pwd=bDdPV1p6bUpKQThUTUN2TzBSbnhsUT09>

Meeting ID: 827 2450 1928

Passcode: 591980

GLWS MEMBERS

LAST UPDATE REPORT: AUGUST 26, 2023



Audience

Gull Lake Watershed Society

Your audience has **1,759** contacts. **1,743** of these are subscribers.

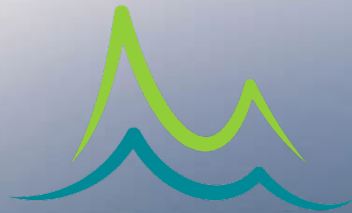
1,759

GLWS CONTACT

EMAIL GULL LAKE WATERSHED SOCIETY



info@gullakewatershed.ca



GULL LAKE
WATERSHED SOCIETY

NORVAL HORNER

GLWS PRESIDENT

Proposed board of directors nominated for 2024

Norval horner - President

Paul Anderson - Past P

Keith Nesbitt – VP

Craig MacLeod – treasurer

Lon Kasha – director and chair Aquifer committee

Henry Brander – membership director

Jeremy Crawford - Communications director

Kent Coleman – director

Wendy Konsorada – director environmental

Lance Dzaman - director

Marc Godin would stay on as a director but would retire if there is a nominee from one of the unrepresented communities.

We still need a secretary for 2024

Need a committee chair for watershed resiliency ?

Retiring with appreciation: Doug Bradley , Glenn Fraser , Brad Turner

Glenn will stay on to work with the aquifer committee