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# Gull Lake stabilization

## Background

This section is designed to provide information about who is responsible for the Gull Lake Stabilization Project, historical pumping volumes and lake levels, and regulatory requirements of the stabilization project.

### Stabilization project responsibility

Alberta Agriculture and Irrigation owns and operates the Gull Lake stabilization project. The project was commissioned in 1976 and is designed to pump water from the Blindman River (via a pumphouse, pipeline, and open canal) into Gull Lake to help stabilize lake levels and maintain recreational value and habitat.

### Pumping history

The project has pumped varying amounts of water for 23 of the last 47 years, adding a total of about 122 million cubic meters into the lake. This is almost 30 per cent of the total lake volume at full supply target. Annual diversion volumes for the 23 years of pumping range from about 1.5 to 12 million cubic meters, with an average around five million cubic meters. Annual pumping volumes vary depending on available flows in the Blindman River, which are seasonally inconsistent and variable. The pumping window from the Blindman River to Gull Lake is usually April to November and is based on lake level triggers and sufficient flow in the Blindman River. Precipitation and evaporation rates play a large role on lake levels.

Pumping ceased in 2011 because the lake reached target lake level. The lake naturally continued to rise above target elevation until 2014 and began declining thereafter.

The regulator suspended the licence to pump water from Blindman River in 2018 because the invasive Prussian carp was found in the river. With no solution to prevent carp getting into Gull Lake, the government stopped pumping.

Lake levels dropped below the pumping trigger level in the fall of 2021. Pumping would have been limited in recent years because the Blindman River is under a water shortage advisory.

### Project costs

The electrical costs of the pumping project are paid for under an agreement with the municipalities surrounding Gull Lake. All other maintenance, staffing, and capital costs remain with the provincial government (Agriculture and Irrigation).

The agreement has been in place for years. Given pumping has not occurred since 2011, electrical costs have been minimal.

### Current and historical lake levels

The lake has seen low levels before. As of August 2024, levels are about 57 centimeters below average and 78 centimeters below the full supply level target for the lake. The lake had similar levels in 1976-1980, and 2002-2006.

Since the early 1960s, the lake's water levels have fluctuated by a total of about one meter. This is similar to other lakes in central Alberta. While lake level fluctuations are natural and unavoidable even with stabilization efforts, the main objective of stabilization is to help raise the average lake levels and help reduce decreases for recreational



benefit. Given the current low level, further declines will continue to be disruptive to recreational use and may pose risk to habitats.

Lake levels are publicly available on [rivers.alberta.ca](https://rivers.alberta.ca) or on the “Alberta Rivers” app available on iOS and Android phones.

### Pumping project license and regulatory requirements

Agriculture and Irrigation is the licence holder for the stabilization project. The project is licenced under the *Water Act* to stabilize Gull Lake to a full supply “target” elevation of 899.16 meters. The pumps pump water up to the target elevation 899.16 meters and then shut off. Pumps remain off until the lake recedes to an elevation of 898.93 meters, which is the trigger elevation to turn the pumps back on.

This fluctuation is intended to mimic natural lake fluctuations and encourage a diversity of aquatic and riparian plant growth along the shoreline.

Pumping water from the Blindman River is only permitted when river flows are above the minimum flow requirements of 0.14 cubic meters per second passing over the weir on the Blindman River, downstream of the pump house. However, a minimum of 0.4 cubic meters per second is required to even turn on one of the three pumps.

It is common for the Blindman River to experience low flow below the pumping threshold, particularly during the summer and fall when precipitation decreases, or during times of drought.



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## Gull Lake stabilization

### Issues and impact of Prussian carp and low lake levels

This section is designed to provide information about the status of the stabilization project, the stabilization licence suspension, and the potential impacts of Prussian carp and low lake levels.

#### Status of the stabilization project

In 2016, after the government learned about the presence of Prussian carp in the Blindman River, Agriculture and Irrigation commissioned an engineering firm to evaluate risks of, and ways to prevent Prussian carp getting through the pump works.

Completed in 2018, the study explored various exclusion options. However, the authors concluded that beyond ceasing operations, no engineering solutions would be 100 per cent effective in eliminating the risk of Prussian carp entering through the pumping infrastructure.

In response, the *Water Act* regulator suspended the water diversion licence to pump water from the Blindman River into Gull Lake. This was done to prevent contamination of the lake from invasive species until an engineered solution could be found that is 100 per cent effective in excluding Prussian Carp and their eggs from passing through the pumping works.

The Gull Lake Watershed Society noted no pressurized filtration methods had been considered in the study. The society explored and tested other options. This included a pressurized filter system that could potentially be used to exclude Prussian carp and their eggs.

#### Prussian carp and their impacts

Aquatic invasive species are non-native animals or plants that can cause economic or environmental harm in waterways where they are introduced. Prussian carp are native to central parts of Europe and Asia. They are commonly considered a type of wild goldfish that can thrive under diverse environmental conditions and are considered a harmful aquatic invasive species. They can decrease water quality, alter the trophic structure of the aquatic ecosystem, and outcompete and displace native fish species for food and by eating eggs of native species, allowing them to quickly become the dominant species.

Prussian carp can thrive and reproduce in a wide range of freshwater systems including lakes, reservoirs, rivers, irrigation channels, ponds, and even farmer dugouts. They are highly adaptive and can survive in poor water quality and various water temperatures. Prussian carp are omnivorous, feeding on a range of food from algae, aquatic vegetation, detritus, invertebrates, fish eggs, and small fish.

Prussian carp are highly competitive in behavior, especially at higher population densities, giving them an advantage over other native fish species. They are highly reproductive, maturing between one and three years of age, and can live up to 12 years. They exhibit rapid early growth, giving them a competitive advantage over other fish species for both food and space.



Prussian carp may increase turbidity and nutrient loading in the water by disturbing sediment while foraging. Re-suspension of lakebed sediments can lead to increased phosphorus and nutrients into the water, which increases availability of phosphorus and nutrients for phytoplankton, algae, and cyanobacteria, ultimately reducing water clarity.

While the exact changes or affects that Prussian carp may have on the fish populations found in Gull Lake cannot be predicted with precision, it is expected that the negative impacts these fish have had elsewhere in the world could occur in Gull Lake. It is anticipated that any introduction of Prussian carp will likely cause change and negative impacts to the lake. These impacts may vary in degree and severity to overall aquatic ecology, water quality, native fish populations and economics related to sport fishing, Indigenous fishing, recreation, and tourism.

There are no options to reverse an introduction of Prussian carp into Gull Lake.

## Are there Prussian carp in Gull Lake?

Prussian carp have **not** been reported or caught in Gull Lake.

Index netting surveys are routinely conducted by Environment and Protected Areas (EPA) fisheries staff, and in recent successive years, including September 2022, Prussian carp have not detected carp in Gull Lake. No Prussian carp were caught or observed in any of the stomachs of pike and walleye. The next scheduled test is in fall 2024.

## Other ways that Prussian carp can contaminate the lake

While the focus of contamination has been avoiding the transfer of Prussian carp and their eggs from entering the lake through the pumping stabilization project, there is also a high risk of contamination through other natural and human-caused means.

Prussian carp could be introduced if boats, angling gear, or other watercraft are not properly cleaned of aquatic vegetation that may house eggs, or if ballast tanks and are not drained and dried before being transferred between water bodies.

Gull Lake is also near the Blindman River and the Red Deer River which both contain Prussian carp. There is risk that birds could potentially transfer Prussian carp, or that waterfowl could ingest aquatic vegetation with eggs attached and transfer them to other areas. Scientists have recently demonstrated that Prussian carp eggs can survive the digestive tract of waterfowl and remain viable fertilized eggs.

The Gull Lake Watershed Society and the Government of Alberta will continue to post all boat launches on Gull Lake to warn boaters of the risk of invasive species and encourage them to drain and dry their watercraft and aquatic gear.

For more information see the [Clean, drain, dry your gear web page](#).



Further information  
about Prussian carp

[Prussian carp](#) Information page.

To report an Aquatic Invasive Species, call the Hotline number: **1-855-336-BOAT** (2628)

Potential  
environmental  
impacts of low  
water levels on Gull  
Lake

Riparian Zone

The area along the edges of the lake (riparian zone) includes a diverse variety of plant species that are well-adapted to both wet and dry conditions and play a crucial role in stabilizing the shoreline, preventing erosion, and providing habitat for wildlife such as birds, mammals, insects, and amphibians. The riparian zone of Gull Lake is important for providing a natural buffer zone between land and water, helping to filter pollutants, sediments, and nutrients, and stabilizing the bank shores against erosion. The riparian zone also provides recreational opportunities for birdwatching, fishing, hiking, and enhances the tourist appeal of the lake.

The declining water levels in Gull Lake could impact the riparian zone and its associated ecosystem. Although the riparian zone will adapt to changing water levels over time, there could be short-term impacts to the riparian zone and shallow wetland areas surrounding the lake.

Waterfowl

Gull Lake is known to host various species of waterbirds due to its ecological diversity and shallow waters. This includes the Common Loon, various species of ducks, geese, American white pelican, great blue heron, various gulls, double-crested cormorants, swans, scoters, and the western grebe. The Western grebe is a threatened species, and Gull Lake has been identified as a priority lake due to its high habitat suitability. Prolonged reductions in water levels could affect nesting habitat suitability as the available reed beds become de-watered in the short term.

Fisheries

Gull Lake supports a diverse fishery that includes sportfish and forage fish species. The sportfish population provides recreational fishing opportunities attracting anglers throughout the year. The primary fish species found in Gull Lake include northern pike, walleye, yellow perch, lake whitefish, and burbot.

The spring spawning sportfish species (northern pike, walleye and yellow perch) as well as minnow and other forage fish species are most likely to be affected by declining water levels as they typically utilize shallower areas for spawning.



## Potential impacts of low water levels on recreation, tourism, investment, and infrastructure on Gull Lake

While it is recognized that current low lake levels have been experienced twice before, even after stabilization was in place, the licence suspension for the Gull Lake stabilization project has caused unease related to future development, tourism, and recreational use of the lake.

The lake is a major driver of investment and property development, including tourism and facilities, and cottages. There are more than 2,961 properties around the lake with a total municipal assessment of more than \$850 million.

While there have been no attributed declines in visitor use of the provincial campgrounds around the lake with low lake levels, continued decline in lake levels could impact popular provincial parks located on the south end of the lake (i.e. Aspen Beach), where the province has made major investments in additional camping spots, day-use facilities and beach improvements. There are several popular day-use beaches that receive thousands of visitors over the course of the summer, Ebeling day-use, Sandy Point, Parkland and Meridian Beach, plus a number of smaller locations.

There are also various private campground facilities surrounding the lake. There are about 2,000 camping spaces around the lake, including 680 in the provincial park areas.

Any loss to improved beach areas would have a major impact on both residents and tourists use and recreational appeal. Prepared beach areas are left high and dry when water levels are low, and the newly exposed beach areas at low water levels can become limited to areas where there is mud bottom, which significantly reduces the lake's appeal for recreation.

Some boat launches and the channels into boat launches are no longer workable at current lake levels. Several boat launches will need expensive dredging and modification, which also entails environmental impacts, should lake levels continue to decline.

Several marinas (ex: Birch Bay and Sandy Point) are experiencing issues due to low lake levels causing shallow inlet channels and low marina depths. Some marinas (eg: Parkland) have already undergone dredging and improvements to mitigate lower lake levels. Further lake level decline could impact additional marinas. This results in further environmental impact for necessary dredging activities.

Alberta Environment and Protected Areas has seen an increase in approval applications related to modifications to boat launches, marinas, and lifts.



# Gull Lake stabilization

## Gull Lake Watershed Society proposed solution

This section is designed to provide information about the proposed pressurized filter system the Gull Lake Watershed Society (GLWS) has recently tested. GLWS has submitted a preliminary design report to Agriculture and Irrigation for consideration for implementation.

### Proposed Prussian carp exclusion filter system

The GLWS carried out a two-year research program aimed at finding a way to resume pumping without transferring carp or the eggs through the stabilization pumping project into the lake.

This program was focused on pressurized filtration, which was not considered as an option in a study commissioned by Agriculture and Irrigation.

The society carried out testing at the stabilization project site along the Blindman River. Volunteers caught live Prussian carp and extracted their eggs to use in the testing, as well as microspheres that were the same size as the eggs.

Pilot tests were carried out on two types of filters, both of which were successful at stopping the actual carp eggs and microspheres that were used for the testing.

Testing efforts were focused on the Forsta backwash filter, which is rated to operate within the pressure created by the pumping system. The Forsta filters are self-cleaning filter using a backwash mechanism that triggers when there is a pressure differential across the screen. Further details on how the Forsta filter operates can be found on the [Forsta Filter](#) website.

To avoid any larger scale issues, the society demonstration tested the Forsta filter at rates of up to 1,000 US gallons per minute, which is one-fifth the size of a full-scale filter (i.e. 3x 5,000 USGPM filters are required for full system capacity). This test demonstrated that the filter worked at larger scales and provided good data on the backwash volumes required.

The Forsta internal screens were designed to stop everything above 200 microns, which is a conservative design as carp eggs average about 1,000 microns (1 millimeter) in diameter.

The testing was overseen by representatives from Agriculture and Irrigation, Environment and Protected Areas, Stantec engineering, and representatives from the four municipalities around the lake.

Stantec prepared a report on the filter viability which concluded: **“It is Stantec’s opinion that a properly designed pressurized filtration system operated with the failure mitigation methods outlined will be 100 per cent successful in avoiding the transference of Prussian carp or their eggs to Gull Lake through the stabilization pumping system pipeline.”**

Stantec also provided a cost estimate for purchasing and installing the filtration system of \$574,000. It also recommended additional upgrades be done to modernize the 50-year-old pumphouse to increase efficiency and reduce power cost.



How can we be sure that the filter will prevent the carp or their eggs from being transferred in the stabilization system?

Both pilot and demonstration testing at 50 and 800 US gallons per minute were successful in excluding Prussian carp eggs and microsphere beads.

The manufacturer has reviewed the possible failure modes that Stantec identified and provided procedures to prevent passing of Prussian carp and their eggs. The filter system would have various monitoring sensors, remote monitoring capability, with alarms and automatic shutdown procedures to stop pumping in the event of any malfunction.

A testing procedure could be completed at the start of each pumping season by injecting microspheres and ensuring that none of them pass through the filters into the pipeline that flows uphill to the delivery canal. The pipeline can be filled and then drained back to inspect that no microspheres made it through before any water is delivered to the lake.



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# Gull Lake stabilization

## Regulatory process and next steps

This section is designed to provide information about the regulatory process for applying to amend the licence and removing the current licence suspension.

### Water licence suspension

In 2018, Alberta Environment and Protected Areas (*Water Act* regulator) suspended the *Water Act* licence that authorized Alberta Agriculture and Irrigation to transfer water from the Blindman River to Gull Lake to mitigate the risk of introducing Prussian carp, an invasive species, into the lake. The suspension will remain until an adequate solution can be implemented.

If introduction of carp were to occur, the lake's ecosystem would be negatively impacted, and contamination would be irreversible.

### Regulatory Application process

Alberta's *Water Act* requires that a licence be obtained before undertaking an activity in a water body or before diverting and using water from a water body.

The regulator has advised Agriculture and Irrigation, the Gull Lake stabilization project licence holder, that the license must be amended to remove the suspension, which will require submission of a formal amendment application to the regulator. The application must include:

- Description of the proposed exclusion filter system and mitigated failsafe mechanisms
- Description of the impacts of Prussian Carp on Gull Lake
- Provide hydrology/modelling related to Gull Lake and the pumping diversion from the Blindman River for various pumping scenarios
  - no pumping; pumping with current lake level elevation triggers limitations; and pumping with new higher elevation trigger levels
- Cost/benefit analysis of various pumping options
- Results from pre-application engagement with impacted stakeholder and Indigenous peoples.
- Public Notice of the amendment will be provided. Environment and Protected Areas encourages public participation.

Additional resources: The [Water Act: Licences](#) fact sheet contains information when applying for a licence under the *Water Act*. The [Guidelines For Licencing Water Diversion Projects](#) provides information to submit an application for a licence to divert and use water or to conduct an activity that could have a potential impact on water.

