Understanding low water levels in the Child–Girl–Woman Lake chain

DNR Fact Sheet • September 2026

Why this fact sheet was prepared
This fact sheet explains what is known about low water conditions in the Child-Girl-Woman chain of lakes, what the Girl Lake rock arch rapids (RAR) was designed to do, why visual observations of flowing water can be misleading, and what the DNR has - and has not - concluded about the cause of current lake levels.

In summary

- The current low water levels are occurring during a prolonged regional drought, with cumulative effects on precipitation, snowpack, groundwater, wetlands, lakes and streams.
- Residents have reported substantial recreational and shoreline impacts, including exposed shoreline, reduced boat access and difficulties using docks and lifts.
- The Girl Lake outlet replacement was designed to maintain the established natural runout elevation and authorized pre-project hydraulic performance of the outlet, not to establish a new lake level.
- The established Girl Lake natural runout elevation is 1321.9 feet NGVD 29, or 1322.6 feet NAVD 88. The 2023 survey confirmed the historical elevation established by the DNR in 1978. (NGVD stands for National Geodetic Vertical Datum of 1929 or 1988, which measures elevations above a standardized mean sea level.)
- The Girl/Woman Lake Ordinary High Water Level (OHWL) is 1323.6 feet NGVD 29, or 1324.3 feet NAVD 88. OHWL is not a target or managed lake level.
- A beaver dam at the outlet was obstructing flow before the project and temporarily held water above the natural runout elevation. After the obstruction was removed, the restored outlet began functioning at the established runout elevation.
- The DNR reviewed the engineering analysis, surveys, construction records and post-construction verification. The outlet construction was consistent with the approved design and established runout elevation.
- The DNR will continue to evaluate information about the project and current lake conditions using established engineering, hydrologic and regulatory standards, and will work with the City on an independent review.

Why are the lakes so low?

Lake levels respond to the overall water balance of a watershed. Important components include precipitation, snowpack, runoff from tributaries and upstream lakes, groundwater inflow and outflow, evaporation, wetland storage and other hydrologic connections. A lake does not necessarily receive or lose all of its water at a single visible inlet or outlet. The Child–Girl–Woman system includes connected lakes, wetlands and low-gradient channels where water can be stored, released or exchanged.

Over the past four years, north-central Minnesota has received 12 to 16 inches below normal precipitation. The DNR has described the resulting conditions as a “storage drought” because the cumulative deficit affects not only lakes, but also wetlands, streams, soil moisture and groundwater. It would take months of precipitation far above normal amounts to bring lake levels and soil moisture back to typical levels.

What did the new outlet project change?

The project modified the former outlet structure with a rock arch rapids structure designed to provide fish passage while maintaining the established natural runout elevation and the hydraulic performance evaluated through the project engineering. The project was not intended to raise or lower the lake level.

For outlet modification projects, the DNR uses engineering hydraulic analysis, field surveys, construction inspection and post-construction verification to evaluate whether the completed structure maintains the established runout elevation and the approved hydraulic design. For Girl Lake, the historical runout elevation was established by the DNR's professional survey staff in 1978 at 1321.9 feet NGVD 29 (1322.6 feet NAVD 88), and a new survey in 2023 confirmed that elevation. Following construction, the outlet was surveyed and verified by the project engineer, contractor and the DNR.

An important pre-project condition

Before construction, a beaver dam on the outlet was obstructing flow and temporarily impounding water above the natural runout elevation. When that obstruction was removed, water began flowing through the modified outlet. Photographs showing little or no water immediately below the pre-modified structure do not provide a like-for-like measure of the outlet's hydraulic performance under an unobstructed condition.

Understanding the Difference Between OHWL and Natural Runout

One of the most common sources of confusion is treating the Ordinary High Water Level (OHWL) as the lake's normal operating or target water level. They serve different purposes:

- The OHWL represents the upper limit of a lake's normal long-term water-level fluctuation and is used to establish the landward boundary of public waters and DNR jurisdiction.
- The OHWL for Girl and Woman Lakes was established by Commissioner's Order in 1955 at 1323.6 feet NGVD 29, 1324.3 feet NAVD 88 following a public hearing held by DNR and the Boy River Chain of Lakes Association.
- The natural runout is the elevation at the outlet where water begins leaving the lake. For Girl Lake, that elevation is 1321.9 feet NGVD 29, 1322.6 feet NAVD 88.

- These elevations are 1.7 feet apart. A lake can be below its OHWL and still be above its natural runout and continue to discharge water. Water levels can also rise above an OHWL.
- The OHWL is not a DNR lake-level management goal or target.

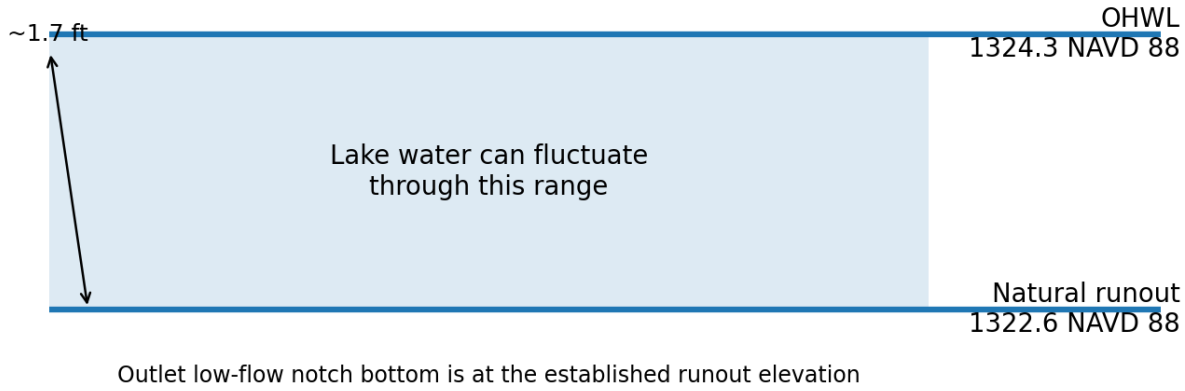

Figure 1. Girl/Woman Lake elevations discussed in the project review. Elevations shown in NAVD 88; historical records also use NGVD 29.

What about the low-flow notch and gaps in the rock arch rapids?

Residents have raised concerns that the gaps between the rocks create a continuous flow path below the outlet crest and therefore lower the effective outlet elevation. The low-flow notch is an intentional part of the rock arch rapids design. It concentrates low flows through the center of the structure to support fish passage.

The important elevation is the bottom of the low-flow notch. Based on the project design and post-construction verification, the bottom of the notch is at the established natural runout elevation of 1322.6 feet NAVD 88. It is not nine inches below the runout elevation, as has been suggested in some communications to DNR.

The rock arch rapids can continue to pass water while the lake surface remains above the runout elevation. As the lake approaches the runout elevation, the available head and resulting discharge decrease. When the lake reaches the runout elevation, flow through the outlet would be expected to cease, absent other pathways for water movement.

Why doesn't seeing more water at the outlet demonstrate that more water is leaving the lake?

Residents have collected photographs and videos of several locations in the lake chain and have understandably noted that flow through the Girl Lake outlet can look more substantial than flow input at some upstream locations. The observation is real; the conclusion about volume does not necessarily follow.

Flow appearance depends on much more than the amount of water moving through a channel. Channel width, depth, slope, roughness, vegetation, obstructions and how the water is concentrated all effect how fast water flow appears. The same discharge can look low and nearly stagnant when spread across a broad, shallow wetland or low-gradient channel and look much higher when concentrated in a

narrower or steeper channel. The graphic below illustrates this concept using the same discharge under different channel conditions.

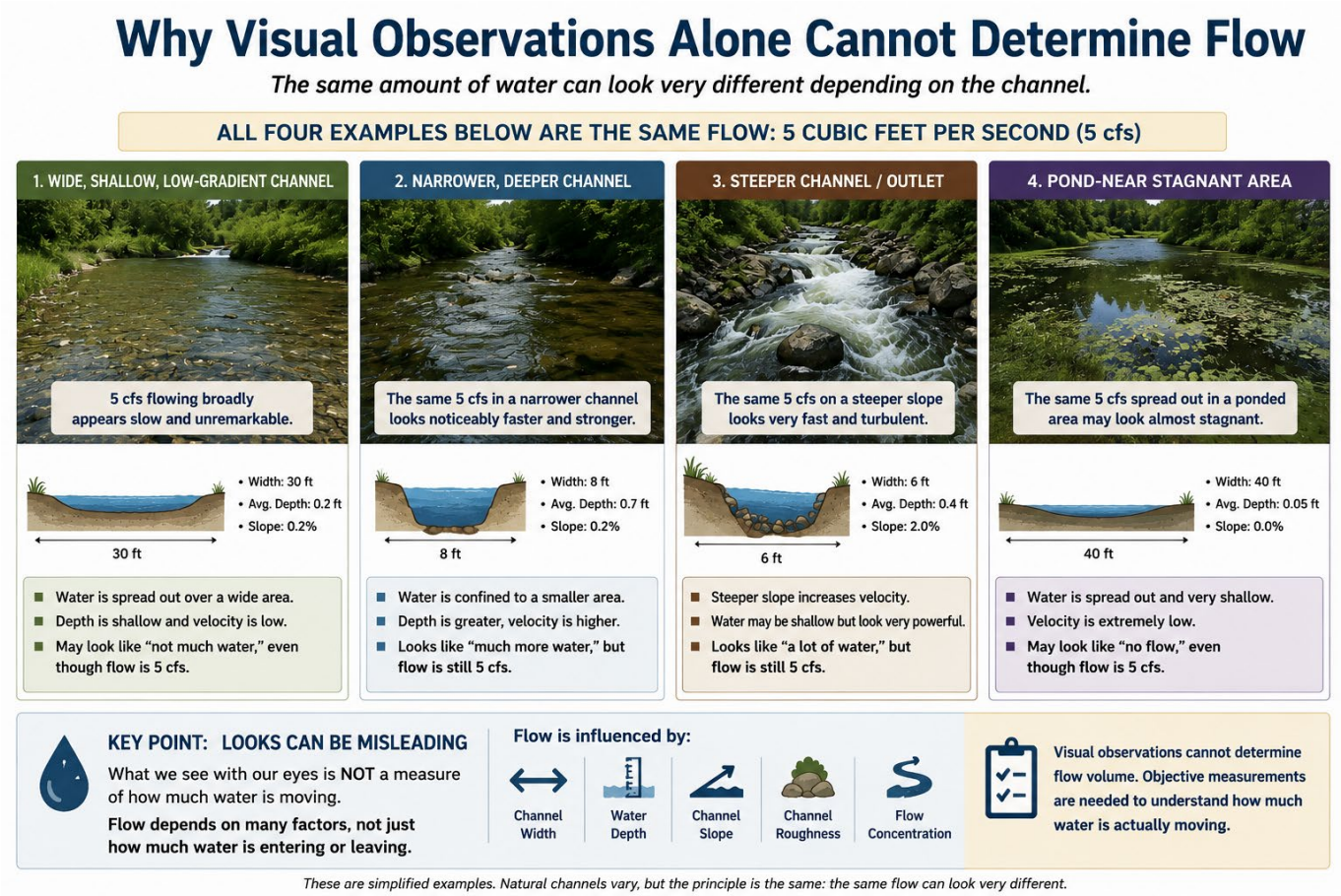

Figure 2. Conceptual illustration: the same discharge can look very different depending on channel width, depth, slope, roughness and how water is concentrated. Visual appearance alone is not a measure of discharge.

The Child–Girl–Woman system contains wetlands, upstream lakes and channels with different slopes and hydraulic conditions. Water can be stored, released or exchanged within those areas. Evaporation and groundwater interactions also affect the water balance. For these reasons, comparing what water flow looks like at a few locations cannot be used to conclude that outflow exceeds inflow.

What about the photographs showing no flow below the old dam?

Photos taken immediately before construction show little or no visible water below the historical outlet structure, while photos taken shortly after construction show water moving through the new rock arch rapids. The DNR has reviewed this concern. The key difference is that a beaver dam was obstructing the outlet at the time of the pre-project photographs. That obstruction was removed as part of the outlet modification.

Those photographs document a meaningful change in what was visible at the site, but they do not provide a quantitative pre-project discharge measurement. The pre-project condition (with beaver dam) was not the unobstructed outlet condition the replacement project was designed to restore.

Was the rock arch rapids designed to be more hydraulically efficient?

Engineers used hydraulic modeling to compare how the outlet worked before the project with how it is expected to work after the project. This is a standard engineering approach for evaluating outlet structures. Modeling allows engineers to see how the outlet will perform across a wide range of lake levels and flows without having to collect years of measurements under every possible condition.

The modeling showed that the rock arch rapids was designed to function in the same way as the outlet did before the project.

As noted above, a change in how or where water flows does not, by itself, mean that the amount of water leaving the lake has changed. The important question is whether the completed rock arch rapids functions materially differently from the approved design. DNR has verified that the completed structure's elevation and configuration are consistent with the approved design.

The DNR's regulatory responsibility

For projects that modify public-water outlets, DNR's responsibility includes protecting public waters and considering potential impacts to affected riparian property owners. Hydraulic modeling is the primary engineering tool DNR uses to evaluate those potential impacts. By comparing existing and proposed conditions across a range of lake levels and flows, the modeling helps DNR determine whether a proposed design could change water levels or flows in a way that would affect other property owners. If the analysis identifies potential impacts, the design can be modified before construction to avoid or minimize them.

For the Girl Lake project, the hydraulic modeling was used to compare the existing outlet with the proposed rock arch rapids and to establish a design intended to maintain the authorized runout and hydraulic performance of the existing outlet. DNR then used field surveys and construction verification to confirm that the completed structure was built consistent with that approved design.

This modeling, design review, and construction-verification approach is consistent with how DNR evaluates similar outlet replacement and rock arch rapids projects statewide.

Why measuring inflow and outflow isn't sufficient

A discharge measurement at the Girl Lake outlet can tell us how much water is moving through the outlet at that particular time and under those particular conditions. It cannot, by itself, determine why water levels in the lake chain are changing or account for all of the water entering and leaving the Child–Girl–Woman chain.

DNR's review has focused on the outlet project itself—using hydraulic modeling to evaluate the approved design, field surveys to verify the completed structure, and engineering analysis to determine whether the project maintains the authorized runout and approved hydraulic performance. This is the established approach DNR has used to evaluate similar outlet projects statewide.

A complete water-balance assessment would require measurements at multiple tributaries and outlet locations over a range of water levels and weather conditions, along with information needed to account for groundwater exchanges, wetland and basin storage, evaporation, precipitation and other components of the system. Establishing reliable discharge relationships at multiple locations would require repeated measurements over time and appropriate reference conditions. DNR believes an

independent reviewer should first assess the existing information before determining whether an assessment of that scope is necessary.

How relevant are lake-level records?

Lake-level records are important information and the DNR recognizes that residents have documented substantial declines during 2026. Girl and Woman lakes are connected and have the same established OHWL and natural runout elevations. The DNR lake-level records use the NGVD 29 datum, while the project plans and recent surveys use NAVD 88; the two datums should not be compared directly without accounting for the datum difference.

A higher water-surface elevation in Woman Lake than Girl Lake on a particular date can indicate a hydraulic gradient between the connected lakes and is consistent with water moving downstream through the system. It does not, however, quantify the amount of water entering the entire chain, nor does it by itself establish the cause of the current lake levels.

What about the concern that water continues to flow through the outlet even though we're experiencing an extended drought?

Drought does not mean that every stream or outlet stops flowing. A lake can continue to discharge water while its level is above the natural runout elevation. The amount of discharge changes with the difference between the lake surface and the outlet and with the hydraulic characteristics of the outlet.

During a drought, inflow can decline while the lake continues to lose water through discharge, evaporation and other pathways. The lake level will continue to fall when losses exceed inputs, and it can continue to fall even while water remains visibly flowing through the outlet.

How can Boy River be dry upstream while it is still flowing downstream?

Residents have pointed to observations of dry or nearly dry portions of the Boy River upstream while flow remains visible near Longville. This can seem inconsistent at first, but water movement through wetlands, connected basins and low-gradient channels is not always visible in the same way. Water can also be stored or released between observation points, and visible flow does not provide a direct measure of discharge.

What about impacts on wildlife, habitat and recreation?

The DNR recognizes that prolonged low water can affect boating, docks, shoreline access, fish habitat and wildlife. Low water can also expose lakebed and change aquatic and wetland habitat. The ecological effects depend on the duration and magnitude of the low-water period and on site-specific conditions.

Periodic low-water conditions are also a natural part of the hydrologic cycle of many Minnesota lakes and wetlands. They can benefit vegetation, sediment consolidation and habitat. The DNR will continue to consider ecological and public-water interests as part of its regulatory responsibilities.

Why doesn't the DNR raise the outlet to the OHWL?

The OHWL is not the lake's normal or target water level, so raising the outlet to the OHWL would not simply restore the lake to its "former" level. It would raise the point at which water leaves the lake and establish a new runout elevation.

That change could affect water levels upstream and downstream, including flooding, wetlands, and private property interests. Those impacts would need to be evaluated before establishing a new runout.

The rock arch rapids project was designed to restore the established natural runout elevation, not to raise the outlet or establish a new lake level.

If there is a proposal to change the established runout, that is a separate question from whether the current project was properly designed and constructed. It would require a separate evaluation of the hydrologic, legal, and property impacts before DNR could consider making that change.

Why does the DNR rely on engineering models instead of measuring each outlet before and after construction?

Hydraulic modeling is a standard engineering tool that allows DNR to compare an outlet's expected performance across a wide range of lake levels and flow conditions, rather than relying on measurements taken at only one point in time. This provides a consistent basis for evaluating whether a proposed design will maintain the established runout and hydraulic performance.

Discharge measurements can provide useful information and may be used when available or when site conditions warrant them. However, comprehensive pre- and post-construction discharge monitoring is not the typical practice for every outlet project and would not replace the need for engineering analysis.

DNR therefore relies on hydraulic modeling, field surveys, and construction verification, supplemented by field measurements when appropriate.

What has the DNR actually verified?

- Historical runout elevation: established by DNR survey work in 1978 and confirmed by a 2023 survey is 1322.6 feet NAVD 88.
- OHWL: established by Commissioner's Order in 1955 at 1323.6 feet NGVD 29 (1324.3 feet NAVD 88).
- Project engineering: Engineers used hydraulic modeling to compare the existing and proposed outlets and determine how much water would flow through the outlet at different lake levels.
- Construction: the completed rock arch rapids was surveyed and checked against the approved design.
- Runout: the as-constructed outlet is at the established authorized runout elevation.
- Low-flow notch: the bottom of the notch is at the established 1322.6-foot NAVD 88 runout elevation.
- Pre-project obstruction: a beaver dam was obstructing the outlet and impounding water above the natural runout elevation.

What should residents expect as conditions change?

A return to more typical lake levels would be driven by precipitation, snowpack, groundwater recharge and runoff. The rate of recovery will depend on future weather and watershed conditions over months or years. A few heavy rainfall events are unlikely to produce lasting improvement if the watershed and groundwater system remain depleted.

While lake levels remain above the natural runout elevation, water will continue to flow through the outlet. As the lake approaches the runout elevation, discharge through the outlet will decrease.

What the DNR will continue to do

- Respond to questions about the project and explain the engineering and regulatory basis for the outlet.
- Continue to monitor lake-level, hydrologic, survey and engineering information.
- Maintain the established engineering and regulatory standards used for similar outlet projects.
- Consider new, relevant technical information as it becomes available.
- Work with the City of Longville to identify an appropriate independent reviewer.
- Recognize and communicate the real impacts that prolonged low water is having on residents, recreation, businesses and natural resources.

ECOLOGICAL AND WATER RESOURCES

500 Lafayette Road St. Paul, MN 55155-4040

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