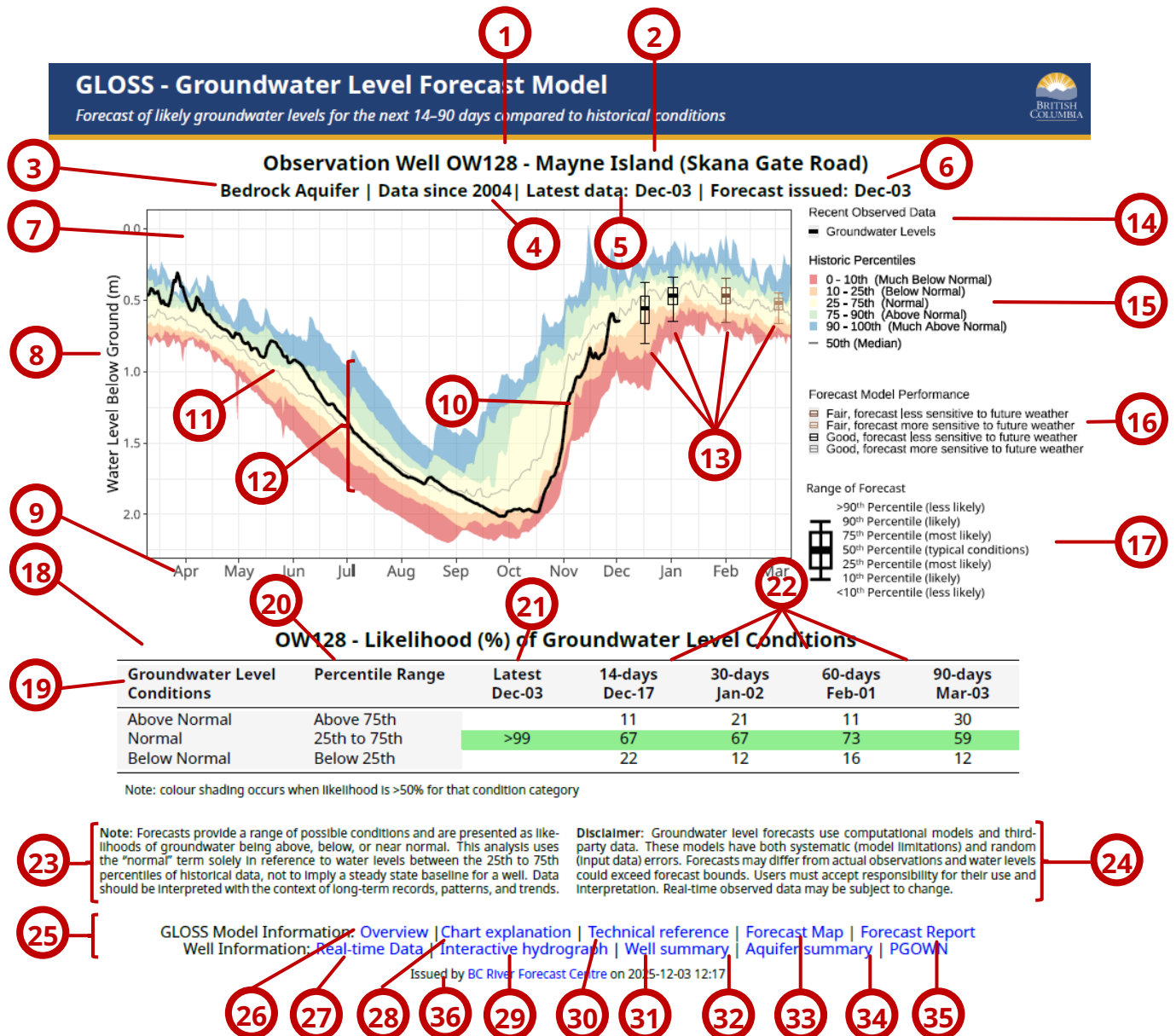


GLOSS - Groundwater Level Forecast Model

Detailed explanation of the forecast model chart

BC River Forecast Centre – July 2026



Clicking on a circle will direct you to the explanation

Index and Description

Well information

- 1 **Observation well number**
- 2 **Location of well**
- 3 **Aquifer material type**
 - One of Bedrock, Sand, Gravel, or Sand and Gravel. Sourced from GWELLS for corresponding aquifer: <https://apps.nrs.gov.bc.ca/gwells/api/v1/aquifers/csv>.
- 4 **Starting year of continuous daily data record used for percentiles calculation and model calibration**
 - The model's start date for continuous data may differ from the original data collection start date if a different calibration period was selected (e.g., to begin after initial trends stabilized).
- 5 **Date of latest available water level value**
- 6 **Date the forecast model for this well was issued/run**

Forecast chart

- 7 **Chart of the GLOSS model results containing the forecast range bars (13), historic percentiles (12) and median (11), and recently observed groundwater levels (10).**
 - The chart will always show a year of data, looking forward just over 90 days from the latest date and back to a year prior from that (back 275 days).
- 8 **Vertical axis showing Water Level Below Ground (m)**
- 9 **Horizontal axis showing for each day of the year, with the start of each month labelled**
- 10 **Recent observed groundwater levels for the well, see [Real-time Data](#) for more real-time and other data**
 - See 14 for legend item.
- 11 **Line showing historic daily median (50th percentile) groundwater levels for each day of the year**
 - Calculated for each day of the year using all available continuous daily data, except for the current year. The model's start date for continuous data may differ from the original data collection start date if a different calibration period was selected (e.g., to begin after initial trends stabilized).
- 12 **Ribbons showing historic daily percentile (0-10, 10-25, 25-75, 75-90, 90-100) groundwater levels for each day of the year**
 - Calculated for each day of the year using all available continuous daily data, except for the current year. The model's start date for continuous data may differ from the original data collection start date if a different calibration period was selected (e.g., to begin after initial trends stabilized).
 - See 15 for legend item.
- 13 **Forecast ranges from the model for 14, 30, 60, and 90 days from the latest available date**
 - The range bars, represented as box plots, illustrate possible groundwater level outcomes, generated using forecast temperature and precipitation data combined with Monte Carlo scenarios based on the model and historical climate conditions.
 - See 17 for an explanation of the range bars.
- 14 **Legend item for recently observed groundwater levels (10)**
- 15 **Legend item for historic percentiles (12)**

- Each coloured box shows its corresponding percentile range, along with its corresponding conditions compared to normal in parentheses.
- See [12](#) for explanation of percentile calculations.

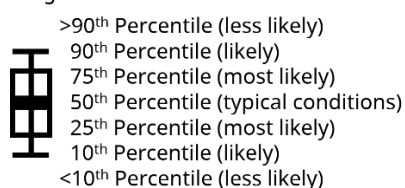
16 Legend item for forecast model performance

- The colour categories of the forecast range bars (see [13](#)) are based on statistical performance metrics (R^2 , NRMSE, and RSR) for each forecast time period of the model during its calibration. These categories reflect both model accuracy and how strongly forecasts depend on future weather conditions.
- Statistics: R^2 (coefficient of determination) measures how well the model's forecasts match observed groundwater levels, with values closer to 1 indicating better performance. **NRMSE** (Normalized Root Mean Square Error) measures the average difference between forecasted and observed groundwater levels, scaled to the data range, with lower values indicating better accuracy. In other words, how well the forecast fall within the range of percentiles. **RSR** (RMSE Skill Ratio) compares the model's error against the error from using average historical groundwater levels, where values below 1 indicate the model performs better than the historical baseline.
- For "Good" model performances, both R^2 and NRMSE score better than their corresponding thresholds (>0.80 for R^2 ; <0.15 for NRMSE). "Fair" performances have one of the metrics as "Good" and one as "Fair" ($0.60-0.80$ for R^2 ; $0.15-0.25$ for NRMSE). Even "Fair" results remain valuable, as they still meet performance thresholds and provide useful forecasts, though with slightly less accuracy than "Good" results. Wells with "Poor" performance models (not included in legend) were not included for forecasting.
- The sensitivity of the model to future weather conditions is determined by the RSR metric. If the RSR value falls below 1, the forecast is more accurate than using just the historical average groundwater levels and is classified as "less sensitive". If the RSR value falls above 1, the forecasts are less useful and results align more with historical average groundwater levels and is thus classified as "more sensitive". Essentially, it indicates how much the forecast relies on future weather versus long-term historical patterns.

17 Range of forecast legend

- Boxplots (see also [13](#)) for each forecast time period (14, 30, 60, and 90 days) are used to show the spread of groundwater level forecasts by summarizing the range of possible outcomes from the model. The box represents the middle 50% of outcomes (25th–75th percentiles of historic conditions, typical conditions), the line inside marks the median forecast, and the whiskers extend to the 10th and 90th percentiles to capture a broader range of possible conditions. This allows users to see both the most likely groundwater levels and the potential uncertainty, or less likely scenarios, around them, though actual water levels may still exceed these forecast bounds.

Range of Forecast



Forecast summary table

18 Groundwater level conditions summary table

- This table summarizes the results of the GLOSS model results as likelihoods (as percentage) of the latest groundwater level values and levels in the four forecast time periods (14, 30, 60, and 90 days) will be above normal (above 75th percentile), near normal (between 25th and 75th percentiles), or below normal (below 25th percentile).

19 “Groundwater Level Conditions” table column

- Each of the three groundwater level conditions – Above Normal, Normal, and Below Normal categorized by percentile ranges, see [20](#) – for which likelihoods are presented.
- This analysis uses the “normal” term solely in reference to water levels between the 25th to 75th percentiles of historical data, not to imply a steady state baseline for comparison. Data should be interpreted with the context of long-term records, patterns, and trends.

20 “Percentile Ranges” table column

- Each of the three percentile ranges for the corresponding groundwater level conditions – Above Normal, Normal, and Below Normal, see [19](#) – for which likelihoods are presented.

21 “Latest Conditions” table column

- The likelihood of the latest conditions being in one of the three groundwater conditions categories. While observed data give a good indication of the latest value, we cannot claim 100% certainty due to natural variability, measurement uncertainties, and the limitations of categorizing continuous values. As a result, likelihoods above 99% are used to indicate very high confidence. No likelihoods are provided for the other categories.
- The “>99” likelihood will be shaded with a colour of blue for Above Normal, green for Normal, or pink for Below Normal conditions.

22 “14-Day” to “90-Day” table columns

- The likelihood of groundwater levels falling into one of three condition categories for each forecast period. Likelihoods below 10% or above 90% are grouped, as very precise probabilities are difficult to interpret, while values between 10% and 90% can take any value to reflect the range of possible outcomes based on model uncertainty and natural variability.
- The likelihood value will be shaded with a colour if there is a greater than 50% likelihood of certain conditions: blue for Above Normal, green for Normal, or pink for Below Normal

Notes and disclaimers

23 Note about use of “normal” terminology in conjunction with percentiles

24 Disclaimer about the use of the model forecast

- **Forecast basis:** This forecast is generated by a machine learning model driven by observed and forecast climate data, collectively referred to as “input data.” Input data come from third-party sources and may contain errors. For more details on the model methodology and underlying science, please refer to the [Technical References](#) page. Because of inherent methodological limitations and errors in the input data, forecasts include uncertainty, known as modeling uncertainty.

- **Modeling uncertainty:** Uncertainty arises from two main sources. Systematic errors stem from intrinsic limitations of the model and are generally recurring and consistent. Random errors result from variability or inaccuracies in the input data and are case-specific, depending on conditions at the time.
- **Forecast scope and limitations:** The model relies on historical and observed data to calibrate and generate forecasts for wells within the PGOWN network. While this provides a basis for predicting likely outcomes, extreme weather, rapid climatic changes, or unusual conditions can cause actual groundwater levels to fall outside forecast bounds. Errors in observed data or unusual recharge conditions can also propagate through the model, contributing to forecast uncertainty. In general, uncertainty increases with longer forecast lead times.
- **User responsibility:** Forecasts are intended for informational purposes and do not guarantee future conditions. Users must accept responsibility for their interpretation and use of the forecasts, including decisions related to water management or planning.

Links to more information

- 25 Links to other GLOSS model and well or aquifer information pages
- 26 Link: [GLOSS Forecast Model Overview](#) (PDF) document providing a brief summary of the model
- 27 Link: [BC Real-time Data](#) page for the well showing real-time water level data and other parameters and information
- 28 Link: This document
- 29 Link: Interactive condition hydrograph for the well showing historical percentiles and conditions
- 30 Link: [Technical references](#) for the GLOSS groundwater level forecast model
- 31 Link: Well Summary in [GWELLS](#) with more information on the well
- 32 Link: Aquifer Summary in [GWELLS](#) with more information on the aquifer
- 33 Link: Map to view results of the groundwater forecast model for all wells
- 34 Link: Report to view results of the groundwater forecast model for all wells
- 35 Link: More information on the PGOWN
- 36 Link to the [RFC homepage](#) and date and time the forecast was updated/issued

GLOSS Model Links: [Overview](#) | [Technical references](#) | [Forecast map](#) | [Forecast report](#)
Related Links: [RFC Homepage](#) | [Provincial Groundwater Observation Well Network \(PGOWN\)](#) | [List of active PGOWN wells](#) | [Latest Groundwater Level Conditions](#) | [Real-time water data tool](#) | [ECCC Climate Data](#) | [BC Snow Program](#) | [B.C. Drought Information Portal](#)

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