STREAM STRESSORS, IMPACTS, AND RESTORATION

# STREAM TEMPERATURE ACTIVITY: STUDENT WORKSHEET

Photo credit: Eiko Jones

**NAME:**_____

**DATE:**_____

PACIFIC SALMON FOUNDATION

PACIFIC SALMON FOUNDATION
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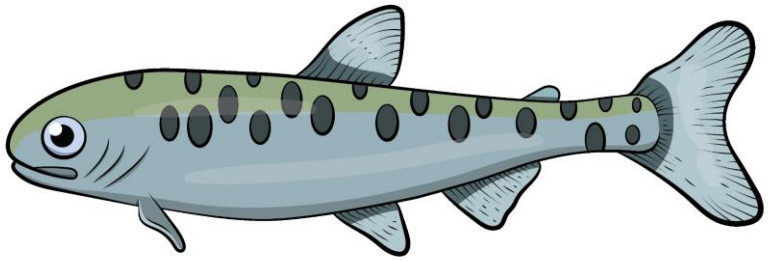
# PART 1

## Vocabulary

| | |
|---|---|
| **Riparian:** | The vegetated area adjacent to the channel. This riparian area provides many ecosystem functions like regulating the temperature of the channel by shading out the sun, adding organic matter and nutrients from falling leaves/branches, and contributing terrestrial invertebrates (insects) to the channel. |
| **Crown Closure:** | An estimation of the amount of shade provided by trees and branches above. Crown closure is measured as the percentage of an area of the sky that is covered by branches and foliage (leaves or pine needles). Also known as percent cover. |
| **Thermal Tolerance:** | The temperatures of water where Pacific salmon can survive. Each species of Pacific salmon have different ranges of thermal tolerance, but they are all sensitive to warming temperatures in both marine and freshwater habitats. |

Given the importance of salmon to the ecosystems and peoples in the North Pacific, there are many scientists and researchers studying the relationships between anthropogenic disturbances including climate change impacts and salmon – how changes in their critical habitat affect salmon throughout all of their life stages. Pacific salmon depend on healthy habitat throughout all their life phases, for example clean water, abundant food sources, shelter and adequate stream temperatures to reside in.



## Sleuthing through data as a Salmon Scientist

Scientists are curious and have a lot of questions – so they go and collect data to try to answer them. Below you will find datasets related to stream temperatures from two locations that Pacific salmon rely upon. Let's pretend you have been hired as a Salmon Scientist – use the data provided in Appendix A to fill in the temperatures for each corresponding hour, then create a figure (line graph) representing temperature for each stream across time. Draw inferences about what this may mean for these streams and for salmon.

Attached you will find stream temperature measurements every hour for an entire day from BC Hydro. Transfer the BC Hydro data into their corresponding tables and then plot the values into a graph to see how the stream temperature changed over time! Plot in 0.5 ℃ increments. Plot the data beginning with 14:00 PM. Include a title for the graph and label the X and Y axis. Use different colours to represent each dataset and include a legend. Data can be found in Appendix A.

**Table 1**. Dataset #1 (pulled from Hydro BC data for October 12th 2021 - Appendix A)

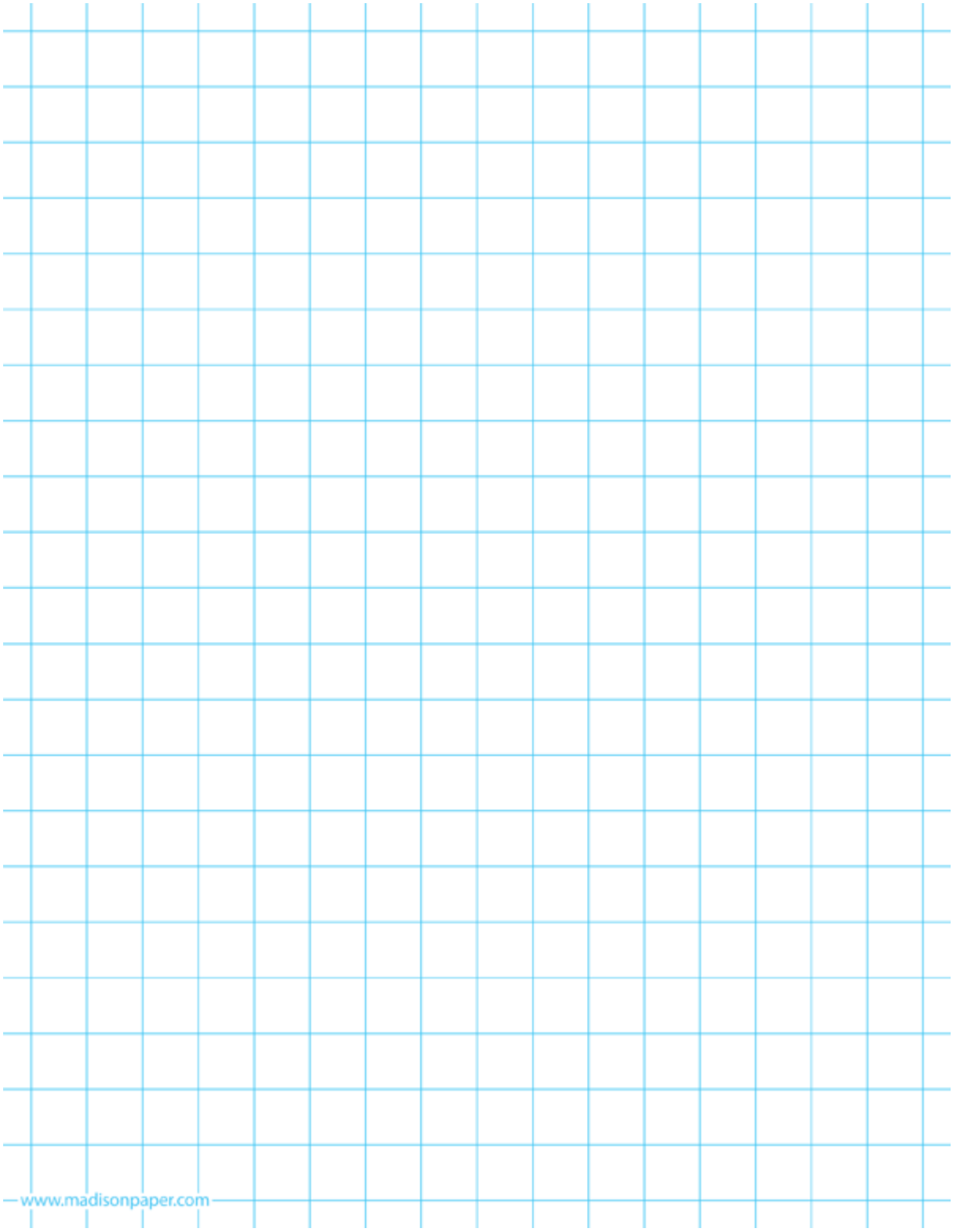
| Hour | Temperature |
|---|---|
| 14:00 PM | |
| 15:00 PM | |
| 16:00 PM | |
| 17:00 PM | |
| 18:00 PM | |
| 19:00 PM | |
| 20:00 PM | |
| 21:00 PM | |
| 22:00 PM | |
| 23:00 PM | |
| 12:00 AM | |
| 1:00 AM | |
| 2:00 AM | |
| 3:00 AM | |
| 4:00 AM | |
| 5:00 AM | |
| 6:00 AM | |
| 7:00 AM | |
| 8:00 AM | |
| 9:00 AM | |
| 10:00 AM | |
| 11:00 AM | |
| 12:00 PM | |
| 13:00 PM | |

**Table 2**. Dataset #2 (pulled from Hydro BC data for October 12th 2021 - Appendix A)

| Hour | Temperature |
|---|---|
| 14:00 PM | |
| 15:00 PM | |
| 16:00 PM | |
| 17:00 PM | |
| 18:00 PM | |
| 19:00 PM | |
| 20:00 PM | |
| 21:00 PM | |
| 22:00 PM | |
| 23:00 PM | |
| 12:00 AM | |
| 1:00 AM | |
| 2:00 AM | |
| 3:00 AM | |
| 4:00 AM | |
| 5:00 AM | |
| 6:00 AM | |
| 7:00 AM | |
| 8:00 AM | |
| 9:00 AM | |
| 10:00 AM | |
| 11:00 AM | |
| 12:00 PM | |
| 13:00 PM | |

Stream A

Stream B


www.madisonpaper.com

**Think-Pair- Share:** Answer the following questions on your own, and then discuss your notes with a partner.

1. What do you notice in these graphs?

2. Which stream (dataset) has higher water temperatures?

3. Compare the photos of stream A and B. Do you see any stressors that we talked about?

4. Which stream would you expect to have a higher temperature? Match the dataset with the stream.

## PART 2 NAME:

Now we are going to take it a step further - let's make some predictions about what we have discovered thus far. Here are five questions related to the figure you just made and more generally- for each one develop a hypothesis or a prediction of what you think the answer is. For example:

Research question 1: *How do high winter river flows affect salmon and their habitat?*

***Prediction:*** *It could scour spawning gravel and make it more difficult to spawn.*

| Research question: | Prediction: |
|---|---|
| What might be the impact of Pacific salmon spending more time in Stream B, rather than Stream A? | |
| **Research question:** | **Prediction:** |
| Which location do you think would be more suitable for salmon to reside in? | |

| Research question: | Prediction: |
| --- | --- |
| How can we get an accurate estimation of mean temperature of the streams? | |
| **Research question:** | **Prediction:** |
| What are some reasons why stream temperature might change over the course of a year? | |
| **Research question:** | **Prediction:** |
| What else do you think could affect stream temperature? | |

# APPENDIX A: STREAM TEMPERATURE DATA

## Dataset #1

** BC HYDRO - GENERATION AND HYDROMETEOROLOGIC INFORMATION **

CLIMATE, SNOW AND/OR SURFACE WATER STATION: Salmon River below Campbell Lake Diversion (SBD)

Note: Data are provided for information only.
BC Hydro does not guarantee their accuracy.
Data are based on automated readings which are from time to time inaccurate.

| Date (yyyy/mm/dd) | Time (PST) | Water level (m) | Discharge (cumec) | Water temperature (°C) |
|---|---|---|---|---|
| 2021/10/13 | 10:30:00 | 2.008 | 10.830 | |
| 2021/10/13 | 10:25:00 | 2.009 | 10.872 | |
| 2021/10/13 | 10:20:00 | 2.009 | 10.872 | |
| 2021/10/13 | 10:15:00 | 2.011 | 10.957 | |
| 2021/10/13 | 10:10:00 | 2.010 | 10.914 | |
| 2021/10/13 | 10:05:00 | 2.014 | 11.086 | |
| 2021/10/13 | 10:00:00 | 2.009 | 10.872 | 6.130 |
| 2021/10/13 | 09:55:00 | 2.011 | 10.957 | |
| 2021/10/13 | 09:50:00 | 2.011 | 10.957 | |
| 2021/10/13 | 09:45:00 | 2.012 | 11.000 | |
| 2021/10/13 | 09:40:00 | 2.013 | 11.043 | |
| 2021/10/13 | 09:35:00 | 2.011 | 10.957 | |
| 2021/10/13 | 09:30:00 | 2.012 | 11.000 | |
| 2021/10/13 | 09:25:00 | 2.014 | 11.100 | |
| 2021/10/13 | 09:20:00 | 2.014 | 11.100 | |
| 2021/10/13 | 09:15:00 | 2.014 | 11.100 | |
| 2021/10/13 | 09:10:00 | 2.013 | 11.100 | |
| 2021/10/13 | 09:05:00 | 2.015 | 11.100 | |
| 2021/10/13 | 09:00:00 | 2.014 | 11.100 | 6.080 |
| 2021/10/13 | 08:55:00 | 2.015 | 11.100 | |
| 2021/10/13 | 08:50:00 | 2.015 | 11.100 | |
| 2021/10/13 | 08:45:00 | 2.016 | 11.200 | |
| 2021/10/13 | 08:40:00 | 2.016 | 11.200 | |
| 2021/10/13 | 08:35:00 | 2.017 | 11.200 | |
| 2021/10/13 | 08:30:00 | 2.015 | 11.100 | |
| 2021/10/13 | 08:25:00 | 2.016 | 11.200 | |
| 2021/10/13 | 08:20:00 | 2.017 | 11.200 | |
| 2021/10/13 | 08:15:00 | 2.017 | 11.200 | |
| 2021/10/13 | 08:10:00 | 2.016 | 11.200 | |
| 2021/10/13 | 08:05:00 | 2.016 | 11.200 | |
| 2021/10/13 | 08:00:00 | 2.018 | 11.300 | 6.090 |
| 2021/10/13 | 07:55:00 | 2.017 | 11.200 | |
| 2021/10/13 | 07:50:00 | 2.016 | 11.200 | |
| 2021/10/13 | 07:45:00 | 2.019 | 11.300 | |
| 2021/10/13 | 07:40:00 | 2.016 | 11.200 | |
| 2021/10/13 | 07:35:00 | 2.019 | 11.300 | |
| 2021/10/13 | 07:30:00 | 2.018 | 11.300 | |
| 2021/10/13 | 07:25:00 | 2.019 | 11.300 | |
| 2021/10/13 | 07:20:00 | 2.021 | 11.400 | |
| 2021/10/13 | 07:15:00 | 2.021 | 11.400 | |
| 2021/10/13 | 07:10:00 | 2.019 | 11.300 | |
| 2021/10/13 | 07:05:00 | 2.018 | 11.300 | |
| 2021/10/13 | 07:00:00 | 2.020 | 11.400 | 6.150 |
| 2021/10/13 | 06:55:00 | 2.021 | 11.400 | |
| 2021/10/13 | 06:50:00 | 2.022 | 11.400 | |
| 2021/10/13 | 06:45:00 | 2.022 | 11.400 | |
| 2021/10/13 | 06:40:00 | 2.022 | 11.400 | |
| 2021/10/13 | 06:35:00 | 2.021 | 11.400 | |
| 2021/10/13 | 06:30:00 | 2.020 | 11.400 | |
| 2021/10/13 | 06:25:00 | 2.025 | 11.600 | |
| 2021/10/13 | 06:20:00 | 2.022 | 11.400 | |
| 2021/10/13 | 06:15:00 | 2.023 | 11.500 | |
| 2021/10/13 | 06:10:00 | 2.023 | 11.500 | |

| | | | |
|---|---|---|---|
| 2021/10/13 06:05:00 | 2.023 | 11.500 | |
| 2021/10/13 06:00:00 | 2.023 | 11.500 | 6.250 |
| 2021/10/13 05:55:00 | 2.025 | 11.600 | |
| 2021/10/13 05:50:00 | 2.025 | 11.600 | |
| 2021/10/13 05:45:00 | 2.023 | 11.500 | |
| 2021/10/13 05:40:00 | 2.025 | 11.600 | |
| 2021/10/13 05:35:00 | 2.026 | 11.600 | |
| 2021/10/13 05:30:00 | 2.027 | 11.700 | |
| 2021/10/13 05:25:00 | 2.026 | 11.600 | |
| 2021/10/13 05:20:00 | 2.025 | 11.600 | |
| 2021/10/13 05:15:00 | 2.026 | 11.600 | |
| 2021/10/13 05:10:00 | 2.026 | 11.600 | |
| 2021/10/13 05:05:00 | 2.025 | 11.600 | |
| 2021/10/13 05:00:00 | 2.027 | 11.700 | 6.370 |
| 2021/10/13 04:55:00 | 2.027 | 11.700 | |
| 2021/10/13 04:50:00 | 2.025 | 11.600 | |
| 2021/10/13 04:45:00 | 2.025 | 11.600 | |
| 2021/10/13 04:40:00 | 2.026 | 11.600 | |
| 2021/10/13 04:35:00 | 2.027 | 11.700 | |
| 2021/10/13 04:30:00 | 2.026 | 11.600 | |
| 2021/10/13 04:25:00 | 2.026 | 11.600 | |
| 2021/10/13 04:20:00 | 2.028 | 11.700 | |
| 2021/10/13 04:15:00 | 2.027 | 11.700 | |
| 2021/10/13 04:10:00 | 2.027 | 11.700 | |
| 2021/10/13 04:05:00 | 2.027 | 11.700 | |
| 2021/10/13 04:00:00 | 2.026 | 11.600 | 6.460 |
| 2021/10/13 03:55:00 | 2.029 | 11.700 | |
| 2021/10/13 03:50:00 | 2.030 | 11.800 | |
| 2021/10/13 03:45:00 | 2.027 | 11.700 | |
| 2021/10/13 03:40:00 | 2.028 | 11.700 | |
| 2021/10/13 03:35:00 | 2.028 | 11.700 | |
| 2021/10/13 03:30:00 | 2.030 | 11.800 | |
| 2021/10/13 03:25:00 | 2.029 | 11.700 | |
| 2021/10/13 03:20:00 | 2.030 | 11.800 | |
| 2021/10/13 03:15:00 | 2.032 | 11.900 | |
| 2021/10/13 03:10:00 | 2.031 | 11.800 | |
| 2021/10/13 03:05:00 | 2.032 | 11.900 | |
| 2021/10/13 03:00:00 | 2.031 | 11.800 | 6.560 |
| 2021/10/13 02:55:00 | 2.029 | 11.700 | |
| 2021/10/13 02:50:00 | 2.030 | 11.800 | |
| 2021/10/13 02:45:00 | 2.032 | 11.900 | |
| 2021/10/13 02:40:00 | 2.031 | 11.800 | |
| 2021/10/13 02:35:00 | 2.032 | 11.900 | |
| 2021/10/13 02:30:00 | 2.032 | 11.900 | |
| 2021/10/13 02:25:00 | 2.031 | 11.800 | |
| 2021/10/13 02:20:00 | 2.035 | 12.000 | |
| 2021/10/13 02:15:00 | 2.033 | 11.900 | |
| 2021/10/13 02:10:00 | 2.029 | 11.700 | |
| 2021/10/13 02:05:00 | 2.034 | 12.000 | |
| 2021/10/13 02:00:00 | 2.031 | 11.800 | 6.680 |
| 2021/10/13 01:55:00 | 2.032 | 11.900 | |
| 2021/10/13 01:50:00 | 2.034 | 12.000 | |
| 2021/10/13 01:45:00 | 2.033 | 11.900 | |
| 2021/10/13 01:40:00 | 2.032 | 11.900 | |
| 2021/10/13 01:35:00 | 2.035 | 12.000 | |
| 2021/10/13 01:30:00 | 2.033 | 11.900 | |
| 2021/10/13 01:25:00 | 2.032 | 11.900 | |
| 2021/10/13 01:20:00 | 2.031 | 11.800 | |
| 2021/10/13 01:15:00 | 2.033 | 11.900 | |
| 2021/10/13 01:10:00 | 2.035 | 12.000 | |
| 2021/10/13 01:05:00 | 2.033 | 11.900 | |
| 2021/10/13 01:00:00 | 2.033 | 11.900 | 6.820 |
| 2021/10/13 00:55:00 | 2.033 | 11.900 | |
| 2021/10/13 00:50:00 | 2.031 | 11.800 | |
| 2021/10/13 00:45:00 | 2.033 | 11.900 | |

| | | | |
|---|---|---|---|
| 2021/10/13 00:40:00 | 2.036 | 12.000 | |
| 2021/10/13 00:35:00 | 2.035 | 12.000 | |
| 2021/10/13 00:30:00 | 2.034 | 12.000 | |
| 2021/10/13 00:25:00 | 2.033 | 11.900 | |
| 2021/10/13 00:20:00 | 2.036 | 12.000 | |
| 2021/10/13 00:15:00 | 2.035 | 12.000 | |
| 2021/10/13 00:10:00 | 2.034 | 12.000 | |
| 2021/10/13 00:05:00 | 2.036 | 12.000 | |
| 2021/10/13 00:00:00 | 2.034 | 12.000 | 6.930 |
| 2021/10/12 23:55:00 | 2.035 | 12.000 | |
| 2021/10/12 23:50:00 | 2.034 | 12.000 | |
| 2021/10/12 23:45:00 | 2.035 | 12.000 | |
| 2021/10/12 23:40:00 | 2.036 | 12.000 | |
| 2021/10/12 23:35:00 | 2.034 | 12.000 | |
| 2021/10/12 23:30:00 | 2.037 | 12.100 | |
| 2021/10/12 23:25:00 | 2.034 | 12.000 | |
| 2021/10/12 23:20:00 | 2.034 | 12.000 | |
| 2021/10/12 23:15:00 | 2.031 | 11.800 | |
| 2021/10/12 23:10:00 | 2.037 | 12.100 | |
| 2021/10/12 23:05:00 | 2.033 | 11.900 | |
| 2021/10/12 23:00:00 | 2.031 | 11.800 | 6.990 |
| 2021/10/12 22:55:00 | 2.034 | 12.000 | |
| 2021/10/12 22:50:00 | 2.033 | 11.900 | |
| 2021/10/12 22:45:00 | 2.032 | 11.900 | |
| 2021/10/12 22:40:00 | 2.034 | 12.000 | |
| 2021/10/12 22:35:00 | 2.033 | 11.900 | |
| 2021/10/12 22:30:00 | 2.034 | 12.000 | |
| 2021/10/12 22:25:00 | 2.030 | 11.800 | |
| 2021/10/12 22:20:00 | 2.033 | 11.900 | |
| 2021/10/12 22:15:00 | 2.031 | 11.800 | |
| 2021/10/12 22:10:00 | 2.031 | 11.800 | |
| 2021/10/12 22:05:00 | 2.030 | 11.800 | |
| 2021/10/12 22:00:00 | 2.029 | 11.700 | 7.000 |
| 2021/10/12 21:55:00 | 2.030 | 11.800 | |
| 2021/10/12 21:50:00 | 2.029 | 11.700 | |
| 2021/10/12 21:45:00 | 2.031 | 11.800 | |
| 2021/10/12 21:40:00 | 2.030 | 11.800 | |
| 2021/10/12 21:35:00 | 2.029 | 11.700 | |
| 2021/10/12 21:30:00 | 2.031 | 11.800 | |
| 2021/10/12 21:25:00 | 2.028 | 11.700 | |
| 2021/10/12 21:20:00 | 2.028 | 11.700 | |
| 2021/10/12 21:15:00 | 2.027 | 11.700 | |
| 2021/10/12 21:10:00 | 2.026 | 11.600 | |
| 2021/10/12 21:05:00 | 2.028 | 11.700 | |
| 2021/10/12 21:00:00 | 2.027 | 11.700 | 7.030 |
| 2021/10/12 20:55:00 | 2.026 | 11.600 | |
| 2021/10/12 20:50:00 | 2.027 | 11.700 | |
| 2021/10/12 20:45:00 | 2.027 | 11.700 | |
| 2021/10/12 20:40:00 | 2.026 | 11.600 | |
| 2021/10/12 20:35:00 | 2.025 | 11.600 | |
| 2021/10/12 20:30:00 | 2.024 | 11.500 | |
| 2021/10/12 20:25:00 | 2.023 | 11.500 | |
| 2021/10/12 20:20:00 | 2.021 | 11.400 | |
| 2021/10/12 20:15:00 | 2.021 | 11.400 | |
| 2021/10/12 20:10:00 | 2.022 | 11.400 | |
| 2021/10/12 20:05:00 | 2.021 | 11.400 | |
| 2021/10/12 20:00:00 | 2.019 | 11.300 | 7.050 |
| 2021/10/12 19:55:00 | 2.019 | 11.300 | |
| 2021/10/12 19:50:00 | 2.019 | 11.300 | |
| 2021/10/12 19:45:00 | 2.019 | 11.300 | |
| 2021/10/12 19:40:00 | 2.020 | 11.400 | |
| 2021/10/12 19:35:00 | 2.017 | 11.200 | |
| 2021/10/12 19:30:00 | 2.018 | 11.300 | |
| 2021/10/12 19:25:00 | 2.016 | 11.200 | |
| 2021/10/12 19:20:00 | 2.014 | 11.100 | |

# Dataset #2

** BC HYDRO - GENERATION AND HYDROMETEOROLOGIC INFORMATION **

CLIMATE, SNOW AND/OR SURFACE WATER STATION: Ash River below Moran Creek (ASM)

Note: Data are provided for information only.
BC Hydro does not guarantee their accuracy.
Data are based on automated readings which are from time to time inaccurate.

| Date (yyyy/mm/dd) | Time (PST) | Water level (m) | Discharge (cumec) | Water temperature (°C) |
|---|---|---|---|---|
| 2021/10/13 | 11:00:00 | 0.831 | 11.468 | 10.200 |
| 2021/10/13 | 10:55:00 | 0.832 | 11.512 | |
| 2021/10/13 | 10:50:00 | 0.832 | 11.512 | |
| 2021/10/13 | 10:45:00 | 0.831 | 11.468 | |
| 2021/10/13 | 10:40:00 | 0.832 | 11.512 | |
| 2021/10/13 | 10:35:00 | 0.830 | 11.424 | |
| 2021/10/13 | 10:30:00 | 0.831 | 11.468 | |
| 2021/10/13 | 10:25:00 | 0.834 | 11.600 | |
| 2021/10/13 | 10:20:00 | 0.831 | 11.468 | |
| 2021/10/13 | 10:15:00 | 0.831 | 11.468 | |
| 2021/10/13 | 10:10:00 | 0.829 | 11.380 | |
| 2021/10/13 | 10:05:00 | 0.833 | 11.556 | |
| 2021/10/13 | 10:00:00 | 0.834 | 11.600 | 10.100 |
| 2021/10/13 | 09:55:00 | 0.827 | 11.300 | |
| 2021/10/13 | 09:50:00 | 0.835 | 11.700 | |
| 2021/10/13 | 09:45:00 | 0.829 | 11.400 | |
| 2021/10/13 | 09:40:00 | 0.833 | 11.600 | |
| 2021/10/13 | 09:35:00 | 0.830 | 11.500 | |
| 2021/10/13 | 09:30:00 | 0.833 | 11.600 | |
| 2021/10/13 | 09:25:00 | 0.830 | 11.500 | |
| 2021/10/13 | 09:20:00 | 0.832 | 11.600 | |
| 2021/10/13 | 09:15:00 | 0.833 | 11.600 | |
| 2021/10/13 | 09:10:00 | 0.830 | 11.500 | |
| 2021/10/13 | 09:05:00 | 0.832 | 11.600 | |
| 2021/10/13 | 09:00:00 | 0.833 | 11.600 | 10.000 |
| 2021/10/13 | 08:55:00 | 0.830 | 11.500 | |
| 2021/10/13 | 08:50:00 | 0.836 | 11.700 | |
| 2021/10/13 | 08:45:00 | 0.831 | 11.500 | |
| 2021/10/13 | 08:40:00 | 0.831 | 11.500 | |
| 2021/10/13 | 08:35:00 | 0.836 | 11.700 | |
| 2021/10/13 | 08:30:00 | 0.834 | 11.600 | |
| 2021/10/13 | 08:25:00 | 0.836 | 11.700 | |
| 2021/10/13 | 08:20:00 | 0.832 | 11.600 | |
| 2021/10/13 | 08:15:00 | 0.832 | 11.600 | |
| 2021/10/13 | 08:10:00 | 0.833 | 11.600 | |
| 2021/10/13 | 08:05:00 | 0.834 | 11.600 | |
| 2021/10/13 | 08:00:00 | 0.833 | 11.600 | 9.900 |
| 2021/10/13 | 07:55:00 | 0.837 | 11.800 | |
| 2021/10/13 | 07:50:00 | 0.835 | 11.700 | |
| 2021/10/13 | 07:45:00 | 0.835 | 11.700 | |
| 2021/10/13 | 07:40:00 | 0.835 | 11.700 | |
| 2021/10/13 | 07:35:00 | 0.834 | 11.600 | |
| 2021/10/13 | 07:30:00 | 0.833 | 11.600 | |
| 2021/10/13 | 07:25:00 | 0.835 | 11.700 | |
| 2021/10/13 | 07:20:00 | 0.833 | 11.600 | |
| 2021/10/13 | 07:15:00 | 0.833 | 11.600 | |
| 2021/10/13 | 07:10:00 | 0.837 | 11.800 | |
| 2021/10/13 | 07:05:00 | 0.834 | 11.600 | |
| 2021/10/13 | 07:00:00 | 0.836 | 11.700 | 9.800 |
| 2021/10/13 | 06:55:00 | 0.833 | 11.600 | |
| 2021/10/13 | 06:50:00 | 0.836 | 11.700 | |
| 2021/10/13 | 06:45:00 | 0.830 | 11.500 | |
| 2021/10/13 | 06:40:00 | 0.838 | 11.800 | |
| 2021/10/13 | 06:35:00 | 0.835 | 11.700 | |

| | | | |
|---|---|---|---|
| 2021/10/13 06:30:00 | 0.836 | 11.700 | |
| 2021/10/13 06:25:00 | 0.836 | 11.700 | |
| 2021/10/13 06:20:00 | 0.836 | 11.700 | |
| 2021/10/13 06:15:00 | 0.834 | 11.600 | |
| 2021/10/13 06:10:00 | 0.830 | 11.500 | |
| 2021/10/13 06:05:00 | 0.837 | 11.800 | |
| 2021/10/13 06:00:00 | 0.837 | 11.800 | 9.800 |
| 2021/10/13 05:55:00 | 0.833 | 11.600 | |
| 2021/10/13 05:50:00 | 0.830 | 11.500 | |
| 2021/10/13 05:45:00 | 0.838 | 11.800 | |
| 2021/10/13 05:40:00 | 0.834 | 11.600 | |
| 2021/10/13 05:35:00 | 0.833 | 11.600 | |
| 2021/10/13 05:30:00 | 0.833 | 11.600 | |
| 2021/10/13 05:25:00 | 0.837 | 11.800 | |
| 2021/10/13 05:20:00 | 0.837 | 11.800 | |
| 2021/10/13 05:15:00 | 0.835 | 11.700 | |
| 2021/10/13 05:10:00 | 0.833 | 11.600 | |
| 2021/10/13 05:05:00 | 0.835 | 11.700 | |
| 2021/10/13 05:00:00 | 0.837 | 11.800 | 9.800 |
| 2021/10/13 04:55:00 | 0.834 | 11.600 | |
| 2021/10/13 04:50:00 | 0.834 | 11.600 | |
| 2021/10/13 04:45:00 | 0.837 | 11.800 | |
| 2021/10/13 04:40:00 | 0.836 | 11.700 | |
| 2021/10/13 04:35:00 | 0.837 | 11.800 | |
| 2021/10/13 04:30:00 | 0.836 | 11.700 | |
| 2021/10/13 04:25:00 | 0.837 | 11.800 | |
| 2021/10/13 04:20:00 | 0.836 | 11.700 | |
| 2021/10/13 04:15:00 | 0.838 | 11.800 | |
| 2021/10/13 04:10:00 | 0.835 | 11.700 | |
| 2021/10/13 04:05:00 | 0.834 | 11.600 | |
| 2021/10/13 04:00:00 | 0.835 | 11.700 | 9.700 |
| 2021/10/13 03:55:00 | 0.836 | 11.700 | |
| 2021/10/13 03:50:00 | 0.837 | 11.800 | |
| 2021/10/13 03:45:00 | 0.836 | 11.700 | |
| 2021/10/13 03:40:00 | 0.837 | 11.800 | |
| 2021/10/13 03:35:00 | 0.832 | 11.600 | |
| 2021/10/13 03:30:00 | 0.838 | 11.800 | |
| 2021/10/13 03:25:00 | 0.830 | 11.500 | |
| 2021/10/13 03:20:00 | 0.834 | 11.600 | |
| 2021/10/13 03:15:00 | 0.835 | 11.700 | |
| 2021/10/13 03:10:00 | 0.837 | 11.800 | |
| 2021/10/13 03:05:00 | 0.835 | 11.700 | |
| 2021/10/13 03:00:00 | 0.839 | 11.900 | 9.800 |
| 2021/10/13 02:55:00 | 0.834 | 11.600 | |
| 2021/10/13 02:50:00 | 0.835 | 11.700 | |
| 2021/10/13 02:45:00 | 0.837 | 11.800 | |
| 2021/10/13 02:40:00 | 0.834 | 11.600 | |
| 2021/10/13 02:35:00 | 0.837 | 11.800 | |
| 2021/10/13 02:30:00 | 0.837 | 11.800 | |
| 2021/10/13 02:25:00 | 0.832 | 11.600 | |
| 2021/10/13 02:20:00 | 0.838 | 11.800 | |
| 2021/10/13 02:15:00 | 0.835 | 11.700 | |
| 2021/10/13 02:10:00 | 0.836 | 11.700 | |
| 2021/10/13 02:05:00 | 0.835 | 11.700 | |
| 2021/10/13 02:00:00 | 0.836 | 11.700 | 9.900 |
| 2021/10/13 01:55:00 | 0.835 | 11.700 | |
| 2021/10/13 01:50:00 | 0.835 | 11.700 | |
| 2021/10/13 01:45:00 | 0.833 | 11.600 | |
| 2021/10/13 01:40:00 | 0.836 | 11.700 | |
| 2021/10/13 01:35:00 | 0.834 | 11.600 | |
| 2021/10/13 01:30:00 | 0.833 | 11.600 | |
| 2021/10/13 01:25:00 | 0.839 | 11.900 | |
| 2021/10/13 01:20:00 | 0.838 | 11.800 | |
| 2021/10/13 01:15:00 | 0.837 | 11.800 | |
| 2021/10/13 01:10:00 | 0.836 | 11.700 | |

| | | | |
|---|---|---|---|
| 2021/10/13 01:05:00 | 0.837 | 11.800 | |
| 2021/10/13 01:00:00 | 0.836 | 11.700 | 10.000 |
| 2021/10/13 00:55:00 | 0.836 | 11.700 | |
| 2021/10/13 00:50:00 | 0.838 | 11.800 | |
| 2021/10/13 00:45:00 | 0.836 | 11.700 | |
| 2021/10/13 00:40:00 | 0.836 | 11.700 | |
| 2021/10/13 00:35:00 | 0.836 | 11.700 | |
| 2021/10/13 00:30:00 | 0.831 | 11.500 | |
| 2021/10/13 00:25:00 | 0.834 | 11.600 | |
| 2021/10/13 00:20:00 | 0.836 | 11.700 | |
| 2021/10/13 00:15:00 | 0.836 | 11.700 | |
| 2021/10/13 00:10:00 | 0.832 | 11.600 | |
| 2021/10/13 00:05:00 | 0.836 | 11.700 | |
| 2021/10/13 00:00:00 | 0.833 | 11.600 | 10.200 |
| 2021/10/12 23:55:00 | 0.836 | 11.700 | |
| 2021/10/12 23:50:00 | 0.834 | 11.600 | |
| 2021/10/12 23:45:00 | 0.835 | 11.700 | |
| 2021/10/12 23:40:00 | 0.827 | 11.300 | |
| 2021/10/12 23:35:00 | 0.834 | 11.600 | |
| 2021/10/12 23:30:00 | 0.833 | 11.600 | |
| 2021/10/12 23:25:00 | 0.835 | 11.700 | |
| 2021/10/12 23:20:00 | 0.835 | 11.700 | |
| 2021/10/12 23:15:00 | 0.837 | 11.800 | |
| 2021/10/12 23:10:00 | 0.834 | 11.600 | |
| 2021/10/12 23:05:00 | 0.834 | 11.600 | |
| 2021/10/12 23:00:00 | 0.828 | 11.400 | 10.300 |
| 2021/10/12 22:55:00 | 0.830 | 11.500 | |
| 2021/10/12 22:50:00 | 0.834 | 11.600 | |
| 2021/10/12 22:45:00 | 0.832 | 11.600 | |
| 2021/10/12 22:40:00 | 0.836 | 11.700 | |
| 2021/10/12 22:35:00 | 0.835 | 11.700 | |
| 2021/10/12 22:30:00 | 0.835 | 11.700 | |
| 2021/10/12 22:25:00 | 0.834 | 11.600 | |
| 2021/10/12 22:20:00 | 0.833 | 11.600 | |
| 2021/10/12 22:15:00 | 0.833 | 11.600 | |
| 2021/10/12 22:10:00 | 0.834 | 11.600 | |
| 2021/10/12 22:05:00 | 0.832 | 11.600 | |
| 2021/10/12 22:00:00 | 0.832 | 11.600 | 10.400 |
| 2021/10/12 21:55:00 | 0.831 | 11.500 | |
| 2021/10/12 21:50:00 | 0.833 | 11.600 | |
| 2021/10/12 21:45:00 | 0.829 | 11.400 | |
| 2021/10/12 21:40:00 | 0.831 | 11.500 | |
| 2021/10/12 21:35:00 | 0.835 | 11.700 | |
| 2021/10/12 21:30:00 | 0.835 | 11.700 | |
| 2021/10/12 21:25:00 | 0.834 | 11.600 | |
| 2021/10/12 21:20:00 | 0.833 | 11.600 | |
| 2021/10/12 21:15:00 | 0.834 | 11.600 | |
| 2021/10/12 21:10:00 | 0.832 | 11.600 | |
| 2021/10/12 21:05:00 | 0.834 | 11.600 | |
| 2021/10/12 21:00:00 | 0.830 | 11.500 | 10.500 |
| 2021/10/12 20:55:00 | 0.833 | 11.600 | |
| 2021/10/12 20:50:00 | 0.835 | 11.700 | |
| 2021/10/12 20:45:00 | 0.831 | 11.500 | |
| 2021/10/12 20:40:00 | 0.830 | 11.500 | |
| 2021/10/12 20:35:00 | 0.833 | 11.600 | |
| 2021/10/12 20:30:00 | 0.828 | 11.400 | |
| 2021/10/12 20:25:00 | 0.830 | 11.500 | |
| 2021/10/12 20:20:00 | 0.828 | 11.400 | |
| 2021/10/12 20:15:00 | 0.831 | 11.500 | |
| 2021/10/12 20:10:00 | 0.829 | 11.400 | |
| 2021/10/12 20:05:00 | 0.830 | 11.500 | |
| 2021/10/12 20:00:00 | 0.831 | 11.500 | 10.600 |
| 2021/10/12 19:55:00 | 0.828 | 11.400 | |
| 2021/10/12 19:50:00 | 0.831 | 11.500 | |
| 2021/10/12 19:45:00 | 0.827 | 11.300 | |



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