STREAM STRESSORS, IMPACTS, AND RESTORATION

STREAM TEMPERATURE ACTIVITY

Photo credit: Eiko Jones

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PACIFIC SALMON FOUNDATION

PACIFIC SALMON FOUNDATION
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PART 1 TEACHER'S ANSWER KEY

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 to create a figure (e.g., line graph) representing temperature for each stream across time and draw inferences about what this may mean for these streams and for salmon.

On the next few pages, 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 0.50 ℃ 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.

Materials Needed

Ruler, two different coloured pencil crayons, either graph paper and pencil, or excel spreadsheet. Data provided below in Appendix A. Students can transfer their data to the table below if it is helpful for their process.

Data Needed

You will find the data you need in table 1 and table 2. Recorded every hour for a whole day.

Provide students 5-10 minutes to answer the following questions, and then 5 minutes to discuss with a partner sitting next to them (Think-Pair-Share!).

1. What do you notice in these graphs?
2. Which stream 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.

Background Notes

Stream temperature is influenced by many variables including, variables at a catchment scale (e.g., drainage, area), macroclimate scale (e.g., air temperature, precipitation), and reach-scale (e.g., shading by riparian vegetation) (Moore 2006). Whether water flow is regulated or not can also influence stream temperature. Stream temperatures can be documented over time to understand temperature regimes and find temperature -sensitive streams (Moore 2006). This can help with assessing whether a habitat is suitable for salmon species and can also help with the restoration decision-making process and how to prioritize urgent actions.

Stream A

Stream B

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

Hour	Temperature
14:00 PM	7.050
15:00 PM	7.090
16:00 PM	7.090
17:00 PM	7.070
18:00 PM	7.060
19:00 PM	7.050
20:00 PM	7.050
21:00 PM	7.030
22:00 PM	7.000
23:00 PM	6.990
12:00 AM	6.940
1:00 AM	6.870
2:00 AM	6.840
3:00 AM	6.830
4:00 AM	6.820
5:00 AM	6.800
6:00 AM	6.790
7:00 AM	6.790
8:00 AM	6.800
9:00 AM	6.820
10:00 AM	6.840
11:00 AM	6.870
12:00 PM	6.920
13:00 PM	6.960

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

Hour	Temperature
14:00 PM	11.000
15:00 PM	10.900
16:00 PM	10.900
17:00 PM	10.800
18:00 PM	10.800
19:00 PM	10.700
20:00 PM	10.600
21:00 PM	10.500
22:00 PM	10.400
23:00 PM	10.300
12:00 AM	10.900
1:00 AM	10.800
2:00 AM	10.700
3:00 AM	10.600
4:00 AM	10.600
5:00 AM	10.600
6:00 AM	10.600
7:00 AM	10.500
8:00 AM	10.500
9:00 AM	10.600
10:00 AM	10.700
11:00 AM	10.800
12:00 PM	10.900
13:00 PM	10.900

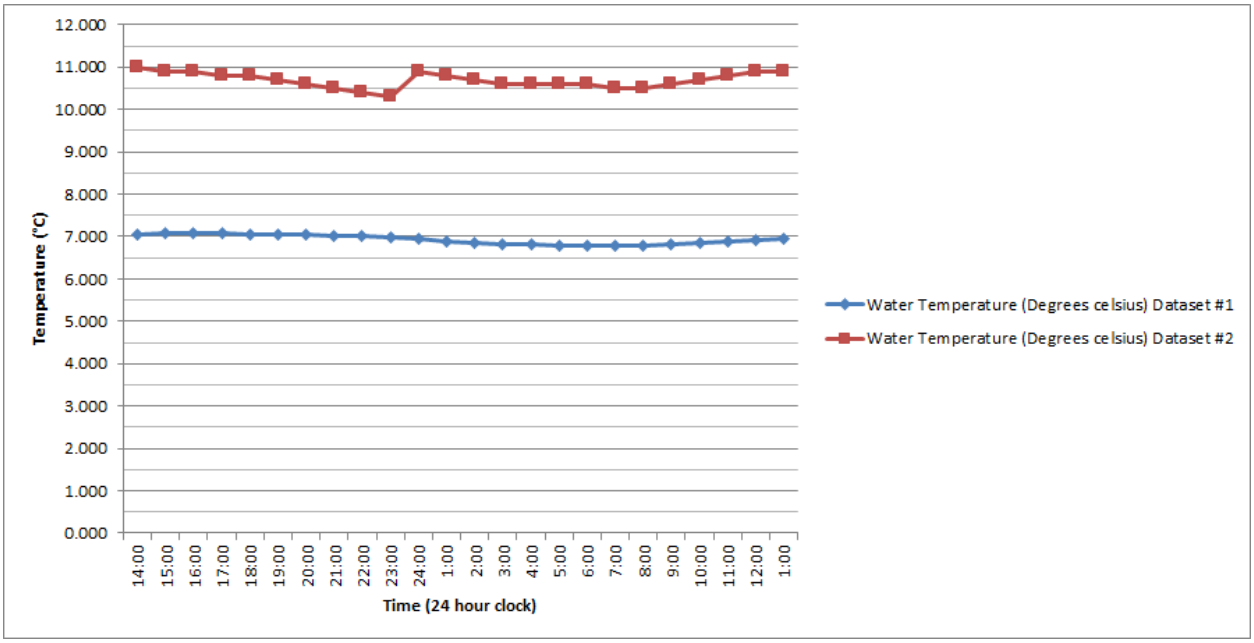
If using excel, it would look like this:

October 12th 2021

Time	Water Temperature (Degrees celsius) Dataset #1	Water Temperature (Degrees celsius) Dataset #2
14:00 PM	7.050	11.000
15:00 PM	7.090	10.900
16:00 PM	7.090	10.900
17:00 PM	7.070	10.800
18:00 PM	7.060	10.800
19:00 PM	7.050	10.700
20:00 PM	7.050	10.600
21:00 PM	7.030	10.500
22:00 PM	7.000	10.400
23:00 PM	6.990	10.300
12:00 AM	6.940	10.900
1:00 AM	6.870	10.800
2:00 AM	6.840	10.700
3:00 AM	6.830	10.600
4:00 AM	6.820	10.600
5:00 AM	6.800	10.600
6:00 AM	6.790	10.600
7:00 AM	6.790	10.500
8:00 AM	6.800	10.500
9:00 AM	6.820	10.600
10:00 AM	6.840	10.700
11:00 AM	6.870	10.800
12:00 PM	6.920	10.900
13:00 PM	6.960	10.900

What graphs will look like, whether drawn or created in excel:

Figure 1. Stream temperature datasets #1 and #2 across a 24 hour period, sampled in two streams on October 12th 2021 by BC Hydro.



1. Stream A has much cooler temperatures than Stream B. Stream A looks to have more stable temperatures across a 24 hour period.
2. Stream B. Teacher can ask, by how much?
3. Stream B has less riparian vegetation (especially less overhanging vegetation) that could provide shade and cooler waters.
4. Stream A matches with dataset #1.

STREAM TEMPERATURE

PART 2 TEACHER'S ANSWER KEY

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, 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?	This requires broader thinking that encompasses elements from Educational Video #1. • Warmer waters (less shade) • Less cover to hide from predators • Less terrestrial food sources entering the stream
Research question:	**Prediction:**
Which location do you think would be more suitable for salmon to reside in?	Stream A Reasoning: stream A is rich in riparian vegetation. Compared to stream B, there is more shade to keep waters cool as well as overhanging vegetation providing refuge for salmon. The riparian vegetation is also habitat for terrestrial insects, which may fall into the stream, providing food for the salmon.

Research question:	Prediction:
How can we get an accurate estimation of mean temperature of the streams?	Add the data from the 24 hour period and divide by the total amount of hours (24).
Research question: What are some reasons why stream temperature might change over the course of a year?	**Prediction:** Seasonal differences • Colder in winter months because of cooler air temperatures and potential freezing in small streams. There is also less hours of sunlight in the winter time, so streams have less of a chance to warm up • Warmer during summer because of warmer air temperatures and longer hours of daylight. • Warmer during periods of drought because lower water levels/flows warm up more easily from the sun and surrounding air.
Research question: What else do you think could affect stream temperature?	**Prediction:** • dams and other obstructions to natural hydrologic flow • groundwater temperature and influence • precipitation • snowmelt and glacier influence • drought • depth of stream

REFERENCES

R D. (Dan) Moore (2006) Stream Temperature Patterns in British Columbia, Canada, Based on Routine Spot Measurements , Canadian Water Resources Journal, 31:1, 41-56, DOI: 10.4296/cwrj3101041

APPENDIX A

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	

PACIFIC SALMON FOUNDATION