Report: Harriman Ranch Temperature Monitoring Project

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Project Background: why care about Ranch water temperatures?



Temperature Logger Housing

There is growing concern regarding river temperatures in Harriman State Park. Water temperature plays a pivotal role in the unique angling experience that is characteristic of the Henry's Fork. Macroinvertebrate diversity, abundance, and size at hatch is influenced by the temperature of the water. Likewise, wild trout have a temperature threshold that can impact growth and activity. With the increasing impacts of climate change on weather and hydrology, there are growing risks to the fishing experience we have come to expect on the Ranch.



1026 Interns - Kate Shiffler & Tate Sargeant

In 2023, we started a comprehensive monitoring project to investigate temperature patterns on the river. With the help of the local angling community, we selected sixteen locations that were of concern for elevated water temperatures. There are a mix of mainstem and tributary sites to represent the full picture of water temperature throughout the Ranch. Onset Computer HOBOlogger water temperature recording devices were placed in the water at each monitoring site. These devices record the temperature every fifteen minutes and store the resulting data. During the summer months (June-August), data is offloaded every week and pushed to the HFF website.

Project Goals:

- Understand thermal variability in Harriman State Park (HSP).
- Build on existing HFF monitoring.
- Address concerns of the community regarding water temperature in HSP.

What We Learned: the state of water temperature on the Ranch

- *Daily average* temperatures on the Ranch are controlled by the *temperature* of the outflow from Island Park Reservoir, not flow amount.
- *Daily maximum* temperatures are affected by flow. High flow from Island Park Reservoir = lower daily maximum temperatures, even if *average* temperatures are high.
- Groundwater plays a major role: springs and aquifer input from winter snowmelt help reduce and stabilize temperatures everywhere on the Ranch, not just at Osborne Springs.
- Tributaries have lower *daily average* temperatures than the Henry's Fork but often experience higher *maximum* temperatures by the afternoon.

We found water temperatures remain ideal for angling only when outflows from Island Park Reservoir are both high *and* cool simultaneously. The situation is even better if a full groundwater aquifer supports strong spring and tributary inflow. Only unusually wet, cold conditions and multiple years of strong snowpack make this possible. Unfortunately, the new normal is the opposite: poor snowpack and early springs result in early ice-off, record-low natural flow, a reduced aquifer, and early irrigation water needs. Flows from Island Park Reservoir are warm and oftentimes low, groundwater is reduced, resulting in the high average and maximum temperatures we see in the modern era.

Future Conservation Efforts: What Can We Do?

To reduce water temperatures, the Henry's Fork Foundation is focused on keeping Island Park Reservoir full, since our science says this helps reduce outflow temperatures and thereby water temperatures on the Ranch (McLaren et al. 2019). Reduced outflow to accomplish this goal may result in occasional high daily maximum temperatures, but keeping daily averages lower is likely more impactful for long-term trout and macroinvertebrate health. The Henry's Fork Foundation's Farms and Fish and Precision Management programs have helped keep Island Park Reservoir about 15% fuller than would be expected. Any further improvements will need to come via major, expensive infrastructure updates to Island Park Reservoir. Infrastructure like a variable-elevation outflow retrofit would allow for direct management of water temperature in Island Park Reservoir, potentially cooling annual maximum average temperatures by 1-2 Celsius.

On the Ranch itself, weather, tributaries, spring input, and flow are the primary driver of thermal patterns. Spring input in certain reaches can be seen for miles downstream, given the poor lateral mixing of the Henry's Fork (Figure 1). This poor mixing provides areas of localized stability (refugia) that can be habitat for juvenile and adult trout when the water temperature increases. Restoration and enhancement of the tributaries can be implemented to reduce temperature and provide refuge for trout. This can be done through habitat work—such as fencing and shading—or through local groundwater recharge.

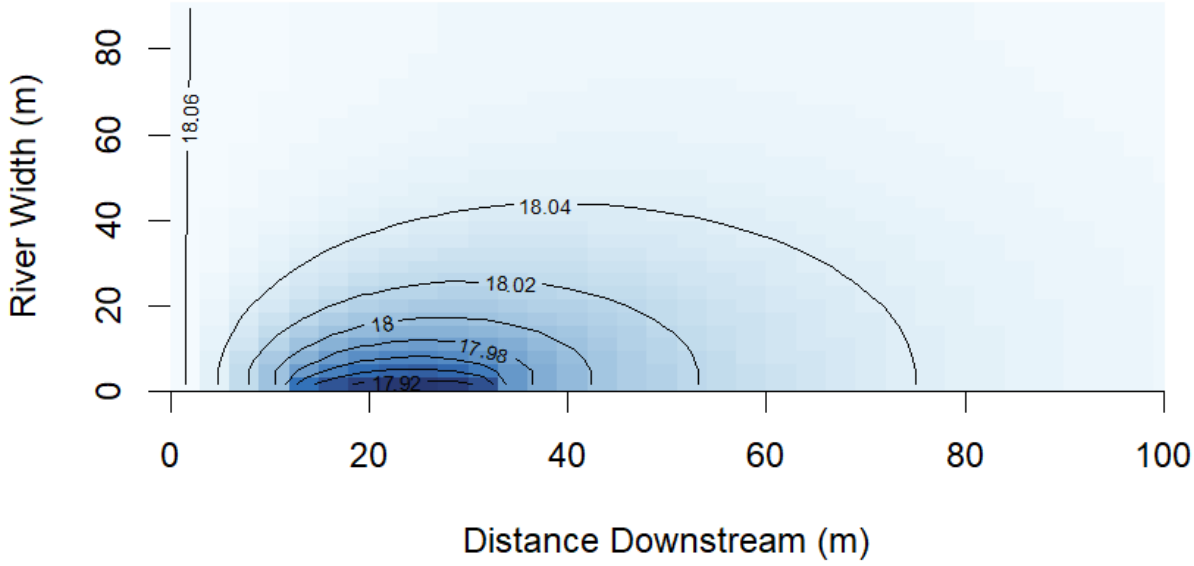


Figure 1: Estimated temperature plume at Blue Springs Creek in the morning when temperatures are at their minimum. Warmer temperatures = white, cooler temperatures = blue. Water flow is left to right, and Blue Springs Creek enters at 0m from the bottom of the plot. If Blue Springs Creek were restored and groundwater inputs increased, this plume would be larger, colder, and expanded in spatial and temporal scope.