ELBOW COULEE FLOODPLAIN RECONNECTION AND SIDE CHANNEL RESTORATION PROJECT

2010 Post-Project Assessment Report

Executive Summary

In September 2008, the Elbow Coulee Floodplain Reconnection and Side Channel Restoration Project was implemented in order to: 1) re-establish a primary side channel to the Twisp River at RM 6.6; 2) increase habitat complexity and large woody debris recruitment potential; 3) reduce stream energy to increase the potential for accumulation of sediment and wood in the Twisp River; and 4) increase habitat for native fish, especially rearing-age salmonids. Specifically, a rock breach was constructed in an existing dike at the upper entrance to the primary side channel (Figure 1). The sill (breach) functions as a grade control structure and permits flow to enter the side channel. The sill was designed to activate the side channel when flows in the Twisp River (based on USGS gauge #12448998 data) reached 200-400 c.f.s.

Post-project assessment of the restored side channel and associated floodplain is necessary to gauge project success at meeting goals and to form the basis of adaptive management. This assessment will consist of both quantitative and visual examinations of side channel form and function. Specifically, monitoring was conducted to assess the: 1) response of the primary side channel geomorphic configuration to restoration activities designed to create long-term habitat benefits; 2) response of physical characteristics (primarily discharge and water temperature) and the biological community to habitat restoration and the newly re-established aquatic habitats within the primary side channel; and 3) identify steps needed to adaptively manage the project in order to maximize project success.

Two years of monitoring was detailed in a 2008-2009 post-project assessment report (Crandall 2009). Overall, the project had functioned to allow rearing of juvenile spring Chinook salmon and steelhead both of which were target species. Both of these species were observed in the primary side channel in 2009. Additionally, the side channel was activated when discharge in the Twisp River was approximately 300 c.f.s., yet significant flow did not enter the channel until the sill rock was overtopped at a Twisp River flow of approximately 575 c.f.s.

Fall 2009- Spring 2010 Monitoring Summary

The primary side channel functioned very similar to what was observed through previous monitoring efforts and has been functioning in close accordance to the goals of the restoration actions undertaken at the site. For the second consecutive year post-construction, juvenile spring Chinook salmon were observed in the side channel following activation flows from the Twisp River. The monitoring described below is limited to the period from November 2009 through May 2010. Previous monitoring results are presented in Crandall (2009).

Flow Monitoring

Flow monitoring during this period focused on increasing the primary side channel discharge dataset to further define the staff gauge rating curve developed in 2008-2009. Additionally, water level in the primary side channel was recorded continuously with an electronic water level logger

identical to that used in previous monitoring. This monitoring continues to elucidate the groundwater regime present in the side channel.

Discharge in the primary side channel was measured between > 0.1 and 10 cubic feet per second during the period 19 November 2009 to 30 May 2010 (Figure 1). Based on both flow monitoring and qualitative visual observations, it appears groundwater inflow into the upstream portion of the side channel is <0.1 c.f.s. There is a sharp increase in side channel flow when staff gauge height >1.0 which corresponds to flow from the Twisp River overtopping the rock sill in the breach. Below this gauge height, flow in the side channel ranges between 0.1 and 2 c.f.s.

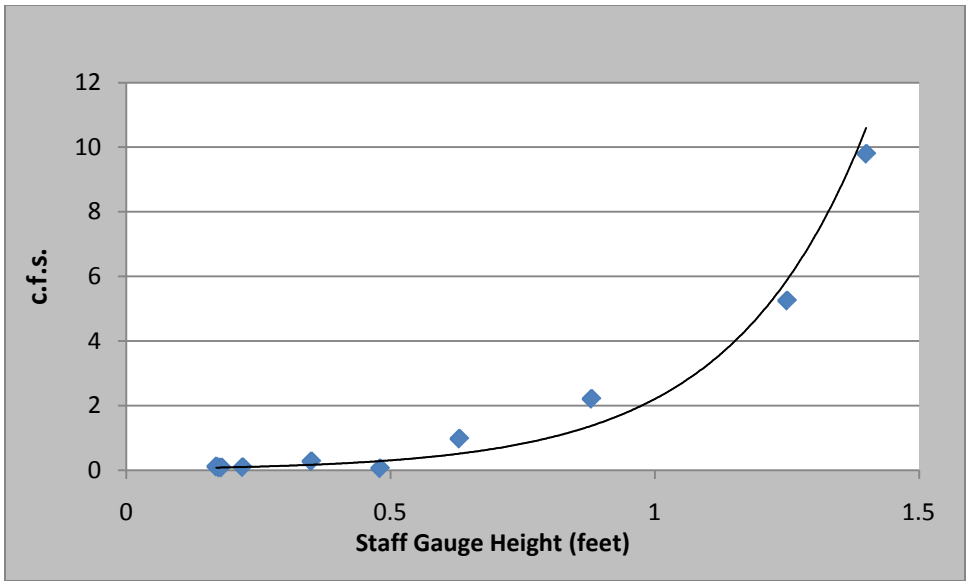

Figure 1. Flow curve based upon nine discharge measurements in the Elbow Coulee Primary Side Channel, November 2009- May 2010.

During the study period and based on a Twisp River flow of 300 c.f.s. required for side channel activation, the primary side channel was activated for 62 days across four separate activation events (Figure 2). Of these, 19 days occurred during two winter flow events in December 2009. The remaining 43 days were associated with high flows associated with the spring runoff.

Similar to 2008-2009 (Crandall 2009), water level in the side channel generally decreased during the winter-spring study period (Figure 2). The two winter flow activation events were captured by the water level monitoring, although the relationships between flow in the Twisp River and water levels, hence, flow, in the side channel, still require additional data collection and observation in order to develop a more complete understanding of the situation. Water level in the side channel rose during the activation events, but icing at both the location of the monitoring, as well as at the USGS Twisp River gauge site, may have confounded precise measurements. Furthermore, the groundwater dynamics influencing the side channel, which also account for its perennial nature, are not fully understood. Thus, the causative factors involved with decreases in water level when the channel is isolated from the Twisp River will require additional monitoring to clarify.

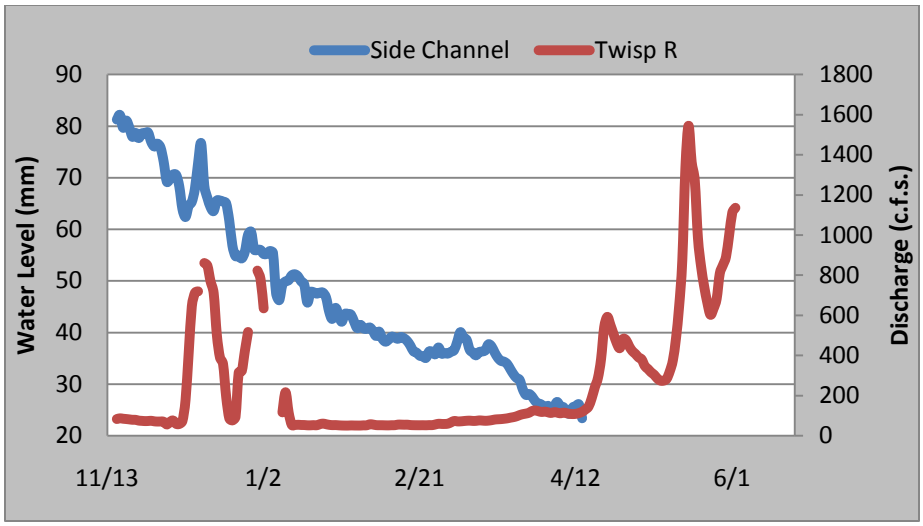

Figure 2. Water level in the Elbow Coulee Primary Side Channel and discharge in the Twisp River, November 2009-May 2010.

Temperature Monitoring

Water temperature monitoring was continuous during the period 26 November 2009 through 30 May 2010 in both the primary side channel and the adjacent reach of the Twisp River. However, due to field logistics, the dataset reported here ended on 21 March 2010. Temperature was recorded by accuracy-checked electronic submersible data loggers every 30 minutes.

Overall, and similar to 2009 (Crandall 2009), the temperature in the primary side channel was warmer during the winter when compared to the adjacent Twisp River (Figures 3 and 4). Temperature in the side channel ranged from 0.5 to 8 °C during the monitoring period. During this same period, the Twisp River ranged between -0.2 to 6 °C and spent over a month at temperatures >0.5 °C while the side channel was only this cold for a few days.

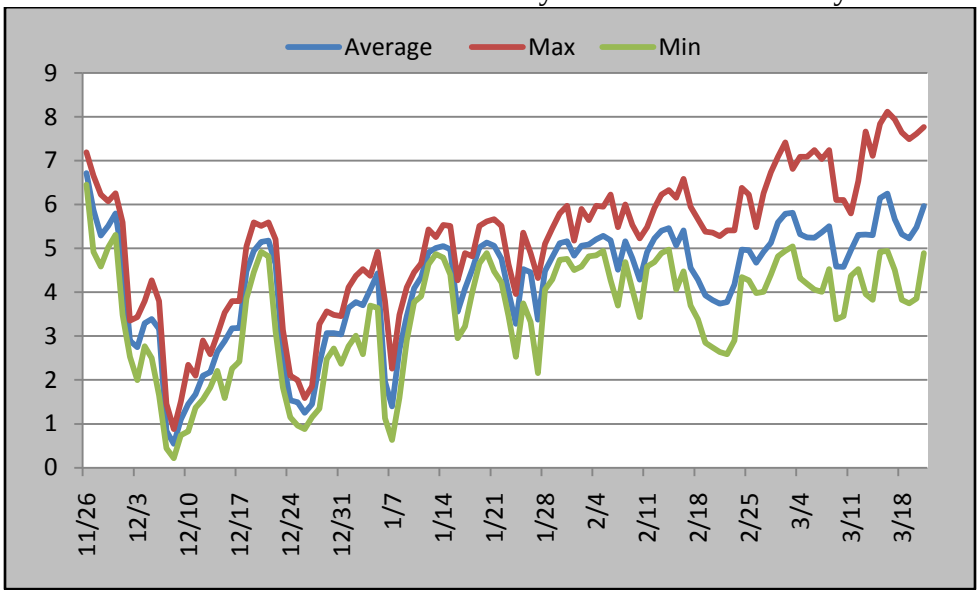

Figure 3. Daily Average, maximum and minimum water temperature, Elbow Coulee Primary Side Channel, 2009-2010.

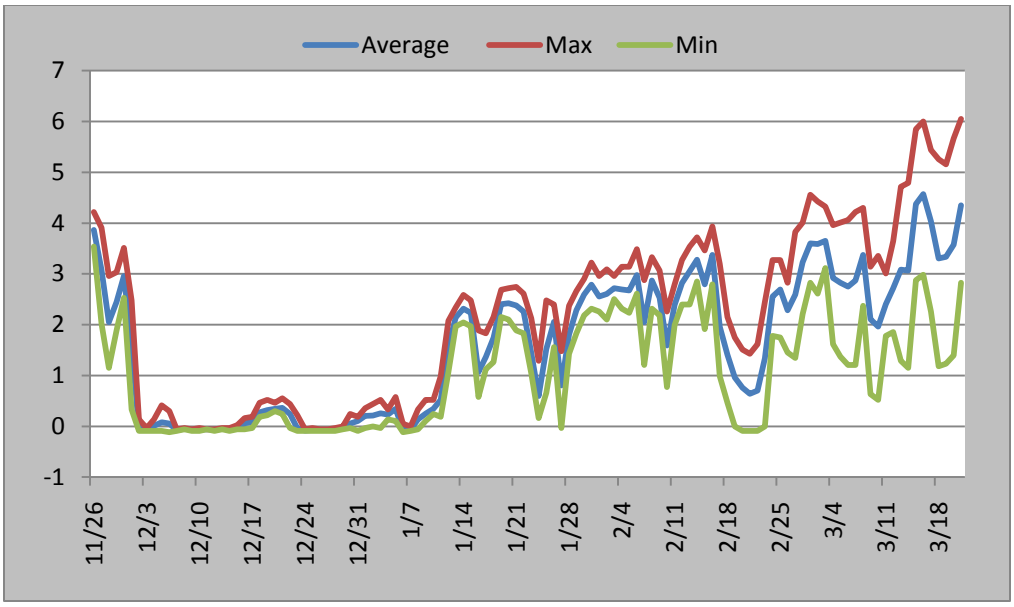

Figure 4. Daily average, maximum and minimum water temperature, Twisp River adjacent to the Elbow Coulee Primary Side Channel, 2009-2010.

Due to the generally consistent nature of groundwater temperatures, winter variations in water temperatures in the side channel are likely influenced by factors associated with air temperature, icing and snow cover in the area of the temperature logger.

Fish Monitoring

Fish monitoring during the study period was limited to visual observations. On 29 April 2010, one juvenile salmonid, likely an endangered spring Chinook salmon, was observed in the perennial portion of the side channel. On 28 May 2010, five young-of-the-year spring Chinook salmon (estimated length 40-45 mm) were observed just downstream of the breach in the upstream portion of the side channel. This was the same location that this species and life stage was observed in the channel in the spring of 2009. It is assumed that these fish were spawned in the Twisp River upstream of the side channel and entered the side channel through the breach when it became connected to the river.

Literature Cited

Crandall, John D. 2009. Elbow Coulee Floodplain Reconnection and Side Channel Restoration Project, 2008-2009 Post-Project Assessment. 22 p.