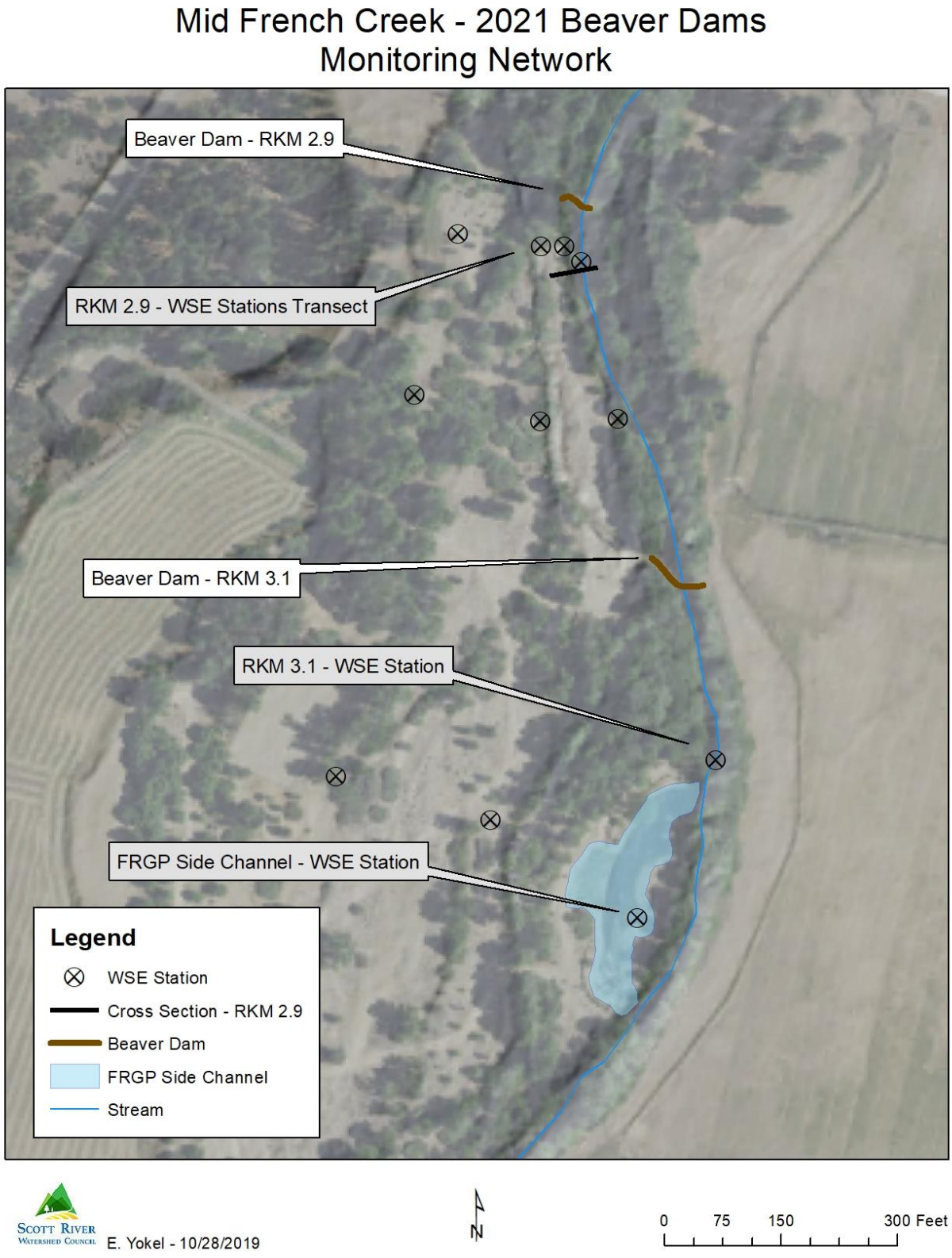
Effect of Beaver Dams on Water Surface Elevation and Water Quality –French Creek RKM 3.1 & RKM 2.9
Scott River Watershed Council

Beaver Dam at French RKM 2.9 during October 22, 2021 runoff event

Mid French Creek supports a critical population of all life stages of Southern Oregon Northern California Coast (SONCC) Coho Salmon. Two beaver dams were built in Mid French Creek during the base flow period of WY2021. Beaver first built a dam at French RKM 3.1 starting in late June and subsequently built a dam downstream at French Creek RKM 2.9 in early September. An existing network of water surface elevation and temperature monitoring stations in Mid French Creek documented the beaver dam's affects on the surface water and groundwater elevations and stream temperatures (Map 1). The monitoring network documented that the beaver dams significantly increased water surface elevations and habitat volume during the period of summer rearing of juvenile Coho Salmon.



Map 1 – Location of beaver dams and monitoring stations in Mid French Creek

French Creek RKM 3.1 Beaver Dam

French Creek RKM 3.1 Beaver Dam – Looking Upstream

Beaver began building a dam in French Creek at RKM 3.1 in late June, 2021. A WSE increase of 0.4 ft was documented at the RKM 3.1 Station from June 27 to July 27, 2021 (Figure 1). Comparison of the WSE on the same calendar day for 2020 and 2021 documents an increase in WSE of 0.5 ft on July 27, 2021 compared to July 27, 2020 (Figure 2). The WSE in the beaver dam pond increased to a maximum elevation of 2878.6 ft on September 11, 2021 – yielding water depths 0.8 ft greater than the minimum depth observed in WY2020.

In addition to increasing the depth in the beaver dam pond, the increase in WSE and habitat depth extends upstream to a constructed complex off channel habitat (FRGP Side Channel) that is supporting a significant population of YOY and 1+ Coho Salmon in the critically dry base flow period of WY2021 (Figure 3). Increases in the WSE of 0.9 feet were observed in the FRGP Side Channel after the creation of the beaver dam in 2021 compared to the same period of 2020.

In addition to the increase in WSE in the FRGP Side Channel, the mid column water temperatures in the side channel were significantly cooler in 2021 after the beaver dam was created compared to the same period of 2020 (Figure 4). It is hypothesized that the increase in water depth and volume in the side channel reduced the increase in water temperature.

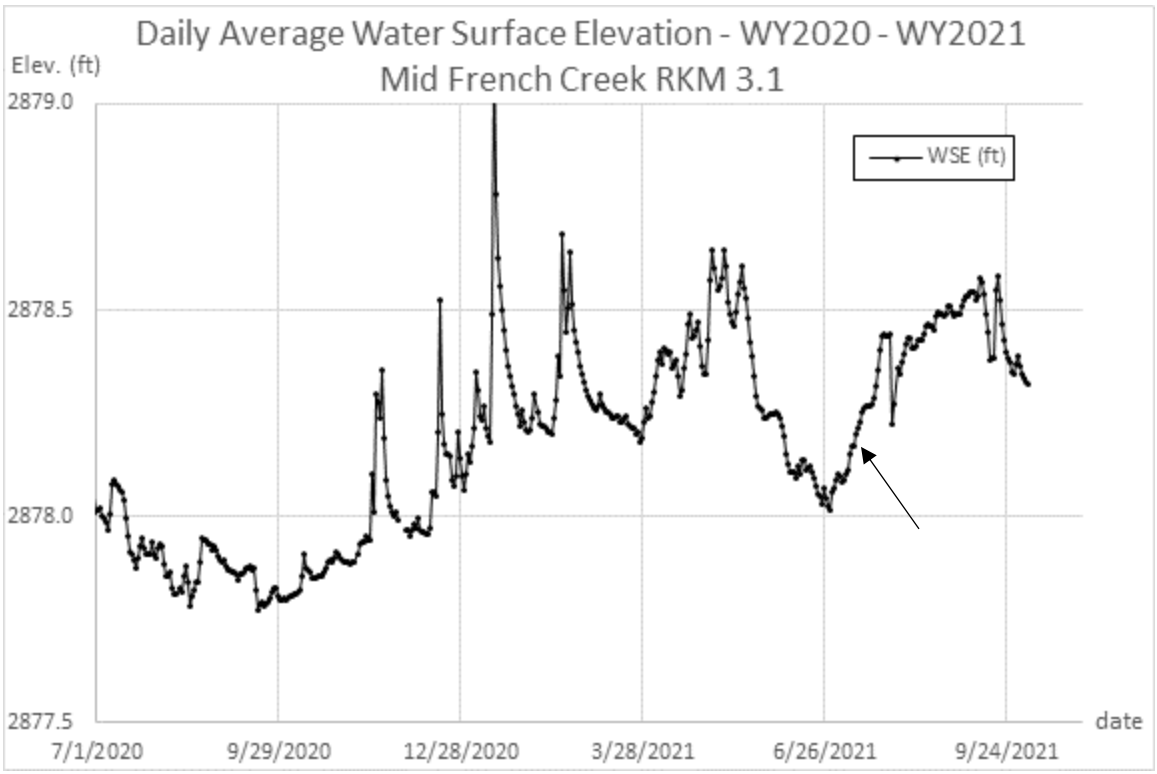


Figure 1 – Daily average water surface elevation (WSE) – Mid French Creek RKM 3.1

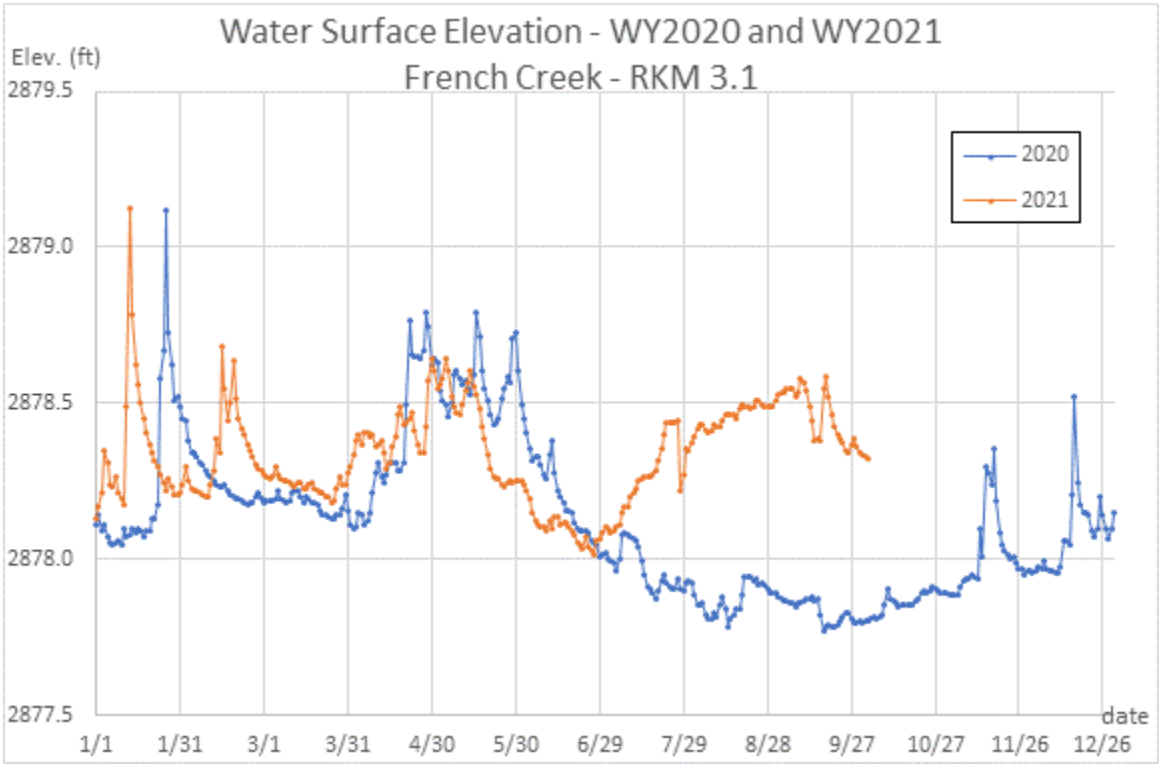


Figure 2 - Comparison of daily average WSE at French Creek RKM 3.1 – WY2020 & WY2021

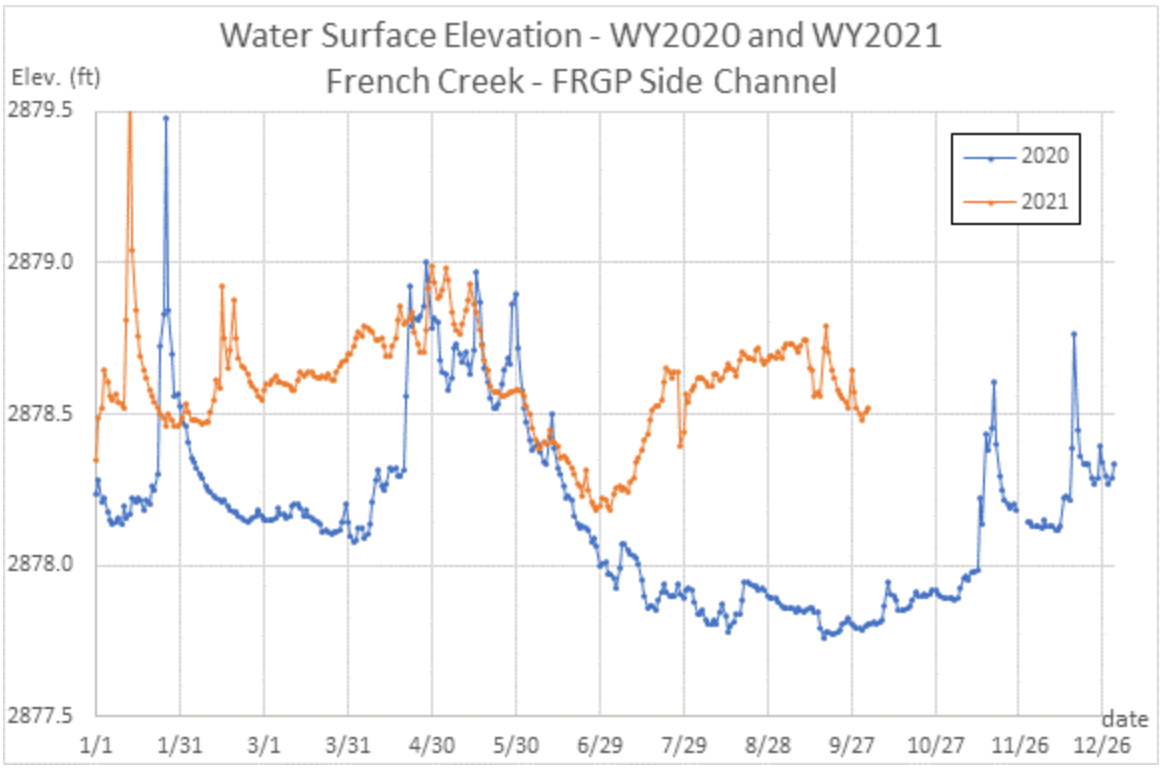


Figure 3 - Comparison of daily average WSE at French Creek FRGP Side Channel – WY2020 & WY2021

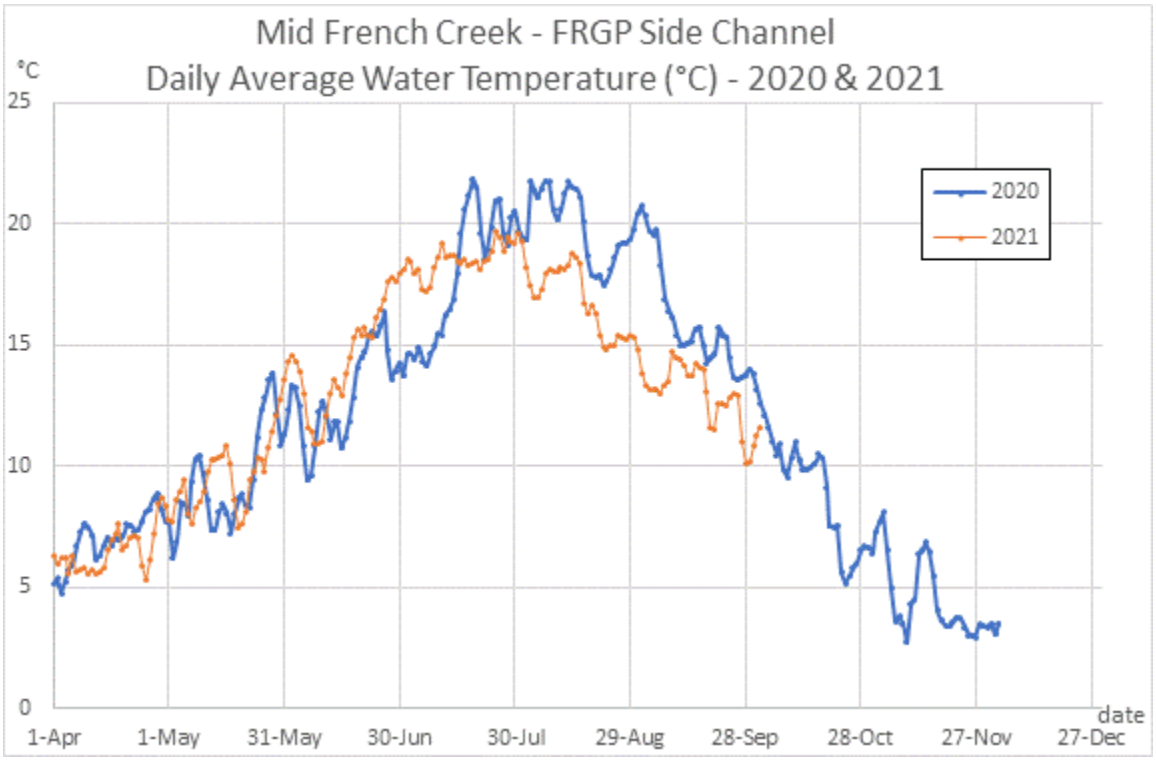


Figure 4 - Comparison of daily average temperature (°C) at FRGP Side Channel – WY2020 & WY2021

Mid French Creek FRGP Side Channel – Looking Downstream

A dissolved oxygen logger was placed in the RKM 3.1 Beaver Dam Pond in late July 2021 to document the dissolved oxygen and temperature conditions (Figure 5). Dissolved oxygen levels were stable in the beaver dam pond with average values greater than 6 mg/L for the period of record.

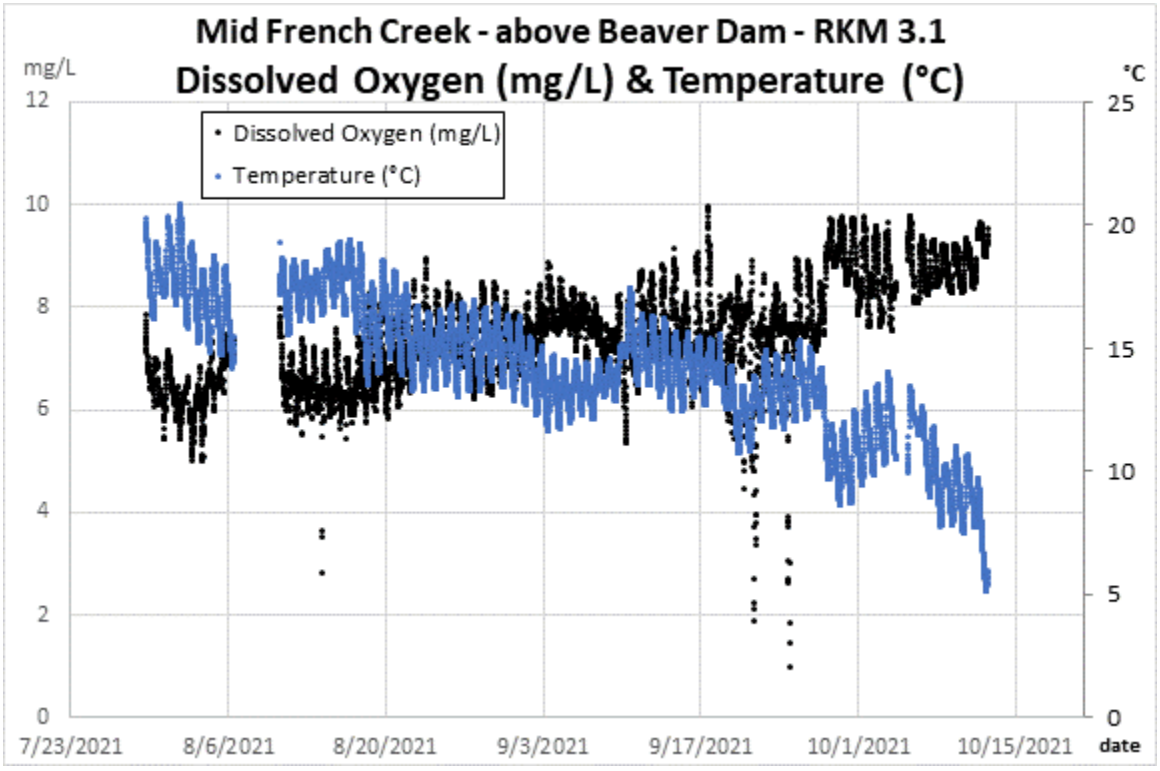


Figure 5 - Dissolved oxygen (mg/L) and temperature (°C)

French Creek RKM 2.9 Beaver Dam

French Creek RKM 2.9 Beaver Dam – Looking Upstream

An increase in water surface elevation above the beaver dam at the French RKM 2.9 water surface elevation (WSE) station was first observed on September 11, 2021. The water surface elevation upstream of the RKM 2.9 beaver dam increased 1.9 ft from September 10 to October 4, 2021 (Figure 6).

The WSE in the RKM 2.9 beaver dam pond in September and October 2021 was significantly greater than the WSE during the same period in 2020 (Figure 7).

Concomitant to the increase in surface water elevation, the increase in WSE was observed in a transect of groundwater monitoring wells at RKM 2.9 (Figure 8). A WSE increase greater than one foot was observed in the groundwater approximately 200 feet from the wetted channel.

A representative stream cross section in the RKM 2.9 beaver dam pond was utilized to illustrate the increase in stream depth and wetted area from the creation of the beaver dam (Figure 9). A longitudinal profile of the channel's thalweg was utilized to illustrate the extent of the RKM beaver dam pond's increased water depths and wetted volume (Figure 10). More than 400 feet of the stream habitat was affected by the beaver dam.

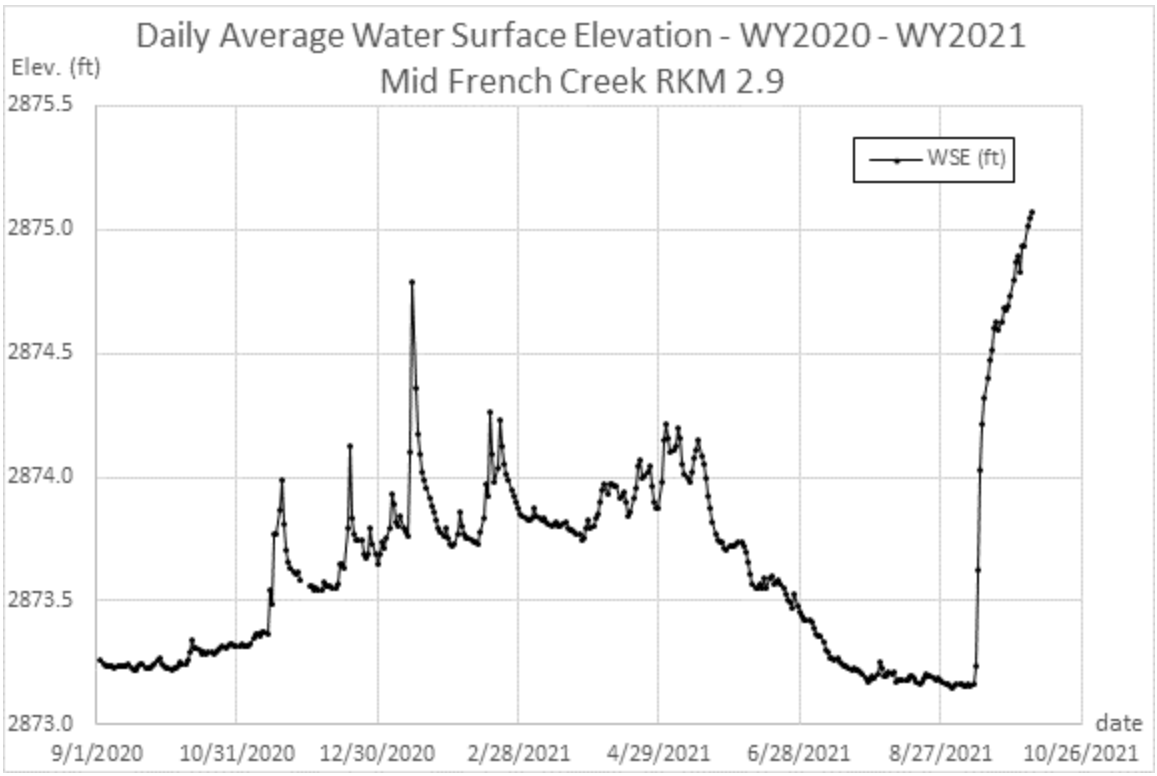


Figure 6 – Daily average water surface elevation (WSE) at French Creek RKM 2.9 – WY 2020 - 2021

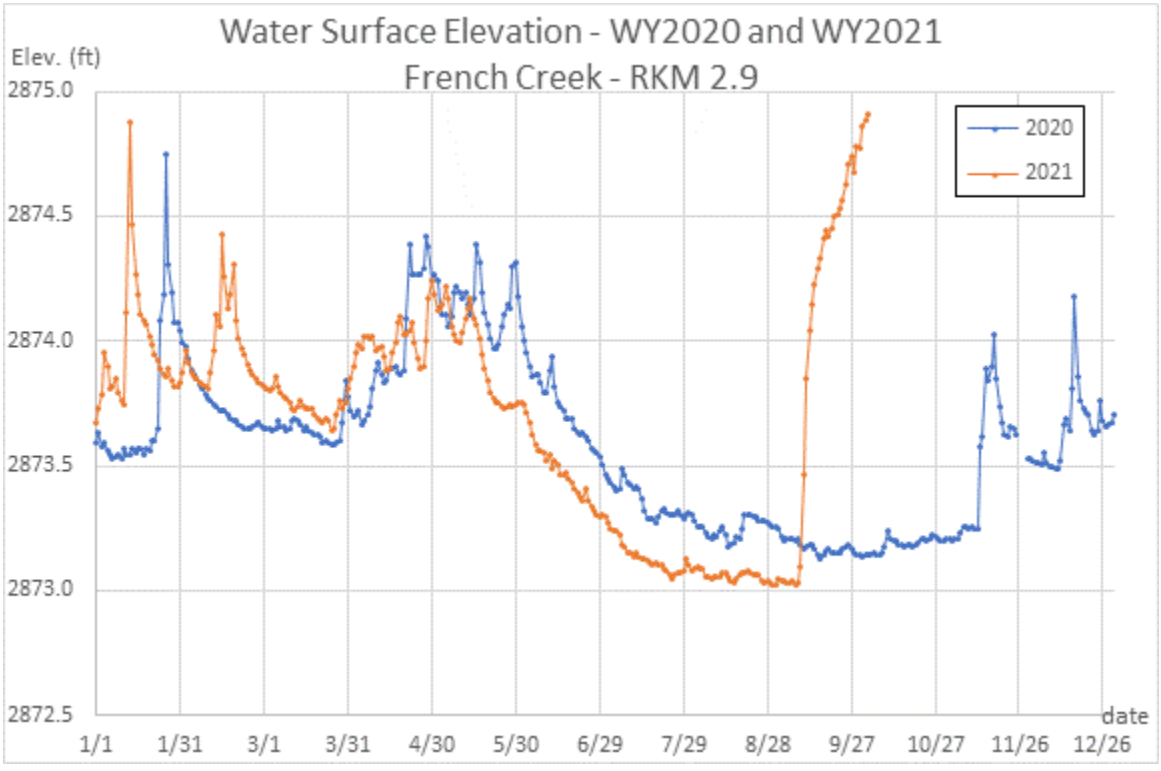


Figure 7 – Comparison of daily average WSE at French Creek RKM 2.9 – WY2020 & WY2021

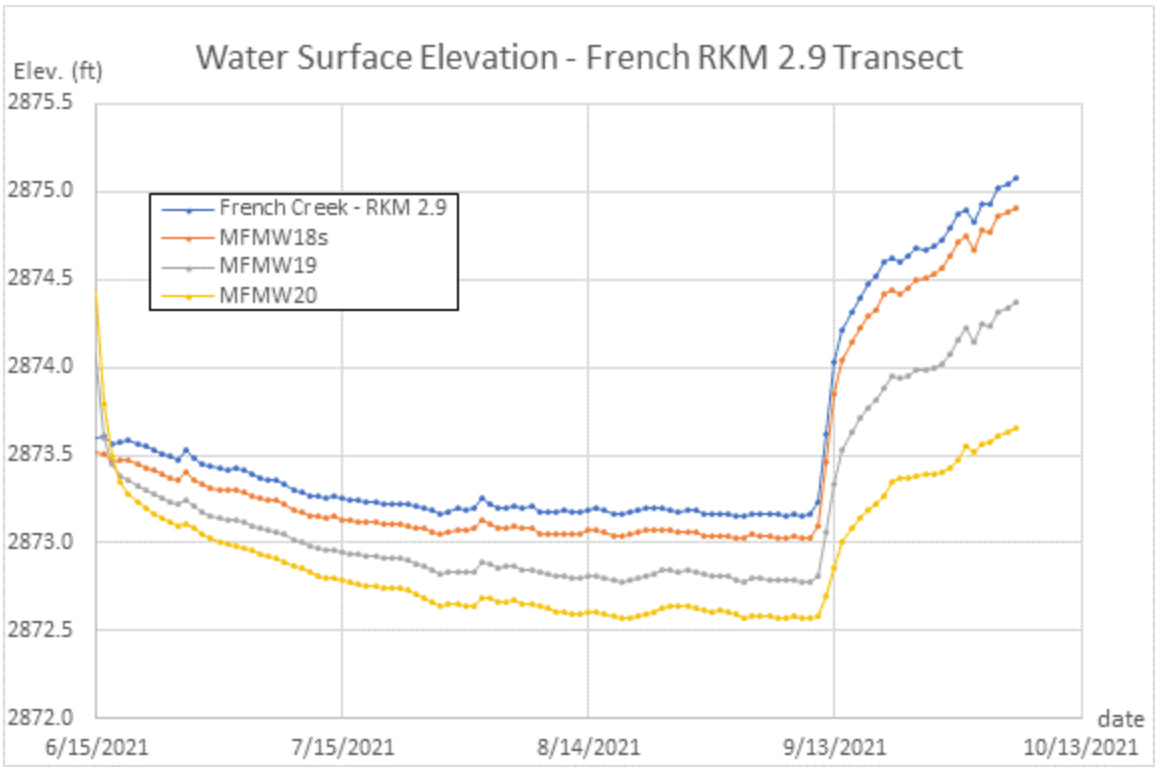


Figure 8 – Daily average WSE at French Creek RKM 2.9 Transect

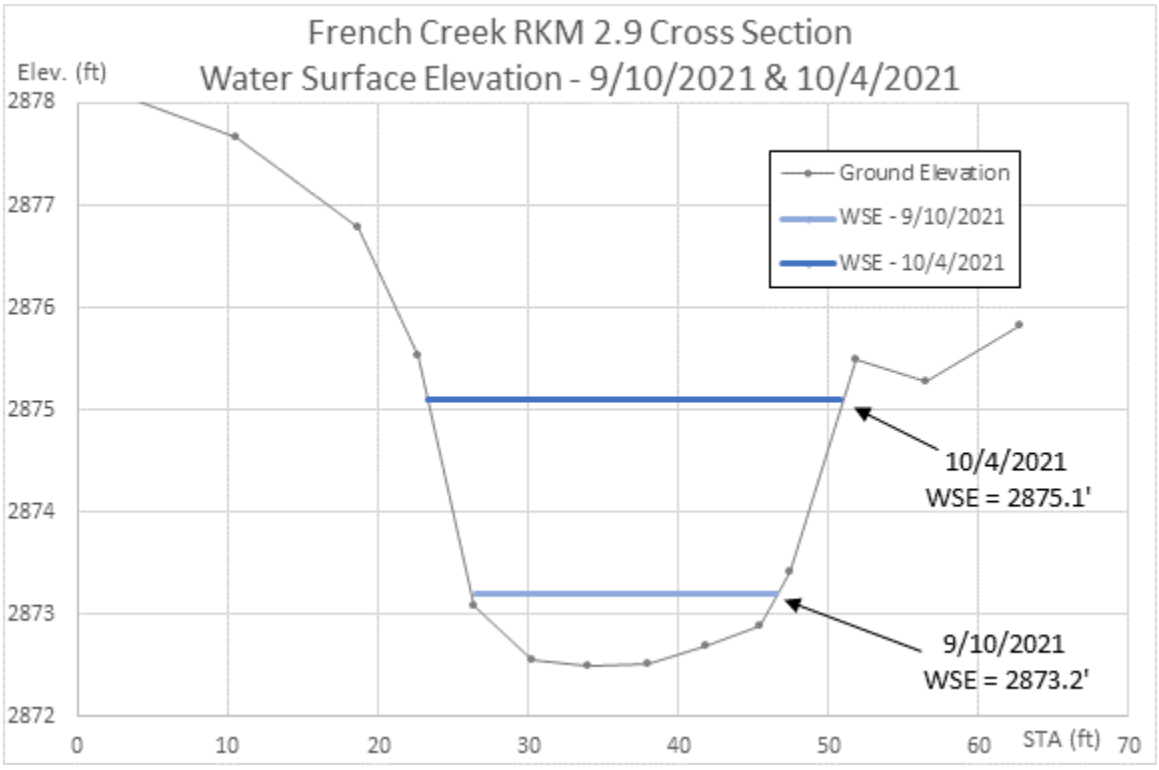


Figure 9 – Increase in WSE in at French Creek RKM 2.9 Cross Section – 9/10/2021 to 10/4/2021

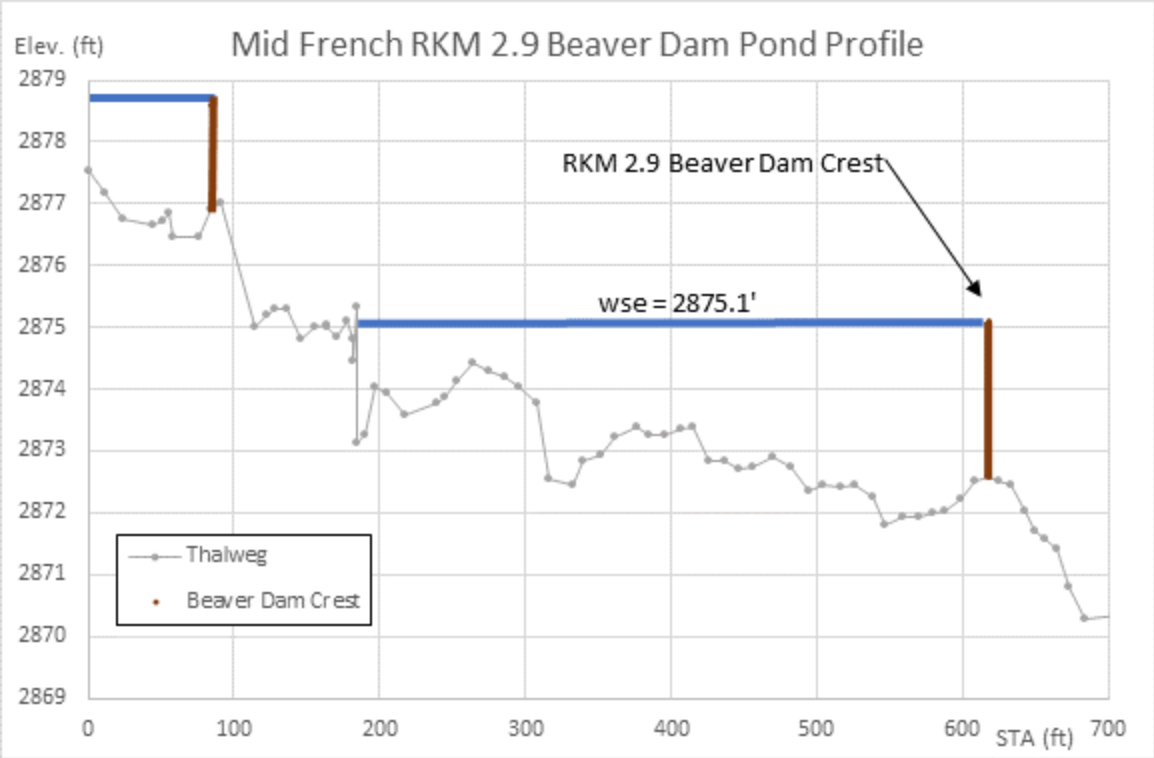


Figure 10 – Longitudinal Profile of Mid French Creek and water level of RKM 2.9 Beaver Dam Pond