

French Creek Ranch Request for an Individual Cooperative Solution

March 21, 2022

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Introduction:

This is a request for an Individual Cooperative Solution (ICS) for the French Creek Ranch (Michael and Betsy Stapleton) as allowed under provision CCR 875(f)(4)(C) of the Scott-Shasta Drought Emergency Regulation. The regulation states that the provision may be approved in the absence of an approved tributary-wide or watershed-wide Local Cooperative Solution (LCS). We are requesting an individual cooperative solution that takes the form of a binding agreement between an individual diverter (Stapleton) and CDFW to perform actions for the benefit of anadromous salmonids, and CDFW makes a recommendation for exemption from curtailment based on an assessment that the benefits of these actions in a specific time period are equal to or greater than the protections provided by their contribution to flow over the same specified time period.

The specific actions undertaken by the French Creek Ranch for the benefit of salmonids starting in 2020 include:

Irrigation Improvements, water management, and soil moisture management since 2020:

We started our water conservation efforts in 2020 by the installation of a center pivot to replace a very inefficient traveler big gun system. Therefore, we are utilizing 2019 as a baseline for our water use. On-going investments in irrigation water efficiency and reduction in water use culminated with the installation of a second pivot occurred in April 2022. The sum of our long-term investment in irrigation efficiency shows a substantive reduction of approximately 40% in water use. Our water use reduction started in 2020, offering benefit in that drought year and prior to any regulatory pressure to do so. We used the following methodology to evaluate our total water use reduction over baseline.

- a. Prior to 2020 we utilized our adjudicated water right of 0.32 CFS¹ until first priority status was reached, and then 0.11 CFS for the rest of the season². We estimate that 1st priority status was reached at 9/1. Therefore total use over the season was 103 acre feet³. See 2019 Bascase in Attachment 1 for calculations.

¹ Please note that all flow rates are averaged over 24 hrs and may have variations as the pump ramps up and or slows down, or electric demand on the grid changes which can result in slight variations in pump pressure with resulting flow variations.

² If the actual date of first priority was reached later, total use would be slightly higher and if reached earlier, total use would be slightly lower.

³ Total acre feet is a weighted average representing use over the entire season.

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- b. In 2022, our new equipment will use 0.2 CFS⁴ (weighted average). We guess that 1st priority status will be reached 7/1 due to the drought conditions. Once first priority is reached, or curtailment is imposed, we will cease surface diversion and utilize our groundwater well (see discussion in section 7 below) with a flow rate of 0.14, resulting in a total season use of 61⁵ acre feet. See 2022 calculations in Attachment 1. Details of the 2022 irrigation schedule with equipment, days, and flow rates for both surface use and groundwater use are shown in the 2022 Detail Schedule.

Additional Detail on Irrigation Water Efficiency Actions:

1. The 2020 installation of a center pivot irrigation system that reduced water usage by 22.44% over 8 acres, of our total 13 irrigated acres, per the water savings tool calculator (Attachment 2: French Creek Ranch water savings calculator). The actual reduction was greater as the reduction calculated in this tool was based on a comparison to a wheel line (which we were not using, but the calculator tool did not have as an option the traveler and a wheel line was the closest approximation), whereas we were actually using the traveler big gun, which used considerably more water than a wheel line. The reductions calculated above in the first section of this document are actual, but the water savings tool calculator is shown as an item of interest. The pivot is a new and improved “wobbler” irrigation sprinkler head technology that provides more uniform water distribution, delivered under lower pressure and utilizing larger, but fewer water droplets that are less prone to evaporation and wind drift, thereby reducing total usage over previous irrigation head designs of older pivots used by many in the valley. The “end gun” is a low pressure device which has less water evaporation and wind drift compared to conventional high pressure end guns. Not completely pertinent to water conservation, but perhaps of interest, the pivot installation was associated with the installation of a solar power system which has made our irrigation system carbon neutral.
2. Associated with the installation of the above center pivot, soil moisture meters were installed to guide water application for the highest efficiency.

⁴ Please note again, that these flow rates are averaged and instantaneous rates may vary and be higher or lower depending on the equipment being used during our irrigation schedule and the factors mentioned before. They are not a “not to exceed” number and do not represent a commitment to operate at that rate.

⁵ Acre feet represent a weighted average total for the entire season. See 2022 detail schedule for details of the calculations.

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Also installed was an in-line flow meter in order to accurately measure to 1/100 of a CFS our actual water usage.

3. A second center pivot was installed on 4/20/22 to cover an additional 3 acres with a similar reduction of water use. Associated with the pivot is a fully automated cloud connected weather station with additional soil moisture sensors to refine and guide water application. We funded ~70% the cost of this total project, with emergency drought funding from the National Resource Conservation Service (NRCS) covering ~30% of the cost. As part of the NRCS practice, we will be generating and submitting irrigation management reports to NRCS for the next 5 years.
4. Flow rate reduction from surface diversion rate to groundwater rate will be accomplished by a change in irrigation nozzles on k-line pods, pivots, and irrigation guns that physically restrict the flow rates.
5. We will cease irrigation on 9/15/2022.
6. In spring of 2022, compost, compost and biochar, and biochar alone were applied to a portion of the pasture to improve soil moisture retention, thereby further reducing water demand. The application was undertaken as part of an NRCS Conservation Innovation Grant (CIG) project to investigate the applicability and extent of benefits of the compost/biochar conservation practice. If the practice is determined to be cost-efficiently beneficial it will be incorporated into a statewide NRCS practice and have large-scale impacts.
7. We keep a ~4" residual height on our post grazing/haying grass height in order to improve soil organic mass with associated water retention capability.
8. We have negotiated the terms of the renewal of our Lake and Streambed Alteration Agreement (LSAA) agreement for a diversion that requires a minimum 90% bypass flow at all times and includes resource protection measures that ensure that our management of the instream diversion infrastructure minimizes any risk to salmonids.
9. We will forgo surface water use when the drought emergency regulation is in effect and/or when French Creek is in first priority status (assuming written notification of such by the Scott Shasta Watermaster District-SSWD) as a drought mitigation measure. This is the known "conjunctive use" strategy for preservation of surface flow in late season.
10. We maintain compliance with our Regional Water Board TMDL compliance waiver document.
11. While installed prior to 2020, we have two solar stock water systems that do not require winter/spring/fall surface water diversion and are highly efficient.

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12. We have a total of 7 different locations in the fields with soil moisture meters to maximize location specific water application.

Ecological restoration actions undertaken for the benefit of salmonids.

We have been highly active restoration partners both on French Creek Ranch and across the watershed. The benefits of our actions have more than offset the impact of our minimal water use. The positive impacts of our actions are of particular importance due to the location of French Creek Ranch on mid-French Creek, which, as is widely known, is a critically important reach of a key Coho spawning and rearing tributary of the Scott River. Many of our restoration actions enumerated below were initiated prior to 2020, however the benefits extend, and possibly compound, into the period under discussion.

1. The 2017 installation of BDAs in a naturally occurring side-channel that has supported the over-winter utilization by juvenile Coho Salmon with superior growth as compared to unrestored habitats (Attachment 4: French Creek Side Channel BDA Ponds – Catch Summary – April 26 and May 4, 2021).
2. The 2018 Installation of “French Creek Instream and Off Channel Enhancement Project”. This project consisted of the installation of a side-channel habitat, the installation of three engineered log-jams in the main French Creek channel and the introduction of spawning gravel. The sum total impact of these actions has benefited all life stages of Coho as documented in the project [Report](#). Improvement of conditions for Coho from this project extends into the present and into the foreseeable future.
3. The 2019 installation of large wood and gravel into the lower extent of the “BDA side channel”, resulting in extensive use by spawning adult Coho and both over-wintering and over-summering juvenile Coho (Attachment 5: MidFrenchCreek_LowerMinersCreek spawning map). This map shows year over year increases in Coho Redds in the side channel and generally across mid-French Creek, indicating the compounding beneficial impact of restoration undertaken in Mid French Creek as a result of our efforts.
4. Design of an additional restoration project for Mid-French Creek, lying solely on French Creek Ranch, which will consist of the construction of Engineered Log Jams, introduction of more spawning gravel, the activation of a latent high flow channel, the removal of invasive riparian vegetation and the planting of native species. The project has proceeded to the 100% design stage. A funding proposal was prepared and submitted to the Bureau of Reclamation’s Klamath Restoration Fund solicitation.

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5. On-going restoration physical and biological monitoring performed by the Scott River Watershed Council under the direction of Principal Investigator Michael Pollock, PhD, NOAA Northwest Science Center. Biological monitoring has included spawning ground surveys, juvenile snorkel surveys, mark and recapture surveys, and passive array PIT Tag monitoring with associated biometric data. A summary report is currently in prep with anticipated release in early 2023. Physical monitoring consists of extensive ground and surface water elevation monitoring, water quality monitoring (temperature) and stream flow monitoring.
6. Support for beaver populations on the property with riparian planting, caging of high value large stream-shading cottonwood trees to mitigate their negative impacts. The important beneficial impact of the beaver dams for stream conditions and Coho on French Creek Ranch has been documented (Attachment 6: Beaver Dam Effects on Water Surface Elevation).
7. Riparian planting has resulted in increased streamside trees and shade, and a Scott River TMDL waiver criteria. The last round of planting, consisting of 57 cottonwood poles and 57 willow bundles was undertaken in the spring of 2021. In addition to riparian shade (and habitat for birds and other terrestrial species), the vegetation will reduce erosion and sediment delivery to French Creek during high flows and flood events.
8. Our upland management practices have potential indirect positive effects on instream conditions. We have performed thinning on our upland 20 acres to reduce stem counts and favor larger diameter trees, thereby reducing tree soil moisture demand, improving run off and reaching optimum canopy cover for snow to reach the ground (avoiding sublimation off of the tree tops), but sufficient shade to reduce melting. We have performed a prescribed burn on ~7 acres, with an additional ~5 acres prepared for burning when it comes into a burn prescription this year, with additional acreage in future years. The combination of thinning and prescribed burning reduces the risk of catastrophic wildfire reaching French Creek and harming the vitally important Coho habitat it supports. This has been a personal project.
9. Less tangible, and without quantifiable results, is the impact of our participation in restoration in French Creek and across the region. While perhaps not eligible to be formally included in the calculation of the offset of water use impacts, it should, in our estimation, be considered. A brief description of these actions includes:
 - a. Our continued commitment to, and participation in, active physical restoration in French Creek, Michael's service, past (over 10 years) and on-going, on the Scott Groundwater Advisory Committee.

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- b. Michael's 8 years of service on the Scott Shasta Watermaster Service.
- c. Betsy's 10 years of service on the Scott River Watershed Council Board of Directors as Board Chair
- d. Betsy's continuing approximately 40 hr/week unpaid service to SRWC in multiple capacities including project development, grant writing and monitoring. Betsy's impact has extended beyond French Creek Ranch, beyond French Creek, and even beyond the Scott River as evidenced by her being the primary driving force behind the revitalization of the Klamath Basin PIT Tag Database. The database will allow for the whole basin monitoring and management of Coho Salmon, with the intended eventual inclusion of other fish species.

Our specific request is that we be allowed to continue to irrigate even when the Scott Curtailment is in effect under the following terms:

1. Prior to French Creek reaching first priority status, we use surface water in our highly efficient pivot systems on 85% of our irrigated acres and existing other sprinkler systems on the residual acreage.
2. When we are notified in writing by the SSWD that French Creek stream flow for all users has reached first priority status, and/or the State Water Board removes the suspension of the Scott Curtailment, we will cease surface diversion and utilize groundwater at a rate not to exceed an averaged 100 gallons per minute, as measured and documented by our taking weekly pictures of the installed in-line flow gauge.
3. The sum total of these actions will result in a water savings of approximately 40% over baseline.
4. We will take photos at every irrigation set change with flow rate and cumulative acre feet of water documented. Photos available upon request by CDFW.

The sum total of the benefit of our highly efficient agricultural water management, ecological restoration, and community volunteer restoration commitment has resulted in improvement to Coho habitat and populations that far outweighs that impact of our small agricultural water use. We have undertaken these actions because of our principles, not because of regulatory pressure. We request that the value of these actions should be acknowledged by CDFW, State Waterboard and NOAA with the issuance of an ICS.

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Michael and Betsy Stapleton

Attachments;

1. Stapleton Water Savings Calculation spreadsheet
2. French Creek Ranch Irrigation Efficiency Calculator Tool
3. French Creek Side Channel BDA Ponds – Catch Summary – April 26 and May 4, 2021
4. MidFrenchCreek_LowerMinersCreek spawning map
5. Beaver Dams Water Surface Elevation.

BINDING AGREEMENT



State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Northern Region
601 Locust Street
Redding, CA 96001
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director



CONSERVATION ACTIONS, BINDING AGREEMENT, AND RECOMMENDATION FOR LOCAL COOPERATIVE SOLUTION

The following binding agreement regarding local cooperative solution (LCS) is entered into between the California Department of Fish and Wildlife (CDFW) as Coordinating Entity, and the French Creek Ranch (Landowner) pursuant to Section 875(f)(4)(C)(ii) of the 2021 Drought Emergency Regulation for the Scott River and Shasta River Watershed (Drought Emergency Regulation), adopted by the State Water Resources Control Board (State Water Board).

BACKGROUND

Under the 2021 drought emergency regulation establishing drought emergency minimum flows in the Scott River and Shasta River watersheds and associated curtailment of water diversions,¹ an LCS by individuals or groups may be proposed by petition to the Deputy Director of the State Water Board as an alternative means of reducing water use to meet or preserve drought emergency minimum flows, or to provide other fishery benefits (such as cold-water refugia, localized fish passage, or redd protection), in lieu of curtailment.

RECITALS

1. Section 875(f)(4)(C)(ii) provides for an individual LCS where CDFW makes a recommendation for an exemption to curtailment based on an assessment that the benefits of the actions to anadromous fish in a specific time are equal to or greater than the protections provided by their contribution to flow under curtailment.
2. Section 875(f)(4)(C)(ii) requires that the diverter(s) enter into a binding agreement with a Coordinating Entity to perform actions for the benefit of anadromous salmonids.

¹ California Code of Regulations, title 23, sections 875–875.9.

PROPOSED LOCAL COOPERATIVE SOLUTION

On March 21, 2022, the French Creek Ranch proposed an LCS that includes and further supplements actions for the benefit of anadromous salmonids pursuant to an existing Lake and Streambed Alteration Agreement (No. 1600-2016-0172-R1) executed on August 26, 2016 (LSAA), and a Regional Water Board total maximum daily load (TMDL) compliance waiver document. The LSAA and TMDL waiver are incorporated herein by reference, including the monitoring and agency coordination elements of each.

The proposed LCS provides additional voluntary conservation actions that include irrigation efficiencies, foregoing surface water diversion, and a fall irrigation forbearance:

1. Installation of a center pivot irrigation system over 7.4 acres of the total 9.85 irrigated acres, an in-line flow meter, and soil moisture meters to guide water application for the highest efficiency. Additionally irrigation nozzles were upgraded on k-line pods, pivots, and irrigation guns to physically restrict the flow rates.
2. The Landowner will forgo surface water use when the drought emergency regulation is in effect and/or when French Creek is in first priority status as a drought mitigation measure.
3. On September 15, 2022, the Landowner will cease irrigation.

CDFW has determined that this LCS provides equal to or greater actions for the benefit of anadromous salmonids compared to the protection provided by Landowner's contribution to flow described in section 875, subdivision (c)(2). However, the cumulative Landowner conservation actions represent obligations above prior commitments and provide instream benefits appropriate to this drought emergency. In addition, Landowner conservation actions include significant French Creek habitat improvements including beaver dam analogs, riparian planting, and channel restoration for fish passage. The Landowner is active in community conversations and contributes to surface and groundwater conservation for beneficial users and shares important data to inform future watershed improvement efforts. CDFW is recommending an exemption to curtailment for the French Creek Ranch based on the following:

1. The cumulative instream contributions defined in items 1-3 above in consideration of Landowner's full portfolio of water rights;
2. The cumulative additional benefits of Landowner's conservation agreements and orders described above; and
3. A commitment in this LCS to coordinate with NOAA Fisheries, the State Water Board, the Regional Water Board, and CDFW to develop cooperative mitigation to balance ranch management and obligations

to the LSAA and Regional Water Board TMDL compliance waiver document.

TERMS OF BINDING AGREEMENT

Landowner is required to adhere to the proposed conservation actions, as submitted to CDFW and approved by the State Water Board. Landowner has requested that CDFW serve as the coordinating entity. Landowner and CDFW hereby agree to the following:

- For the duration of this binding agreement, Landowner shall give CDFW and CDFW agents the right to reasonably access the included parcels for the limited purpose of verifying execution of the conservation actions. any individual not directly employed or contracted by CDFW shall provide a minimum of 24 hours advance notice to the Landowner and shall obtain approval from the Landowner prior to entering the French Creek Ranch.
- CDFW will strive to notify Landowner a day in advance of visiting the French Creek Ranch and shall provide Landowner or a designee the ability to participate in the monitoring inspection.
- CDFW representatives will exercise its monitoring obligations defined in the LSAA and this LCS.
- Written irrigation logs for water dedication, any photos, checklists, and other documentation for the conservation actions incorporated by reference will be transmitted by the Landowner via email to the Klamath Watershed Program at klamathwatershed@wildlife.ca.gov. This information for each month shall be transmitted within the first 7 calendar days of each calendar month.
- CDFW will submit the information regarding the verification materials and actions described in this agreement and the conservation plan incorporated by reference herein, to the State Water Board upon request, for the purposes of verifying compliance with the LCS.
- This binding agreement is not intended to preclude, harm, or otherwise interfere with Landowner's ability to secure any funding to mitigate the financial impacts imposed by the emergency regulation or proposed conservation practices. CDFW supports use of funding programs to ameliorate the costs of implementing the conservation practices described in the proposed conservation plan. Planning and cooperation under a voluntary LCS should not undermine the ability to receive such

funding.

- This binding agreement may be terminated by either party with 30 days' notice. The Coordinating Entity will only terminate the agreement if Landowner is not cooperating with the terms of this binding agreement (e.g., is not providing access, is not reporting, etc.). Both parties agree to take reasonable measures to resolve any concerns related to performance of the conservation plan, negative human interaction, or any other unforeseen circumstance prior to invoking termination.
- It is recognized that as the irrigation season unfolds, there may be reason to change the terms of the conservation plan or this agreement regarding its implementation and verification. Any such changes to the conservation plan or binding agreement will need to offer continued compliance with the drought emergency regulations and shall be agreed upon by both parties as well as the State Water Board.
- Landowner has prepared a petition to the State Water Board in consideration of this agreement (Petition) (Exhibit A). The Coordinating Entity has reviewed the Petition and agrees that the Petition accurately reflects, and is not in conflict with, any provisions in this LCS.

Contact Information	
California Department of Fish and Wildlife Carmen Tull klamathwatershed@wildlife.ca.gov 916.203.1947	French Creek Ranch Michael and Betsy Stapleton 

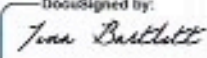
This Binding Agreement is valid while the current drought emergency regulation is in place. By signature, both parties agree and memorialize CDFW as the Coordinating Entity for this binding agreement. The Landowner shall include one signed copy with its petition to the State Water Board, return one signed copy to CDFW, and retain a signed copy of this binding agreement and the conservation plan readily available at its residence in the event any questions arise from either party during implementation or monitoring.

Authorized Landowner Signature:

Sign Here:  Date Signed: July 1, 2022

Sign Here:  Date Signed: 7/1/2022

Authorized Coordinating Entity Signature:

Sign Here: DocuSigned by:

150224017.20220629 Date Signed: 6/29/2022

SUPPORTING INFORMATION

2019- Baseline

Comments

Time frame	CFS	Acre feet/day	Days	total Acre ft
4/1-9/1		0.32	0.64	150 96
9/1-0/1		0.11	0.22	30 6.6
Total 2019 Acre Feet				102.6

Time frame estimates based on "good water year"

2022

Time frame

4/1-7/1	0.2	0.4	90	36
7/1-10/1	0.14	0.28	90	25.2
Total 2022 Acre feet				61.2

Guess as to 1st priority date- Surface water prior. Water use is a based on weighted average- see detail calculations below
Groundwater after 1 st priority

Percentage of 2019 Baseline Use	60%
Reduction from 2019	40% 59.64912281

2022 Detail

Surface Right to 4/1-7/1

equipment	cfs	Days out 9 day irrigation schedule	Weighted Average
k-line	0.3	1	0.3
pivot 1	0.21	4	0.84
pivot 2	0.14	2	0.28
big gun 1	0.08	1	0.08
big gun 2	0.26	1	0.26
		9	1.76 0.195555556

Groundwater after 7/1

equipment	cfs	days	Weighted Average
k-line	0.18	1	0.18
pivot 1	0.12	4	0.48
pivot 2	0.14	2	0.28
big gun 1	0.08	1	0.08
big gun 2	0.21	1	0.21
		9	1.23 0.136666667



SWEEP Irrigation Water Savings Assessment Tool

Estimated "Before" Scenario Water Use	75.34 ac-in/ac
Estimated "After" Scenario Water Use	58.44 ac-in/ac
Annual Estimated Water Savings	16.90 ac-in/ac
Percent Water Savings	22.44 %

French Creek Side Channel BDA Ponds – Catch Summary – April 26 and May 4, 2021
Scott River Watershed Council



Mid French Side Channel BDA Pond 1 – Looking Upstream

Baited minnow traps were utilized on April 26, 2021 to capture Coho Salmon in the Mid French Side Channel BDA Step Pool 1.1, Pond 1 and Pond 2. A total of 128 Coho Salmon were captured in the three sampled BDA influenced habitats with 61 recaptured PIT tagged Coho (Table 1). No rainbow trout (*O. mykiss*) were captured in the BDA habitats during the sampling effort.

4/26/2021 Coho Sample Summary

Location	Total Catch	Recaptures
French SC BDA Step Pool 1.1	12	4
French SC BDA Pond 1	111	55
French SC BDA Pond 2	5	2
Total	128	61

Table 1 – Total catch by sampled habitat – 4/26/2021



Coho Salmon captured in Mid French Side Channel BDA Pond 1 – April 26, 2021

Coho Salmon Forklength (mm) - April 26, 2021

Site	Side Channel BDA Pond 1 and	
	Step Pool 1.1	Side Channel BDA Pond 2
Average	90	122
Stand. Dev.	7.4	4.2
Minimum	73	115
Maximum	111	126
Count	123	5

Table 2 – Coho Salmon average forklength (mm) in BDA Pond 1 and 2 – April 26, 2021

The Coho Salmon captured in BDA Pond 2 (n = 5) were considerably larger than the Coho captured in BDA Pond 1 and BDA Step Pool 1.1 (n = 123) – Table 2. The forklength histogram for Coho captured in BDA Pond 1 and Step Pool 1.1 illustrates the range of sizes (Figure 1).

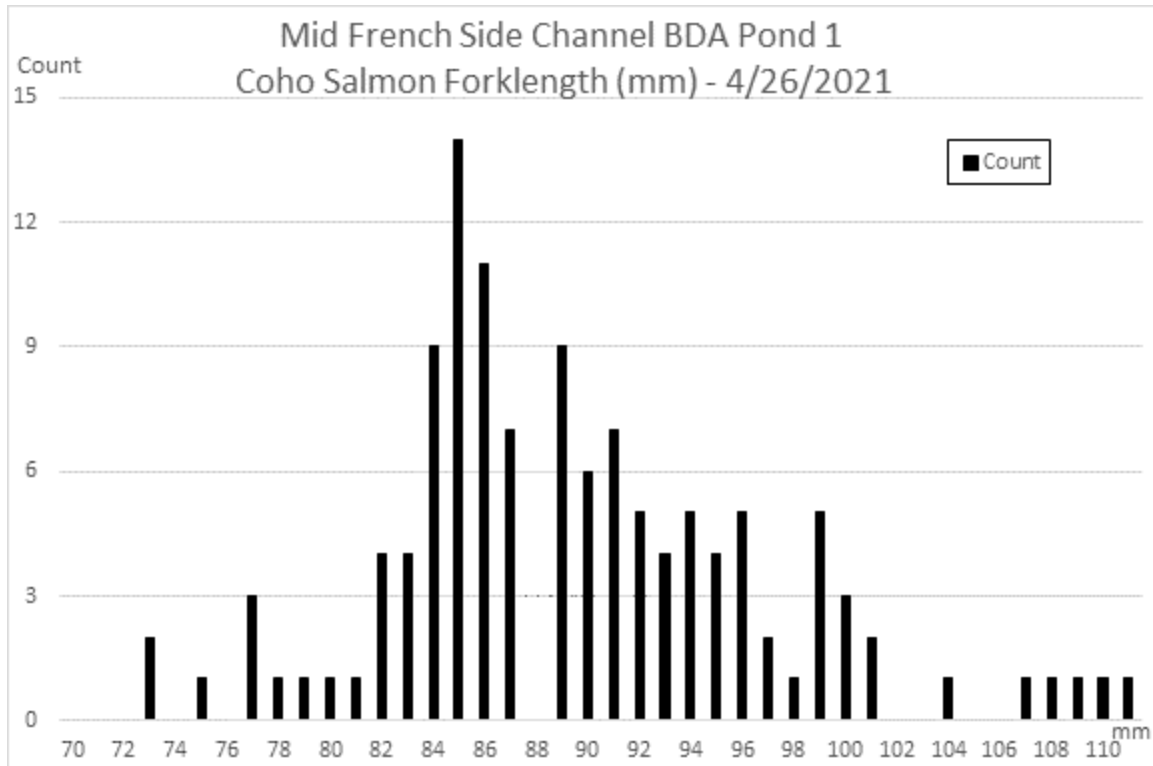


Figure 1 – Forklength (mm) histogram of Coho Salmon captured in BDA Side Channel Pond 1 – 4/26/21



Coho Salmon captured in Mid French Side Channel BDA Pond 2 – April 26, 2021

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
7/27/2020	Cohsal	French Control Pool 3	989001028113170	84	6.3		y			
10/9/2020	Cohsal	French Control Pool 3	989001028113170	85	6		y	74	0.01	-0.004
1/26/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001028113170	89	7		y	109	0.04	0.009
2/24/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001028113170	95	8		y	29	0.21	0.034
3/23/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001028113170	98	9.2		y	27	0.11	0.044
4/26/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001028113170	104	11.8		y	34	0.18	0.076

Table 3 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001028113170) and rate of growth (mm/days and g/days) between captures

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
10/7/2020	Cohsal	French Control Pool 2	989001038203265	75	4.6		y			
1/26/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203265	80	5.1		y	111	0.05	0.005
2/25/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203265	83	5.9		y	30	0.10	0.027
4/26/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203265	96	8.5		y	60	0.22	0.043

Table 4 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001038203265) and rate of growth (mm/days and g/days) between captures

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
10/9/2020	Cohsal	French Control Pool 3	989001038203548	74	4.1		y			
4/26/2021	Cohsal	Mid French Creek SC BDA Pond 2	989001038203548	115	15.9		y	199	0.21	0.059

Table 5 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001038203548) and rate of growth (mm/days and g/days) between captures

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
10/12/2020	Cohsal	French Creek - below Miners	989001038203755	81	5.2		y			
4/26/2021	Cohsal	Mid French Creek SC BDA Pond 2	989001038203755	123	20.2		y	196	0.21	0.077

Table 6 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001038203755) and rate of growth (mm/days and g/days) between captures

Baited minnow traps were utilized on May 4, 2021 to capture Coho Salmon in the Mid French Side Channel BDA Step Pool 1.1, Pond 1 and Pond 2. A total of 14 Coho Salmon were captured in two of the three sampled BDA influenced habitats with 4 recaptured PIT tagged Coho (Table 1). No Coho Salmon were captured in BDA Pond 2 and no rainbow trout (*O. mykiss*) were captured in the BDA habitats during the sampling effort.

5/4/2021 Coho Sample Summary

Location	Total Catch	Recaptures
French SC BDA Step Pool 1.1	4	2
French SC BDA Pond 1	10	2
French SC BDA Pond 2	0	0
Total	14	4

Table 7 – Total catch by sampled habitat – 5/4/2021

Coho Salmon Forklength (mm) - May 4, 2021

Site	Side Channel BDA Pond 1 and 1.1 Step Pool
Average	95
Stand. Dev.	5.3
Minimum	86
Maximum	105
Count	14

Table 8 – Coho Salmon average forklength (mm) in BDA Pond 1 and 2 – May 4, 2021



Coho Salmon captured in Mid French Side Channel BDA Pond 1 – May 4, 2021

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
10/7/2020	Cohsal	French Control Pool 3	989001038203588	70	3.7		y			
2/25/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203588	80	5.3		y	141	0.07	0.011
3/23/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203588	87	6.5		y	26	0.27	0.046
5/4/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001038203588	103	12		y	42	0.38	0.131

Table 9 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001038203588) and rate of growth (mm/days and g/days) between captures

Date	Species	LocationDetail	PIT Code	FL	WT	Mark	Recap	Days	mm/days	g/days
2/24/2021	Cohsal	Mid French Creek SC BDA Pond 1	989001039120218	79	4.7		y			
5/4/2021	Cohsal	Mid French Creek SC BDA step pool	989001039120218	101	10.9		y	69	0.32	0.090

Table 10 – Forklength (mm) and weight (g) of PIT tagged Coho Salmon (989001039120218) and rate of growth (mm/days and g/days) between captures

Mid French Creek – Side Channel BDA Ponds Water Quality

A significant runoff event on January 13, 2021 connected the Mid French Side Channel BDA Ponds (Figure 2). PIT tagged Coho Salmon from the mainstem of French Creek were immediately detected in BDA Pond 1 on January 13.

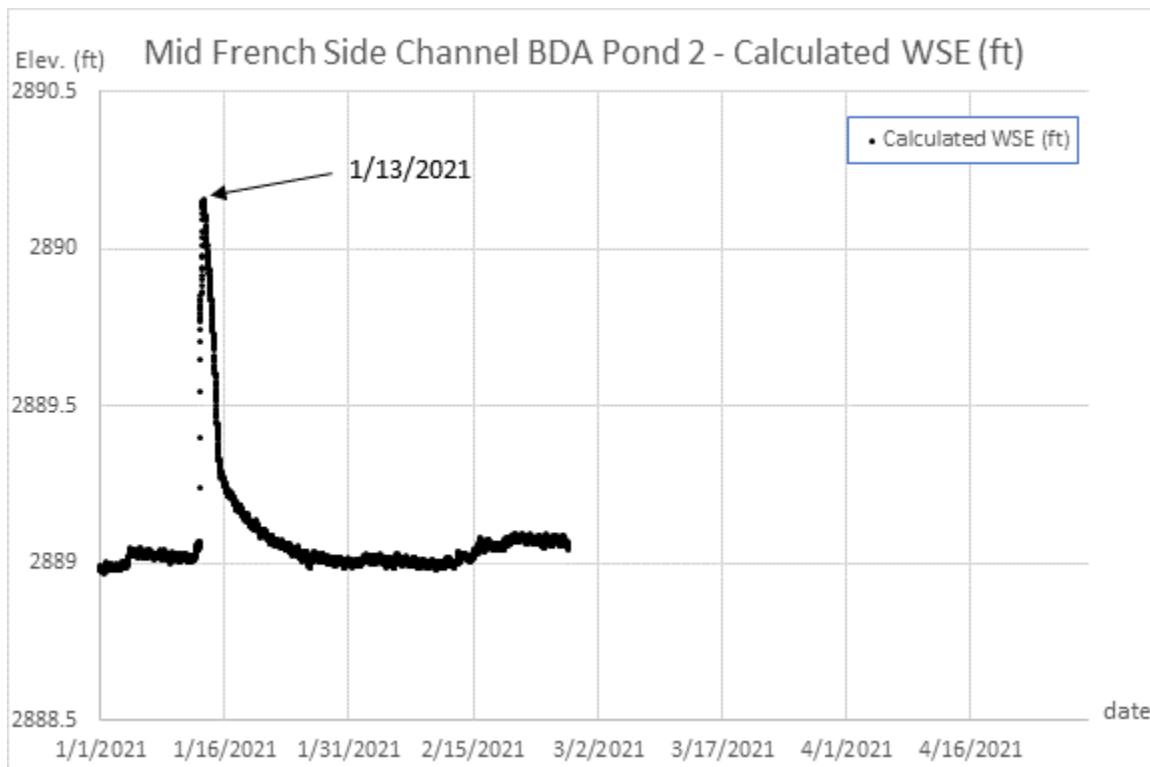


Figure 2 – Water surface elevation (ft) – Mid French Side Channel BDA Pond 2

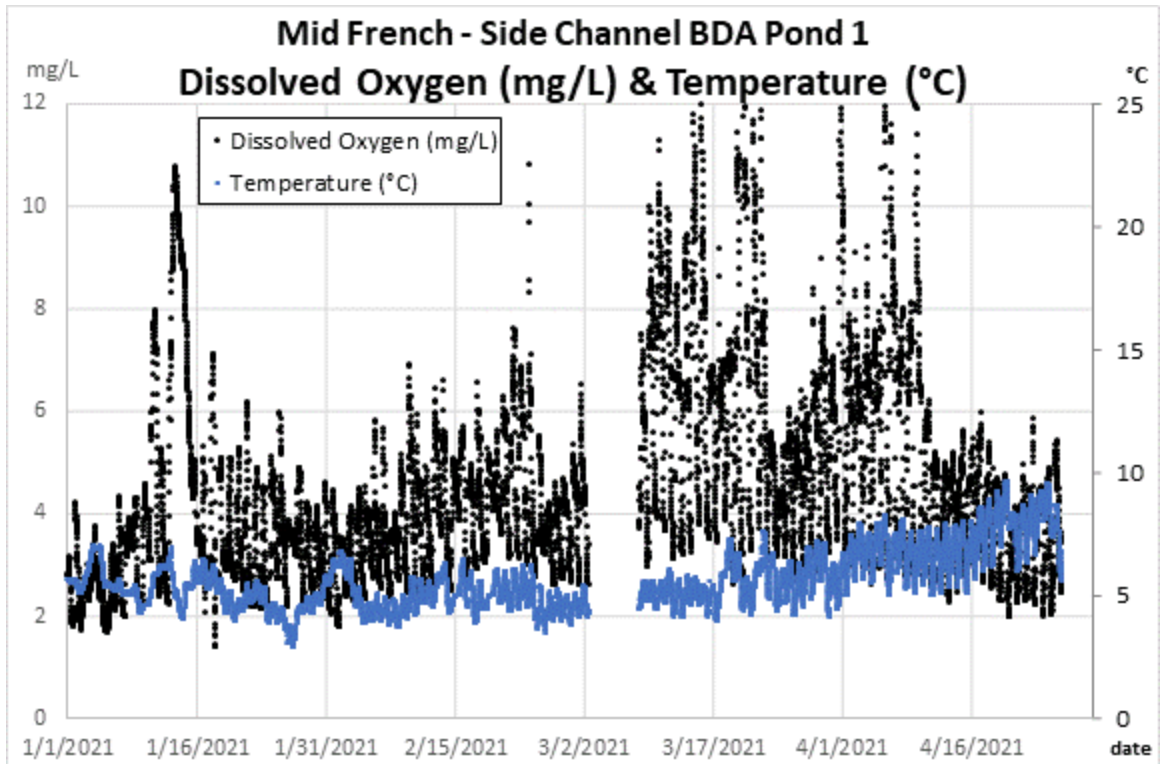


Figure 3 – Dissolved oxygen (mg/L) and temperature (°C) – Side Channel BDA Pond 1

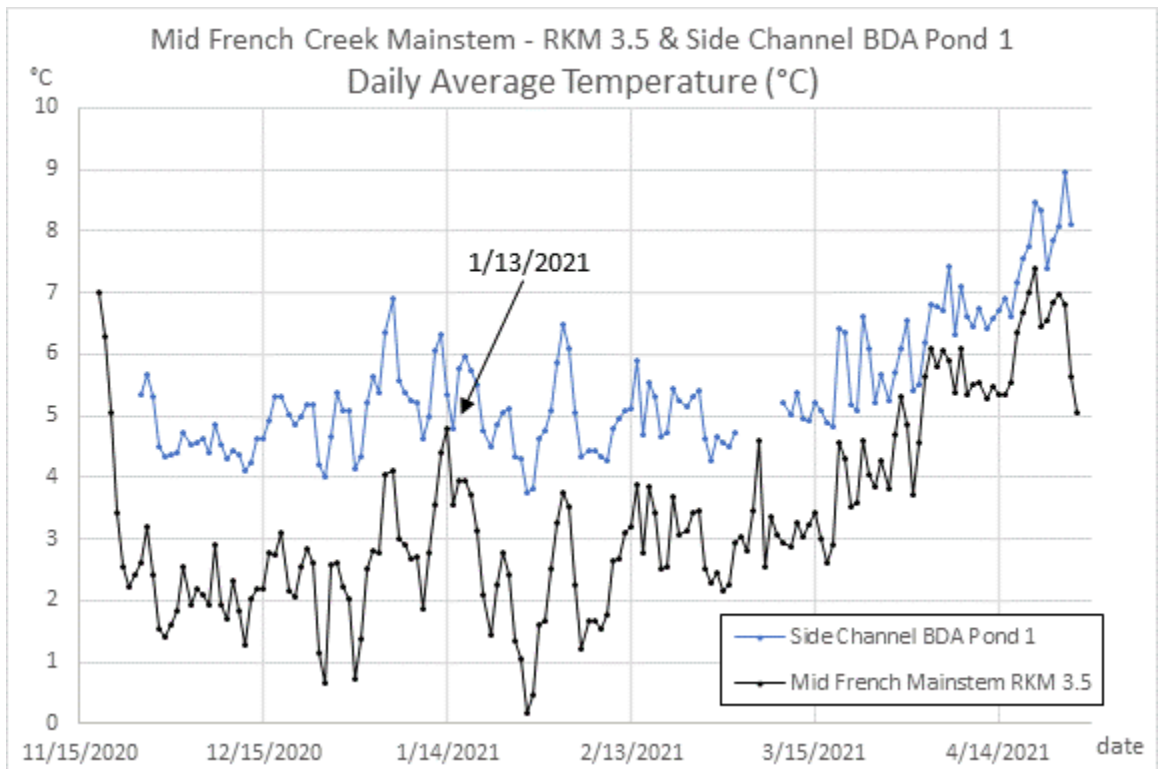
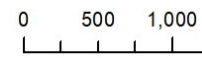
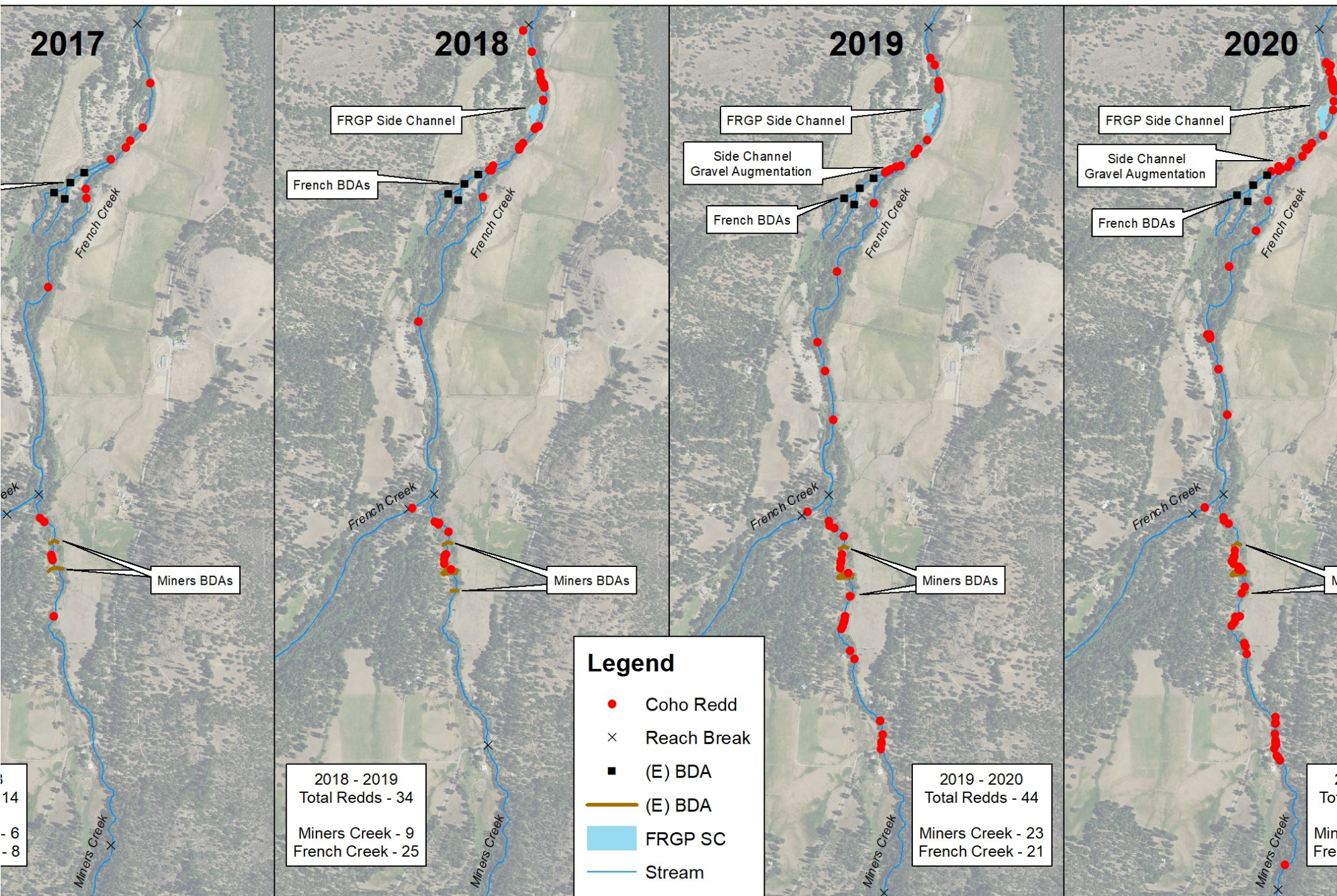


Figure 4 – Daily average temperature (°C) – Mid French mainstem – RKM 3.5 & Side Channel BDA Pond 1

Though the dissolved oxygen in the BDA Pond 1 was relatively low growth and survival of Coho Salmon in the BDA Ponds was good.

Water temperatures in the Mid French BDA Side Channel were significantly warmer than temperatures in the mainstem (Figure 4). The minimum moving weekly average temperature at the Mid French Creek Mainstem – RKM 3.5 station was 1.2° C on January 29, 2021. The moving weekly average temperature on January 29, 2021 in the Side Channel BDA Pond 1 was 4.4° C – 3.2° C warmer than the mainstem.

French Creek and Lower Miners Creek - Coho Salmon Redds - Brood Year 2017 to Brood Year 2020



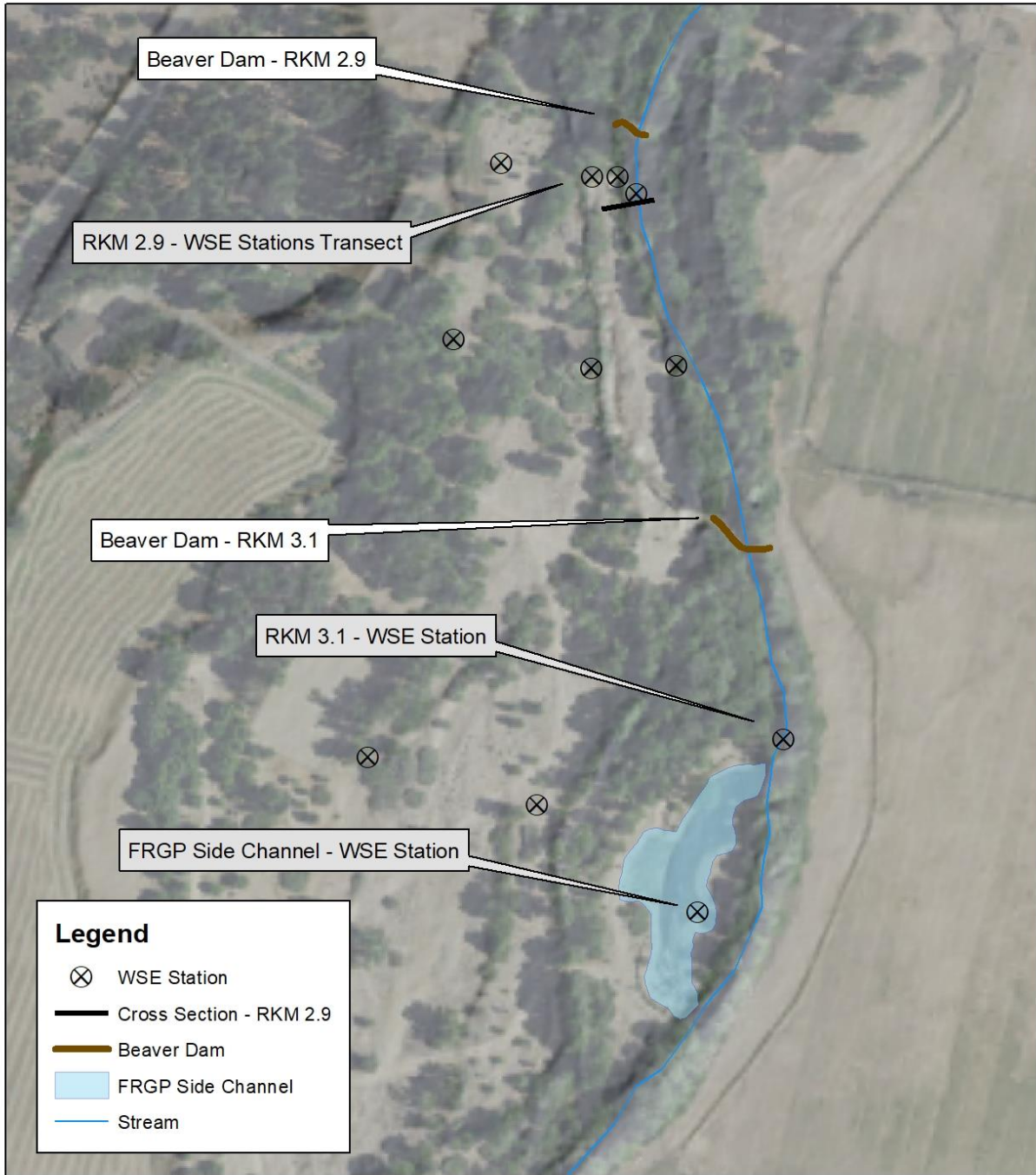
Effect of Beaver Dams on Water Surface Elevation and Water Quality –French Creek RKM 3.1 & RKM 2.9
Scott River Watershed Council



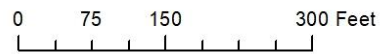
Beaver Dam at French RKM 2.9 during October 22, 2021 runoff event

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 effects 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.

Mid French Creek - 2021 Beaver Dams Monitoring Network



E. Yokel - 10/28/2019



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.

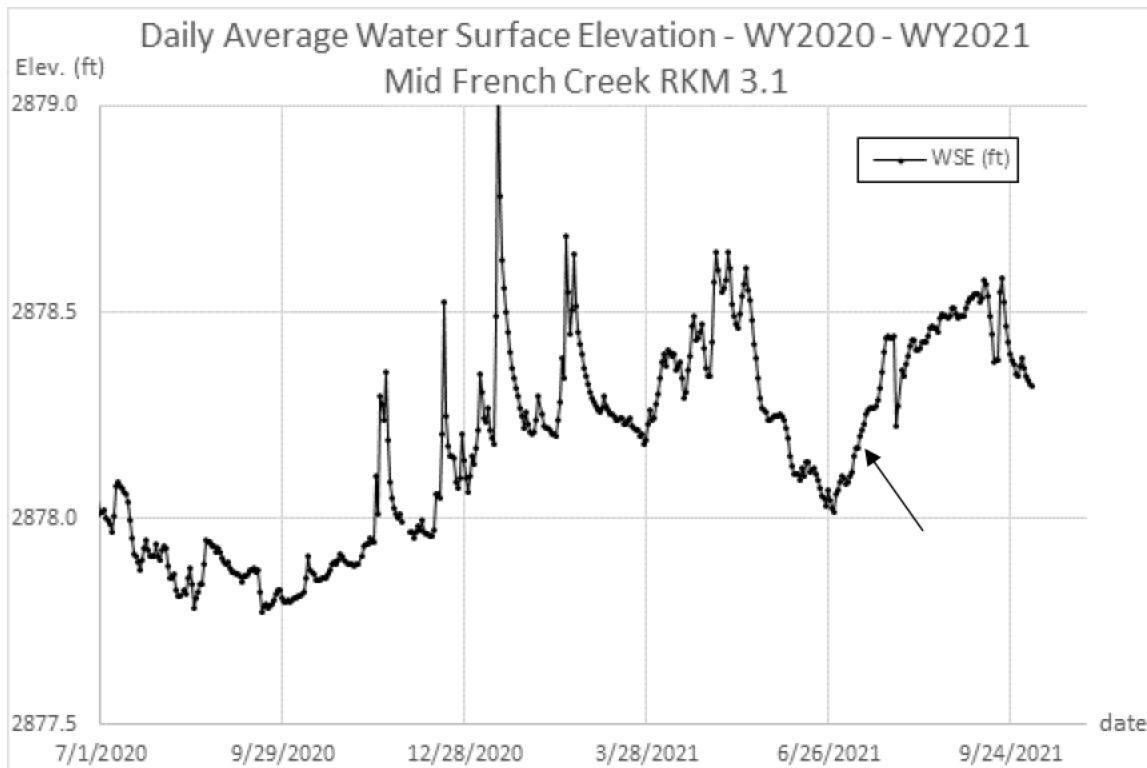


Figure 1 – Daily average water surface elevation (WSE) – Mid French Creek RKM 3.1

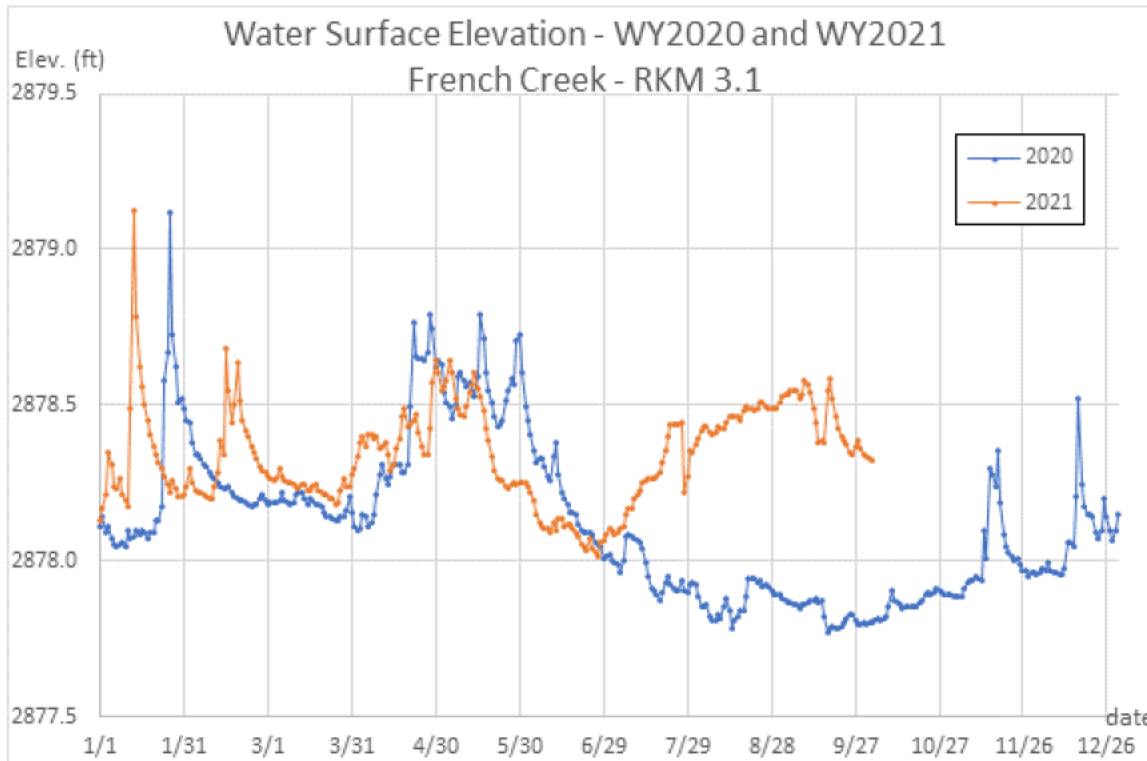


Figure 2 - Comparison of daily average WSE at French Creek RKM 3.1 – WY2020 & WY2021

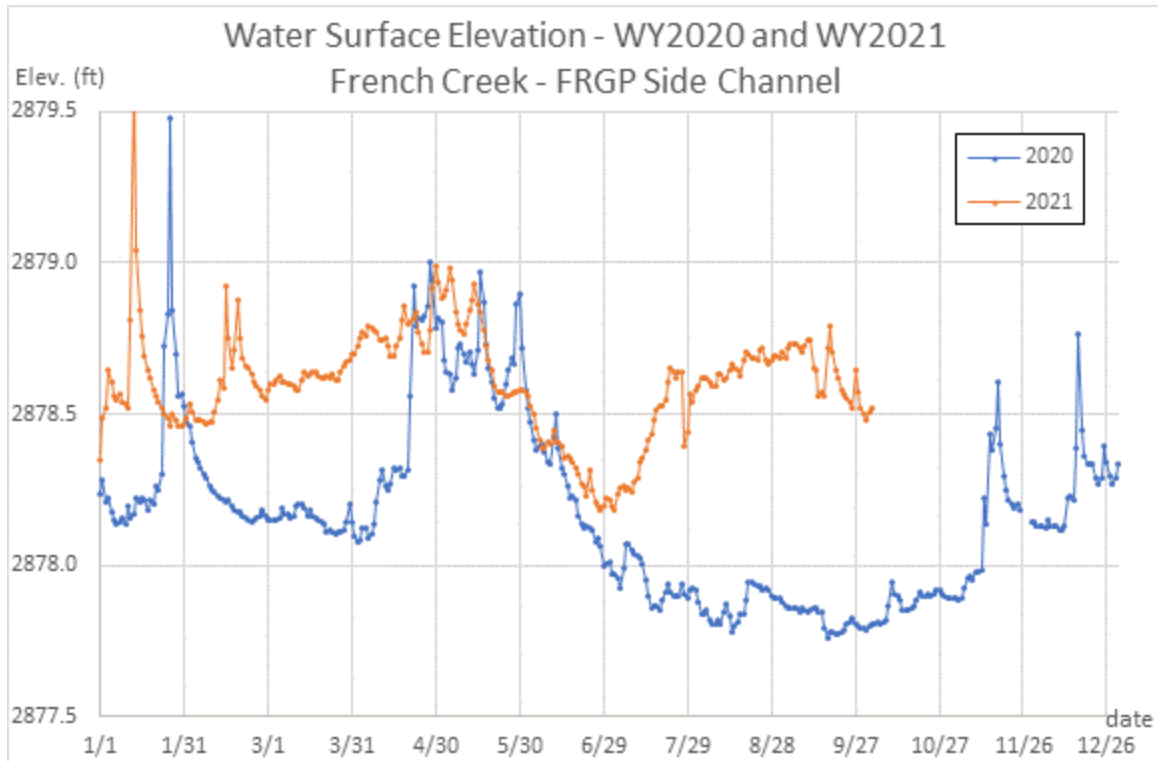


Figure 3 - Comparison of daily average WSE at French Creek FRGP Side Channel – WY2020 & WY2021

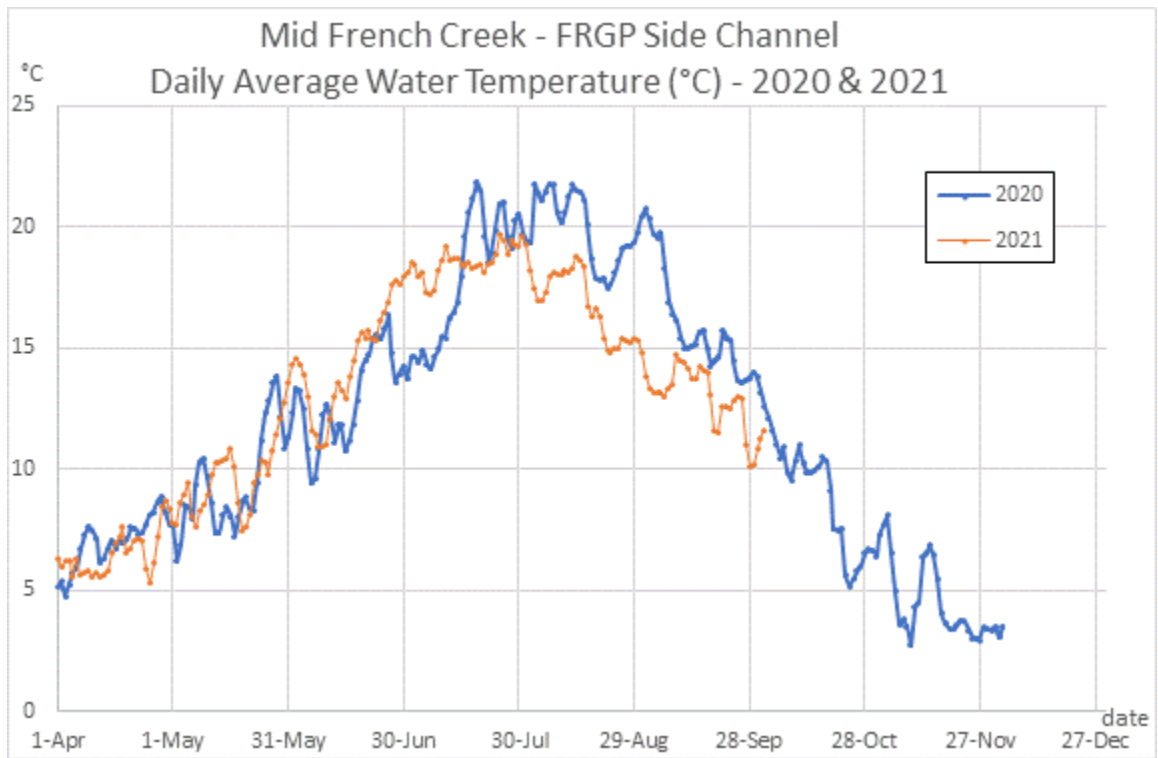


Figure 4 - Comparison of daily average temperature (°C) at FRGP Side Channel – WY2020 & WY2021



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.

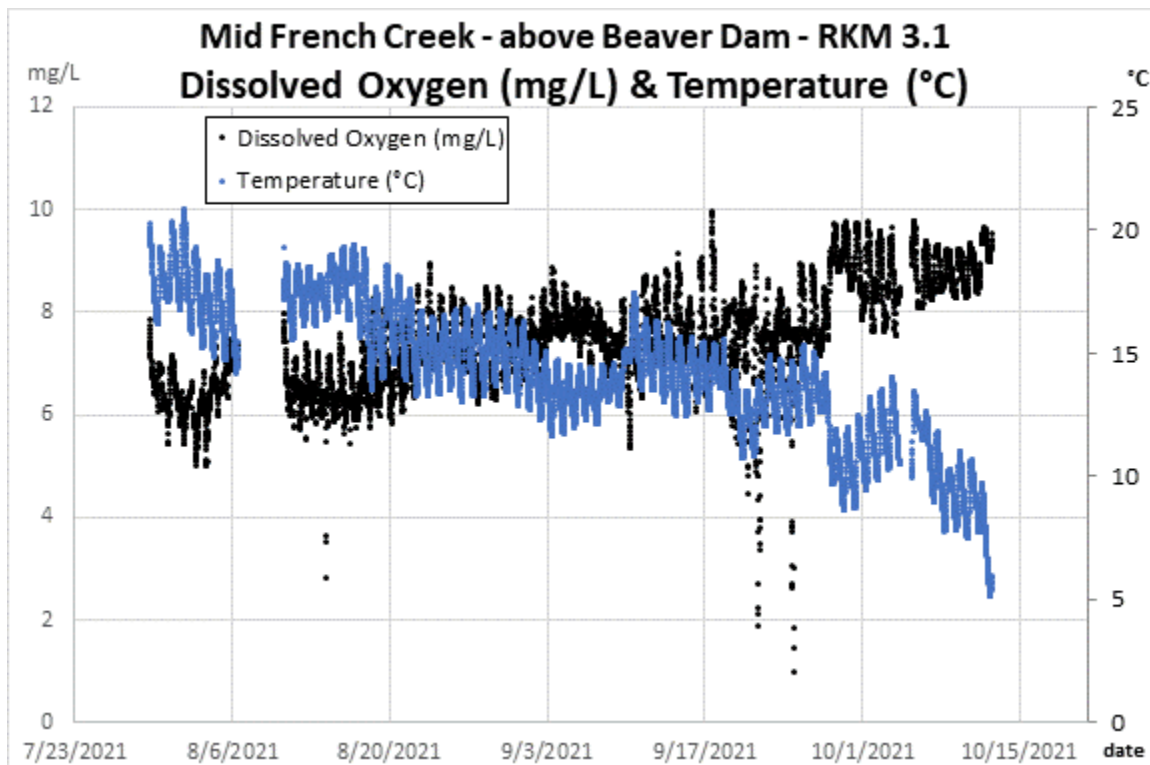


Figure 5 - Dissolved oxygen (mg/L) and temperature (°C)

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.

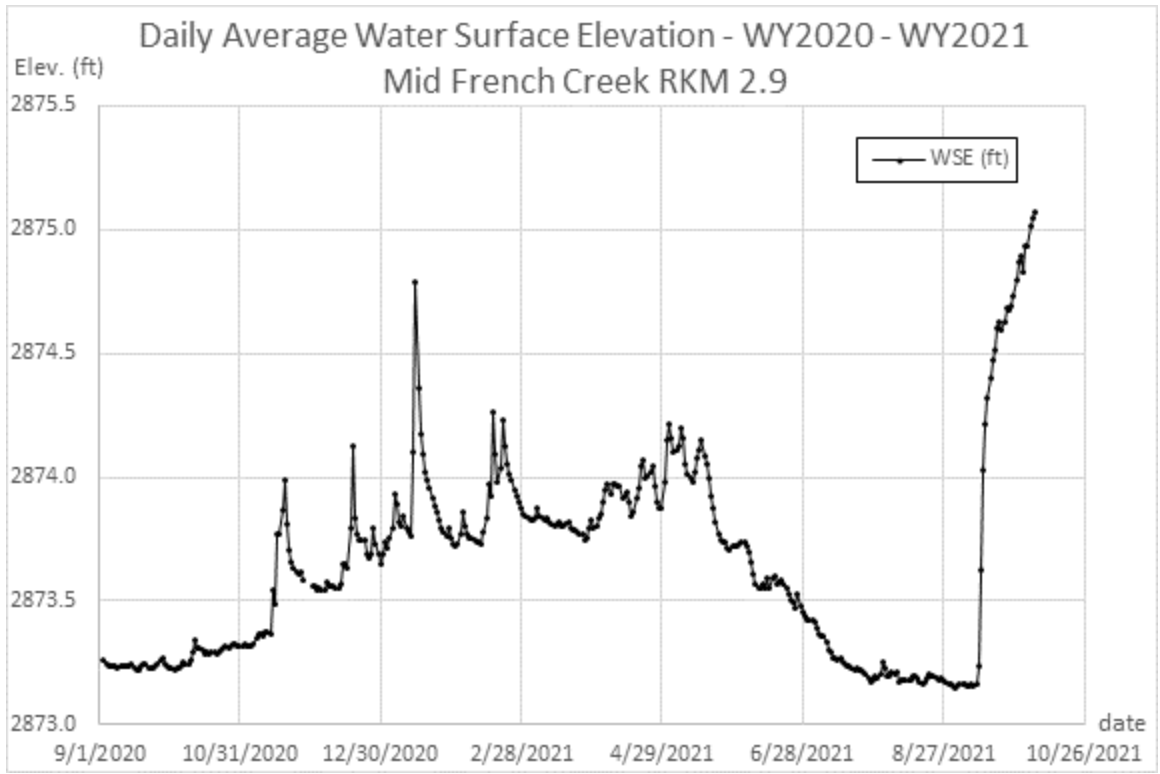


Figure 6 – Daily average water surface elevation (WSE) at French Creek RKM 2.9 – WY 2020 - 2021

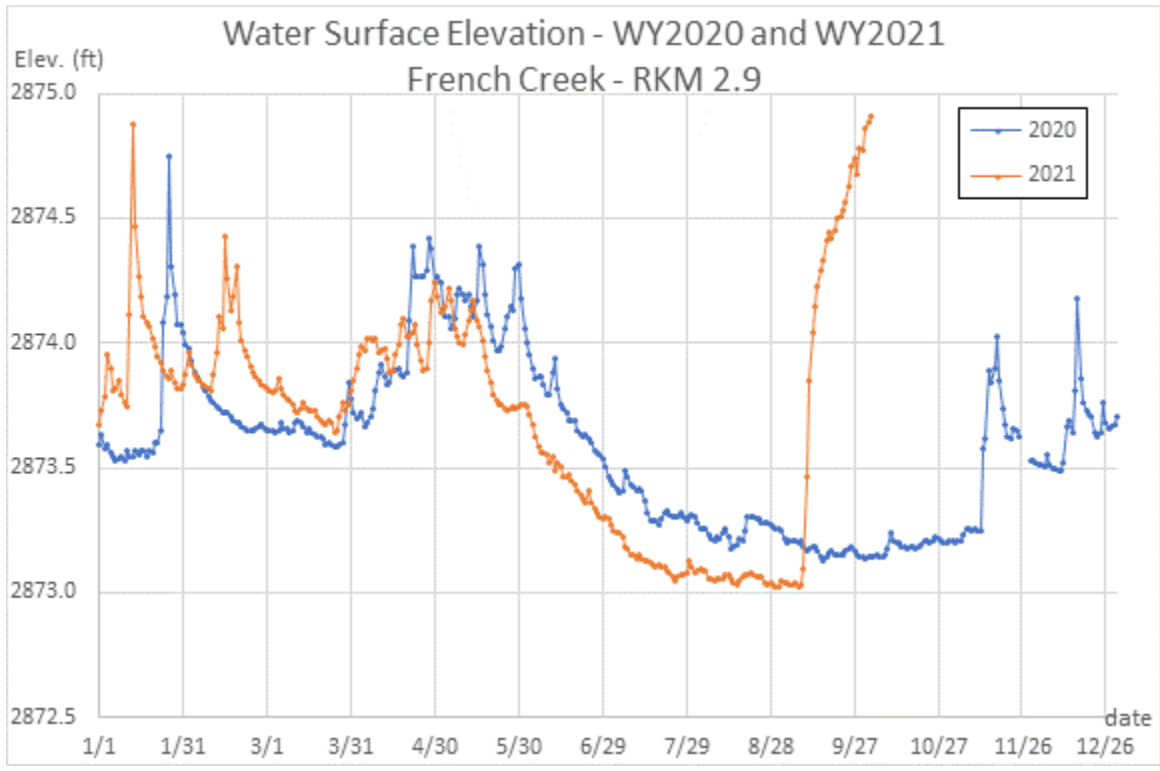


Figure 7 – Comparison of daily average WSE at French Creek RKM 2.9 – WY2020 & WY2021

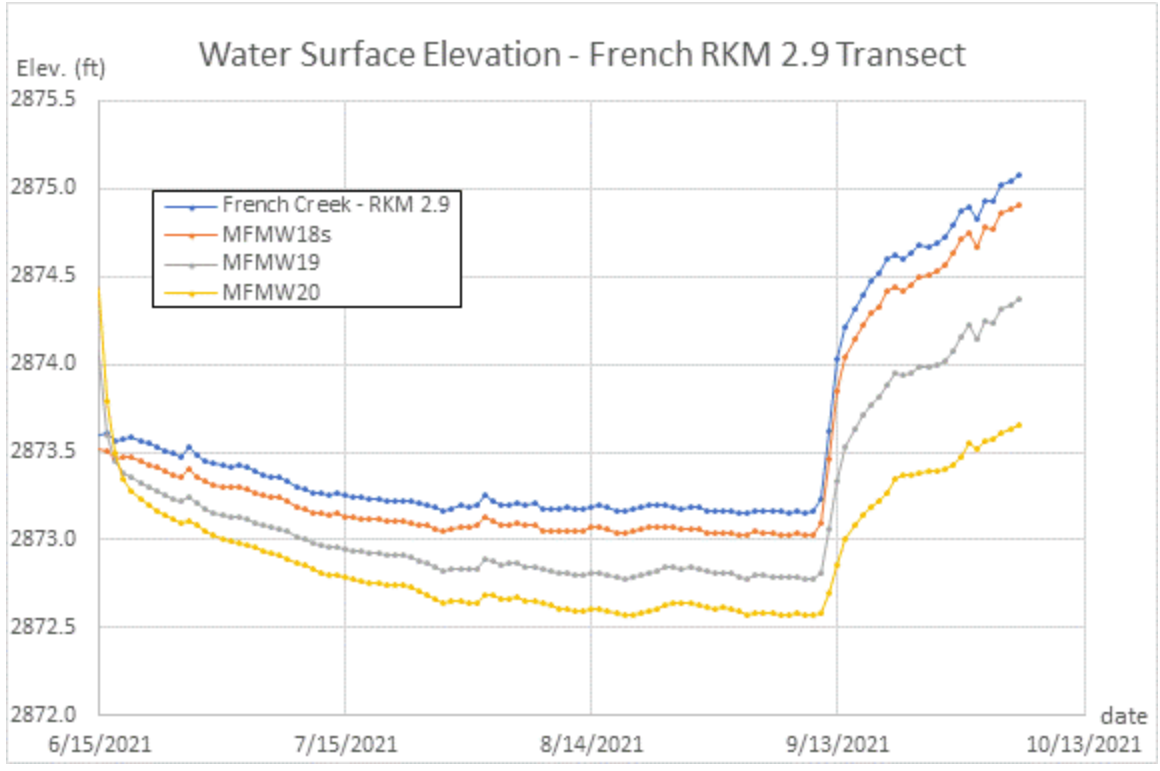


Figure 8 – Daily average WSE at French Creek RKM 2.9 Transect

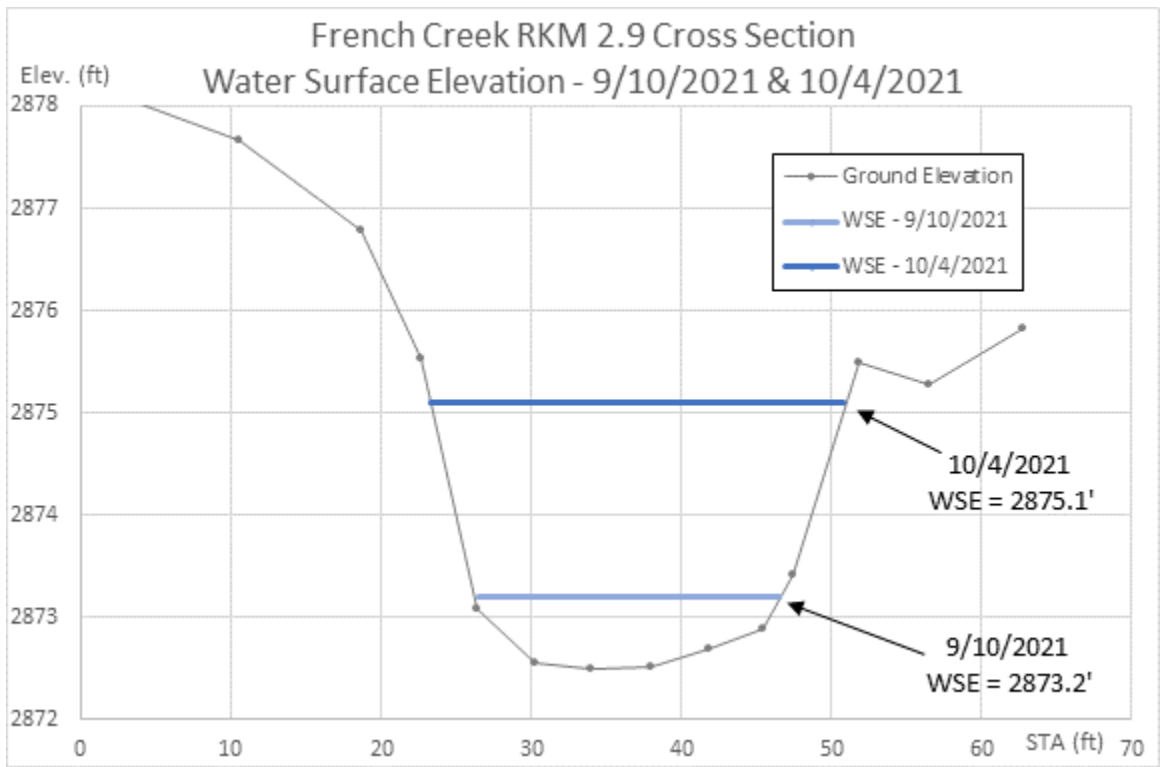


Figure 9 – Increase in WSE in at French Creek RKM 2.9 Cross Section – 9/10/2021 to 10/4/2021

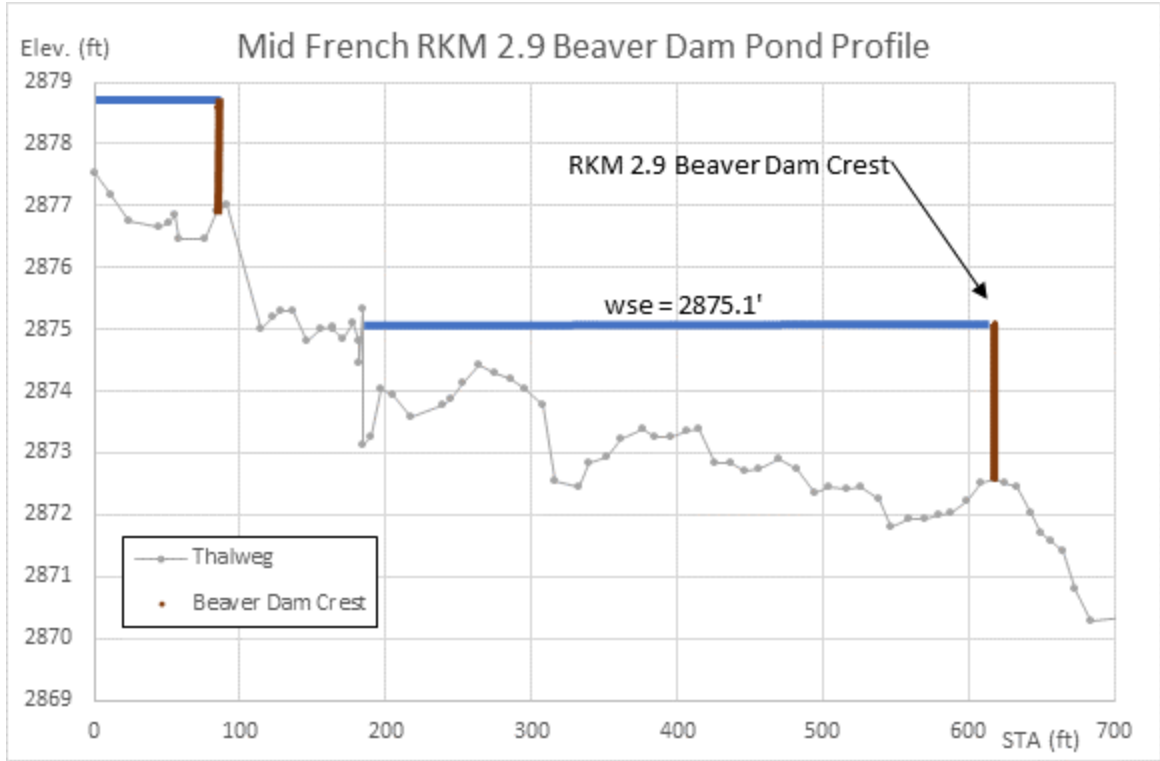


Figure 10 – Longitudinal Profile of Mid French Creek and water level of RKM 2.9 Beaver Dam Pond