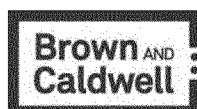


Nez Perce Tribe and Save the South Fork Salmon Fisheries Expert Report Rebuttal for Perpetua Resources Water Right Application

Prepared for
Perpetua Resources Idaho, Inc.
Valley County, Idaho
November 6, 2023



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List of Abbreviations

cfs	cubic feet per second
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESFSR	East Fork South Fork Salmon River
IFIM	Instream Flow Incremental Methodology
LWD	large woody debris
MODPRO2	Model Refined Modified Proposed Action
NPT	Nez Perce Tribe
PHABSIM	Physical Habitat Simulation
POD	point of diversion
POU	place of use
SDEIS	Stibnite Gold Project Supplemental Draft EIS
SGP	Stibnite Gold Project
SHSM	Stibnite Hydrologic Site Model Report
SSFS	Save the South Fork Salmon River
SWWB	Site Wide Water Balance Report
TSF	tailings storage facility
WUA	Weighted Usable Area

Section 1

Expert Qualifications

Paul Leonard, CFP

Paul Leonard is an American Fisheries Society (AFS) Certified Fisheries Scientist with more than 40 years of experience with fisheries and aquatic investigations, instream flow studies, fisheries effects analysis, and the permitting and environmental assessment for large and complex water resource, mining, transportation, linear facilities, and other coastal and riverine infrastructure projects. He has been involved with fisheries assessments for the Stibnite Gold Project (SGP), fisheries studies in the East Fork South Fork Salmon River (EFSFSR) including the salmonid population and movement studies for the Yellow Pine Pit lake and was closely engaged with the multiple agencies that participated in Endangered Species Act (ESA) Section 7 informal consultation meetings. Paul has provided expert review and evaluation for a number of projects, including independent evaluations, depositions and expert testimony. Paul also has many years of experience with hydroelectric projects project relicensing and associated technical studies including instream flow studies using the Instream Flow Incremental Methodology (IFIM) and associated hydrologic analysis and hydraulic and habitat modeling for salmonids, warm water fish, and mussels, temperature modeling and thermal effects, and hydroelectric project operations including peaking operations and ramping rates. Paul participated in some of the planning studies for instream flow studies that were used to support the Snake River Adjudication process.

Rob Richardson, PG, PMP

Rob Richardson is a licensed professional geologist (ID, WA, OR) and project management professional with over 20 years of professional experience in water resources with a focus on watershed and reach-scale geomorphic analyses, channel evolution, risk analysis, and stream restoration design in Idaho, Oregon, and Washington. Rob has a BS in environmental science and a MS in Quaternary Sciences with an emphasis of geomorphology. He is currently an owner, cofounder, and principal geomorphologist at Rio ASE, a boutique science and engineering firm specializing in river analysis and restoration in Boise, ID. Rob's technical approach includes understanding historic, existing, and potential future site conditions in order to evaluate and develop long-term solutions that work with natural processes. He has completed projects within private, government, non-government organizations, and Tribal sectors including river and habitat restoration designs; watershed and reach-scale geomorphic assessments; channel migration zone analyses and other risk assessments; pipeline and bridge stream crossing evaluations; paleoenvironmental site reconstructions; climate change research; and interdisciplinary planning and prioritization studies. Rob has served as an expert witness evaluating the impacts and restoration plans following a dam-breach flood event in southeastern Oregon in 2017. Regarding the Stibnite Gold Project (SGP), Rob completed a qualitative sediment and erosion study at the site in 2010 and has been working since 2017 as the lead scientist for the stream restoration design and stream functional assessment.

Dan Stanaway

Dan Stanaway is a principal scientist with Brown and Caldwell, focusing on water supply, groundwater management, water rights, and permitting projects. He has 13 years of professional experience including 10 years of working on water resource issues in Idaho. Dan has a BS in environmental studies and an MS in Hydrologic Sciences. Dan's work experience includes working in

the private and public sectors where he has filled technical and management roles in water rights modeling and administration, developing and executing complex groundwater programs, managing hydrologic modeling tasks and leading state and federal environmental permitting projects. Specific to the SGP, Dan leads a team of technical hydrogeologists to conduct groundwater studies, leads the hydrologic modeling, stream temperature modeling and water chemistry modeling teams, and is a technical resource and team leader for water rights permitting. Dan has been involved in the Perpetua Resources water rights process for 5 years and has drafted or reviewed all reports delivered as a part of this process. Further, Dan has been involved with, oversaw, drafted, or reviewed all Perpetua Resources water modeling related reports and other deliverables for the past five years.



Section 2

Introduction

By request of Perpetua Resources Idaho, Inc., this expert report rebuttal raises concerns with the analysis and refutes conclusions of the Nez Perce Tribe (NPT; Kinzer and Ackerman 2023)) and the Save the South Fork Salmon River (SSFS; Cochnauer 2023) expert reports on Perpetua Resources water right applications for permit nos. 77-14377, 77-1437, and 77-14379, applications for transfer nos. 85396, 85397, 85398, and 85399, and application for exchange no. 85538 for the Stibnite Gold Project (SGP).

Our review demonstrates inaccuracies in the NPT and SSFS expert reports' hydrologic assessment and the incomplete and unsupported characterization of the effects of water diversions on fish and fish populations. The hydrologic assessment does not fully consider all project documentation and evaluations that have described water right application for permit, applications for transfers, water management, simulated diversion demand, and the environmental effects analyses. This expert report rebuttal describes the water right application and justification for the diversion rate sought, the range of potential streamflow impacts, and associated fisheries impacts resulting from the Stibnite Gold Project (SGP).

The primary concerns with the NPT and SSFS expert reports are as follows:

- Anticipated streamflow and fisheries impacts are overstated in duration, magnitude, and extent (stream miles).
- Water management and water conservation is not considered in the expert reports and so streamflow and fisheries impacts are overstated in magnitude and duration.
- The expert reports use fish flow-habitat and flow-productivity analysis from streams other than the EFSFSR and apply them to the upper EFSFSR without any evaluation of or support for their applicability to the upper EFSFSR stream segments. No comparison of the fish populations or habitat conditions are made to demonstrate that this “transfer” of information to the upper EFSFSR is valid. The streams they cite (Sugar Creek upstream of the EFSFSR and Johnson Creek) have considerably different fish populations, fish densities, and habitat conditions as the upper EFSFSR. Therefore, appropriateness of the “transfer” of flow-productivity and flow-habitat relationships from other streams has not been scientifically supported.
- Both expert reports characterize effects on fish and fish populations that are not supported by either their analysis or relevant scientific literature, leaving their effects analyses largely unsupported.
- The expert reports provide little or no context for their effects analysis within the larger SGP action, ignore the broader context of the current baseline conditions that limit fish populations and proposed beneficial mitigation, and other analyses and information that is publicly available in the SGP SDEIS. The expert report analyzes certain potential effects in a vacuum, without appropriate context and consideration.
- The expert reports ignore a large body of information available for salmonids and habitat in the upper EFSFSR that are available in publicly available documents, especially the Stibnite Gold Project and its supporting resource reports. This includes documents by Ecosystem Sciences

that use and evaluate some of the same data. As a result, their analyses have not been compared similar analyses by others.

- Both expert reports incorrectly assume that the maximum water withdrawals would be made constantly and that low flow conditions typically occurring less than 5 percent of time (95% exceedance flows) would always occur. The expert reports characterized that the worst effects as if they would occur most of the time, which incorrect. The expert reports then go on to make far-reaching conclusions about the effects on fish populations that are unsupported.
- Both expert reports make key assumptions necessary for their analysis, such as the assumption of a linear relationship between flow reduction and overall fish habitat loss, but do not provide support that these assumptions are valid or appropriate.

Section 3

Hydrologic and Fisheries Impacts Inappropriately Represented

The NPT and SSFS expert reports do not accurately represent potential streamflow and fisheries impacts because their assessments assume that the full diversion rate of Perpetua Resources' water rights will be continuously withdrawn from the EFSFSR system and streamflow effects of 9.6 cfs withdrawal occur throughout the project area. Their assessments do not consider the large body of evidence describing the water right application for permit, water management and project related impact assessments. The NPT and SSFS assessments thereby overstate the magnitude and duration of likely streamflow depletion and affected stream reaches without consideration of overall stream habitat improvement because of the SGP. This section describes the water right application and derivation of the 9.6 cfs diversion rate sought, water management considering relevant for water rights, a balanced assessment of streamflow impacts and a description of overall habitat improvement.

3.1 Perpetua Resources Water Right Application is Misrepresented

Applying the full water right withdrawal rate at all times and within all stream reaches misrepresents anticipated use and impacts. Peak rates are not simulated to occur simultaneously and, at times when dewatering produces water in excess of industrial demand, this water will be treated and discharged into either Meadow Creek or the East Fork South Fork Salmon River (EFSFSR). Below we provide the details of these statements and support with clarifying data and information the correct and appropriate interpretation of the proposed water right.

Perpetua Resources water right application for permit seeks a total of 9.6 cfs from groundwater and surface water. Groundwater sources are industrial water supply wells and Hangar Flats pit dewatering wells in the Meadow Creek valley, Yellow Pine pit dewatering wells below the confluence of the EFSFSR and Meadow Creek and above the EFSFSR confluence with Sugar Creek and dewatering from West End pit. Surface water is sourced from the EFSFSR point of diversion (POD) near the Yellow Pine pit at the tunnel inlet (Figure 1).

The 9.6 cfs diversion rate is the sum of the modeled peak diversion demand for mill water, excess dewatering water (treated and discharged), dust suppression, and drilling water (Table 1). The applied for diversion rate is determined by cumulative peak rate for each industrial use to account for modeling uncertainties from 1) the monthly timestep is not resolved to a daily rate, 2) the deterministic climate condition that is based on a 14-year historical period and 3) timing and quantities of reclaim water from the tailings storage facility (TSF; BC 2021a). Instantaneous or daily diversion demand will be higher and lower than the expected monthly diversion demand and could be as high as 9.6 cfs for short durations, actual climate conditions will vary from the climate series used in the model and TSF reclaim water could be available earlier or later in mine life or in different quantity than simulated.

Table 1. Operations Industrial Water Requirements

Use	Peak Rate (cfs)	Estimated Average Annual Volume (acre-feet) ^d
Mill Demand	9.7	TSF Reclaim (average): 4,832 Mill Diversion Demand (average): 1,438
Mill Diversion Demand ^a	4.5	1,438
Dust Control	0.7	186
Drilling Water	0.1	40
Excess Dewatering Water ^b	4.3	608
Total Diversion Rate ^c	9.6	2,272

Notes:

Values based on SWWB 14-year climate scenario (2004 to 2017) used in the predictive modeling as the “average climate scenario”

^a Mill diversion demand is water needed in addition to the TSF reclaim water

^b Dewatering water in excess of dewatering water used for industrial water supply. This water is treated and discharged.

^c Total Diversion Rate is the sum of the mill diversion demand, dust control, drilling water, and dewatering water

^d Volumes shown are the actual volumetric requirement for each use estimated by the SWWB model

Abbreviations:

cfs = cubic feet per second

SWWB = site-wide water balance

TSF = tailings storage facility



Figure 1. SGP Points of Diversion and Key Features for Expert Report Rebuttal

Brown AND Caldwell

3.1.1 SSFS Misinterprets Availability of Existing Water Rights

The SSFS assessment uses a withdrawal rate of 11.14 cfs. This rate is greater than the total applied for industrial use and domestic use diversion rates for the SGP and results in exaggerated effects analysis.

Perpetua Resources has existing water rights for the SGP for which transfers and an exchange of the place of use (POU) and/or POD were submitted to the IDWR (Table 2). Existing water rights are not enlarged (i.e. seeking a higher diversion rate) and diversion rates and volumes are not modified. Transfers are described in the water right application for permit in both the application and cover letter. Table 2 includes a summary of the application for transfer.

Table 2. Existing Water Rights, Transfers and Exchanges

Water Right; Transfer/Exchange No	Current Owner	Source	Beneficial Use(s)	Transfer Application	Diversion Rate (cfs)	Annual Volume (acre-feet)
77-7122; 85396	Idaho Gold Resources Company	East Fork South Fork Salmon River	Diversion to Storage Mining Storage Mining from Storage	Transfer POD to surface water intake at tunnel	0.33	7.1
77-7141; 85399	Idaho Gold Resources Company	Groundwater	Domestic	Transfer POD to worker housing facility	0.20	11.4
77-7285; 85397	Stibnite Gold Company	Groundwater	Mining Diversion to Storage Mining Storage Mining from Storage	Transfer POU to proposed mine and mill area	0.50	30.2
77-7293; 85398/85538	Stibnite Gold Company	Unnamed Stream (Hennessy Creek)	Mining	Transfer POD to surface water intake at tunnel	0.25	20

Abbreviations:

cfs = cubic feet per second

POD = point of diversion

POU = place of use

Total diversion rate of existing water rights is small. Industrial use is 1.08 cfs and 0.2 cfs for industrial use and domestic use, respectively, with limited annual volumes. These water rights are active until the authorized annual volume is met and, at that point, water may not be diverted under these water rights. While the existing water rights add to the authorized diversion rate, the industrial and domestic water right application and total authorized industrial use is 10.68 cfs and domestic use is 0.26 cfs, the full rate of the existing water rights will be available for a limited duration because of the annual volume limit.

3.1.2 Diversion Rate that is Simulated in the Water Models is not Considered in the NPT and SSFS Assessments

Perpetua Resources water right application for permit does not seek to authorize specific diversion rates from industrial supply groundwater, surface water, or mine impacted water (i.e., dewatering

water and contact water¹). Rather, the diversion rate application is based on the cumulative industrial diversion demand for all industrial uses. The Site Wide Water Balance Report (SWWB; PRII 2021) and the Stibnite Hydrologic Site Model Report (SHSM; BC 2021b) present the modeled monthly diversion rate and timing for each of the water sources (Figure 2 through Figure 8). Treated water discharge rate is presented in Figure 6 because this water is sourced predominantly from dewatering water and is an approximation of dewatering water in excess of industrial demand, largely corresponding to Hangar Flats pit dewatering.

While the diversion rate sought in the water right application is based on the modeled peak demand for each industrial use (not including mill demand satisfied by reclaim water) at the monthly time step, the SWWB model provides stochastic output that assesses the range of water production and demand from various sources (PRII 2021). The monthly 95th percentile makeup water demand, that is the industrial demand not sourced from TSF reclaim water, is approximately 7.25 cfs (PRII 2021). The 95th percentile freshwater demand, that is water from the EFSFSR surface water diversion and industrial supply wells (dewatering water not included), peaks in mine year 1 and is approximately 4.5 cfs (PRII 2021;

Figure 7, Figure 8). Importantly, the water demand estimates do not include the dewatering water that is treated and discharged. The contribution of TSF reclaim water increases throughout the mine life and the freshwater makeup demand, therefore water withdrawal, declines through time. It should be noted that the impacts of the full 9.6 cfs diversion rate were not simulated in the SWWB and SHSM because this would lead to an unbalanced water balance at the monthly timestep and the anticipated actual withdrawal rate presented in the SWWB and SHSM is not considered by the NPT or SSFS.

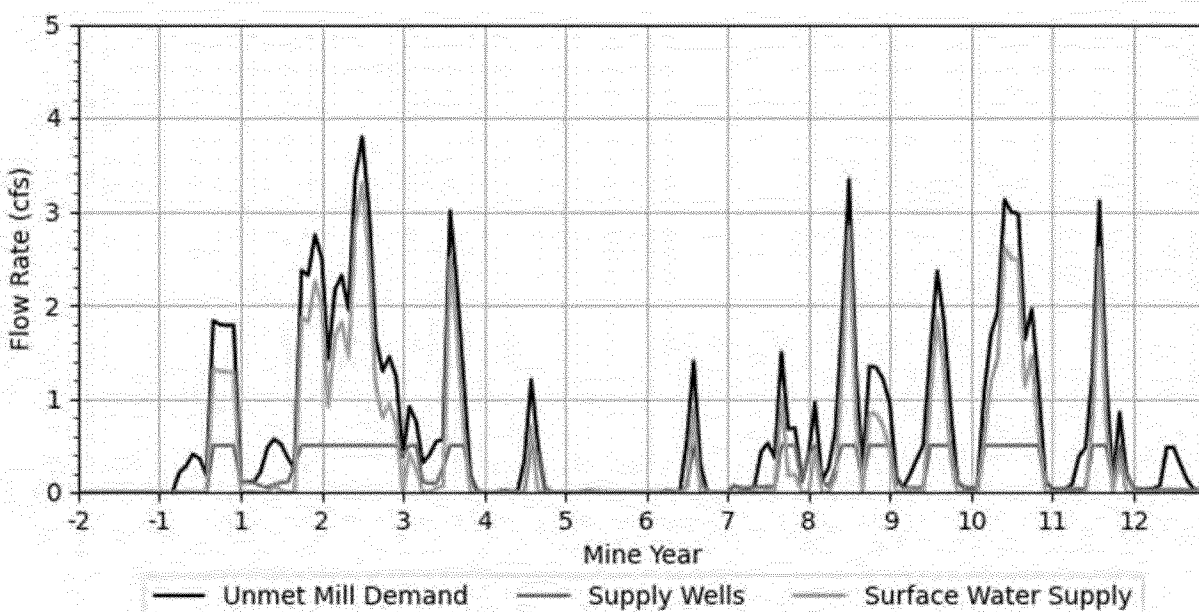


Figure 2. Modeled Diversion Rate for Industrial Supply Wells and Surface Water

¹ Whether Perpetua Resources' direct diversion of diffuse contact water before it reaches a natural stream channel, a required practice to protect water quality, requires a water right, was recently addressed in the August 19, 2022 Interlocutory Order issued by the Idaho Department of Water Resources (IDWR) which concluded capturing diffuse water does not require a water right (IDWR 2022).

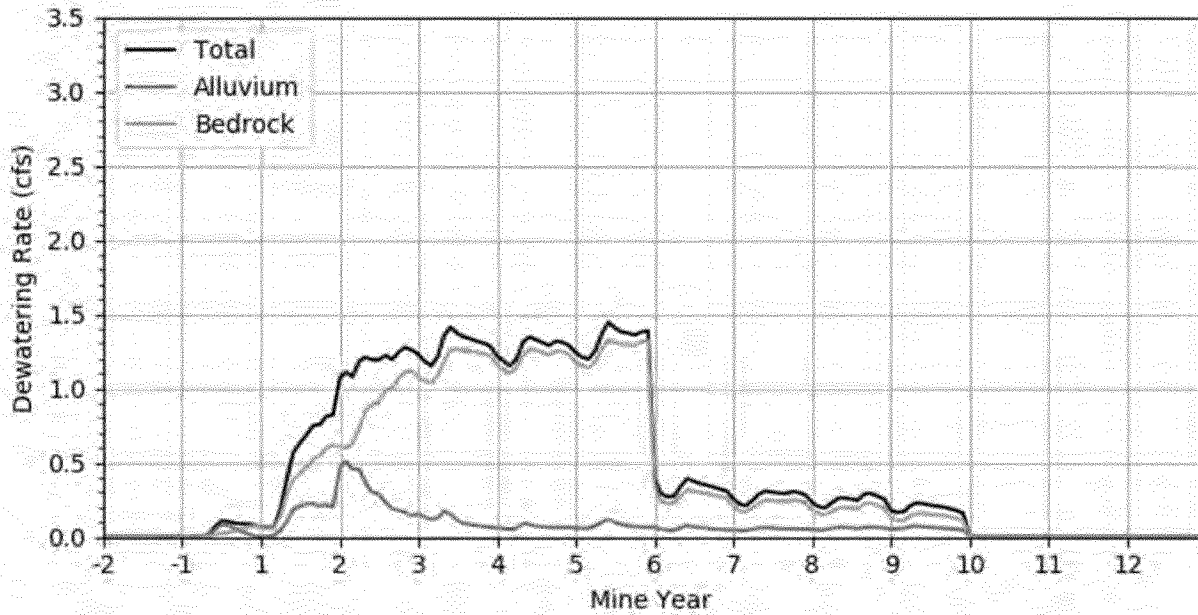


Figure 3. Modeled Yellow Pine Pit Dewatering Rate

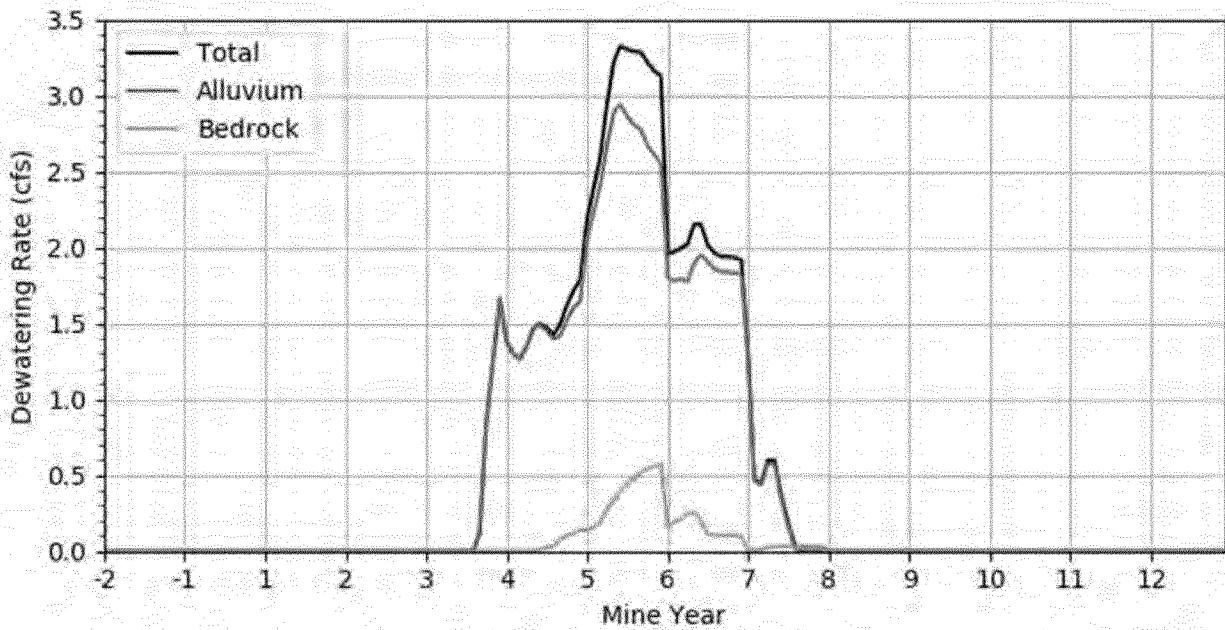


Figure 4. Modeled Hangar Flats Pit Dewatering Rate

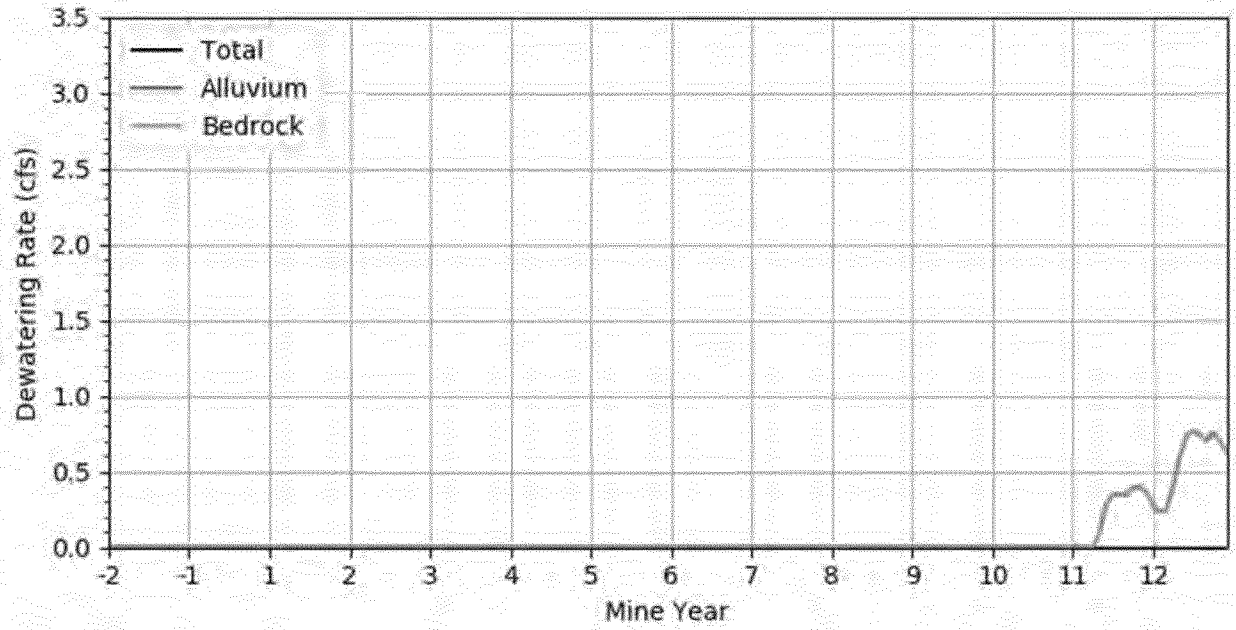


Figure 5. Modeled West End Pit Dewatering Rate

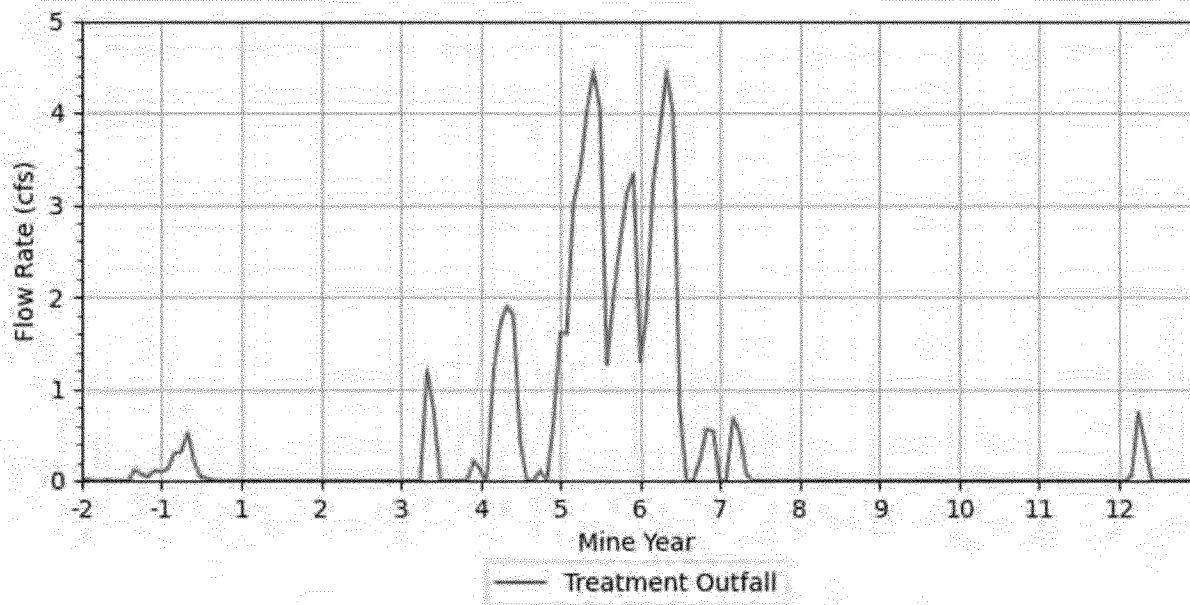


Figure 6. Modeled Treated Water Discharge Rate

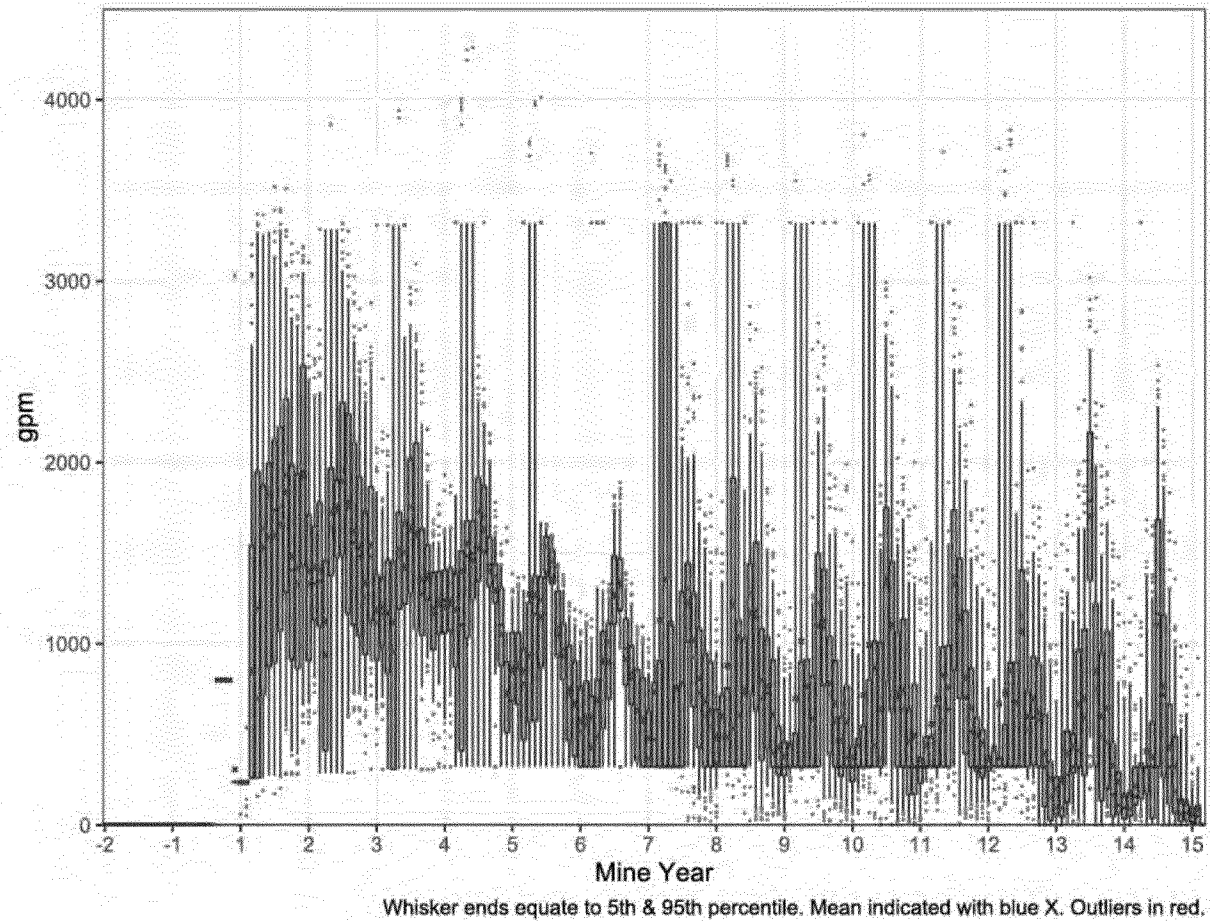


Figure 7. Total Makeup Water Demand from all Sources²

² Figured copied from the Site Wide Water Balance Refined Modified Proposed Action (ModPRO2) Report (PRII 2021) and units are in gpm while discussion is in cfs. Makeup water sources include contact water, dewatering water, fresh groundwater and surface water.

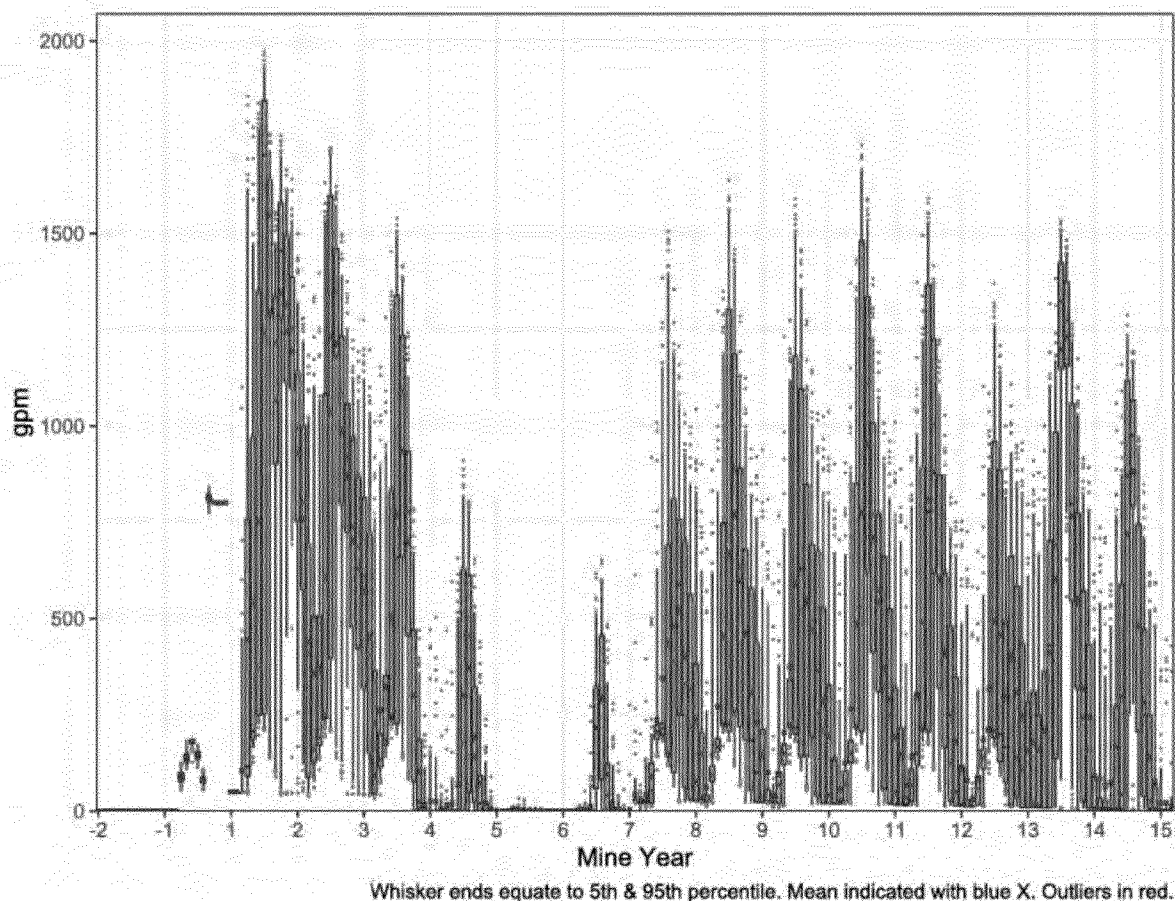


Figure 8. Total Makeup Water Demand from Freshwater Sources³

3.1.3 Proposed Water Right Condition to Limit Withdrawal During Low Flow

The NPT contend that Perpetua Resources has not proposed withdrawal limitations and point to the low flow period as the highest concern. Contrary to this statement, Perpetua Resources has agreed to water withdrawal limitations in a proposed condition agreed to with the Idaho Department of Fish and Game and the Office of Species Conservation (PRII 2022). This low flow condition is active when flow in the EFSFSR below Sugar Creek is less than 25 cfs and limits net diversion from groundwater and surface water diversions to 20% of the streamflow during these times. The condition is defined as:

Net diversions from East Fork South Fork Salmon River (EFSFSR) and groundwater under water rights 77-7122, 77-7285, 77-7293, and 77-14378 shall not cause more than 20 percent depletion to the unimpaired streamflow in the EFSFSR below its confluence with Sugar Creek when unimpaired streamflow is less than 25 cubic feet per second (cfs). For purposes of this condition:

1. Percent depletion is equal to net diversion divided by unimpaired streamflow.
2. Net diversion is the sum of groundwater and EFSFSR diversions minus discharge of treated water to the EFSFSR and its tributaries.
3. Unimpaired streamflow is defined as the gaged flow at the EFSFSR below Sugar Creek (Condition 4), plus the net diversion from EFSFSR and groundwater under water rights 77-7122, 77-7285,

³ Freshwater sources are groundwater from the industrial supply wells and EFSFSR surface water. Dewatering water is not included in freshwater makeup as it is regulated as contact water.

77-7293, and 77-14378. The sum of the gaged flow at Sugar Creek (United States Geological Survey [USGS] 13311450) and the gaged flow at EFSFSR above Sugar Creek (USGS 1331250) will be used to estimate streamflow for the unimpaired flow calculation in the event the gage at the point of quantification (POQ; Condition 4) is not operational because of icing or other environmental factors or during rating curve development.

4. Calculations shall be based on running 3-day averages of net diversion and gaged stream flows.
5. Diversion rate from the EFSFSR surface intake point of diversion shall not exceed 20 percent of the unimpaired EFSFSR stream flow below its confluence with Sugar Creek (POQ).

The intent of the condition is to limit authorized diversion rate based on streamflow to maintain sufficient flow for fish passage within and downstream of the project site. When the condition is active, the maximum net diversion rate is 5 cfs and scales down with streamflow, with lower authorized diversion rate as streamflow declines from 25 cfs. This condition addresses 1) maintaining water in streams, 2) providing sufficient streamflow within the tunnel and downstream of the tunnel to the Sugar Creek confluence for fish passage, 3) climate change impacts to streamflow, and 4) ice formation at winter low flows. Condition 1 limits the authorized diversion rate during low flow periods, generally consisting of late summer (potential higher water temperatures and Chinook salmon and bull trout migration) through winter (incubation and potential ice formation), while avoiding a static minimum streamflow requirement that would itself be uncertain in its benefit and feasibility due to climate change.

3.2 SGP Water Management Strategies and Design Features Are Not Considered in the NPT and SSFS Analyses

Water management strategies and pit dewatering timing for each pit affect the quantity of diversion demand and the timing, quantity and locations of diversions at the SGP. The NPT and SSFS expert reports did not consider water management strategies in their assessments, thereby overstating the impact to fisheries resulting from industrial water use. The NPT and SSFS assessments do not consider the limited 14.25-year span of the SGP mining and milling period, nor the gradual reduction in makeup water demand.

Perpetua Resources strives to conserve water and limit streamflow impacts through water conservation approaches and design features. Water management and conservation strategies in the Perpetua Resources mine plan relevant to water rights and water use include the use of 1) reclaim water from the TSF supernatant pond to satisfy the majority of industrial water demand, 2) storage and use of mine impacted water (i.e. contact water is diffuse stormwater runoff that has been in contact with mine features and dewatering water) as a prioritized water source to meet diversion demand, 3) treating mine impacted water and discharging to either Meadow Creek or the EFSFSR and 4) design features such as management of freshwater diversions and stream lining in the Meadow Creek valley to minimize streamflow impacts and length of stream miles affected. As a result of these water conservation and design features, diversion demand declines through mine life (Figure 7; Figure 8) and the water diversion rate will not directly reduce streamflows in some cases. The NPT and SSFS analyses incorrectly assume that 9.6 cfs will be withdrawn continuously and that streamflows will have a direct and immediate response to water diversions.

Reclaim water from the TSF supernatant pool is the first priority water supply source to satisfy mill demand. The rate of water entering the supernatant pool is limited in early mine life with volume increasing through the 14.25-year milling period. Therefore, makeup water demand that must be satisfied by contact water, groundwater and surface water is highest in the first four years of the mine life, declining from that point through the end of milling. The NPT and SSFS assessments do not consider the limited 14.25-year span of the SGP mining and milling period, nor the gradual reduction in makeup water demand.

Contact water generation occurs primarily during spring runoff and this water is either used when generated or stored in contact water storage ponds for use during the drier, low flow summer months to meet industrial demand. The use of contact water to meet industrial supply needs offsets diversion demand on freshwater. The NPT and SSFS expert reports assess a condition that overstates streamflow impacts in magnitude, duration, and frequency because it is assumed that direct diversions from groundwater and surface water meet the industrial demand. The utilization of contact water for industrial water demand reduces freshwater diversions and associated impacts to fish habitat.

Excess dewatering water and contact water are treated and discharged into either Meadow Creek or the EFSFSR when the quantity of mine-impacted water is greater than what can be used for industrial water demand. The Meadow Creek outfall will be utilized to mitigate streamflow depletions that result from groundwater pumping. Water treatment is highest during Hangar Flats pit dewatering, and it is at this time that Meadow Creek streamflow is most affected. The NPT and SSFS expert reports did not consider streamflow augmentation with treated water in their assessment.

Water sources for industrial purposes are generally prioritized to first utilize TSF reclaim water and mine-impacted water, prior to diverting groundwater from industrial supply wells and surface water. The relative contribution of each source to meet industrial demand is interdependent. For instance, during times of high pit dewatering, minimal to no contributions from freshwater sources are needed. Freshwater diversions from the industrial supply wells and the EFSFSR are not continuous and at modest monthly rates used only when needed (Figure 2). The SHSM (BC 2021b) was used to estimate a groundwater diversion rate from the industrial supply wells that will limit impacts to Meadow Creek. The model demonstrated that 0.5 cfs resulted in acceptable streamflow impacts. The 0.5 cfs industrial groundwater diversion rate is not set by regulation and more water may be withdrawn from the well field. However, actual production rate will be limited by the number of wells, water yield from each well, and observed streamflow impacts. Freshwater demand that exceeds 0.5 cfs is modeled to be sourced from the EFSFSR.

The EFSFSR surface water POD is located at the tunnel inlet to limit extent (miles) of streamflow impacts and maintain streamflow in the higher quality habitat areas upstream of the tunnel. Perpetua Resources has demonstrated the EFSFSR diversion maintains the fish passage function of the reach between the EFSFSR POD to the confluence with Sugar Creek (McMillen 2022, RioASE 2023a, RioASE 2023b). The management of the freshwater sources is protective of fish habitat and neither the total freshwater demand nor the location of the PODs were considered in the NPT or SSFS expert reports, specifically in the assessment of Meadow Creek.

Additionally, Meadow Creek is diverted around the Hangar Flats pit and reconstructed as a sinuous channel within a floodplain corridor to allow potential spawning habitat and establishment of riparian habitat within the floodplain. Approximately 3,800 feet of geosynthetic liner will be installed under the stream and floodplain to minimize streamflow reduction caused by groundwater pumping that occurs between the TSF Buttress and the confluence of the EFSFSR. Groundwater pumping wells are the only diversions in the Meadow Creek valley and therefore the only source of streamflow depletions caused by water withdrawal considered in the water right application for permit. The NPT habitat loss analysis does not consider that only groundwater diversions are present in Meadow Creek, nor that stream habitat restoration and enhancement design features will be constructed to improve fish habitat and minimize water depletions in Meadow Creek.

3.3 A Correct Hydrology Evaluation Should Consider Anticipated and Maximum Authorized Diversion Rates

In recognition that the 10.94 cfs from existing and new water rights would be authorized for some portion of the year and 9.86 cfs would be authorized for domestic and industrial uses once volume limits on existing water rights have been reached, it is appropriate to assess the impacts of this condition during higher flow periods (>25 cfs). However, while the full authorized rate is anticipated to be needed at times, this condition is expected to be short duration and not continuous. The NPT and SSFS assessments only consider the condition of the full water right being withdrawn and do not consider the more routine diversion rate expectation. Impacts were based on static low flow conditions, whereas actual flows are dynamic and will vary seasonally and interannually. Information is available in the SWWB Report (PRII 2021) and the SHSM Report (BC 2021b) for the protestants to present a more representative assessment.

A correct expectation of the range of potential streamflow impacts is presented here at the Meadow Creek (USGS gage 13310850) and EFSFSR above Sugar Creek (USGS gage 13311250) using data from the SHSM and the historical record. The SHSM simulates the future condition with (ModPRO2) and without (No Action) the SGP (BC 2021b). The difference between the two scenarios is the project impact. The SHSM model does not include the low flow diversion rate limitation condition because the modeling was completed before the agreement was in place and the condition has not been promulgated. Assessment of potential streamflow impacts is also presented using historical data at the EFSFSR above Sugar Creek in 2015 (low water year), 2016 (average water year), and 2017 (high water year) with selected years determined using a basin yield assessment at the EFSFSR above Sugar Creek gage. Evaluation of streamflow impacts using the historical record for Meadow Creek is not appropriate because the streamflow benefit of the Meadow Creek stream and floodplain geosynthetic liner cannot be represented in this historical data evaluation and the maximum allowable diversion rate is not sourced completely from the Meadow Creek valley. The geosynthetic liner is designed to minimize streamflow depletion from groundwater pumping and all diversions in Meadow Creek are from groundwater.

3.3.1 Water Diversions in Meadow Creek Valley Do Not Dewater Meadow Creek

The NPT and SSFS expert reports assume that the industrial supply and pit dewatering wells in the Meadow Creek valley will dewater lower Meadow Creek. However, the lower Meadow Creek stream channel will be lined, and so lowering groundwater levels will not have a direct 1:1 effect on streamflow in lower Meadow Creek.

Water diversions in the Meadow Creek valley are limited to the industrial water supply wells and the Hangar Flats pit dewatering wells. The NPT contends that “approximately all of Meadow Creek surface water could be removed.” On the contrary, water withdrawal in the Meadow Creek valley will not dewater the stream as demonstrated in the SHSM (Figure 9).

Streamflow assessment using the SHSM simulation data is based on the prediction node at Meadow Creek below the lined section, that is near the confluence with the EFSFSR and downgradient of all water diversions in the Meadow Creek valley. The SHSM considers all water management activities and mine development that includes water routing, construction of the TSF and TSF Buttress, the stream and floodplain liner, water diversions and treated water discharge, and the effect to streamflow from groundwater pumping that has a delayed and attenuated effect to surface water. The impact of the project is compared to the No Action alternative that applies the model to a no SGP scenario. Streamflow impacts are assessed as the percent change in simulated Refined

Modified Proposed Action (ModPRO2)⁴ streamflow from the No Action alternative (Figure 10). Negative values are streamflow depletions and positive values are simulated streamflows greater than No Action that result from discharge of treated water. In the 168 months simulated of the SGP construction and mining period, streamflow depletion averages about 10%, with the greatest depletion of about 42% that occurs in February of mine year 7. Streamflow depletions are simulated to be less than 20% in 142 out of 168 months. The gridlines in Figure 9 and Figure 10 correspond to the January of the year.

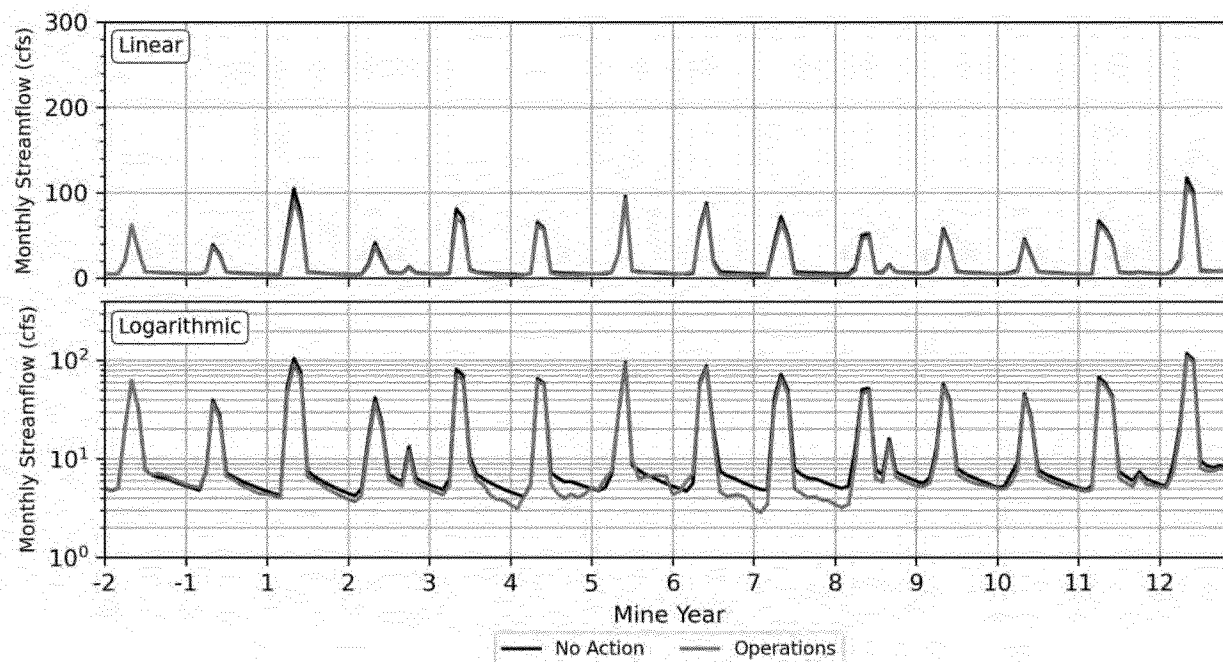


Figure 9. SHSM Simulation of Meadow Creek below the Lined Section

⁴ Labeled as Operations in Figure 9 and Figure 11

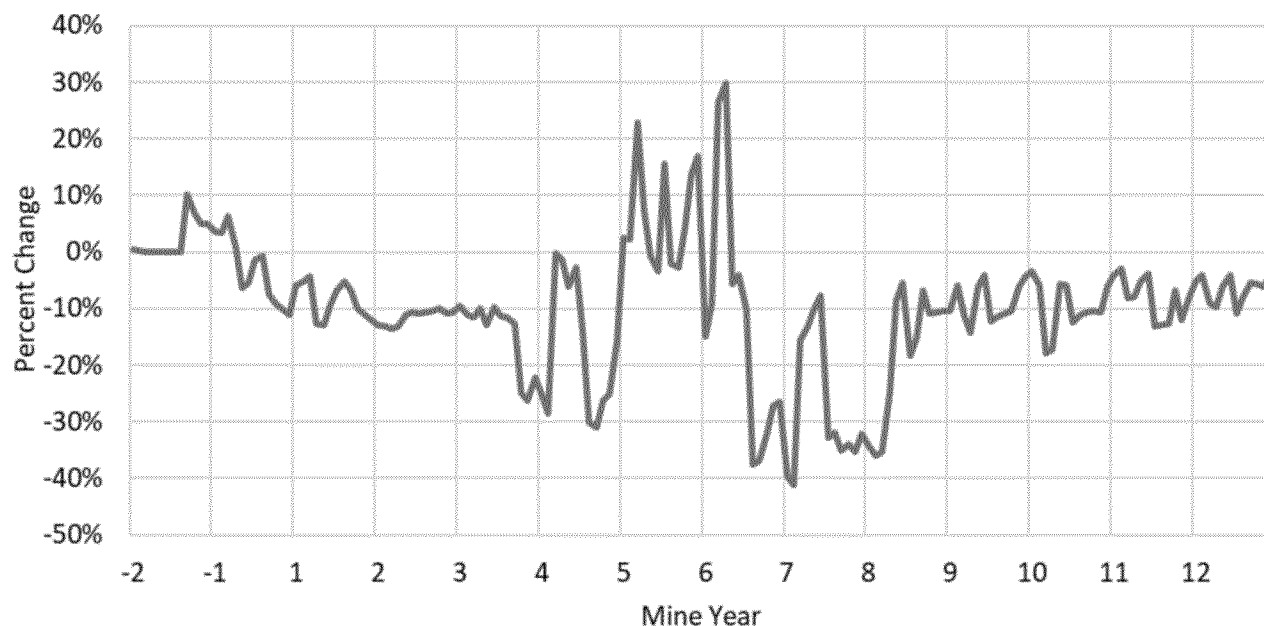


Figure 10. Percent Change in Streamflow at Meadow Creek below lined section based on SHSM Simulation

3.3.2 Streamflow Assessment at the EFSFSR Above Sugar Creek For the Maximum Allowable Diversion Rate and Anticipated Diversion Rate

Streamflow impacts are assessed at the EFSFSR above Sugar Creek using the SHSM and the maximum allowable diversion rate (9.6 cfs or 20% of EFSFSR below Sugar Creek flows when flows are below 25 cfs) and the expected diversion rate based on the SWWB modeling to demonstrate the range of potential impacts for low, average and high water years. The assessment of maximum allowable diversion rate was not possible for Meadow Creek because the maximum allowable diversion rate will not be fully sourced from the Meadow Creek valley and the stream and floodplain liner would not be represented. The streamflow impact evaluation below is assessed at USGS gage 13311250.

Figure 11 shows the monthly timeseries of the SHSM No Action and the ModPRO2 alternatives. Streamflow impacts result from the modeling of the expected diversion rate generated by the SWWB. Streamflow impacts during low flow periods are exaggerated because the low flow condition is not modeled in the SHSM. The SHSM simulations reinforce that sufficient flow (6.6 cfs) is expected to be maintained in the stream for the tunnel operation and to maintain the habitat function between the tunnel inlet and Sugar Creek for adult Chinook salmon, the species and life stage requiring the greatest water depth.

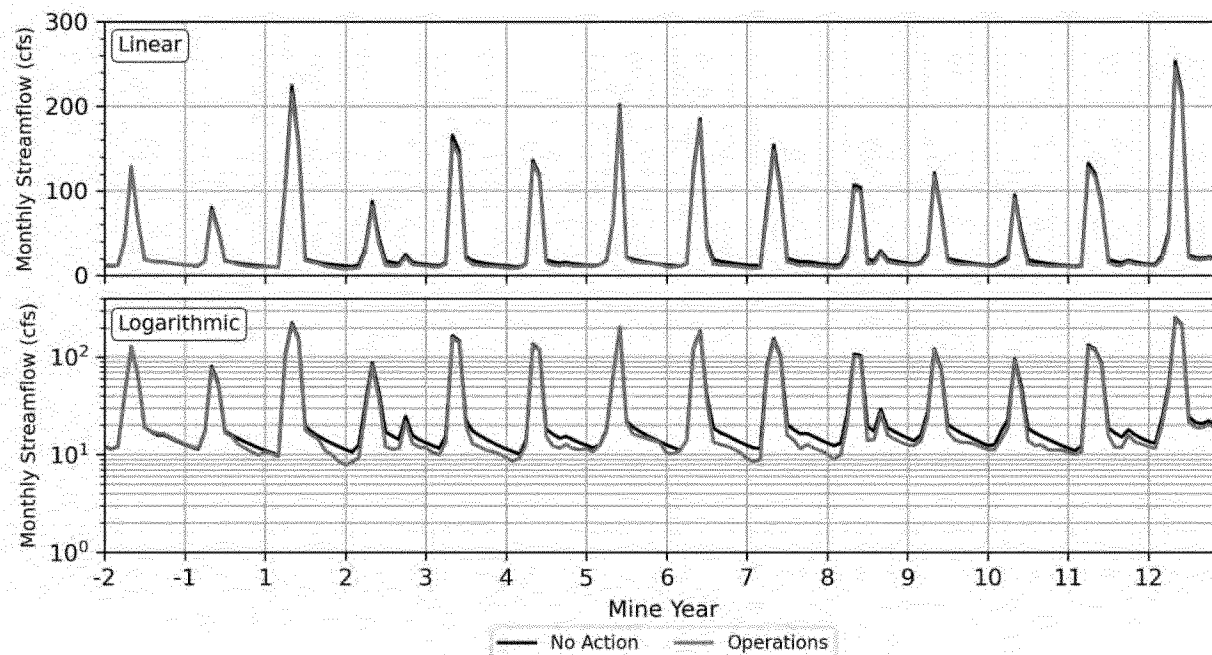


Figure 11. SHSM Simulation of EFSFSR at USGS Gage 13311250

Figure 12 shows percent change between the ModPRO2 streamflows compared to No Action with negative values being streamflow reductions resulting from the SGP. The greatest streamflow depletion is 30 percent and all minimums in the time series occur during low flow periods where diversions would be limited to 20 percent of the unimpaired flow of the EFSFSR below Sugar Creek. This condition is not represented in this data because modeling occurred prior to the agreement to the low flow condition but is considered in the evaluation of the range of potential impacts using observed streamflow data. Nonetheless, streamflow depletions greater than 20 percent are short duration events that are not continuous through the mining lifespan.

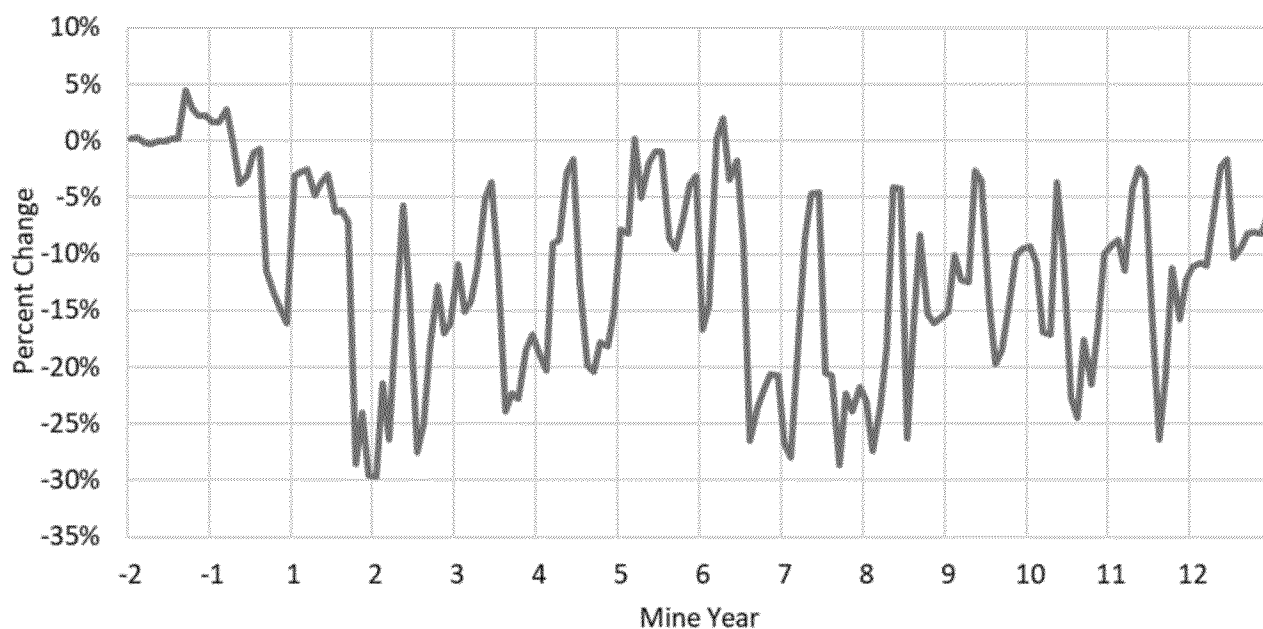
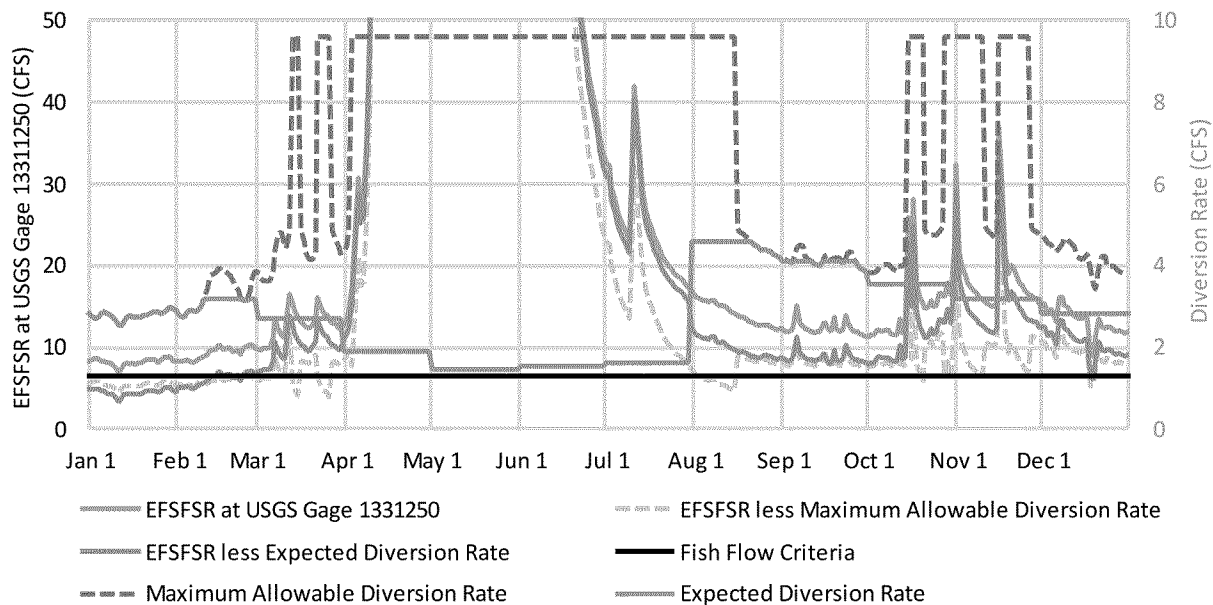
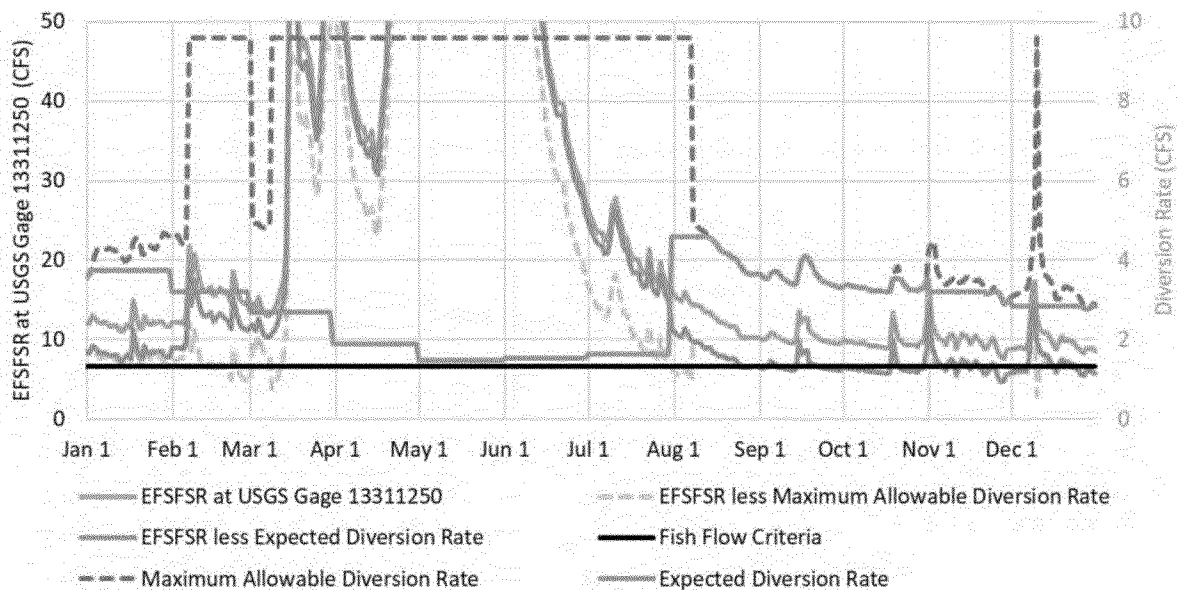


Figure 12. Percent Change in Streamflow based on SHSM Simulation

The range of streamflow impacts from water diversions for industrial use for the expected diversion rate and the maximum allowable diversion rate are assessed using a low water year (Figure 13), average water year (Figure 14) and a high water year (Figure 15). The maximum allowable diversion rate used here is 9.6 cfs or 20 percent of streamflow in the EFSFSR below Sugar Creek when streamflow is less than 25 cfs. The expected diversion rate is the monthly rate from the SWWB in a simulation of 2015. The maximum allowable diversion rate and the expected diversion rate are both plotted in orange on the secondary axis in Figure 13 through Figure 15. The expected diversion rate in the average and high water years is an overestimation of diversion demand because more contact will be available in these years that will reduce diversion demand from dewatering and freshwater sources. In times when the monthly expected rate was higher than the daily maximum allowable rate, the daily maximum allowable rate was used. The maximum allowable diversion rate and stream impacts associated with this rate are dotted. The solid black line is the fish flow criteria for the tunnel and EFSFSR reach between the tunnel outlet and Sugar Creek of 6.6 cfs to demonstrate minimum flows for adult Chinook salmon. Fish flow criteria is based on the flows required for fish passage for adult and juvenile Chinook salmon, steelhead, and bull trout for sufficient water depth and flow velocity in the tunnel downstream to the confluence of the EFSFSR and Sugar Creek (McMillen 2022, Rio 2023a, Rio 2023b). The primary y-axis is set to a maximum 100 cfs to better show the low flow period.



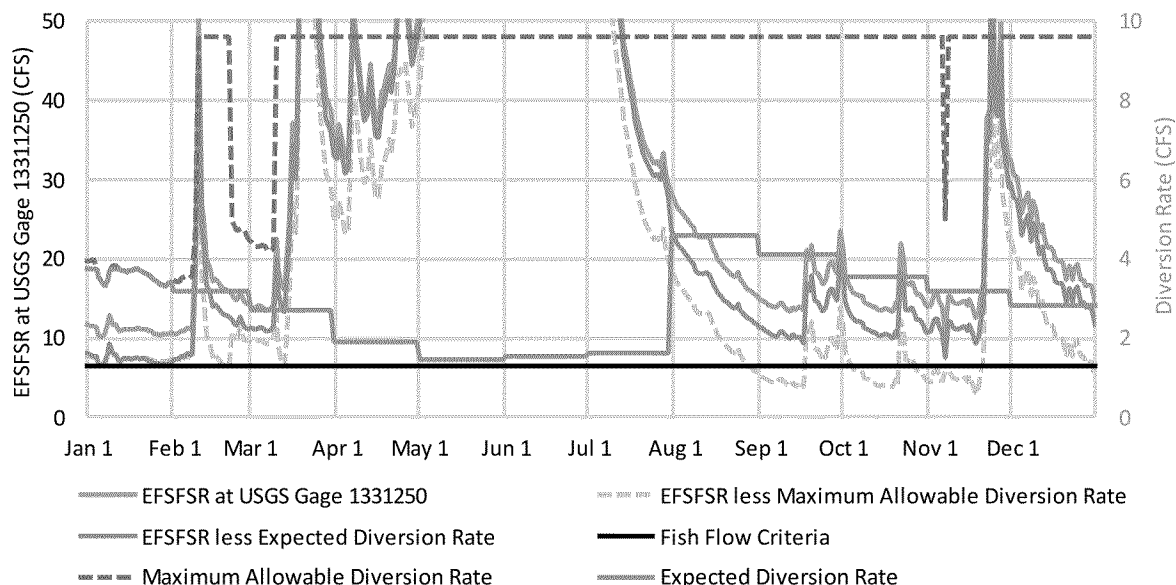


Figure 15. Range of Diversion Rates and Potential Streamflow Impacts in High Water Year

Figure 13 through Figure 15 demonstrate the difference between the monthly expected diversion rate and the maximum allowable diversion rate during periods with the EFSFSR below Sugar Creek flows greater than 25 cfs. The daily diversion rate will vary from the monthly rate in practice and the full diversion rate of 9.6 cfs is expected to be required for limited durations, however, diverting at this rate is not expected to be continuous. The maximum allowable diversion rate is expected to be needed frequently when EFSFSR below Sugar Creek flows are at or below 25 cfs. The NPT and SSFS assessments do not consider the expected diversion rate in their analyses and the range of potential impacts and therefore misrepresent the impacts to fisheries because of industrial water use.

Additionally, the figures demonstrate that streamflows are anticipated to be maintained above or very near too the 6.6 cfs rate that is demonstrated to be sufficient for fish passage in the hydraulic modeling of the tunnel and for fish habitat in the reach from the tunnel outlet to Sugar Creek (McMillen 2022, Rio 2023a, Rio 2022b). This flow rate provides sufficient depth and velocities for adult and juvenile Chinook salmon, steelhead and bull trout, and passage is expected to be feasible at lower flows. The NPT and SSFS assess impacts based on static low flow conditions, whereas actual flows are dynamic and will vary seasonally and interannually.

3.3.3 95 Percent Exceedance Flow Condition

The NPT impact assessment is based on the 95 percent exceedance flow that is a low flow condition that occurs only 5 percent of the time. The vast majority of flows exceed this value and therefore the NPT assessment overstates likely impacts. Additionally, the Meadow Creek 95 percent exceedance is calculated at the Meadow Creek near Stibnite gage that omits large flow contributions affecting the high quality reach of Meadow Creek. Actual flows in this reach are reported below. The underestimation of 95 percent exceedance flows in Meadow Creek and the use of the 95 percent exceedance flow to quantify impacts influence any of the NPT analyses and results.

An extended gage analysis was completed to develop 95 percent exceedance flows for specific stream reaches and fish species and life stages at three locations: EFSFSR below Sugar Creek, the EFSFSR above Sugar Creek (from proposed tunnel outlet to the confluence with Sugar Creek) and the Meadow Creek reach between the East Fork Meadow Creek confluence and the confluence with the EFSFSR (Figure 1. Rio ASE 2021, Rio ASE 2023d). These reaches are highlighted in pink in

Figure 1. USGS Gage 13311250 was used to estimate historic flows at EFSFSR upstream of Sugar Creek. USGS Gage 13311450 on Sugar Creek was used to estimate additional flows contributing to the discharge at EFSFSR below Sugar Creek and streamflow estimates were developed by adding the 95 percent exceedance flow from USGS Gage 13311450 to the 95 percent exceedance flow from USGS Gage 13311250. USGS Gages 13311000 and 13310800 (both on the EFSFSR) were used to estimate Meadow Creek streamflow by subtracting the 95 percent exceedance flow from USGS Gage 13310800 from the 95 percent exceedance flow from USGS Gage 13311000.

A direct comparison to the 95 percent exceedance flows presented in Kinzer and Ackerman (2023) is not applicable because their analysis calculated monthly exceedances whereas Rio ASE (2021) calculated exceedances for the period of use.

However, Kinzer and Ackerman (2023) incorrectly assume streamflow in the lower Meadow Creek spawning reach (downstream of the confluence with East Fork Meadow Creek) is equivalent to the 3-day rolling mean of daily averages at the Meadow Creek near Stibnite, ID gage (USGS Gage 13310850). This gage is located approximately 1.5 miles upstream of East Fork Meadow Creek and incorporates only 60 percent of the basin area (5.7 sq miles vs 9.3 sq miles) contributing to discharge in the spawning reach of lower Meadow Creek. This results in a significant under representation of the actual discharge in the lower Meadow Creek spawning reach. Accurate existing conditions hydrology calculations are provided for lower Meadow Creek and other pertinent stream reaches in Table 3. The under representation of streamflow and assessing a continuous 9.6 cfs withdrawal rate in the Meadow Creek valley result in exaggerated fisheries impacts in this reach.

Table 3. Calculated 95% Exceedance Discharge and Fish Periodicity for Fish Species and Life Stages

Species and Life Stage	Periodicity Timeframe	EFSFSR below Sugar Creek (cfs)	EFSFSR above Sugar Creek (cfs)	Lower Meadow Creek (cfs)
Chinook Adult Upstream Passage	June 30 – Sept 30	17.4	9.9	4.2
Steelhead Adult Upstream Passage	April 1 – May 31	17.9	9.8	3.0
Bull Trout Adult Upstream Passage	July 8 – Sept 30	17.4	9.9	4.2
Westslope Cutthroat Trout Adult Upstream Passage	Apr 15 – Jun 30	38.8	22.7	5.0
Juvenile Downstream Passage	Year-Round	14.2	8.5	3.3

Abbreviations:

EFSFSR = East Fork South Fork Salmon River

cfs = cubic feet per second

3.4 Overall Fisheries Benefit of the SGP

The proposed water withdrawals would not occur without the remainder of the project also occurring; therefore, it is inappropriate to evaluate only the impacts of the water withdrawals without also considering the impacts (positive and negative) of the entire project. When considering potential impacts to fish, Kinzer and Ackerman (2023) and Cochnauer (2023) incorrectly calculated the existing and proposed surface water hydrology leading to inaccurate conclusions regarding fish passage, productivity, and usable stream area. Their analyses also neglected incorporating any of the enhancement or restoration actions proposed by the Project, thereby compounding the error generally in a negative direction.

The proposed water rights withdrawals are a relatively small part of the much larger SGP as outlined in Supplemental Draft Environmental Impact Statement prepared by the U.S. Forest Service (USFS

2023). The SGP includes unavoidable stream and wetland impacts concentrated in an area characterized by large-scale legacy impacts from historical mining. These stream and wetland impacts (proposed and historical) would be restored as described in the *Stibnite Gold Compensatory Mitigation Plan* (Tetra Tech 2023) and *Stream Design Report* (Rio ASE 2021). Stream restoration objectives include restoring passage for fluvial and anadromous fish to the upper EFSFSR and Meadow Creek and improving habitat for aquatic species by restoring and/or enhancing stream and riparian habitat disturbed historically or by proposed mining or mine-related activities (Rio ASE 2021). The stream functional assessment predicted that the SGP would result in a short-term net deficit and a long-term net gain in total stream function relative to the existing condition based on 17 watershed condition indicators (Rio ASE 2021). Two off-site mitigation projects are proposed to offset this temporal loss in stream function (Tetra Tech 2023).

The Stibnite Gold Project Supplemental Draft EIS (SDEIS) predicts the Project would “substantially increase the amount of habitat volitionally available to Chinook salmon and steelhead” (USFS 2023). The Stream Functional Assessment (Rio ASE 2023) similarly predicts large-scale improvements to fish passage. These predictions are based on the proposed removal of an existing complete passage barrier at the Yellow Pine Pit cascade that blocks approximately 29.5 miles of perennial streams that would be otherwise assessable to migratory fish and restoration of partial barriers at the EFSFSR box culvert and the constructed riffle in lower Meadow Creek (Figure 1). Passage at the Yellow Pine pit cascade would first be achieved by a tunnel with a fishway (McMillen Jacobs 2018). The USFS SDEIS concluded that the proposed tunnel fishway “would provide passage for all four special status fish species...based on professional judgement and review of other similar or longer tunnels” (USFS 2023). Once decommissioned after 11 years, the tunnel would be replaced with a new stream and floodplain corridor over the backfilled Yellow Pine pit providing volitional passage for all future years (Rio ASE 2021). The EFSFSR box culvert would be replaced with a passable structure following the USFS Stream Simulation guidelines (USFS 2008), and the partial barrier in Meadow Creek would be removed as part of the lower Meadow Creek stream and floodplain restoration around the proposed Hangar Flats pit (Rio ASE 2021). These gains in fish passage accessibility would be partially offset by a new complete passage barrier because of the TSF buttress on Meadow Creek approximately 3,300 ft upstream of the East Fork Meadow Creek confluence (Rio ASE 2023a) blocking 8.2 miles of perennial stream. The SGP results in a net increase of 21.3 miles of accessibility to migratory fish, the majority of which consists of pristine stream habitat in the upper EFSFSR, upstream of the Meadow Creek confluence.

Water withdrawals would decrease flows in the EFSFSR upstream of Sugar Creek, which may have a small adverse effect on fish passage as quantified above, but proposed passage conditions would remain better than those measured on Sugar Creek, which is not considered a barrier to any of the species evaluated. This small adverse effect would likely be significantly overcome by the substantial increase to the amount of habitat afforded by the removal of barriers also associated with the Stibnite Gold Project, which is reflected in the USFS SDEIS (2023) and Rio ASE’s Stream Functional Assessment (2023a).

Kinzer and Ackerman (2023) suggest that water withdrawals would adversely affect fish passage in the EFSFSR above Sugar Creek. A detailed fish passage analysis was completed for this reach, concluding that proposed water withdrawals would marginally decrease the length of stream channel meeting NOAA fish passage guidelines (NMFS 2023) for adult Chinook salmon from 91% to 87%, adult steelhead from 98% to 95%, adult bull trout from 98% to 96%, and no change for westslope cutthroat trout or juvenile salmonids (Rio ASE 2023b).

A more conservative assessment that incorporated stricter guidelines not necessarily suitable for this reach of the EFSFSR found that the length of stream channel meeting these guidelines decreased for adult Chinook salmon from 59 percent to 46 percent, adult steelhead from 81 percent

to 70 percent, adult bull trout from 81 percent to 72 percent, and no change for westslope cutthroat trout or juvenile salmonids (Rio ASE 2023c). This same conservative analysis predicted only 34 percent, 65 percent, and 62 percent of the evaluated stream length in neighboring Sugar Creek currently meets these passage guidelines for adult Chinook, steelhead and bull trout respectively. Whereas this assessment found that some portions of the existing stream reaches (EFSFSR and Sugar Creek) do not meet these guidelines, no passage limitations have been previously documented in Sugar Creek, and all species identified above are known to pass these reaches, suggesting no new fish passage limitations will result from the SGP. Kinzer and Ackerman (2023) point to the EFSFSR results to support their conclusion that “Any decrease in flow in this reach will have adverse effects to fish passage, but to an unknown degree.” However, as demonstrated in the comparative assessment of Sugar Creek and the EFSFSR, fish passage function will still be supported.

The SGP proposes habitat enhancements and restoration of stream reaches disturbed by historical and proposed mining activities. Enhancements are focused in areas with legacy impacts that are not proposed to be directly impacted by the SGP including the EFSFSR from Meadow Creek downstream to Sugar Creek. Proposed enhancements are comprised of large woody debris (LWD), boulder clusters, and pools (Rio ASE 2021). Included in this area is the reach of the EFSFSR between the major point of surface water diversion and Sugar Creek which is classified as a step-pool morphology (Rio ASE 2021) and “generally lacks necessary habitat components to support quality fish habitat” (Kinzer and Ackerman 2023). Adding enhancements as proposed would improve habitat.

The SGP further proposes restoration of stream reaches that would be diverted around proposed mine features during operations then reestablished over or around the reclaimed mine features in a manner consistent with their natural/historical functions (Rio ASE 2021). Approximately 4,400 ft of lower Meadow Creek and all streams restored over backfill (EFSFSR over the Yellow Pine pit, Meadow Creek over the TSF and TSF Buttress, and unnamed streams over the Hangar Flats pit) would include a broad floodplain corridor, in-stream LWD structure, off-channel habitat, appropriate riparian revegetation, and incorporate a stream corridor liner buried below the maximum scour depth of the respective stream to a width encompassing the entire floodplain (Rio ASE 2021). Such a liner would allow the channel to evolve, moving vertically and laterally over time while preventing interactions with materials buried beneath. The stream corridor liner would also prevent undue surface water losses to the ground while still enabling shallow groundwater (hyporheic) exchange.

Planned stream restorations include:

- East Fork Meadow Creek will be restored prior to mining operations to address large unstable slope and incised meadow upstream⁵
- Lower Meadow Creek would be restored around the proposed Hangar Flats pit
- Following pit backfill, EFSFSR will be restored over the Yellow Pine pit with a new stream corridor
- The reach of Meadow Creek between East Fork Meadow Creek and the proposed TSF Buttress⁶ would be fully restored adding approximately 2,500 ft of spawning and rearing habitat that was previously blocked by a partial passage barrier
- Garnet Creek restoration will occur with the reclamation of the plant site
- Upper Meadow Creek restored over top of TSF during TSF reclamation and closure

⁵ East Fork Meadow Creek will not be directly impacted by the SGP

⁶ Reach is currently occupied by a rock-lined ditch around the existing Spent Ore Disposal Area

Section 4

Nez Perce Tribe Fisheries Expert Report Rebuttal – Fisheries Issues

The following comments on the Kinzer and Ackerman (2023) Expert Witness Report are organized according to the headings and/or paragraph numbers in that report. Only those sections for which we provide comments are included. Quotes taken directly from the Cochnauer (2023) Expert Witness Report are in “quotes and italics.”

1 Introduction

Section 1.2 Data Limitations Summary

The authors state that the data available is limited and therefore the authors used “...*non-local (e.g., regional) data, reviews of the scientific literature, and/or expert judgment.*” However, the authors failed to use certain valuable fish population and habitat data that are available for the Upper EFSFSR and relied on “*non-local*” data. The use of this “*non-local data*” requires that it be extrapolated or “*transferred*” to stream segments in the Upper EFSFSR. However, the authors do not address the validity of this data transfer and whether these “*non-local*” data are applicable. This is the case for the Weighted Usable Area (WUA) analysis (Section 2.1), ramping rates (Section 2.4) or the flow-productivity analysis (Section 2.6).

The assumptions used in the application of the “*non-local*” data to the Upper EFSFSR are not explained and the validity of the data transfer (i.e., using data from different stream systems for project-area streams) of these is also not addressed. The authors make the unstated assumption that the data is suitable and applicable to a different stream system and fish populations. Without providing the supporting information to address these issues, the veracity of the expert’s use of “*non-local*” data is questionable and speculative.

Importantly, the authors state that “*PRII provided a limited assessment of the effect of PRII’s water right applications on fish effects, focusing solely on fish passage through a 1,617 ft stream reach downstream of the proposed EFSFSR point of surface water diversion.*” However, this entirely ignores a number of assessments of these issues in reports submitted by PRII and cited in the SDEIS (USFS 2023), supporting analyses by Ecosystem Sciences (working for the USFS), and the SDEIS for the Stibnite Gold Project (SGP).

Finally, the authors state that “*We found evaluations could be improved through both hydraulic models at a greater number of flows (discharge) and stream reaches, and implementation of appropriate fish-habitat models, plus additional data on other factors important to fish (temperature, substrate, cover, etc.) under existing and proposed conditions.*” However, these “*evaluations*” are largely the same as the ones already completed for the SGP and reported in submittals by PRII and its consultants, Ecosystem Sciences, and in the SDEIS. However, these are analyzed differently than the other available analysis in these reported cited above, and the authors made no comparison of the results.

Section 1.3 Conclusions Summary

Almost the entire first paragraph of the Conclusions Summary is composed of assertions about salmonid populations in the entire Snake River basin and comes from literature. These are not conclusions supported further in the expert report and are therefore inappropriate and misleading. It is important to recognize the potential impacts of low flows in the two reaches of the Upper EFSFSR are very limited in their spatial extent of habitats and the number of fish, and are a very small percentage of the Snake River Basin. The authors imply that certain effects would affect salmon populations (e.g., flow productivity, flow-mediated habitat amounts) throughout in the Salmon River Basin but this is inaccurate; no information is presented by the authors to support impacts at the Salmon River Basin level. The authors fail to describe what the contribution of effects in the upper EFSFSR would be at the population level of the species analyzed. This is inappropriate and misleading. The authors do not establish whether baseline habitat conditions are limiting fish populations in the upper EFSFSR.

Finally, in this section, the authors, citing NOAA (2021), saying that "*any water reductions in any stream environmental generally has a negative effect on salmonids...*" is not supported. This is not stated in the NOAA letter and is therefore a misrepresentation. This should be corrected.

Section 2 Major Concerns

2.1 Fish Habitat Upstream of Surface Water Diversion Proposed Tunnel

2.1.1 Concerns

The authors state that "*During our review of PRII's water right applications and supporting technical documents, we found no evaluations of potential effects to aquatic species upstream of the EFSFSR surface water diversion, and are unaware of any data provided to the Nez Perce Tribe which quantifies effects to fish habitat.*" The Nez Perce Tribe has been involved with the SGP for years, including involvement in the meetings for ESA informal consultation during which these issues and associated studies were discussed; they are aware and have access to the DEIS and SDEIS and considerable supporting reports, modeling, and assessments that have been developed in support of the EIS. To say that the NPT or the authors found no such evaluations is disingenuous. To ignore these other analyses is inappropriate and not including them makes the expert report incomplete. This completely ignores the extensive evaluations completed by PRII, the USFS as reflected in the SDEIS, and other technical reports that are widely and publicly available.

The authors state that "*It is alarming that PRII ignored in its evaluations areas upstream of the EFSFSR surface water diversions with existing critical habitat for ESA-listed fish species.*" This statement is patently incorrect, as number of studies and assessments of fish and habitat are available in reports submitted by PRII, supporting analyses by Ecosystem Sciences (working for the USFS), and the SDEIS for the SGP (USFS 2023). These documents are too numerous to list here, but they are cited in the USFS Fish and Aquatic Technical Support Report (USFS 2022a) and in Appendix J of the SGP DEIS (USFS 2022b).

The authors state that "*In the absence of fish habitat data, we can alternatively assume that flow reductions in this reach of the EFSFSR have a linear relationship with overall fish habitat loss in the reach i.e., we can calculate potential loss of habitat as being equal to the proportion of surface water removed from the stream reach of interest. For example, removing 1 cfs from a stream with 10 cfs of discharge would result in an estimated 10% reduction of available habitat.*" This assumption of a linear relationship is unsupported by any data or citations by the authors and is counter to many flow-habitat relationships documented in the salmonid literature and contrary to the fundamentals of open-channel hydraulics. Flow-habitat relationships generated by studies in the

Salmon River Basin, including the upper EFSFSR have shown many different shapes of flow-habitat response for difference streams, salmonid species, and life stages (Maret et al 2005).

The authors state that *“Given the location and proposed amount of water that is possible for diversion under PRII’s proposed water rights, approximately all of Meadow Creek surface water could be removed with the exception of the spring months May and June. This would result in an assumed 100% loss of critical habitat for ESA-listed species.”* This statement is unsupported by any facts presented in the expert report. These statements build on something that the authors say *“is possible”*, they then connect it to something that *“would”* happen.

In Section 2.1, the authors present an analysis of habitat effects due to changing flows using habitat data (WUA) collected by the U.S. Forest Service in lower Sugar Creek developed with the Instream Flow Incremental Methodology. No source citation for this data is provided by the authors. Importantly, whenever data and analysis are developed in a different region or stream with certain habitat and fish population characteristics, and then applied to a different stream or region, a “transferability” assessment should be completed. The authors made no comparison of the source data (habitat and fish populations in Sugar Creek) and where the results were applied (EFSFSR) on the basis of habitat or salmonid populations to support the validity of the transfer. This renders unreliable the use of Sugar Creek data to represent impacts in the EFSFSR.

2.1.3 Conclusions and Recommended Conditions

The authors contend that *“PRII has not proposed water withdrawal limits impacted streams upstream of the EFSFSR surface water diversion.”* This is factually incorrect (see citations). Further, the authors state that *“Without withdrawal limits or established minimum stream flows for all reaches, PRII could divert almost all of the flow in Meadow Creek causing a complete loss of fish habitat.”* This is not what PRII proposes, as described earlier in this rebuttal, and so this assertion is entirely inaccurate.

2.2 Fish Habitat Downstream of Surface Water Diversion

2.2.1 Concerns

The authors state that *“Existing steelhead redds, created during higher stream flows, would be dewatered in early summer months, and the gravels necessary for Chinook salmon and bull trout spawning would be dry”* but they present no data or analysis to support this, and it is therefore speculative and misleading. Also, the authors fail to provide important context for interpreting their judgment of impacts. For example, under current (baseline) conditions, much of this reach has low or negligible Intrinsic Potential (IP) habitat for steelhead and Chinook (Ecosystem Sciences, 2019a) and few Chinook salmon redds were typically found in redd surveys in this area of the EFSFSR (USFS, 2023). Importantly, no adult spawning steelhead currently access or are present in most of this reach of the EFSFSR because steelhead and Chinook salmon are currently prevented from volitional access by the steep cascade just upstream of the Yellow Pine Pit Lake (USFS, 2023). All adult Chinook salmon found upstream of this passage barrier are currently present only because they are stocked (USFS, 2023).

2.2.2 Data Gaps and Recommended Analysis

In this section, the authors imply adverse effects in the EFSFSR using analyses from Scottish streams (Baxter 1961). The authors state that *“Baxter (1961) reported, ‘Salmon needed 30-50% of the average annual flow for passage through the lower and middle reaches in Scottish rivers and up to 70% for passage up headwater streams.’”* The authors then use this concept and introduce Table 3 showing 30%, 50%, and 70% exceedance flows for the EFSFSR upstream of Sugar Creek. The EFSFSR is not a Scottish river, the Scottish rivers are unlikely to have habitat, flow, and fish

populations comparable to the Upper EFSFSR. Therefore, the data in Table 3 are simply hydrologic statistics for the EFSFSR. These together make no supportable argument for any assessment of potential effects in the EFSFSR and support no particular conclusion about effects in the Upper EFSFSR.

2.3.3 Conclusions and Recommended Conditions

As described in Section 3 in the hydrology section of this Rebuttal, the authors have incorrectly analyzed the SGP's proposed changes to the baseline hydrology of the EFSFSR segments, therefore some of the assertions made in this section are based on incorrect flow data.

2.3 Point of Quantification

2.3.1 Concerns

It is expected that the EFSFSR above Sugar Creek will have depletion greater than 20 percent of streamflow when the maximum allowable diversion rate is diverted and streamflow at the EFSFSR below Sugar Creek is less than 25 cfs. The analysis leading to the conclusion of a 55 percent flow reduction is problematic because a daily flow rate is compared to a monthly exceedance flow and the monthly exceedance flow is based on a rare condition that exaggerates expected impacts. Section 3 presents a more factual and balanced assessment of potential streamflow impacts based on the expected diversion rate and maximum allowable diversion rate.

Section 2.3.2 Conclusions and Recommended Conditions

Water right diversions will be monitored, and multiple existing and new gaging stations will be in operations during the mining operations.

2.3.3 Conclusions and Recommended Conditions

The conclusion of greater than 30 percent flow depletion in the EFSFSR above Sugar Creek is based on the maximum allowable diversion rate. This is a biased approach to assess streamflow impacts and doesn't account for the expected diversion rate or the range of potential impacts. Fish passage and habitat effects of the entire project, for which water diversions are one part, are detailed in Section 3.4 and are anticipated to improve overall condition for fisheries because of the project.

2.4 Ramping Rates

The authors raise the concern that PRII has not proposed ramping rates for changing flows during low flows in the EFSFSR. The author's concerns are largely based on literature (Nagroski et al. 2012), which summarize studies largely based on flow fluctuations at hydroelectric facilities, generally in river systems much larger than the Upper EFSFSR, and that have much larger and more abrupt flow changes. The other studies from (Nagroski et al. (2012) were for situations very different than the Upper EFSFSR and not comparable to the project and the proposed operations⁷.

Flow changes at hydroelectric facilities can be and are often of much greater frequency and magnitude than would occur under the proposed conditions at the SGP. The flow changes that would occur as a result of changes between groundwater withdrawal and withdrawals at the intake at the upstream end of the tunnel would be small proportions of streamflow and would take time to propagate downstream resulting in further dampening of the flow change. The authors' use of literature ramping rate issues at hydroelectric projects to suggest ramping rate effects in the EFSFSR

⁷ Of the cases summarized by Nagroski et al., (2012), the cases that were not from hydroelectric facilities were for water level management in the St. Lawrence river for northern pike (Mingelbier et al., 2008), sudden changes in irrigation operations (Kroger, 1973), water diversion (Becker et al., 1986), stranding in large river floodplains (Jones and Stuart, 2008) and vessel-induced drawdowns (Pearson and Skalski, 2011).

is a false equivalency and does not support the author's contention that such effects would occur in the EFSFSR under SGP operations.

2.5 Water Temperatures

2.5.1 Concerns

Kinzer and Ackerman (2023) assert that the proposed low flow condition does not address situations where stream temperatures are elevated during summer periods or decreased during winter periods. Presumably, the connection between stream temperature and Perpetua Resources water right application is surface water depletions caused by water withdrawal. This stream temperature condition would be most pronounced during low flow periods and the proposed low flow water right condition explicitly limits water withdrawal during low flow periods that extend from the summer and through the winter months, effectively refuting the assertion.

2.5.2 Data Gaps and Recommended Analysis

Kinzer and Ackerman (2023) suggest that “PRII’s 2022 Proposed Conditions did not provide conditions for when water withdrawals influence stream temperatures or when temperatures approach sub-optimal, sublethal, or acute temperature thresholds for salmonids.” Presumably, such a condition would be to limit diversion rate, a condition that is proposed and affects the time periods in question. Limiting water right withdrawals at the SGP will be largely ineffectual to address stream temperature within the project site because the surface water diversion is at the downgradient end of the site, limiting affected stream length; streamflow effects of groundwater pumping are lagged and attenuated in any case.

The authors also recommend an analysis to assess potential risks or impacts to salmonids under proposed conditions. This evaluation has occurred and is documented in the Stream and Pit Lake Network Model Refined Modified Proposed Action (ModPRO2) Report (BC 2021c) and the SDEIS (USFS 2023). Summary of stream temperature impacts of the SGP during operations and into early reclamation is stated in the Stream and Pit Lake Network Model Refined Modified Proposed Action (ModPRO2) Report as: “The SGP results in water temperatures that are the same as, or up to 2°C cooler than, the No Action scenario for the diversion channels and streams from the headwaters of Meadow Creek to the confluence with EFSFSR. These mine years include buried pipes to convey low flows around the TSF (BC 2021c).”

2.6 Fish-Flow Productivity Relationships

The authors begin this section with the statement that “*The amount of water in a stream environment has a direct relationship with fish population productivity.*” This statement is weakly supported and false. Flow-productivity relationships are rarely if ever “direct” and are often confounded by complex relationships between habitat conditions, population levels, competitive relationships, density dependent mortality, water quality, temperature, and other factors. This is described well by Rosenfeld (2017).

“The shape of flow–ecology relationships is critical for determining the biological consequences of water withdrawal or flow regulation. Of particular importance are the slope (positive or negative), intercept, the presence of nonlinearity and location of any threshold for nonlinear relationships (Figure 1; Bennett & Radford, 2009; Bestelmeyer et al., 2011; Rosenfeld & Ptolemy, 2017). Reviews (e.g. Lloyd et al., 2004; Poff & Zimmerman, 2010; Kovach et al. 2016) have observed both positive and negative biological responses to flow alteration (i.e. varying slopes), depending on the ecological attribute and environmental context (Davies et al., 2014; Walters, 2016).” (Note that full citations for these are provided in the Kinzer and Ackerman (2023) report.

The author's description of their analysis is very unclear. They cite Morrow's (2018) relationships for Chinook salmon productivity in Johnson Creek, but then characterize the analysis as theirs (e.g., "*We found juvenile productivity for Chinook salmon in Johnson Creek was significantly (p -value = 0.04) correlated with average flows in September.*"). Therefore, it is unclear if these results are those of Morrow (2018) or a separate analysis by the authors, so we cannot definitively use our review of Morrow (2018) to review the authors' assertions.

Regardless though, the authors rely on an important assumption that "*Our analysis assumes a similar flow to Chinook salmon juvenile productivity relationship in the headwaters of the EFSFSR as in Johnson Creek.*" We believe that this assumption is questionable and the authors have not provided the necessary supporting analysis to justify applying Johnson Creek flow-productivity analyses to the Upper EFSFSR in the manner outlined. The authors actually point this out, saying that "*This assumption may be invalid due to Johnson Creek having much larger flow conditions and different fish densities and habitat quality.*" This is not strong support for relying on the Johnson Creek analysis to the Upper EFSFSR.

As described by Rosenfield (2017), empirical flow-ecology relationships like the ones developed in Johnson Creek can be simple and definitive, but their predictions may not transfer well beyond their local hydrologic and geomorphic context. Johnson Creek is different than the EFSFSR upstream of Sugar Creek; has a larger Chinook salmon population size, and its watershed is considerably different in size and basin shape and has different habitat assemblages. Johnson Creek has much more extensive spawning areas and extensive areas of high-quality spawning habitat, that are unlike the upper EFSFSR. As illustrated by Arthaud et al. (2010) for the Lemhi River and Marsh Creek, Idaho, the flow-productivity relationships can vary considerably among streams in the same basin.

Finally, the authors conclude that "Any reduction to early rearing productivity for these fish may push the EFSFSR population closer towards the quasi-extinction threshold." The authors have not completed the necessary population analysis to support this contention. The key words "any" and "may" make this statement dubious.

Section 5

Save the South Fork Salmon Fisheries Expert Report Rebuttal – Fisheries Issues

The following comments on the Cochnauer (2023) Expert Witness Report are organized according to the headings and/or paragraph numbers in that report. Only those sections for which we provide comments are included. Quotes taken directly from the Cochnauer (2023) Expert Witness Report are in “quotes and italics”.

INSTREAM FLOW INCREMENTAL METHOD ANALYSIS

The author states that “*11. Instream Flow Incremental Method (IFIM) was used to provide an assessment of instream flows for select fish species within the East Fork South Fork Salmon River (EFSFSR) both downstream and upstream from its confluence with Sugar Creek.*” A clarification here is important. Only the Physical Habitat Simulation (PHABSIM) analysis was used, not IFIM.

In item 12. The authors describe a “*...Payette National Forest IFIM study conducted in Sugar Creek for the Snake River Adjudication...*” but fail to provide an actual traceable citation for the study. Therefore, we do not have and cannot access that information and therefore do not have the benefit reviewing the actual report containing the methods, results, and interpretations by the original authors of the study cited. This is a significant omission and made it difficult to fully review the author’s analysis and conclusions.

WATER WITHDRAWAL AMOUNTS

“*23. Perpetua Resources has filed applications with the Idaho Department of Water Resources for four transfers of existing water rights and five new water rights. The total of these applications within the upper EFSFSR Basin is 11.14 cfs.*” This figure is incorrect, as described earlier in this rebuttal report.

The author states that “*17. For this analysis, there are two stream sections of the EFSFSR of interest above and below Sugar Creek. There was no IFIM analysis work done on either of the two sections of EFSFSR, consequently it was necessary to extrapolate the Sugar Creek IFIM data to the two sections of interest in the EFSFSR.*” The “extrapolation” completed by Cochnauer was essentially using one stream's flow-habitat relationships as a surrogate for another stream for which these relationships have not been quantified. The validity of using data from one stream to another is predicated on the assumption that WUA-flow relationship from Sugar Creek is being correctly applied to the EFSFSR above Sugar Creek. This means that the two sites should be similar in size, gradient, hydrology and hydraulics, substrate composition, and generally similar habitat conditions. Cochnauer (2023) makes no such comparison and does not provide the necessary data to allow the reader to make such a comparison. Notably, Ecosystem Sciences (2019b), using the same data, stated that “*The PHABSIM data are approximately 30 years old and originated from another project, they represent*

available data that provide reference information and should not be viewed as directly transferable to the project site.” We agree with this statement.

Importantly, whenever data and analysis are developed in a different region or stream with certain habitat and fish population characteristics, and then applied to a stream with a different stream or region, a “transferability” assessment should be completed⁸. The authors made no comparison of the source data (habitat and fish populations in Sugar Creek) and where the results were applied (EFSFSR) on the basis of habitat or salmonid populations to support the validity of the transfer. Therefore, as Cochnauer (2023) has not demonstrated the validity of the “*extrapolation*” and so the use of the Sugar Creek data applied to the EFSFSR is in question.

Water Withdrawal Amounts

In this section of the Cochnauer report, in Paragraphs 23-25, the amount of water to be withdrawn by PRL is outlined. Earlier in this document we outlined and errors in assumptions made by Cochnauer regarding hydrology and withdrawals, as so this must be considered as a validity issue throughout the interpretation of this section.

Interpretation of Effects Analysis Based on WUA

Cochnauer (2023) presents the effects of water withdrawals as percentage change in WUA but does not discuss or indicate the actual amount of reduction in WUA or the amount of area needed by any of the life stages of the salmonids considered based on the population density of those species. Note that WUA is the actual amount of habitat (square feet per 1,000 feet of stream) in the stream. So, when Cochnauer makes statements like “...*Available spring spawning steelhead habitat was substantially reduced...*” this is based only on habitat available, not the amount of that habitat needed by the species and life stage. So, the effects outlined by Cochnauer (2023) are relative impacts only, and any judgement about whether this is substantial or not is speculative. While the water withdrawals may result in reductions on WUA, no evidence is provided by Cochnauer to judge what the effects would be and whether such a reduction is meaningful to the species based on the population density of that species and life stage. Without such essential information, all statements made about what effects are important or not important are purely judgment calls. Cochnauer does not make this clear.

For example, Paragraph 30. Summary, states “*Designated critical habitat for spring spawning steelhead, fall spawning Bull Trout, and spring/summer spawning Chinook Salmon was substantially reduced by water withdrawals from the EFSFSR downstream from Sugar Creek.*” Cochnauer (2023) has assumed that this is a “*substantial reduction*” but has provided no basis for that judgement. Additionally, the statement that “*Designated critical habitat...*” was reduced is patently incorrect. WUA is not equal to designated critical habitat. “Critical habitat” is the specific areas within the geographic area, occupied by the species at the time it was listed, that contain the physical or biological features that are essential to the conservation of endangered and threatened species and that may need special management or protection (United States Fish and Wildlife Service 2017).

Also, at Paragraph 30. Summary, the statement is made that “*It is important to emphasize that, for ESA listed species as risk of extinction, even a relatively small percent reduction in critical habitat can have a disproportionately large, negative effect on a small fish population.*” Cochnauer presented no population analysis and did not even state what the contribution of the EFSFSR population of any of the species was relative to the “population” that Cochnauer was referencing. Because Cochnauer presented no population analysis, and because no literature citation or details

⁸ Transferability is established by providing readers with evidence that the research study’s findings could be applicable to other contexts, situations, times, and populations.

were provided in support of this statement, it has little meaning. Also, based on the definition of critical habitat, no change in critical habitat would occur, only a temporary change in habitat availability.

Referencing “33. *Summary: Designated Critical Habitat for spring spawning steelhead, fall spawning Bull Trout, and spring/summer spawning Chinook Salmon will be substantially reduced by water withdrawals from the EFSFSR upstream from Sugar Creek,*” as described above, Cochnauer does not explain the basis for the assumption that these reductions are substantial, and make a false equivalency between WUA and designated critical habitat.

CONCLUSIONS

Regarding “34. *Under several of the scenarios I analyzed, withdrawal of 11.14 cfs completely dewatered the stream with a complete loss of fish habitat.*” As described in Section 3 above, the withdrawal rates used by Cochnauer were, for some comparisons, incorrectly represented.

Cochnauer states in Paragraph 34 that “*It is important to re-emphasize that, for ESA listed species as risk of extinction, even a relatively small percent reduction in Critical Habitat can have a disproportionately large, negative effect on a small fish population particularly during the warmer low flow months (July-October).*” No basis for this statement is provided and no literature is cited to support it.

Finally, Paragraphs 35 and 36 raise concerns about a “pipeline” and about potential impacts to upstream-migrating fish. These two items are completely unrelated to and not supported by the preceding analysis and have nothing to do with PHABSIM, WUA, or IFIM. As unsupported statements unrelated to the analysis and objectives of this report, they should not be considered as part of this report or should be omitted.

Section 6

Summary

This rebuttal to the NPT and SSFS fisheries expert reports demonstrates the flawed assumptions and assessment of impacts to hydrology and effects on fisheries resources from the diversion rate sought in the Perpetua Resources water right application. An incorrect portrayal of the system hydrology, the expected water demand, the locations and magnitude of diversions throughout the project and the water right application underscore their fisheries assessment. The inaccurate and worse-case scenario hydrology assessment then carries into the fisheries assessment that is consequently overstated in duration, frequency and magnitude.

Contrary to the arguments made in the NPT and SSFS expert reports, and evident in the documentation provided in Perpetua Resources water right application and in discovery, large magnitude streamflow depletions (maximum 40 percent in Meadow Creek and 30 percent in the EFSFSR based on the SHSM) would be rare and short lived with modest streamflow impacts of less than 20 percent for the majority of the active mining and milling period (14.25 years), and at times, more water is in the system at Meadow Creek resulting from SGP water management. Streamflow impacts assessed by the SHSM do not recognize the low flow water right condition and are therefore simulated to be greater during low flow periods. The claim of the NPT that the SGP will completely dewater Meadow Creek is false and does not consider available project documentation.

Even in light of the lack of recognition by the NPT and SSFS of the full body of evidence available to assess fisheries impacts, their assessment overstates streamflow and fisheries impacts because the maximum allowable diversion rate is applied to the entire project area at all times with streamflows assessed at the 95 percent exceedance flow. The 95 percent exceedance flow is an exceedingly rare flow, the maximum allowable diversion rate will not be withdrawn at all times and not in all stream reaches of the SGP. Compounding this error is the assessment of the Meadow Creek 95 percent exceedance at the USGS gage 13310850. This gage is approximately 1.5 miles upstream of the East Fork Meadow Creek and therefore underrepresents flow where the PODs are located. A more representative flow value, even at these very rare low flows, is the Meadow Creek value presented in this rebuttal because it pertains to the habitat rich reach of Meadow Creek downstream of East Fork Meadow Creek.

Aside from the incorrect representation of hydrology and the SGP's impact to streamflow, a clear omission in their expert reports is the neglect of habitat improvements, water management and SGP design features. The SGP results in largely improved fisheries in habitat quality and accessibility, water conservation practices result in lower makeup water diversion demand through time with the prioritization of reclaim water and mine-impacted water, and reduced streamflow impacts from necessary water diversions (i.e. groundwater diversions won't have a 1:1 impact on streams and streamliners limit flow depletion resulting from groundwater pumping). Instead, hydrologic and fisheries impacts as assessed in isolation as if these beneficial project components are nonexistent.

Specific to fisheries, the NPT and SSFS assessment assert impacts that are largely unsubstantiated and based on invalid assumptions, in addition to basing assessment on unrealistic streamflow impacts. Similar to hydrologic assessments, there is a substantial body of evidence that has been generated by Perpetua Resources, the USFS and their contractors that is ignored and claims of the NPT and SSFS directly conflict with these extensive studies in some cases. Inappropriate application of fisheries impacts are applied to the EFSFSR and Meadow Creek without evidence or justification

of the applicability. Two blatant instances are the extrapolation of flow-productivity and flow-habitat relationships from Johnson Creek and Sugar Creek to the EFSFSR above Sugar Creek and the use of a Scottish stream to imply impacts in the EFSFSR.

Further, the NPT and SSFS make claims in their respective expert reports that are unsubstantiated. Therefore, while strong statements are made of the detrimental effect to fisheries, these statements, and the assumptions used to come to their conclusions, are unsupported by either their analysis or relevant scientific literature. This is evident in the assumption of a linear relationship between flow reduction and overall fish habitat loss that may not be valid or appropriate and no justification for validity is discussed.

The NPT and SSFS expert reports assert an incorrect situation for fisheries that overstates anticipated streamflow and fisheries impacts. The claims made are not supported by, and in some instances, in conflict with, the documentation provided to these groups during the water right process and publicly available through EIS permitting. An inaccurate future condition is described that is based on a worst-case scenario affecting all stream reaches at all times during the life of the SGP. Impacts to fisheries presented by the NPT and SSFS are inappropriate because non-applicable data is extrapolated to the SGP and faulty claims are generated without scientific support or justified assumptions.

Section 7

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