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U.S. Forest Service, Payette National Forest
Attn: Linda Jackson, Payette Forest Supervisor
500 North Mission Street
McCall, ID 83638

Subject: Comments on the Stibnite Gold Project Draft Environmental Impact Statement: Fish Resources and Fish Habitat

Dear Ms. Jackson,

Midas Gold Idaho, Inc. (Midas Gold) appreciates the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS). Clearly, the document represents a substantial effort by many individuals to compile and convey a very large volume of information and analysis regarding the Midas Gold proposed Stibnite Gold Project (SGP). The synthesis of hundreds of documents developed from a much greater multitude of data values, statistical analyses, and modeling projections into a single draft product is a noteworthy accomplishment, and Midas Gold is pleased to have been a stakeholder in its development.

In its comments, Midas Gold wishes to respectfully offer its perspective and insight to assist in clarifying and improving content for the Final Environmental Impact Statement (FEIS). This letter offers comments on the portions of the DEIS devoted to Fish Resources and Fish Habitat in the Affected Environment (Section 3.12) and the potential Environmental Consequences (Section 4.12 and the closely related Appendix J). Our comments are summarized below, and for your convenience, comments have been provided in a tabulated format (included as Attachment A) that references each appropriate subsection heading, page number, and paragraph.

1.0 Summary and General Comments

The following sections summarize our leading comments in six technical areas:

- Improving the Characterization of Adverse and Beneficial Effects Fully Considering Midas Gold's Mitigation Plans
- Stream Lengths, Barriers, Habitat Availability, and Habitat Accessibility and Connectivity to Fish
- Use and Interpretation of Intrinsic Potential (IP) Habitat and Occupancy Modeling (OM) Results
- Use of Temperature Criteria and the Presentation of Stream Temperature Modeling and Evaluation Results Interpretation of Flow Productivity Analysis and Results
- Assessment of the Effects of Sediment and Turbidity

A primary leading comment that Midas Gold has for the DEIS generally, and for Section 4.12 specifically, is that the DEIS generally focuses on the adverse effects of the proposed SGP without accurate integration and recognition of the offsetting beneficial effects of Midas Gold's Stibnite Gold Mitigation Plan (SGMP) and its component plans; the Conceptual Stream and Wetland Mitigation Plan (CMP), the Fisheries and Aquatic Resources Mitigation Plan (FMP), the Fishway Operations and Management Plan (FOMP), and the Wildlife Habitat Mitigation Plan (WHMP). These documents outline the proposed restoration of stream, floodplains and wetland habitats, improved habitat access and connectivity during and after mining, restoration of volitional migratory access for salmonids to the historically blocked upper East Fork of the South Fork of the Salmon River (EFSFSR), restoration and sediment reduction in Blowout Creek, restoration of portions of Meadow Creek, and in some areas the long-term net benefit to salmonids and the increases of habitat connectivity of the upper EFSFSR to the rest of the EFSFSR and South Fork Salmon River.

Fish passage barriers immediately upstream of the Yellow Pine pit lake and at the Box Culvert have been listed as impairing habitat access in the upper EFSFSR and have long been on the management priorities for the United States Forest Service (USFS) for Management Area 13 Big Creek/Stibnite (Payette National Forest [PNF] 2003). Removing these barriers will reconnect the upper EFSFSR and will provide the associated benefits of long-term access to critical habitats of bull trout, Chinook salmon and important steelhead to salmonid movements and migrations. The FEIS should explicitly recognize that the SGP would help achieve these agency priority management actions.

2.0 Improving the Characterization of Adverse and Beneficial Effects Fully Considering Midas Gold's Mitigation Plans

The characterization of the project's proposed impacts in the FEIS should provide a more representative description of the effects of the proposed action including a more balanced and complete characterization of the adverse and beneficial net benefits of the project, explicitly including all of the elements of Midas Gold's SGMP and its component plans (listed above). More focus should be provided on the proposed benefits of the project that are achieved during and after mining through stream channel and floodplain restoration in Meadow Creek, Fiddle Creek, Hennessey Creek, Midnight Creek, and the EFSFSR. There is little discussion of one of the primary restoration benefits derived from restoring the EFSFSR over the Yellow Pine pit backfill to achieve permanent fish passage. Midas Gold has provided extensive information and descriptions of the stream, floodplain, and riparian wetland restoration that are provided in the DEIS Appendix D (Midas Gold's CMP); this information should be more effectively summarized and included in the analysis.

Specifically missing from the from the DEIS and Section 4.12 is clear communication that under the Clean Water Act Section 404, and consistent with the 2008 Mitigation Rule, Midas Gold must replace the functions and values of the Waters of the United States (streams and wetlands jurisdictional to the United States Army Corps of Engineers [USACE]) that it impacts using a watershed approach. Section 4.12 should express this fully and describe the requirements of the 2008 Mitigation Rule. The FEIS should also better describe the compensatory mitigation proposed in Midas Gold's CMP and make clear to the reader that stream and wetlands and their functional values would be restored in a manner consistent with the Clean

Water Act and USACE requirements and guidelines. The benefits of the SGP on streams and riparian conditions during mining and post mining should be readily discernible.

The DEIS describes streams as being “removed” or “lost” to be replaced with diversions, but then does not characterize or account for the proposed restoration. Instead the DEIS characterizes the to-be-restored streams as “constructed channels” with no explanation of the floodplain-stream-riparian stream designs or proposed restored conditions. For example, the discussion should reflect that the proposed restored floodplain would provide riparian habitat and space for channel evolution in the future. Midas Gold has provided the USFS with qualitative tools to illustrate the improvement of stream and stream corridor habitats through restoration, and the EIS reader’s understanding would be considerably improved by the inclusion of that information.

A notable analysis tool that is available and would demonstrate the improvement of fish, stream and stream corridor habitats through restoration is the Stream Functional Assessment (SFA; Rio Applied Science and Engineering [Rio] 2019b). The SFA was developed in consultation with the USFS, the USACE, and other state and federal agencies during project meetings occurring the period of 2017 through 2020. The SFA and the SFA Ledger document the loss and gain of stream lengths and their functional values over time, ultimately showing the net benefit. These are applicable qualitative data that should be included or better referenced and reflected in the FEIS. Using the SFA and incorporating 17 watershed condition indicators (WCI) elements is a much more robust and objective method of estimating habitat quality and then integrating habitat quantity. Including results from the SFA and all available WCI data would provide a much more complete reporting of existing and proposed effects on fish and aquatic resources. Integrating habitat quantity and quality results in an objective and repeatable manner would also lend more credence to the effects analysis.

Midas Gold believes that the FEIS can be improved by using the SFA results to show the adverse and beneficial stream impacts at the sequential steps of the project and the resulting changes in stream impacts and restoration so that the reader can understand the actual proposed changes to streams and floodplains over the life of the project.

3.0 Stream Lengths, Barriers, Habitat Availability, and Habitat Accessibility and Connectivity to Fish

In DEIS Section 4.12, the quantification of stream habitat length was estimated by the use of models (i.e., IP and OM) to estimate potential available habitat for bull trout, westslope cutthroat trout, Chinook salmon, and steelhead. However, the section has a lack of clarity due to confusing terminology and would benefit from a more discrete characterization of available versus accessible habitats. The clarity of Section 4.12 would be considerably improved and made more accurate and understandable to the reader by clearly defining terminology, telling the story of changing amount, potential, and actual quality of stream and floodplain habitats over the duration of the project caused by mining impacts, reflecting the restoration and improvement of floodplain and stream habitats resulting from the proposed CMP, showing the changes over time and net change achieved post mining, and representing the importance of watershed and stream habitat connectivity which is so critical to the maintenance and recovery of salmonids (Roni et. al. 2008; 2014). This will require bringing together the concepts of habitat accessibility, habitat amount (stream channel length), habitat quality, and habitat potential and applying them appropriately and consistently.

The terms habitat availability and accessibility should also be clarified as the terms available and accessible can be easily confused (Hall et. al. 1997; Johnson 1980). Their definitions should be made clear in the text and perhaps only one of the terms should be used for clarity. For example, not all stream space that is "present" is "accessible" all of the time to all individuals due to barriers to movement, so availability is in fact determined by limitations in animal preferences and mobility (fish ability to migrate to the habitat/fish passage). It reflects the amount of habitat effectively available to an organism based on size and configuration of habitat patches and the organism's ability to reach them. The DEIS confuses these terms and uses the term habitat "availability" in way that means either "present" and "accessible" or both; this should be rectified. Generally, Section 4.12 uses the terms "suitable habitat", "available habitat", "useable habitat", "important fish habitat", and "potential habitat". These terms should be defined and used consistently as well, to improve clarity.

Similar treatment should be given to terminology definitions for "total stream habitat", habitat "potential", and habitat quality – terms that are quite different and which can be estimated independently of accessibility. We recommend that total stream habitat for the fish analysis be defined as length of stream with sufficient size and flow and suitable gradients to support fish (fish supporting streams). The IP and occupancy probability from OM should be clearly defined as representing the potential for habitat and the species to occur, not as the actual occurrence or quality of the habitat (see section below; Use and Interpretation of Intrinsic Potential Habitat and Occupancy Modeling Results).

With the terminology clearly defined, Section 4.12 can then use an approach that presents habitat types and accessibility over time (tables and figures) and clearly relates the changes to key events happening in the mine development (i.e., stream diversions, stream enhancements during mining, etc.) . This approach will enhance Section 4.12 to clearly show how fish habitats and their accessibility changes over time as caused by mining impacts and proposed floodplain and stream restoration.

The approach outlined above will clearly show, for example, that habitats upstream of the barrier at the Yellow Pine pit are currently occupied only by resident bull trout and are not accessible to riverine-migratory forms, and that the project will increase access by riverine-migratory life forms of bull trout to habitats upstream, during and after mining. The amount of habitat that migratory bull trout would then be able to access would increase, and that can be directly estimated by the amount of Endangered Species Act designated critical habitat that becomes accessible and amounts of potential habitat (IP and OM) accessible. Certain habitats suitable for resident and migratory-riverine bull trout would also be permanently lost or inaccessible when the tailings storage facility/development rock storage facility are constructed.

Once this story is presented, the effects should be represented and interpreted as well. There is a large body of literature that demonstrates positive effects of removing barriers to migration to salmonids which is not mentioned or included in the DEIS consideration of benefits, and this omission should be rectified. For example, for bull trout alone, there are many publications that address the importance of habitat patch size and connectivity that are crucial to bull trout population viability: (see Hillman et al. 2016; Roni et al. 2008; Roni et al. 2014). Notably, Roni et al. (2014) pointed to the removal of fish barriers as the single most important and effective salmonid habitat restoration technique available. This information should be used to refine and interpret the results of the analyses completed, and to better assess potential impacts and responses. For example, it is well accepted in the literature that habitat patch size, connectivity of habitat patches, isolation/dispersal dynamics, and diversity of life history migratory pattern (riverine, resident, and adfluvial) are very important to bull trout populations, persistence, and viability (Reiman and McIntyre 1995; Dunham and Reiman 1999; Whitesel et al. 2004; Tyre et al. 2011; Hudson et. al. 2017) (and for Chinook salmon as well; Isaak et al. 2007, Carnie et. al. 2016). These ecological relationships should be integrated with the results of the analysis and accessibility of connected habitats associated with the removal or addition of passage barriers presented in Section 4.12 to create a more meaningful and understandable analysis.

Upstream of the passage barrier at the Yellow Pine pit lake, only resident bull trout occur. Downstream, highly migratory riverine bull trout and possibly adfluvial migratory bull trout occur. The benefits of connecting these habitats to the long-term diversity and sustainability to bull trout populations are well known and should be acknowledged. Midas Gold recommends that important and relevant literature be used for the FEIS to provide greater support for improved analysis and interpretation of the results. This is true for other important analysis such as the evaluation in changes to the water temperature regime in the EFSFSR and generally characterizing the meaning of changes in IP, OM, Physical Habitat Simulation System (PHABSIM), and others.

Similar presentations could then be made showing increased access to habitats potentially valuable to steelhead occurring now, during, and after mining. The story for Chinook salmon can also be told in this objective way, but the story is a bit more complicated, as Chinook salmon are currently supported in their “access” to valuable habitat by stocking of hatchery broodstock. But the story for Chinook salmon should reflect that the SGP would provide natural, volitional fish passage later in the life of the mine, and potentially allow part of the upper EFSFSR to move over time from “hatchery supported” to “natural”, which is viewed positively in terms of the measurement of Chinook salmon viability and recovery (National Oceanic and Atmospheric Administration [NOAA] 2017).

Potential habitat and accessibility should be quantified first to document the amount of habitat at baseline and then integrated later with other factors like water temperature and water quality to determine potentially accessible and suitable available habitat during baseline conditions that can be compared among the different alternatives by superimposing and integrating further. This will make it easier for the reader to understand and attribute the different effects.

4.0 Use and Interpretation of Intrinsic Potential Habitat and Occupancy Modeling Results

Sections 3.12 and 4.12 of the DEIS (and the supporting Appendix J-4 and J-X) describe the development and use of two habitat metrics that are centrally used as proxies for potential habitat (IP) and the potential for habitat to be used or occupied (OM) which are used for impact assessment. Considerable attention is given to describing these habitat metrics, but the assessment would be considerably improved by providing more information about the appropriate interpretation of the results of these analyses so that the reader can better understand their meaning in the analysis of effects. As stated above, IP and occupancy probability from OM should be clearly stated as representing the potential for habitat and the species to occur, not as the actual occurrence or quality of the habitat. The NOAA documents regarding intrinsic potential make clear that for the application and interpretation of IP:

"We used the IP modeling framework to estimate the likelihood-strictly speaking, the relative likelihood-that a stream reach will exhibit suitable habitat for juveniles of a particular species. Keeping this in mind is critical for appropriate interpretation of model results and for understanding the assumptions invoked in applying IP to estimate historical conditions. The IP models estimate neither the actual, fine-scale distribution of habitat within a basin nor the quality of habitat in a given reach under current or historical conditions." (Agrawal et. al. 2005).

Similarly,

"Intrinsic potential measures the potential for development of favorable habitat characteristics as a function of the underlying geomorphic and hydrological attributes, … The model does not predict the actual distribution of "good'' habitat, but rather the potential for that habitat to occur, nor does the model predict abundance or productivity. Additionally, the model does not predict current conditions, but rather those patterns expected under pristine conditions as related through the input data." (NOAA 2017)

The FEIS should reflect these important distinctions explicitly when the IP results are applied and interpreted – (IP is a likelihood and OM is a probability. Neither are measures of actual stream habitat quality; an important fact for readers to understand. There are, however, two other indices that do reflect existing and potential habitat quality that are available to supplement the analysis - Stream Functional Assessment as reflected in the SFA Ledger (discussed above; Rio 2019b) and WCI. These should be added to the analysis as well as additional and potentially more meaningful metrics of habitat. In contrast to IP and OM, the SFA and WCI are based on actual field observations of the existing habitat conditions in the study area streams.

Throughout the DEIS, IP is commonly referred to as a tool for predicting "habitat", "habitat quality", "habitat capacity", and/or "habitat availability". Please provide a clearer definition and understanding of how IP should be interpreted and please also globally replace any reference to the above terms with "habitat intrinsic potential" or more simply "potential habitat."

Similarly, the sections on OM would be improved if the use and meaning of occupancy probability and how changes in occupancy probability should be interpreted would be more clearly explained. There is considerable scientific literature on the application of occupancy models and the interpretation of occupancy probability (McKensie et al. 2006), including for bull trout (McKelvey et. al. 2016) and these should be used to support the interpretation of OM results. The literature on occupancy modeling identifies some cautions in the use and interpretation of occupancy models. For example, Dibner et al. (2017) state that "while occupancy modeling can be an efficient approach for conservation planning, predictors of occupancy probability should not automatically be equated with predictors of population abundance. Understanding the differences in factors that control occupancy versus abundance can help us to identify habitat requirements and mitigate the loss of threatened species."

Without these clarifications, the reader is left to assume that there is a direct relationship between OM results and fish abundance, fish health, habitat quality/suitability or productivity. An explanation of these matters should provide a better context for interpretation and explanation, supported by literature on the topic. Important questions to address might be how much of a change in the probability of occupancy is meaningful or significant? How do baseline occupancy probabilities in the EFSRSR compare to reference streams in terms of occupancy probability? Is 10 percent occupancy probability considered to be poor, fair, or good based on the available literature and studies from other streams, including historically unimpacted or reference streams?

5.0 Use of Temperature Criteria and the Presentation of Stream Temperature Modeling and Evaluation Results

Midas Gold understands potential impacts to fish as a result of water temperature increases is a concern for the SGP and for the public. Midas Gold appreciates the effort undertaken in the DEIS and the breadth of the temperature analysis with respect to potential impacts on fish. This section recommends some items to present the analysis more clearly, better inform the reader of the context for the temperature analysis and describe actions to mitigate and minimize potential impacts. These recommendations focus on the following issues:

- Include a description of the conservative assumptions in the stream and pit lake network temperature (SPLNT) model.
- Describe measures that Midas Gold proposes to avoid, minimize, or mitigate impacts
- Compare temperature criteria to simulated values in a manner that is consistent with previous agency discussions and United States Environmental Protection Agency (EPA) guidance.
- Explain that temperature is one factor in evaluation of suitable habitat and temperatures near or above certain temperature criteria should be interpreted within the full context of conditions.
- Include a description of the stream temperature modeling sensitivity analyses in the discussion of potential effects of climate change.

We provide the specific comments below along with suggestions for how the analysis can be refined and improved for the FEIS.

5.1 Selection and Application of Temperature Criteria

For the past three years, Midas Gold and Brown and Caldwell have worked with the review agencies to develop and reach agreement on the development of the stream and pit lake network temperature (SPLNT) models, thermal criteria to be used, and output graphics/summaries. These discussions included selection of thermal criteria dating back to the development of the stream and pit lake network temperature (SPLNT) Model Work Plan (Brown and Caldwell 2018a). The selected criteria based on these discussions include Idaho Department of Environmental Quality (IDEQ) and USFS criteria which address multiple fish species, life stages, and designated uses. They are consistent with state standards and with water temperature criteria outlined in the USFS' Appendix B, the Southwest Idaho Ecogroup Matrix of

Pathways and Watershed Condition Indicators, or the “Matrix” included in the PNF Land and Resource Management Plan (LRMP), Appendix B-Errata 2003-2010 Soil, Water, Riparian, and Aquatic Resources.

The DEIS introduces and applies additional thermal criteria in the analysis which may be confusing for the reader when comparing to previously submitted and approved project documentation as well as during interpretation of the results. In addition to the IDEQ and USFS thermal criteria included in the project documentation, the DEIS includes thresholds which are presented in EPA guidance as considerations for the development of temperature criteria (Table 1 and 2; EPA 2003), many of which are based on laboratory studies. In EPA guidance, these thresholds are used as the basis from which temperature criteria may be developed but are not themselves the criteria. This is because the results of laboratory studies are not directly comparable to field conditions without complicated conversions, and their applicability is specific to the conditions under which the laboratory experiments were conducted. The FEIS would be improved with a discussion of why these additional considerations from EPA guidance were included, how each is applicable to the temperature analysis, and how each will be used to determine impacts. And if the EPA additional considerations are not individually appropriate as temperature criteria, then the USFS should consider omitting them from the analysis.

Appendix J-2 of the DEIS discusses the details of how the SPLNT model results were compared to the selected criteria in order to determine potential impacts. However, the FEIS could be improved with these suggested refinements of providing more detailed understanding of what temperature calculations were used in the comparison to thresholds and how those calculations apply in a manner to clearly understand the results. The FEIS should explain how and when daily or weekly maximum temperatures, or constant temperatures (as described in EPA guidance) were applied to certain criteria. Additionally, the FEIS should explain how unusually warm conditions were addressed in the analysis relative to EPA guidance that suggests thresholds should not apply during these conditions. This would allow for a more complete understanding of the results and put potential impacts into context.

For example, Appendix J-2 of the DEIS states that "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22 degrees Celsius (°C). If the ***maximum*** water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." The body of the DEIS, however, uses the simulated daily maximums for the warmest summer period for the comparison to the 21°C and lists any reaches with simulated maximums greater than 21°C as “lethal conditions.” This should be clarified in the FEIS to resolve this discrepancy.

5.2 Calculation of Stream Lengths in Analysis

The DEIS Appendix J-2 bases the temperature analysis on length of stream (in kilometers [km]) that fall within each life stage-specific temperature threshold. It is unclear how these stream lengths were calculated and providing additional information would be helpful to the reader. For example, Table 6 (Appendix J-2, pg. 11) shows baseline conditions with 4.99 km of stream that fall within the optimal temperature range for Chinook salmon incubation and emergence temperature threshold (6 to 10°C). That is, stream temperatures fall between 6 and 10°C (fall max constant) in approximately 5 km of stream in the baseline condition. Also, in the baseline condition, Table 6 shows 1.51 km of stream within the reduced viability of gametes threshold (> 13°C). Both thresholds are calculated as a fall max constant and both have the same periodicity shown in Table 1 of Appendix J-2. Reasonably, if approximately 5 km of stream fall within the optimal range for incubation and emergence (6 to 10°C), then those same 5 km should also be less than 13°C and included in the calculation of stream length for the reduced viability of gametes threshold. This example highlights discrepancies that exist using the same metric (i.e., fall max constant) with different life stages throughout the Appendix J-2 tables. Midas Gold recommends providing clarifying information in the FEIS to explain these calculations and applications to the reader.

5.3 Combining Temperature Effects and Changes in Habitat Availability

The DEIS analysis appears to combine changes in access to suitable habitat with changes in temperature. The DEIS states in Chapter 3.12 that access was included in the calculation of potential habitat for the listed fish species (see Chapter 3.12, pages 22, 36, and 43). The effect of including changes in habitat access is apparent in the Appendix J-2 temperature analysis and Chapter 4.12 results.

The temperature analysis in the DEIS could be improved by providing additional clarity in how the net increases or decreases in stream length based on changes in temperature were calculated. The analysis should standardize changes in available habitat in order to clearly show changes in stream lengths throughout the mine life that are potentially the result of temperature alone. The presentation of the analysis would be improved in Appendix J-2 by showing the total available habitat (in km) for baseline and each mine year and suitable habitat (in km) within a given temperature threshold. Comparisons between baseline and each mine year could be shown using a percentage of total habitat for that mine year that falls within a threshold and comparing percent changes from baseline to evaluate effects. This approach would provide clarity and understanding for how the analysis was conducted and how results should be interpreted.

5.4 Comparison of Temperature Evaluation Results to Other Regional and Local Studies

Section 4.12 and Appendix J-2 of the DEIS present numerous literature-based temperature criteria and thresholds (18-20 criteria per species/lifestage) and extensive tables showing the lengths of stream meeting the various criteria. This quantitative information should be supplemented with published reports and peer-reviewed literature to provide the reader an interpretation of the meaning of these changes in thermal regime on the fish species evaluated.

The literature on salmonids ecology and thermal requirements is extensive, and relevant information useful in interpreting the results of modeled changes in temperature is available. Some of the seminal work on salmonids thermal requirements, behavioral adaptations, use of coldwater refugia, and other important considerations for impacts assessment are available from the Region 10 Temperature Criteria Guidance (EPA 2003) prepared as part of EPA Region 10 Temperature Water Quality Criteria Guidance Development Project (https://cfpub.epa.gov/si/si_public_record_Report.cfm?Lab=ORA&dirEntryID=73651) as well as related resources available within the Northwest Water Quality Temperature Guidance for Salmon, Steelhead and Bull Trout (https://www.epa.gov/wa/northwest-water-quality-temperature-guidance-salmon-steelhead-and-bull-trout) and associated references.

Although scientific understanding of fish and their fundamental physiological and behavioral responses to elevated water temperature was well developed in a laboratory setting prior to the 1990s, application of this understanding in the field to address management needs has been and remains a significant challenge (Torgersen 2012). The results presented in Section 4.12 and Appendix J-2 should identify this uncertainty and address the application of laboratory developed criteria to the natural stream setting (Sullivan et. al. 2000, Carter 2005). The interpretive context of similar assessments in the Pacific Northwest region, such as Forney et. al. (2013) may provide useful corroborating information or supporting science to improve the reader's understanding.

It would be helpful to provide information on other nearby streams that currently harbor populations of Chinook salmon. For example, Johnson Creek is an analogue stream to the EFSFSR that currently has a viable Chinook salmon spawning and juvenile rearing at temperatures above some criteria known to result in adverse effects. Temperatures typically approach or reach 18°C in Johnson Creek, during the summer maximum time period. These measurements exceed thresholds applicable to spawning, incubation, and rearing for Chinook salmon recommended by EPA, USFS and IDEQ, yet these streams are inhabited by viable, reproducing Chinook salmon. Chinook salmon, like other salmonids, are known to seek out and hold in temperature refuges that allow them to survive warmer stream temperatures. As cited in Forney et al. (2013), locations of thermal refugia in mainstem rivers are typically associated with cool water accretions from tributaries, springs, seeps, groundwater, and (or) hyporheic flow (Hatch et al. 2006; Gilbert et. al. 1997), from which salmonids have been observed to forage for food (Belchik, 2003; Sutton et. al. 2007).

The FEIS should put the temperature analysis in the context of streams such as Johnson Creek. Streams currently or apparently exceeding temperature thresholds can still provide habitat for Chinook salmon, steelhead, and bull trout. While increasing temperatures can still have negative effects on the species, the FEIS should acknowledge that exceeding a threshold does not indicate the habitat is unsuitable. There are natural factors contributing to uncertainty and variability when it comes to administering temperature criteria (Hegerl et al. 2007).

5.5 Comments in the Draft Environmental Impact Statement About Climate Change

At several locations the DEIS states that SPLNT modeling did not account for climate change and therefore actual temperatures will be likely be warmer than those simulated. The FEIS would be improved to include a discussion of the sensitivity analysis for climate change included in the SPLNT modeling as well as the conservative assumptions built into the model that resulted in predicted temperatures likely to be higher than would actually occur. Though the SPLNT analysis did not consider the effects of climate change in the comparison of alternatives, to test the potential impacts of increasing air temperatures potentially resulting from climate change, sensitivity analyses were conducted to test the effects of a uniform increase air temperature by 5°C. The effect of this was an increase in stream water temperature by about 0.5°C (Brown and Caldwell 2018b).

It is noteworthy that generally, the sensitivity analysis indicated water temperature is much more affected by changes in solar insolation (shading) than by air temperature or flows. These estimates are similar to another study completed specifically to address the sensitivity of summer stream temperatures to climate variability and riparian reforestation strategies in the Salmon River in northern California, a region of steep mountains and diverse conifer forests (Bond et. al. 2015). The SPLNT sensitivity analyses are also consistent with the range forecast by climate models for Idaho (and represent progressive warming through the end of the 21st century).

It is important to also note that the models represent the warmest periods for summer and fall, that the models incorporate conservative assumptions (see more below), and that the SPLNT simulation results represent the warmest observed temperatures in the recent decade, and so the predicted changes in water temperatures would be representative of the warmest years, and that in other years, the effect may well be less. Sections mentioning climate change throughout Section 4.12 should be edited to clarify that the water temperature modeling did address climate change in a semi-quantitative fashion, similar to other recent studies (Bond et. al. 2015).

5.6 Conservatism Built into the Stream Temperature Model Should be Described and Considered

A considerable number of conservative assumptions were built into the SPLNT model during extensive review and discussions with the EPA and USFS. The FEIS should document the conservative assumptions used to develop the SPLNT models to provide context to the reader. Sections mentioning climate change throughout Section 4.12 should also include a description of the conservative assumptions. The conservative assumptions built into the modeling likely result in an overestimation of potential temperature impacts. These conservative assumptions include:

- Development of SPLNT models using the warmest, driest periods in the summer and fall (Brown and Caldwell 2019a, b, c)
- SPLNT models account for shade only in narrow strips of plantings next to streams, while actual vegetation growth would occur beyond what is simulated
- Assuming linear growth curves for plantings that under-represent early (faster) growth rates
- No overlap in canopy although multiple levels of canopy would develop (Brown and Caldwell 2019a)
- Hyporheic exchange resulting from the restored channel designs has also been discounted significantly, as baseflow contributions in lined reaches are assumed zero. Hyporheic water exchange is generally shown to decrease water temperatures during warm summer periods and to buffer stream temperature variations and promote downstream cooling (Surfleet and Louen 2018)

The SPLNT models include many conservative assumptions associated with shade and baseflow contributions that should be acknowledged in the FEIS. These assumptions likely result in modeled temperatures higher than would actually be expected as a result of the SGP. The effect of these assumptions should be discussed to provide the correct context of the results to the reader.

5.7 Clarifications Regarding Temperature Impacts of the Water Treatment Plant

The DEIS states that Brown and Caldwell indicated that a 1°C temperature increase could occur at the water treatment plant, but that the SPLNT models assumed a value of 0.5°C. In fact, Brown and Caldwell (2020) explains that a 1°C increase would be highly unlikely due to the temperature differential that would be required for that degree of increase, and states that the increase is likely between 0.25°C and 0.5°C, and that 0.5°C was applied. Paragraphs that mention a 1°C increase at the water treatment plant should be clarified in this regard, so the reader understands that the assumed temperature increase in the water treatment plant is a conservative assumption relative to what is likely to occur.

The DEIS also indicates that the water treatment plant would have little impact on stream temperatures in the summer months. However, during some months reductions in stream temperature are likely. Paragraphs that mention little impact on stream temperature in the summer months as a result of the water treatment plant should be modified to clarify: The analysis determined that there would often be negligible change in surface water temperature during the summer months, but during some conditions, temperatures could decrease by 1.5°C to 2°C.

5.8 Description of Simulated Temperature Changes Beyond End of Year 18

Several areas of the DEIS focus on the water temperatures in end of year (EOY) 18, but do not provide a discussion of improved temperatures over time, and sometimes these improvements happen in a relatively short time frame. Paragraphs that mention only the highest temperatures in EOY 18 should include the duration of the increased temperature and provide summaries of how temperatures change over time to provide the reader more information about the duration of potential impacts.

5.9 Clarifications Regarding Potentially Beneficial Impacts to Steelhead Trout

Some sections of the DEIS summarize that "water temperatures in this reach during the summer have the potential to adversely impact all four salmonid species and result in WCI ratings that are at best functioning at risk, and at worst functioning unacceptably." Other sections indicate that the increased stream temperatures are beneficial to steelhead trout (Section 4.12.2.3.5.3). The FEIS should clarify how the determination of impacts was made as a result of changes in temperature.

5.10 Description and Results of Alternative 2

Discussions of Alternative 2 would be improved by including a discussion of temperature reductions associated with piping low-flows in or along diversion channels. In some areas this measure results in temperatures that are lower than baseline conditions in some streams. The description and benefits associated with piping low flows during operations should be included in the FEIS: as described in Section 4.9.2.2.2.1, Surface Water Quality – Mine Site, Table 4.9-19, actions under Alternative 2 would result in water temperature increases for each simulated stream reach during the mine operational and post-closure period except during operations in Meadow Creek where low-flow pipes reduce temperatures below baseline conditions.

Also, Section 4.12.2.4.3.1 should be comparable in breadth to the same sections provided for Alternative 1 and Alternative 3 to allow for a direct comparison. We recommend expanding Section 4.12.2.4.3.1, so the reader has a better understanding of the potential impacts and improvements associated with Alternative 2.

5.11 Description of Mitigation Measures in the Draft Environmental Impact Statement

The FEIS should mention potential mitigation measures that have been documented by Midas Gold in project documents. For example, the DEIS says that "post-closure conditions in lower Meadow Creek are impacted by simulated discharges from the Hangar Flats pit lake," but it does not mention that water could be withdrawn from lower depths to reduce stream temperatures. Mitigation measures should be mentioned throughout the FEIS as ways to reduce stream temperature.

5.12 Comparisons of Simulated Temperatures to Thermal Criteria and Baseline Conditions

The presentation of simulated temperatures relative to criteria should, in the FEIS, be put into context of baseline conditions (as listed by the WCIs and include comparison to IDEQ thermal criteria); see Table 1.

Table 1. Current Conditions Compared to Alternatives

Metric	Baseline (Alternative 5 is similar)	Alternative 1 (Alternative 4 is similar)	Alternative 2	Alternative 3
Watershed Condition Indicators (WCIs)				
Temperature WCI FR=Functioning at Risk; FUR=Functioning at Unacceptable Risk	EFSFSR: FR Meadow Creek: FR	EFSFSR: FUR Meadow Creek: FUR during operations; FR post closure	EFSFSR: FUR Meadow Creek: FR during operations; FR post closure	EFSFSR: warmer than Alternative1 Meadow Creek: similar to baseline
Six Integrated WCIs across the project area	FR	FR	FR	FR
IDEQ Temperature Standards				
22°C Coldwater daily maximum, summer maximum period	All reaches comply	All reaches are within 0.3°C by EOY 22 All comply by EOY 52	All reaches except Meadow Creek comply by EOY 18 Meadow Creek is within 0.5°C by EOY 52	Meadow Creek complies during every mine year; EFSFSR upstream of Meadow Creek is within 0.4°C by EOY 112; EFSFSR between Meadow Creek and Sugar Creek is within 0.4°C by EOY 52
19°C Coldwater daily average, summer maximum period	All reaches comply	All reaches are always within 0.2°C	All reaches always comply	All reaches are always within 0.2°C
13°C Salmonid Spawning and Bull trout daily maximum, summer maximum period	Only Fiddle Creek complies	Fiddle Creek no longer complies	Fiddle Creek no longer complies	Fiddle Creek no longer complies
9°C Salmonid Spawning and Bull trout daily average, fall maximum period	Only Fiddle Creek and the EFSFSR upstream of Meadow Creek comply	Fiddle Creek and the EFSFSR upstream of Meadow Creek are within 0.2°C of this criterion by EOY 52	EFSFSR upstream of Meadow Creek is within 0.1°C of this criterion during each mine year Fiddle Creek is within 0.2°C of this criterion by EOY 112	EFSFSR upstream of Meadow Creek is within 0.6°C of this criterion by EOY 52 Fiddle Creek is within 0.2°C of this criterion by EOY 52

Notes:

1 Meadow Creek exceeds by 0.25°C in EOY 18 if compared to summer constant (the midpoint between the mean and the maximum)

Abbreviations:

°C = degree Celsius

EFSFSR = East Fork of the South Fork of the Salmon River

EOY = end of year

FR = Functioning at Risk

FUR = Functioning at Unacceptable Risk

IDEQ = Idaho Department of Environmental Quality

WCI = watershed condition indicators

6.0 Interpretation of Flow Productivity Analysis and Results

The effects of flow changes on Chinook salmon were analyzed using a flow-productivity model developed by NOAA Fisheries (2018) for Johnson Creek, a tributary that joins the EFSFSR at Yellow Pine. The analysis used the flow-productivity relationships from Johnson Creek and applied them to locations in the upper EFSFSR in the mine area to estimate the potential impacts on Chinook salmon productivity. Our primary concern is that the transferability of the Johnson Creek flow-productivity to the upper EFSFSR should be addressed to provide important context for interpretation of the results.

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. We believe that the above considerations and the transferability of the flow-productivity relationships from Johnson Creek to the upper EFSFSR should be addressed and supported with literature on the topic so that readers can better understand and appropriately interpret the results presented in Section 4.12.2.3.4.2 Stream-flow/Productivity Analysis – Alternative 1 and Appendix J-5.

7.0 Assessment of the Effects of Sediment and Turbidity

Section 4.12.2.3.3.1 describes potential changes to WCI including sediment and turbidity, and the subsection Sediment and Turbidity – Alternative 1 potential sources of fine sediment associated with mining and roads. We wish to point out several items that could improve the section and provide more complete and appropriate analysis and result.

The USFS is an agency that manages over 380,000 miles of roads nationally within the National Forest Road System (https://www.fs.fed.us/eng/road_mgt/qanda.shtml) and has a great depth of experience in road design and management, sediment management, best management practices (BMP), road crossings, and other facets of unpaved road management. This expertise and supporting contemporary research findings and literature should be integrated into this section (and for the similar sections for the other alternatives. The information and insights about road and sediment dynamics, sediment delivery, road design and BMP found in Al-Chokhachy et. al. (2016), Edwards et al. (2016), and Sosa-Pérez and MacDonald (2017) are just a few examples of meaningful contemporary literature findings and insights that should be integrated into these sections.

In a recent review titled Evaluating the Effects of Sedimentation from Forest Roads (Orndorff 2017), the author concluded that appropriate road design, location, construction, and maintenance can help ensure forest roads achieve their intended use without negatively impacting water quality, and that existing BMP programs have proven successful in reducing the effects of sedimentation from forest roads. Similar recent conclusions come from the EPA, which in 2016 determined not to designate stormwater discharges from forest roads for regulation under Section 402(p)(6) of the Clean Water Act at this time (Federal Register, Vol. 81, No. 128).

The sections on sediment and turbidity in Section 4.12 would also benefit from a more complete discussion of the benefits that good road design and effective BMP will have on reducing contributions of road sediments to streams. One of the most important BMP is good road location and design. Designing stable stream crossings, roads that adequately divert runoff to the forest floor, and isolating roads away from streams can significantly reduce and even prevent sediment from entering streams (Douglass 1974; Swift 1985; Swift and Burns 1999; cited in Orndorff 2017). These BMP and their effectiveness should be discussed more completely, and the USFS mandated BMP and those proposed by Midas Gold should be more explicitly described. These include the proposed use of sediment and dust reduction compounds, use of Stream Simulation Methods (United States Department of Agriculture Forest Service 2008) for road crossings that address sediment reduction, and other similar methods that will reduce sediment contributions.

Additionally, the characterization of potential impacts of sediment and turbidity in this section due to roads appears to be inconsistent with the conclusions in Section 4.9 Surface Water and Groundwater Quality, which states on Page 4.9-87, that “Overall, the potential for access road-related erosion and sedimentation to impact surface water quality would be minimal and limited to periods of substantial overland flow, such as from very large rainfall events.” We recommend that the Forest Service clarify and rectify this inconsistency and revise these sections to avoid redundancy and ensure consistency.

We are also curious as to why this section uses the number of stream crossings as a metric for potential increases in erosion and sedimentation when the USFS most often uses road density (crossing/watershed area) as an indicator of potential sedimentation effects (Gucinski et. al. 2001; Al-Chokhachy et. al. 2016). Also, the general understanding of road effects on aquatic ecosystems has been based largely on varied measures of road density and their associations with in-stream habitat or species/population status (e.g., Thurow et al. 1997; Hughes et al. 2004). The USFS uses road density, not number of stream crossings, in its watershed condition index, Road Density and Location (see PNF LRMP and its Appendix B, Southwest Idaho Ecogroup Matrix of Pathways and Watershed Condition Indicators). We believe that road density may be a more appropriate metric and its use would allow greater consistency with the analysis of sediment related WCI values used in other sections.

Finally, in the discussion of the effects of sediment and turbidity, there seems to be no mention of Midas Gold’s proposed restoration to reduce and stabilize the largest documented sediment source in the upper EFSFSR (Etheridge 2015) – the East Fork of Meadow Creek, also known as Blowout Creek. The discussion of changes in overall changes in sedimentation and turbidity in the EFSFSR due to the SGP should include the reduction in sediment from Blowout Creek in the analysis.

Thank you for considering Midas Gold's comments. Please contact me if you any questions.

Sincerely,

MIDAS GOLD IDAHO, INC.

Alan Haslam

Vice President – Permitting

Enclosures:

Attachment A: Stibnite Gold Project DEIS Fish Resources (Sections 3.12 and 4.12) Comments Compilation Table

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Attachment A

Attachment A: Stibnite Gold Project DEIS Fish Resources (Sections 3.12 and 4.12) Comments Compilation Table

Comment Number	Page # or Global	Section	Paragraph (count from top of page)	Commenter Initials	Relevant DEIS Text Excerpt (if applicable)	Comment
1	Global, 3.12-26, 3.12-36, 3.12-40, 3.12-43, 3.12-47, 3.12-49, 3.12-55, 3.12-56	Global, 3.12.4.2.5, 3.12.4.3.3.1, 3.12.4.3.5, 3.12.4.4.3.1, 3.12.4.4.5, 3.12.4.4.5.2, 3.12.4.5.3	Multiple, Table 3.12-14	MG	Various statements about "available habitat", Intrinsic potential, habitat conditions, and useable habitat.	Available habitat and useable habitat are not the same as occupancy potential or intrinsic potential. Replace "available habitat" with "potential habitat". Replace "provide habitat conditions" with "IP provides habitat POTENTIAL." From the DEIS: "In general, the Intrinsic Potential is the underlying capacity (i.e., potential) of a stream to provide habitat." This definition should be revised given the use of the IP throughout this document as a surrogate for habitat. The IP represents the potential for a stream to provide habitat based on its size and gradient regardless of the actual habitat conditions or accessibility (i.e. passage) at a given site.
2	Global, 3.12-22, 3.12-23, 3.12-36, 3.12-43	Global, 3.12.4.2.3.1, 3.12.4.3.3.1, 3.12.4.4.3.1	Multiple	MG	temperature thresholds	Need to clearly state which type of threshold applies to which life stage and to differentiate between "optimal," "lethal," or "other." Also need to specify if the range represents both the high and low threshold or if it represents the difference between two different thresholds (optimal vs lethal for example).
3	Global, 3.12-65, 3.12-82, 3.12-85	Global, 3.12.4.7.3.2, 3.12.4.7.3.3	Global, Table 3.12-20, Table 3.12-21	MG		Recommend providing the reader a preface before Table 3.12-20, 3.12-21 to introduce what the indicator categories mean for each metric and the context as to what these indicators mean for the fish and potential effects. Need to list the thresholds for FA, FR, FUR for each criteria. Global search within document- Check for "FU" and replace with appropriate rating.
4	Global	3.12	All figures with AECOM 2020 as the Source	MG		The references for these figures state AECOM 2020, which is the geodatabase deliverable for the EIS to the USFS. Recommend including the sources of studies these data came from (i.e., Baseline MWH aquatic studies, IDEQ, etc.)
5	Global	3.12		MG	General comment on the baseline temperature tables	The total habitat numbers listed in the baseline temperature tables for each species are based on OM potential lengths while the rows in the table are based on SPLNT modeling results and temperature thresholds. It is difficult to understand how these reaches intersect and if the lengths overlap. Please clarify or separate into two tables.
6	3.12-3	3.12.1	Figure 3.12-1	MG		Figure 3.12-1 Please define the tan subwatershed areas in the figure. Is this the extent of potential direct and indirect effects within the analysis area?
7	3.12-8	3.12.2.1.4	3, 4	MG	Text summarizing FWCA statute	Consider replacing the text here with that in Section 3.13.2.6. Reason: The summary in Section 3.13.2.6 is more consistent with the text of the statute and the summaries of FWCA in various sections should be consistent with one another.
8	3.12-10	3.12.3.1	3, bullet 6 & 7	MG	Stream Functional Assessment Report for the Stibnite Gold Project (Rio Applied Science & Engineering [Rio ASE] 20-19a; and Streem Functional Assessment Ledger (Rio ASE 2019b)	The SFA (Report and Ledger) includes both modeling and measurements of baseline conditions. As placed in this list of bullets it would suggest it only includes "computer modeling." Please clarify.
9	3.12-12	3.12.3.2.2	1	MG	2018	2019
10	3.12-12	3.12.3.2.2	1	MG	Figure 3.12-4 shows the location of the surveys	Figure 3.12-4 only shows locations of fish occurrence and habitat surveys not the Rio ASE spatially continuous LWD and Pool data from lower Meadow Creek (at the downstream end of the SODA) to the EFSFSR and downstream to the confluence with Sugar Creek.
11	3.12-12	3.12.3.2.2	2	MG		To better evaluate habitat elements proposed to be enhanced by the Project, spatially continuous LWD and pool data were collected (Rio ASE 2019b) in lower Meadow Creek and the EFSFSR from Meadow Creek to Sugar Creek. Please include a summary of these data collected at the request of the USFS.
12	3.12-12	3.12.3.2.2	2	MG	HDR (2016) also conducted geomorphic and stream functional assessments of the same streams targeted for the PIBO surveys	Please also note that Rio ASE conducted a revised and updated stream functional assessment in 2019 (Rio ASE 2019 a, b).
13	3.12-15	3.12.4	1	MG	habitat modeling	The USFS Forest Plan (Appendix B-errata 2003-2010) does not identify or reference any habitat models used in the WCI. Please change to include "field data, remotely-sensed spatial data, and relevant recent literature."
14	3.12-21	3.12.4.2.2	Figure 3.12-6	MG		As described in section 3.12.4.2.2, Critical habitat for Chinook salmon was modeled using historic and current distribution of Chinook salmon occurrences combined with a maximum gradient slope for the upstream extent of habitat. Chinook salmon distribution covers a wide area of the analysis area, yet modeled critical habitat was only assessed at the SGP. How are you considering critical habitat in streams along the haul road at stream crossings?
15	3.12-22	3.12.4.2.3.1	Table 3.12-1	MG		If the measured temperature was below the threshold range for Adult Migration, was that segment of stream excluded from the stream length identified in Table 3.12-2? Low temperatures in the spring are closely tied to the amount of snowpack and associated snowmelt, to which fish commonly adjust the timing of their migration with little or no impact.
16	3.12-22	3.12.4.2.3.1	Table 3.12-1	MG		Table 3.12-1 It would be informative to define these general seasons by annual dates. Document which temperature thresholds are regulatory standards.
17	3.12-22	3.12.4.2.3.1	2	MG	the entire 16.72 km of potential habitat is within the temperature threshold for adult migration, adult spawning, juvenile rearing.	Please explain the origin of 16.72 and why it is the only length evaluated and not all of the IP and/or critical habitat length.
18	3.12-23	3.12.4.2.4	2	MG	Spawning occurs from mid-July to September, with peak spawning in August. Egg incubation begins in August, and emergence of larval fish occurs between January and April.	Consider adjusting incubation so that it overlaps with the beginning of spawning in mid-July so there is no gap between spawning and start of incubation. Incubation begins with spawning.
19	3.12-23	3.12.4.2.3.1	Table 3.12-2	MG	Table 3.12-2 shows that of the entire 16.72 km of potential habitat is within the temperature thresholds for adult migration, adult spawning, juvenile rearing, and common summer habitat use. Adult Migration - Lethal (1 week exposure) = 0 in table.	The paragraph above (p. 3.12-22) identifies that the entire site is within Adult Migration Thresholds (100%) not 0%.
20	3.12-25	3.12.4.2.4.2	Table 3.12-4	MG		Table 3.12-4 displays zeros for redd counts in Tamarack, EFSFSR, Johnson Creek, and Burntlog Creek. Are these zeros or no data?

Comment Number	Page # or Global	Section	Paragraph (count from top of page)	Commenter Initials	Relevant DEIS Text Excerpt (if applicable)	Comment
21	3.12-26	3.12.4.2.5	2	MG	The application of an IP approach provides a subwatershed-specific analysis of Chinook and steelhead habitat conditions that may be used to compare existing conditions to interim and post closure conditions in the impact analysis (Section 4.12, Fish Resources and Fish Habitat).	Consider revising last sentence in paragraph suggesting that IP will be used to compare habitat conditions.
22	3.12-26	3.12.4.2.5	4	MG	provide	Change "provide" to "support" habitat. The IP conditions (stream size and gradient) support habitat but do not provide habitat.
23	3.12-26	3.12.4.2.5.1	5	MG	IP modeling used	Reference the IP model inputs as shown in Table 3.12-5
24	3.12-26	3.12.4.2.5.1	5	MG	channel characteristics	Specify that channel width was the only channel characteristic.
25	3.12-27	3.12.4.2.5.1	Table 3.12-5	MG	Source	Use proper citation. Source should have date and full reference provided in the References section at the end of the document.
26	3.12-27	3.12.4.2.5.1	Table 3.12-5	MG		The wetted width (meters) cutoff for Chinook salmon should be 3.7m
27	3.12-29	3.12.4.2.5.2	Figure 3.12-7	MG		Label incorrectly identifies Sugar Creek as the EFSFSR.
28	3.12-30 and 3.12-40	3.12.4.2.5.2	Tables 3.12-6 and 3.12-9	MG		Improve the results in the tables for the % of IP habitat available across the two watersheds. Of the 113km assessed, much of that length doesn't meet the width thresholds for wetted width (Chinook) nor bankfull width (steelhead). Recommend filtering out those reaches as not assessed due to size and state the length of stream that can even possibly have an IP score based on the three metrics
29	3.12-31	3.12.4.3.1	3	MG	Habitat limiting factors for the South Fork Salmon River steelhead population are linked to human distrubances, such as mining and road construction. Human disturbances and heavy precipitation make the subbasin susceptible to large sediment-producing events that degrade habitat quality for steehead. Roads located near streams encroach on riparian habitat, limit potential sources of large woody debris, and create passage barriers at road-stream crossings. Priorities for addressing limiting factors in the South Fork Salmon River steehead population include mitigation and elimination of sediment inputs from human-caused distrubances and elimination of artivicial fish passage barriers.	Add supporting citations.
30	3.12-32	3.12.4.3.2	1	MG	Critical habitat for steelhead is not designated upstream of the Yellow Pine pit lake; however, it is assumed that steelhead were found in the headwaters of the EFSFSR prior to 1938.	Add supporting citations.
31	3.12-35	3.12.4.3.3	3	MG	Priorities for steelhead populations specific to the EFSFSR watershed include:	Is there more than one population of steelhead in the EFSFSR watershed? Please correct if the reference is to a single population.
32	3.12-36	3.12.4.3.3.1	Table 3.12-7	MG		What life stage does "common summer habitat use" refer to in the table? Global comment on table with this designation.
33	3.12-36	3.12.4.3.3.1	1	MG	2.13 km of available habitat	Explain how this length was calculated; using what threshold(s)?
34	3.12-36	3.12.4.3.3.1	1, Table 3.12-8	MG	there is no available habitat (0 km) within the water temperature threshold for incubation/emergence.	Incubation/Emergence is not reported in Table 3.12-8
35	3.12-37	3.12.4.3.4	1	MG		Suggested additional text: "The preponderance of evidence therefore, suggests that steelhead have not historically and do not presently pass the YPP cascade (i.e. complete barrier to steelhead migration)."
36	3.12-37	3.12.4.3.4	3	MG	redds and adults were identified in 2004	Please clarify (Golden Trout or steelhead).
37	3.12-37	3.12.4.3.4	3	MG		Thurow (1987) documented spawning locations of steelhead in the SFSR. This will provide additional information on spawning locations. Thurow, R. F. 1987. Evaluation of the South Fork Salmon River steelhead trout fishery restoration program. Completion report. Contract no. 14-16-0001-86505. Idaho Dept. of Fish and Game, Boise, ID.
38	3.12-37	3.12.4.3.4	4	MG	it is likely the distribution is limited	Add citation.
39	3.12-42	3.12.4.4.3	4	MG	Historically, the Uppers Snake Recovery Unit is believed to have largely supported the fluvial life history form; however, many core areas are not isolated or have become fragmented watersheds, resulting in replacement of the fluvial life history with resident or adfluvial forms	Needs citation.
40	3.12-43	3.12.4.4.3.1	2	MG	none of it is within optimal thresholds for incubation/emergence, about half of it is optimal for juvenile rearing, approximately 5 percent is within the thresholds for adult spawning, and about 30 percent is optimal for common summer habitat use.	This paints a picture that due to temperature constraints, bull trout should not survive well in the project area, but fish sampling suggests the area is broadly used by bull trout. This should be discussed.
41	3.12-44	3.12.4.4.4	2	MG		Hogen and Scarnecchia (2006) did not refer to bull trout in YPP as a subpopulation. They referred to different migration patterns of bull trout in the EFSFSR. Revise sentence.
42	3.12-47	3.12.4.4.5	1	MG		Please discuss OM model limitations and any calibration completed.
43	3.12-48	3.12.4.4.5.1	2	MG	reach length	Clarify if reach length (Reach 1, 2, 3) or stream segment length.
44	3.12-62	3.12.4.6.2.2	2	MG	The results indicate limited abundance of these salmonids in the Yellow Pine pit lake.	What species is being referred to in the statement?

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45	3.12-64	3.12.4.7.3	1	MG	WCIs for fish	The linkage between WCIs and fish needs to be better explained. For example: Watershed Condition Indicators include various measurable elements for which specific functional thresholds have been established with regards to specific species of fish (Forest Service 2003 and 2010).
46	3.12-64	3.12.4.7.3.1	2	MG	historical records	Provide citation
47	3.12-65	3.12.4.7.3.2	Table 3.12-20	MG		Recommend providing the reader a preface before this table to introduce what a WCI is, how used in impact assessment, the terminology and how measured.
48	3.12-73	3.12.4.7.3.2	Table 3.12-20	MG	Table Source: forest Service 2010a: Johnson Creek Watershed Improvement Project-Boise NF: Attachment B, Subwatersheds Baselines; Forest Service 2012; Foust and Nalder 2010; Rio ASE 2019a; StreamNet 2020	Please clarify data sources for this table and interpretation
49	3.12-75	3.12.4.7.3.3	2	MG	However, habitat for migratory salmonids in the EFSFSR upstream of the Yellow Pine pit lake is inaccessible because historical mining excavation of the stream channel has created a gradient barrier (Yellow Pine pit lake cascade)	If listing the exceptions to historical restoration, please list all of the major exceptions. Suggested addition:"and the water is still contaminated with arsenic, etc., the largest fine sediment source in the watershed remains in Blowout Creek, and nearly 1 mile of Meadow Creek is confined to a boulder-lined ditch around the SODA. "
50	3.12-75	3.12.4.7.3.3	3	MG	"The most significant geophysical processes affecting channels in the EFSFSR are mass wasting and erosion. The most obvious impacts to stream channels are located at the Yellow Pine pit lake, Meadow Creek, East Fork Meadow Creek, and the Cinnabar Mine area."	The quote in the Kuzis paper reads, "The most significant natural processes influencing channels in the EFSF are mass wasting and erosion. This has affected the Tamarack (all natural), Sugar (natural and human-caused), and Upper East Fork (primarily human caused) subwatersheds." Two pages later in the report Kuzis states, "There are still significant legacy effects which continue to impact channel conditions and fish populations, the most obvious which include the Glory Hole, Blowout Creek, the Cinnabar Mine area, and Meadow Creek."
51	3.12-75	3.12.4.7.3.3	6	MG	Wildfires have eliminated much of the tree canopy at the proposed mine site and vicinity.	Suggested addition: "and historical mining activities (i.e. most of West End, SODA, Hecla Heap, old processing plants and roads along the EFSFSR, etc.)"
52	3.12-76	3.12.4.7.3.3	2	MG	This assessment is presented Table 3.12-21 Mine Site Stream Reaches Baseline Summary of Watershed Condition Indicators below.	Please clarify that this is a subset of the assessment as presented. The Assessment referred to is the SFA report produced by Rio ASE, which included much more than the "Mine Site Stream Reaches Baseline Summary of Watershed Condition Indicators."
53	3.12-77	3.12.4.7.3.3	3	MG	Therefore, all streams upstream of the Yellow Pine pit lake are naturally inaccessible to anadromous Chinook salmon and steelhead without human intervention	Delete "naturally." The cascade barrier as described above is human-caused.
54	3.12-77	3.12.4.7.3.3	3	MG	Therefore, all streams upstream of the Yellow Pine pit lake are naturally inaccessible to anadromous Chinook salmon and steelhead without human intervention	Rephrase to say "with the exception of periodic trap-and-haul"
55	3.12-78	3.12.4.7.3.3	4	MG	The uppermost section of Fiddle Creek flattens in gradient, becoming a slower meandering stream where the reservoir formerly existed	This is inaccurate. The former reservoir was downstream of these flat areas that are the result of 2 terminal glacial moraines. The former reservoir was located much farther downstream, approximately where the existing small pond is currently. Please revise description.
56	3.12-79	3.12.4.7.3.3	2	MG	This reach has a short section with a 9 percent gradient, shallow depths, and few pools, which may be a partial fish migration barrier at low flows	Reference the fish barrier TM.
57	3.12-79	3.12.4.7.3.3	Multiple	MG	Stream Reach 2 description	Describe fish occurrence in stream reach 2 like it was presented in reach 1. Global comment for reach if fish occurrence is not described for a reach.
58	3.12-80	3.12.4.7.3.3	2	MG	Immediately upstream of the SODA, Meadow Creek is unconfined, with a gradient less than 1 percent. The reach is composed of low-gradient riffle, step run, and pool habitat. The floodplain is active with oxbow cutoffs, side channels, and backwater features.	It may be worth noting that a significant reason for the low gradient and unconfined condition in this area is due to placement of tailings and other legacy mine waste that has altered the valley geometry enabling the development of this channel morphology.
59	3.12-80	3.12.4.7.3.3	4	MG	streambed aggradation (deposition of material),	Streambed aggradation is not the same as deposition of material. Aggradation implies deposition over time, such that the streambed elevation increases. There is no evidence of recent/modern aggradation.
60	3.12-80	3.12.4.7.3.3	4	MG	Kuzis (1997) suggested that much of the sediment found in the channel had been transported from Fern Creek, where the access road to the inactive Fern Creek Mine appears to be the source of much of the sediment.	The Kuzis report suggest that "the access road to the inactive Fern Creek mine appears to be the source of much of the sediment." A volumetric calculation reveals that filling the relatively broad EFSFSR valley downstream of Fern Creek by even a few inches would result in a 10s of meters deep chasm where the Fern Creek road is located. No such erosional scar exists. No doubt the Fern Mine and associated road contribute sediment, but it is not likely to be the major source of sediment in the Headwaters EFSFSR.
61	3.12-81	3.12.4.7.3.3	2	MG	before crossing the creek	The road crossing has been completely decommissioned. This statement implies that a bridge or culvert may remain in place.
62	3.12-81	3.12.4.7.3.3	2	MG	the most productive fish habitats in the Upper EFSFSR	Citation needed.

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63	3.12-82	3.12.4.7.3.3	Table 3.12-21	MG		How were data aggregated to develop these scores per "Reach"? Do they represent length-weighted averages from the Rio ASE SFA Ledger? Tributaries and even individual reaches within this stream segment have very different conditions and functional scores. To report a single "average" value is not as informative as the individual reach scores; the limitations of this approach should be discussed. Also, if Rio ASE SFA results were used for developing these results, how were WCI calculated for the EFSFSR below Sugar Creek and all of Sugar Creek which were not evaluated in the Rio SFA?
64	3.12-82	3.12.4.7.3.3	Table 3.12-21	MG	Bull Trout Local Population Characteristics within Core Area	What data source was used for these indicators? Not in the Rio ASE 2019 SFA.
65	3.12-82	3.12.4.7.3.3	Table 3.12-21	MG	Temperature (steelhead/Chinook); Temperature (bull trout)	The Rio ASE SFA used the stricter of the criteria for steelhead/Chinook and bull trout. How did the report tease out the difference between the two when that wasn't reported by Rio ASE?
66	3.12-83	3.12.4.7.3.3	Table 3.12-21	MG	Refugia (steelhead/Chinook); Refugia (bull trout)	What data source was used for Refugia? Not in the Rio ASE SFA. Also, how can Refugia be considered FR rather than FUR within a reach with a passage barrier precluding access to the refugia? The definition by USFS specifically states "connectivity to maintain viable populations or subpopulations." There is no connectivity, so it can't be FR. Same is true for Reaches 2, 3, and 5.
67	3.12-84	3.12.4.7.3.3	Table 3.12-21	MG	Disturbance Regime	Which data source were used for Disturbance Regime? Not Rio ASE SFA.
68	3.12-84	3.12.4.7.3.3	Table 3.12-21	MG	Integration of Species/Habitat Conditions	Unclear which data source. Not Rio ASE. Need more explanation as to why professional judgement ranked this FR not FUR for each species for Integration of Species and habitat WCI. Specifically for steelhead and Chinook salmon, it seems an existing conditions ranking of FR is overly optimistic when this ranking states "the reduction [in population size] does not represent a long-term trend." The population has been effectively extirpated from the project area as a result of the YPP cascade. This does represent a long-term trend. The species cannot access the habitat (i.e. integration of species and habitat does not exist except for truck and haul some years for Chinook only). This seems like a clear case of FUR - "a clear declining trend in subpopulation size."
69	3.12-84	3.12.4.7.3.3	Table 3.12-21	MG	Forest Service 2010b; IDEQ 2017; Kuzis 1997 and Burns et al. 2005; and Reach 6 which is from Kuzis 1997 and MWH 2017; Bull Trout Local Population Characteristics with Core Area which is from USFWS 2015a, and Integration of Species and Habitat which is derived from professional judgment	The Rio ASE data reports WCI scores, but how were some of these data interpreted to develop a WCI score in reports that did not produce such a score (Reaches 4 and 6)?
70	3.12-85	3.12.4.7.3.3	1	MG	For these reasons, a small number (six) of WCIs that have the greatest potential to accurately identify potential impacts due to the SGP were selected for detailed analysis in Section 4.12.	Need an explanation per WCI element to justify why some where or were not selected for greater analysis. The selection of WCI elements for greater analysis appears to be based on presumed impacts from the proposed mine but does not consider proposed restoration. Additional WCIs significantly affected by restoration include LWD density and recruitment, pool frequency and pool quality. The USFS requested the collection of spatially continuous LWD and pool data for lower Meadow Creek and the EFSFSR from Meadow Creek to Sugar Creek specifically because these elements are proposed to be affected by the project.
71	3.12-85	3.12.4.7.3.3	3	MG	The SPLNT model was developed using two separate software packages: QUAL2K for stream temperature modeling, and the General Lake Model for simulating pit lake temperatures. Results of the SPLNT model describing existing conditions (maximum weekly summer and fall temperatures) are shown in Table 3.12-22 and Figure 3.12-12.	The text indicates that both daily maximums for the maximum weekly summer and fall conditions are provided in Table 3.12-22, but the table only includes the summer numbers. Recommend adding the daily maximums for the fall condition as well as the daily averages for both the maximum weekly summer and fall condition.
72	3.12-89	3.12.4.7.3.3	2	MG	The SPLNT model did not account for changes to stream temperatures caused by changing climate conditions. This means the model assumed future stream temperatures would be similar to the historic water temperature data without the SGP (Brown and Caldwell 2018a). Given ongoing climate changes, modeled temperature results would likely be higher if climate change had been considered in the model.	If discussing future predictions, please also discuss the many model components that are conservative and would result in over-predicting future temperature results that are outlined in the Brown and Caldwell document: Reduced vegetative growth rates and canopy width, narrow planting width evaluated although actual planting plan is much wider, linear growth curves under representing early growth, no overlap in canopy, and reduced rating curves for predicted conditions. All of these variables have been conservatively estimated resulting in likely over estimating temperature.
73	3.12-89	3.12.4.7.3.3	3	MG	The SPLNT model did not account for changes to stream temperatures caused by changing climate conditions. This means the model assumed future stream temperatures would be similar to the historic water temperature data without the SGP (Brown and Caldwell 2018a). Given ongoing climate changes, modeled temperature results would likely be higher if climate change had been considered in the model.	Recommend editing to clarify: "The SPLNT model did not account for changes to stream temperatures caused by changing climate conditions in the comparative modeling; however, the models were developed using the warmest, driest periods in the summer and fall. During model development, sensitivity analyses were conducted to test the effects of changing air temperature. Increasing air temperature every hour of the day by 5C had the effect of raising water temperatures by 0.5C."
74	3.12-89	3.12.4.7.3.3	Table 3.12-22	MG	Lower EFSFSR (between Fiddle and Sugar creeks) 14.2	The correct value for Lower EFSFSR (between Fiddle and Sugar creeks) is 17.4
75	3.12-89	3.12.4.7.3.3	4	MG	...The stream temperatures from the most downstream National Hydrography Dataset-Plus reach within each stream reach and the equivalent SPLNT reach water temperatures are presented in Table 3.12-23. NorWeST-modeled stream temperatures are presented (Isaak et al. 2016) alongside the SPLNT stream temperatures in Table 3.12-23 and Appendix J-2 to provide information regarding the possibility of changing climate conditions in the analysis area.	It is unclear which SPLNT temperatures were used for this comparison. Recommend adding a statement that "Mean August temperatures were simulated with the SPLNT models for comparison to the NorWest models".

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76	3.12-90	3.12.4.7.3.3	2	MG	(Rio Ase 2019a)	The temperature criteria originated from the USFS Forest Plan and the temperature WCI evaluated in this DEIS does not match Rio ASE criteria. Please update the reference accordingly to match the reference in the next sentence which is accurate.
77	3.12-90	3.12.4.7.3.3	3	MG	Chinook salmon and steelhead are at risk in Stream Reaches 2, 4, and 6. In comparison, under baseline conditions bull trout are at risk or at unacceptable risk throughout the proposed mine site due to elevated water temperatures.	This is a misinterpretation of the WCI functional condition. "At risk" or "unacceptable risk" is with regard to the stream temperature functionality and may or may not directly correlate to species risk (i.e. Chinook salmon, steelhead and bull trout). The USFS Forest Plan Appendix B Errata (2003-2010) clearly states that the functional characteristics are tied to the element not a specific species regardless of the species role in developing the criteria.
78	3.12-90	3.12.4.7.3.3	4	MG	unacceptable risk for Chinook salmon, steelhead, and bull trout	Same comment as above. The functional risk is associated with the WCI element not the species. It is in appropriate to assume risk to an element correlates to risk for a species.
79	3.12-90	3.12.4.7.3.3	4	MG	Sediment and Turbidity Section	The reference is to the functional rating. Please identify what was measured and how it compares to the functional rating standards.
80	3.12-97	3.12.4.7.3.3	Table 3.12-25	MG	EFSFSR-Yellow Pine Pit High Gradient (02)	Appendix J-3 Table 5 shows 10,209 meters at baseline.
81	3.12-97	3.12.4.7.3.3	Table 3.12-25	MG	EFSFSR-Yellow Pine Pit High Gradient (02)	Appendix J-3 Table 5 shows 8,530 meters
82	3.12-100	3.12.4.7.3.3	1	MG	All stream reaches at the mine site were scored as "functioning at risk" for this WCI for Chinook salmon, steelhead trout, and bull trout due to past and current disturbance (Table 3.12-21).	Functioning at risk includes "fragmented connectivity" while functioning at unacceptable risk includes "little or no connectivity among local populations." A complete passage barrier that blocks all connectivity for migratory fish (i.e. Chinook, steelhead and bull trout) should put this in the FUR category. Functioning at risk includes a reduced population size that does not represent a long-term trend; Chinook and steelhead (as well as the fluvial life form of bull trout) have been extirpated from the vast majority of the project area representing a clear decline in the population over the long-term. Please explain the professional judgment that determined this element should be considered functioning at risk rather than functioning at unacceptable risk.
83	3.12-100	3.12.4.7.3.3	2	MG	This WCI is scored based on professional judgment, consideration of specific WCIs that have a major influence on the overall condition, and the criteria listed in Table 3.12-27. All stream reaches at the mine site were scored as "functioning at risk" for this WCI for Chinook salmon, steelhead trout, and bull trout due to past and current disturbance (Table 3.12-21).	Clarify how professional judgment arrived at the functional ratings (i.e., suitable habitat, connectivity, temperature, etc.). Integrate the WCIs used so that the reader understands the functional rating.
84	Global, 4.12-9, 4.12-20	Global, 4.12.2.3.1, 4.12.2.3.2.2	4	MG	Rio ASE 2018	There should be no reference to Rio ASE 2018; All Rio ASE 2018 reports were replaced with 2019 versions of the same report.
85	Global, 4.12-21, 4.12-68, 4.12-99	Global, 4.12.2.3.2.2, 4.12.2.3.4.4, 4.12.2.4.2	2	MG	important fish habitat	What is "important fish habitat"?
86	Global	Global, 4.12.2.3.3, 4.12.2.3.4, 4.12.2.3.5, 4.12.2.4.4, 4.12.2.4.5, 4.12.2.4.6, 4.12.2.4.7	Multiple	MG	Various descriptions of habitat: usable habitat, usable IP habitat, total useable, available habitat, suitable habitat	Global comment for all IP and OM results. These results are frequently described as synonymous with usable, available, suitable, and quality habitat. Habitat availability or usability implies passage and access which is not fully available to all life histories of bull trout. The IP and OM do not evaluate usable/suitable/available habitat; changes in IP/OM are not the same as changes in usable habitat. Please change to refer to changes in Intrinsic Potential, Occupancy Potential, or potential habitat, not changes in usable, suitable, or available habitat.
87	Global, 4.12-11, 4.12-39	Global, 4.12.2.3.1.1, 4.12.2.3.3.1	3, bullet 2	MG	barrier on Fiddle Creek	In several places in the DEIS, the Fiddle DRSF is counted as a new barrier with an associated loss of habitat in the analysis. However, Fiddle Creek has an existing barrier preventing access and the proposed action and other alternatives with a Fiddle DRSF would continue to prevent access = no net gain or loss of access. The current barrier on Fiddle Creek prevents this stream segment from being volitionally accessible to fish, so this is not a mining-induced change - it is currently not accessible.
88	Global, 4.12-29, 4.12-66, 4.12-69, 4.12-73, 4.12-82, 4.12-87, 4.12-92, 4-12-203	Global, 4.12.2.3.3.1, 4.12.2.3.4, 4.12.2.3.5, 4.12.2.3.6, 4.12.2.3.7, 4.12.7	Multiple	MG	temperature thresholds and habitat use, stressful and lethal	There are several global comments on temperature. 1. Difference between maximum and average: The DEIS is reporting the Summer MAXIMUM high temperature. The Summer AVERAGE high temperature is less. The thresholds used from EPA are not comparable to the MAX (i.e. not comparable to the 7DADm). Please compare thresholds to average temperatures from the SPLNT model. 2. No definition of temperature thresholds for "Stress" and "Lethal" conditions are given. Need to document difference between thresholds associated with optimal, stressful, and lethal. 3. Statements about "potential water temperatures are lethal" are confounding 7-day prolonged (constant laboratory) exposure (i.e. average temperature as reported in Appendix J-2 Table 1) for lethal conditions with the SPLNT model results referenced that are 7-day MAXIMUM high temperatures. The SPLNT model AVERAGE high temperatures are below the lethal threshold. Please compare thresholds to average temperatures from the SPLNT model. 4. Changing the comparison for the thresholds to be compared to the average temperatures will also affect evaluation of length of streams impacted for each species (i.e. Changes in Lengths (km) of Stream Reaches within Temperature Threshold Categories). Please revise in each section and for each species.
89	Global	4.12	Multiple	MG		In summaries of habitat gains and losses for each species under each alternative (like the bullet list on p. 4.12-67), please include the quantitative net increase or decrease.
90	4.12-1	4.12.1	1	MG	Effects Analysis Issues and Indicators and Methodology of Analysis	Please provide explanation for the missing WCI elements; describe all proposed mitigation/restoration/enhancement in conjunction with associated project impacts; and provide methods and explanation for the synthesis of impacts vs. benefits (quantity and quality) affects analysis for each section of the report.

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91	4.12-1	4.12.1	2	MG		Definition of aquatic species should be included and substantiation is needed when referencing impacts on all aquatic species.
92	4.12-1	4.12.1	3	MG	Indicators	How were these indicators identified and selected? Why were other indicators for which data are available not selected?
93	4.12-1	4.12.1	3	MG		Why is length of steelhead habitat not included as a metric? It is an ESA-listed species as well. Recommend it be included, or the reason for not including it be provided.
94	4.12-1	4.12.1	3, bullet 3	MG	Direct loss of Chinook salmon Critical Habitat (km).	The indicators that use "Direct loss of" should be stated as "Change in" so that all changes, not just adverse changes, are reflected.
95	4.12-1	4.12.1	3, bullet 11	MG	Changes in stream peak and baseflow (cubic feet per second [cfs]).	This indicator includes "Changes in peak flows", but no analysis is provided for the change in peak flows. Provide the supporting analysis.
96	4.12-1	4.12.1	3, bullet 13	MG	Changes in water chemistry (analysis criteria).	Analysis criteria is not explained here. Explain analysis criteria.
97	4.12-1	4.12.1	4, bullet 1	MG	Amount of increased traffic (average daily traffic).	Impacts not proportional to increased traffic if supplemental BMPs are used; sediment, water quality, etc.
98	4.12-1	4.12.1	5	MG	Issue: The SGP may affect fish populations through establishment of fish access upstream of the Yellow Pine pit.	Revise this to include all changes in accessibility throughout the mine area, not just at the cascade at the Yellow Pine pit.
99	4.12-2	4.12.1	1	MG		Missing here is the change in length of stream habitats accessible to fish by volitional access. One of the most important things that happens during and after the mining is the opening of the streams into the upper EFSFSR by the fishway and by stream restoration that provides permanent volitional passage after mining.
100	4.12-2	4.12.1	1, bullet 1	MG	Changes in migratory patterns of fish.	This section provides little information about the "migratory patterns" of fish. Rather it is limited to a discussion of accessibility of different areas caused by passage barriers. This should be changed to accessibility of habitats.
101	4.12-2	4.12.2	3	MG	While these listed and sensitive species are the focus of the analyses, the effects described are expected to be similar for all fish species in the analysis area	Delete sentence unless you intend to discuss/demonstrate how the effects will be similar for non-salmonids.
102	4.12-2	4.12.1	2, bullet 1	MG	Length of important fish habitat within 91 meters of access routes	Risk = Probability x Consequences; where is the probability component, that is, the likelihood that a spill will occur?
103	4.12-2	4.12.2	3	MG	affected	Define "affected." As documented in this report, "affected" appears only to address the negative project impacts but excludes many of the positive project impacts/benefits/mitigation (i.e. proposed restoration and enhancement).
104	4.12-2	4.12.2	3	MG	The mine site is designated as critical habitat and Essential Fish Habitat (EFH) for Chinook salmon, and many of the area streams also are designated as critical habitat for steelhead trout and/or bull trout.	This should be corrected to "portions of streams within the mine site" as not all streams and segments are critical habitat for Chinook.
105	4.12-2	4.12.2	3	MG	The effects described are expected to be similar for all fish species in the analysis area.	No basis for this assumption is provided and no basis is provided to support that the effects would be similar for all species in the analysis area. Delete or substantiate.
106	4.12-3	4.12.2	1	MG		Please include mention that population estimates are in fact available for the Yellow Pine Pit and that some population estimates were made based on stream electro-fishing.
107	4.12-3	4.12.2.1	2	MG	There is a lack of a site-specific, two-dimensional Hydraulic-based habitat	This is incorrectly stated. It should be stated with the phrase "one-dimensional modeling"
108	4.12-3	4.12.2.2	3, bullet 2	MG	The constructed and enhanced stream reaches would perform as described in the Stream Design Report (Rio Applied Science and Engineering [Rio ASE] 2019).	Define the following terms: - Constructed stream/channel - Enhanced stream/channel - Reclaimed stream/channel - Ditch All of these terms are used in reference to stream channels identified in the Rio ASE Stream Design. The Rio ASE design referenced here and elsewhere in this report defines "Restored" streams following the definitions provided in 33 DFR 332.2. "Constructed stream" and "restored stream" have two very different connotations. References to stream restoration efforts as "constructed channels" should include a definition or an explanation of the proposed construction/restoration plan. Also, the difference between restored and enhanced stream channel should be defined as is done in the Rio ASE Stream Design Report.
109	4.12-3	4.12.2.2	3	MG		This section on assumptions also covers areas of uncertainty, but it is incomplete because it does not describe the uncertainty and incomplete data that is the case for methods used by the USFS in this section, specifically flow-productivity, Intrinsic Potential, PHABSIM habitat, and Occupancy Modeling. Midas Gold discussed the application of the flow-productivity modeling for Chinook salmon based on data from Johnson Creek, and in November 2018, filed Comments and Questions on NOAA Fisheries Technical Memorandum on Flow-Productivity in Johnson Creek, Valley County, Idaho bringing up questions on this analysis and its applicability to the upper EFSFSR. NOAA responded to this technical memorandum, but nothing is provided here for the reader to understand that this analysis was based on relationships from other streams and as a result has associated uncertainty. Please revise.
110	4.12-3	4.12.2.2	3, bullet 1	MG	The proposed EFSFSR fish tunnel under Alternatives 1, 2, and 3 would provide passage for all four special status fish species. This assumption is based on professional judgment and review of other similar or longer tunnels that have been documented to be fish passable (Gowans et al. 2003; Rogers and Cane 1979; Wollebaek et al. 2011). This analysis also includes a brief description of the effects if the tunnel does not provide passage as planned (USFWS 2019).	This should be updated to include mention of the longest existing fishway currently operating successfully on the North Fork Clackamas River. https://www.fisheries.noaa.gov/feature-story/noaa-works-partners-develop-state-art-fish-passage

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111	4.12-3	4.12.2.2	3, bullet 1	MG	The proposed EFSFSR fish tunnel under Alternatives 1, 2, and 3 would provide passage for all four special status fish species. This assumption is based on professional judgment and review of other similar or longer tunnels that have been documented to be fish passable (Gowans et al. 2003; Rogers and Cane 1979; Wollebaek et al. 2011). This analysis also includes a brief description of the effects if the tunnel does not provide passage as planned (USFWS 2019).	Please add from USFS 2019: "Trapping and transportation of fish also may be necessary if the EFSFSR tunnel does not pass fish upstream and/or downstream. Truck and haul operations would be implemented as a management measure if needed. If this occurs, it could negatively affect some individuals during trapping activities, transportation, or release previously described."
112	4.12-3	4.12.2.2	3, bullet 4	MG	The stream flow analysis within the combined stream and pit water temperature models (Stream and Pit Lake Network Temperature [SPLNT] models, Brown and Caldwell 2018, 2019b,c) accurately reflect future conditions, which is based on historic conditions.	Modeling was not based on historic conditions; the SPLNT model was calibrated with available data using the available water temperature data from recent years.
113	4.12-4	4.12.2.3.1	1, bullet 1	MG	Construction and Operations: fish bearing streams would be diverted into ditched channels, enhancements would occur in some stream channels, existing barriers to natural fish movement would be removed, and new barriers would be created.	It is not correct that all fish-bearing streams would be diverted. Correct to "some fish-bearing streams".
114	4.12-4	4.12.2.3.1	2, bullet 1	MG	ditched channels	Diversion channels are proposed with a broad range of characteristics. Not all diversion channels are ditches. Define/describe the various types including the diversion around Hangar Flats pit lake that includes a floodplain and habitat structures.
115	4.12-7	4.12.2.3.1	Table 4.12-1	MG	In-Stream Mining-related Work	The left column is referring to both Mining and Restoration Work without differentiating. This table largely comes from Rio ASE where it was identified as a "proposed construction schedule for stream design implementation as it relates to key benchmarks in the mine sequence." Specifying that the "In-Stream Mining-related Work" column represents both mining benchmarks (i.e. diversions) and restoration design implementation (i.e. reclaimed channels). Please separate the mining (impacts) into one column and the reclamation (restoration) into a separate column so it is clear which is an impact and which is a benefit.
116	4.12-7	4.12.2.3.1	Table 4.12-1	MG	In-Stream Enhancements	In the original summary from which these data were derived (Rio ASE Stream Design 2019), Stream Enhancements were identified with the other stream-related construction items. Calling out stream enhancements separately from the "In-Stream Mining-related Work" implies that the "Mining-related Work" is an impact and the "Enhancements" are the only benefits. Suggest separating into 3 columns: Impacts, Enhancements, and Restoration.
117	4.12-7	4.12.2.3.1	Table 4.12-1	MG	Sediment control and rock drain constructed on East Fork Meadow Creek.	No description of the proposed Blowout Creek sediment control and rock drain provided nor is their discussion of the improvements to sediment this will provide. Please include these important project components in this summary to explain to the reader that the rock drain is to stabilize the unstable and eroding slopes in Blowout Creek and the grade control structure is to restore the water table in the otherwise incised meadow in the upper watershed. (This comment applies to some other alternatives)
118	4.12-7	4.12.2.3.1	Table 4.12-1	MG	reclaimed channel	The reclaimed channel is a diversion designed with habitat to function naturally (including natural channel pattern, shape, pool, LWD, vegetation, etc.). Please distinguish this high-quality channel from other diversion ditches.
119	4.12-8	4.12.2.3.1	Table 4.12-1	MG	Blowout Creek: enhancements in meadow channel upstream of boulder chute.	No description of these enhancements is provided or the benefit they would provide. Please describe the Blowout Creek enhancements as noted above.
120	4.12-8	4.12.2.3.1	Table 4.12-1	MG	diverted	Flows are being removed from the diversion and placed back into the restored channel - the flow is therefore restored -- no longer diverted. Please correct.
121	4.12-8	4.12.2.3.1	Table 4.12-1	MG		Add to Year 10: Yellow Pine pit backfilled and restoration of streams over the backfill begins (EFSFSR, Hennessy Cr, and Midnight Cr.)
122	4.12-8	4.12.2.3.1	Table 4.12-1	MG	diverted	Flows are being removed from the diversion and placed back into the restored channel - the flow is therefore restored -- no longer diverted.
123	4.12-9	4.12.2.3.1	Table 4.12-1	MG		Add to Year 13: Groundwater table restored in upper East Fork Meadow Creek meadow.
124	4.12-9	4.12.2.3.1	Table 4.12-1	MG	diverted	Flows are being removed from the diversion and placed back into the restored channel - the flow is therefore restored -- no longer diverted.
125	4.12-10	4.12.2.3.1	Table 4.12-2a	MG		Missing column to identify length of restored stream after mining and Net difference (Restored - Baseline). As shown the table does not show all stream channel changes as identified in table 4.12-1 above. Please add columns for "Length of Restored Stream" and "Net Change" to facilitate the reader's understanding of the full project. All stream lengths (baseline, interim, and restored) are available per SFA Reach in the Rio ASE 2019 SFA Ledger.
126	4.12-10	4.12.2.3.1	Table 4.12-2a	MG		Table does not include Hennessey, Midnight, West End, and Garnet Creeks. Unclear if this includes both perennial and non-perennial streams. Please provide more information regarding the methods, source(s), and stream types used to derive the table.
127	4.12-10	4.12.2.3.1	Table 4.12-2a, column 2	MG	Length of Existing Channel Removed	This should be Length of Stream Channel Temporarily Impacted.
128	4.12-11	4.12.2.3.1.1	1	MG	Stream channel changes that would occur in this stream reach, include mining the Yellow Pine pit and constructing the EFSFSR tunnel to redirect flow around the west side of the Yellow Pine pit during mining.	When summarizing the project, please include all phases of the project not just the impacts. Please add, "backfilling Yellow Pine pit and restoring the stream over the top of the backfill, diverting Fiddle Creek while placing a DRSF, then restoring Fiddle Creek over the top of the DRSF."

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129	4.12-11	4.12.2.3.1.1	1	MG		Please provide documentation that this stream segment currently supports steelhead. No actual steelhead were captured or identified during baseline studies. If referencing historical occurrence, provide citations.
130	4.12-11	4.12.2.3.1.1	2	MG		Where is this shown in tabular form showing changes over time and net effect including restoration?
131	4.12-11	4.12.2.3.1.1	2	MG	Changes in stream channels directly altered would be permanent.	Please accurately show changes in stream channel lengths including replacement and restoration of streams. Changes in stream channels include all changes, including restoration. See Stream Design Report and Conceptual Stream and Wetland Mitigation Plan (CMP)
132	Global, 4.12-11, 4.12-12, 4.12-13	4.12.2.3.1.1, 4.12.2.3.1.2	Multiple	MG	channel	Channel and floodplain. Global comment. When describing the restored channel, all restored channels also include an appropriately sized floodplain to enable channel migration, scour, and evolution in the future. Please add this detail wherever needed.
133	4.12-12	4.12.2.3.1.1	1, bullet 1	MG	fish passage would be available to the upper EFSFSR	Please note that fish passage would be provided to the upper EFSFSR AND tributaries including lower Meadow Creek.
134	4.12-12	4.12.2.3.1.1	1, bullet 3	MG	rocks	An energy dissipation pool (not rocks) would be placed at the toe of the waterfall.
135	4.12-12	4.12.2.3.1.1	1, bullet 3	MG	Hennessy Creek...then connect to the constructed EFSFSR	Please include the following: "The connection to the EFSFSR is via a 1,193ft long channel accessible to fish and designed to support juvenile rearing habitat representing a net gain of 1,193ft of accessible habitat." Please include these important details.
136	4.12-12	4.12.2.3.1.1	1, bullet 4	MG	Midnight Creek...connecting to the EFSFSR	Please include the following: "The connection to the EFSFSR is via a 892ft long channel accessible to fish and designed to support juvenile rearing habitat representing a net gain of 892ft of accessible habitat." Please include these important details.
137	Global, 4.12-13	Global, 4.12.2.3.1.2	Multiple	MG	Natural	Global Comment: What is "natural upstream fish passage"? This phrase is commonly used in the report. Please clarify.
138	4.12-13	4.12.2.3.1.3	4	MG	This reach contains Chinook salmon	As with Stream Reach 2, it is important to note that Chinook salmon only exist in this reach as a result of periodic stocking (i.e., trap and haul).
139	4.12-14	4.12.2.3.1.6	3	MG	There would be no physical stream channel changes as part of the SGP in this stream reach.	What about West End Creek? West End Creek is in Stream Reach 6.
140	4.12-14	4.12.2.3.2	6, 7	MG		Please include discussion of mitigation measures as outlined in provided plans - Fish Mitigation Plan and Fishway Operations and Management Plan
141	4.12-14	4.12.2.3.2	7	MG	Injury or mortality also may be caused by flow reductions, water temperature changes, change in habitat structure, water quality changes, and reduced access to suitable habitat. These effects are described in the following sections.	Provide the reader with all potential effects not just those that may cause injury or mortality. Include positive effects associated with the project.
142	4.12-15	4.12.2.3.2	1	MG	potential impacts discussions	Potential impacts generally tend to include negative impacts but exclude positive impacts (restoration, enhancement, and other potential benefits of the project). Please note all phases of the project when describing a reach or project feature -- impacts and reclamation/restoration.
143	4.12-15	4.12.2.3.2.1	2	MG		Please include "Changes in Access" which is a significant component of the restoration strategy for the project.
144	4.12-15	4.12.2.3.2.1	2	MG	These activities could cause injury or mortality to fish that get caught in screens, or during removal activities (traps, dip nets, seine nets, electrofishing).	Screen mesh size would sized accordingly to help prevent entrainment and injury/mortality (i.e., NOAA criteria).
145	4.12-15	4.12.2.3.2.1	6	MG		This statement is using data from a specific study with a unique, custom built seine to calculate a mortality rate. Literature based information and statistics on mortality of handling salmonid species should be included to show the variability of mortality from typical salvage and handling techniques.
146	4.12-15,16	4.12.2.3.2.1	Whole section	MG		This entire section does not address or recognize the mitigation measures proposed in the Fish Mitigation Plan or Fishway Operations and Management Plan to avoid or minimize potential effects to salmonid species
147	4.12-16	4.12.2.3.2.1	Table 4.12-2b	MG	Length of Existing Channel Removed (km)	Update numbers to match SFA as noted previously.
148	4.12-17	4.12.2.3.2.1	1	MG		Fish density may be considerably reduced by flow reductions before salvage and relocation. Please revise to include.
149	4.12-18	4.12.2.3.2.1	3	MG	Outside of the zone of lethal or harmful shock waves, the vibrations caused by drilling and blasting have the potential to disturb fish causing stress or altering behavior.	Include citation
150	4.12-19	4.12.2.3.2.1	4	MG		More detail should be provided based on what is provided in the Fisheries and Aquatic Mitigation plan, which provides some measures that are more than those required by applicable regulations and standards.
151	4.12-20	4.12.2.3.2.1	1	MG	Spills occurring in the winter may be easier to contain because spilled material may not penetrate frozen ground as readily as unfrozen ground, and snow would absorb some spilled material; however, winter conditions also may slow the rate of the response.	Add citation for assertion that spills would be easier to contain in winter
152	4.12-20	4.12.2.3.2.2	3	MG		This paragraph does not mention the blasting protective measures proposed as part of the project; see Fisheries and Aquatic Mitigation Plan (FMP).
153	4.12-20	4.12.2.3.2.2	3	MG		Of the 64 stream crossings, should list the number assumed to be fish bearing rather than say ..."and a number of these would cross fish-bearing waterbodies" based on fish survey data, stream size, and stream gradient

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154	4.12-20	4.12.2.3.2.2	4	MG	The potential re-establishment of access upstream of these culverts could affect the composition of the aquatic community. Changes in types of fish present and the abundance of fish could increase the risk of injury and mortality for some species. For instance, additional habitat could benefit some species, while the presence of additional fish in previously inaccessible reaches would introduce competition for resources. These changes may affect the distribution and relative abundance of fish populations in affected streams. Furthermore, establishing or increasing access could allow non-native species to access upstream habitat that is currently blocked, such as brook trout.	Improving fish access is roundly accepted as a net positive for fish. Please provide references for the negative outcome and provide examples of the far more likely/prevalent positive outcomes.
155	4.12-20	4.12.2.3.2.2	5	MG	Furthermore, establishing or increasing access could allow non-native species to access upstream habitat that is currently blocked, such as brook trout. Brook trout are known to compete with bull trout for resources and habitat (USFWS 2008). Brook trout also are known to hybridize with cutthroat trout, which has the potential to negatively impact the genetic integrity,	Where are brook trout now and what is required to make this potential impact occur (stocking of brook trout?). Adams et al. (2002) cited in Section 3.12 should be used to better characterize the potential effects.
156	4.12-22	4.12.2.3.2.2	2	MG		How is length of habitat indices converted to number of fish?
157	4.12-22	4.12.2.3.2.2	3	MG	Past accident records indicate that of all the substances to be transported, diesel fuel may pose the highest risk to fish and fish habitat. This is because large quantities of diesel fuel are transported in each load, numerous trips are made each year, and the substance is a liquid that rapidly flows down gradient toward nearby streams.	What are the past accident records? Does toxicity also determine risk of transporting hazardous materials?
158	4.12-22	4.12.2.3.2.2	4	MG		How did the NEPA team arrive at that conclusion that the intensity of a spill could be high? Please define for the reader what is meant by intensity and severity of a spill should it occur.
159	4.12-22	4.12.2.3.2.2	Table 4.12-3	MG		What are the specific sources for length of each habitat type?
160	4.12-23	4.12.2.3.2.2	1	MG	As an example, schools of adult Chinook salmon (20 to 100 individuals) have been seen in the EFSFSR and Johnson Creek. Thus, a large spill could potentially kill a substantial number of adult salmon depending on various factors (NMFS 1995).	Provide citation or documentation
161	4.12-23	4.12.2.3.2.2	1	MG	It is expected the risk associated with a spill large enough to negatively affect fish or aquatic habitat would generally be low. This varies depending on the substance that is spilled but considers typical substances that would be transported.	What does a low, moderate, or high risk of spill mean? Inform the reader the difference between the risk categories.
162	4.12-23	4.12.2.3.2.3	7	MG	The magnitude of an injury or mortality could be high to individual fish impacted by activities at specific locations throughout the SGP, such as dewatering and translocation activities. These activities include dewatering, fish salvage, relocation, blasting, changes in access, or hazardous material spills.	"High" mortality has not been quantified or described anywhere in this section. Please provide a basis for this statement or revise.
163	4.12-23	4.12.2.3.2.3	Whole section	MG		Recommend providing context or basis for summary conclusions of potential effects on fish species.
164	4.12-24	4.12.2.3.3	3	MG	elements that reflect water quality, habitat access, channel conditions and dynamics, flow and hydrology, and watershed conditions	Please include all available pertinent data, including habitat elements which change within most reaches throughout the life of the project.
165	4.12-24	4.12.2.3.3	3	MG	(1) Water Temperature; (2) Sediment/Turbidity; (3) Physical Barriers; (4) Chemical Contaminants; (5) Change in Peak/Base Flows; and (6) Integration of Species/Habitat Conditions.	What process was used to select the specific elements to use (or not use) in this evaluation? No Habitat Elements are included despite the title of this section "Habitat Elements/Watershed Condition Indicators". Also, no Channel Conditions and Dynamics elements are included despite the indicator being listed above as used to evaluate stream function.
166	4.12-24	4.12.2.3.3	4	MG	A Stream Functional Assessment (SFA) (Rio ASE 2019) was developed to model the predicted changes in the WCIs from baseline through construction, operations, closure and reclamation and the mine site. Several other methods also were used and are described in Section 3.12.4.7.3.3, East Fork South Fork Salmon River Watershed Baseline - Mine Site Watershed Condition Indicator Described in Detail	Please clarify if and how the Rio ASE SFA used in this analysis. It appears the SFA Ledger was used in part - only reporting the WCI scores, while the main purpose of the SFA Ledger was to combine stream length, size, and aggregated function (WCI scores) to compute a comprehensive and holistic Functional Unit score for each mine year to objectively and quantitatively compare each of the alternatives. Please describe also how Rio ASE SFA Ledger reach results were aggregated into the much larger EIS reaches.
167	4.12-25	4.12.2.3.3	Table 4.12-4	MG		Changes in Habitat Indicators occur in nearly all reaches, and to a lesser degree changes in Channel Conditions and Dynamics occur, but are excluded from this assessment. Please include all pertinent data.
168	4.12-25	4.12.2.3.3	Table 4.12-4	MG	FUR (-)	Rio ASE reports Temperature as FR (not FUR) from Mine Years 18 on for Reach 1.
169	4.12-25	4.12.2.3.3	Table 4.12-4	MG	FR (*)	Rio ASE Reports Reach 2 Temp is FUR from Mine Year -1 on.
170	4.12-25	4.12.2.3.3	Table 4.12-4	MG	Integration of Species/Habitat	This WCI is not from Rio ASE 2019. Please update the notes at the bottom to indicate the source of these data.

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171	4.12-25	4.12.2.3.3	Table 4.12-4	MG	Table Source: Rio ASE 2019	Need source for Integration of Species and Habitat WCI. Not from Rio ASE.
172	4.12-25	4.12.2.3.3	Table 4.12-4	MG	where the model predicts a change	First: There are many additional elements that do change in several reaches that were excluded as noted above. Second: No change (i.e., no impact) is also significant and would indicate successful avoidance and/or minimization. By excluding "no change" from the analysis it is unclear which areas are not impacted at all versus those areas where the impact has been successfully mitigated to the point where the measurable change is negligible with regards to the WCI evaluated. Please include all pertinent information as provided from Rio ASE SFA Ledger.
173	4.12-25	4.12.2.3.3	Table 4.12-4	MG	Functional Index (FI);	Define Functional Index.
174	4.12-26	4.12.2.3.3.1	2	MG	These life cycle processes are impeded and may risk survivability if life history functions are impaired by increases in water temperatures greater than the tolerance limits for the species.	Please inform the reader what life cycle processes (i.e., spawning, rearing, migration, etc.) may be at risk. Life cycle processes may be different for the species of interest. We assume you are referring to only the freshwater life cycle processes.
175	4.12-26	4.12.2.3.3.1	3	MG	Table 4.9-11 in Section 4.9.2.1.2.1, Surface Water and Groundwater Quality – Mine Site Temperature – Alternative 1, summarizes the projected temperatures for selected years for the predicted maximum weekly summer condition, average weekly summer condition, maximum weekly fall condition, and average weekly fall temperatures	Suggest rewording to clarify: "Table 4.9-11 in Section 4.9.2.1.2.1, Surface Water and Groundwater Quality – Mine Site Temperature – Alternative 1, summarizes the predicted maximum and average temperatures for the maximum weekly summer condition and the maximum weekly fall condition..."
176	4.12-28	4.12.2.3.3.1	2	MG	The following discussion provides an overview of the predicted water temperature changes that would affect fish and fish habitat to varying degrees depending on the timing, magnitude, duration, and frequency of exposure to the temperature tolerance thresholds for each species and **life history function** (e.g., spawning, juvenile rearing).	Is this statement referring to life history or life stage. Please make the appropriate selection.
177	4.12-28	4.12.2.3.3.1	3	MG	It should be noted the SPLNT models (Brown and Caldwell 2018, 2019a,b,c) used for the temperature predictions in Table 4.12-5 do not account for changes to stream temperatures caused by changing climate conditions.	Global for all temperature discussions regarding SPLNT model: It should also be noted that the SPLNT model incorporates documented conservatism that would lead toward over estimating temperatures including: Only evaluating a 7ft planting width despite a much wider planting plan, assuming linear growth curves under-representing early (faster) growth rates, assuming no overlap in canopy although it is understood that multiple levels of canopy would develop, and the use of conservative (slower/wider) rating curves for future conditions modeling).
178	4.12-28	4.12.2.3.3.1	3	MG	In reality, water temperatures would likely be higher if climate change had been incorporated into the model	This sentence is identifying a future condition as reality. Please rephrase: "Water temperature predictions would likely be higher if climate change had been incorporated into the model."
179	4.12-28	4.12.2.3.3.1	3	MG	It should be noted the SPLNT models (Brown and Caldwell 2018, 2019a,b,c) used for the temperature predictions in Table 4.12-5 do not account for changes to stream temperatures caused by changing climate conditions. This means that modeled future water temperatures (e.g., EOY 112) assumed that without Alternative 1, stream temperatures would be similar to the historic water temperature data (Brown and Caldwell 2018). In reality, water temperatures would likely be higher if climate change had been incorporated into the model. For additional information regarding potential climate change impacts to water temperatures see Section 3.12.4.7.3.3, East Fork South Fork Salmon River Watershed Baseline Conditions – Water Temperature.	Recommend editing to clarify: It should be noted the SPLNT models (Brown and Caldwell 2018, 2019a,b,c) used for the comparative temperature predictions in Table 4.12-5 do not account for changes to stream temperatures caused by changing climate conditions. However, the models were developed using the warmest, driest periods in the summer and fall, and they do not account for growth of vegetation that would be expected to occur in the project area outside of the simulated 7-ft buffer strip on either side of restored reaches. All other reaches and areas beyond the 7-ft riparian planting zone are assumed to have a cleared vegetative state or baseline vegetation heights and densities if no clearing occurred (i.e., no growth from baseline conditions even 112 years after closure). Additional conservative assumptions include assuming linear growth curves under-representing early (faster) growth rates and assuming no overlap in canopy although it is understood that multiple levels of canopy would develop (Brown and Caldwell 2019). It is likely that growth of vegetation would occur over time across the project site, beyond that which was simulated. Also, the increased hyporheic exchange resulting from the restored channel designs has also been discounted significantly, as baseflow contributions in lined reaches are assumed zero. Because the liner is installed several feet below the stream bed and extends out to the edge of the floodplain, a shallow groundwater zone will contribute baseflows to these streams at temperatures lower than the stream. To test the potential impacts of climate change during model development, sensitivity analyses were conducted to test the effects of changing air temperature by plus or minus 5C every hour of the day. The effect over this range was a difference of 1C, so a 5C increase in air temperature (assumed even at night) would have the effect of raising water temperatures by 0.5C (BC 2018). For additional information regarding potential climate change impacts to water temperatures see Section 3.12.4.7.3.3, East Fork South Fork Salmon River Watershed Baseline Conditions – Water Temperature.
180	4.12-28	4.12.2.3.3.1	4	MG	less shade	Please correct to indicate that decrease in streamflow is not a primary driver of changes in water temperature; shade is the primary variable. See SPLNT Model Report (BC 2018).
181	4.12-28	4.12.2.3.3.1	4	MG	Water temperatures at the mine site would be increased primarily by two activities: the decrease in streamflow caused by the use of water for mining activities, and the change in stream habitat structure to longer and flatter meandering channels, which initially would have less shade due to riparian vegetation having been removed by general SGP disturbances including construction and operations activities.	Suggest rewording to clarify: "Water temperatures at the mine site would be increased primarily by two activities: discharges from pit lakes and the change in stream habitat structure to longer and flatter meandering channels, which initially would have less shade due to riparian vegetation having been removed by general SGP disturbances including construction and operations activities."
182	4.12-28	4.12.2.3.3.1	5	MG	most consistently favorable	Please correct to say that "temperatures would be the most consistently favorable." Not necessarily all conditions within the reach.
183	4.12-28	4.12.2.3.3.1	5	MG	... Nonetheless, at EOY 112, water temperatures are predicted to be slightly warmer than baseline conditions.	Suggest rewording to clarify: ... Nonetheless, at EOY 112, water temperatures are predicted to be slightly warmer than baseline conditions in the lower part of this reach.

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184	4.12-29	4.12.2.3.3.1	1	MG	During the summer season, SPLNT modeling predicts that even under baseline conditions average maximum weekly water temperatures have the potential to reach less-than-optimum levels for salmonids. At the beginning of the post-closure period (EOY 18), Meadow Creek upstream of the East Fork Meadow Creek is predicted to have a maximum summer temperature of 26.2°C, which is more than 8 degrees greater than the baseline condition (Table 4.12-5). The main reason for the predicted high temperature is the limited vegetation regrowth that would occur during the first six years post-closure, and the relatively low flows that would persist in Meadow Creek until the new creek channel is constructed.	Recommend adding additional information: During the summer season, SPLNT modeling and stream temperature data indicate that under baseline conditions daily maximums for the maximum weekly summer condition reach less-than-optimum levels for salmonids. At the beginning of the post-closure period (EOY 18), Meadow Creek upstream of the East Fork Meadow Creek is predicted to have a maximum summer temperature of 26.2°C, which is more than 8 degrees greater than the baseline condition (Table 4.12-5). The main reason for the predicted high temperature is the limited vegetation regrowth that would occur during the first six years post-closure, and the relatively low flows that would persist in Meadow Creek until the new creek channel is constructed. By EOY22, the maximum summer temperature is predicted to be 21.1°C which is approximately 3°C higher than baseline, and by EOY112, temperatures are within 2°C of baseline.
185	4.12-29	4.12.2.3.3.1	2	MG	For example, Appendix J-2, Table 1, indicates that a 7-day exposure to 21°C or more could be lethal to Chinook salmon.	Global: Refer to the life stage for which the temperature threshold applies (i.e., adult Chinook salmon).
186	4.12-29	4.12.2.3.3.1	2	MG	During the life of the mine and irrespective of other environmental constraints in Meadow Creek, maximum water temperatures have the potential during the summer season to exceed temperatures that are known to be stressful and even lethal to all the special status salmonids. For example, Appendix J-2, Table 1, indicates that a 7-day exposure to 21°C or more could be lethal to Chinook salmon. Meadow Creek downstream of the East Fork Meadow Creek would have potential water temperatures that are lethal to Chinook salmon during the summer in perpetuity. Under such circumstances, Meadow Creek would have a WCI rating for salmonids during the summer of functioning at risk at best, and potentially functionally unacceptable for much of the time.	There are no simulated temperatures for any alternative or mine year that exceed the lethal threshold of >21C for 7 days. Guidance summarized in Table 1 of Appendix J-2 indicates that the daily average is the appropriate comparison for evaluation of lethal conditions; there are no mine years or proposed alternatives with daily averages that exceed this value. Only simulated daily maximums exceed 21C, and this does not constitute a lethal condition as noted in Appendix J-2: "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22°C. If the maximum water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." Suggest editing to: During the life of the mine and irrespective of other environmental constraints in Meadow Creek, maximum water temperatures have the potential during the summer season to exceed temperatures that are known to be stressful to all the special status salmonids, but conditions are not expected to be lethal or cause migratory blockages. For example, Appendix J-2, Table 1, indicates that a 7-day exposure to 21°C or more could be lethal to Chinook salmon, and there are no simulated Alternatives or mine years that have a simulated, sustained temperature greater than 21°C in any reach (daily averages do not exceed this threshold). Meadow Creek downstream of the East Fork Meadow Creek has daily maximum temperatures under the maximum weekly summer condition of 21.1°C by EOY22 which is compliant with the IDEQ criteria for Coldwater (22°C). Neither baseline conditions nor simulated mine years under Alternative 1 are compliant with IDEQ criteria for bull trout or salmonid spawning (13°C) or USFS criteria for Chinook salmon, bull trout, or steelhead trout (temperatures greater than 15.5°C to 17.7°C are considered functioning unacceptably depending on the species).
187	4.12-29	4.12.2.3.3.1	3	MG	Baseline water temperature conditions in this reach are predicted to be less than optimum during the summer season with the potential for the maximum temperatures to reach sublethal and even lethal levels as discussed for Meadow Creek. Even at EOY 112, the EFSFSR has the potential to reach lethal levels during the summer. At temperatures greater than 21°C, Chinook salmon migratory blockages to spawning locations could occur (Appendix J-2, Table 1). Given that Chinook salmon (spring/summer-run) generally migrate from mid-June to late August and spawn in August, the water temperature in a given year, if too high, may impede movement to the upper EFSFSR watershed where spawning conditions are more favorable from a temperature perspective.	Simulated temperatures are not at lethal levels for any Alternative or mine year or at levels to cause migratory blockage. Suggest editing to: Baseline water temperature conditions in this reach exceed optimum temperature thresholds during the summer season with daily maximum temperatures in the summer up to 17.4°C upstream of the YPP and 15°C downstream of the YPP. Under Alternative 1, the potential for the daily maximum temperatures to reach stressful levels with simulated daily maximums up to 22.3C during early post closure. By EOY 112, daily maximum temperatures up to 21.6°C are predicted during the summer upstream of Sugar Creek and 19.3°C downstream of Sugar Creek. At temperatures greater than 21°C as a daily average, Chinook salmon migratory blockages to spawning locations could occur (Appendix J-2, Table 1). None of the daily averages simulated for Alternative 1 for any mine year exceed 16.3°C except for lower Meadow Creek which has a daily average during the maximum weekly summer condition of 19.2°C.
188	4.12-29	4.12.2.3.3.1	4	MG	Water temperatures in this reach during the summer have the potential to adversely impact all four salmonid species and result in WCI ratings that are at best functioning at risk, and at worst functioning unacceptably.	Suggest editing to clarify: Water temperatures in this reach during the summer have the potential to adversely impact Chinook salmon, bull trout, and westslope cutthroat trout and result in WCI ratings that are at best functioning at risk, and at worst functioning unacceptably. For steelhead trout, the temperature changes would be beneficial and increase habitat.
189	4.12-29	4.12.2.3.3.1	5	MG	...However, maximum summer (19.3°C) and fall (14.4°C) temperatures and average summer temperatures (13.2°C) are still predicted to be as much as 4.8 degrees greater than baseline 100 years into the post-closure period (Table 4.12-5).	Recommend editing to clarify: ...However, maximum summer (19.3°C) temperatures are still predicted to be as much as 4.8 degrees greater than baseline 100 years into the post-closure period (Table 4.12-5) partly due to the removal of YPP which mitigates diurnal temperature variation and reduces summer maximum temperatures by 3°C under baseline conditions (BC 2019 Proposed Action Report). Maximum fall (14.4°C) temperatures and average summer temperatures (13.2°C) are within 2.5°C and 0.8°C of baseline, respectively.
190	4.12-30	4.12.2.3.3.1	2	MG	Sediment and Turbidity – Alternative 1	Please include removal of the single largest fine sediment source in the subwatershed (Blowout Creek gully) and the potential for sediment retention in the lower-gradient streams designed as well as within Hangar Flats pit. Please include discussion of the following, quantification of stream sediment/turbidity, mitigation measures or BMP's and their effectiveness, and analysis and documentation for road crossing effects on stream sedimentation. Please state the implicit assumptions in this analysis and associated conclusions or provide justification and evidence supporting them. (This comment also applies to other Alternatives.)
191	4.12-30	4.12.2.3.3.1	3	MG	Proposed activities at the mine site would result in some erosion and sedimentation	Erosion is proposed to be contained on-site with standard stormwater BMPs so as not to result in stream sedimentation. There is risk of sedimentation if some sediment is not captured using stormwater BMPs. Please revise to indicate the assumptions implicit in this statement and the analysis included below. What BMPs were considered in this analysis? Were any analyses conducted to quantify potential affects, or are all predicted impacts qualitative and based on assumption?

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192	4.12-30	4.12.2.3.3.1	Whole section	MG	Sediment and Turbidity section	List, describe, or provide a reference to some of the control measures that will minimize and/or avoid sediment production associated with the SGP (i.e., mine site and access route).
193	4.12-31	4.12.2.3.3.1	7	MG	If not properly designed, constructed, and maintained, culverts and bridges could alter natural streamflow, velocity, and morphology leading to an increased risk of scour and erosion at the structure outlet and inlet	In addition to the potential negative impact, there is also a potential positive impact to replacing old culverts and bridges: If properly designed and replacing poorly designed or degraded bridges/culverts, streamflow, velocity, and morphology could lead to improved stream function and less scour and erosion. Please include discussion of potential positive impacts.
194	4.12-33	4.12.2.3.3.1	3	MG	The baseline WCI rating for sediment in the mine site stream reaches ("functioning at unacceptable risk") is likely to remain the same under Alternative 1 due to increased potential for erosion and sedimentation under this alternative compared to baseline	Please include in this analysis the removal of the single largest fine sediment source in the subwatershed (Blowout Creek gully) and the potential for sediment retention in the lower-gradient streams designed as well as within Hangar Flats pit. Please include discussion and quantification where possible of sediment causing features and sediment mitigation measures. Indicate if the mitigation measures are appropriate, and provide documentation or analysis supporting the conclusion that there is an increased potential for erosion and that the increased potential would also result in an actual increase in erosion. The increased potential for erosion is not the same as a predicted increase in erosion and sedimentation. The WCI is not based on potential for erosion, it is based on actual fine sediment in the stream. Please provide justification for these conclusions.
195	4.12-33	4.12.2.3.3.1	5	MG	no species can move upstream or downstream	Incorrect. A complete barrier no species can move upstream. Just upstream; not up/down stream.
196	4.12-37	4.12.2.3.3.1	Table 4.12-6	MG	Table 4.12-6 Existing and Expected Future Fish Passage Barriers in Mine Site Area Streams under all Alternatives	The net length of habitat blocked or made available should be summarized. As it is presented, it up to the individual reader to determine which barriers are removed then reconcile with the added barriers on the next page to determine if there will be more or less upstream habitat made available.
197	4.12-37	4.12.2.3.3.1	Table 4.12-6	MG	Removed/Added	Fish Habitat upstream of blockage (km) - please explain what the numbers mean. Not sure of what is removed/added and these numbers are additive or not
198	4.12-39	4.12.2.3.3.1	3	MG	The Fiddle Creek diversion and then DRSF would block 3.95 km of fish habitat.	This habitat is already blocked. Please clarify.
199	4.12-39	4.12.2.3.3.1	4	MG	However, the removal of natural barriers to access can have negative results as well. These include changes to established food webs, increased competition for resources between fish species and life stages, introduction of or increase in predation, and/or the introduction of invasive species such as brook trout.	Is the discussion on removal of <u>natural barriers</u> relevant to the SGP? No natural barriers are proposed to be removed. Please clarify.
200	4.12-40	4.12.2.3.3.1	5	MG	Mining activities would alter the mine site geochemistry by exposing development rock in the pit walls, and by generating mine waste in the form of tailings and development rock that would be disposed locally at the mine site (SRK 2018).	Please include proposed mitigation/environmental protection/reclamation measures from Midas Gold.
201	4.12-41	4.12.2.3.3.1	Table 4.12-7	MG	Exceedance of Analysis Criteria, Operations and Post-Closure, for Assessment Nodes and Hangar Flats Pit Lake, Alternative 1	Please add to this table exceedances during baseline conditions for comparison.
202	4.12-50	4.12.2.3.3.1	3	MG	exceedances of the NMFS and USFWS and other applicable criteria for antimony, arsenic, copper, and mercury are anticipated to extend indefinitely post-closure	Please revise section to characterize relative to existing condition and the potential for improvements in water quality over that of the baseline. From the SRK modeling provided by Midas Gold it has been modeled that the total number of constituents exceeding thresholds will go down and the levels of most constituents would decrease. The modeling suggests the project would reduce contamination. Please include this comparison.
203	4.12-50	4.12.2.3.3.1	3	MG	Impacts due to aluminum, antimony, and arsenic are not anticipated	The previous sentence identified exceedances for antimony and arsenic extending indefinitely, but this sentence states impacts are not anticipated. Please clarify.
204	4.12-54	4.12.2.3.3.1	2	MG		Only portions of Meadow Creek would experience this level of flow reduction. Please clarify and state the lengths of Meadow Creek affected and the range of flow reductions.
205	4.12-54	4.12.2.3.3.1	2	MG	There were no models developed or used to analyze the potential impacts to fish that over-winter in the SGP area.	This section characterizes all flow reductions as having the same magnitude of impact, which is incorrect. The available data on flow-habitat response (PHABSIM) and stream cross-sectional data provided in the aquatic baseline studies and the Stream Design Report in the CMP should be used to establish a general threshold for when impacts may become measurable, manifested, or significant.
206	4.12-55	4.12.2.3.3.1	1	MG	There is substantial uncertainty in the prediction of impacts of flow reductions from a lack of understanding of the relationship between flow and fish populations and site and time-sepecific variations in how aquatic organisms react to habitat changes (Bradford and Heinonen 2008).	Bradford and Heinonen (2008) is not the source for this entire statement. Please clarify.
207	4.12-55	4.12.2.3.3.1	2	MG		If adults build their redds after flow is already reduced then they will likely select areas that will remain permanently wetted. This would reduce the chance of redds freezing or becoming dry during winter. Please include some discussion on this topic if streamflows remain constant during winter.
208	4.12-55	4.12.2.3.3.2	3	MG	4.12.2.3.3.2 Changes to WCIs outside the Mine Site – Alternative 1	This discussion does not mention that new and upgraded roads would be decommissioned and/or returned to baseline conditions after mine closure.
209	4.12-56	4.12.2.3.3.2	Table 4.12-9	MG	WCI	Please clarify why all of the WCI are discussed and evaluated for off-site facilities where there are far less data and analysis, but many WCI are excluded from the analysis and discussion on the mine site where data are far more readily available.
210	4.12-56	4.12.2.3.3.2	Table 4.12-9	MG	Entire table	For those indicators where effects are likely to occur, please indicate if the functional rating for the WCIs is likely to change.
211	4.12-57	4.12.2.3.3.2	Table 4.12-9	MG	A decline in FI from Baseline conditions is likely to occur as a result of offsite activities during construction and operations, such as increased traffic, disturbed or unstable soils and slopes, and water crossings. A decline in FI for fine sediment is anticipated.	Explain FI. Why would a decline in FI not result in a decline in the Element Score (FR to FUR)?

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212	4.12-58	4.12.2.3.3.2	Table 4.12-9	MG	upgrades	Upgrades to existing roads would not change the road density which is based solely on the length of road (not the size of road).
213	4.12-60	4.12.2.3.4.1	2	MG	Intrinisic Potential Modeling Alternative 1	Intrinsic potential models differ from other fish-habitat suitability models in attempting to estimate the potential to provide high-quality habitat and not the actual condition of habitat. The reader should be advised that IP habitat is not actual habitat condition, but rather is an estimate of potential habitat. https://www.fs.fed.us/pnw/pubs/pnw_gtr880/pnw_gtr880_032.pdf The model does not predict the actual distribution of "good'' habitat, but rather the potential for that habitat to occur, nor does the model predict abundance or productivity. Additionally, the model does not predict current conditions, but rather those patterns expected under pristine conditions as related through the input data. https://www.fisheries.noaa.gov/inport/item/56775/printable-form
214	4.12-60	4.12.2.3.4.1	2	MG	stream gradient, wetted width, and bankfull width.	Provide citation to support this statement.
215	4.12-61	4.12.2.3.4.1	Figure 4.12-4	MG	MC4.2, HL1, HL2, full flow	Correct to MC4.1, MC4.2, MC5, and MC6. HL1 and HL2 are part of Hangar Lake at year 20.
216	4.12-61	4.12.2.3.4.1	Figure 4.12-4	MG	HL1 and HL2 = Meadow Creek SFA reaches through the Hangar Flats pit lake.	HL1 and HL2 (i.e. Hangar Flats pit lake) were not included in the IP analysis. Please explain these results or remove them.
217	4.12-61	4.12.2.3.4.1	Figure 4.12-4	MG		This is in meters and the corresponding table below in in kilometers; confusing the reader; use on or the other so comparable.
218	4.12-62	4.12.2.3.4.1	Table 4.12-10	MG	Chinook Salmon Length of Stream Habitat per IP Rating	It should be noted that the many stream reaches in the project area are near the minimum threshold for IP wetted width, and predicted project alterations to those channels often results in a reduction in the wetted width estimate by only a few inches due to different calculation methods used for future vs. existing conditions. These few inches result in a change in IP from some to none in several instances. The sensitivity of this analysis and the data used is not discussed, but would prove useful given that the error in predicting channel wetted width is much greater than the difference between existing and proposed wetted width resulting in a loss of predicted IP habitat in many locations. There were no such increases in IP habitat as a result of greater predicted wetted widths.
219	4.12-62	4.12.2.3.4.1	Table 4.12-10	MG		Recommend incorporating accessibility of the IP shown in the table as well.
220	4.12-63	4.12.2.3.4.2	3	MG	flow-productivity model	For those unfamiliar with this model, the basic relationship between flow and productivity should be outlined along with the intended use and potential limitations of this model. The R-squared value was only 0.63 in the regression equation and due to density dependencies on Johnson Creek, productivity drops rapidly with low flow. It is unclear if similar density dependencies would occur in Meadow Creek and if the much smaller Meadow Creek is an appropriate comparison for the model developed from Johnson Creek. Please discuss these potential model limitations.
221	4.12-63	4.12.2.3.4.1	bullets	MG		Identify the reduction or gain in Chinook salmon habitat for each bullet.
222	4.12-64	4.12.2.3.4.2	1	MG	The numbers help to show the relative impact of flow modifications on Chinook salmon productivity.	Please provide supporting evidence for this statement.
223	4.12-64	4.12.2.3.4.2	Table 4.12-11	MG	Meadow Creek (13311850)	100% reduction is due to a passage barrier according to Appendix J-5. Following this approach, shouldn't all baseline conditions above the YPP barrier be defined by zero productivity? And if that were the case, any improvement would represent an infinite increase rather than the small or negative increases identified? Barriers should be considered under existing and proposed conditions in a consistent manner.
224	4.12-65	4.12.2.3.4.2	1	MG	At this site (13311850) Meadow Creek would be routed into diversion channels around the TSF/DRSF by Mine Year -2 and would eventually be buried under the TSF/DRSF during operations and through closure and reclamation.	Meadow Creek would not be buried under the TSF/DRSF. The stream would be restored over the top of the TSF/DRSF.
225	4.12-65	4.12.2.3.4.2	1	MG	All habitat upstream of Hangar Flats DRSF would be lost because it would be inaccessible to fish.	All habitat is not lost because it is inaccessible, otherwise there would be no habitat above the existing YPP barrier. Habitat above the barrier would be inaccessible to migratory fish but could be utilized by fish isolated above the barrier. Please clarify this.
226	4.12-66	4.12.2.3.4.3	2	MG	modeled temperature results would likely be higher if climate change had been a factor in the model.	Please refer to previous note about conservative factors built into the model causing it to potentially over predict temperatures. If identifying factors that could cause the model to under predict future temperatures, the same care should be taken in reporting factors that could cause the model to over predict future temperatures.
227	4.12-66	4.12.2.3.4.3	2	MG	...Note that the SPLNT model did not consider the effects of climate change; modeled temperature results would likely be higher if climate change had been a factor in the model.	Recommend editing to clarify: "Note that the SPLNT model did not consider the effects of climate change in the comparative models. However, the models were developed using the warmest, driest periods in the summer and fall. To test the potential impacts of climate change during model development, sensitivity analyses were conducted to test the effects of changing air temperature by plus or minus 5C every hour of the day. The effect over this 10C range was an average difference of 1C, so a 5C increase in air temperature (assumed even at night) would have the effect of raising water temperatures by 0.5C (BC 2018)."
228	4.12-66	4.12.2.3.4.3	Table 4.12-12	MG	EOY 112 is the beginning of the post- closure timeline	EOY 112 is the end of the model. The beginning of post-closure is EOY 18. There is not a 65-year closure period.
229	4.12-66	4.12.2.3.4.3	Table 4.12-12	MG		Please define Common Summer Habitat and Total Available Habitat
230	4.12-66, 4.12-116, 4.12-163	4.12.2.3.4.3	Table 4.12-12, Table 4.12-31, Table 4.12-51	MG	Table row 1 indicates that during some mine years, some reaches have temperatures that would cause lethal conditions or migratory blockages for chinook salmon.	There are no simulated temperatures for any alternative or mine year that exceed the lethal threshold of >21C for 7 days. Guidance summarized in Table 1 of Appendix J-2 indicates that the daily average is the appropriate comparison for evaluation of lethal conditions; there are no mine years or proposed alternatives with daily averages that exceed this value. Only simulated daily maximums exceed 21C, and this does not constitute a lethal condition as noted in Appendix J-2: "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22°C. If the maximum water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." Table should be corrected to 0.0 km for all mine years in row 1.
231	4.12-67	4.12.2.3.4.4	3	MG		Please cite correctly as "designated critical habitat" and provide citation in Federal Register and explain that the Federal Register critical habitat was supplementally defined for this analysis and reference documentation.

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232	4.12-67	4.12.2.3.4.4	3	MG	Chinook salmon critical habitat outside themine site also would be directly affected by culvert installations and would be at risk of accidental hazardous materials spills in the streams adjacent to the access roads	Please make this statement specific to the access route instead "outside the mine site".
233	4.12-67	4.12.2.3.4.3	Table 4.12-12	MG	decreases in stream length within water temperature thresholds	Please explain in more detail. Appendix J indicates that only IP/OM streams were evaluated in the first place and that stream segments that are calculated to fall outside of a given temperature threshold were removed. This should be mentioned here to clarify the table. Please explain how a calculated temperature exceedance representing the hottest week of the year is appropriate to compare against a variety of "optimal" habitat thresholds? If maximum temperatures exceed optimal for a few days, the stream reach has been removed from this table suggesting it is not optimal. Please add discussion and consider revising.
234	4.12-68	4.12.2.3.4.4	2	MG	naturally accessible	What is "naturally accessible"?
235	4.12-68	4.12.2.3.4.4	2	MG	...completely unusable even for translocated fish	Please provide explanation as to why the habitat would be unusable to translocated fish. The gradient and valley width are appropriate for fish.
236	4.12-68	4.12.2.3.4.5	3	MG	The combination of physical stream channel changes, direct effects to individuals, and changes tomany of the WCIs (e.g., temperature, streamflow would negatively impact Chinook salmon and habitat in the analysis area under Alternative 1.	Please summarize changes during mining and post-restoration in place of this sentence.
237	4.12-69	4.12.2.3.4.5	2, bullet 2	MG	The largest impacts to productivity would be to Upper Meadow Creek where the model predicts a 100 percent reduction from baseline productivity throughout all phases of the SGP, including post-closure because Meadow Creek would be diverted around Hangar Flats pit footprint and then the TSF/DRSF would be constructed on top of this location.	If the EIS identifies a 100% loss of Chinook salmon productivity in a reach just because it is inaccessible then it should be applied equally at the baseline condition where all habitat upstream of the YPP cascade barrier is inaccessible. Please apply the same analysis at baseline and proposed conditions.
238	4.12-69	4.12.2.3.4.5	2, bullet 3	MG	two new barriers would be constructed in Mine Years 2 (Fiddle Creek DRSF diversion) and -2 (Meadow Creek TSF and Hangar Flats DRSF and Meadow Creek diversion) preventing upstream volitional passage.	Fiddle Creek is not a new barrier, it is replacing an existing barrier. Also, the Meadow Creek TSF barrier would only block a small fraction of the IP stream length available to Chinook. The net habitat resulting from barriers (added and removed) would result in a significant gain (21.0 km net gain of Chinook critical habitat) based on data in Appendix J-3 Tables 2, 3 and 4. Please update this summary to include the net change. Please update the similar section for 4.12.2.4.4.5 in Alternative 2.
239	4.12-69	4.12.2.3.4.5	2 bullet 1	MG	This is a change from approximately 18.61 km at baseline to 16.83 km in Min Year 20.	Please include increased access by Chinook salmon. Please cite the sources of this statement; table reference.
240	4.12-69	4.12.2.3.4.5	2 bullet 3	MG	The Yellow Pine pit barrier would be removed in Mine Year -1 with the construction fo the EFSFSR tunnel opening up 19.70 km of naturally accessible Chinook critical habitat.	The EFSFSR tunnel would not open up naturally accessible Chinook habitat - it would open up volitional access to habitats not previously accessible.
241	4.12-69	4.12.2.3.4.5	3	MG	quality	How is habitat quality determined? The only variables measuring quality include temperature and water quality. Several of the metrics used as habitat quality surrogates in this report (IP, OM, Critical Habitat, and Productivity) are all estimated from channel width, slope, valley width, and/or changes in flow. Using a multivariate tool (like the Rio ASE 2019 SFA) incorporating 17 WCI elements provides additional ways of estimating habitat suitability, including some of the "habitat" or "channel conditions" WCI elements reported in the SFA. We recommend updating this analysis including additional WCI elements in this analysis of habitat.
242	4.12-69	4.12.2.3.4.5	5	MG		Please clarify that there is net increase in available habitat achieved due to increased accessibility
243	4.12-73	4.12.2.3.5.2	2	MG	However, the results could not be replicated for steelhead trout and therefore the modeling has not been completed for this EIS.	Please explain why this modeling could not be "replicated" for steelhead but could be replicated for Chinook salmon.
244	4.12-73	4.12.2.3.5.3	4	MG	length of streams	Per Appendix J-2; the stream length was first truncated to only include IP stream segments, then relevant temperature threshold categories. Need to explain both steps.
245	4.12-74	4.12.2.3.5.4	6	MG	However, no critical habitat is identified for steelhead trout upstream of the barrier	There is no critical habitat upstream of the YPP cascade barrier because of the barrier. The barrier defines the upstream extent of the critical habitat. Please revise.
246	4.12-74	4.12.2.3.5.4	6	MG	regardless of the lack of identified critical habitat for steelhead trout upstream of the Yellow Pine pit barrier.	The gain in habitat upstream of the YPP cascade barrier is not despite there being no identified critical habitat upstream of the barrier, because the critical habitat limit has been defined by the barrier itself. Please revise.
247	4.12-74	4.12.2.3.5.4	7	MG	A complete list of existing and anticipated complete and partial barriers is provided in Table 4.12-6.	What is "anticipated complete"; the Table 4.12-6 Existing and Expected Future Fish Passage Barriers in Mine Site Area Streams under all Alternatives shows nothing about "anticipated".
248	4.12-75	4.12.2.3.5.5	1	MG		This summary paragraph does not match the evidence provided in the three bullets below, which all show net benefits. Please clarify and describe both adverse and beneficial effects in the summary.
249	4.12-75	4.12.2.3.5.5	1	MG	This would cause a temporal loss of habitat.	With many of the indicators in the bullets below being positive to steelhead, please explain how this results in a temporal loss of habitat for steelhead.
250	4.12-75	4.12.2.3.5.5	3	MG	The Forest Service has preliminarily determined that Alternative 1 will adversely affect steelhead trout and their critical habitat. Informal Section 7 ESA consultation is ongoing with the NMFS.	How was it determined that Alt 1 would adversely affect steelhead if the net effect of the project per all of the metrics described above would be to increase both quantity and quality of habitat? All steelhead designated critical habitat is downstream of the mine site and impacts to suggest that those areas would be adversely affected has not been presented. (Comment applies to other alternatives.)
251	4.12-75	4.12.2.3.6	4	MG	occupancy modeling (OM), streamflows, water temperature changes, loss of lake habitat, critical habitat	Please include a discussion of bull trout life histories and how access can impact those various life histories and the species.

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252	4.12-76	4.12.2.3.6.1	2	MG	The OM calculates occupancy probabilities based on the combination of three independent variables important to bull trout: stream flow, stream temperature, and channel slope.	It should be noted that the occupancy model does not consider access/passage.
253	4.12-76	4.12.2.3.6.1	3	MG	The largest reduction in bull trout occupancy probability would occur in Stream Reach 1 and Stream Reach 2 in EOY 18 following the construction of the channel on top of the TSF/DRSF when Meadow Creek flows would be re-routed from the diversion to the channel and to the Hangar Flats pit lake.	Please include more discussion to support this statement that rerouting the stream channel from a diversion into a restored channel (both of which are lined and over the TSF) result in a reduction in OM.
254	4.12-76	4.12.2.3.6.1	Table 4.12-16	MG		Have these baseline predictions been compared with actual fish presence/absence observations to verify and/or calibrate the model results? The OM model figures from Appendix J show Blowout Creek and Fiddle Creek with predicted bull trout occupancy, but MWH 2017 baseline aquatic report did not observe any bull trout in these reaches. Please discuss the model calibration, verification and potential limitations.
255	4.12-76	4.12.2.3.6.1	Table 4.12-16	MG		These changes in OM on the EFSFSR upstream of Meadow Creek are an artifact of different methods used to calculate existing vs. proposed discharge. There aren't any changes proposed that would actually alter flow, temp, or slope, yet the OM is a 10% less during operations. This illustrates a limitation of the model that is not discussed (i.e. model predicts 10% reduction in OM for a reach that would be enhanced while only a roughly 8% reduction for Meadow Creek with significant impacts). Please discuss the limitations of the model in this area.
256	4.12-77	4.12.2.3.6.1	1	MG	During this period the main activities that contribute to the loss of potential habitat in these areas are	Correlation does not prove causation. Simply because certain activities occur at the same time as a predicted decline in OM does not mean they are the cause. Please indicate which of the 3 variables measured is creating the reduction in OM for each action.
257	4.12-77	4.12.2.3.6.1	1	MG	dewatering of the Yellow Pine pit lake	Please provide evidence to support that dewatering of Yellow Pine pit contributes to reduced OM. Yellow Pine Pit Lake was not included in the OM study, and flows downstream of the lake are negligibly affected, so the dewatering of Yellow Pine pit lake should not be included in this summary. The diversion tunnel captures the change and resulting decline in OM associated with the pit lake.
258	4.12-77	4.12.2.3.6.1	3	MG	bull trout may be extirpated from the reaches upstream of the TSF/DRSFs	Provide support for the suggestion that bull trout may be extirpated from reaches upstream of the TSF/DRSF. It is unknown if bull trout occupy these reaches currently and no basin size limitation has been provided. The farthest upstream fish survey was conducted at site MWH-034 near the confluence of the NW tributary to Meadow Creek upstream of the SODA roughly in the middle of the proposed TSF. Bull trout were observed at this monitoring location (MWH 2017). Please provide evidence, justification, and/or citation for conclusions. (This comment applies to some other Alternatives.)
259	4.12-78	4.12.2.3.6.1	2	MG	The following section summarizes the results for Alternative 1. The full technical memorandum, including methods and complete results, is provided as Appendix J-8, PHABSIM Technical Memorandum. For a summary of the model methodology see Section 3.12.4.4.6, Stream Flows (Physical Habitat Simulation (PHABSIM).	Appendix J-8 states "It should be noted that the differences in the site parameters influence habitat values. The PHABSIM data are approximately 30 years old and were performed for another project. They represent available data that provide reference information and should not be viewed as directly transferable to the project site." This section is directly transferring the data from the off-site PHABSIM analysis to the project site. Please explain how that is consistent with the recommendation of the technical memo provided in Appendix J-8. If PHABSIM is used, the limitation and uncertainty should be clearly stated. Also the habitat suitability index used for the PHABSIM modeling is highly site specific. Streams that are narrow and deep (low width-to-depth ratio) exhibit less reductions in weighted usable area compared to wide, shallow streams (high width-to-depth ratio) resulting from flow reductions because stream depth is impacted less as a percentage of the total depth when the channel is narrow and deep. This analysis does not compare existing versus proposed width-to-depth ratio or compare on-site to off-site width-to-depth ratios to evaluate if the reported negative habitat to flow general trend is applicable. Width-to-depth ratios are available in the Rio ASE SFA for existing and proposed conditions.
260	4.12-78	4.12.2.3.6.2	5	MG	First, the analysis centered on the low-flow period of the year (defined as the months of August-March) under the assumption that SGP-induced changes in streamflow would have their greatest effect on fish habitat during this period.	Provide the supporting basis for this assumption.
261	4.12-78	4.12.2.3.6.2		MG	Stream Flows (Physical Habitat Simulation [PHABSIM])	We recommend using the SFA data which are site specific and include many more variables than PHABSIM.
262	4.12-79	4.12.2.3.6.2	1	MG	Each mine site Stream Reach was assigned to an index:	How were different reaches assigned to different indices (based on basin size, flow, stream width, channel character, gradient, etc.)?
263	4.12-80	4.12.2.3.6.2	1	MG	both of which are similar to the Summit Creek site of the PHABSIM study	Please provide support for this assumption that the sites are similar.
264	4.12-80	4.12.2.3.6.2	2	MG	impacts can be inferred	See previous comment about directly comparing off-site data to project sites. General conclusions can be made about likely relationships between flow and weighted usable area, but not predicting site-specific percent changes to a tenth of a percent. Please provide clarification and discussion about model limitations and preferably replace this analysis with the Rio ASE SFA which measures site variables predicting habitat quantity and quality.
265	4.12-80	4.12.2.3.6.2	2	MG	Given the relationships between stream discharge and bull trout habitat provided in Table 4.12-18 impacts can be inferred from changes in discharge at the mine site stream reaches.	Table 4.12-8 shows very specific impacts but they are based on other streams and applied to the study streams (see previous comments on PHABSIM). This should be revised.
266	4.12-80	4.12.2.3.6.2	Table 4.12-19	MG	Table 4.12-19 Alternative 1 Change in Streamflow for the Low-Flow Period for Active Mine Years and Post-closure	These results compare low flows from "Average" and "High" discharge years from the PHABSIM sites to modeled low flows from an extreme low flow year for the "Project" site. Please revise to compare similar flow conditions.

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267	4.12-81	4.12.2.3.6.1	1	MG	Table 4.12-19 shows that the changes in discharge during the low-flow period in the different mine site reaches under Alternative 1 varies as a function of Mine Year and the SGP activities occurring during those years.	This should say that these are the presumed changes in flow with changes in habitat based on flow-habitat relationships from other streams.
268	4.12-81	4.12.2.3.6.2	1	MG	According to the modeled PHABSIM habitat data,	this should say, "based on modeled PHABSIM habitat data from nearby streams"
269	4.12-81	4.12.2.3.6.2	Table 4.12-19	MG	There is a relationship between percent change in flow and the amount of available habitat per species and life stage.	This relationship is for the off-site locations where the PHABSIM data were evaluated and has been assumed to carry forward to the mine site at the same level. Please explain this limitation.
270	4.12-83	4.12.2.3.6.3	1, bullet 6	MG	Total habitat availability for this species decreases to varying degrees at points along the timeline of the SGP and is anticipated to be lower than baseline at post-closure.	Table 4.12-20 does not show this; it does not show total habitat availability at all. Please revise.
271	4.12-83	4.12.2.3.6.4	2	MG	Loss of Lake Habitat	This heading does not describe the contents of this section. The results of this section suggest there will be a loss of habitat quality but a significant gain in habitat quantity. The total amount of habitat (quality AND quantity) is not provided. Please explain how quality and quantity have been integrated to make conclusions.
272	4.12-84	4.12.2.3.6.4	Table 4.12-21	MG	39.48	There are 0.0 km of available fish habitat upstream of the existing Yellow Pine pit lake because there is an impassable cascade barrier immediately upstream of the lake. Where does the 39.48km value come from? Please explain via foot note or other means that any available fish habitat is upstream of a barrier and therefore inaccessible.
273	4.12-84	4.12.2.3.6.4	Table 4.12-21	MG	There would be 10 km of available fish habitat above Hangar Flats pit lake; however, most of it (just upstream of the pit lake) would not naturally accessible to fish because of the steep gradient barrier at the TSF/DRSF.	Why provide a note identifying the passage barrier upstream of Hangar Flats pit lake in the proposed condition, but not identify the passage barrier above Yellow Pine pit lake in the existing condition? Please be consistent.
274	4.12-85	4.12.2.3.6.4	2	MG		Please provide reference for the 9.8 meters statistic
275	4.12-85	4.12.2.3.6.4	3	MG	temperature guidelines	What temperature guidelines? Citation.
276	4.12-85	4.12.2.3.6.4	5	MG	downstream fish movement	Not blocked to downstream fish movement. The stream will be a cascade similar to the existing cascade at Yellow Pine pit that also passes fish downstream. Please correct this statement.
277	4.12-85	4.12.2.3.6.4	6	MG	With the closure of the Yellow Pine pit lake and creation of the Hangar Flats pit lake, there also would be a loss of this food base for adult bull trout unless a comparable mountain whitefish population is established through natural migration and colonization.	Please provide support for claim that mountain whitefish would not establish in the Hangar Flats pit lake. This species established in the Yellow Pine pit lake.
278	4.12-86	4.12.2.3.6.5	1	MG	most importantly barriers, flow, and water temperature	How was the level of importance determined? Please explain and/or provide justification or citation for this prioritization.
279	4.12-86	4.12.2.3.6.5	3	MG	Appendix J-6	Appendix J-6 is for Chinook salmon critical habitat not bull trout.
280	4.12-86	4.12.2.3.6.5	5	MG	This barrier also would represent a barrier to downstream movement of fish as well.	How is the proposed cascade down the TSF/DRSF a barrier to downstream fish movement? Need explanation as this cascade would be very similar to the existing cascade at the Yellow Pine pit cascade that does successfully pass fish downstream.
281	4.12-87	4.12.2.3.6.6	2, bullet 2	MG	construction of the French drain on Blowout Creek	The French drain on Blowout creek is not discussed in the DEIS. How has it been determined that it will result in a loss of habitat to bull trout? Also, there are potential benefits associated with fixing the largest source of fine sediment in the watershed. Please provide support for the statement that the French drain on Blowout Creek would be one of the "main activities that contribute to the loss of potential habitat." Furthermore, although Blowout Creek has a relatively high occupancy model prediction for bull trout, no bull trout were ever observed in Blowout Creek, suggesting the conditions are not favorable although the slope, flow, and temperature may be. Limitations of the occupancy model such as this need to be discussed.
282	4.12-87	4.12.2.3.6.6	2, bullet 4	MG	In Mine Year -1 access to 4.67 km of bull trout critical habitat in upper Meadow Creek would be blocked in-perpetuity by the diversion of Meadow Creek around the TSF/DRSF footprint and then by the completion of the TSF/DRSF, which would become a gradient barrier to upstream and downstream fish passage.	How can a proposed barrier block access to an area upstream of an existing barrier without mentioning the existing barrier? There is a very large net increase in accessibility, but all that is discussed here is the relatively small loss in acceptability without mentioning the much larger gain. Please revise the discussion of barriers to include existing barriers.
283	4.12-87	4.12.2.3.7	4	MG	These narratives address: OM, streamflows, water temperature change	Please clarify how were these elements were selected
284	4.12-87	4.12.2.3.6	6	MG		Please clarify there is still a net increase in available habitat compared to the baseline condition.
285	4.12-87	4.12.2.3.6.6	3	MG	The Forest Service has preliminarily determined that Alternative 1 will adversely affect bull trout and their critical habitat	How was this determination made? How were the various analyses integrated to come to this conclusion? How were proposed project improvements included in this synopsis?
286	4.12-88	4.12.2.3.7.1	3	MG	The largest reduction	In addition to discussing the largest reduction, include mention of the reaches with increased potential and discuss the relative lack of overall impact to this metric (occupancy probabilities percentages generally range by only a couple %).
287	4.12-94	4.12.2.3.8	3	MG	No changes in streamflow or water temperature are expected; however, water quality may be temporarily degraded.	Over-generalization. Specify which aspects of water quality be affected; if referencing sediment, be specific.
288	4.12-94	4.12.2.4	4, bullet 3	MG	The diversion of Meadow Creek channel	There is no differentiation between this diversion (which is proposed to include a natural stream design with floodplain and habitat) versus other diversions (which are designed free of floodplain and habitat). Please explain why maintaining this diversion could minimize effects on fish and fish habitat.
289	4.12-94	4.12.2.4	4, bullet 4	MG	geosynthetic liner	Replace with "geosynthetic clay liner". The clay is the critical component. Please revise for all references to the liner throughout the section.

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290	4.12-95	4.12.2.4.1	3	MG	channel disturbance	Global comment: Channel disturbance and enhancement are summarized but not channel reconstruction (i.e. restoration as defined by the Rio ASE 2019 Stream Design Report). There are significant improvements associated with channel reconstruction/restoration that are not discussed in this document which leaves the reader to believe the streams remain in diversion channels after mine reclamation.
291	4.12-95	4.12.2.4	3	MG	In addition, a Water Quality Management Plan (Brown and Caldwell 2020b) has been developed to address potential water quality impacts associated with Alternative 2.	Although the WQMP presented detailed results for only Alternative 2, it was proposed to be applicable to all alternatives and the USFS chose to apply it only to Alternative 2 for comparative purposes. This should be made clear.
292	4.12-95	4.12.2.4.1	6	MG	Negative effects would include the loss of connection to lake habitat, which would reduce habitat for bull trout and other fish species. If connectivity occurred during high flows, it could result in entrainment as fish move into the pit lake and may not be able to get out if flow levels change.	Section 4.12.2.4.1 states that a surface water connection to Hangar Flats pit lake would be lost and that if connectivity occurred during high flows, it could result in entrainment and negative effects. This statement is incorrect. There has been no analysis or data to support entrainment of fish in Hangar Flats pit. To the contrary, from groundwater modeling results Hangar Flats pit has been shown to fill and spill with significant groundwater contributions resulting in a minimum 0.7 cfs, average of 5.26 cfs and max of 32.34 cfs outflow over the 97.7yrs of modeled outflow. The model results predict flows would be less than 1 cfs for only 0.11% of the entire model period. The proposed designed channel geometry would accommodate this estimated design discharge enabling year-round passage into and out of Hangar Flats pit lake once it has filled and persisting in perpetuity. Please correct this statement.
293	4.12-97	4.12.2.4.1	Figure 4.12-6	MG		This map shows the West End DRSF and associated stream diversion that are not present in Alt 2. Please remove.
294	4.12-99	4.12.2.4.2	3	MG	This segment would cross Riordan Creek, which provides habitat for Chinook salmon, steelhead trout	The stream crossing in question is roughly 25km upstream of any potential Chinook and steelhead use and separated further by a large lake. This sentence makes it sound like the stream at the location of the crossing provides habitat for Chinook and steelhead. Please revise and/or clarify.
295	4.12-99	4.12.2.4.2	3	MG	crossing 14.8 km of important fish habitat	This statement "crossing 14.8 km of important fish habitat within 91 meters of the Burntlog Route" is confusing. Please rephrase to indicate that 14.8km of streams classified with "important" fish habitat lie within 91 meters of the proposed Burntlog Route. There are not 14.8 km of stream crossings.
296	4.12-100	4.12.2.4.2.1	1	MG	Under Alternative 2, the amount of stream channel and Yellow Pine pit lake disturbance would be the same as under Alternative 1 (shown in Table 4.12-2a).	The amount of stream channel disturbance would be less in Alt 2. Table 4.12-2a does not include West End Creek. The length of disturbance to West End Creek would be substantially less than Alt 1 given the removal of the West End DRSF in Alt 2.
297	4.12-100	4.12.2.4.3.1	3	MG	The WCIs that would be affected by the SGP are shown graphically in Appendix J-1 and summarized herein. Note that only those WCIs that experience changes are discussed; the WCIs not discussed would not change as a result of the SGP.	It is stated here that only those WCIs that experience changes are discussed, but many that do change are not discussed (including habitat elements and channel conditions and dynamics elements). The USFS requested that Midas Gold collect WCI data and specifically to collect spatially continuous LWD and pool data for lower Meadow Creek and the EFSFSR between Meadow Creek and Sugar Creek. Please include this previously reported data (Rio ASE 2019 SFA).
298	4.12-100	4.12.2.4.3.1	3	MG	As described in Section 4.9.2.2.2.1, Surface Water Quality – Mine Site, Table 4.9-19, actions under Alternative 2 would result in water temperature increases for each simulated stream reach during the mine operational and post-closure period.	Alternative 2 includes use of low-flow pipes. Recommend editing to: As described in Section 4.9.2.2.2.1, Surface Water Quality – Mine Site, Table 4.9-19, actions under Alternative 2 would result in water temperature increases for each simulated stream reach during the mine operational and post-closure period except during operations in Meadow Creek where low-flow pipes reduce temperatures below baseline conditions..
299	4.12-100	4.12.2.4.3.1	4	MG	Table 4.12-27 provides a summary of predicted maximum weekly summer and fall water temperatures under Alternative 2 in the six stream reaches within the mine site for five different time periods.	Suggest adding a clarification: Table 4.12-27 provides a summary of predicted maximum weekly summer and fall water temperatures under Alternative 2 in the six stream reaches within the mine site for five different time periods. Daily average temperatures in addition to the daily maximums are provided in Table 4.9.-19.
300	4.12-100	4.12.2.4.3.1	4	MG	Missing	Section 4.12.2.4.3.1 should be comparable in breadth to the same sections provided for Alternative 1 and Alternative 3 to allow for a direct comparison, incorporating the clarifications listed in relevant comments on those sections.
301	4.12-102	4.12.2.4.3.1	1, bullet 2	MG	due to the buffer effect of Hangar Flats pit lake on diurnal water temperature variation.	Please clarify. The "buffer effect" is provided by large bodies of water that buffer maximum temperatures because they act as a large heat sink. Without flows routed through the Hangar Flats pit lake, the buffer effect would be lost resulting in higher maximum temperatures, but lower average temperatures.
302	4.12-102	4.12.2.4.3.1	1, bullet 3	MG	However, maximum summer and fall water temperatures and average summer water temperatures are still predicted to be as much as 4.5°C higher	Please clarify: Which metric would be as much as 4.5C higher than baseline? The sentence includes reference to maximum summer, maximum fall, and average summer water temperatures.
303	4.12-102	4.12.2.4.3.1	bullet 1	MG	Low flows in Meadow Creek stream diversions around the Hangar Flats DRSF and TSF would be piped. Modeling shows that water temperatures would increase in open channels during low flows potentially impacting fish downstream. Piping stream diversions could reduce the potential for warming.	Suggest editing to clarify: Low flows in Meadow Creek stream diversions around the Hangar Flats DRSF and TSF would be piped. Modeling shows that water temperatures would increase in open channels during low flows potentially impacting fish downstream. Piping stream diversions would reduce the potential for warming, and simulated temperatures during operations are 3C cooler than baseline.
304	4.12-102	4.12.2.4.3.1	bullet 3	MG	....However, maximum summer and fall water temperatures and average summer water temperatures are still predicted to be as much as 4.5°C higher than baseline 100 years into the post-closure period. This finding demonstrates that projected water temperature increases associated with SGP activities under Alternative 2 would extend downstream in the EFSFSR past Sugar Creek and persist for at least 112 years after mining is initiated.	Please clarify the statement to indicate if it is in reference to maximum summer, maximum fall, or average summer water temperatures. The results of one metric may not be the same for all other temperature metrics. Recommend editing to clarify: ...However, maximum summer (19.0°C) temperatures are still predicted to be as much as 4.1 degrees greater than baseline 100 years into the post-closure period (Table 4.12-27) partly due to the removal of YPP which mitigates diurnal temperature variation and reduces summer maximum temperatures by 3°C under baseline conditions (BC 2019 Proposed Action Report). Maximum fall (14.5°C) temperatures and average summer temperatures (13.0°C) are within 2.6°C and 0.6°C of baseline, respectively.
305	4.12-103	4.12.2.4.3.1	2	MG	increased potential for erosion and sedimentation under	Please also include the decreased potential for erosion and sedimentation as well including: Blowout Creek sediment fix; road surfacing, proper road BMPs and road maintenance; improved culvert and bridges, etc.
306	4.12-104	4.12.2.4.3.1	3	MG	During post-closure YP-SR-4	Please always include baseline values for comparison. Do antimony, arsenic and mercury currently exceed thresholds? Is there a fundamental change as a result of the project?

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307	4.12-109	4.12.2.4.3.1	1	MG	Under Alternative 2, peak flows (>5 cfs) from the combined flows of Meadow Creek and Blowout Creek would be diverted to the Hangar Flats pit lake to shorten the duration to fill Hangar Flats pit. This would reduce the low flow in Meadow Creek SFA reach MC-6 and the EFSFSR at Stibnite during Mine Year 11 through Mine Year 15.	How does diverting peak flows from Meadow Creek into Hangar Flats lake reduce base flows in Meadow Creek? Reductions in Meadow Cr. baseflow are a result of losses to groundwater while the pit is dewatered and filling. Filling it faster will reduce this affect. Additionally, the lined stream channel reduces the area in which groundwater can contribute to base flows, resulting in a perpetual change in those lined streams, but that groundwater returns to the surface farther downstream. Please describe this process for the reader to understand where the water goes throughout this process.
308	4.12-109	4.12.2.4.3.1	2	MG	Upstream of Sugar Creek (USGS 13311250), the simulated streamflows for the EFSFSR are lower than baseline conditions with a simulated 14 percent decrease in seasonal monthly average low flows. Alternative 2 would result in an average monthly flow reduction of 32 percent relative to the existing conditions during Mine Years 7 through 12	Please clarify if these simulated reductions in stream flow represent an average for the reaches evaluated or if the actual output at the bottom of the system would discharge less water. It is unclear what these conclusions mean otherwise.
309	4.12-111	4.12.2.4.4.1	Figure 4.12-8	MG	HL1 & HL2	No explanation for these SFA Reach names is given; the SFA Report is not part of this document. Please clarify.
310	4.12-111	4.12.2.4.4.1	Figure 4.12-8	MG	SFA reaches	Global comment - no explanation is given for SFA Reaches -- what they are, why they're used in this analysis but not used in others. An explanation should be provided.
311	4.12-113	4.12.2.4.4.2	5	MG	Effects of Streamflow Changes on Chinook Salmon Productivity	A discussion of the modeling limitations and appropriate use of the Productivity model should be added to the associated discussion in this section. It should include a quantification of model uncertainty when discussing changes in flow affecting productivity with the accuracy of a 10th of a percent. Besides flow, other variables that are not modeled affect productivity (like food availability, temperature, fish access, etc.).
312	4.12-114	4.12.2.4.4.2	2	MG	The model predicts the reach from the confluence of Meadow Creek (Reach 2) and the EFSFSR to Sugar Creek would increase in productivity at the top of the reach but decrease in productivity towards the bottom for the first half of the mine life. Under Alternative both the top and bottom of this reach show an increase in productivity	This paragraph includes information at a resolution finer than what is reported in Table 4.12-30. Please provide finer resolution data are available. Please explain why the reach sizes were selected and report data at the scale in which the document discusses/analyses the data (in this case at a subreach scale).
313	4.12-114	4.12.2.4.4.2	Table 4.12-30	MG	Meadow Creek 13311850	Same comment as Alt 1 regarding 100% loss of productivity upstream of a barrier.
314	4.12-115	4.12.2.4.4.2	1	MG	the EFSFSR tunnel followed by a new channel being created over the current the Yellow Pine pit location further complicate this reach's productivity	Please clarify what is meant by "complicate this reach's productivity" or remove this statement that is not providing any information to support an increase or decrease in productivity.
315	4.12-115	4.12.2.4.4.3	3	MG	Water Temperature Changes – Alternative 2	Same comments as Alt 1 regarding temperature analysis.
316	4.12-116	4.12.2.4.4.3	Table 4.12-31	MG		See comments from Alt 1.
317	4.12-117	4.12.2.4.4.4	4	MG	Under Alternative 2, the Meadow Creek diversion (Mine Year -1) and then the TSF/DRSF would permanently block approximately 5.5 km of Chinook salmon critical habitat (Table 4.12-32) to natural fish movement both upstream and downstream	Please include discussion of passage blocked and gained in order to present the impacts and the benefits of the project. Providing a summary of the net difference between baseline and the end of the project would help the reader understand the net effect of the project as well. Please consider adding the net difference to the discussion and tables such as 4.12-32.
318	4.12-117	4.12.2.4.4.5	5	MG	Integration of	In this section we believe no integration has been performed; rather, a list of potential impacts and a partial list of potential benefits has been discussed and in some cases quantified, but nowhere are the various metrics combined. No direct measure or analysis of habitat has been performed, rather several surrogates have been used to estimate habitat based on stream size, slope, flow, and temperature. Please clarify that no WCI habitat metrics were used in this analysis. Finally, the quality and quantity of habitat do not appear to have been integrated. Please identify the methods used to integrate the various analyses used as well as providing explanation and methods for integrating habitat quantity and quality. (This comment also applies to other Alternatives.)
319	4.12-121	4.12.2.4.5.1	3	MG	As mentioned previously, steelhead trout habitat may not be currently blocked at the EFSFSR box culvert or the Meadow Creek barrier, as these barriers are partial and they may be able to pass under higher flow conditions.	It is a moot point if steelhead habitat is blocked upstream of the YPP cascade because it is blocked at the YPP cascade making any upstream barrier moot. Upstream barriers are only significant if they would not be fixed after the downstream barrier is removed, but that is not the case. Please consider omitting this comment or clarifying that partial barriers upstream of a complete barrier are irrelevant.
320	4.12-121	4.12.2.4.5.1	3	MG	both upstream and downstream fish passage	Same comment as Alt 1; downstream passage is expected. Please remove reference to downstream passage barrier or provide evidence supporting it.
321	4.12-121	4.12.2.4.5.1	3	MG	1.91 km of steelhead trout IP habitat would be blocked by the Meadow Creek diversion and then permanently by the high gradient at the TSF/DRSF.	The conclusion presented here is that 1.91 km of steelhead IP habitat would be blocked by a barrier, but the net gain in overall IP habitat accessible resulting from the whole project is a gain of 6.94 km. Please summarize the entire project (impacts and benefits = net change) not just key impacts.
322	4.12-122	4.12.2.4.5.3	2	MG	Water Temperature Changes – Alternative 2	Same comments as Alt 1 regarding temperature analysis. Please update.
323	4.12-124	4.12.2.4.6.1	4	MG	block lake habitat for bull trout	Alt 1 is described as providing inferior lake habitat that may not be accessible to fish and therefore routing Meadow Creek through Hangar Flats lake was depicted as a negative attribute of the project. Alt 2 is described as Meadow Creek bypassing Hangar Flats lake by maintaining the diversion around the lake. This too was described as a negative attribute resulting in lost lake habitat. Please explain how routing Meadow Creek into the lake is considered negative and routing Meadow Creek around the lake is also considered negative. Please provide clarification.
324	4.12-125	4.12.2.4.6.1	2	MG	Major barriers	Appendix J-7 does not indicate that barriers were included in the OM analysis. Please explain how barriers were included or explain why discussion of barriers in this section is relevant.
325	4.12-125	4.12.2.4.6.1	Table 4.12-37	MG		Total available habitat for bull trout appears to increase from 41.70 km to 41.80 km by EOY 18. There is no mention of the increase. Please clarify.
326	4.12-125	4.12.2.4.6.2	Table 4.12-38	MG		Provide low flow condition in the table so that the reader know what the cfs is for each index area.

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327	4.12-126	4.12.2.4.6.1	1	MG	evidence that bull trout occur in small headwater streams upstream	Regarding the comment that there is no evidence that bull trout occur in small headwater streams upstream of the proposed TSF. There is also no evidence that bull trout do not occur in small headwater streams upstream of the proposed TSF as no fish sampling was performed that high up in the watershed. Please provide appropriate evidence for your conclusions.
328	4.12-126	4.12.2.4.6.2	3	MG	As described previously in Section 4.12.2.3.6.2, Streamflows	See previous comments from Alt 1.
329	4.12-128	4.12.2.4.6.3	3	MG	4.12.2.4.6.3 Water Temperature Changes – Alternative 2	See previous comments from Alt 1.
330	4.12-130	4.12.2.4.6.4	1	MG	Loss of Lake Habitat – Alternative 2	The title "Loss of Lake Habitat" does not allow for an evaluation of impact versus benefit and implies only an evaluation of the impact. Please change the title to reflect an analysis of impact and benefit.
331	4.12-130	4.12.2.4.6.4	1	MG	Therefore, there would be no connection between Meadow Creek and the Hangar Flats pit lake except as occasional outflow from the lake through a channel that would reconnect with lower Meadow Creek downstream of the lake.	See previous comments: from groundwater modeling results Hangar Flats pit has been shown to fill and spill with significant groundwater contributions resulting in a minimum 0.7 cfs, average of 5.26 cfs and max of 32.34 cfs outflow over the 97.7yrs of modeled outflow. The model results predict flows would be less than 1cfs for only 0.11% of the entire model period. The proposed designed channel geometry would accommodate this estimated design discharge enabling year-round passage into and out of Hangar Flats pit lake once it has filled and persisting in perpetuity. Also, 2 paragraphs below this one (still in Section 4.12.2.4.6.4) the report states "mean August discharge from the Hangar Flats pit lake to Meadow Creek would be 1.098 cfs. By both accounts there will be more than an occasional outflow and connection between Hangar Flats pit lake and Meadow Creek. Please revise.
332	4.12-130	4.12.2.4.6.4	2	MG	Under Alternative 2, the Hangar Flats pit lake would be connected to Meadow Creek only at the outlet, which would create changes in the outflow discharge and water temperature.	What is meant by "create changes in the outflow discharge and water temperature." What changes? Please describe.
333	4.12-130	4.12.2.4.6.4	4	MG	Because the pit lake would not be connected to Meadow Creek (except at the outlet), it is unclear if bull trout would move into and out of the lake	Please add supporting documentation that fish may not be able to pass upstream into a lake.
334	4.12-130	4.12.2.4.6.4	4	MG	Based on the flows described for Alternative 1, it is unlikely that there would be sufficient flows to connect the pit lake to Meadow Creek and provide for passage of bull trout for most of the year.	This section identifies a baseflow discharge from Hangar Flats pit lake to be around 1 cfs (that is roughly equivalent to 450 gallons per minute) which is sufficient for fish passage in a stream properly sized (i.e. appropriate width to depth ratio). There is every reason to believe that fish would therefore be able to pass into and out of the lake given the stream design approach because the depth would be sufficient and the velocity would not be high given the relatively low gradient. Please update this section to identify the potential for passage into and out of the pit lake.
335	4.12-131	4.12.2.4.6.6	2, bullet 1	MG	This change would result in a loss of connection to lake habitat for bull trout	See previous comments regarding connection of Hangar Flats pit lake. Please update this sentence reporting the "loss of connection to lake habitat" to reflect the information reported previously that there would be at least 1cfs outflow form the lake and that an appropriately sized outflow channel can reasonably be expected to provide adequate depth and velocity to maintain year-round fish passage into and out of Hangar Flats pit lake.
336	4.12-131	4.12.2.4.6.6	2, bullet 2	MG	reductions of bull trout adult and juvenile habitat	Please update this sentence identifying reductions in bull trout habitat to reflect the analysis results (i.e. weighted usable area based on flow changes and regional relationships between flow an weighted usable area).
337	4.12-132	4.12.2.4.6.6	1, bullet 1	MG	suitable habitat	The majority of the temperature thresholds describe optimal temperature ranges not suitable ranges. Please correct terminology to reflect the thresholds used in the analysis.
338	4.12-132	4.12.2.4.6.6	1, bullet 2	MG	permanently blocked	When summarizing barriers and access please include the net gain or loss in access rather than only reporting the loss. Please also make note of improved access resulting from the removal of the YPP cascade barrier.
339	4.12-133	4.12.2.4.7.1	1	MG	the greatest reduction	Discussing the greatest reduction should also include a section on the greatest gain. Also, the relative changes are on the order of just a couple percent difference and therefore functionally equivalent. Please update the discussion to identify the relative magnitude of the change as small to insignificant.
340	4.12-133	4.12.2.4.7.2	5	MG	4.12.2.4.7.2 Streamflows – Alternative 2	Please see previous comments regarding the stream flow analysis using PHABSIM data from Johnson Creek.
341	4.12-138	4.12.2.4.9	3	MG	The reduction in flow in Meadow Creek would negatively affect fish, especially given that the portion of Meadow Creek is currently almost too shallow for Chinook salmon and steelhead trout passage.	Please update this sentence referring to shallow water potentially limiting Chinook passage. There is no documentation that any portion of "Meadow Creek is currently almost too shallow for Chinook salmon and steelhead trout passage" other than the partial barrier at the downstream end of the SODA that would be removed and restored as part of the project.
342	4.12-139	4.12.2.4.9	1	MG	...In the warm, low-flow periods (July, August, and September), it is predicted that there would be very little change in stream temperature for the average water yield scenario, which represents the typical condition (Brown and Caldwell 2020b).	Suggest editing to clarify..."In the warm, low-flow periods (July, August, and September), it is predicted that there would be very little change in stream temperature for the average water yield scenario, which represents the typical condition (Brown and Caldwell 2020b); however, there are some periods where the discharge would result in stream temperatures 1.5C to 2C cooler than without the discharge. "
343	4.12-139	4.12.2.4.9	3	MG	The length of the EFSFSR for which water temperatures would be raised during the winter-spring period would be limited because mixing of the discharge with colder ambient streamflow would result in water temperatures being lowered rapidly within a relatively short stream reach, especially given the cold air temperatures and limited solar input during this period (Brown and Caldwell 2020b).	Suggest editing to clarify: "The length of the EFSFSR for which water temperatures would be raised during the winter-spring period would be limited because mixing of the discharge with colder ambient streamflow would result in water temperatures being lowered rapidly within a relatively short stream reach, especially given the cold air temperatures and limited solar input during this period (Brown and Caldwell 2020b). Engineering controls that leverage cold air temperatures would be utilized as needed to meet permit limits."
344	4.12-140	4.12.2.5.1	Table 4.12-44	MG	Table 4.12-44 Alternative 3 Stream Channel Changes	Please see comments from Alt 1 regarding reporting all of the changes in stream channels including the restoration channels and providing a summary of the net difference to facilitate evaluation.

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345	4.12-145	4.12.2.5.3.1	2	MG	As described in Section 4.9.2.3.2.1, Surface Water Quality - Temperature, Alternative 3 would result in higher water temperatures than baseline conditions within Meadow Creek and the upper EFSFSR during both the mine operational and post-closure periods.	Suggest editing to clarify: "As described in Section 4.9.2.3.2.1, Surface Water Quality - Temperature, Alternative 3 would result in higher water temperatures than baseline conditions within Meadow Creek and the upper EFSFSR during both the mine operational and post-closure periods. These increases would propagate downstream, resulting in warmer temperatures in the EFSFSR compared to Alternative 1 or 2."
346	4.12-145	4.12.2.5.3.1	2	MG	Table 4.12-46 provides a summary of predicted maximum weekly summer and fall water temperatures under Alternative 3 in the six stream reaches within the mine site for five different time periods.	Suggest editing to clarify: "Table 4.12-46 provides a summary of predicted maximum weekly summer and fall water temperatures under Alternative 3 in the six stream reaches within the mine site for five different time periods. Daily average temperatures in addition to the daily maximums are provided in Table 4.9.-23."
347	4.12-147	4.12.2.5.3.1	1	MG	Table 4.9-23 in Section 4.9.2.3.2.1, Surface Water and Groundwater Quality – Mine Site Temperature – Alternative 3, summarizes the temperatures for selected years for the predicted maximum weekly summer condition, average weekly summer condition, maximum weekly fall condition, and average weekly fall temperatures for several stream reaches throughout the mine site (Brown and Caldwell 2019b).	Suggest editing to clarify: "Table 4.9-23 in Section 4.9.2.3.2.1, Surface Water and Groundwater Quality – Mine Site Temperature – Alternative 3, summarizes the predicted maximum and average temperatures for the maximum weekly summer condition and the maximum weekly fall condition for selected years for several stream reaches throughout the mine site (Brown and Caldwell 2019b). "
348	4.12-147	4.12.2.5.3.1	2	MG	During the life of the mine, maximum summer water temperatures in Meadow Creek have the potential to exceed temperatures that are known to be stressful and even lethal to all the special status salmonids (Table 4.12-46). Meadow Creek downstream of the East Fork Meadow Creek would have potentially lethal water temperatures during the summer in perpetuity. As such, Meadow Creek would have a WCI rating for salmonids during the summer of functioning at risk at best, and potentially functionally unacceptable for much of the time (Rio ASE 2019).	Suggest editing to clarify and remove references to lethal based on other comments on the temperature thresholds: "During the life of the mine, maximum summer water temperatures in Meadow Creek have the potential to exceed temperatures that are known to be stressful to all the special status salmonids (Table 4.12-46). Meadow Creek downstream of the East Fork Meadow Creek would have potentially stressful water temperatures during the summer in perpetuity. As such, Meadow Creek would have a WCI rating for salmonids during the summer of functioning at risk at best, and potentially functionally unacceptable for much of the time (Rio ASE 2019). "
349	4.12-147	4.12.2.5.3.1	3	MG	Water temperatures at the mine site would be increased primarily by the decrease in streamflow caused by the use of water for mining activities, and the change in stream habitat structure to longer and flatter meandering channels, which initially would have less shade due to riparian vegetation having been removed by general SGP disturbances including construction and operations activities.	Suggest editing to clarify: "Water temperatures at the mine site would be increased primarily by the decrease in streamflow caused by the use of water for mining activities, and the change in stream habitat structure to longer and flatter meandering channels, which initially would have less shade due to riparian vegetation having been removed by general SGP disturbances including construction and operations activities. Under this Alternative, this disturbance extends to the EFSFSR above Meadow Creek, which is largely undisturbed in baseline conditions."
350	4.12-147	4.12.2.5.3.1	4	MG	The SPLNT models (Brown and Caldwell 2018, 2019a,b,c) used for the temperature predictions in Table 4.12-46 do not account for changes to stream temperatures caused by changing climate conditions. Modeled future water temperatures (e.g., EOY 112) assumed, stream temperatures would be similar to the historic water temperature average without the SGP (Brown and Caldwell 2018). However, water temperature would likely be higher if climate change had been incorporated in the model.	Recommend editing to clarify: "The SPLNT models (Brown and Caldwell 2018, 2019a,b,c) used for the comparative temperature predictions in Table 4.12-46 do not account for changes to stream temperatures caused by changing climate conditions. However, the models were developed using the warmest, driest periods in the summer and fall, and they do not account for growth of vegetation that would be expected to occur in the project area outside of the simulated 7-ft buffer strip on either side of restored reaches. All other reaches and areas beyond 7-ft riparian planting zone are assumed to have a cleared vegetative state or baseline vegetation heights and densities if no clearing occurred. Additional conservative assumptions include assuming linear growth curves under-representing early (faster) growth rates and assuming no overlap in canopy although it is understood that multiple levels of canopy would develop (Brown and Caldwell 2019). It is likely that growth of vegetation would occur over time across the project site, beyond that which was simulated. Also, the increased hyporheic exchange resulting from the restored channel designs has also been discounted significantly, as baseflow contributions in lined reaches are assumed zero. Because the liner is installed several feet below the stream bed and extends out to the edge of the floodplain, a shallow groundwater zone will contribute baseflows to these streams at temperatures lower than the stream. To test the potential impacts of climate change during model development, sensitivity analyses were conducted to test the effects of changing air temperature by plus or minus 5C every hour of the day. The effect over this range was a difference of 1C, so a 5C increase in air temperature (assumed even at night) would have the effect of raising water temperatures by 0.5C (BC 2018). For additional information regarding potential climate change impacts to water temperatures see Section 3.12.4.7.3.3, East Fork South Fork Salmon River Watershed Baseline Conditions – Water Temperature. "

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351	4.12-147	4.12.2.5.3.1	5	MG	Maximum water temperatures during the summer season in this area have the potential to exceed temperatures that are known to be stressful and even lethal to all the special status salmonids (Appendix J-2: Table 1) in perpetuity. Water temperatures that exceed 21°C for extended periods of time can be lethal to salmonids (Appendix J-2). Table 4.12-46 indicated that such water temperature levels may be reached during the summer period based on SPLNT modeling (Brown and Caldwell 2019b). As such, the Upper EFSFSR immediately upstream of Meadow Creek would have a WCI rating for salmonids during the summer of functioning at risk at best through Mine Year 12, and potentially functionally unacceptable for much of the time thereafter (Rio ASE 2019).	There are no simulated temperatures for any alternative or mine year that exceed the lethal threshold of >21C for 7 days. Guidance summarized in Table 1 of Appendix J-2 indicates that the daily average is the appropriate comparison for evaluation of lethal conditions; there are no mine years or proposed alternatives with daily averages that exceed this value. Only simulated daily maximums exceed 21C, and this does not constitute a lethal condition as noted in Appendix J-2: "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22°C. If the maximum water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." Suggest editing to: "Maximum water temperatures during the summer season in this area have the potential to exceed temperatures that are known to be stressful to all the special status salmonids (Appendix J-2: Table 1) in perpetuity. Water temperatures that exceed 21°C for extended periods of time (sustained for 1 week) can be lethal to salmonids (Appendix J-2). Table 4.12-46 indicated that such water temperature levels may be reached as a daily maximum during the summer period based on SPLNT modeling (Brown and Caldwell 2019b). However as stated in Appendix J-2, "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22°C. If the maximum water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." As such, the Upper EFSFSR immediately upstream of Meadow Creek would have a WCI rating for salmonids during the summer of functioning at risk at best through Mine Year 12, and potentially functionally unacceptable for much of the time thereafter (Rio ASE 2019). "
352	4.12-148	4.12.2.5.3.1	1	MG	... Post-closure conditions in lower Meadow Creek are impacted by simulated discharges from the Hangar Flats pit lake.	Suggest editing to clarify: ..." Post-closure conditions in lower Meadow Creek are impacted by simulated discharges from the surface of Hangar Flats pit lake. Midas Gold can withdraw water from deeper layers to reduce stream temperatures."
353	4.12-148	4.12.2.5.3.1	3	MG	Baseline water temperature conditions in this reach are less than optimum during the summer season with the potential for the maximum temperatures to reach sublethal and even lethal levels during the summer (Table 4.12-46). Water temperatures in this reach during the summer have the potential to adversely impact all four salmonid species and result in WCI ratings that are at best functioning at risk, and at worst functioning unacceptably (Rio ASE 2019).	Suggest editing: "Baseline water temperature conditions in this reach exceed optimum temperature thresholds during the summer season with the potential for the maximum temperatures to reach stressful levels during the summer (Table 4.12-46). Water temperatures in this reach during the summer have the potential to adversely impact Chinook salmon, bull trout, and westslope cutthroat trout and result in WCI ratings that are at best functioning at risk, and at worst functioning unacceptably (Rio ASE 2019). For steelhead trout, the temperature changes would be beneficial and increase habitat."
354	4.12-148	4.12.2.5.3.1	4	MG	In the EFSFSR downstream of Sugar Creek, summer and fall stream temperatures would increase during the mine operational period and early post-closure period to reach a maximum at the EOY 18. After that time, average and maximum temperatures would likely remain stable or gradually decrease as riparian vegetation is established shading the stream. However, maximum summer and fall temperatures are still predicted to be greater than baseline during the post-closure period (Table 4.12-46). EFSFSR Downstream of Sugar Creek would have a WCI rating for salmonids during the summer of functioning at risk during operations and at post-closure based on the data for water temperature tolerances presented in Appendix J-2.	Suggest editing to clarify: "In the EFSFSR downstream of Sugar Creek, summer and fall stream temperatures would increase during the mine operational period and early post-closure period to reach a maximum at the EOY 18. After that time, average and maximum temperatures would likely remain stable or gradually decrease as riparian vegetation is established shading the stream. However, maximum summer and fall temperatures are still predicted to be greater than baseline during the post-closure period (Table 4.12-46). One contributing factor is the removal of the Yellow Pine Pit lake that dampens diurnal temperature variability; removal of this pit lake results in warmer stream temperatures in the downstream reaches. EFSFSR Downstream of Sugar Creek would have a WCI rating for salmonids during the summer of functioning at risk during operations and at post-closure based on the data for water temperature tolerances presented in Appendix J-2."
355	4.12-163, 4.12-170	4.12.2.5.4.3, 4.12.2.5.5.3	Bullets	MG	A net increase in habitat with lethal one-week exposure temperatures during operations and at post-closure; from 0 km at baseline to 6.49 km at EOY 112; A net increase of habitat with lethal (1-week exposure) temperatures for juvenile rearing during operations and at post-closure; from 0 km at baseline to 7.52 km at EOY 112;	There are no simulated temperatures for any alternative or mine year that exceed the lethal threshold of >21C for 7 days. Guidance summarized in Table 1 of Appendix J-2 indicates that the daily average is the appropriate comparison for evaluation of lethal conditions; there are no mine years or proposed alternatives with daily averages that exceed this value. Only simulated daily maximums exceed 21C, and this does not constitute a lethal condition as noted in Appendix J-2: "The lethal temperature criterion for Chinook is set for a 1-week exposure to water temperatures 21 to 22°C. If the maximum water temperature in a day or week reaches that temperature, it does not mean it would be lethal to fish. However, it is a measure of stress on fish." Bullet should be deleted.
356	4.12-170	4.12.2.5.5.3	Table 4.12-55	MG	Table row 2 indicates that during some mine years, som reaches have temperatures that would cause lethal conditions or migratory blockages for steelhead trout	There are no simulated average temperatures for any alternative or mine year that exceed the lethal threshold of >21C for 7 days. Table should be corrected to 0.0 km for all mine years in row 2.
357	4.12-193	4.12.2.7	3	MG	no SGP-caused impacts	Please also note that Alt 5 would also include no benefits provided by the SGP either including passage at the Yellow Pine pit barrier (addressing Chinook salmon and steelhead recovery targets for the state of Idaho); existing chemical constituents exceeding water quality standards would continue; the Bradley tailings and spent ore would remain in the Meadow Creek valley, and Blowout Creek would not be restored.

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358	4.12-193	4.12.3	4	MG	The preceding impact analysis has taken these mitigation measures into consideration,	It is unclear how the USFS is considering the mitigation measures in Appendix D to minimize impacts by alternative in the preceding sections. Please clarify. Many mitigation measures were not taken into consideration during the course of the preceding impact analysis as noted in previous comments. Please explain why the following mitigation measures were not included: Blowout Creek restoration (gully sediment source and upper meadow), discussion and quantification of the stream restoration reaches when evaluating changes to stream length; floodplain restoration in conjunction with stream channel restoration; use of a stream liner to prevent excessive groundwater losses and exposure to contact water; a natural stream design to accommodate future channel changes and dynamic response.
359	4.12-194	4.12.4.1	4	MG	The South Fork Restoration and Access Management Plan and the East Fork Salmon River Restoration and Access Management Plan	The term "restoration" and "reclamation" appear to be used interchangeably in this sentence and potentially in a way differing from their use elsewhere in this DEIS. Please provide a definition of these terms and explain how they may be similar or different to the proposed mitigation actions at the SGP. For context it is important that readers understand if the actions proposed for mitigation as part of the SGP are similar (or not) to those types of actions proposed in the South Fork Restoration and Access Management Plan or other similar restoration strategies.
360	4.12-196	4.12.5	2	MG		This entire section does not address the relevance of stream, wetland, and floodplain restoration as part of the categorization of the resource commitments as irretrievable or irreversible. The restoration proposed by Midas Gold as part of the project is essential to retrieval of resources and their associated productivity. Please address.
361	4.12-196	4.12.5.1	3	MG	Certain biological resources that would be affected by the SGP are renewable only over long-time spans including mature vegetation, seedbanks, and topsoil. Loss of these resources would be considered irreversible.	Please explain to the reader the difference between "long-term" and "irreversible." These two sentences state on the one hand that certain losses are renewable over long time spans; then in the next sentence identifies the same losses as irreversible. The terms irreversible and irretrievable are defined in Section 4.1 Introduction, and those definitions are stated differently than in this section. There terms should be defined once and also be included in the Glossary. Please clarify.
362	4.12-196	4.12.5.1	4	MG		Midas Gold believes that the categorization of fish mortality and the "take" of fish are incorrectly categorized as irreversible. Fishery resources – unlike cultural artifacts or fossil fuels – are renewable in the sense that they are capable of growth (Gordon and Scott 1985) and can replenish themselves through natural reproduction (Hanley et al. 1997). The mortality of individual fish or the "take" of fish (harm, harass, incidental mortality) therefore is not an "irreversible" according to widely accepted definitions under NEPA, including the definition provided above. Some of the fish habitats affected by the SGP during the course of the project may constitute and irretrievable commitment of resources because these resources and the production from them may be forgone for the period of the proposed action, but they are eventually retrievable through restoration and natural processes, and do have future management options. Midas Gold requests that the judgements of impacts to resources as irretrievable or irreversible commitments include a clear reason for the categorizations of the commitments of resources. Hanley N., Shogren J.F., White B. (1997) Renewable Resource Economics. In: Environmental Economics in Theory and Practice. Macmillan Texts in Economics. Palgrave, London. https://doi.org/10.1007/978-1-349-24851-3_10 Gordon, R. and A. D. Scott. 1985. Chapter 14: The economics of fisheries management. In Handbook of Natural Resource and Energy Economics. Volume 2, 1985, Pages 623-676 https://doi.org/10.1016/S1573-4439(85)80021-X
363	4.12-197	4.12.5.1	1	MG	During construction and operations, the presence of the TSF and Hangar Flats DRSF would essentially isolate any populations of bull trout and cutthroat trout which are known to inhabit the upper reaches of Meadow Creek. After closure and reclamation, this habitat would be re-connected through construction of Meadow Creek over the TSF/DRSF and is expected to allow fish passage throughout Meadow Creek.	These statements are in direct conflict with those earlier in the report evaluating the various alternatives that stated bull trout would be at risk of extirpation (rather than isolated) and that passage through Meadow Creek would be blocked in the upstream and downstream direction (rather than passage allowed through Meadow Creek as described here). Please clarify for consistency.
364	4.12-198	4.12.6.1	3	MG	The long-term change in habitat would favor steelhead trout over Chinook salmon.	While the long-term benefit may favor one species over the other, please also include a conclusion regarding the net long-term affect on both species similar to the conclusions provided for short-term changes. Would the project provide a net long-term benefit or impact to the species?
365	4.12-198	4.12.7	6	MG	For fish and aquatic habitat, the important difference is among the alternatives lie in the location of the TSF/DRSF (which affects different species), the modifications in the surface water management at the mine site, access through the EFSFSR tunnel, and the location of access roads.	It is not correct to say that putting the TSF/DRSF in the upper EFSFSR would affect different species. This placement would have the potential to affect all for the same key species - Chinook, steelhead, bull trout, and Westslope cutthroat trout. Please update this sentence.
366	4.12-200	4.12.7	1	MG	but avoids fish mortality/injury in the mine site streams during mining	Alternative 4 would not avoid fish/mortality just because it prevents fish from coming upstream through the tunnel. Chinook, bull trout and Westslope cutthroat trout are already present upstream of the Tunnel location. Please change or provide a basis for the statement.
367	4.12-201	4.12.7	Table 4.12-66	MG	Baseline Conditions	Please clarify what the baseline values represent for each indicator. Several indicators call out the "change" or "loss" of stream length. Does the baseline value in this case represent a change or loss relative to some pre-human disturbance time, or does the baseline represent the existing condition prior to any proposed change or loss?
368	4.12-201	4.12.7	Table 4.12-66	MG	Length of bull trout habitat (km).	Please define what is meant by "bull trout habitat"? Is this a combination of several metrics or a synonym for one of the analyses performed? Please clarify which data and analysis is being reported in this row.

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369	4.12-201	4.12.7	Table 4.12-66	MG	occasional outflow from the lake through a channel that would reconnect with lower Meadow Creek downstream of the lake, which may be insufficient to provide for passage of bull trout for most of the year.	See previous comments regarding Hangar Flats pit lake predicted outflow and likely year-round accessibility for fish.
370	4.12-203	4.12.7	Table 4.12-66	MG	Refer to Table 3.12-24 for baseline measurements.	The purpose of a summary table is to provide a summary without having to search back into the document. Please provide a summary of baseline conditions for Aluminum, copper, antimony, arsenic, and mercury as these are the main constituents that change according the reporting here. In that way a comparison against baseline can be determined.
371	4.12-204	4.12.7	Table 4.12-66	MG	Fish passage at Yellow Pine pit lake would initially be provided in a the EFSFSR tunnel, then ultimately by backfilling the Yellow Pine pit and building a new stream channel over the top of the backfill, thereby providing permanent fish passage through the area. The Meadow Creek diversions and then construction and operation of TSF/DRSF and the construction/operation of the DRSF in Fiddle Creek would create new barriers to natural fish movement that would be permanent.	Please provide quantification of the net gain or loss of accessible habitat. Noting that 1 barrier is removed but 2 are created implies a net loss of habitat when in fact there is a significant net gain. Please identify the net gain.
372	4.12-204	4.12.7	Table 4.12-66	MG	Amount of increased traffic (average daily traffic).	Assumes WQ impacts proportional to traffic count, which has not been demonstrated or documented and which ignores road design, age, best management practices, etc. Please revise.
373	J-1-31	J-1	Table J1-11	MG		Water temperature pathway states that the temperature are being revised to appropriate values for the subbasin. What are the appropriate values that were used?
374	J-1-60 to J-1-75	J.4	WCI Figures	MG		Many of the habitat elements in the WCI matrix are readily available in the appendix. Some show positive increasing trends (i.e., LWD, pool frequency, etc.) but they were not discussed in the main DEIS document. Please clarify why some were not discussed in the DEIS Section 4.12.
375	J-9 (TM Page 2)	J-9 (TM Section 2.0)	TM Table 1	MG		Table does not include any of the IDEQ state criteria for bull trout. Please update.
376	J-9	J-9	Whole section	MG		Global comment: update appendix to be current with alternative descriptions of YPP Lake and 2019 fish sampling results.
377	J-10-1	J.10	1	MG	The relative fish community abundance of each species differs downstream of the Yellow Pine pit when compared to upstream of the Yellow Pine pit due to habitat differences and altitude influences	Please explain how the altitude influences fish abundance near the YPP. Otherwise, consider revising the statement or deleting reference to altitude.
378	J-10-10	J.10.4.2	5	MG	To the degree that abundance estimates are accurate, the results indicate limited abundance of these salmonids in the Yellow Pine pit. Brown and Caldwell (2019) notes that several hundred whitefish also were captured suggesting that the lake can support a large number of fish given suitable habitat.	The statement appears to suggest that the abundance estimates may not be accurate. Suggest deleting sentence unless there is some rationale for questioning the abundance estimates.