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First name: Alan
Last name: Haslam
Organization: Midas Gold Idaho, Inc.
Title: Vice President, Permitting
Comments: Please see attached comment letter from Midas Gold Idaho, Inc. 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).

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:

[bull] Improving the Characterization of Adverse and Beneficial Effects Fully Considering Midas Gold[rsquo]s Mitigation Plans

[bull] Stream Lengths, Barriers, Habitat Availability, and Habitat Accessibility and Connectivity to Fish

[bull] Use and Interpretation of Intrinsic Potential (IP) Habitat and Occupancy Modeling (OM) Results

[bull] Use of Temperature Criteria and the Presentation of Stream Temperature Modeling and Evaluation Results Interpretation of Flow Productivity Analysis and Results

[bull] 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[rsquo]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[rsquo]s Mitigation Plans

The characterization of the project[rsquo]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[rsquo]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[rsquo]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[rsquo]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 [ldquo]removed[rdquo] or [ldquo]lost[rdquo] 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 [ldquo]constructed channels[rdquo] 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[rsquo]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 [ldquo]present[rdquo] is [ldquo]accessible[rdquo] 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[rsquo]s ability to reach them. The DEIS confuses these terms and uses the term habitat [ldquo]availability[rdquo] in way that means either [ldquo]present[rdquo] and [ldquo]accessible[rdquo] or both; this should be rectified. Generally, Section 4.12 uses the terms [ldquo]suitable habitat[rdquo], [ldquo]available habitat[rdquo], [ldquo]useable habitat[rdquo], [ldquo]important fish habitat[rdquo], and [ldquo]potential habitat[rdquo]. These terms should be defined and used consistently as well, to improve clarity.

Similar treatment should be given to terminology definitions for [ldquo]total stream habitat[rdquo], habitat [ldquo]potential[rdquo], and habitat quality [ndash] 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 [ldquo]access[rdquo] 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 [ldquo]hatchery supported[rdquo] to [ldquo]natural[rdquo], 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:

[ldquo]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.[rdquo] (Agrawal et. al. 2005).

Similarly,

[ldquo]Intrinsic potential measures the potential for development of favorable habitat characteristics as a function of the underlying geomorphic and hydrological attributes, [hellip] 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.[rdquo] (NOAA 2017)

The FEIS should reflect these important distinctions explicitly when the IP results are applied and interpreted [ndash] (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 [ldquo]habitat[rdquo], [ldquo]habitat quality[rdquo], [ldquo]habitat capacity[rdquo], and/or [ldquo]habitat availability[rdquo]. 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 [ldquo]habitat intrinsic potential[rdquo] or more simply [ldquo]potential habitat.[rdquo]

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 [ldquo]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.[rdquo]

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:

[bull] Include a description of the conservative assumptions in the stream and pit lake network temperature (SPLNT) model.

[bull] Describe measures that Midas Gold proposes to avoid, minimize, or mitigate impacts

[bull] Compare temperature criteria to simulated values in a manner that is consistent with previous agency discussions and United States Environmental Protection Agency (EPA) guidance.

[bull] 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.

[bull] 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[rsquo] Appendix B, the Southwest Idaho Ecogroup Matrix of Pathways and Watershed Condition Indicators, or the [ldquo]Matrix[rdquo] 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 ([deg]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[deg]C and lists any reaches with simulated maximums greater than 21[deg]C as [ldquo]lethal conditions.[rdquo] 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[deg]C). That is, stream temperatures fall between 6 and 10[deg]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[deg]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[deg]C), then those same 5 km should also be less than 13[deg]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=736 51) 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[rsquo]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[deg]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 there- fore 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[deg]C. The effect of this was an increase in stream water temperature by about 0.5[deg]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:

[bull] Development of SPLNT models using the warmest, driest periods in the summer and fall (Brown and Caldwell 2019a, b, c)

[bull] SPLNT models account for shade only in narrow strips of plantings next to streams, while actual vegetation growth would occur beyond what is simulated

[bull] Assuming linear growth curves for plantings that under-represent early (faster) growth rates

[bull] No overlap in canopy although multiple levels of canopy would develop (Brown and Caldwell 2019a)

[bull] 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[deg]C temperature increase could occur at the water treatment plant, but that the SPLNT models assumed a value of 0.5[deg]C. In fact, Brown and Caldwell (2020) explains that a 1[deg]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[deg]C and 0.5[deg]C, and that 0.5[deg]C was applied. Paragraphs that mention a 1[deg]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[deg]C to 2[deg]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 [ldquo]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.[rdquo] 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 [ndash] 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 [ldquo]post-closure conditions in lower Meadow Creek are impacted by simulated discharges from the Hangar Flats pit lake,[rdquo] 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

SEE LETTER SUBMISSION: Table 1 Current Conditions Compared to Alternatives

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 [ndash] 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 [ndash] 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-P[eacute]rez 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 [ldquo]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.[rdquo] 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[rsquo]s proposed restoration to reduce and stabilize the largest documented sediment source in the upper

EFSFSR (Etheridge 2015) [ndash] 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.

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SEE LETTER ATTACHMENT FOR TABLE PROVIDING EXTENSIVE EDITS EDITS/SUGGESTIONS:
Attachment A: Stibnite Gold Project DEIS Surface and Groundwater Quantity (Sections 3.8 and 4.8) and Surface and Groundwater Quality (Sections 3.9 and 4.9) Comments Compilation Table