APPENDIX I – RESPONSE TO PUBLIC COMMENTS

As described in **Section 12.0**, the formal public comment period for the Kootenai-Fisher Project Area Metals, Nutrients, Sediment, and Temperature TMDLs extended from February 3, 2014 to March 4, 2014. Formal written comments were received from three organizations and two individuals. DEQ evaluates all comments and related information to ensure no critical information was excluded from the document. Particularly for stakeholders selected to help advise the TMDL development process, early and active involvement and feedback with DEQ enhances the ability for collaboration and dialogue about the process. All three organizations submitting comments were involved in the stakeholder advisory group for the project, and the comments/concerns provided by two of the three organizations were not shared until the public comment period. This made it difficult to fully collaborate with these two organizations; whereas, early and timely input and feedback from Plum Creek Timber, particularly Brian Sugden, provided numerous opportunities for collaborating and discussing concerns.

Excerpts of the public comments received are organized by category, with most comments pertaining to a specific pollutant (i.e., nutrients, temperature, metals, and sediment). The original comment letters are located in the project files at DEQ and may be reviewed upon request. Responses follow each comment, and because this project was a joint effort between DEQ and the EPA Region 8 Montana Office, the responses were jointly prepared.

In addition to the general and specific comments presented in this appendix, several general grammatical and typographical comments were provided. Changes were made to the final document to reflect those comments but they are not summarized below.

I.1 GENERAL COMMENTS

Comment 1.1: Non-Pollutant Impairments Section 9.0
"For streams that do not have a TMDL in this document, the non-pollutant causes were not investigated. They are being summarized in this section to increase awareness of the non-pollutant impairment definitions and typical sources." Will the non-pollutant causes be investigated in the future and is there the potential for streams listed for non-pollutant impairments being delisted?

> **Response 1.1**: The non-pollutant causes will be investigated in the future as part of the monitoring and assessment process, and if updated assessment information indicates those causes are no longer causing impairment, they will be delisted. For instance, Quartz Creek was previously listed for physical substrate habitat alterations, and as a result of habitat data collected to assist with TMDL development, that cause is being removed within the 2014 Integrated Report.

Comment 1.2: Why wasn't a TMDL assessment for sediment done on the Fisher River? Why wasn't the Fisher River assessed for temperature impairments?

> **Response 1.2**: The scope of TMDLs within this document is based on the 2012 303(d) List and the Fisher River is not on that list as being impaired by sediment or temperature. The Fisher River was last formally assessed for beneficial-use support in 2003. Information about that assessment is available at the Clean Water Act Information Center

(http://deq.mt.gov/wqinfo/CWAIC/default.mcpx). For each 303(d) listing cycle, DEQ solicits stakeholders throughout the state for recent data. All data received as a result of the solicitation are added to the assessment file, but they must be screened to make sure they constitute sufficiently credible data to proceed with an assessment. Additionally, because of time and resource constraints, not all waterbodies with recent data are able to be formally evaluated within that listing cycle. More information about this process is described in the Reports section of the CWAIC website (listed above). If you have specific questions regarding the assessment decision for the Fisher River or would like to follow up with DEQ regarding recent data you think may assist with an assessment, you should contact the DEQ Monitoring and Assessment staff.

Comment 1.3: Point sources figure in Appendix A, Figure A-18. This may be correct, just something we are not currently aware of or it could be an error on the map. It appears that one of the MPDES permits for suction dredging is off of the main stem of Libby Creek up Crazyman Creek. Like I said, could be a mapping error.

Response 1.3: The suction dredge permit was incorrectly plotted on Crazyman Creek. **Figure A-18** has been revised with the correct location for that permit. On a related note, there is a suction dredge permit that is plotted on Libby Creek but the permittee is also authorized to suction dredge on Crazyman Creek.

Comment 1.4: Clarify reference to "*North Fork*" as North Fork Keeler Creek. Correction: North Fork Keeler Creek flows into main Keeler Creek, not South Fork Keeler Creek.

Response 1.4: The correction was made.

Comment 1.5: Page 8-18; 2nd paragraph: What is a "devil" deposit?

Response 1.5: The text was changed to the following: "developed deposits."

Comment 1.6: I believe that the TMDL work was done in too big of a hurry due to lawsuit. The people working on the TMDL should have spent more time in the field. A good example is the new TMDL for Nitrate/Nitrite on upper lake creek. This TMDL was attributed to the Troy Mine tailing dam. However the sample that triggered the new TMDL was taken from sample site (Lake Creek 4) which is way below the tailings facility. In the public meeting we were told that the new TMDL's were not new rules. This is not the truth as the new limits preclude new activity on National Forest Land. I see the environmental groups using their lawsuit as a hammer and the clean water act as the nail to restrict new activity anywhere in the national forest. Very Sad!!!

Response 1.6: Spending more time in the field is always desirable, but DEQ feels that staff spent adequate time in the field during the project. Regarding the example, Lake Creek has been identified as impaired for nitrate/nitrate since the 2000 303(d) List, and recent algal data from multiple locations on the stream confirmed it is still impaired. The allocation for the tailings impoundment was based on the trend in water quality data and literature documenting elevated nitrate concentrations going into the groundwater from the impoundment. However, we agree that more data is needed to refine the source assessment. Given this uncertainty, the allocations in **Section 6.5.4** were changed into a single composite allocation to all human sources and more detailed recommendations for refining the source assessment have been added to **Section 11.3.1**. We disagree with the statement that the TMDL precludes new activity on USFS land. Sources permitted under the MPDES program must adhere to their permits, but this document sets no restrictions on activities on USFS land. We did mention in the public meeting that implementing the TMDLs is voluntary, and in most cases, using all reasonable best management practices is what is recommended. For instance, if all BMPs are implemented during timber harvest on USFS land, that is meeting the intent of the TMDL. In general, this is already being adhered to for activities on USFS land.

Comment 1.7: In general, we believe that DEQ/EPA has done a good job in developing the draft TMDLs, and involving stakeholders in the process. Clearly there was a huge amount of effort put into this draft document. There was good communication with the EPA project manager throughout this process, and as a stakeholder, we felt like our input was heard.

Response 1.7: Thank you for the positive feedback.

Comment 1.8: We made a request in early 2013 that DEQ should conduct additional monitoring of Raven Creek in order to obtain sufficient credible data to resolve the nutrient impairments. We thank DEQ for collecting this additional data during your already busy 2013 monitoring season.

Response 1.8: DEQ is glad this request could be accommodated.

Comment 1.9: SC-15 is marked incorrectly on this map in the Draft K-F TMDL. The correct location for SC-15 is above SC-17A (48°14'33.78"N 115°54'26.90"W). This should also answer the concern later in the document about the lack of location information for SC-15 (8-18). If there are any other sample locations needing location clarification the Troy Mine is available to assist the MTDEQ.

Response 1.9: We have updated document maps to reflect the coordinates provided. The Troy Mine water quality database did not have site coordinates. We noticed that site names had changed some over the years with the addition of sites 15a, 15b, and 15c and had trouble discerning the location of site 15.

Comment 1.10: While many watersheds throughout Montana have very little data concerning the health and history of streams, this is not the case for those streams surrounding the Troy Mine. Over the 30 year life of the Troy Mine, there has been continuous surface water quality sampling and monitoring in Lake Creek, Stanley Creek, and other nearby lakes and streams in the watershed, as well as extensive groundwater sampling. These water sampling efforts have been conducted by mine operators, third-party consultants, and governmental agencies and have produced an extensive amount of baseline data and water quality related reports that provide a detailed analysis of the watershed.
The following are important sources of publically available water quality data and information for Lake and Stanley Creeks:

1. An especially helpful resource with pre-mining water quality data collected as far back as the 1970s is a 1984 report by the Montana Bureau of Mines and Geology prepared in cooperation with the U.S. Geological Survey entitled Water Resources of Lake Creek Valley, Northwestern Montana, Memoir 56 by G.W. Levings, R.F. Ferreira and J.H. Lambing, 1984.
2. Baseline water quality data for Lake Creek is available in a 1983 report by the Montana Bureau of Mines and Geology entitled Hydrochemical Baseline Studies, Lake Creek Drainage, Lincoln County, Montana, Open-File Report 111.

3. Water Quality data gathered by third-party consultants from the Lake Creek and Stanley Creek watershed has been submitted to MT DEQ by the mine operators on an annual basis for over thirty years. This data is compiled and referenced in the Troy Mine Water Quality Monitoring Program Reports, years 1-28; by Paramatrix, Anchor QEA, (et. al.)
4. Excellent work on metals-related water quality impacts performed by third-party consultants in the watershed is available in a 2004 report by Scott Mason entitled Assessment of Fate and Transport of Copper in Decant Pond Disposal System-Troy Mine (Land & Water Consulting, Inc. Kalispell, Montana) and his 2010 report entitled Assessment of Natural Attenuation of Metals in a Decant Pond Disposal System (Hydrometrics, Inc. Helena, Montana).
5. The 2012 report entitled Troy Mine Revised Reclamation Plan: Final Environmental Impact Statement (MT DEQ and US Forest Service, June 2012) includes in its appendices relevant water quality data and analytical reports about water quality in the watershed. Significantly, the Record of Decision for this FEIS does not require construction of water treatment facilities at Troy Mine because of natural attenuation of metals within the tailings impoundment.

The data and reports referenced above provide important information regarding pre-mining and operating conditions. We also have extensive documentation during our care and maintenance period from 1993 until 2005, during a time when mining operations were suspended. Some of the determinations and conclusions in the Draft K-F TMDL suggest that this extensive available data were not referenced by MT DEQ during preparation of the document. The process of listing Lake and Stanley Creeks as impaired waterways and the subsequent Draft K-F TMDL analyses employed by MT DEQ for these creeks are based on a very limited set of data points which do not consider the depth and breadth of publically available data sources. We trust that the MT DEQ will consider these overlooked data resources to improve the analysis and conclusions of the TMDL process for Lake Creek and Stanley Creek.

Response 1.10: Thank you for summarizing this information. Information from Sources 3 and 5 are referenced in the document. We were unaware of the other sources, or else we would have consulted them during development of this document. Since receiving these comments, we located a copy of Source 1, and reviewed that to determine if and how it should be incorporated into the source assessments for Lake and Stanley Creeks. We also obtained the 2013 Final Annual Report for the Comprehensive Water Quality Monitoring Program for Streams Adjacent to the Troy Mine submitted to DEQ's Hardrock Mine Bureau and located the reports in Source 4 in the appendices of the Troy Mine Revised Reclamation Plan Final Environmental Impact Statement. We had previously obtained the electronic database of the water quality data but did not have the macroinvertebrate summary provided in the annual report. Please note, for assessment purposes DEQ only considers data from the previous 10 years.

The sources mentioned above that we were not aware of have been incorporated into revisions in **Section 6** to the extent possible, but they cannot be incorporated in great-depth at this time because we were not made aware of them until this late in the project. As shown in **Appendix F**, the nutrient water quality data through 2011 from the mine were incorporated into the impairment assessments. It is too late to add macroinvertebrate data to the assessment file for the 2014 Integrated Report cycle, but they can be added to the file for inclusion into future assessments if it meets data quality requirements. However, the 2013 Annual Report (Troy Mine and DEQ, 2013) only has a graph of the HBI scores – additional information such as the sample locations, sample dates, and corresponding HBI scores will need to be submitted to DEQ's Monitoring and Assessment Section. As a side note, based on the other available nutrient-related data, additional HBI scores would not have changed the outcome of the nutrient impairment determinations for Lake and Stanley creeks.

DEQ strives to obtain all relevant information during project development, including solicitations for data in meetings and e-mails, as well as pre-public review drafts for project stakeholders (which include the entity that provided this comment). DEQ initiated these efforts starting in early 2012 and extending throughout the life of the project, to help ensure information and data would not be overlooked and available information could be incorporated into the document. Specifically, nutrient-related data was requested in April 2012, and assessment results with updated impairment determinations were presented to the stakeholder group in March 2013. At either of those times and extending until late 2013, additional data could have been incorporated to update the assessment for the 2014 Integrated Report. Nevertheless, as noted above, these new data do not modify any impairment determinations and are not critical to the primary TMDL components.

Comment 1.11: Page 2-12 states “Operations for the Rock Creek Mine are based on the west side of the Cabinet Mountains just outside the Kootenai-Fisher Project Area, but depending on how underground workings are developed the mine could potentially extend into the project area.” The inclusion of the Rock Creek Project within the project area for this TMDL is erroneous and may represent a fundamental misunderstanding of the physiography of the watershed. All planned or potential mining operations at Rock Creek will be conducted within the Clark Fork River watershed. There is no potential for the Rock Creek Project to impact water quality in the Kootenai River watershed.

Response 1.11: The reference was intended to convey the hydrological complexity of underground mine workings, but the statement was erroneous and has been removed from the document. Additionally, all discussion of Rock Creek Mine has been removed from the TMDL document and it been removed from **Figure A-17** in **Appendix A**.

Comment 1.12: Did the TMDL development for Raven Creek account for the potential sale and subsequent development of Plum Creek land into smaller land holdings (subdivisions)? What water quality protection practices were identified to mitigate potential sediment and phosphorus sources given the potential for land development? Given that application of water quality improvement practices is a landowner’s decision is the State of Montana going to be proactive in TMDL listed watersheds that undergo intensive development as Plum Creek sells its inholdings?

Response 1.12: TMDL development did not explicitly account for subdivision of Plum Creek land. Forecasting changes in land ownership are outside the scope of the TMDL process and unnecessary. Land ownership and/or use within a particular watershed could change at any given time and as long as that owner applies all reasonable land, soil, and water conservation practices for a given use, it will be meeting the intent of the TMDL. **Section 10.5** discusses best management practices for most land uses (i.e., potential source categories), and also includes subsections on Residential/Urban Development (**Section 10.5.4**) and Bank Hardening/Riprap/Revetment/Floodplain Development (**Section 10.5.5**). Based on these concerns additional language regarding best management practices and DEQ recommendations has been added to subsections mentioned above. DEQ is concerned about development within riparian areas and floodplains, and Montana DEQ’s strategies for dealing with this concern are detailed on p. 3-16 of its Nonpoint Source Management Plan (DEQ 2012).

Comment 1.13: Adaptive management comments were provided relative to nutrients and temperature (sections 6.8 and 7.8, respectively) - How would adaptive management address the potential development of Plum Creek lands in the ongoing TMDL implementation and evaluation? Are there identified BMP's for subdivisions or lands being transformed from timber to rural development?

Understandably there are uncertainties in regards to the potential development of Plum Creek lands in the Wolf Creek watershed; they own the vast majority of land in Wolf Creek and it is evident that they are rapidly selling off their inholdings in the Kootenai area. Was any of this considered when developing the adaptive management?

> **Response 1.13**: It is not evident to DEQ that Plum Creek is rapidly selling off its inholdings in the Kootenai-Fisher Project Area, and this concern was not brought up by stakeholders during the TMDL development process. Regardless, as discussed in Response 1.12, predicting effects from changes in land ownership is outside the scope of the TMDL process and unnecessary, but BMPs for most potential sources (including residential development) are included in **Section 10.0**.
>
> As discussed in **Sections 5.0** through **8.0** and **11.2**, adaptive management means that TMDL implementation and reassessment of the impairment status of streams is flexible and will change from circumstances such as new information becoming available, land management and uses changing, and standards and/or assessment procedures changing. Because these changes cannot be foreseen and are case-specific, the concept of adaptive management is discussed but no specific details are provided in the document. **Section 7.8** does mention that as part of adaptive management changes in land and water management that affect stream temperatures should be tracked. Using land conversion as an example, this would mean that different BMPs would be necessary, project prioritization for TMDL implementation would change as a result of ownership changes, and monitoring locations may need to be changed as a result of new potential sources and/or access issues.

Comment 1.14: Neither the NHCP nor the TMDL address the potential sale and development of Plum Creek land in the Kootenai-Fisher TMDL Project Area. The progressive sale and development of Plum Creek land has the potential to preclude improvements to watershed conditions.

> **Response 1.14**: See Responses 1.12 and 1.13 for information regarding the TMDL and sale and redevelopment of land. DEQ is not familiar with the details of the NHCP and recommends that interested parties contact Plum Creek Timber Company for additional information, but Section 5 of the NHCP discusses Land Use Planning in the context of working to be compatible with native fish conservation by providing incentives for conservation land sales, protecting fish-bearing streams during private sales through deed restrictions, and transferring the NFHCP to new owners where possible (Plum Creek Timber Co., 2000).

I.2 Nutrients Comments

Comment 2.1: A visual inspection of Stanley Creek is a subjective evaluation for nutrient impairment. In addition, Troy Mine consultants have been conducting macroinvertebrate sampling in Stanley Creek and submitting annual reports to MT DEQ (Troy Mine Water Quality Monitoring Program, years 1-28;) for nearly thirty years. None of this data was referenced as being used in evaluating Stanley Creek for impairment nor was referenced as being analyzed during the TMDL process.

Response 2.1: Algal sampling is time and resource intensive, and in streams where algal biomass is well below the target, a visual determination that algal biomass is <50mg/m^2 is made to conserve resources. For assessment purposes, the target threshold is 125mg/m^2 for chlorophyll-*a* and 35g/m^2 for AFDM. Our field personnel are highly trained, the field protocol has photographs with varying levels of algae, and we are confident that the visual assessment threshold is sufficiently below the target so that physical samples are collected if algal levels are anywhere close to the target.

As discussed in Response 1.10, the macroinvertebrate data collected by Troy Mine was not included because the DEQ Water Quality Planning Bureau was not aware of it. It is submitted via hard copy to a different bureau and is not uploaded electronically to STORET, which is the EPA water quality monitoring database DEQ routinely uses to check for macroinvertebrate data to assist with assessments. Also, as discussed in Response 1.10 macroinvertebrate results would not have affected the outcome of either impairment determination (i.e., Lake or Stanley creeks). The assessment method considers HBI scores over 4.0 to be indicative of nutrient enrichment (when there are other indicators), and a review of the summer HBI scores in the graphs in the 2013 Annual Report shows several samples in both Stanley and Lake creeks have exceeded 4.0 within the past 10 years (Anchor QEA, LLC., 2013).

Comment 2.2: Pre-mining water quality data gathered in the watershed by governmental agencies shows that the Troy Mine is not the source of the nitrate/nitrite in Stanley Creek. Significantly, in 1984, the Montana Bureau of Mines and Geology and the US Geologic Survey jointly published a report entitled *Water Resources of Lake Creek Valley, Northwestern Montana* (Levings et al. 1984) that documented pre-Troy Mine nitrate/nitrite levels are similar to those described in the draft TMDL report. Further, the conclusion that the upper part of Stanley Creek is impacted by the mine fails to take into account the virtually identical values found in the control creek (Fairway Creek, located away from mine operations). Pre-mining water quality data and subsequent water quality data show that Stanley Creek would have the same nitrate/nitrite values with or without the Troy Mine.

Response 2.2: We reviewed *Water Resources of Lake Creek Valley* (Levings et al., 1984) and *Relation between Troy Project and the Hydrology of the Vicinity, Lincoln County, Montana* (Halpenny and Greene, 2014), which both evaluate surface and groundwater conditions prior to Troy Mine being in full production. However, we disagree that the data represent pre-mining water quality. In 1973, exploration drilling was being conducted at Troy Mine and nitrate concentrations in Fairway Creek, Thicket Creek, and Stanley Creek downstream of Fairway Creek were below detection (0.5 mg/L), whereas the concentration in the North adit and upper Stanley Creek (west of the N adit) were 1.86 mg/L and 0.48 mg/L, respectively (Halpenny and Greene, 2014). This indicates that even the exploration activities were affecting nitrate concentrations, and that data from this time period are not representative of pre-mining conditions. Additionally, as described below, other human activities occurred in the watershed prior to exploration drilling associated with the Troy Mine that could have affected background nitrate concentrations.

As stated on the Revett Minerals website (http://www.revettminerals.com/projects/troy-mine), "The Troy ore body was discovered by Bear Creek Mining (Kennecott) in the early 1960's, and was later optioned to ASARCO to develop and operate." The 2005 SRK report titled, "Independent Technical Report on the Troy Cu-Ag Project, Montana" also states that, "In the vicinity of the project area, several small mineral occurrences were found during the 1920's and 1930's. During the 1960's and through to the early 1980's, three major copper/silver deposits – Spar Lake (Troy), Rock Creek and Rock Lake (Montanore) – and numerous smaller deposits were discovered within the Revett Formation inside a narrow belt extending from the Coeur d'Alene Mining District north to approximately the Kootenai River. The ensuing drilling programs, between 1964 and 1967, resulted in the delineation of the Troy deposit." As stated in the EIS, there were also historic timber harvest and road construction activities in the Stanley Creek watershed in the 1960s.

DEQ does not consider Fairway Creek to be a control creek, as there are numerous potential nutrient sources in the watershed including timber harvest, campgrounds, abandoned mines, etc. DEQ has changed the text in the document to recommend additional water quality monitoring in the watershed to (1) identify natural background conditions for Stanley Creek, and (2) identify and better quantify source loads for Fairway Creek.

Comment 2.3: The assertion that the Troy Mine impacts nutrient levels in Lake Creek is also incorrect. If the tailings impoundment were a source of nitrate/nitrite to Lake Creek, then the levels should be high at sampling location K01LAKEC06 as well, as this site is downstream of the impoundment. For a complete assessment of loadings downstream of the impoundment at sampling location LC04 (referenced in the Draft TMDL), the loadings from Porcupine Creek and Twin Creek need to be accounted for. Also, the fate of the mine water at the tailing impoundment has been extensively studied (Scott Mason, 2004). Hydrogeological study has shown that the general direction of ground water flow is cross-valley (Ebasco Environmental, 1990). None of the studies to date have found any evidence of an impact on Lake Creek due to the water from the Troy Mine tailing impoundment. Lastly, the suggestion later in the document that the water quality in wells MW-1 and MW95-4 are indicators of the source of the nutrients detected at LC-4 fails to take into account water sampling done by the Montana Bureau of Mines and Geology prior to the establishment of the impoundment. Levings et al. (1984) found higher levels of nitrate/nitrite in wells adjacent to the impoundment 0.27 ppm, 0.33 ppm, and 0.4 ppm in wells 30N33W30DAAD01, 30N33W30DAAD02, and 30N33W30DCAD01 respectively.

Response 2.3: The groundwater well data cited from Levings et al. (1984) are actually total nitrogen concentrations. The nitrate concentrations at those sites and at the wells in 30N33W20, which is where Lake Creek site LC-04 is located, were below 0.1 mg/L with the exception of one sample at 0.12 mg/L. Additionally, the concentrations that the comment referenced in the TMDL document represent the mean concentration, whereas the maximum shallow well concentration cited the Final EIS and also referenced in Section 6 of this document was 1.19 mg/L (MW95-4). The final EIS states that "if nutrients in shallow groundwater, as measured at MW95-4, discharge locally to surface water (as they may at the toe ponds) nuisance algal growth could occur." Although the data in Levings et al. (1984) do indicate variable groundwater nitrate concentrations in the Lake Creek watershed, we do not feel this negates the evidence that the tailings impoundment is elevating nitrate concentrations in groundwater, and is a probable source to Lake Creek. However, we do agree that based on the distance and other potential sources between monitoring locations, there is insufficient information to retain a separate load allocation to the impoundment (as was proposed in the draft TMDL). The load allocation has been revised to include all potential human sources.

In regards to groundwater flow and loading to Lake Creek, the studies have focused on metals fate and transport and not nitrate, but the groundwater flow information may be helpful for making inferences. **Appendix H** from the Final EIS (U.S. Forest Service and Montana Department of Environmental Quality, 2012) – Mine Water Plume Location and Identification Phase 1 Results and Phase 2 & 3 states the following: "it is hypothesized that a shallow gravel unit may provide the primary flowpath for transport of water from the decant ponds." **Appendix H** also states, "Although the general directions of groundwater movement in the area are likely towards the north (in the general direction of flow in Lake Creek) and towards the west (toward Lake Creek), local groundwater flow directions are likely controlled primarily by the location and orientation of permeable water bearing zones within the glaciolacustrine and alluvial deposits." Based on these statements, it appears that <u>shallow</u> groundwater flow from the tailings ponds does flow towards Lake Creek but the flowpath from the decant ponds is not well understood. Therefore, it is possible that the ponds are contributing nitrate to the groundwater and manifesting at site LC-04 and not Site K01LAKEC06.

DEQ added a recommendation in the document for additional groundwater studies in the area to better understand movement of nitrate from the tailings ponds. The current studies focus on metals movement and attenuation; the Assessment of Natural Attenuation of Metals in a Decant Pond Disposal System, Troy Mine in **Appendix I** of the Final EIS (U.S. Forest Service and Montana Department of Environmental Quality, 2012) concludes that "concentrations of chemically conservative parameters such as nitrate are similar between the mine/decant water and the underlying groundwater…indicating that mine water is not appreciably diluted in the groundwater close to the pond." DEQ has also changed the text in the document to acknowledge that other sources (e.g., Porcupine Creek, Twin Creek, etc.) may be contributing excess nitrate loads from unknown sources. Further monitoring should be conducted to better quantify these other potential sources.

<u>Comment 2.4</u>: The Document Summary, Page DS-2 states "mining-related BMPs are the principle method needed to meet the TMDLs." BMPs are and have been used at the Troy Mine as documented by the decades of inspections and monitoring conducted by Montana DEQ and the US Forest Service.

<u>Response 2.4</u>: The comment about BMPs is not intended to imply that no BMPs have been used but that additional BMPs are necessary because under current practices, water quality standards are still being exceeded. Based on the uncertainties in the source assessment discussed in Response 2.3, this language has been broadened to include more than mining sources and a recommendation that additional monitoring and refinement of the source assessment be conducted.

<u>Comment 2.5</u>: Stanley and Lake Creeks are listed for Nitrate-Nitrite (Nitrate), and TMDLs are proposed for this parameter. DEQ has provided mixed signals on Nitrate, and the need for it to be included as a numeric water quality standard. In Suplee and Watson, they note in the Executive Summary that "Total Nitrogen and TP provide better overall correlation to the eutrophication response than soluble nutrients…" As such, Nitrate was excluded as a proposed numeric nutrient standard for Montana. This was accepted by peer reviewers that evaluated Montana's proposed nutrient criteria. However, later in 2013, DEQ issued a Technical Memorandum (dated 11/14/2013) that recommends that Nitrate be evaluated as a "…benchmark for assessment purposes…." The proposed benchmark level is 0.1 mg/L. In this draft TMDL, DEQ/EPA developed Nitrate TMDLs using the 0.1 mg/L benchmark value. It is unclear to us why - if Nitrate is not suitable as a numeric water quality standard for Montana - that TMDLs are being written for Nitrate using a one-size-fits all benchmark value of 0.1 mg/L.

Response 2.5: DEQ does not agree that mixed signals have been given regarding elevated levels of nitrate is surface waters. While it is true that DEQ is proposing total nutrients as standards, Suplee and Watson (2013) state on pages 1-3 and 1-4:

> "Rapid uptake of soluble nitrogen compounds by aquatic organisms (mainly algae and plants) makes these compounds' concentrations highly variable, and difficult to use as ambient surface water criteria. Total nitrogen and TP have been shown to provide better overall correlation to eutrophication response than soluble nutrients (Dodds et al., 1997; Dodds et al., 2006; Dodds et al., 2002) and, in terms of water quality criteria, total nutrients are more practical than soluble forms for river monitoring and assessment, total maximum daily loads, etc. (Dodd and Welch, 2000). However, the Department strongly encourages the collection of nitrate + nitrite when collecting TN and TP data. The soluble data can often point to specific types of nutrient sources, for example. The Department's Water Quality Monitoring Section will continue to include nitrate + nitrite alongside TN and TP for routine monitoring for nutrients and may use some general guidelines from the scientific literature for determining when measured concentrations are clearly too high."

As was made clear in the last sentence above, DEQ intended that guidance be used to evaluate nitrate data when it has been collected by Monitoring Section staff. The technical memorandum dated November 14, 2013 provided that guidance.

The rationale for not adopting nitrate standards for eutrophication control is that nitrate only provides useful information in one direction (when it is present), but its absence does not necessarily mean there are no issues. A stream might well be choked with *Cladophora* and have no measurable nitrate because the algae have drawn the concentration down. As a water quality standard, this is problematic, because a water quality standard works best when decisions can be made on either side of a threshold. For eutrophication control, numeric nutrient standards will be used for surface water assessment and MPDES permits, and total nutrients were selected as the best measurement for both purposes while nitrate is better addressed in ambient surface water assessment. That is, if monitoring staff are finding elevated nitrate levels in ambient surface waters outside of an MPDES mixing zone, there is reason to be concerned.

The 11/13/2014 technical memo outlines the means by which nitrate data —when it is in fact measured— can be evaluated by monitoring staff. The recommended benchmark is scientifically defensible and DEQ has demonstrated significant eutrophication impacts at concentrations just slightly higher than the benchmark of 0.1 mg/L. And it should be emphasized that the nitrate data is always evaluated alongside the effect variable of concern, excess algal growth, for the reasons outlined above.

Comment 2.6: The use of the nitrate+nitrite threshold does not seem to be appropriate as Montana Department of Environmental Quality (MDEQ) does not plan on using nitrate+nitrite as a method to measure eutrophication (Suplee and Watson, 2013). This issue needs to be discussed in the Kootenai-Fisher TMDL, or the use of nitrate+nitrite needs to be dropped from the process.

Response 2.6: See response to Comment 2.5.

Comment 2.7: The nitrate+nitrite threshold is cited as being from McCarthy (2013). The McCarthy value for nitrate+nitrite is contrary to what is said in Suplee and Watson (2013). Suplee and Watson state that nitrate+nitrite levels are too variable in streams to be used to evaluate eutrophication; however, McCarthy implies it is useful based on a study from a stream in the Eastern Plains of Montana. Which opinion takes precedence in this report? It seems that the nitrate+nitrite threshold may be applicable to the Eastern Plains but not applicable to the Rocky Mountain region of Montana.

> **Response 2.7**: Please see the detailed discussion of this topic under Response 2.5. Regarding the idea that the nitrate threshold is only applicable to eastern MT plains streams, the Department would like to point out that the half-saturation constant used to derive the 0.1 threshold was identified after giving consideration to a collection of studies carried out in many different stream types and locations around the U.S.

Comment 2.8: This report and Appendix B are in error if MDEQ means to cite Suplee and Watson (2013) (Appendix B) as a source for the nitrate+nitrite threshold. Nitrate+nitrite criteria are not defined in the Suplee and Watson report (2013). The source for the threshold is from McCarthy (2013). Furthermore, in Suplee and Watson (2013) it is specifically stated that nitrate+nitrite will not be used to evaluate eutrophication.

> **Response 2.8**: The commenter is correct that nitrate + nitrite criteria or thresholds are not presented in Suplee and Watson (2013), and that the nitrate benchmark used to make assessments is actually found in a technical memo. However, the commenter is not correct in asserting the Suplee and Watson (2013) state that nitrate+nitrite will not be used to evaluate eutrophication. Rather, Suplee and Watson (2013) say "…the Department will not be recommending nitrate (or nitrate + nitrite) criteria ***for adoption*** for the control of eutrophication at this time." (emphasis added). The point they were making is that nitrate will not be proposed for adoption by the Board of Environmental Review, not that nitrate is unimportant to eutrophication. To the contrary, Suplee and Watson (2013) clearly state on page 1-4 that nitrate measurement is very important in ambient surface water monitoring and should continue. But there are specific reasons why DEQ is only intending at this time to adopt standards for total nutrients; please see the discussion of this topic under Response 2.5. On a side note, the TMDL document erroneously cited the memo to McCarthy when it should have been M.W. Suplee – references in the document have been corrected.

Comment 2.9: The nitrate/nitrite target value listed in Table 6.2 originates from a study conducted on the Box Elder Creek. Box Elder Creek is located in the Northwestern Great Plaines ecoregion and is not an appropriate steam to use to establish a target value for developing TMDLs for steams in a wooded intermontane valley (Northern Rockies Level III Ecoregion). At the core of the nitrate/nitrite target value as described in the McCarthy (2013) memo is the assumption that all watersheds in the diverse state of Montana are homogenous. Within an ecoregion the MTDEQ recognizes that variation can be expected. In Suplee et al. (2013) it is stated, "The Department recognizes that within each ecoregional zone there are likely to be some streams with unique characteristics that could render the ecoregional criteria inappropriate."

The Box Elder Creek study showed an increase in the amount of algae to "near-nuisance" levels and an impact to the dissolved oxygen concentration, which exceeded state standards, with dosing rates of 0.119 mg/L. The draft TMDL states that in Stanley Creek there isn't a nuisance algae population (page 6-

6, table 6-4). The bloom detected in Lake Creek (failure of the AFDM test) is likely attributable to *D. geminate*.(see other comments on this topic) In both Levings et al. (1984) and Troy Mine data, it has been shown that the dissolved oxygen content in both creeks is saturated, with nutrient levels virtually identical and in some cases greater than the nitrate + nitrite values tested at the Box Elder Creek sites. The use of nitrate/nitrite for detecting impairment isn't congruent with the Suplee et al. (2013) where it says, "The other major change, relative to the 2008 document, is that the Department will not be recommending nitrate (or nitrate + nitrite) criteria for adoption for the control of eutrophication at this time." In light of Suplee et al. (2013) a target value of 0.1 mg/L nitrate/nitrite is inappropriate for evaluating the health of the streams in the Kootenai-Fisher project area.

The scientific standing for impairment determinations would be enhanced if MT DEQ would investigate the dissolved oxygen level in each stream. In conclusion, it is inappropriate, at least with regards to Lake and Stanley Creek, to use a target value from a Northwestern Great Plains ecoregion steam when developing TMDLs for streams in a wooded intermontane valley.

> **Response 2.9**: See Responses 2.5 and 2.7.

Comment 2.10: In Section 9 there is reference to a Chlorophyll-*a* non-pollutant impairment for Raven Creek (see Table 9-1). Was this not addressed by the Chl-*a* data that DEQ collected on the stream, which showed median values of <20 mg/m^2? If so, can Raven Creek be delisted for this non-pollutant impairment?

> **Response 2.10:** Because of the additional Raven Creek data collected in 2013, the assessment was completed very close to completion of the draft TMDL document. All pollutant listings were updated within the document to reflect the impairment determinations but we forgot to update the non-pollutant status change for Raven Creek. Based on all chlorophyll-*a* and AFDM values being below the target, chlorophyll-*a* will be delisted as an impairment cause for Raven Creek for the 2014 303(d) List. The text in **Sections 6** and **9** has been edited to reflect the delisting.

Comment 2.11: More detail needs to be provided on how the diatom (Didymosphenia geminata; rock snot) is taken into account for all of the Ash Free Dry Matter (AFDM) samples. This is relevant for all of the streams evaluated in this report. Didymosphenia geminata has been observed in Lake Creek up to LC01 (my observations). The biomass provided by D. geminata would likely bias any AFDM measurements made at any location. D. geminata occurs most frequently in waters with low total phosphorus (less than 2 micrograms per liter [µg/L]) and low nitrate (less than 1 milligram per liter [mg/L]; Spaulding and Elwell 2007); however, it can also be found where both of these nutrients are present at very high concentrations (Spaulding and Elwell 2007). Spaulding and Elwell (2007) also suggest that where D. geminata is present, there is no clear indication that the biomass or growth rate for the diatom is in association with nutrient concentrations. Furthermore, it is not known if the diatom is limited by either nitrate or phosphorus in any streams in North America (Spaulding and Elwell 2007). Therefore, if the AFDM measurements are biased by this diatom, the AFDM measurements may not be directly correlated to nutrient levels in the stream.

> **Response 2.11**: In locations where *D. geminata* is not the major benthic growth, DEQ considers the collective measurement of benthic algae, fungus, and bacteria via AFDM to be a reasonable approach for quantifying bottom-attached biomass. Growth of lotic benthic algae typically follows a general pattern of colonization, exponential growth, and autogenic sloughing and loss. During colonization and exponential growth, chlorophyll-*a* and AFDM of algae track one another

fairly well. But with age, the algae begin to be colonized with other algae, bacteria, and fungi, forming the collective periphytic community referred to as *aufwuchs*. The loss phase in late fall is generally followed by repetition of the process the following summer. Leaves, pine needles, macrophytes, and moss are not considered appropriate to sample when sampling *aufwuchs.* DEQ field staff knows not to include them in routine sampling of stream benthic biomass. Thus, AFDM—as measured by DEQ—provides a means of quantifying stream biomass even if the peak of algal chlorophyll-*a* has passed. This gives DEQ more flexibility in sampling (otherwise, field staff would always have to be on the stream at the peak of algal growth, which is not practicable). DEQ does assume, when carrying out these analysis, that the streamflow associated with spring runoff largely resets the *aufwuchs* community each year.

At streams where *D. geminata* has dominated the stream bottom, the commenter has a point in noting that AFDM measurements collected there may lead to false positives using the Nutrient Assessment Methodology. DEQ's use of AFDM in accompaniment with benthic chlorophyll-*a* is predicated on the assumption that what DEQ is measuring is largely green algae and diatoms, and associated *aufwuchs*, and not big mats of *D. geminata.* Large mats of *D. geminata* can occur in waters with very low total P and their ability to do proliferate under these conditions is still under study. It should be noted that high N:P ratios in stream water may be a contributing factor. Field testing assessment methods are a critical component of method development. DEQ will be revising its nutrient assessment methodology over the next couple of years and will take this comment into consideration at that time.

Comment 2.12: Section 6.4.3.1, Page 6-6; "Eight chlorophyll-a and seven AFDM samples were collected from Lake Creek between 2011 and 2012. Chlorophyll-a values ranged from 5.5 to 38.9 mg/m² with none exceeding the target of 125 mg/m². The AFDM samples ranged from 18.5 to 69.5 g/m2 with four of the observations exceeding the target of 35 g/m2."

If the AFDM for Lake Creek were relevant, then the Chlorophyll-a would be closer to the target; however, the highest Chlorophyll-a was less than one-third of the target. The AFDM was likely affected by other sources of organic matter. MDEQ uses AFDM collected from stream-sediment surfaces as a way to estimate algal biomass (Suplee and de Suplee 2011). The method for AFDM analysis is based on oxidizing all material in the sample and reporting back the mass of all organic material in the sample (American Public Health Association 1998). It is used to provide an additional means of assessing accumulated algal biomass independent of Chlorophyll-a (Suplee and de Suplee 2011). The U.S. Environmental Protection Agency exemplifies this in the Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition (Barbour et al. 1999): "Periphyton biomass can be estimated with Chlorophyll-a, ash-free dry mass (AFDM), cell densities, and biovolume, usually per cm2 (Stevenson 1996). Each of these measures estimates a different component of periphyton biomass (see Stevenson 1996 for discussion)." In the Stevenson report (1996), it is stated that AFDM can be biased high due to non-algal sources (e.g., detritus, fungi and bacteria).

This leads to the question: how are the AFDM measurements, which should be measuring periphyton biomass, controlled for the added mass coming from bacteria, fungi, and the diatom (D. geminata)? Are all of the AFDM measurements in this report biased high due to other sources of organic matter? Also, all locations with the AFDM exceedance of the threshold are downstream of LC04, the most downstream location on Lake Creek monitored by the Troy Mine. If the impoundment is affecting Lake Creek at LC04, then the AFDM should fail to be a reliable metric there as well.

> **Response 2.12**: See response to comment 2.11. DEQ does not believe that the AFDM measurements in Lake Creek are biased due to other sources of organic matter. Because algae and other primary producers consume nutrients and alter instream concentrations, and other factors such as sunlight, macroinvertebrate densities, and water depth and velocity affect algal growth, occurances of high levels of algal growth will not necessarily correspond to locations where nutrient concentrations are elevated.

Comment 2.13: Section 6.4.3, Page 6-5, mentions a shift in analytical method from Total Kjehldahl Nitrogen (TKN) to Total Persulfate Nitrogen because of a bias associated with TKN. What bias does this passage refer to? There needs to be more detail why the switch between the methods was implemented. Are there studies that back up this statement?

> **Response 2.13**: The "bias" referred to in the TMDL document pertains to the TKN measurement, which can give higher results than simultaneously-collected total persufate nitrogen measurements (i.e., total N). Since TKN (organic N plus ammonia) should be a subcomponent of total N (TN), it should in theory never be higher than TN, but this was found to occur. This high bias was observed during review of in-house data undertaken by DEQ's QA officer some years ago, and for this reason the Water Quality Monitoring Bureau switched to total persulfate N around 2006.
>
> The USGS recently completed an analysis of calculating TN via different methods, including the persulfate method and the TKN +nitrate +nitrite method (see Assessing Total Nitrogen in Surface-Water Samples—Precision and Bias of Analytical and Computational Methods, USGS Scientific Investigations Report 2012-5281, Rus et al., 2012) . Results are best summarized in Figure 17 of that document. Total N calculated using TKN tends to be biased high and is quite variable, whereas total persulfate N has a somewhat low bias and is fairly precise as long as total suspended sediments are not too high. Streams in the TMDL area in question tend to have low suspended sediments, therefore the total persulfate N method is a good fit. The text has been clarified to state that TKN can have a high bias and a citation for the USGS report has been added.

Comment 2.14: Section 6.5.3.1 - In general, it seems that MDEQ is conducting a TMDL on what it perceives is groundwater. It needs to be described in this document that it is unusual for a small intermittent tributary such as upper Stanley Creek to have intermittently high nutrient levels.

> **Response 2.14**: Many streams are groundwater-dominated, particularly during the summer growing season, but this does not preclude human sources from causing impairment. The TMDL for Stanley Creek applies to all portions of the creek, from the headwaters to the mouth. As stated in the report, reductions in loads vary depending on site-specific conditions. No specific statement was made regarding nutrient concentrations in intermittent streams because the nutrient targets are set at concentrations that are not typically exceeded by natural sources in all streams in the Northern Rockies level 3 ecoregion.

Comment 2.15: The historic level of nitrate/nitrite has been well documented in Stanley Creek (Levings et al., 1984). Levings et al. (1984) stated, "Ross and Stanley Creeks ordinarily had larger nitrite plus nitrate concentrations than did Lake Creek." Using a nitrate/nitrite target value of 0.1 mg/L for impairment, Stanley was impaired from 1976-1978 (prior to the development of Troy Mine) with 42% of the samples exceeding the 0.1 mg/L nitrate/nitrite benchmark. The use of nitrate/nitrite for detecting impairment isn't congruent with Suplee et. al. (2013) where it says, "The other major change, relative to the 2008 document, is that the Department will not be recommending nitrate (or nitrate + nitrite) criteria for adoption for the control of eutrophication at this time." In light of Suplee et al. (2013) a target value of 0.1 mg/L nitrate/nitrite is inappropriate for evaluating the health of Stanley Creek.

> **Response 2.15**: See Responses 2.2 and 2.5.

Comment 2.16: Section 6.5.3.1, Page 6-6: "NO3+NO2 concentrations at the site just downstream of Fairway Creek (K01STNLC01/SC-02) are typically close to those upstream of Fairway Creek, as evidenced by the median at that site and the upper site (K01STNLC05/SC-15) being similar (Figure 6-4). Particularly given the substantial flow from Fairway Creek, this indicates Fairway Creek is also a source of NO3+NO2 to Stanley Creek. Fairway Creek originates from Spar Springs (which are fed by Spar Lake in the upper watershed) approximately 0.5 miles upstream of its confluence with Stanley Creek (KNF 2010)." This statement does not make sense if Stanley Creek upstream of Fairway Creek is the source of nitrate+nitrite to the system.

> **Response 2.16**: The text in the document has been changed and now acknowledges that unknown sources in Fairway Creek are also contributing to the nitrate load in Stanley Creek.

Comment 2.17: The impairment reported during this evaluation of Lake Creek is likely the result of a sampling or measurement false positive. The likely source of the higher than expected AFDM values is due to the presence of *D. geminate* (rock snot) in Lake Creek (see supporting comments herein). The presence of rock snot has been mentioned in the Comprehensive Water Quality Monitoring Program for Streams Adjacent to the Troy Mine report provided to the MTDEQ. Did the MTDEQ look for the presence of *D. geminate*? If so, what proportion of the sample was rock snot and was an adjustment made to the AFDM results?

D. geminate is known to skew the AFDM test. In Spaulding and Elwell (2007) it is stated, "The AFDM biomass of *D. geminate* was measured to be 250 times greater than the chlorophyll α biomass." Spaulding and Ewell go on to say, "blooms of *D. geminate* are unlike other algal blooms, because they are associated with nutrient-poor waters. Notably, many *D. geminate* blooms have occurred in stream habitats generally considered pristine or with limited ecological disturbance."

> **Response 2.17**: See Response 2.12. DEQ did not specifically look for *D. geminata* in Lake Creek when sampling. Four periphyton samples are available for Lake Creek (available in STORET, 2006-2011). The dominant species in each of the four samples was *Achnanthidium minutissimum*, *Achnanthidium pyrenaicum,* and/or *Encyonema silesiacum. Didymosphenia geminata* was present in all four samples, but was less than 1% of each sample. No adjustment was made to the results.

Comment 2.18: Page 6-9 states that no monitoring data could be used to estimate natural background nutrient loading and natural background loading was estimated by using the median concentration from the reference nutrient dataset for each pollutant in the Level III Northern Rockies ecoregion. However, independent data is in fact available for Stanley Creek dating back to at least 1976 (Levings et al., 1984).

> **Response 2.18**: See Response 2.2.

Comment 2.19: Given MT DEQ's recognition about the uncertainty regarding the non-mining related sources of NO3+NO2 what is the scientific basis for the MT DEQ conclusion that Troy Mine is the source for nitrates/nitrites in Stanley Creek?

> **Response 2.19**: DEQ concluded that the mine and Fairway Creek are sources of excess nitrate but did not adequately and consistently clarify this in the Draft document. The source assessment conclusions and load allocation rationale have been clarified regarding the uncertainty in loading from the mine and Fairway Creek.

Comment 2.20: The loading evaluation for Stanley Creek took place outside the preferred MT DEQ evaluation period (July 1st- September 30th) (Suplee et al. 2013). The historic pre- mining record and much of the data from the ongoing 28 years of monitoring wasn't examined by MT DEQ in the development of the draft TMDL. The use of nitrate/nitrite for detecting impairment isn't congruent with the Suplee et al. (2013) where it says, "The other major change, relative to the 2008 document, is that the Department will not be recommending nitrate (or nitrate + nitrite) criteria for adoption for the control of eutrophication at this time." In light of Suplee et al. (2013) a target value of 0.1 mg/L nitrate/nitrite is inappropriate for evaluating the health of Stanley Creek.

> **Response 2.20**: Suplee et al. (2013) allows a ten day window on either side of the evaluation period, and all samples fell within that allowable timeframe. This clarification has been added to the document. See Responses 1.10, 2.5, and 2.8.

Comment 2.21: Two commenters made this point - Refer to the previous comments concerning Lake and Stanley creek. Based on data reported by the Montana Bureau of Mines and Geology prior to the establishment of the mine, under the current definition of impairment, Stanley Creek was impaired with 42% of the samples exceeding the 0.1 mg/l nitrate+nitrite threshold (Levings et al. 1984). Furthermore, during the same time period, Ross Creek had almost 79% of the samples above 0.1 mg/l nitrate+nitrite (Levings et al. 1984). Clearly, nitrate+nitrite levels have been above the present threshold in the past and before the Troy Mine existed.

The suggestion in the TMDL document that the water quality in wells MW-1 and MW95-4 is consistent with the source of the nutrients detected at LC04 assumes an overly simplistic and incorrect model for nutrients in this watershed. The Montana Bureau of Mines and Geology prior to the establishment of the tailing impoundment (Levings et al. 1984) found higher levels of nitrate/nitrite in wells adjacent to the proposed impoundment 0.27 ppm, 0.33 ppm, and 0.4 ppm in wells 30N33W30DAAD01, 30N33W30DAAD02, and 30N33W30DCAD01, respectively. While this only represents a single year of testing, it points to pre-tailings historic local variation in the nitrate-nitrite levels in the ground water.

If the tailings impoundment were a source of nitrate-nitrite to Lake Creek, then the levels should be high at sampling location K01LAKEC06 as well, as this site is immediately downstream of the impoundment and upstream of the cited LC04 sampling location. For a compete assessment of loadings downstream of the impoundment at LC04, the loadings from Porcupine Creek and Twin Creek need to be accounted for, both of which have residential septic systems and other sources of nutrients. Furthermore, the measurements were made during periods of harvest in this assessment. As stated in the draft MTDEQ TMDL report, it takes 2 to 3 years for nitrate levels to drop to normal. It was also stated in the MDEQ report that harvests did occur during the time period in question **(Section 6.5.4.2, Page 6-21: "Harvests occurred on 1,354 acres of Kootenai National Forest land in 2012 (KNF 2012). Harvests units were**

spread throughout the Lake Creek watershed"). Therefore, loadings from these harvests should be considered as likely sources in this report.

> **Response 2.21**: See Responses 2.2 and 2.3. Additionally, as noted in Comment 2.30, the time period for timber harvest was incorrectly stated in the draft document, and the sampling associated with this project did not overlap with timber harvest on USFS land. The decision authorizing the Sparring Bulls Timber harvest was made in 2012, but the harvest occurred (and will be occurring) in 2013-2015. The text has been corrected.

Comment 2.22: Page 6-26: "For Stanley and Lake Creeks, most of the source assessment uncertainty is regarding the non-mining related loading. For both streams, a substantial amount of NO3+NO2 loading is attributable to Troy Mine, so implementation of BMPs to address mining-related loading will also help refine the source assessment by indicated if other sources are also causes exceedances of the water quality standard."

Refer to the previous comments concerning Lake and Stanley creek.

> **Response 2.22**: The referenced text has been deleted from the document, and the source loading and uncertainty discussions have been updated to reflect the uncertainty in the source assessment for Lake and Stanley creeks.

Comment 2.23: The plot in Figure 6-2 implies little difference in nitrate+nitrite concentrations between Stanley Creek upstream of Fairway Creek as compared to downstream of the confluence with Fairway Creek. Data for nitrate+nitrite results for samples collected between 2005 and 2012 (during the growing season, July to September) are presented on Figure 1. The data on Figure 1 imply that there is no difference in nitrate+nitrite concentrations when comparing Stanley Creek upstream of Fairway Creek, Fairway Creek, and Stanley Creek downstream of the confluence with Fairway Creek. Fairway Creek must be evaluated as a part of the TMDL process for nitrate+nitrite loadings to Stanley Creek.

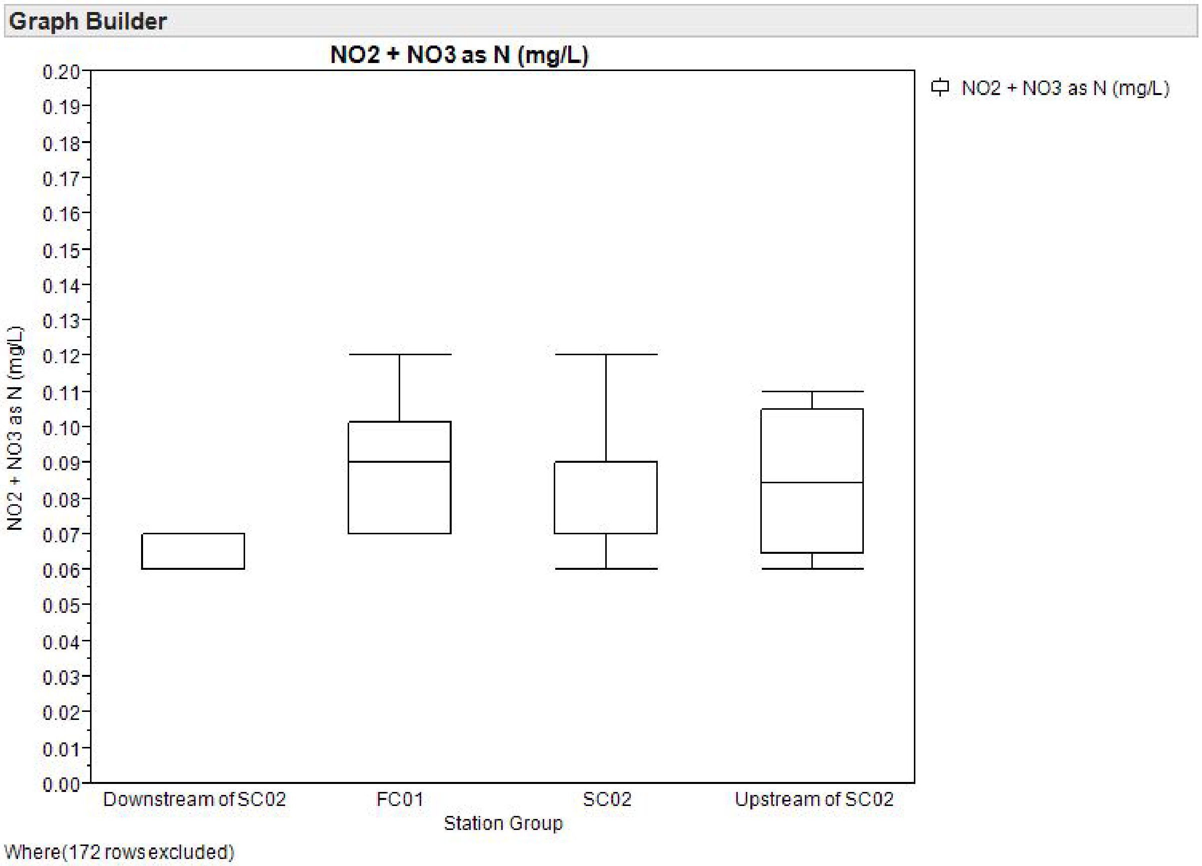

Figure 1 Nitrate+Nitrite Concentrations in the Stanley-Fairway System

> **<u>Response 2.23</u>**: The box plots indicate the overall concentrations at the monitoring locations but do not indicate changes within a single sampling event. Synoptic data where samples were collected on the same day were somewhat limited but a time series plot is shown in **Figure 6-6**, and does show nitrate concentrations (and particularly the peaks) to be consistently greater upstream of Fairway Creek. However, concentrations in Fairway Creek are higher than anticipated and the text has been updated to reflect the uncertainty in nitrate loads from Fairway Creek.

<u>Comment 2.24</u>: Given the location of the underground workings it seems highly unlikely that Fairway Creek is influenced by the mine in which case Fairway should be a good reference stream for nitrite/nitrates. Is this what the natural background value is based on?

> **<u>Response 2.24</u>**: Fairway Creek has a number of possible anthropogenic sources and cannot be used as a reference stream. As stated in **Section 6.5.1**, “Natural background loading was estimated by using the median concentration from the reference nutrient dataset for each pollutant in the Level III Northern Rockies ecoregion (as described in Suplee and Watson, 2013; Suplee et al., 2008)”.

<u>Comment 2.25</u>: Two commenters made this point **-** The historic record agrees with your assessment that Fairway Creek is also a source of nitrate/nitrite to Stanley Creek. Based on this fact we question the flawed conclusion in the draft TMDL that the Troy Mine is the source of impairment for Stanley Creek. Fairway Creek is not impacted by mine operations yet it is a source of nitrate/nitrite to Stanley Creek.

> **Response 2.25:** See Response 2.19. The text has been updated to reflect the uncertainty in the source loads.

Comment 2.26: Two commenters made this point - It seems that DEQ concludes that upper Stanley Creek is the major source of nutrients to Stanley Creek downstream of its confluence with Fairway Creek; however, Fairway Creek must be accounted for with this loading analysis. The additional loading from Stanley Creek will be minor relative to that of Fairway Creek.

> **Response 2.26:** DEQ concluded that loading to upper Stanley Creek is causing target exceedances in upper Stanley Creek but that Fairway Creek is contributing most of the load downstream of its confluence with Stanley Creek. The text has been updated to reflect this comment and better clarify loading upstream and downstream of Fairway Creek.

Comment 2.27: At this point, it is not possible to know which samples from Appendix F are used for the assessment on page 6-6, as there are 25 sample results presented in Appendix F.

> **Response 2.27:** There are 24 growing season samples for Stanley Creek in **Appendix F**, and all 24 were used in the assessment. The text erroneously stated 22 samples, and this had been corrected.

Comment 2.28: "Figure 6-8. Synoptic growing season NO3+NO2 data for Lake Creek[1]**"**
[1]Some sites in the above figures are collocated with multiple sites including: K01LAKEC05, LKC-280, LC01; K01LAKEC06, LKCA; LKC-279, K01LAKEC02; K01LAKEC07, LKC-278; K01LAKEC01, LKC-276." This footnote is confusing. Please clarify

> **Response 2.28:** The text has been updated to clarify which sites are collocated.

Comment 2.29: P. 6-19; Paragraph 4: The Final EIS for the Troy Mine concluded that the tailings impoundment does contribute to nitrate loading in Lake Creek (p. 3-79). Explain why you have reached a different conclusion as compared to this document.

> **Response 2.29**: The measured data in Lake Creek suggest that there is a significant and consistent nitrate source in the segment of Lake Creek downstream of the tailings ponds impoundment that has persisted for decades. Multiple documents have also documented that water in the tailings impoundment has high nitrate concentrations (as described in the EIS) and has a documented seepage rate into localized groundwater. These factors and the long-term presence of the tailing ponds versus a short-term potential source such as timber harvest strongly suggest that the tailings pond is the primary source of the excess nitrate load observed in Lake Creek. However, DEQ acknowledges that there are still uncertainties regarding the magnitude of impacts to Lake Creek and impacts from other localized sources. The text and load allocation have been updated to reflect this uncertainty. DEQ also recommends further groundwater study in the vicinity of the tailings pond to accurately describe transport of nitrate from the pond through the groundwater.

Comment 2.30: P. 6-21 states "*Harvests occurred on 1,354 acres of Kootenai National Forest land in 2012 (KNF, 2012)*". The decision authorizing the harvest for Sparring Bulls was in 2012. However, the timber sale did not begin until 2013, and probably will continue until 2015.

> **Response 2.30**: The text on p. 6-21 has been edited to reflect the correct harvest years.

Comment 2.31: The document summary on page DS-2 states "Nutrient and biological data in these streams indicate nutrients are present in concentrations that can cause algal growth that harms recreation and aquatic life beneficial uses." This implies that there are biological data that indicate effects due to nitrate+nitrite in Stanley Creek; however, in Section 6, Stanley Creek was determined to meet all biological thresholds. Therefore, this statement is not correct. Furthermore, in Lake Creek all biological measures are satisfactory except AFDM, where AFDM measurements are likely affected by D. geminata and other sources of organic matter.

> **Response 2.31**: The statement referenced from the document summary is intended to be a general statement that those streams are not meeting all beneficial uses because of nutrients and that collectively that is due to nutrient and biological data. You are correct in that the impairment determination for Stanley Creek was based on water quality data and the determination for Lake Creek was based on biological data. The statement in the document summary has been revised to state "Nutrient and/or biological data…" Regarding the D. geminata portion of the comment, refer to Responses 2.11, 2.12, and 2.17.

I.3 Temperature Comments

Comment 3.1: Temperature Section 7.2.1.2, Are there no special temperature considerations for western pearlshell mussels? Are there no special temperature considerations for other aquatic organisms?

> **Response 3.1**: In 2012 during the temperature TMDL planning stage, DEQ corresponded with the Montana Natural Heritage Program, which has monitored western pearlshell mussel populations in Montana. Dave Stagliano, the aquatic ecologist who conducted much of the monitoring, responded that "they can withstand temperatures greater than 25 degrees (C°), but obviously those high temperatures will quickly kill their salmonid host fish species and the mussel population will eventually die with no recruitment. So, for temperature models, use the most temperature sensitive organisms expected in the aquatic community (salmonids: westslope cutthroat or Columbia redbands, not the pearshells)." Based on this information and no literature values to the contrary regarding temperature tolerances of western pearlshell mussels, only salmonids were discussed relative to the temperature levels of concern in Wolf Creek (see **Section 7.2.1.1**). In the public review document, the western pearlshell mussels in Wolf Creek were discussed in the sediment TMDL section on p. 5-37 because the mussels are sensitive to excess siltation as well. Although literature indicates salmonids are likely the most sensitive aquatic organisms in regard to elevated stream temperatures in Wolf Creek and focusing on temperature thresholds important for their survival should also protect less sensitive species, you make a good point that the mussel should be mentioned in the temperature section. Additional text been added to **Section 7.2.1** and **7.2.1.1**.

Comment 3.2: In our opinion, the only notable lapse in obtaining stakeholder input in this process was with regard to the stream temperature modeling for Wolf Creek. DEQ/EPA failed to involve stakeholders in perhaps the most critical step of this process, which was helping evaluate the physical attainability of the Naturally Occurring Shade Scenario. With the exception of one willow complex in the middle of the drainage and the railroad and paved roads, DEQ/EPA assumed a 50-foot buffer of medium-density trees along the remaining length of Wolf Creek. This included many areas that are natural sedge meadows, or areas that are otherwise not capable of supporting 50-foot tall medium-density vegetation. Additionally, this ecoregion is naturally frequented by periodic wildfires that prevent long distances of tall riparian vegetation. It cannot be overstated how sensitive the TMDL is to this modeling assumption. We raised this concern to DEQ/EPA in the stakeholder review process, but it was apparently too late to make corrections. DEQ/EPA did note the limitations of this assumption in the analysis, and this has also been noted in the adaptive management and uncertainty sections of the TMDL, as well as the "Surrogate Allocation" portion of the TMDL shown in Table 7-5. We strongly encourage DEQ/EPA to involve local experts in this most critical step in future stream temperature TMDLs.

> **Response 3.2:** We did solicit stakeholder input and feedback regarding the shade scenario at the onset of model development, and did receive positive feedback, but do apologize there were not additional opportunities for stakeholder feedback prior to model finalization. In general though, the nature of the model, field-scale information, and level-of-detail of the project necessitated a fairly coarse approach to scenario development for the QUAL2K model. DEQ realizes that not all areas have the same potential for effective shade, which is why we included the extensive discussion on the intent of the shade scenario and potential limitations to achieving the shade target you referenced in your comment.
>
> After receiving these concerns during the stakeholder review process, we communicated with the USFS, who had been supportive of the shade scenario initially but had reviewed aerial photos from 1932 and conducted extensive vegetation surveys in the watershed in 2013. The botanist/silviculturist with the Kootenai National Forest, Debra Bond, said that after her review of the photos and recent work in the watershed, she feels the shade scenario applied in the model is generally applicable (Bond, Debra, personal communication 3/7/2014). Given that a large part of defining the naturally occurring condition within the model relies on best professional judgment, DEQ works hard to incorporate local expert knowledge into scenario development, but particularly where stakeholders disagree on the endpoint, DEQ must make the final determination. We are confident in the applicability of the shade scenario for the Wolf Creek watershed scale but agree that for reassessment of the Wolf Creek temperature impairment and future TMDLs, more technical stakeholder involvement on scenarios and a higher level of detail on the achievable condition is preferable.

Comment 3.3: Temperature Section 7.5.1-Why were human influences on tributary water temperatures considered outside of the scope of this project? The tributaries to Wolf Creek account for a substantial area of the overall Wolf Creek watershed.

> **Response 3.3**: We agree that tributaries are an important consideration, and data were collected for temperature and flow at the mouth of major tributaries to help identify tributaries that may have a warming or cooling effect on Wolf Creek temperatures. However, to evaluate human influences on tributaries would have required more resources than were available for this project and is not a typical part of the source assessment process for temperature TMDLs. Including tributaries would have required a similar effort of data collection as Wolf Creek, which

included temperature loggers, flow measurements, and shade measurements dispersed from the headwaters to the mouth. DEQ strongly believes in the watershed approach but must prioritize resources during TMDL development to waterbodies that are already identified as impaired. However, during implementation and future monitoring, the tributaries definitely could and should be included when possible. Clarification on this topic was added to **Section 7.5.1**. In the discussion of strengthening the source assessment within the Monitoring Strategy and Adaptive Management Section (**11.3.1**), identifying areas for improvement in shading along tributaries is noted.

Comment 3.4: Were future climatic projections incorporated into the QUAL2K model to assess water temperature in Wolf Creek?

Response 3.4: No, as stated in the Uncertainty and Adaptive Management Section on p. 7-22, future climate projections were not incorporated into the model. DEQ acknowledges that climate change could affect both the baseline condition and naturally occurring condition, but developing projections and applying them to a new baseline and alternative scenarios was outside the scope of the model and TMDL.

Comment 3.5: Temperature Section 7.5.1.1 states "The calibrated and validated model was set up entirely on measured conditions and corresponding weather data, but because long-term flow data at the nearby Fisher River gage indicated Wolf Creek summer flows were likely higher than usual (which could result in cooler water temperatures), flow and climate data were adjusted to represent more critical (i.e., hotter and drier) conditions for the baseline scenario." Why wasn't flow data for Wolf Creek used?

Response 3.5: There is no long-term continuous flow record for Wolf Creek, so the Fisher River gage was used to get a sense of how flows measured in Wolf Creek in 2012 likely fit into the long-term flow regime for Wolf Creek. Flow data from Wolf Creek was used but it was reduced by 45% based on the relative difference (i.e., 45%) between the 2012 August flow at the Fisher River gage and the 25th percentile flow at the gage. **Appendix G** contains more detail than **Section 7.5.1.1**.

Comment 3.6: For the temperature TMDL, were future temperature predictions associated with climate change incorporated into the allowable temperature change? Were future climatic changes and impact to riparian vegetation incorporated into the assessment of riparian shade?

Response 3.6: By representing the 25th percentile flow conditions and more extreme meteorological conditions than were observed in 2012 in the baseline scenario (hotter, drier), the baseline is likely representative of conditions that could occur with greater frequency in the future (under climate change). The allowable change uses the naturally occurring scenario as the starting point, and because that scenario is built on a baseline scenario representing more critical conditions than observed in a typical year. Therefore, it incorporates climate change to a certain extent but it was not explicitly included as part of the model. The potential effective shade from the riparian vegetation was based on an estimate of the existing potential and does not account for climate change; if climate change is sufficient enough to alter the vegetation, it would also likely alter the aquatic species that could inhabit the watershed - the naturally occurring condition would need to be redefined as part of the adaptive management process.

Comment 3.7: How were the potential climatic changes projected for this area incorporated into the margin of safety?

> **Response 3.7**: As discussed in Response 3.6, future predictions associated with climate change were not explicitly incorporated into the TMDL process and would be incorporated into the adaptive management process. **Section 7.7** of the document discusses how the margin of safety was incorporated into the temperature TMDL.

Comment 3.8: Did the TMDL development for temperature in Wolf Creek account for the potential development of Plum Creek land and subsequent increases in water diversions, irrigation, and withdrawals? The potential subdivision of Plum Creek land in Wolf Creek could significantly alter surface water flow paths, water availability, and influence water temperature. Consumptive water use could significantly increase with the sale of Plum Creek land.

> **Response 3.8**: As stated relative to nutrients in Responses 1.12 and 1.13, potential changes in land ownership and the ramifications of that are outside the scope of TMDL development. Forecasting land ownership changes is speculative and would not affect the outcome or allocations for the temperature TMDL, as the surrogate allocation to consumptive water use is to apply all reasonable water conservation practices. Therefore, regardless of land ownership, and even if consumptive water use does become more significant, the temperature standard is narrative and following the surrogate allocation will meet the intent of the TMDL and contribute towards meeting the water quality standard.

Comment 3.9: Why wasn't the potential development of Plum Creek lands and water resources included in the water use scenario to assess the effect on instream flow and water temperatures? If Plum Creek lands are sold off and developed there is the potential for increased flood irrigation and decreased instream flow. How much water development potential is in Wolf Creek before stream temperatures would be impacted? Given the high probability of Plum Creek land being developed, what levels of consumptive water usage would cause the allowable temperature change to be exceeded?

> **Response 3.9**: See Response 3.8.

I.4 Metals Comments

Comment 4.1: In Section 2.3.5, the document refers to the Montanore Mine and the Rock Creek Mine projects as being located in the wilderness and therefore controversial with the future of the projects described as unclear. A better description of the status of these projects is as follows:

In compliance with NEPA and MEPA, the KNF and DEQ released the Montanore draft EIS (2009) and Supplemental draft EIS (2011) for public comment, and responses to comments will be included in the Final EIS which is due to be completed in 2014. The USFWS is completing the formal consultation with the release of the Final BO targeted for Spring of 2014. If approved the project would be administered under an Approved Plan of Operations (KNF) and a modification to the existing DEQ Operating Permit. There are no facilities or other surface disturbances proposed within the wilderness for the Montanore or Rock Creek projects. In response to the US District Court Opinion in 2010, the KNF is completing a Supplemental EIS to address deficiencies in the 2001 Rock Creek FEIS, as outlined in the Court Opinion. The release of the Rock Creek Project Supplemental EIS for public comment is estimated for 2014.

Rather than the description above, if a more succinct description is necessary, it would be better to state that: *The KNF and DEQ are completing the Final EIS for the Montanore Mine project, and the KNF is completing a Supplemental EIS for the Rock Creek project. Both projects have undergone formal consultation under ESA. Neither project proposes surface facilities or other surface disturbances within the wilderness.*

Concerning the Troy Mine,
The DEQ and the KNF completed an EIS which analyzed Troy Mine, Inc.'s revised reclamation plan as well as agency-proposed modifications concerning adit closure, mine water management, water treatment and monitoring, reclamation and road closures. The 2012 ROD approved the amendment to the reclamation plan for the Troy Mine and selected the Agency Mitigated alternative. The agencies are developing bond calculations and the revised reclamation plan.

> **Response 4.1:** Because Rock Creek Mine is outside of the project area and all references to Rock Creek Mine have been removed from the TMDL document (see Response 1.11), none of the suggested text regarding the mine used. The reference to the wilderness area was also removed and a general summary of the Troy Mine and Montanore Project NEPA/MEPA status was added based on the comments provided.

Comment 4.2: The biotic ligand model (BLM) for copper should be used in any evaluation of copper in Montana (USEPA 2007a). An evaluation of copper with the BLM should be provided as an addition to the Kootenai-Fisher TMDL. The use of total recoverable metal analysis to evaluate divalent metals has the potential to over-estimate effects on aquatic life (USEPA 2007b).

> **Response 4.2:** The water chemistry targets for metals are based on numeric human health standards and both chronic and acute aquatic life standards as defined in DEQ Circular DEQ-7. Most of the metals pollutants have numeric water quality criteria defined in Circular DEQ-7 (Montana Department of Environmental Quality, 2008). These criteria include values for protecting human health and for protecting aquatic life, and apply as water quality standards for all streams. Although Montana DEQ does not use biological indicators to assess metals impairments to waterbodies, it is important to note that the chronic and acute water quality standards apply toward the protection of multiple forms of aquatic life, including fish.
>
> Montana water quality standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure (Martin et al., 1994). TMDLs must be based on the applicable water quality standards.

Comment 4.3: My comment for the TMDL Document is that it seems the Big Cherry Millsite Reclamation that took place during the summer of 2007 under CERCLA has not been included. The mining history/reclamation section where it should likely be listed in in section 2-11, this is where the Snowshoe Reclamation is discussed. The Big Cherry metals section is in 8-6, and the metals source assessment for Big Cherry is in 8-14 – the reclamation also seems relevant here.

The Big Cherry Millsite is located approximately three miles below the confluence of Snowshoe Creek and Big Cherry Creek on the east side of Big Cherry Creek (T.29 N., R.31 W., Section 27, MPM). The lowest portion of the millsite was built on a terrace above Big Cherry Creek and contained several flotation tailings impoundments of small to moderate size.

The Big Cherry Mill site contained approximately 3,600 bank cubic yards of waste that was high in arsenic and lead. Downstream of the Mill site and adjacent to Big Cherry Creek another mine waste deposit area contained approximately 3,900 bank cubic yards of contaminated material which originated at the Snowshoe Mine. In 2007, a total of about 10,455 bcy of material (including 6 -12 inches of native underlying material) was excavated from these areas and securely placed in an onsite repository. Clean soil was obtained from a local source on NFS land to backfill and blend the area with surrounding topography. The area has been reclaimed with native vegetation and seedlings. In 2010, approximately 700 cyd of amended material was brought to the Mill site location to improve vegetation, the area was again seeded and mulched.

More information can be found in the Engineering Evaluation Cost Analysis EECA for the Snowshoe Mine, Snowshoe Creek and Big Cherry Mill site.

> **Response 4.3: Section 2.3.6** Mining, on pages 2-11 and 2-12 was updated with the following language: "*The Big Cherry mill site has undergone significant reclamation. The Big Cherry Mill site originally contained approximately 3,600 bank cubic yards (bcy) of waste that was a significant source of metals pollution. Downstream of the Mill site and adjacent to Big Cherry Creek another mine waste deposit area contained approximately 3,900 bcy of contaminated material which originated at the Snowshoe Mine. Reclamation activities include excavation of a total of about 10,455 bcy of material (including 6 -12 inches of native underlying material) that was excavated from these areas and securely placed in an onsite repository. Clean soil was obtained from a local source on NFS land to backfill and blend the area with surrounding topography. The area has been reclaimed with native vegetation and seedlings. In 2010, approximately 700 bcy of amended material was brought to the Mill site location to improve vegetation, the area was again seeded and mulched.*"
>
> A reference to the mine reclamation activities included in **Section 2.3.6**, detailed above, have been added to **Section 8.5.1**.

Comment 4.4: 8.5.2 Stanley Creek -This section states that historical mining activities contribute metals to Stanley Creek. This is not the case in Stanley Creek and this section needs to be revised. Please review and reference Montana Bureau of Mines and Geology "Abandoned-Inactive MInes of the Kootenai National Forest Administered Land (Open-file Report MBMG 395) by Hargrave et al. in December 1999. The source of metals in Stanley Creek is from naturally occurring sources and the Troy Mine. The evidence (1996 road failure that overwhelmed mill site containment system, two tailings spills into the stream, and ongoing mill sidecast issues) indicates that the mining and road operations have continued to lead to an introduction of metals and sediment to Stanley Creek.

> **Response 4.4:** There are a number of small mines, and ongoing active mining in the upper portions of the Stanley Creek watershed. Given the limited amount of data available to the DEQ, during the TMDL development process (particularly upgradient), we were unable to differentiate metals sources that would be considered natural background, existing or historical mining. Review of *"Abandoned-Inactive Mines of the Kootenai National Forest Administered Land"* (Open-file Report MBMG 395) by Hargrave et al. December 1999 did not produce a direct reference to the source of metals in Stanley Creek as being from naturally occurring sources and the Troy Mine. DEQ has associated the metals loading to Stanley Creek with sediment

production in the Stanley Creek basin (**Section 8.5.2** paragraph 2). Those activities that produce sediment are the likely sources of metals pollution in Stanley Creek.

Comment 4.5: Page 8-33; 2nd paragraph: “The source assessment for the Stanley Creek watershed indicates that historical mining sources contribute the most human-caused metals loading; load reductions should focus on limiting and controlling metals loading from these sources.” This conclusion is incorrect. The MBMG 395 report indicates historic mining activities have no effect on Stanley Creek. There are known sources of contamination from the current mining operation (tailings spills and ore containing material sidecast directly next to the stream at the mill site), and there may be elevated natural background levels as well.

Response 4.5: The TMDL document has been updated to read as follows: “The source assessment for the Stanley Creek watershed indicates that active and historical mining sources contribute the most human-caused metals loading; load reductions should focus on limiting and controlling metals loading from these sources.”

Comment 4.6: P. 8-16; last paragraph: Add information regarding the second (October 2011) spill into Thicket and Stanley creeks. Although smaller than the October 2009 spill, this spill also resulted in tailings being deposited in Thicket and Stanley creeks. Both spill reports are on file with the DEQ.

Response 4.6: The DEQ Hard Rock Program Operating Permit Field Inspection Report form was reviewed and additional language has been added to **Section 8.5.2**. The following language was added: *“In October of 2011 another tailings pipeline spill occurred in Thicket Creek. Again tailings flowed down Thicket Creek and were deposited in Stanley Creek. Tailings deposits in Stanley Creek were visibly larger than those observed during the 2009 Spill, as noted in the October 26, 2011 DEQ Hard Rock Program Operating Permit Field Inspection Report. Water quality data collected at the time of the inspection indicated levels of copper in exceedance of the chronic aquatic life standard. Total recoverable copper was reported at 0.017 mg/L, at a hardness of 86 mg/L.”*

Comment 4.7: P.8-16 - Add information regarding sidecast material at mill site and related water quality sampling results. Runoff from this sidecast ore material on steep slopes immediately above Stanley Creek enters the stream during any period with substantial runoff. The material has elevated metals concentrations (see DEQ site inspection report from 2012).

Response 4.7: The following language was added to **Section 8.5.2**: *“That being said, water quality samples collected upstream and downstream of the sidecast area during a July 2012 Hard Rock Program Operating Permit field inspection showed elevated copper concentrations. The upstream sample was reported as 0.004 mg/L, and increased to 0.006 mg/L downstream of the sidecast area. Both samples were above the chronic aquatic life standard. Soils samples collected during the inspection from the sidecasting area contained elevated concentrations of copper, lead, and antimony.”*

Comment 4.8: Section 8.5.3 Lake Creek - Please review and reference Montana Bureau of Mines and Geology “Abandoned-Inactive Mines of the Kootenai National Forest Administered Land (Open-file Report MBMG 395) by Hargrave et al. in December 1999. Note that most of the historic mines in this area are small prospecting developments or are on dry upland slopes and do not have surface water connections downstream. The only small abandoned mines found in this report to have potential water quality impacts are the Giant (Montana) Sunrise/Sunrise Mill in Copper Creek watershed and the Iron Mask/Grouse Mountain mines in NF Keeler watershed. The MBMG report found that the environmental risks posed by these sites were very low.

> **Response 4.8:** The MBMG report *"Abandoned-Inactive Mines of the Kootenai National Forest Administered Land"* (Open-file Report MBMG 395) by Hargrave et al does not indicate that the Giant Sunrise, Iron Mask and Grouse Mountain mines contribute metals pollution directly to surface waters, however it does indicate they have the potential to contribute metals pollution to nearby surface waters, that flow into Lake Creek. The following quotes are from MBMG Open- file Report 395:
>
> *The Giant Sunrise Mine waste is in the flood plain of the unnamed tributary to Copper Creek. Several seeps emanate from the toe of the main waste dump. This may be the result of the infiltration of the standing water in the adit at the top of the waste dump.*
>
> *The Iron Mask had a small adit discharge on private land that flowed into the waste dump and exited on KNF-administered land. The drainage that came from the mine flowed only intermittently before entering into the North Fork of Keeler Creek.*
>
> *The Grouse Mountain mine waste dumps were in contact with the small tributary to Carr Draw. The stream was flowing in October 1997 and showed signs of having a larger flow earlier in the year.*
>
> Given the limited amount of data that is available for source assessment on tributaries to Lake Creek, the Department must take a conservative approach in designating contributing sources, and account for all potentially contributing sources in wasteload allocations (WLAs).

Comment 4.9: Page 8-18; 2nd paragraph: Need to delete most of these references to specific small mines based on lack of evidence of water quality impacts per MBMG report.

> **Response 4.9:** MBMG and DEQ acknowledge the presence of a high density of inactive or abandoned mines in Keeler Creek, Copper Creek and Iron Creek. While there are no data necessarily supporting potential contributions from these small mines, there is no water quality data refuting the potential for these mines to be contributing metals pollution to tributaries of and subsequently the mainstem of Lake Creek. See response to comment 4.8, as the Iron Mask, Grouse Mountain, and Giant Sunrise mines are within the Keeler Creek and Copper Creek watersheds, which contribute to Lake Creek.

Comment 4.10: Page 8-18; 3rd paragraph: Delete or modify "there are likely other unidentified abandoned mines and waste rock piles acting as contributing sources." Based on extensive field review in the Lake Creek watershed by Forest Service employees for recent timber sale and watershed projects additional sources are federal land highly unlikely.

> **Response 4.10:** See Response 4.8.

Comment 4.11: P. 8-33; Second paragraph - "The source assessment for the Lake Creek watershed indicates that historical mining sources contribute the most human-caused metals loading; load reductions should focus on limiting and controlling metals loading from these sources." As discussed previously the historical mining sites themselves are probably not a measurable source, however since the limits are exceeded at high flows it is possible that contaminated sediment from these streams is a contributing factor and should be evaluated. Since the current Troy Mine is a known source of metals to Stanley Creek, a discussion of the effect of dilution in Lake Creek should be addressed.

> **Response 4.11:** The TMDL document text was updated to read as follows: "*The source assessment for the Lake Creek watershed indicates that active and historical mining sources contribute the most human-caused metals loading; load reductions should focus on limiting and controlling metals loading from these sources".*
>
> *DEQ agrees that metals bound in sediment dose contribute to metals loading during some high flow events. Sediment sources in Lake Creek are likely a result of active and historical mining activities that have occurred in Lake Creek as well as in Stanley Creek. Differentiating between these two sediment sources can be quite difficult.*
>
> *The specific loading rate from the Troy mine was not determined as a part of this TMDL. A discussion of the effects of dilution in Lake Creek is beyond the scope of this document. Nevertheless, any effects of dilution during both high and low conditions in Stanley Creek are inherently incorporated within the sampling results.*

Comment 4.12: Page 8-18; First paragraph: *"Likely sources of metals pollution include the aforementioned tailings pond".* This conclusion is not consistent with Troy Mine Reclamation EIS (p. 3-79). A lot of analysis occurred for the Troy Mine Reclamation DEIS so a different conclusion must be well supported. Also this statement is not internally consistent with paragraph on page 8-20 which says that monitoring wells indicated limited metals as a result of seepage. Why wouldn't the active Troy Mine operations be a possible source given contamination to Stanley Creek? Need to explain why or why not.

> **Response 4.12:** DEQ has taken into consideration the DEIS conducted by the USFS. DEQ has not defined the tailings impoundment as a sole source of metals pollution to Lake Creek. Given that DEQ identified elevated metals concentrations in water quality data below the tailings impoundment, the impoundment should not be neglected as a potential source. Clarifying language has been added to the TMDL document (**Section 8.5.3**) to identify active mining in Stanley Creek, historical mining throughout the watershed, as well as the tailings pond as potential metals sources. The wasteload allocation (WLA) in Lake Creek is to all mining source including all active and historical mining in Lake Creek and Stanley Creek.

Comment 4.13: In Table 8-6, MDEQ states they had 38 copper samples, but in Appendix F, there are 34 results for detected and non-detected copper collected from Stanley Creek. It is not clear where the other four samples came from. Of the 34 results, 26 are non-detect (24 at 1 µg/L, 1 at 0.5 µg/L, and 1 at 3 µg/L). Therefore, between 2005 and 2012, there were only eight samples where copper was detected—seven upstream of Fairway Creek and only one in Stanley Creek downstream of its confluence with Fairway Creek. During this same time period, 24 samples were collected by the Troy Mine from Fairway Creek; all but one sample was non-detect at 1 µg/L, and the single detected copper sample had 1 µg/L copper. If the system was adding a significant load of copper to Stanley Creek downstream of its confluence to Fairway Creek, then there should be more than one sample with detectable copper. Finally, if copper was affecting the aquatic macroinvertebrates in Stanley Creek, then those effects would be apparent. A discussion on aquatic macroinvertebrate communities as they relate to metals in Stanley Creek and Lake Creek is presented in the comment regarding copper in Lake Creek.

<u>Response 4.13:</u> Table F-2 in **Appendix F** has been updated to show a total of 38 samples for copper. The assessment and impairment determination for copper in Stanley Creek was based on the 38 samples. **Table F-2** did not originally show the 38 samples the assessment was based on. Any assessment or impairment determinations made in the text of the main document will not change as a result of the addition of these data points to the **Table F-2** in **Appendix F**.

The DEQ agrees that fairway Creek is not a significant source of metals loading, and that the majority of elevated copper loading may be coming from the upper portions of Stanley Creek. The TMDL document does not indicate Fairway Creek as a source of metals pollution contributing to Stanley Creek. Regardless of a contributing load from Fairway Creek, Stanley Creek was still found to be impaired. The DEQ determines impairment by assessing a waterbody as a whole. Stanley Creek, from its head waters to the mouth is one assessment unit (AUID MT76D002_010). In the case of Stanley Creek, the if impairment was found to be in the upper portions of the stream or the lower portions of the stream, the stream as a whole would be listed as impaired. Six samples listed in **Table F-2** in **Appendix F** were above twice the acute aquatic life target (AAL). The assessment methodology dictates that if one sample is above twice the AAL target, it is considered impaired, and TMDL development shall take place.

The water chemistry targets for metals are based on numeric human health standards and both chronic and acute aquatic life standards as defined in DEQ Circular DEQ-7. Most of the metals pollutants have numeric water quality criteria defined in Circular DEQ-7 (Montana Department of Environmental Quality, 2008). These criteria include values for protecting human health and for protecting aquatic life, and apply as water quality standards for all streams. Although Montana DEQ does not use biological indicators to assess metals impairments to waterbodies, it is important to note that the chronic and acute water quality standards apply toward the protection of multiple forms of aquatic life, including fish.

<u>Comment 4.14:</u> In Table 8-6, MDEQ states they had 18 lead sample results, but in Appendix F, there are 20 results for detected and non-detected lead collected from Stanley Creek. It is not clear why two of the sample results were not used. Of the 20 results, 17 are non-detect (16 at 0.5 µg/L and 1 at 0.3 µg/L); therefore, between 2005 and 2012, there were only three samples where lead was detected—all three upstream of the confluence with Fairway Creek. From 2009 to 2012, 12 samples were collected by the Troy Mine from Fairway Creek, and samples were non-detect at either 0.3 or 0.5 µg/L. If Stanley Creek upstream of Fairway Creek was adding a significant load of lead to Stanley Creek downstream of its confluence to Fairway Creek, then lead should have been detected in Stanley Creek. Furthermore, any exceedance of chronic threshold for lead is based on total recoverable concentrations for this metal. Using total recoverable lead measurements is conservative as the dissolved bioavailable fraction is less than the total recoverable concentration; conversion factors are typically used to convert from a total recoverable concentration to a dissolved concentration (USEPA 2013). Finally, if lead was affecting the aquatic macroinvertebrates in Stanley Creek, then those effects would be apparent. A discussion on aquatic macroinvertebrate communities as they relate to metals in Stanley Creek and Lake Creek is presented in the comment regarding copper in Lake Creek.

<u>Response 4.14:</u> Table 8-6 correctly identifies 19 lead samples used for assessment purposes, versus 20 mentioned in the comment. There were 19 non-detect samples that were within detection limits at levels above either AAL, the chronic aquatic life (CAL) or the human health standard. Samples reported as non-detect cannot be compared to the standard if the detection level is below the AAL, CAL or the human health standard.

The assessment and impairment determination for lead in Stanley Creek was based on the remaining 19 samples with reporting limits below the AAL, CAL, and the human health standard. Assessment or impairment determinations made in the text of the main document will not change as a result of the addition of data points to the table in **Appendix F**.

Clarifying language has been added to **Section 8.4.3.2** describing the data set, and the samples that could not be used. **Table F-2** in **Appendix F** has been updated to show a total of 38 samples for lead.

The DEQ determines impairment by assessing a waterbody as a whole. Stanley Creek, from its headwaters to the mouth is one assessment unit (AUID MT76D002_010). In the case of Stanley Creek, if the impairment was found to be in the upper portions of the stream or the lower portions of the stream, the stream as a whole would be listed as impaired. Data from the whole assessment unit for Stanley Creek (upstream and downstream of Fairway Creek) indicated a 15.79% exceedance rate of the CAL. This is above the 10% exceedance rate for impairment determination.

Montana water quality standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure (Martin et al., 1994). TMDLs must be based on the applicable water quality standards.

Comment 4.15: In Table 8-6, MDEQ states it had 34 zinc sample results, and in Appendix F, there are 34 results for detected and non-detected zinc collected from Stanley Creek. Of the 34 results, 30 are non-detect (29 at 10 µg/L and 1 at 5 µg/L); therefore, between 2005 and 2012 there were only four samples where zinc was detected—three upstream of the confluence with Fairway Creek and one downstream of its confluence. From 2005 to 2012, 24 samples were collected by the Troy Mine from Fairway Creek, and samples were all non-detect at either 5 or 10 µg/L. If Stanley Creek upstream of Fairway Creek was adding a significant load of zinc to Stanley Creek downstream of its confluence to Fairway Creek, then zinc should have been detected in Stanley Creek at 20 µg/L more than once.

Response 4.15: There is significant difficulty in making source determinations based a limited data set, with a limited number of exceedances. Given the low flow in the upper portions of Stanley Creek and the increased flow contributed from Fairway Creek, there is a significant chance that there is some dilution occurring downstream of the confluence of Stanley and Fairway Creeks, thereby masking the occurrence of zinc in the lower portions of Stanley Creek.

Impairment determination for zinc in Stanley Creek was based on one sample collected by the mine on 10/7/2005 that was 2 times the AAL. DEQ considers a waterbody with one sample above 2 times the AAL as impaired.

Comment 4.16: The high exceedance of the zinc acute life threshold for Stanley Creek may be an outlier. The sample from Stanley Creek upstream of Fairway Creek had 230 µg/L total recoverable zinc. Using recent (2005 to 2012) data for the Troy Mine, the level of zinc in that sample is not exceeded by any water sample collected from the mine adit or from the decant pond (Table 1). The adit water and decant water samples reflect water quality in the mine. Furthermore, the 75th percentile zinc concentration in

Stanley Creek is 10 µg/L; this emphasizes the nature of the outlier concentration. Therefore, the zinc levels measured in Stanley Creek in 2005 do not reflect levels measured in mine water and are likely not directly related to the mine. Finally, if zinc was affecting the aquatic macroinvertebrates in Stanley Creek, then those effects would be apparent. A discussion on aquatic macroinvertebrate communities as they relate to metals in Stanley Creek and Lake Creek is presented in the comment regarding copper in Lake Creek.

> **Response 4.16:** *The sample result of 230 ug/L was reported to DEQ by the Troy Mine. This sample was 2 times the AAL, DEQ considers a waterbody with one sample above 2 times the AAL as impaired.*
>
> The water chemistry targets for metals are based on numeric human health standards and both chronic and acute aquatic life standards as defined in DEQ Circular DEQ-7. Most of the metals pollutants have numeric water quality criteria defined in Circular DEQ-7 (Montana Department of Environmental Quality, 2008). These criteria include values for protecting human health and for protecting aquatic life, and apply as water quality standards for all streams. Montana DEQ does not use biological indicators to assess metals impairments to waterbodies.

Comment 4.17: In **Table 8-9**, MDEQ states it had 77 copper samples, but in Appendix F, there are 73 results for detected and non-detected copper collected from Stanley Creek. It is not clear where the other four samples came from. Of the 73 results, 59 are non-detect (56 at 1 µg/L and 3 at 0.5 µg/L); therefore, between 2005 and 2012, there were 14 samples where copper was detected—two upstream of the tailing impoundment at LC01, four near the tailings impoundment at LC02, one between LC02 and LC04, four at LC04, and three downstream of LC04. When using the measured hardness at the time of sample collection, the acute threshold was exceeded in two of the 14 detected samples, one at LC01 and one at LC02. Therefore, this is an exceedance with 2 of 73 samples. As noted in the Troy Mine annual monitoring reports, there are no signs of any effects of copper on the aquatic macroinvertebrates at LC01, LC02, or LC04 (Anchor QEA 2013).

An important metric for the Fairway-Stanley Creek and Lake Creek systems is the metal-intolerant taxa metric. This metric, using a set of the most metal-sensitive species, is essential in determining whether a macroinvertebrate community is affected by metals (Clements et al. 2000; Fore 2000). For the past 27 years, the number of metal-intolerant taxa has been nearly equal for all seasons (at the median and 75th percentile) when comparing Fairway Creek and Stanley Creek (Anchor QEA 2013). In 2012, the average number of metal-intolerant taxa was the same—one taxa higher or one taxa lower in Stanley Creek when compared to Fairway Creek (Anchor QEA 2013). In the Lake Creek system, the metal-intolerant taxa have nearly always been higher at LC02 in the summer and fall compared to LC01 (comparing medians; Anchor QEA 2013), and nearly the same at LC04 in the summer and fall compared to the upstream site, LC01 (Anchor QEA 2013). For all seasons in 2012, the number of metal-intolerant taxa at LC01 were less than, equal to, or greater than the number found at LC02 and LC04 (Anchor QEA 2013). As with Fairway and Stanley creeks, the standard deviations are high enough to indicate no difference between the sites. Based on this metric, no metal-related effects on the stream macroinvertebrates have been identified (Parametrix 2007; Anchor QEA 2013).

> **Response 4.17:** **Table 8-9** specifies water quality data for Lake Creek, not Stanley Creek. **Table F-2** in **Appendix F** has been updated to show a total of 77 samples for copper in Lake Creek. The assessment and impairment determination for copper in Lake Creek was based on the 77 samples in the updated **Table F-2**. Any assessment or impairment determinations made in the

text of the main document will not change as a result of the addition of these data points to the table in **Appendix F**. Copper in Lake Creek was reported to be above 2 times the AAL, as such DEQ considers the waterbody impaired.

The water chemistry targets for metals are based on numeric human health standards and both chronic and acute aquatic life standards as defined in DEQ Circular DEQ-7. Most of the metals pollutants have numeric water quality criteria defined in Circular DEQ-7 (Montana Department of Environmental Quality, 2008). These criteria include values for protecting human health and for protecting aquatic life, and apply as water quality standards for all streams. Although Montana DEQ does not use biological indicators to assess metals impairments to waterbodies it is important to note that the chronic and acute water quality standards apply toward the protection of multiple forms of aquatic life, including fish.

Comment 4.18: In Table 8-9, MDEQ states they had 43 lead sample results and in Appendix F there are 43 results for detected and non-detected2 lead collected from Lake Creek. Of the 43 samples, 36 are non-detect (33 at 0.5 µg/L and 3 at 0.3 µg/L); therefore, between 2005 and 2012, there were only seven samples where lead was detected—two were near the tailings impoundment at LC02, two at LC04, and three were downstream of LC04. However, as noted earlier with copper, there are no measureable effects on the aquatic macroinvertebrate community using a set of the most metal-sensitive species. Furthermore, any exceedance of chronic threshold for lead is based on total recoverable concentrations for this metal. Using total recoverable lead measurements is conservative as the dissolved bioavailable fraction is less than the total recoverable concentration; conversion factors are typically used to convert from a total recoverable concentration to a dissolved concentration (USEPA 2013). As noted above, if lead was affecting the aquatic macroinvertebrates in Lake Creek, then those effects would be apparent. A discussion on aquatic macroinvertebrates communities as they relate to metals in Stanley Creek and Lake Creek is presented in the comment regarding copper in Lake Creek.

Response 4.18: As stated in this comment, 43 sample results were reported in **Table 8-9** of the TMDL document, and 43 sample results were in **Table F-2** in **Appendix F**. The data results summary provided is consistent with the document data summary. Impairment determination was based on methods identified within the TMDL document. See response to comment 4.17 regarding the effects on macroinvertebrate communities.

DEQ agrees that the use of total recoverable measurement is a conservative approach. Montana's water quality standards for metals (except aluminum) in surface water are based upon the analysis of samples following a "total recoverable" digestion procedure (Martin et al., 1994). TMDLs must be based on the applicable water quality standards.

See the above comments pertaining to similar comments (Comment 4.17). Montana DEQ does not use biological indicators to assess metals impairments to waterbodies.

Comment 4.19: The reports listed in this section of the TMDL document are interesting and confirm there has been no degradation to Lake Creek by the Troy Mine tailing impoundment. There are other studies that provide an even greater examination of the attenuation and fate of the metals in the Troy Mine tailing impoundment (Mason 2004; Mason 2010; & CDM 2010). In these aforementioned studies it is shown that the metals are fully attenuated within the tailing impound. In Mason (2010) it is stated, "The mineral precipitation and co-precipitation mechanisms are expected to last indefinitely or in perpetuity as long as geochemical conditions remain similar to current conditions. The adsorption mechanisms are conservatively estimated to last a minimum of 600 years." It is unclear why the Troy Mine is listed as a source of metal impairment to Lake Creek. It is clear from numerous reports, field mapping, and stream sediment sampling that the source of metals in both Lake and Stanley Creeks is due to the natural erosion of the ore outcrop in Stanley Creek. A consideration of the natural history of the streams in question should be evaluated prior to a determination of impairment.

> **Response 4.19:** The DEQ has reviewed those studies mentioned above and agrees that there is metal attenuation that takes place at the Troy mine tailings impoundment. That being said, the DEQ also acknowledges that the Troy mine and its associated activities are a potential source of metals pollution. The metals load allocations to Lake Creek and Stanley Creek are related to active, inactive, and abandoned mining in the watershed. **Section 8.6.2** describes the basic approach DEQ used to allocated loads. At no place in the TMDL document does it state that Troy Mine and the associated tailings impoundment are the sole sources of metals pollution to Stanley or Lake Creeks.

I.5 Sediment Comments

Comment 5.1: Attachment A, Page 41, 4.1 methods- paragraph 2 and table 4.1: The Colorado dataset for streambank retreat rates isn't applicable to this study area. These rates underestimate known rates in the Kootenai drainage. The dataset developed in the Blackfoot drainage would be more realistic.

> **Response 5.1**: Dave Rosgen has told DEQ that the Colorado dataset is applicable where there is sedimentary and metamorphic geology (like in this project area), and that the curve from that dataset has been tested against measured data for various streams in Montana and been working well (Rosgen, Dave, personal communication 7/17/2011). Given Dave Rosgen's extensive experience measuring streambank erosion in Montana and the fact that the TMDL focuses on a relative change/percent reduction from the existing load based on implementing all reasonable land, soil, and water conservation practices, DEQ feels our approach was sound, and therefore no modifications were made to the existing retreat rates provided within the document. As stated in Section 5.5, EPA guidance for sediment TMDLs suggests determining the relative magnitude of loading (U.S. Environmental Protection Agency, 1999).
>
> DEQ is open to using other datasets to estimate streambank erosion, particularly if there is evidence to indicate it may be more applicable than the Colorado or Lamar curves typically used to support TMDL development, but as noted in Response 1.10, repeated data requests and numerous review drafts of document components were provided to stakeholders (including the party who provided this comment) for review. For the reasons described above, the data from the Blackfoot drainage have not been incorporated into the streambank erosion source assessment. However, DEQ strives to use the most applicable retreat rates and is interested in obtaining this information as it may be relevant for other project areas and could prove useful regarding adaptive management concepts discussed within the document.

Comment 5.2: Appendix D Section 2.1.2.2 - "No evidence of sediment loading from these segments was observed, and based on the condition and composition of the vegetative buffer throughout the Project Area, unpaved parallel road segments were determined to be an insignificant sediment source (**Figure 2-4**). Thus, no field data was collected along parallel road segments in the Kootenai-Fisher Project Area." This is a very broad generalization given the mile of roads in the Kootenai-Fisher Project Area.

Response 5.2: It is a broad generalization but we feel confident in it given the miles of road driven and the buffers observed in watersheds of sediment-impaired streams in the project area. However, we acknowledge that there may be some near-stream parallel segments that are hotspots or areas where problems could develop, and language regarding BMP implementation on parallel road segments was added to the road allocation discussion in **Section 5.6.2.3**.

Comment 5.3: Appendix C, Section 2.2.4.2-"Land cover types identified as 'grasslands/ herbaceous' and 'hay/pasture' were conservatively adjusted to reflect a 10% improvement in ground cover over existing conditions based on input from the local Natural Resources Conservation Service representative as depicted in **Table 2-3** (Don Feist, personal communication)." Given the substantial cattle grazing that occur in Wolf Creek and the propensity of the cattle to congregate in the riparian area a more comprehensive assessment of existing conditions may be warranted.

Response 5.3: Based on DEQ observations along Wolf Creek at the field sites and driving throughout the watershed, as well as communication with the major landowner in the watershed about its practices, current grazing management practices are facilitating recovery of the riparian vegetation. As stated in Response 5.1 relative to streambank erosion, the assessment of upland erosion was a coarse assessment that had to make assumptions at the watershed scale and was intended to estimate the relative loading. If there are significant problems in grazing management that were not identified as part of this process, DEQ encourages you to share that information with the Kootenai River Network, so that those areas and/or landowners can be approached during TMDL implementation. In some instances, the modeled improvement in upland and riparian vegetation will be an underestimate of what is achievable and in others it will be an overestimate – in both instances, the allocation will be met if the landowner is applying all reasonable BMPs.

Comment 5.4: Appendix C, Section 4.0 - "There is uncertainty associated with classifying riparian health into such broad categories because vegetation type and health can vary greatly over small distances." Given this level of uncertainty and the heavy cattle grazing impacts in Wolf Creek additional criteria may be needed to assess existing conditions.

Response 5.4: See Response 5.3.

Comment 5.5: Page 5-7, table 5-2- If the width/depth ratio or entrenchment ratio falls out of the assigned value the channel can no longer be described as a B, C, or E channel type. There are no parameters for A, G, or F channel types. How are adjusting channel types viewed with the parameters of this table?

Response 5.5: Other channel types were not mentioned because B, C, and E channels are either the primary existing or potential channel type in low gradient sections of the streams of concern, which is where the effects of excess sediment from human sources are most likely to be observed. For other channel types, the Rosgen delineative criteria apply (Rosgen, 1996). Channel types can evolve naturally or as a result of human changes to the landscape, and channel type adjustments should be evaluated in the context of the potential cause(s) and whether human sources are causing channel instability or if the channel is recovering. The information in this response has been added to the target discussion (**Section 5.4.1.2**).

<u>Comment 5.6</u>: In Section 5.4.2, a summary of Stanley Creek conditions as compared to targets is missing except for a couple of comments in the Lake Creek section.

> **<u>Response 5.6</u>**: There is no summary for Stanley Creek because as mentioned in **Section 5.2**, it is not on the 303(d) for sediment impairment.

<u>Comment 5.7</u>: 5.4.2.2 Lake Creek; Page 5-21; Paragraph 1: The wording implies that Stanley Creek no longer supports bull trout due to degradation. *"At one time, Stanley Creek supported bull trout, but channel sediment is now highly embedded and does not provide suitable habitat (KNF 2002)."* Double check this information with FWP. The evidence that Stanley Creek "supported" bull trout in the recent past is weak. Also, the cobble embeddedness appears to be largely natural due to the channel type, low gradient and lack of scouring flows because of the natural flow regulation due to Spar Springs. There has been documented increased sediment delivery due to mining and road related disturbances, but the effect on the fisheries as compared to the natural conditions in Stanley Creek is unclear. There may be other reasons why Stanley Creek is not supporting native fish.

The BMP work on the haul roads for the timber sales was implemented for both projects. However, most of the road storage and decommissioning work proposed in the Spar/Lake Decision that was not deemed "critical" has not been implemented. Some of this work was determined to be low priority due to lack of downstream connection (such as in the Spar Lake watershed). None of the road storage and decommissioning work proposed in the Sparring Bulls Decision (Madge and Keeler watersheds) has been implemented. The Madge Creek work could be implemented at any time if there was funding. The Keeler Creek work cannot be implemented until the Sparring Bulls timber sale activities are completed (mitigation for grizzly bear security).

> **<u>Response 5.7</u>**: DEQ did not intend to imply that Stanley Creek does not support bull trout due to degradation and agrees that despite the source cited in the document that you reference, FWP sources cannot confirm this statement. Therefore, it has been removed from the document.
>
> Thank you for the additional details regarding road work – that information has been added to the Lake Creek discussion in **Section 5.4.2**.

<u>Comment 5.8</u>: Page 5-21; 2nd paragraph: There is an active landslide on private land that periodically produces substantial sediment that may be worth noting. It is located in T30N, R33W, Section 7, SE ¼ of NE ¼ which is upstream of the lower Lake Creek monitoring site (Lake 03-03). In 2012 the slide caused turbid water in Lake Creek for weeks. Road construction and riparian vegetation removal may have contributed to activating this slide area. It is not currently stable. The Lincoln County Conservation District would be a source of information on this slide.

> **<u>Response 5.8</u>**: This information is helpful for DEQ from a source assessment perspective and may be useful when additional information is collected for Lake Creek. Particularly if the additional information recommended in the TMDL document to refine the impairment status indicates more BMPs are needed to meet the Lake Creek sediment TMDL, this information may also be useful to the Kootenai River Network and other stakeholders.
>
> We followed up on this issue with Mike Hensler, FWP fish biologist, who has worked extensively with the Conservation District, and learned that the slide initiated in the early 1990s and has progressed to the point that it is a mass wasting site that extends several hundred feet up the

hillslope. Additionally, he stated that the stream is actively migrating upstream of the slide area and is putting more pressure on the streambank. He echoed the statements in the Lake Creek discussion in **Section 5.4.2.2** that residential development and removal of riparian vegetation has exacerbated streambank erosion. Some of this additional information has been added to the discussion in **Section 5.4.2.2**.

Comment 5.9: Two commenters made this point - Section 5.4.2.2, Page 5-21 states "The streambanks are fine-grained glacial till, glacial outwash, and lacustrine material that is highly erodible if not well vegetated, particularly by perennial plants and trees (KNF 2002; USFS 2010). Erosion of the fine-grained streambanks is a chronic source of sediment at high flows (J. Dunnigan, pers. comm., 2013). Even at lower flows, fine sediment can sometimes be observed in suspension for several miles (M. Hensler, pers. comm., 2013)." This is an important statement; it implies that sources of fine sediment to Lake Creek are ongoing throughout the drainage.

Response 5.9: We agree that it is very important to recognize the susceptibility of soils, particularly along the stream channel, to disturbance and increased erosion and that there are sources of excess fine sediment dispersed throughout the Lake Creek drainage.

Comment 5.10: We agree that additional data regarding human sediment sources and instream conditions should be collected from Lake Creek prior to TMDL finalization and implementation.

Response 5.10: DEQ appreciates your support of additional data collection on Lake Creek.

Comment 5.11: For Lake Creek, a sediment TMDL is proposed. In the beneficial use assessment for Lake Creek, DEQ/EPA construct a rationale for listing the stream as impaired based on only isolated excedances of habitat data in comparison with reference conditions. The primary rationale for the listing is that there are threats to water quality, sensitive soils in the watershed, and some verbal consultation with local experts (no data brought to bear). This causes us significant concern. It is our belief that sediment – as a narrative criteria – must have some biological impact demonstrated. However, the only biological data provided – for macroinvertebrates and periphyton - both indicate full support. No other biological data demonstrating biological impairment has been provided, and the physical data provided are far from overwhelming evidence. How is the sediment assessment method valid if the hard data collected are disregarded in favor of opinion and conjecture?

Response 5.11: We disagree that the rationale was based solely on the habitat data or that biological impact must be demonstrated. There is extensive literature documenting the harmful effects of excess sediment on fish and other aquatic life – particularly because biological indicators can be affected by other stressors besides excess sediment and biological communities can change rapidly, DEQ uses biological metrics as supporting information but primarily uses other metrics that are not response variables but indicate harm to the aquatic life use. In regards to the data at the two Lake Creek sites, sampling sites are selected to be representative. However, particularly on such a large stream as Lake Creek, a holistic review of management practices, sources, and instream conditions throughout the watershed is used when evaluating sediment impairment. As described in the target summary (**Section 5.4.1**), "the target parameters are a combination of measurements of instream siltation, channel form, biological health, and habitat characteristics that contribute to loading, storage, and transport of sediment, or that demonstrate those effects." Particularly because the standard for sediment is narrative, evaluating sediment impairment is not as straightforward as comparing stream data to target values. **Section 5.4.1** also describes how target exceedances and other factors are considered: "The exceedance of one or more target values does not necessarily equate to a determination that the information supports impairment; the degree to which one or more targets are exceeded are taken into account (as well as the current 303(d) listing status), and the combination of target analysis, qualitative observations, and sound, scientific professional judgment is crucial when assessing stream condition."

Updates have been made to the document, however, that resulted in revision of the impairment determination language for Lake Creek: the O/E metric used to evaluate impairment to macroinvertebrates was recalibrated in 2011 to reflect sampling protocol changes and scores from the revised metric were not included in the public comment draft. Although we disagree that biological impact must be demonstrated, the updated scores have been incorporated into the document and both samples from Lake Creek fail to meet the target. We stand by the original TMDL development determination for Lake Creek, which was made considering the threats to water quality and sensitive soils, the existing listing status, the numerous remaining sediment sources, and the pool tail target exceedance. Additionally, as described in **Section 5.4.2.2**, the input from two local professionals regarding stream conditions and observations of elevated suspended sediment that persists for extended periods of time and is associated with streambank erosion that has been exacerbated by human sources. Additional information has been added to the text about the elevated suspended sediment and the potential for harm to aquatic life. The updated O/E scores add further supporting evidence that excess sediment is likely limiting aquatic life use support. However, because of the management actions that have been conducted to address sediment sources in the watershed and the pool tail target being marginally exceeded, the language suggesting additional data collection regarding remaining human sediment sources and instream conditions prior to TMDL implementation to determine if additional restoration measures are necessary has been retained in the document.

Comment 5.12: Based on the information you provided for Lake Creek, sediment in Lake Creek is not an issue and no TMDL should be developed.

Response 5.12: See Response 5.11.

Comment 5.13: Page 5-5, paragraph 2: Suspended sediment data can be useful to define sediment budgets or daily loads.

Response 5.13: Suspended sediment data can be useful to define sediment budgets or daily loads, but this approach was not used for sediment TMDLs in this document. Additional details are provided below in Response 5.14.

Comment 5.14: Appendix E, E.1.2 - Paragraph 1 (stakeholder review version of the document)
The Fisher River is not a reasonable proxy for suspended sediment loads of Wolf Creek, or Libby Creek. Using the fisher river sediment curve will misrepresent daily loads for the listed streams. Actual data collected at the mouth of Wolf Creek would be more realistic as would sediment data collected on Libby Creek. These data could be used to generate more realistic loads for the listed streams.

What percentage of the Fisher River sediment budget was applied to Wolf Creek and Libby Creek?

Sediment budgets based on the Fisher River might not be the most realistic method as it has excessively high loads; more than any stream in the middle Kootenai. The actively eroding unstable banks in this basin have produced excessive sediment loads as high as 1500-2000 mg/l under less than bankfull stages.

> **Response 5.14**: The sediment loads for the Fisher River were not used as a proxy for any of the streams of concern and the daily loads were not based on a sediment budget for the Fisher River. Because most sediment tends to enter streams from the landscape and streambanks during high flows and runoff, the rating curve for the Fisher River was used to establish the general relationship between suspended sediment and streamflow in the project area. **Appendix E** explains how that information was used to calculate the percentage of sediment in the Fisher River on a daily basis relative to the annual load. The daily percentage was multiplied by the annual load for Wolf Creek to show the daily load, and the daily percentage and annual load for all other streams with sediment TMDLs was shown so that the daily loads could be calculated if desired.
>
> As stated in **Appendix E**, the percent reduction based on average annual loading is the primary approach for expressing sediment TMDLs and they are only presented on a daily basis because it is an EPA requirement. If the daily loads presented in **Appendix E** are summed, they will equal the annual load for Wolf Creek presented for the TMDL in **Section 5.6.3**. Particularly since the annual loads presented in the document represent relative loads and the daily loads are based on the annual load, it is not necessary to use data specific to each stream to calculate the daily loads.

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