APPENDIX K
RESPONSE TO COMMENTS

As described in Section 10.0, the formal public comment period for the Grave Creek Water Quality Restoration Plan and Sediment TMDL extended from November 24 to December 20, 2005. Nine different individuals, agencies, organizations, or other entities submitted formal written comments. The comments have been organized by primary topic headings, although comments often span several topics and sections. MDEQ responses follow each of the comments. It is noted when essentially the same or similar comment was received by more than one entity. Under these circumstances, one or more comments covering the range of all similar comments were used for example purposes or the comments were paraphrased. Italics are used where language was added to clarify a comment that may have been taken out of context as part of the effort to organize the comments by subject matter or document section. There were a few requests to extend the comment period. The MDEQ was not able to extend this comment period due to scheduling and resource commitments.

The most significant modification to the document involves impairment updates and determinations, as noted in the comment responses in Section K.5 of this appendix. This includes an improved discussion on the application of targets and supplemental indicators for making an updated sediment impairment determination on Grave Creek consistent with the impairment status in the most recent 2004 303(d) list. Also, the MDEQ has decided to no longer identify any of the Grave Creek tributaries (Foundation, Lewis, Blue Sky, Clarence and Williams) as being impaired. This is also consistent with the most recent 2004 303(d) list since the MDEQ has not made any previous impairment determinations for these tributaries. Nevertheless, the sediment TMDL for Grave Creek includes sediment load allocations for sources throughout the watershed. These sediment load allocations provide a level of protection from excess sediment loading to the tributaries by specifically addressing both fine and coarse sediment loading sources at the watershed scale.

K.1 General Process Related Comments and Responses

Comment 1-1: There were several comments suggesting that the document could not withstand critical scientific or legal review, and that the document did not adequately follow the Federal Clean Water Act. There were also several comments implying or stating that the authors were biased against timber management on National Forest System lands.

> **Response to Comment 1-1:** The document defines a process for compliance with Federal Clean Water Act and Montana State Law requirements for TMDL development and water quality protection. The process includes development of target conditions for the water quality status update as defined in Section 3.0 and applied in Section 5.0, with modifications identified in this response to comments section. This process is consistent with the EPA-approved approach defined within the State's 303(d) list and associated documentation.

As far as the accusations of bias against timber management on National Forest lands, the Montana Department of Environmental Quality takes responsibility for all that is written within this and other water quality plans and TMDLs developed by the State. State law allows logging and forest management activities where such activities can be accomplished in a way that is consistent with what is necessary to meet water quality standards. Historic logging activities as recent as 15 years ago often were not protective of water quality. It is our conclusion that current logging/timber management, with the application of best management practices and other water protection measures, can be protective of water quality in the Grave Creek Watershed. One important component of the TMDL that land managers need to focus on is the allocations. Note that harvest activities within the Grave Creek Watershed can continue in a manner consistent with the Section 7.0 allocations, even where streams are identified as impaired.

Comment 1-2: A group could pick up the *(impairment)* designation to fight logging, recreation, roads, hunting, snowmobiling, or whatever they chose based upon your designation that Grave Creek is impaired. That designation would be with the creek for at least five years and that assumes that in five years the state has the money for a new study.

Response to Comment 1-2: Grave Creek, as well as several hundred other streams within the State of Montana, has been identified as impaired for several years. Yet logging and other activities continue in many of the watersheds with impaired waters. Montana law is written in a manner that allows the use of National Forests or other lands for multiple uses such as those listed in the comment, as long as the activities are pursued in a manner consistent with BMPs and/or reasonable land, soil and water conservation practices. The load allocations and the restoration objectives developed within this plan (Section 7.0) identify any limitations or corrective measures that, if implemented, would protect and improve the water quality in Grave Creek Watershed as necessary to address the sediment and habitat impairments. Significant effort went into developing a set of allocations that would provide protection while avoiding any unnecessary restrictions or hardships, and we feel that we have been successful in this effort. The real test for any lawsuit aimed at preventing an activity from occurring in an impaired watershed should be whether or not the activity is consistent with the allocations portion of the TMDL once one has been developed, or is consistent with all reasonable land, soil and water conservation practices prior to TMDL development.

Comment 1-3:

- We ask that you review the Flathead River Headwaters Water Quality Assessment and TMDL document (Flathead Headwaters). We would like consistency on all the TMDLs on the Forest. We believe the Headwaters document provides a valuable template and process.
- The addition of “number of pools” as a seemingly primary target seems like kind of a manipulation to keep upper and middle on the impaired list. We are led to believe

that number of pools does not have to be a target. Coal Creek, which is within the Headwaters TMDL Plan for the Flathead, and just "over the hill" from Grave Creek, did not include number of pools as a requisite target. Coal Creek is particularly similar to Grave Creek in many ways, including historical management circumstances, yet does not appear to have been used as a reference stream.

- Knowing the history of Grave Creek management efforts since the 1960's, I find it very hard to believe this stream is in an impaired state. If this stream is impaired, then there are very few streams in the state that are not impaired. It appears to me that different standards were used here than those used elsewhere in the state. Are the standards used here the same as the standards on the Flathead National Forest? If they were not the same, why weren't they the same?
- *Page 35, first through third paragraph* – "…provides updated impairment determinations for streams in the Grave Creek Planning Area and justifies new impairment determinations for tributary streams." Then goes on to explain the process. Note the Headwater TMDL method on page 53 of that Flathead River Headwaters TMDL document which states, "Habitat alterations, flow alteration, and bank erosion are considered ***pollution,*** while siltation and suspended solids are considered ***pollutants***. It is EPA's position that TMDLs are required only for pollutants that are causing or contributing to water body impairments. Therefore, because TMDLs are required for only pollutants and flow alteration, habitat alteration, and bank erosion are not pollutants, the focus of this document is on the sediment related pollutants and nutrients. Flow alteration, habitat alteration, and bank erosion might certainly constitute potential sources or causes of sediment related impairments, and while no TMDLs are established to specifically address these issues, they will be addressed as sources, as appropriate."

Response to Comment 1-3: We have not only reviewed the Flathead Headwaters Assessment and TMDLs for the Flathead Headwaters Planning Area but also worked with the EPA in the development of the TMDL process reflected within both the Flathead and Grave Creek documents. The approach used in each document utilized a suite of parameters to measure/validate impairment via targets and supplemental indicators. When addressing the fine sediment impairment question, both documents are consistent within the context of varying types and amount of data as well as varying land uses and sediment sources. The Grave Creek assessment approach included additional evaluation of habitat alteration conditions to address the channelization impacts in lower Grave Creek and to address other potential habitat limitations based on the available literature for the Grave Creek Watershed. As noted in Section E.1.1, the "other habitat alterations" cause can sometimes be linked to other pollutant loading impacts such as those from excess coarse or total (coarse plus fine) sediment loading. Based on the assessment data for Grave Creek, a linkage between pool habitat and excess total sediment loading conditions, particularly below the GLID was identified, thus justifying development of a total sediment TMDL.

In summary, the approach used in both documents is consistent with EPA sediment TMDL guidance (EPA, 1999), and a review of all Montana TMDL documents

approved by EPA to date would show that other documents have used approaches similar to the Grave Creek TMDL as well as the Flathead Headwaters TMDL. Both documents addressed the "pollutants" identified on the 303(d) list. One document (Grave Creek) further evaluated habitat conditions linked to the 303(d) list and identified an additional link between the habitat impairment and excess total or coarse sediment load within the stream.

Review Section K.5 below for further comment response regarding impairment determinations.

Comment 1-4: *Page 1, third and fourth paragraphs and page 2, first paragraph* – "There are several tributaries with the upper portion of this watershed that also have sediment and habitat impairments addressed with this document." "This plan also includes restoration strategies where habitat or other conditions impair a beneficial use but a clear link to excess sediment or other pollutant is lacking." "This deviation from desired conditions provides the basis for validating impairment conditions. Where impairment is validated, restoration objectives are developed to define conditions that, if implemented, would result in meeting reference parameter conditions and lead to full support of beneficial uses." Why? This does not appear to be the process or logic used in other TMDLs.

Response to Comment 1-4: This is a water quality restoration plan that includes restoration objectives in the form of all necessary TMDLs and load allocations where a pollutant is linked to impairment, consistent with other TMDL documents. Where the impairment is linked to pollution, restoration objectives are defined in a way that does not incorporate TMDLs and load allocations. This is further defined in the document in Section 7.0 and is consistent with how the MDEQ has pursued their approach to water quality restoration planning in many watersheds that address both pollution and pollutants. These other plans include the *Water Quality Protection Plan and TMDLs for the Swan Lake Watershed* (MDEQ, 2004d) and the *Blackfoot Headwaters Planning Area Water Quality and Habitat Restoration Plan and TMDL For Sediment* (MDEQ, 2004b). By taking such an approach, the MDEQ is able to develop plans that come closer to addressing all known fishery or other beneficial use limitations consistent with satisfying goals within the Federal Clean Water Act and Montana State Law, versus just addressing goals and problems linked to a pollutant on the 303(d) list. This approach can provide improved flexibility and opportunity for restoration planning, including improved opportunities for future funding.

Comment 1-5: *Page 23, Table 3-1* – Data does not indicate excess fine sediment. There is no data referenced in the document regarding excess bed material.

Response to Comment 1-5: Table 3-1 was meant to present the 303(d) list impairments and potential TMDL requirements as they existed at the start of the water quality planning and TMDL development effort pursued in this document. Presenting the most recent 303(d) listing information, as well as any relevant

historical listing information, is a critical component of MDEQ water quality restoration plans. Table 3-1 in the draft is now Table 3-2, and the table and text have been modified, along with Table E-2 and language in Appendix E, to clarify the fact that the listing conditions presented in Section 3.0 could end up being modified via the water quality impairment status update (Section 5.4).

Refer to further comments and responses in Sections K.3 through K.5 regarding excess fine sediment and excess bed material indicators identified within this document.

Comment 1-6: *Page 26, fourth paragraph* – " The recovery represents the greatest potential and the reference condition." What does this mean?

Response to Comment 1-6: This means that the reference condition can be used to represent the recovery condition from existing and/or past impacts, as further developed and applied in the document, within the context of adaptive management. This is defined in detail in Section E.2.3.1 in both the public review and this final document.

Comment 1-7: (there were a overlapping comments on data collection, including concern about developing a plan during long term drought conditions; below is the most comprehensive):

A concern with the upper section is when was the data collection. Was the collection after the culverts were removed from Williams creek and other drainages or was it collected after the many snow slides that occurred two years ago. Was it collected during the rainy season or during spring runoffs? Was it collected soon after the fire on Blue Sky Creek? No one could answer when the data was collected and I think that is crucial.

Response to Comment 1-7: Most data was collected after 2001 using standard methods during post runoff conditions as defined in Appendix F. This was several years after the Blue Sky Creek fire. Note that the pool frequency values in Blue Sky Creek are comparable to other streams (Table 5-7) and the mass wasting loading from natural events that could be linked to fire-produced landslides should be captured in Table 6-2. The fact that some data may have been collected after culvert removals is reflected by the road erosion allocation in Section 7.1.3.2. MDEQ observed the snow slide before the snow all melted and noted that there was little to no sediment from this event, and the photo of this slide area does not reveal an exposed hillside (Photo 18). It is, however, noted (Section 5.4) that the large woody debris (LWD) values for Upper Grave would now be higher because of the LWD recruitment from this snow slide.

The drought conditions in the area would not be expected to impact the monitoring results for the pool and geomorphic parameters used for targets in Grave Creek, and would not be expected to impact the targets and supplemental indicators for other

parameters such as LWD. Nevertheless, the application of adaptive management incorporates these types of concerns. Flow conditions and other natural events have the potential to impact percent fines values in a watershed, which is also incorporated into the discussion on adaptive management. Given the general lack of issues linked to percent fines, impacts from natural events as implied in the comment are not considered a significant factor in making updated impairment determinations and for making determinations on allocation requirements.

Comment 1-8: I know there was a blurb in the local newspaper about your meeting at Jerry's because I put it there. Other than that, though, did you publicize that meeting locally?

Response to Comment 1-8: The MDEQ submitted a press release to a local radio station and several local and state newspapers when the document was released approximately one week prior to the public meeting. Also, local landowners were contacted by the KRN to facilitate public comment and meeting attendance.

K.2 Comments and Responses Primarily Linked to the Watershed Characterization (Section 2.0) and Related Appendices (A, B, C and D)

Comment 2-1: *Page 4, Figure 2-1* – Doesn't MT Fish, Wildlife, and Parks have some of this data?

Response to Comment 2-1: Yes, MFWP has some additional discharge data from discrete sampling events over the past few years. This has been noted in the document.

Comment 2-2: Rain-on-snow events are not common in the Grave Creek watershed, as is hinted at on page 10, paragraph 4. See the Kootenai National Forest Hydrologic Guide.

Response to Comment 2-2: The rain-on-snow language has been modified on Page 10 to avoid making a judgment on occurrence. Relative to other KNF rain-on-snow dominated systems (such as Bobtail Creek and Pipe Creek), Grave Creek experiences rain-on-snow events on a less frequent basis. Nevertheless, rain on snow events do occur periodically in the Grave Creek watershed and can be of significant magnitude. A review of the Stahl Peak SNOTEL site suggests the possibility of a number of such occurrences over the past few decades. In fact, temperatures were above freezing just recently during the January 19 to January 20, 2005 period when precipitation increased by 1.7 inches and the snow water equivalent was reduced by about 0.6 inches at Stahl Peak, suggesting a 2.3 inch total precipitation amount contributing to runoff volume from rain on snow. This was consistent with higher flows noted in Grave Creek during this time.

Comment 2-3: *Page 16, second paragraph* – "…most damaging of these influences was the periodic bulldozing of the channel that occurred following large flood events in a

misguided attempt to stabilize or clean the channel of sediment and debris." Misguided is a value judgment and should not be used in this document. Historic practices occurred with the best knowledge of the time. To judge that based on what we have learned since is not appropriate. As we have stated previously, this did not happen on Forest System lands. Disclose where this practice occurred.

Response to Comment 2-3: The terminology has been changed and it has been noted that these activities have only been documented on private lands below the National Forest boundary.

Comment 2-4: *Page 16, last paragraph* – "The management of the spruce beetle epidemic dramatically changed the character of the entire Grave Creek basin." Define dramatic change. Later in the same section it is estimated that 13% of the watershed has been harvested at least once. Is 13% harvest dramatic?

Response to Comment 2-4: We agree that the term "dramatic" is not necessary and have removed it, but note that a 13% harvest could have numerous negative impacts on a stream, including sediment loading and mass wasting where BMPs are not implemented and riparian areas are not protected. We have added additional language in Section 2.11 to refer to additional evidence of such impacts from aerial photos.

Comment 2-5 (refer to Pages 16-17): The same section also lists harvested acres by the decades harvested and then again by the harvest methods. By doing so the document is confusing and could lead to an interpretation that the number of acres harvested was twice what it actually was.

Response to Comment 2-5: We agree and have clarified this language to help avoid any confusion.

Comment 2-6 (Pages 16-17):

- It makes no sense to lump intermediate harvest acres with regeneration harvest acres. The effects of each are quite different. Regeneration harvesting leads to very little retained vegetation immediately after harvest since most trees are removed. Intermediate harvest selects only individual trees to remove and in many cases leaves fully stocked stands in place immediately after harvest.
- *Page 17, first paragraph* – "Of this, a little over 5 miles squared (7%) was harvested in stands that are in or adjacent to the riparian corridor." Studies have shown that fine sediment movement from timber harvest and roads travels a maximum of 300'. Only acres harvested within 300' of a stream should be included in this figure. This would accurately reflect the area in which harvest could affect sediment and large woody debris in the stream. The fact that harvest occurred in stands in or adjacent to a riparian corridor does not necessarily mean it had any measurable effect on the stream. This is because stands can be quite large and only a percentage of them would be within 300' of the stream. Page A-1, last paragraph states that the stands shown in these figures may not have had any harvest with the 300' riparian buffer. It

also states that the acres figure we have requested above cannot be obtained. That is not true. With GIS, aerial photos, and TSMRS data this figure could be calculated quite easily.

- Using miles squared as a unit of measure for harvested acres and acres that are impacted by roads does not make sense. All timber harvest reporting is by acres and the total acres in the watershed are known. Therefore acres should be the unit of measure used. It is more accurate and will also give a more accurate value for percentages.
- How much harvest actually occurred (show in acres and percentage of watershed)? What percentage of that harvest was within 300' of a stream?

Response to Comment 2-6: In many situations, the data is presented in a variety of manners based on how the data was made available or how it could be best incorporated within the document. The eventual use of most this data is as a supplemental indicator of potential impacts from past activities. Greater detail and accuracy as requested is not necessary given the ultimate use of the information as a linkage to historical and existing loading conditions, although Appendix A does discuss some of the points brought up in the above comments. There are two questions being addressed as part of the source identification and assessment effort within this document: 1) were there historic activities that would be expected to increase sediment loading to the system (answer is "yes"), and 2) are there still existing sources that could be increasing loading to the system (answer is "yes"). The actual quantification of loading as used for TMDL development purposes is based more on the Section 6.0 mass wasting loading estimates (historical and current) and existing roads loading analysis. More detailed loading analysis was not necessary and was outside the scope of this document.

Intermediate harvest can include roads, skid trails, or riparian activities that can have an impact, especially under historical management conditions lacking BMPs, and therefore is included in the discussion although it is noted that the two are different in potential impacts linked to total land clearing. We agree that under current BMP applications sediment movement to a stream beyond 300 feet is unlikely, but in this document historical information within and beyond the 300-foot length is used to provide information about historical loading conditions during a time prior to BMP implementation, since sediment loads can remain in a stream for extended periods. Note that the Forest Service's WEPP and X-Drain models show that sediment yields can more than double when roads greater than 300 feet in distance without BMPs contribute increased sediment loading to a channel. Historical harvest activities in excess of 300 feet from the channel where little or no riparian buffers were in place or road lengths were greater than 300 feet without drain dips or other BMPs have the potential to contribute sediment based on the WEPP model and field observations. Increased runoff and water routing from harvest, roads, and skid trails (USFS, 2000), some of which may have been more than 300 feet from the stream, could also have contributed to the initiation of the mass wasting events observed in the watershed (refer to Photos 2 and 8 for examples of large clearcuts adjacent to riparian areas).

Comment 2-7: Page 17, second paragraph – This section fails to disclose how many of the roads are actually in Lower Grave and on private land. This paragraph also fails to disclose how many of the Forest system roads in the middle and upper watershed are currently closed, how many have had BMPs implemented, and how many of the skid trails and jammer roads are now fully revegetated because the harvest occurred 25-50 years ago.

Response to Comment 2-7: The revegetation condition is noted and the reader is referred to Appendix I where many of these questions were addressed using an analysis of road impacts provided by the Kootenai National Forest.

Comment 2-8:

- *Page 17, third paragraph* –There is no data to support the statement "Jammer or skid road construction on steep, sensitive soils within the rain-on-snow zone coupled with extensive removal of large diameter trees generally increased water yield, peak flows, and sediment production in the watershed." Please define "extensive removal of large diameter trees." Where did jammer or skid road construction occur on steep, sensitive soils with-in the rain-on-snow zone? How many acres were so impacted?
- *Page 17, fourth paragraph* – "the timber salvage program was expedited so rapidly those timber sales were implemented without adequate erosion controls and streambank protection measures." This statement is speculative and appears biased. These sales were implemented with the standard operating practices of the time. BMPs were not developed in the 1950s or 1960s to the level they are today and therefore were not implemented.

Response to Comment 2-8: The term "extensive" has been removed as suggested and the language has been modified to note the expected linkage between such activities and potential for sediment loading as would be predicted by any model given the lack of BMPs during the time of harvest. The fourth paragraph on Page 17 is unnecessary and has been deleted, although we do not consider the use of this language, obtained from an existing USFS document (USFS, 2000) as speculative and biased given the fact that erosion modeling would reveal increased sediment loading where BMPs were not applied and modeling shows increases in peak flows even today from the historical logging activities. Reference the comments and responses in Section K.3 regarding sediment contributions from historical activities and the request for a more detailed quantification of the activities.

Comment 2-9: Section 2.0 Watershed Characterization- This section describes a pre-European settlement condition with the eventual encroachment by homesteaders in the 1890's. Even though prime creek bottoms and meadows in the Grave Creek valley had been claimed by 1897 the valley today, as back in the late 1800's, is very sparsely populated. The Grave Creek valley has not succumbed to agriculture pressures, as the draft plan states. Disturbance to channel stability, fish habitat, and riparian conditions has been the direct result of natural disturbances such as flood and several rock and snow slides down avalanche chutes.

Response to Comment 2-9: Stream channelization to allow settlement and facilitate agricultural development along lower Grave Creek has modified the character of the stream channel. We feel that the description of impacts to lower Grave Creek from agricultural and other activities, as defined in Section 2.11, is accurate. We are encouraged by efforts within the agricultural community to protect water quality in the Grave Creek Watershed.

Comment 2-10: *Page 18, Figure 2-2* – "hi-grade logging" is an inflammatory, value-laden, and non-measurable term. Delete it. In our October 6th meeting we asked to be consulted to verify these figures. That has not occurred.

Response to Comment 2-10: The term "hi-grade logging" has been removed, although it is interesting to note that the term was obtained from within a publication from the agency providing this comment (USFS, 2002). Identifying the precise historical acreage details is not considered as important as identifying the overall occurrence of such activities as utilized within this document, which is sufficiently accomplished by Figure 2-2. A note is added to the document here and other places pointing out that future detailed analysis may result in further refinement of some of the land use values linked to timber harvest levels.

Comment 2-11:

- *Page 20, second paragraph* – "Although large wood debris was historically abundant…" What historical data supports this statement? See previous discussion about Page 17, first paragraph.
- This section also erroneously suggests that riparian harvesting has resulted in stands characterized by overstocked, small diameter spruce and Douglas fir. This section further states that "These simplified stands will typically lack the capacity to provide the level of bank stability historically associated with mature spruce and cedar habitat types." The author suggests logging activities from the 1950s and 1960s have reduced the volume of large diameter wood available for recruitment to the channel. Again, an on-site field examination will provide otherwise. The author's statement must again be stricken from the document.

Response to Comment 2-11: We agree that there has been significant LWD recruitment and bank stability recovery in this system since the activities that occurred in the 1950s and 1960s, but we also note that more recent riparian harvest has again reduced LWD recruitment (Photos 2 and 8). Riparian harvest can reduce the size and availability of trees for LWD recruitment and bank stabilization, and the removal of all or most of the mature trees completely from riparian area can take decades before trees of a similar size are again available for recruitment to the stream. Language in Section 2.12.3 has been modified to focus on the potential impacts from the riparian harvest activities in the 1950s, 1960s and more recent riparian harvest.

Comment 2-12: *Page 20, third paragraph* – "…have converted large reaches of the channel into braided…" Define large reaches. What percent of the streams are in this condition? What is the range of lengths of stream in this condition? What stream reaches is this occurring in? In fact, wasn't this part of the natural and historical condition of the stream?

Response to Comment 2-12: The existing condition was not part of the historical conditions of the stream as suggested by the comment. According to the historical Government Land Office notes, the lower Grave Creek valley existed as a broad, spruce wetland defined by multiple channels. This historical condition is better defined as a stable, low sediment supply, multiple channel system developed within a wetland environment, versus a "braided" condition which implies general instability and dynamicity resulting from excess bedload and sediment transport impairment. These original multiple channels covered a wide floodplain area representing a condition that is no longer considered the stream's potential based on permanent human settlement in the valley. This situation is discussed in Section E.2.3.2.1 of the document. The braided 'D' channel regimes are located downstream of the Flanagan Ranch to approximately .25 miles upstream of the Highway 93 bridge, and from the Highway 93 bridge downstream to approximately .25 miles upstream of the confluence of Grave Creek and Fortine Creek. These channel reaches that are closer to a 'D' versus 'C' channel are not considered the desired potential even with existing land use constraints. Much of the above language within this comment response has been added to Section 2.12.3 for further clarification.

Comment 2-13: *Page 20, fourth paragraph* – "Classified as a bull trout core area (Montana Bull Trout Scientific Group, 1996b)." There has been no bull trout habitat designated as critical in the State of MT.

Response to Comment 2-13 The document does not use or refer to the term "critical" within the discussion of bull trout core area in Section 2.13 or Appendix D as implied by the comment. The USFWS considers Grave Creek as a local population within the Lake Koocanusa core area. The Montana Bull Trout Scientific Group essentially identified local populations as core areas.

Comment 2-14: *Page 62*, *Macroinvertebrate Date Type I Target* – The text mentions only the Lower Grave Creek macro-samples that were collected post-restoration. It is our understanding that macro-samples were collected prior to restoration. What did these indicate, using the same metric that is now being proposed?

Response to Comment 2-14: We have obtained, reviewed, and further analyzed the macroinvertebrate data referred to in the comment. The analysis shows good macroinvertebrate results in four riffles and one pool prior to restoration and good results in three riffles and one pool after restoration work. One riffle sample did not obtain an adequate population for analysis, possibly due to difficult sampling conditions (personal communication with J. Dunnigan). These results have been

added to the document in Appendix D and incorporated into the Section 5.4 water quality impairment status update.

Comment 2-15: *Page 24, second paragraph* – "…including significant timber harvest…" Define significant timber harvest. See previous discussion regarding Page 16, last paragraph. The words significant and significantly are regularly used without definitions throughout this document. They do not define, and in fact tend to exaggerate, the situation they describe. Therefore, they are inappropriate. Generally they are not supported by science or data. They also appear to be value-laden.

Response to Comment 2-15: The term "significant" has been removed in the referenced sentence and in most locations throughout the document. We have been careful in the use of this term, although we do not feel like we should be prohibited from using common and useful terms. Where this term remains within the document, apply the definition from Webster's Dictionary.

Comment 2-16: Section 4.0 Stream Condition and Data Summaries - This section discusses LWD, channel morphology, surface fines and percent surface fines in pool tail outs. Again, as mentioned above a field survey would demonstrate the presence of large woody debris in the riparian areas as a direct result of avalanches and mortality over time. Very little logging activities occur in the riparian areas due to adherence to the Montana Streamside Management Zone regulations, with strict implementation of BMPs.

Response to Comment 2-16: We agree that current management and forest practices in the watershed are protective of water quality and facilitate recovery to the stream's potential as discussed in the Executive Summary. The Montana Streamside Management Zone regulations and widespread applications of BMPs unfortunately did not occur until the 1990s, after timber harvest within riparian areas occurred in the Grave Creek Watershed, thus reducing LWD recruitment. Refer to comments and responses in Section K.3 for further discussion concerning historical impacts from riparian harvest.

Comment 2-17:

- With 13% harvest in the watershed we are well within the historic range of variability for PFI in the watershed.
- *Page 64, first paragraph* – peak flows aren't high at all. What is this discussion trying to say or to infer?

Response to Comment 2-17: The language in Section 6.5, Appendix C and elsewhere has been modified to note that values are not currently considered high at this time although during the 1950s and 1960s PFI would have been higher and would have had more potential impacts given a lack of BMPs during this period. We acknowledge that the historic PFIs may have been within a range that could occur naturally from fire or other disturbance, but again point out that the increased sensitivity of the stream corridor is not considered part of the natural variability.

K.3 Comments and Responses Primarily Linked to Sediment Loading Source Assessment (Section 6.0) and Related Appendices (Appendices I and J)

Comment 3-1: "Bedload" is probably not the word to use to describe the situation throughout the document, since it includes all sediment including fine sediment. Coarse sediment is a more accurate description.

Response to Comment 3-1: Actually, bedload is defined as the material that generally remains in contact with the streambed and is transported via siltation. Depending on the type of stream system, the bedload may or may not include some or all of the fine sediment as implied in the comment. The fine sediment can be part of the suspended load in a system like the Grave Creek Watershed. The excess loading from human activities includes both coarse and fine sediment. The potential lack of excess fine sediment problems in the upper watershed, coupled with the fact that most loading is more than 10 years old and the fact that fine sediment should transport through the system more efficiently suggest that coarse is a more accurate description of the sediment size of concern above the Glen Lake Irrigation Diversion (GLID). High rates of bank erosion in lower Grave Creek include both fine and coarse sediment, and geomorphic conditions may hinder transport of both the fine and coarse sediment sizes that can then remain as excess total load in lower Grave Creek. Therefore, it appears that coarse sediment is a more accurate description of the size class of concern in the watershed above GLID, whereas the concern in the lower watershed is linked to total sediment that includes both the fine and coarse material that can remain in the system as bed material and interfere with cold water fish habitat. We have made updates to the document to be consistent with the sediment terminology within this response.

Comment 3-2: *Page 91, first paragraph* – Road sediment is not necessarily a function of road density. It is a function of road condition and location. Quantify which roads do not meet BMPs. This is especially important since the Forest Service has done quite a bit of BMP work in the watershed.

Response to Comment 3-2: As suggested, the text had been modified to identify road sediment loading from erosion is also a function of road condition and location. The fact that many roads are now meeting BMPs is reflected in the modeling results from Appendix I, the use of road sediment loading information from 2002 for the allocation in Section 7.1.3.2, and in Section 8.2.1 of the Implementation Strategy. The Kootenai National Forest personnel responsible for the model consulted with experts on road conditions and improvement activities that had occurred in the basin, in particular the headwater tributaries that had not been recently surveyed. The additional BMP quantification requested is not necessary for this document, although it would be a desirable pursuit for landowners consistent with the suggestions in Section 8.2.2.3.

Comment 3-3: Section 6.0 Sediment Loading Source Assessment Summary - The lead statement that the "Total modeled sediment loading in the Grave Creek watershed is attributed primarily to human caused sources of accelerated bank erosion in the lower Grave Creek system segment", is misleading and not supported in fact. Currently, the lower reaches of Grave Creek contain heavy equipment that is causing consideration sedimentation disturbance downstream. Also, there has been some bank disturbance due to cattle grazing on private property; however, field observation demonstrates stable bank conditions all along the upper and lower reaches. Again, we have to question the absence of credible data in this section. What sediment loading that has occurred from natural disturbances is not proved to be detrimental to water quality in the Grave Creek Watershed and therefore, a TMDL for sediment is not required under the law.

Response to Comment 3-3: The loading values are linked to human causes in Section 6.0 (Section 6.1, 6.2 and Appendix J) based on a peer-reviewed approach for determining sediment loading. The accelerated bank erosion is linked to channel geomorphic changes caused by human manipulation in addition to near bank activities such as grazing, as defined in Appendix J. These represent preventable sources that may take many years, even with grazing BMPs, to fully recover. Active restoration, along with riparian and bank protection BMPs after restoration, may help with recovery in places. The heavy equipment used to pursue active restoration is consistent with all legal permits to help remedy the accelerated bank erosion concerns. Heavy equipment used for private non-sanctioned uses such as attempts to improve flow for flood protection typically cause more flooding problems in the future and are harmful to the stream and aquatic life. The loading impacts from these types of non-sanctioned activities would generally be captured the bank erosion assessment.

Other sources of sediment not modeled, both naturally occurring and human induced, are discussed in the introduction portion of Section 6.0 and in Section 6.2. We acknowledge the fact that many landowners are cooperatively working toward riparian protection and solutions to habitat limitations in lower Grave Creek. We further acknowledge that there are risks and short-term sediment disturbances involved with any active restoration effort, but the consensus among many water quality professionals supports this type of effort on a case-by-case basis.

The Section K.5 comment responses further address the concern about impairment determinations and the need for a sediment TMDL also brought up in this comment.

Comment 3-4: *Page 91, Section 6.2.5* – "Erosion from existing timber harvest locations is not believed to be a significant source of sediment loading except via mass wasting and roads as discussed above." Where and how much is the mass wasting from timber harvest contributed? Again all fine sediment targets are met in every segment, 36 of 41 segments (88%) meet the percent surface fines <6.35 mm in riffles target, and every segment met the percent fines <6.35 in pool tail outs (grid toss) target.

Response 3-4: We disagree with the implied suggestion that meeting fine sediment targets should imply that all sediment target conditions, including those linked to coarse sediment, are satisfied (refer to Response to Comment 5-1). Section 6.0 identifies existing loading estimates from mass wasting and provides and example of the very high loads from the initial mass wasting event (historical load to the system of 30,000 tons from Williams Creek drainage alone). Based on the Table 6-2 information, human caused mass wasting likely contributed as much as 115,000 tons of sediment from the initial mass wasting events to the Grave Creek Watershed. Much of this would have been fine sediment that appears to have either flushed through the system or at least made it down below GLID. Pool frequency limitations are linked in part to the coarser portion of this mass wasting load.

Comment 3-5: *Page 92* – "These past PFI increases would have contributed extra bedload to the system via channel scour." Isn't this the process that scours pools which is shown in this document to be lacking? If there is a concern that there is excess bedload material it could be easily detected in permanent bench marked cross sections. Why wasn't this proposed?

Response to Comment 3-5: Increased peak flows do not just potentially scour more pools; it can result in scour of the entire channel resulting in increased bedload/sediment load and an increase in pool filling. Research documents the effects of increased water yield/peak flows on channel scour and sediment load. Nevertheless, the words "would have contributed extra bedload" have been changed to "could have contributed extra bedload." Adding benchmarks to track system recovery is an option added to the monitoring section, although we disagree on the implication that cross section benchmarks alone would adequately identify and characterize impacts from excess bedload.

Comment 3-6: (there were several similar comments that suggested that there was no source of sediment loading, particularly the upper reaches, and that existence of mass wasting sites were not adequately identified based on the public meeting):

- The headwaters of the tributary drainages have not deviated from their form due to stable bed forming features. The primary and natural sources of sediment and debris to these reaches are colluvial draws and avalanche chutes. These sources have periodically provided large volumes of trees and other organic material to the system, oftentimes causing extensive debris jams to form, channel avulsions, and bank cutting. Due to glacial moraines on both sides of the channel in the lower reaches of the tributary, this portion of the watershed may be more susceptible to disturbance. However, to state that when disturbed through road construction or logging, these landforms may respond with accelerated soil creek and slope failure, and can become significant sources of sediment intentionally omits Best Management Practices (BMP's), lacks credible data to support, is biased and must be stricken from this document.
- *Page 102, Table 7-1* – Statement under Load Allocation for "Historic Sediment Loads Remaining in the System" makes no sense. What does this mean? Where are these areas?

- *Page 100, third paragraph* – "Based on historical harvest statistics, elevated sediment loading attributed to elevated historical PFI values may still be part of the excess sediment load in the system." There is no data to support this statement. Historical PFI values are not provided and neither are historic sediment loads. It is unknown if there is an elevated sediment load, but data suggests there is not. Since the only sediment identified as a potential issue is bedload and coarse material, it is highly unlikely it was result of past timber harvest. See previous discussions above about the same topic.

  Response to Comment 3-6: The data in Section 6.0 and the photos all identify sources of sediment, which include mass wasting sites and bank erosion. Natural sources are also identified in this section. This source assessment and results are consistent with a large number of watershed evaluations and existing TMDLs, both in Montana and other states. The documented sources include both fine and coarse sediment and have been substantiated within other assessments of the Grave Creek Watershed (USFS, 2000; USFS, 2002). Many of the sediment loads were preventable had BMPs and other measures commonly applied today have been applied in the past, thus making them elevated loads from historical versus current activities. It is well documented that sediment loads within watersheds can take a very long time to transport through the stream network, particularly coarse or bedload size material. These points are made throughout the document. It is probable that some of this elevated sediment load, particularly the coarser bedload size material, is still working through the system.

Comment 3-7: (Refer to Table E-1 of Executive Summary) In the portion of the table titled "Major Pollutant Source Categories" timber harvest is listed. Yet the data and the document fail to identify where pollutants are being introduced into the streams because of these activities. The chart does not disclose that most of these activities are 25-50 years old and through revegetation, implementing BMPs, and closing roads are having no measurable effects on the streams in Upper and Middle Grave and the tributaries.

Response to Comment 3-7: We disagree with the statement about not identifying where pollutants are being introduced into the stream and disagree with the implication that roads are having no measurable effects on the streams. Identification of pollutant loading and loading locations are covered in Section 6.0 of both the public review and existing documents. We agree that many of the roads are having limited impacts from surface erosion processes and that the impacts would not be measurable from many of these roads. We also agree that many road impacts have been mitigated through revegetation and have noted that within the text in Appendix I. On the other hand, there are several locations where roads encroach on streams and are still eroding and contribute to fine sediment loading (Appendix I, Photo 6) that may be causing percent surface fines values above preferred reference values in a few reaches such as upper Grave Creek. There are also locations where roads have contributed to the mass wasting and associated continued sediment loading, which is cumulatively linked to the habitat conditions in Grave Creek. We have changed "major pollutant source categories" to "pollutant

source categories" in the table since some loading categories contribute much more modeled sediment loading of concern than others.

K.4 Comments and Responses Primarily Linked to Reference and Target Development (Sections 5.1 and 5.2 and Appendix H)

Comment 4-1: Plans to engage in more adaptive management practices may be commendable, but "Adaptive Management," to many, has become a synonym for experimentation."

Response to Comment 4-1: Adaptive management is the accepted approach to deal with uncertainty at all levels of the water quality planning process, including target and TMDL/allocation development. Adaptive management provides a framework to protect water quality while still allowing the continuation of many activities within a watershed under the assumption that the activities will be protective in a manner consistent with the allocations, even when there is some uncertainty about how the activities may ultimately impact water quality.

Comment 4-2: (there were several similar comments, below is the most comprehensive)

- The 1987 Forest Plan for this forest was amended by the Inland Native Fish strategy (INFS) in 1995. INFS included Riparian Management Objectives (RMOs) including one relating to pools per mile to the channel wetted width. These were part of the PACFISH/INFISH Biological Opinion rendered by the US Fish and Wildlife Service. Three of the primary targets for pools per mile in the in the Draft Grave Creek TMDL exceed INFS objectives. Therefore, they also exceed the standards in the Forest Plan. I am quite concerned about the state setting a precedent by setting TMDL targets that invalidate current Forest Plans.

  This is especially concerning since it is well known that the pool measurements in the reference streams were done counting pools that were 1/3 the width of the stream. The measurements in Grave Creek counted pools that were ½ the width of the stream. This invalidates the comparison between the reference streams and Graves Creek. In addition, pool counts are subjective at best, have only been done in Grave during a series of drought years, and science relating to how many pools/mile are natural is not well defined. Because of this we maintain that the pools/mile targets are not applicable in these systems, especially since they are naturally poor pools/mile systems.

  Response to Comment 4-2: The MDEQ has agreed to modify the reference and pool target ranges (Sections H.1 and 5.2.1.2.1) so they are consistent with the Forest Service Riparian Management Objectives. The decision to make this change was due to the both the concern about pool measures methods and the fact that the RMOs are nearly identical to the values presented in the public review draft as discussed in Section H.1.

We have not seen evidence that either the public document or this final version from MDEQ invalidate any forest plans. The comment implies that pool frequency goals are an important part of the forest plan and yet the comment goes on to imply that pool frequency goals are not at all relevant to water quality, beneficial use support, and fisheries habitat.

The variable methods that the Forest Service and others use to measure pools as well as other target parameters is always of concern, as discussed within the section where pool target values are developed, specifically on page H-5 and within the adaptive management section. This variability is not as extensive as implied by the comment since, according to the methodologies provided by the Forest Service, the reference condition widths were based on bankfull measures and the Grave Creek measures were based on wetted width. Bankfull widths are greater than wetted widths. It is possible that these differences compensate for the implied variability, and it is even possible that a pool that is not even 1/3 bankfull width could actually be 1/2 of the wetted width, implying a variability opposite from what is suggested in the comment. Furthermore, the development of new pool targets based on new reference data is discussed in the pool target applicability considerations section (Section 5.2.1.2.1) to also provide an approach to deal with measurement variations within the context of adaptive management.

We disagree with the implication that the data does not apply because of drought conditions since we do not feel that the pool filling in the watershed is linked to such conditions, although adaptive management allows for continued evaluation and modification in response to these types of concerns. We also disagree about the suggestion that the science on the pools per mile not being well defined. This document provided substantial reference data that supports the target values as well as other targets in this document. More rationale was provided for the development of the targets in this document than most other TMDLs given the large amount of reference data. Furthermore, pool frequency is an established value used by the Forest Service as one of their RMOs and key indicator of stream health.

It is interesting to note that the comment suggests that “the science relating to how many pools/mile are natural is not well defined”, and yet goes on to suggest that the science is defined well enough defined to conclude that “the pools/mile targets are not applicable in these systems, especially since they are naturally poor pools/mile systems”. The data and reports evaluated for development of this document do not provide sufficient justification to conclude that pool frequency in the Grave Creek Watershed is naturally low, although the adaptive management approach in this document does acknowledge and incorporate this as a possibility.

Comment 4-3:

- *Page 40, third paragraph* – Why are targets being arbitrarily established on the 25th percentile of the reference data? If the range was found in the reference streams why is that same range then not acceptable in the Grave Creek watershed? Also somewhat discerning is that the resultant number of pools targets are in some cases

higher that the PACFISH/INFISH targets which were later determined (5 yr monitoring) to be simply unattainable in many unmanaged streams. If values used as targets have no high degree of attainability then, again, there is no scientific justification in their use.

Response to Comment 4-3: The use of the 25th percentile value is discussed in detail in Section E.2.3.2.2 as a method to address the expected range of natural variability within systems and the MDEQ does not consider this arbitrary. In fact, the following language has been added to Section E.2.3.2.2:

> "The use of a non-parametric statistical distribution for interpreting narrative water quality standards or developing numeric criteria is consistent with EPA guidance for determining nutrient criteria (EPA, 2000). Furthermore, the selection of the applicable 25th or 75th percentile values from a reference data set is consistent with ongoing MDEQ guidance development for interpreting narrative water quality standards where it is determined that there is "good" confidence in the quality of the reference sites and resulting information (MDEQ, 2004e). If it is determined that there is only a "fair" confidence in the quality of the reference sites, then the 50th percentile or median value should be used, and if it is determined that there is "very high" confidence, then the 90th percentile of the reference data set should be used. Most reference data sets available for water quality restoration planning and related TMDL development, particularly those dealing with sediment and habitat alterations, would tend to be "fair" to "good" quality. This is primarily due to a the limited number of available reference sites/data points available after applying all potentially applicable stratifications on the data, inherent variations in monitoring results among field crews, the potential for variations in field methodologies, and natural yearly variations in stream systems often not accounted for in the data set."

The goal is to ensure that the stream is functioning within the range of its natural variability under conditions where all reasonable land, soil, and water conservation practices are applied. The use of multiple targets and/or supplemental indicators assists with this effort, and can eventually lead to a situation where a target is not met but it is determined that the stream is functioning within an acceptable range of its natural variability. Using the total range of variability for setting target values would result in an unacceptable risk of missing major impacts from human activities, and is not consistent with MDEQ interpretation of narrative water quality standards. The approach used in this document is protective of water quality and allows for flexibility through adaptive management.

Comment 4-4:

- *Page 39, fourth paragraph* – The rationale contradicts the pool frequency target for Lower Grave. If dewatering is a cause of impairment and decreased pool frequency makes dewatering even more detrimental to fish, then why aren't the pool targets for Lower Grave higher than anywhere else?

- It also makes no sense since low pool frequency cannot impact fish in a stream that is dewatered. The fish either aren't there or they are dead. In that case pools or lack of them makes no difference.

Response to Comment 4-4: The pool target derivation is based on reference condition for lower Grave Creek as clearly defined in Section H.1.4, following the process defined in Section 3.0. Pools in lower Grave Creek provide important habitat during most of the year, even with dewatering during part of the year. These comments miss the point in that a major goal of this plan is to identify the limiting factors causing impairment and identify solutions, with focus on those impacts/solutions that can be linked to pollutants and TMDL development as well as solutions that are consistent with standard BMP applications.

Comment 4-5: *Page 40, third paragraph*: Why would the median value of a stream need to be greater than the median value of the reference streams to meet target?

Response to Comment 4-5: The median value condition in the third sentence of the third paragraph on Page 40 was intended as an example of additional target application flexibility. We agree that this sentence is confusing and have deleted it from the document.

Comment 4-6: *Page 40, last paragraph* – Using the method suggested by Riggers does not accomplish what is intended here. To detect changes in pools, you do not multiply the pool length by the average pool depth. Instead you compare maximum and residual pool depths over time. Pool length does not really matter when determining impairment.

Response to Comment 4-6: The Riggers example has been removed since there are also other methods to evaluate pools that may work better, as noted in the comment. We do not agree or disagree with the pool length statement in the comment; it is no longer relevant to this document.

Comment 4-7:

- Some segments are at the 10% target level for percent fines < 6.35 mm in pool tail outs (grid toss) as shown on Table 5-10 on page 55. There is no scientific rationale for the 10% target that was adopted for this analysis. See Page 44.
- There is no scientific rationale for the Type 1 target of 18% for percent surface fines <2 mm in riffles. Page 41, second paragraph states that research indicates that these fines need to be between 20-40% to decrease macroinvertebrate richness. Yet because the streams in Grave Creek watershed all meet this target it was then arbitrarily lowered to 18%.

Response to Comment 4-7: The target development process is based on a scientific approach using comparisons to reference conditions and/or literature values. The 10% supplemental indicator and 18% target ranges are derived in Section H.4 using the process outlined in Section 3.0 and Appendix E. Several published reference data sets were used to develop these target values, although

the fact that Grave Creek and tributaries to Grave Creek currently meet the 10% and 18% values was a major consideration consistent with the primary reference development approach. As was discussed in Section 5.2.1.2.2, the percent fines value of 18% was applied as a margin of safety since all streams currently meet this value, although this value has been changed to 20% for consistency with other TMDLs.

Comment 4-8: *Page 41, third paragraph* – "Where the target value is exceeded in a representative riffle…" Does this mean it would only take one sample to consider a stream impaired? This is not scientifically or statistically sound. How do you verify the accuracy of the sample?

Response to Comment 4-8: Flexibility is added to suggest that re-sampling to validate the result is acceptable, and where there are multiple representative spatial samples in a reach, meeting the target value with 75% of the pebble count results may be acceptable as long as there are acceptable macroinvertebrate results also. Nevertheless, given the already low values that tend to be well below the target everywhere in the watershed (Table 5-8), pebble count results for less than 2 mm above 20% should be a cause for concern.

Comment 4-9: *Page 42, first paragraph* – "If the lower end is exceeded…" What does this mean? The 15% target appears arbitrary. Bimodal distribution of channel substrate is very common on the Kootenai.

Response to Comment 4-9: It is not arbitrary and is developed using reference data from the Kootenai National Forest as defined in Section H.4.2, perhaps reflecting the bimodal distribution identified, but in a way that suggests an average result of less than 15% is not so common. Nevertheless, in reviewing this section of the document, the MDEQ feels that values less than 15% should not be used as a TMDL target implying impairment from excess fine sediment. Such values may be more of an indicator of habitat or another type of problem. The document has been edited to reflect this.

Comment 4-10: *Page 41, fifth paragraph* – "…average or median…" These are not the same thing. Clarify.

Response to Comment 4-10: These words are unnecessary and confusing as used in this location and have been removed.

Comment 4-11: "…macroinvertebrate samples are a more direct measure of beneficial use based on developed reference approaches." If this is the case then why weren't these samples taken? It appears they were only taken in a portion of Lower Grave and even then not enough samples were taken to provide sufficient data. Why were more questionable measures used as a means to determine impairment?

Response to Comment 4-11: Additional macroinvertebrate data would have been useful and is noted for future TMDL development planning in other areas. Nevertheless, the process of using multiple targets and indicators is consistent with TMDL methodology used in Montana and elsewhere (EPA, 1999). The selected indicators for sediment TMDL targets are not considered questionable as implied in the comment. Similar targets and indicators have been successfully applied in other nonpoint source TMDLs in Montana and throughout the country, Their use is consistent with EPA guidance and they can be used instead of or in conjunction with macroinvertebrate data.

Comment 4-12: *Page 42, second paragraph* – this mentions core sampling for cutthroat redds. This appears to be a new requirement that we have not discussed before.

Response to Comment 4-12: It is not meant as a new requirement, but instead to point out that the target is intended as a means to measure support of other cold water fish spawning habitat, whether the spawning is by bull trout or cutthroat trout. Language in this location has been modified to further clarify this and allow for the use of Type II target surrogates.

Comment 4-13: Page 43, third paragraph – "Furthermore, continued high w/d ratios may eventually need to be evaluated from the perspective of a potential temperature impairment in Lower Grave Creek." Why is this here? Why discuss things are not a concern at this time?

Response to Comment 4-13: The potential temperature impacts from high width-to-depth (w/d) ratios as well as other habitat and flow limitations is a concern at this time. Increased temperatures are a typical response to increased w/d ratios. The additional temperature reduction benefits of reduced w/d ratios should be identified within a water quality restoration plan. The language "potential temperature impairment" has been changed to "potential temperature impacts" since no such impairment determination has been noted although temperature could end up being a concern in the Tobacco River. Efforts to reduce water temperatures in Grave Creek are, at a minimum, desirable for Tobacco River aquatic life use support.

Comment 4-14: Where did the 15% target for % fines< 6.35 mm in riffles (pebble count) come from? Why doesn't it represent the range (15-28%) found in the reference streams? It appears arbitrary. Why was median value used? Did you intend to use the mean value?

Response to Comment 4-14: The target value is not arbitrary and it is derived in Section H.4.3 using the process outlined in Section 3.0 and Appendix E. The 15 to 28% target range in the public review draft, now presented as less than 28%, is for substrate fines based on McNeil core data, whereas the 15% target applies to surface fines from pebble counts and is used as an indicator that the substrate target is satisfied. Therefore, it would not be appropriate to apply the 15 to 28% reference range values from substrate sampling to surface fines values. The median value is

applied as a preferred option for larger data sets versus the mean since the use of non-parametric statistics (median vs. means) is typically preferred for environmental data (reference Section 2.3.2.2).

Comment 4-15: *Page 45, last paragraph, and Page 46, first through third paragraphs* – Where did the sinuosity targets come from? They appear arbitrary. Rosgen shows 1.2 ± 0.2. 1.2 or below is not a considered a problem. What's more Rosgen (1996) states, "Sinuosity, however, carries the least weight of all criteria used to delineate Level II morphology." Based on that, width to depth ratio should be the target and the sinuosity target should be dropped entirely.

Response to Comment 4-15: Sinuosity is only applied as a supplemental indicator, with the derivation of the 1.2 to 1.6 reference range explained in Section H.7 of both the public review document and this document. There is a high level of confidence in this reference range and subsequent supplemental indicator range given the fact that there are both historic aerial photos and an internal reference reach used to derive the values. This is perhaps one of the more important supplemental indicators for Lower Grave Creek. MDEQ does not agree with the use of values below 1.2, particularly all the way down to 1.0, which would imply that a straight stream in an alluvial valley is an acceptable stream potential.

Comment 4-16: *Page 46, last paragraph* – "Ideally future values should be as high or higher over most years." What if the stream has already reached or exceeded its maximum potential? What science or data indicates the statement is a realistic expectation?

Response to Comment 4-16: The referred-to sentence is not necessary and will be removed since so many factors can influence the redd counts.

Comment 4-17: *Page 52 and 53, third paragraph and Table 5-8* – If the target is met, it is met. Statements such as "…suggested elevated levels of fines", "Low End of Type II Range" or "High End of Type II Range" are readily apparent by reading the chart. These appear to be trying to highlight problems that in fact may not exist. This is inflammatory and unnecessary.

Response to Comment 4-17: Some Type II targets are used in the context of a supplemental indicator, making it appropriate to note where the value is relative to the reference range. We do not consider this inflammatory and unnecessary.

It is noted here that the MDEQ has determined that the use of the 9 – 12% range as a Type II Target for percent fines < 2 mm is not necessary. This target has been removed from the document.

Comment 4-18:

- We question the scientific basis for the large woody debris targets. Again we know how variable this is in natural situations. We also know large woody debris counts

are very subjective. It appears that the targets were derived from areas with mainly old growth character. This gives no variation for stand types or age which are naturally variable.

- It is interesting to note that to gain large woody debris in the stream frequently requires some type of disturbance such as fires, slumps, etc. These same events can also introduce sediment into the stream. Such things are portrayed in the document as negative if they are potentially caused by timber harvest but as positive if they occur from natural events.

Response to Comment 4-18: Reference streams from which LWD values were derived had undergone many of the natural cycles referred to in the comments. Under the application of reasonable land, soil, and water conservation practices, there would be more old growth character along Grave Creek and several tributaries. The application of the 25^{th} to 75^{th} percentile for setting LWD objectives, takes much of this natural variability into consideration, and is an acceptable approach to a supplemental indicator for sediment TMDL development.

We acknowledge that natural events such as fire and slumps can have positive impacts, as was witnessed from the snowslide that added significant LWD to Grave Creek without adding significant sediment load (personally witnessed by MDEQ water quality specialist). Excess sediment loading associated with human causes such as mass wasting/landslides or road erosion where BMPs are or have been lacking is not considered a desirable imitation of natural events as implied by the comment. As noted by the assessment results and photos in this document, the human caused slumps in the Grave Creek Watershed are typically linked to tree removal and actually provide little if any LWD recruitment. No changes were determined to be necessary based on these comments.

Comment 4-19: *Page 118, first paragraph* – At last meeting we agreed LWD would be an indicator but not a reason to make an impairment determination.

Response to Comment 4-19: At the meeting LWD was presented as both a supplemental indicator for the TMDL sediment targets and as a "use support objective" for potential impairments linked to habitat alterations outside the context of TMDL development. This is reflected within the document. This document no longer uses the conditions where the LWD "use support objective" is not met to justify impairment determinations as was done in the public review draft.

Comment 4-20: *Page 68, second paragraph* – There is no data that shows a clear statistical link between large woody debris and pools in Grave Creek. See previous discussions regarding pools and LWD targets. There is also no statistical data to link lack of LWD in these systems to low fish populations.

Response to Comment 4-20: As noted in the Response to Comment 4-19, LWD is no longer used as a separate impairment justification, although it is used as a supplemental indicator linked to habitat or lack of pools impairment, and still retained

as an additional "use support objective" as defined in Section 5.2.2.1. We agree that there is a lack of a statistical linkage as noted in this data set and in the Libby reference data set. Nevertheless, the 1993 Forest Survey, as discussed in the Section 7 Consultation (USFS, 2000), identified that cover associated with pools varies from 5-75 percent, and that in-stream cover is provided by logs, rocks, undercut banks, and overhanging vegetation and root wads. Also, the Grave Creek EAWS (USFS, 2002) notes that for Grave Creek below Blue Sky that most of the pools are greater than three feet in depth and are associated with large woody debris, although it is presumed that these are not residual pool depth values given the results reported in Table G-12. The fact that the existing data do not show a clear relationship between LWD and pools in Grave Greek indicates that there may be other factors that confound the statistical analysis. It does not mean that there is no relationship between LWD and pools in Grave Creek. The physics of water flowing over and around wood and causing scour is no different in Grave Creek from those very same physics in other streams with LWD. Research supports the fact LWD plays a major role in pool formation in many systems.

For the above reasons and based on general cover provided by LWD, we consider it appropriate to use of LWD as both a supplemental indicator for pool formation and as a separate use support objective for cold water fish use support. Ideally, future monitoring and data assessment will record pools as well as information linking pool formation and depth to LWD, recognizing that past observations have noted apparent positive contributions to pool habitat due to LWD within portions of the watershed.

K.5 Comments and Responses Primarily Linked to the Impairment Status Update (Section 5.4)

Comment 5-1:

- Throughout the document there are similar references to sediment issues caused by past harvest practices and yet no data indicates such a fine sediment problem. The only sediment issue identified is for 5 of the 41 segments, which are above the target levels for surface fines <6.35 mm in riffles. See the next paragraph for the discussion regarding that target. Purge the document of references and inferences to sediment issues caused by past timber harvest and roads, since data fails to support these statements. Studies show that sediment introduced through timber harvest and roads is fine sediment, not bed load, and larger size materials.
- Page 1, first paragraph of the documents states, "A TMDL is a pollutant budget identifying the maximum amount of a particular pollutant that a waterbody can assimilate without causing applicable water quality standards to be exceeded." What pollutant budget is exceeded in the Grave Creek watershed? All fine sediment targets were met in every segment, 36 of 41 segments (88%) met the percent surface fines <6.35 mm in riffles target, and every segment met the percent fines <6.35 in pool tail outs (grid toss) target. In addition, there is no data presented in the document with regards to coarse sediment levels. This concerns us since the

document repeatedly uses coarse sediment levels (referred to as bedload in the document) as rationale for an impairment determination.

Response to Comment 5-1: We disagree with the overall premise of these comments. As discussed throughout the document and summarized in the Executive Summary, it appears that fine sediment may not be a problem in most if not all stream segments in the Grave Creek Watershed, although we may be lacking important data for some reaches. The pool data and problems in the lower watershed suggest an impairment linked to excess total sediment loading, with a significant portion of the sediment of concern in the streams being of a coarser material size. As discussed in detail in Section 6.0 of the public review document and in the final version of this document, coarse sediment loading has been linked to timber harvest activities. This coarser material can take decades or more to work through a stream system, as identified in several references that are added to the document. Even Forest Service documentation identifies bedload, pool filling and aggradation as apparent impacts in various locations associated with past timber management in the watershed (USFS 1998 and USFS 2002). The process by which excess fine and/or coarse sediment can lead to pool filling or loss of pool habitat was not invented by this document as implied by the comments, but is instead referred to within USFS publications for Grave Creek as well as other studies throughout the Western United States.

Comment 5-2:

- We continue to request a clear definition of impairment to measure against. These discussions have often led to answers that danced around “not meeting potential,” “can be improved”, “not what it could be”, and “not meeting reference conditions”. However, in our minds these situations do not necessarily indicate impairment. Completely unmanaged streams go through cycles of disturbance. Therefore, there is a range of the various factors that would be natural, not impaired. We have requested that the natural range of variability be considered in making these determinations. While it was given some “lip service” on Page 37 of the document, there is no indication the natural range of variability was truly considered in the impairment determinations. We believe that Upper and Middle Grave and it’s tributaries are within the natural range of variability, are fully supporting beneficial uses, and therefore most likely are not impaired.
- I would also doubt upper Grave Creek was meeting pool targets before road building and logging began during the decade of the 50’s.
- We also do not agree that functioning below its maximum potential is necessarily a basis for an impairment determination.

Response to Comment 5-2: Natural variability is incorporated into the derivation of reference values/ranges that are then used to assist with impairment determination consistent with Montana Water Quality Standards as defined in Section 3.0 and Appendix E of the document. Natural variability was considered and used to justify application of a 25th percentile value for pool data, versus the median value from the reference data set. This approach does not require that a stream function at its

maximum potential, but instead implies that the stream could be below its potential and still considered not impaired since the true potential could be upwards of the median or even the 75th percentile of the reference range. Natural variability is part of the adaptive management approach as defined within the document (Sections 5.2.1.1, 5.4.3) to ultimately determine what Grave Creek is capable of from a pool and habitat perspective. The reference approach is similar to how several TMDL targets have been developed in Montana. The Response to Comment 5-3 addresses the portions of the comments referring to the impairment determinations.

Comment Set 5-3: (8 of 9 entities or individuals commenting on the document did not agree with the impairment determination, particularly relating to pools, in the upper watershed. Below is a representative subset of these comments)

- Montana State law defines impaired water as a water or stream segment for which sufficient, credible data indicate that the water or stream is failing to achieve compliance with applicable water standards. The Grave Creek Planning Area contains one stream segment listed on Montana's 303(d) impaired waters list. Probable causes analyzed were sediment-related pollutants and habitat alteration impairments... When water quality monitoring data reveal changes to natural conditions that exceed those allowed by the State standards, the water is determined impaired or threatened. More specifically, the beneficial uses, which are protected by the exceeded standards, are determined impaired or threatened. Under the requirements of Section 208 and 303(e) of the Clean Water Act, any water found to have one or more threatened or impaired uses must be placed on a list for which "water quality management plans" must be developed. Since there is no sufficient and credible data supporting the assumption that Grave Creek does not meet beneficial uses, by virtue of federal statute, it must be dropped from the 303(d) protected list.
- We continue to question if data supports the impairment determination for Upper and Middle Grave and it's tributaries. Page 36 of the Draft Grave Creek TMDL document states "Per EPA sediment guidance (EPA, 1999) it is stated that in many watersheds more than one indicator and associated numeric target might be appropriate to account for process complexity and the potential lack of certainty regarding the effectiveness of an individual indicator." Why then does failure to meet a single Type 1 Target or even possibly a single Type II Target result in an impairment determination, even when all the other targets are met? See page 37 of the document.
- *Page 68, sixth paragraph* – There is no statistical link between sedimentation in these systems and lack of pools. See previous discussions regarding sediment and Page 69, third-fifth paragraphs.

Response to Comment 5-3: MDEQ placed Grave Creek on the 2000 303(d) list using an EPA-approved procedure for determining sufficient credible data that supported an impairment determination as identified in Section E.1.1. Grave Creek has since been on the 2002 and 2004 303(d) lists. This document did not find sufficient evidence to change any impairment conclusions found within the most

recent 303(d) list, although the water quality impairment status (Section 5.4) further refines our knowledge of the impairment linkages to sediment. Section 3.0 and Appendix E in both the existing document and public review document provide discussion on the overall approach used to evaluate Montana Water Quality Standards. This includes discussion on the application of statistical ranges for setting target parameters and identifying the linkages between targets and water quality standards.

Section 5.4 includes an improved discussion on the application of targets and supplemental indicators for making an updated sediment impairment determination on Grave Creek consistent with the impairment status in the most recent 2004 303(d) list. The targets and supplemental indicators are more clearly presented to point out that all three primary targets must be met at this time. This is because they each deal with a different way in which sediment can impair fish and/or aquatic life, and because there are sediment loading sources, now included within the supplemental indicators, that can be linked to potential sources of impairment. The pools target in the Grave Creek document is related to a different set of conditions from the percent fines targets, and it would not be appropriate to require an indication of a percent fines problem before concluding that there is a coarse or total sediment problem.

As noted in Section 5.4.2.2 the MDEQ has decided to no longer identify any of the Grave Creek tributaries (Foundation, Lewis, Blue Sky, Clarence and Williams) as being impaired. This is consistent with the most recent 2004 303(d) list since the MDEQ has not made any previous impairment determinations for these tributaries. Nevertheless, the sediment TMDL for Grave Creek includes sediment load allocations for sources throughout the watershed. These sediment load allocations provide a level of protection from excess sediment loading to the tributaries by specifically addressing both fine and coarse sediment loading sources at the watershed scale.

The EPA guidance does not limit the number of targets that must be met, nor require that multiple targets not be met to define impairment. EPA uses several examples where it is implied that all targets must be met for full support (EPA, 1999), and the MDEQ has several EPA- approved TMDLs where this approach was applied. The application of supplemental indicators, including land use indicators from Appendices A, B and C and sediment loading indicators from Section 6.0, provide a reasonable explanation for the lack of pools in comparison to the reference condition. This approach is consistent with the new language regarding interpretation of Montana Water Quality Standards at the beginning Section 5.4.1.3.

As more data is collected in the Grave Creek Watershed, we will obtain a better understanding on the natural condition of Grave Creek and the tributaries, the role of LWD and its linkage to pool formation, and the role of residual coarse sediment on pool formation. This improved understanding is part of the adaptive management process that will be used for future impairment status updates.

Comment 5-4: *Page 82, first paragraph* – "Historically road networks that include skid trail impacts would have had more significance." What is this trying to say? What are the impacts today? Is the author trying to make the case that since the watershed has had past logging, road building, and skid trails it has to be impaired, regardless of what the current data shows? What about MT DEQ statements that reference conditions reflects a waterbody's greatest potential for water quality given historic land use activities?

Response to Comment 5-4: We disagree with what is implied in the comment about impairment determinations. There are a number of streams with significant existing and/or historical harvest that have been considered not impaired for sediment by MDEQ personnel working on this document (Swan TMDL, MDEQ 2004d). The historical activities provide sediment sources and are used in conjunction with the pool frequency and other target criteria. As noted in Section E.2.3.2.1: "for many streams such as those in the upper portions of the Grave Creek Watershed, recovery from historic land use activities that led to elevated sediment loading and removal of riparian vegetation is possible, even though full recovery may take decades. This recovery then represents the greatest potential because existing and future forest activities, including timber harvest, can still be pursued in a way that will allow recovery via the application of BMPs and all reasonable land, soil and water conservation practices." Additional monitoring as part of the adaptive management will help determine what the true potential, given past land uses, will be for Grave Creek as well as the tributaries to Grave Creek.

Comment 5-6: *Page 61, Table 5-14* – listed for each stream "Significant human activity lacking BMPs or other conservation practices" This statement is inflammatory and appears to be value-laden. Define significant human activity. Why does this chart indicate the activity is historical in Lower Grave but not in the other streams? In fact Lower Grave is the one stream segment most apt to see additional current and future human activity because of private ownership. Most of the activities that have occurred were prior to BMPs and current conservation practices being developed.

Response to Comment 5-6: We agree that Table 5-14 was lacking information regarding lower Grave Creek as implied in the comment. Table 5-14 has been removed and the newly written Section 5.4 incorporates concerns about higher levels of human activity in lower Grave Creek.

Comment 5-7: *Page 63, ninth paragraph* – As we have discussed before and as data indicates removal of the fish barrier at GLID is not the most notable habitat improvement leading to increased bull trout redd counts. The change in fishing regulations was the most notable improvement.

Response to Comment 5-7: Wording has been changed in Section 5.4 to only note that the fish barrier impairment no longer exists in lower Grave Creek. Wording in Section D.2.1 identifies fishing regulations as one factor, along with GLID removal, contributing to an improved fishery.

Comment 5-8: *Page 65, second paragraph* – Why is this data used when it clearly does not give a representative sample? What were the temperature measurements? This appears inflammatory. Check the bull trout redd counts for that same year. Was there really a problem? Rationale is not consistent with Page 64, fourth paragraph.

Response to Comment 5-8: This comments is no longer relevant given the new wording in Section 5.4 and the removal of the text that this comment is based upon.

Comment 5-9: Page 70, first paragraph – Road density of 1.8 miles is not high. Most research indicates road densities are high between 3-5 miles, depending on soils and precipitation.

Response to Comment 5-9: Language has been changed to avoid this terminology. Some studies suggest road densities above 1.7 miles per square mile are "high" (USFS, 1996), although we have modified the language in Section 5.4.1.1 as follows: "Road density is also not very high, although there appear to be further opportunities for BMP improvements".

Comment 5-10: Page 71, sixth paragraph – Many headwater drainages consist of a combination of A/B or BA stream types. Having indicators that overlap in A/B or B/A type streams are not, by themselves, an indicator of "instability."

Response to Comment 5-10: We agree that the natural condition of the stream can include this overlap, but still note within Section 5.3.6 that these conditions can be used as an indicator of a potential instability type problem consistent with a supplemental indicator approach.

Comment 5-11: *Page 77, third paragraph* – Makes no sense. Large woody debris does not influence pool tail formation.

Response to Comment 5-11: Large woody debris can influence pool formation, such as increasing pool depth, and thus is likely to impact the quality of pool tail (glide) formation.

Comment 5-12: Page 77, second paragraph – Most data does not indicate an impairment determination linked to excess sediment. If there were a coarse material issue, would not the w/d ratio also indicate an issue?

Response to Comment 5-12: The width to depth ratio is used as a Type II target and is an important indicator of stream potential regarding pool formation as noted in the Section 5.4 rewrite. We agree that the fact that generally acceptable w/d (width to depth) ratios in upper Grave Creek and in several tributaries provide one indication of acceptable conditions in this portion of the watershed and this is noted in Section 5.4. Excessive width to depth values in lower Grave Creek is an important indicator of impairment.

Comment 5-13:

- *Page 78-80, discussion on Lewis Creek* – Calling Lewis Creek impaired could not pass even the "prudent person test." Statements contradict the data. Page 80 hints at excess fine sediment and then a couple of sentences later states percent fines were very low suggesting no percent fines problem. Only 1 in 5 segments don't meet target for the percent surface fines <6.35 mm in riffles. How does this equate to an impairment?
- In particular, I am surprised at the Lewis Creek designation of impaired. Man has had very little impact except for the road. Historically very little logging was done, which makes me believe the sediment must be from natural causes—mainly the snow slides this drainage suffers every year.

Response to Comment 5-13: As noted in the Response to Comment 5-3, Lewis Creek is no longer identified as being impaired in the newly written Section 5.4. In fact, the following language has been incorporated: "the relatively high natural background load and lower human loading and overall lower land use indicators in Lewis Creek suggests the possibility that pool filling is linked to natural conditions". It is interesting to note that the pool frequency values in Lewis Creek are about the same amount below reference levels as the other tributaries, and the pool size values are also apparently low similar to the other tributaries. It is also interesting that the Grave Creek Watershed EAWS (USFS, 2002) notes negative impacts from log drop structures and pool filling from excessive bedload in Lewis Creek. The document does not identify the bedload source but goes on to say "the channel condition has improved in the last 20 years. However, portions of the channel are still widening and aggrading." This language implies a potential impact from historical logging and channel work, and a prudent person might have uncertainties about whether or not conditions should only be attributed to natural sediment loading. The sediment allocations for Grave Creek include existing and potential future activities in Lewis Creek, as well as other tributaries, since the few existing human related sources, as well as potential future activities, can contribute sediment to Grave Creek.

K.6 Comments and Responses Primarily Linked to Section 7.0 Restoration Objectives, Including TMDL Allocations

Comment 6-1:

- *Page 106, third and fourth paragraph* – 8% water yield is not what we agreed to at our last meeting. We agreed to the standard DEQ recommended 15% water yield increase ceiling. If that is and has been the standard DEQ recommendation we see no reason to change it for Grave Creek.
- *Page 106, fourth paragraph (relates to water yield discussion)* – data does not show increased bank erosions as a result of timber harvest in the Grave Creek watershed. Overall bank stability in the watershed is rated at 96% and for 29 of 32 reaches it is over 90%. Also important to note that bed scour, whether created by natural events or timber harvest, creates pools.

Response to Comment 6-1: Water yield or peak flow is a difficult concept to incorporate into sediment load allocations. We agree that the lower bank erosion rates and higher stability in the upper watershed in comparison to the lower watershed suggest less concern from increased water yield and related peak flows. Therefore, the wording in this section has been modified to note that an 8% water yield level increase is a potential increase of concern, but only for lower Grave Creek due to existing eroding banks and apparent instabilities in this portion of the stream. It is further noted that "in more stable reaches such as middle and upper Grave Creek, as well as the tributaries, water yield values closer to 12% would be a more appropriate potential level of concern. These water yield values are not meant to be substitute load allocations, but instead are indicator levels at which further analysis may be necessary to ensure consistency with the allocation for forest management activities." Note that these values do not represent a water yield increase ceiling, and take increased stability in the upper watershed into concern.

We disagree with the statements about peak flow increases being a likely improvement to pool formation. Increased peak flows can scour the whole bed, including riffles, not just pool areas, and can lead to increased bank erosion. We agree that minor flow changes are probably not of concern, and do agree that floods can play a role in pool formation, but also note that not all flooding results in desirable channel impacts and can negatively impact fish habitat in some situations.

Comment 6-2: *Section 7.0 Restoration Objectives*- This section makes reference to a lack of implemented BMPs during logging activities, which is a completely erroneous and biased statement. As the BI-annual BMP audits report, BMPs are applied and successful 97% to 99% across all land ownerships. To suggest that BMPs are not being implemented during harvest activities is to expose the author's ignorance and/or bias towards logging practices.

Response to Comment 6-2: BMPs were not in place during the majority of logging that occurred in the Grave Creek drainage. Evidence of mass wasting and riparian harvest still exist from the lack of BMPs, from as recent as the late 1980's or early 1990's in the Grave Creek Watershed. We do not consider it a bias against any industry to note instances where BMPs were not in place and sediment loading and potential stream impacts are identified. We acknowledge the fact that the BMP compliance rate is currently very high based on scheduled audit results and compliment the logging industry on this successful effort.

Comment 6-3: *Page 107, third paragraph* – 1 pool = 1% load reduction? Makes no sense. Neither science nor data supports this approach. Arbitrary conclusion.

Response to Comment 6-3: The wording referred to in this comment has been removed since a load allocation is no longer developed for the "Historic Sediment Loads Remaining in the Stream."

K.7 Comments and Responses Primarily Linked to Implementation (Section 8.0)

Comment 7-1: *Page 128, Table 8-1* – Define High, Moderate, and Low Disturbance.

> **Response to Comment 7-1:** The table has been removed and this terminology is no longer used.

Comment 7-2: *Page 134, last paragraph* – "Channel restoration is the most optimal method to restore the river to its potential condition." Based on what? This appears to be a justification for the work already being done. It also appears to contradict the idea put forth in this document regarding anthropogenic activities within the watershed.

> **Response to Comment 7-2:** We disagree with the overall implications of this comment and support the following language modification to the document: "Based on initial results from the Phase I Restoration Project, active channel reconstruction appears to be the most optimal method to restore the river to its potential condition in several reaches of lower Grave Creek". We have determined that the document provides adequate justification for this conclusion, particularly given the reduced width to depth ratios and increased pool habitat identified as part of the Phase I Restoration Project summary in the document. Active channel restoration can be a preferred and appropriate approach to address anthropogenic (human) impacts where such impacts have significantly altered the geomorphic character of the stream and a very long recovery time is anticipated in absence of the active channel restoration work. We acknowledge that such work introduces some risk of failure, although even when a project is not completely successful there are still often improvements to fish habitat. The MDEQ has not invented this approach to addressing impairment conditions in watersheds, many other agencies, including the United States Forest Service, often promote similar active restoration work.

Comment 7-3: Restoration is an admirable goal, but again, because of the unique characteristics of this stream and the havoc caused by its spring run-off, how do you determine what was its original condition? On what basis do you determine that upon achieving what you believe to be its original condition, that condition will be impervious to the forces of nature, which have continually reshaped the landscape?

> **Response to Comment 7-3:** Channel design dimensions are based on many of the same dimensions used for targets and supplemental indicators for lower Grave Creek. These designs are based on best available science and criteria that will handle yearly spring runoff while still maintaining the overall pattern, dimension and profile of a stream that is in equilibrium with sediment transport and maintains favorable aquatic life habitat. These criteria are discussed within Section 8.0.

Comment 7-4:

- My husband and I still live on a portion of my father-in-law's original homestead, which is located approximately 5 miles from Grave Creek. For over 50 years we

have fished in the stream and know it well. We have over the years had opportunity to observe the phenomena to which I have referred. I have grave concern that allegations made to present a case for stream "restoration" could result in restricting water use and stakeholders' ability to utilize their property as has been their custom. Any goals established should be achievable without imposing hardship on adjacent property owners and the water users in North Lincoln County.

- Major consideration must be given to the protection of existing water rights, which in the Grave Creek drainage go back to the early 1900s. Preservation of The Glen Lake Irrigation District is a major concern as its delivery system provides the life blood of the entire Tobacco Valley, as well as recreational opportunities at Glen Lake. Equally important to other stakeholders in the basin is the protection of original domestic, irrigation and stock watering rights.

Response to Comment 7-4: We agree that any goals established should be achievable without imposing hardship on adjacent property owners and the water users. As noted in Section 3.5, State Law directs the MDEQ to support a voluntary program of reasonable land, soil and water conservation practices to achieve compliance with water quality standards. It is also noted in Section E.1.2.2 and again in Section 8.3.2 that the TMDL development section of State Law states that "nothing in this part may be construed to divest, impair, or diminish any water right recognized pursuant to Title 85". Additional language regarding water rights protection has been added to the Section 7.3.3 discussion on Other Restoration Objectives. State lawmakers obviously felt the same way as the reader about trying to avoid imposing unnecessary hardships on property owners and water users. The MDEQ develops water quality restoration plans and TMDLs in a way that is consistent with the above state law.

Projects completed to date along lower Grave Creek have improved diversions points of the affected landowners. These improvements, which are noted in Section 8.0, included improved diversion structures to ensure flows are able to be diverted during low flow periods, fish screens to prevent entrainment of fish and debris into the respective irrigation canals, and in one instance, installation of a center pivot system to improve irrigation efficiency. Addressing landowner concerns with regard to water rights will always be one of the primary objectives of stream restoration planning in lower Grave Creek.

Comment 7-5: No restoration for the problem *(excess sediment loading from historical logging activities)* is identified.

Response to Comment 7-5: The load allocations for existing and future activities developed within Section 7.0, the implementation strategies developed in Section 8.0, and the monitoring strategy developed in Section 9.0 all create a comprehensive program to protect and restore water. These Sections address excess sediment loading from historical and other timber harvest activities as well as other significant or potentially significant sources in the watershed.

Comment 7-6: One commenter was concerned about cattle grazing along the river and within a spring complex that flows into Grave Creek. The commenter felt that this issue needed to be addressed and that the grazing was not consistent with water quality protection, with particular concern about e coli or nutrient loading.

Response to Comment 7-6: The referred to grazing activities along the stream are being pursued as part of a voluntary grazing BMP implementation effort to protect the riparian area. The protection of these riparian areas is an important component to the load allocation and overall solution to excess bank erosion in lower Grave Creek. Grazing BMP strategies can and often do include limited grazing near streams. Nutrient and e coli (pathogens) problems have not been noted in Grave Creek and are probably not a problem, although landowners are always encouraged to reduce pollutant loading and impacts to streams as a voluntary and cooperative effort. Future TMDL development for the Tobacco River may involve nutrient load reductions via allocations, and there may be additional focus on grazing management throughout the whole Tobacco River Watershed. The landowner referred to in this comment has voluntarily implemented extensive riparian fencing in cooperation with the Natural Resources Conservation Service and US Fish and Wildlife Service, and the current water quality protection efforts are likely consistent with or very close to being consistent with any future nutrient reduction goals in the Tobacco River Watershed.

K.8 Comments Based on Minor Wording Corrections or Suggestions

Comment 8-1: *Page 40, first paragraph* – "…typically dry…" when in fact it *(Grave Creek)* has occasionally been documented to dry up in the past. It is not typically dry. Could say "…may dry up completely, providing no habitat."

Response to Comment 8-1: The language has been changed as suggested by the comment.

Comment 8-2: *Page 14, Table 2-7* – shows clearing, tilling, and pasturing under major natural disturbances for agricultural land

Response to Comment 8-2: The information has been deleted from the table.

Comment 8-3: *Page 104, fourth paragraph* – INFS provides guidelines, not requirements.

Response to Comment 8-3: Corrections made per the comment.

Comment 8-4: *Page 72, third paragraph* – Disclose the results of the counts.

Response to Comment 8-4: The redd count results have been added to the new tables in Section 5.4.

K.9 Comments Noted; No Response Necessary

Comment 9-1: I think anyone would agree that lower Grave Creek is impaired. The reasons are of course varied but the log drives when three streams were combined into one creek below Stoken Bridge and then widened by the drive itself. When crawler tractors became common in the 30's this made clearing the forest, channeling the river, and over grazing the riparian area common.

Comment 9-2: The lack of large woody debris can be attributed in large part to the past forest service decision using best science available, to remove logs and log jams from the mainstream Grave Creek.

Comment 9-3: I would also like to comment on our fishery. I believe, and think the biologist would agree, the decline in cutthroat numbers is mostly related to Libby dam.

Comment 9-4: I feel there is consensus the Bull Trout numbers between Libby dam and the international border are greater than they were prior to development in upper Grave Creek.