APPENDIX L
RESPONSE TO PUBLIC COMMENTS

As described in **Section 12.0**, the formal public comment period for the Upper and North Fork Big Hole River TMDLs extended from December 15th, 2008 to January 16th, 2009. Three individuals/organizations submitted formal written comments during the public comment period. Excerpts of the comments have been organized by primary topic heading in this section. Responses prepared by DEQ follow each of the individual comments. The original comment letters are located in the project files at DEQ and may be reviewed upon request.

1. General TMDL Process and Considerations

Comment 1.1: How were "streams of interest" selected? It seems many streams were omitted from evaluation, such as Big Lake Creek, Little Lake Creek, Hamby Creek, and Big Swamp Creek among others. What can one assume about the condition of non-selected streams?

> **Response 1.1:** **Section 3.2** was amended to review the rational that follows.

Category five of the Montana's Integrated Water Quality Report (303d assessment) drives the scope of each TMDL project. Some streams within this TMDL planning area do not have sufficient information for 303d assessment or have been deemed as fully supporting all uses and meeting water quality standards and therefore may not be mentioned in this report. See Montana's Integrated Water Quality Report to determine the status of 303d assessment for streams not addressed within this document. If streams can not be found through a search on the csaic web site, then insufficient information is available for the 303d assessment. (http://www.deq.state.mt.us/wqinfo/303_d/what_is_303d.asp and http://cwaic.mt.gov/)

2. Targets and Existing Conditions

Comment 2.1: The various sediment targets include width/depth ratios, pebble counts (% fines), understory shrub cover along greenline, and length of channel (expressed in terms of # of bank full widths) per pool. It's unclear how this will be applied on the Beaverhead Deer-Lodge National Forrest (BDNF). Apparently the field work done in 2004 assessed these sediment targets, and whether they were attained. A display of streams on the BDNF that do not currently meet these targets would help us focus our efforts. Monitoring results supplied by the BDNF will help display attainment of targets.

> **Response 2.1:** The data summary tables provided in **Section 5** correspond to stream segments identified on **Maps 1 or 4 in Appendix K**. If more precise data locations are needed please contact DEQ for a project database or use information provided in **Appendix C** which provides a data summary.

3. Source Assessment, TMDLs and Allocations

Comment 3.1: While sediment allocations are not parsed out by ownership, there is mention that removal of beaver, loss of riparian function, willow removal, reduced haying/intensive pasturing, and diversions play major roles in sediment exceedances. While the BDNF is not completely immune from these actions, it could be argued that these activities occur largely outside of the BDNF boundary.

> **Response 3.1**: Loss of riparian function, willow removal, haying/intensive pasturing, unpaved roads, diversions and removal of beaver all have the potential to affect in-stream sediment conditions. In limited locations, USFS riparian graze and browse recommendations are not being met. Erosion from unpaved roads may impact localized conditions along streams in mountainous areas. Also, in limited locations irrigation diversions for private lands are diverted on USFS land. Beaver trapping on USFS land is permitted without regard to beaver management. Yet, at a general level, the argument above is correct.

Comment 3.2: Sediment Load Allocations don't display what portion the BDNF is responsible for, though mention of this occurs in broad terms. This might better define where we need to focus our efforts. There is acknowledgement that allocations (% reduction) do not account for BMPs already in place. There is mention of this within the adaptive management section, but that is not part of the Draft. While there is acknowledgement in a narrative fashion of BMPs put in place on BDNF lands, no adjustment to allocations have been made. The road sediment modeling doesn't break out the portion of sediment derived under BDNF ownership. The BDNF recognizes a role of supplying information which further defines the improvements to roads. If the BDNF has already implemented adequate BMPs on roads they are responsible for, then how do we achieve further reductions as defined under Sediment Load Allocations? The incentive for reducing sediment inputs before an approved TMDL is released should not be diminished by not recognizing those accomplishments. A display of what a reduction in road-related sediment would accomplish in the overall sediment reduction budget would provide context with other analysis and allocations that state overall, unpaved roads account for <1% of sediment yield. Please consider displaying a "% of total" for each source. In addition, describing the process used for sampling and analysis could lead to a better understanding of the results.

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> **Response 3.2:** Allocations are provided at a watershed scale within each TMDL. DEQ urges BDNF to coordinate with the Big Hole Watershed Committee (BHWC) to provide a more detailed plan to address restoration approaches within each watershed through a locally lead Water Quality Restoration Plan (WRP). The WRP will consider the technical findings within the TMDLs and will provide a more detailed approach for watershed restoration efforts.
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> The allocations do account for a general condition of BMPs across the whole landscape of the Upper Big Hole Valley and surrounding mountains. Numeric allocations do not reflect detailed considerations at each tributary scale if BMP implementation differs greatly from the whole Upper Big Hole Watershed. Written qualifiers were incorporated into the sediment source assessment and allocation sections for each watershed when general information about BMP implementation was included in watershed narratives provided by the USFS to DEQ during the TMDL project. The USFS conducted the

unpaved road monitoring on USFS lands via an MOU with DEQ. USFS personnel involved with the project at that time were provided with a draft road analysis report for comment and feedback on 8/22/06. DEQ received no feedback at that time.

Without a much more detailed monitoring effort or more detailed feedback from the USFS with specific information about completed BMPs within each watershed, a more detailed numeric allocation approach is not feasible. DEQ urges BDNF to coordinate with the BHWC during formation of the upcoming WRP to address a more detailed approach of where restoration activities have occurred in the recent past and where restoration funding should be prioritized during future efforts. If USFS can provide detailed information about previously implemented BMPs specific to reducing pollutant loads in the watersheds where TMDLs were written, the information will be identified in the WRP and may be useful for future TMDL reviews.

DEQ provides sediment allocations as a percent reduction by source because the estimated sediment loads from each type of assessment (roads, bank erosion, and upland) depends upon different techniques of monitoring, modeling and associated assumptions. Therefore, caution should be used when comparing sediment loads between categories of sources which depend upon the differing assessment techniques. Also, some sources are localized within a specific area of the watershed and localized in-stream sediment impacts may occur when overall loads at a watershed scale appear to be small. A "percent of total" TMDL reduction by source is not provided because of these rationales.

Sediment source assessments are described in **Sections 8.2.1** through **8.2.5**. Detailed reviews of each type of sediment source assessment were provided in **Appendices A, H and G** and were referenced in **Sections 8.2.1** through **8.2.5**.

Comment 3.3: Silvicultural practices are listed as a source of sediment on many of the streams. The Draft states that timber sales are not targeted for reduction-based allocations, only "no increases" allowed. This appears as a discrepancy that may prove to be a "red flag" during legal review of proposed timber harvest activities. The BDNF proposes the following narrative that recognizes the opportunity for silvicultural practices to occur in a tightly controlled manner where a low probability of sediment delivery exists: "No modeled increase in sediment delivery", with a footnote that the model may not account for extraordinary storm events that may lead to a remote potential for sediment delivery.

Response 3.3: This allocation applies to ground disturbance or vegetation clearing activities associated with timber harvest activities and does not consider associated roads. Associated roads would fall under the unpaved road sediment allocations. DEQ recognizes the need for future silvicutural practices to occur with all reasonable land, soil and water conservation practices in place. The recommendation provided in comment 3.3 falls in line with this approach. The "no modeled increase" recommendation will be incorporated into the sediment allocations.

Comment 3.4: Another recognition that the BDNF would like to see is the research that compares the risk of soil erosion and sediment delivery from fuels treatment activities and catastrophic fire (Elliot W., Robichaud P., *Comparing Erosion Risks from Forest Operations to Wildfire*, 2001). This paper displays the role that proper management actions can have in reducing the long-term erosion/sedimentation budget where uncharacteristically high fuel loadings/fire potential exists.

> **Response 3.4:** Recently, much attention has been devoted to this topic in the Northwest US. Historically, timber harvest and large scale fire suppression efforts have occurred for much of a century in a majority of the forested areas. Recently, less fire suppression, a warming trend, biological factors and the lacking ability of the USFS to manage fuels have culminated to provide conditions where fires are influencing large portions of the forested landscape in the Northwest US. Results from Elliot W., Robichaud P., *Comparing Erosion Risks from Forest Operations to Wildfire*, 2001 indicates overall erosion rates may be lower or equal to natural fire regimes when implementing harvest management and/or prescribed fire in a watershed This study does not consider spatial and temporal sediment production considerations in the assessment. Changes in temporal and spatial sediment production likely have impacts upon beneficial uses. Effects of fire are considered in the upland sediment source assessments and attributed to natural loads. The potential affects from fire upon in-stream sediment conditions are noted in **Section 5**. Language about how fire and timber harvest affect sediment production and how fire was considered in the TMDL source assessment was added to **Section 8.3**.

Comment 3.5: It's understood that the allocation of sediment from eroding stream banks accounts for potential stream type and associated vegetation communities. A concern exists if allocations were based on conditions assessed on private lands, and then applied throughout the watershed. This could misrepresent conditions where stream reaches are rocky and/or do not receive grazing pressure or other disturbances. The map which shows estimated levels of riparian vegetation cover using aerial photo analysis displays very few reaches on the BDNF with "Sparse" or "Moderate/Sparse" compared to reaches downstream of the BDNF boundary. Breaking out the analysis by ownership, as suggested for roads, may better reflect conditions on the BDNF and allow us to recognize areas that need improvement. The BDNF also recognizes its role of providing site-specific information were clarification is needed.

> **Response 3.5:** Both vegetation conditions and stream type were considered during the selection of field assessment sites and during the bank erosion extrapolation process. Stream type and vegetation condition breaks usually coincided near land ownership boundaries in this TPA. The extrapolation process did not consider land ownership boundaries but the process does address the concerns raised in comment 3.5 because vegetation density conditions and stream channel types were both considered during the extrapolation process. Rock dominated stream channels were compared to each other and low gradient streams were compared to similar low gradient streams for extrapolation without regard to land ownership. See page 7-8 of Appendix H for a description of how bank erosion rates were extrapolated from measured sites to the remainder of the watershed.

Comment 3.6: The allocation based on upland erosion mentions agricultural practices (grazing, hay ground, etc.) and forested areas. Research has shown that any erosion associated with silvicultural practices (and any possible sediment delivery) usually diminishes to pre-disturbance levels after three years. Ongoing monitoring of soils by BDNF staff will help frame this. Conversely, agricultural practices occur year after year, and typically constitute chronic sources. The BDNF sees a need to display consistency in regards to effects from silvicultural practices versus other activities on uplands throughout the TMDL.

> **Response 3.6:** Wording was added to **Section 8.2.3** to address this comment. "Timber harvest has the potential to for transient short term (3-5 years) increases in sediment loading if located near streams. Agricultural activities such as grazing and hay production provide more persistent sediment loads over many years although hay production may produce higher short term loads when reseeded or rotated to alfalfa."

Comment 3.7: All listed streams are described from the headwaters to the mouth. Many of the streams on the BDNF exist within roadless areas or areas of very minimal management actions. For example, while boundaries for livestock grazing may be displayed through GIS on many of these headwater areas, primary range exists only on the lower end of the watersheds. Relying on broad-scale GIS analysis may prove to be problematic. The BDNF recognizes the extra work required to break stream reaches by ownership. However, this may prove useful by better illustrating where emphasis is needed to achieve water quality goals. The BDNF would need to provide watershed specific information where available to better define the existing condition.

> **Response 3.7:** TMDLs are provided for watersheds which contribute pollutants to impaired water bodies. Where information was provided by the USFS, spatial considerations about sources were incorporated into the text of the existing conditions review, TMDL and allocation sections. Detailed information about range use was not provided by the USFS during the project timeframe, only the amount of watershed area within an active grazing allotment.

Comment 3.8: Doolittle – It appears that sediment condition is a worse-case scenario on relatively short reach. Could agree to TMDL findings, since it acknowledges improvement and would continue monitoring.

> **Response 3.8:** Comment noted.

Comment 3.9: Fox – No TMDL. Agree with findings.

> **Response 3.9:** This comment is incorrect. A TMDL for Fox Creek was completed in the draft public comment document.

Comment 3.10: Governor – TMDL. Agree with findings.

> **Response 3.10:** Comment noted.

Comment 3.11: Johnson – Appears to be based on narratives and assumptions. States most sediment is natural or from cattle. This allotment (Tie-Johnson) receives light use from cattle, with limited time spent on BDNF due to cattle not preferring to occupy allotment (pers. con. Kevin Greenwood, Range Conservationist, Wisdom RD, BDNF). The BDNF recognizes the need to release implementation monitoring data to help support assessments.

> **Response 3.11:** The sediment source assessment and TMDL for Johnson Creek are based upon analysis and monitoring reported in Appendices A, C, G and H. No grazing allotment implementation monitoring was received from the BDNF. **Section 8.3.6** was modified to include the professional judgment provided in **comment 3.11**.

Comment 3.12: Joseph – No TMDL. Agree with findings.

> **Response 3.12:** This comment is incorrect. A TMDL for Joseph Creek was completed in the draft public comment document.

Comment 3.13: NF Big Hole – Mentions sediment deposition could be partially natural and also from past activities within the forested mountains. Seems ambiguous, based on assumptions.

> **Response 3.13:** The referenced text was deleted from **Section 5.8.1**. Sediment source assessments are described in **Sections 8.2.1** through **8.2.5**. Detailed reviews of each type of sediment source assessment were provided in **Appendices A, H and G** and were referenced in **Sections 8.2.1** through **8.2.5**.

Comment 3.14: McVey – Mentions potential risks on BDNF for increased sediment delivery, but is this based on data or assumptions? It seems to imply that sediment effects (embedded substrate) occur mainly on private land. Again, does a distinction need to be made between BDNF and private?

> **Response 3.14:** Potential sources of human caused sediment are identified in **Section 5.9**. Sediment source assessments are described in **Sections 8.2.1** through **8.2.5**. Detailed reviews of each type of sediment source assessment were provided in **Appendices A, H and G** and were referenced in **Sections 8.2.1** through **8.2.5**.
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> In general, grazing has the most sediment and stream channel related impacts on State owned lands and private lands in this watershed. BDNF grazing allotment monitoring data was not provided in the BDNF watershed data compilations provided to DEQ during the project.

Comment 3.15: Miner – Sediment effects appear to be on private, but again no distinction between ownerships.

> **Response 3.15:** Potential sources of human caused sediment are identified in **Section 5.10**. Sediment source assessments are described in **Sections 8.2.1** through **8.2.5**.

Detailed reviews of each type of sediment source assessment were provided in **Appendices A, H and G** and were referenced in **Sections 8.2.1** through **8.2.5**.

In general, only a few small reaches of Miner Creek are impacted by grazing. BDNF grazing allotment monitoring data was not identified in the BDNF watershed data compilations provided to DEQ.

Comment 3.16: Mussigbrod – While some effects to sediment might occur below the dam, most of watershed (above dam) has little management activity. Again, need to make distinction between ownerships.

Response 3.16:. DEQ is using all but the lower 3 to 4 miles of Mussigbrod Creek as a reference condition site for water quality monitoring indication that most of this watershed is managed appropriately. This information was added to **Section 8.3.10**.

Comment 3.17: Pine – Data suggests sediment issues occur below BDNF.

Response 3.17: Some limited grazing impacts were noted on BDNF lands in the Pine Creek Watershed yet most grazing impacts were on private and State lands.

Comment 3.18: Pintlar – States that given low proportion of degraded riparian, the loss of function in a portion of Pintlar Meadows is an unlikely contributor of excess sediment to Pintlar Creek. This is exactly the type of rationale I think is appropriate to apply to other reaches w/in BDNF, but only applied here.

Response 3.18: Comment noted.

Comment 3.19: Rock – Reasons for sediment contributions from BDNF seem arbitrary and capricious: 1) 80% of watershed within allotment. In reality, only a small fraction is used by cattle. 2) “Extensive” multiple use trail system. What data exists to support this? Same with roads that are mentioned. 3) Also mentions presence of brook trout as having an advantage over Westslope Cutthroat Trout on degraded systems. Is this an evaluation criteria (target)?

Response 3.19: The sediment source assessment and TMDL for Rock Creek are based upon analysis and monitoring reported in **Appendices A, C, G and H**. **Section 5.14.1** was edited to consider **comments 3.19.1 and 3.19.2**. Information about trails and roads was provided by BDNF. The type of fish species present and consultation with fisheries biologists are used as supplemental information to the TMDL process but are not used as targets.

Comment 3.20: Ruby – Need data to support claims about multiple use (cattle and roads), and actual effects to sediment. Mentions fine sediment issue in lower reaches (ie. below BDNF?). Need to clarify.

Response 3.20: The information about USFS lands in **Section 5.15.1** was constructed with information provided by the BDNF. No supporting data was provided. **Section**

5.15.1 provides narrative about possible sources and existing conditions. **Section 8.3.14** provides a quantified sediment source assessment, TMDL and allocations.

Comment 3.21: Steel – Meets most targets, except "not fully" for stream-bed sediments. This begs question of how to allocate loads, especially when it mentions effects below BDNF.

Response 3.21: **Comment 3.21** applies only to the Steel Creek monitoring location in the upper watershed on or near USFS lands. The two lower sites indicate impacts to sediment conditions and stream channel. At monitoring reach SC02 near the USFS boundary, the only siltation related results were in pool tails and indicated 100% fines. Therefore, human influenced sources on USFS land should be addressed with all reasonable land, soil and water conservation practices. In general, sources on USFS lands are not as severe or widespread as on private lands in the Steel Creek Watershed but may have localized impacts.

Comment 3.22: Schultz – No TMDL. Though mention of past timber harvest and roads, no effects to sediment. So how is this different from other watersheds where assumptions are drawn which connect timber harvest/roads to sediment. This emphasizes the need to do site-specific evaluation on the ground, accounting for landtype, soils, delivery coefficients, etc.

Response 3.22: Sediment monitoring conducted during the TMDL process collected site specific information to identify in-stream conditions. If in-stream sediment conditions do not meet targets, a TMDL is pursued. If in-stream conditions meet the targets, the TMDL and allocation process is forgone. Data from Schultz Creek met the targets and did not indicate a need for a TMDL.

Comment 3.23: Tie – Mentions timber harvest/roads done in 1960s and 70s. But does that necessarily mean a connection with sediment? The point is, trying to evaluate in-channel sediment and drawing a conclusion based on circumstantial evidence is difficult if not dangerous. Need to accomplish this through the use of "reference watersheds", not merely "reference reaches" as done in developing targets.

Response 3.23: **Section 5.19.1** describes potential human caused sources which may influence sediment conditions. The intent of this section is to identify if human caused sediment sources are present. Sediment source loads are assessed in the Tie Creek sediment TMDL **Section 8.3.17** and in **Appendices A, H and G**.

Comment 3.24: Trail – TMDL. Agree with findings including acknowledgement that conditions are improving, but need to better assess potential conditions. I bring into question that the riparian vegetation assessment rates most of the stream as "moderate". It appears that a robust, recovering vegetation community is providing beaver with the necessary resources to re-establish themselves throughout the system.

Response 3.24: The riparian vegetation assessment referred to was derived from an aerial photo based review of general riparian vegetation condition. The aerial photo assessment provides a course estimate based on aerial photo viewing. Notes from field assessments

and results from riparian vegetation monitoring at 5 locations indicate a robust recovering vegetation community except where fire impacted riparian vegetation (**Table 5-21**). This could have been due to affects of heavy moose browse which generally does not kill willows but browse them to snow cover levels during winter. These small shrubs provide excellent rooting which hold stream banks together. Short shrubs are hard to differentiate from grasses during aerial photo reviews. FWP began to more actively manage the expanding moose populations in this area during the TMDL project.

Comment 3.25: Warm Springs – No TMDL, but considered as a source (sediment). The BDNF recognizes the need to link sediment to pool habitat and % fines in spawning channels.

Response 3.25: Comment noted.

4. Temperature and Stream Flow

Comment 4.1: A great deal of my concern is focused on the issue of thermal loading and the possible recommendations and allocations. First, let me state that the word allocation is fairly threatening in that it represents an allotment and allotments have historically been limiting factors. Water rights in and of themselves prove to be very limiting factors and in combination with the seasonal flow variations that affect these high desert valleys. One more restriction could prove very damaging indeed to a low margin industry like agriculture.

Response 4.1: Increasing summer time stream flow within the temperature TMDL is not an allocation. The document was updated to more clearly convey this approach. Wording was added to **Table 7.2** and associated text for clarification. While the term "allocation" may seem threatening, the national TMDL program, which is guided and overseen by the Environmental Protection Agency, mandates the use of the term "allocation" in forming TMDLs. The allocation process is a central principle for forming TMDLs. None of the allocation approaches for the Upper and North Fork Big Hole River TMDLs are built upon assumptions that should be construed to take water rights, reduce hay or cattle production, or affect viability of the ranching community. Allocations were based upon using reasonable land, soil and water conservation practices to alleviate water quality problems. If the restoration approaches are followed, the numeric allocation approaches will likely be met. The results of this process should be used to provide funds from grants to educate landowners about implementing grazing, crop and irrigation practices which will promote better water quality. The same grants can be used to implement these practices.

Additionally, the following wording is included in the document when restoring summer time instream flows is discussed:

> "The allocation strategy and subsequent proposed restoration approaches consider that water rights can not be legally affected by any decisions provided in this document. Therefore, a locally coordinated approach is essential for achieving the goal of increasing summer time instream flows. Increasing thermal assimilative

capacity via instream flow conservation must be accomplished within the sovereignty of Montana's water rights law."

Comment 4.2: The upper Big Hole valley represents one of the greatest water storage assets we have and the limitation of irrigation, or frankly the creation of an over simplified model touting efficiency would likely damage the watershed as a whole. A study completed last summer cites a quick return flow, but that study is very limited to the shallow alluvium in one small area of the valley. A study conducted through the Montana Tech in the late 90's showed considerable upwellings at geological constriction points along the river most likely occurring from a deeper water bearing strata. The more recent study even indicated that deep wells return water until nearly February. It should be noted that even that "short" period extended the return for up to ten days at a critical time. We would likely be entering a crisis period at least a week earlier if not for those flows.

Response 4.2: Ground water and surface water are connected. Irrigation plays a role in the amount of ground water in many areas of the Big Hole River Watershed. The most limiting timeframe in the Big Hole River for both irrigators and aquatic life occurs during the heat of the summer (July-early September). Irrigation efficiencies are only called for during hot weather periods for the temperature TMDLs. The timeframe it takes ground water to return to streams is not easily understood without specific study. The temperature TMDL uses general knowledge about irrigation and ground water influences within the project area. This is because of the scale of the project and difficulty in determining spatially and temporally specific groundwater return timeframes. Therefore, further study should occur to determine time it takes ground water to travel to surface water within specific areas before large scale irrigation efficiency efforts are implemented. Further study should include any consideration of pivots or sprinklers, which may have a large affect upon ground water recharge rates and time of water use associated with water rights. Pivots are not always appropriate for preserving cool stream temperatures, yet may be appropriate in some areas if groundwater return from the irrigated area to streams is naturally delayed until cool weather timeframes when irrigation and evapotranspiration is not occurring within the watershed. **Section 10.4.2.2** was updated with clarifying information about implementation of irrigation efficiencies.

Most of the Montana Tech studies mentioned in **comment 4.2** were considered in the temperature TMDLs and results from each study are reviewed in **Appendix D**. The same upwelling location identified by Montana Tech were found during temperature TMDL monitoring.

Comment 4.3: Already a great deal of water is lost to evaporation and transpiration, and no doubt the water that returns directly to the stream contributes to thermal loading, however; the water that makes it into the alluvium is returned for longer and at a consistent cool temperature. Whereas, "efficient" irrigation would result in the plants using most of the available irrigation and very little return to the water table. We see examples of this in the Gallatin Valley where flood irrigated crop and pasture land have been replaced by pivot irrigation and housing developments. These areas are now faced with a constantly receding water table. There are also

indications that the over use of pivots may be damaging the ability of Rock Creek (Phillipsburg) to sustain it's summer flows.

> **Response 4.3**: Comment noted. See response to **Comment 4.2** for an applicable response.

Comment 4.4: My family has been on our ranch at Glen since the 1890's and during that time my great-grandmother, and my grandmother kept journals that not only kept track of day to day activities, but of the natural world. In the pages of these journals I have found references to the river drying up to the point you could walk across it without getting your feet wet (at what is now the near Melrose gauge). These types of entries didn't disappear completely until the 1920's when some of the larger ditch systems began to go in, which certainly suggests a relationship in terms of in stream flow. I will include these with any statement I have on the Lower Big Hole TMDL, however; as today is the deadline I do not have time to retrieve them for the Upper.

> **Response 4.4**: Comment noted. See response to **Comment 4.2** for an applicable response. The following language was added to **Section 10.4.2.2** to address this comment.
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> > "Early season irrigation should consider both 1) stream flows which are necessary for channel formation and also 2) the ability for irrigation during this timeframe to recharge local aquifers. Spring time aquifer recharge has the potential to increase cool groundwater return flow during the heat of the summer. Irrigation efficiencies during the spring timeframe should not be implemented, unless bank full flood events are needed to scour stream channels and sort sediment within the channel. These two early season irrigation considerations should be balanced in concurrence with each other. Fertilizer application timeframes should also be considered for reducing nutrient runoff if excess water application occurs during high water. "

Comment 4.5: It should also be mentioned that most irrigators in the Upper Big Hole typically only irrigate while they have water, which tends to be during periods of high flow. This fact and the extremely short growing season are limiting factors to types of crops produced and the economic viability of other irrigation systems.

> **Response 4.5**: Comment noted. Hay/pasture was the only "crop" considered as being grown this TPA during the TMDL assessments. Recent efforts to more efficiently irrigate hay and pastures are noted in the restoration section of the document. Economic viability of proposed irrigation systems should be considered along with impacts to groundwater and summer stream flows during specific implementation efforts.

Comment 4.6: I believe it is a mistake to look at this river system in separate pieces when in fact it is a sum of its parts. Changes and recommendations in one part of the system ultimately affect the whole, and while some of the CCAA (candidate conservation agreement with assurances) habitat restoration may positively effect everyone, the efficient or limited irrigation wording could have large negative impacts downstream.

Response 4.6: The state of Montana packages TMDLs into basin wide areas to address watershed sources during the TMDL process. The Big Hole Watershed was addressed in two separate documents because if the large size of the watershed and the large number of TMDLs produced with in the watershed. DEQ agrees that a watershed should be managed as a whole. Upstream and downstream impacts from any proposed activity should be considered prior to instating changes. See responses to **comments 4.1, 4.2 and 4.4 for** further response to this comment.

5. Water Quality Restoration

Comment 5.1: A Fluvial Arctic Grayling CCAA (candidate conservation agreement with assurances) restoration project list was provided by Montana Fish Wildlife and Parks (FWP) during the public comment period. FWP indicated it should be included in **Section 10** prior to the public comment period.

Response 5.1: **Section 10.5** was created to review recent restoration activities. Portions of the table provided by FWP are included within this section.