SECTION 3. UCFRB AQUATIC RESOURCES RESTORATION PLAN

This section constitutes the State's aquatic resources restoration plan for the UCFRB. Section 3.1 provides the State's analysis of restoration alternatives for aquatic resources based on achieving restoration goals and on evaluation criteria specified in federal natural resource damage regulations and identifies the State's preferred alternative. Section 3.2 describes how the State further developed the preferred alternative into a proposed set of restoration actions and budgets. These proposed actions are grouped in two parts: The first part covers flow augmentation (Section 3.2.1) and the second part covers other proposed restoration actions (Section 3.2.2).

3.1 Evaluation of Alternatives

3.1.1 Aquatic Restoration Goals

As explained in Section 2.2, restoration of aquatic resources and services to baseline condition is not possible in the UCFRB due the widespread injury to natural resources associated with the release of hazardous substances from the mining and mineral processing activities in the Basin. However, the State's previous restoration planning efforts, which are summarized in Section 2.2, make it clear that significant progress can be accomplished with restoration efforts. The *Aquatic Prioritization Plan* focused on the areas and general types of projects most likely to derive the greatest fishery benefits for the UCFRB, and in so doing, restore, rehabilitate, replace, or acquire the equivalent of the injured natural resources of the UCFRB. The priority areas set forth in the *Aquatic Prioritization Plan*, and the types of projects recommended for specific priority stream areas in the *2012 Process Plan*, are based not solely on hazardous substances, but also based on the predicted effectiveness of actions in addressing limiting factors to aquatic life in the UCFRB. The State used the knowledge gained from the 2008 and 2017 aquatic assessments[1] to help determine the recommended types of restoration actions and the priority stream areas for UCFRB restoration work identified in the *Aquatic Prioritization Plan*.

The State has developed goals for its on-going and planned remediation and restoration of the mainstems of Silver Bow Creek and the Clark Fork River that are guiding the integrated remediation and restoration actions that have been or will be conducted on those mainstems with dedicated NRD settlement funds. The primary goal for the Silver Bow Creek and Clark Fork River mainstem fisheries is to restore trout populations and associated angling opportunities to levels similar for other area rivers. More specific goals for the mainstem fisheries are reflected in the *Aquatic Prioritization Plan*, which connects the following goals for the UCFRB tributaries to the already-developed goals for the mainstem fisheries:

1. Restore the mainstem trout fishery by improving recruitment of fish from tributaries.

[1] Lindstrom, J. 2011. Upper Clark Fork River Fish Sampling: 2008-2010. Montana Fish, Wildlife and Parks. Helena, MT, and Pat Saffel, Region 2 Fisheries Manager FWP, Personal Communication, September 2012.

2. Replace lost trout angling in the mainstem by improving trout populations in tributaries; and

3. Maintain or improve native trout populations in the UCFRB to preserve rare and diverse gene pools and improve the diversity and resiliency of the trout fishery.

As noted in the *2012 Process Plan*, the following are the types of projects that could be implemented to achieve the goals of the aquatic resources stated above.

- Flow augmentation: water right purchase, lease, or irrigation system efficiency improvements.

- Riparian habitat protection and/or Improvement: riparian fencing, grazing management, woody plant re-establishment, conservation easement, land purchase.

- Fish passage improvement: culvert replacement, irrigation diversion improvements, fish screen construction on diversions; and

- Sediment reduction/Bank stabilization: woody plant re-establishment, streambank/channel reconstruction, road improvements.

In general, water quantity, riparian habitat protection and/or improvement, fish passage/fish entrainment, and sediment reduction/instream habitat improvements are targeted for UCFRB restoration. These actions improve instream flows, fish passage, riparian condition, and reduce sediment, to obtain the above goals.

As discussed in Section 2.2, the *Aquatic Prioritization Plan* was adopted as part of the *2011 Long Range Guidance Plan,* which focused future restoration to the priority areas identified in *Aquatic Prioritization Plan* and the aquatic injured resource areas for which the State made its restoration claims. The *2012 Process Plan* further narrowed the universe of aquatic restoration alternatives by focusing restoration alternatives on the mainstems and high Priority 1 and Priority 2 tributary stream areas, consistent with the approach advocated in the *Aquatic Prioritization Plan*.

As part of the development of a restoration plan, alternatives are considered in selecting a preferred alternative for the plan. As explained above, this process began with the restoration planning efforts that occurred prior to adoption of the *2011 Long Range Guidance Plan*. The previous restoration plans and other pertinent evaluations that contain alternative analyses are described in Section 2.2. The State, through these efforts, has already considered many alternatives for restoration of the injured groundwater, aquatic, and terrestrial resources in the UCFRB.

3.1.2 Description of Alternatives

The State analyzed no action, and two alternatives based on geographic approaches, for aquatic restoration in the Basin.

Alternative 1: No Action. Alternative 1 is the no action alternative. It is a required alternative under state and federal law and allows for comparison to other alternatives. The no action alternative leaves the Clark Fork River and Silver Bow Creek mainstem and their tributaries in their current condition, allowing only natural processes to restore the fishery and angling opportunities.

Alternative 2: Restoration of Mainstem Injured Areas and Priority 1 Stream Areas. The *2012 Process Plan* required that aquatic restoration alternatives focus on the high Priority 1 and Priority 2 stream areas, consistent with the *Aquatic Prioritization Plan*. Alternative 2 focuses on restoration of the aquatic natural resources of the Clark Fork River and Silver Bow Creek mainstem injured areas, and ten Priority 1 tributary stream areas within the UCFRB, as shown on Figure 2-1. Alternative 2 also includes recreational components associated with the Priority 1 stream areas.

Alternative 3: Integrated Restoration of Mainstem Injured Areas and High Priority 1 and 2 Stream Areas on a Watershed basis. As the *2012 Process Plan* required aquatic restoration alternatives to focus on the mainstem injured areas and Priority 1 and Priority 2 stream areas, Alternative 3 focuses on restoration of the aquatic natural resources of the Clark Fork River and Silver Bow Creek mainstems, and the 28 Priority 1 and Priority 2 tributary stream areas on an integrated, watershed basis, as shown on Figure 3-1. This approach would implement restoration actions to address each of the watersheds' limiting factors with a goal of restoring aquatic resources in the UCFRB through actions in each of the 14 watersheds. Alternative 3 also includes recreational components associated with the mainstems and Priority 1 and Priority 2 stream areas.

3.1.3 Evaluation of Alternatives

Under the DOI NRD regulations, a Trustee's restoration plan needs to evaluate a reasonable number of alternatives for restoring, rehabilitating, replacing, or acquiring the equivalent of injured natural resources based on all relevant considerations, including the DOI legal criteria.[2] Below, the three restoration plan alternatives are evaluated using the ten evaluation criteria set forth in the *2012 Process Plan*. Those include eight legal criteria, seven of which represent the criteria set forth in the U.S. Department of the Interior's NRD assessment regulations,[3] which Trustees are to use when selecting the restoration plan alternatives. The other legal criterion addresses the additional factors the State is to consider under a Memorandum of Agreement with the Confederated Salish and

[2] 43 CFR §11.93, §11.81, and §11.82.

[3] 43 CFR §11.82(d). These regulations provide a list of "factors" to consider when selecting the alternative to pursue; those factors are referred to as DOI legal criteria in this document.

Kootenai Tribes and the Department of the Interior. In addition to these legal criteria, there are two policy criteria of special interest to the State.

The evaluations below provide a summary description of each criterion and how each of the three alternatives meets that criterion. Section 3.1.5 provides an overall summary of these criterion-specific analyses and identifies the State's preferred alternative based on the collective analysis of the ten criteria.

Technical Feasibility: Under this criterion, the State evaluates the degree to which an alternative employs well-known and accepted technologies and the likelihood that the alternative will achieve its objectives. Application of this criterion focuses on an evaluation of the alternatives' relative technological feasibility**.**

Alternative 1 (the no action alternative) is technically feasible. Alternative 2 (Priority 1 stream areas) and Alternative 3 (Priority 1 and Priority 2 stream areas) would both employ the encouraged activities set forth in the *2012 Process Plan*, which are well-known and accepted technologies, with a reasonable chance of successful completion in an acceptable period of time and are therefore also technically feasible. For Alternative 2, there is a minor uncertainty that enough access will be allowed on private lands to sufficiently effectuate implementation. The same minor uncertainty exists for Alternative 3, but to a lesser extent, due to the larger geographical area available for action.

Relationship of Expected Costs to Expected Benefits: Under this criterion, the State examines whether an alternative's costs are commensurate with the benefits it provides. In doing so, the State will need to determine the costs associated with the alternative, and the benefits that would result from the plan.

For this criterion, Alternative 3 (Priority 1 and Priority 2 stream areas) is superior to Alternative 1 (the no action alternative) and Alternative 2 (Priority 1 stream areas). For Alternative 1, there would be no benefit, and no costs would be incurred. As past mining and mineral processing activities have resulted in widespread injury to natural resources in the UCFRB, a lack of benefit would be an unacceptable outcome.

Alternative 2 offers net expected benefits compared to expected costs, by providing fisheries improvement as well as related services (e.g., restoring and replacing angling opportunities and other recreational services) in the two mainstems and ten Priority 1 stream areas. However, by providing fisheries improvement and related services in the two mainstems and twenty eight Priority 1 and Priority 2 stream areas, Alternative 3 will provide significantly more fisheries improvement and related services through its integrative approach (since greater benefits and cost efficiencies can be achieved than would occur by addressing separately), offer a greater opportunity for partnerships and for coordination with terrestrial resource projects, and cover a larger geographic area within the UCFRB for the same costs as Alternative 2, thereby providing higher net expected benefits compared to expected costs.

Cost-Effectiveness: Under this criterion, the State evaluates whether the alternative accomplishes its goal in the least costly way possible. In evaluating this criterion, the State considers whether the alternative is consistent with the guidance for aquatic and terrestrial restoration and recreation projects provided in the *2012 Process Plan*,[4] as well as the likelihood of matching funds, which can enhance cost-effectiveness.

For this criterion, Alternative 3 (Priority 1 and Priority 2 stream areas) is superior to Alternative 1 (the no action alternative) and Alternative 2 (Priority 1 stream areas). Alternative 1 is cost-effective, as no costs would be incurred. However, there is considerable precedence in the UCFRB for cost-sharing with other entities in UCFRB restoration activities. This ability to accomplish more restoration through the use of matching funds is lost under Alternative 1.

Alternative 2 and Alternative 3 are similar in that both would require necessary evaluations and designs before implementing the encouraged activities set forth in the *2012 Process Plan.* Both are consistent with the aquatic and recreational projects guidance set forth in the *2012 Process Plan*, and not inconsistent with the terrestrial guidance.

However, Alternative 3 offers greater opportunities for matching funds due to its greater opportunity for partnerships, and the larger geographical area available for actions. In addition, Alternative 3 offers superior cost-effectiveness to Alternative 2 through its integrative watershed approach (which creates efficiencies to reduce costs), plus its larger geographic area offers more selectivity in determining specific locations for actions in order to improve cost-effectiveness. Also, as set forth below, Alternative 3 can also be expected to lessen the recovery period for the UCFRB, thereby leading to further restoration at less cost.

Results of Response Actions: Under this criterion, the State considers the results or anticipated results of response actions underway, or anticipated, in the UCFRB. Numerous response actions are ongoing and additional response actions are scheduled to begin in the next several years, continuing for many years into the future.

Alternative 1 (the no action alternative), Alternative 2 (Priority 1 stream areas), and Alternative 3 (Priority 1 and Priority 2 stream areas) do not interfere with planned response actions, however, Alternative 1 does not enhance planned response actions. Alternative 2 enhances planned response actions, while Alternative 3 offers further enhancement by addressing a larger portion of the UCFRB watershed.

Adverse Environmental Impacts: Under this criterion, the State weighs whether, and to what degree, the alternative will result in adverse impacts to both the physical and human environment. Specifically, the State will evaluate significant adverse impacts, which could arise from the

[4] This guidance is provided in Attachments 5-2, 5-3, and 5-4 of the *2012 Process Plan*.

alternative, short- or long-term, direct, or indirect, including those that involve resources that are not the focus of the project.

There would be much greater adverse environmental impacts associated with implementation of Alternative 1 (the no action alternative) because the adverse impacts resulting from the contamination would not be addressed. Temporary impacts are anticipated for Alternative 2 (Priority 1 stream areas), and Alternative 3 (Priority 1 and Priority 2 stream areas) due to construction activity. Protective measures would be required to assure that impacts to human health and safety would be limited to the extent practicable.

Recovery Period and Potential for Natural Recovery: Under this criterion, the State evaluates the merits of the alternative considering whether the resource is able to recover naturally and, if a resource can recover naturally (i.e., without human intervention), how long that will take. (The term "recovery" refers to the time it will take an injured natural resource to recover to its "baseline," i.e., pre-injury condition.)

As noted in the *1995 Restoration Determination Plan*,[5] natural recovery to baseline would be anticipated to take thousands of years. Therefore, Alternative 1 (the no action alternative) would result in an indefinite recovery period, and extremely poor potential for natural recovery. This would be an unacceptable result. Alternative 2 (Priority 1 stream areas) would advance the recovery period and enhance potential for natural recovery by addressing restoration needs on the two mainstems and ten Priority 1 stream areas and should significantly shorten the time of recovery for the UCFRB fishery. Alternative 3 (Priority 1 and Priority 2 stream areas) would be expected to further advance the recovery period and enhance potential for natural recovery through its expanded and integrated approach of addressing the UCFRB through actions within the fourteen priority watersheds.

Federal, State, and Tribal Policies, Rules, and Laws: Under this criterion, the State considers the degree to which the alternative is consistent with applicable policies of the State of Montana and applicable policies of the federal government and Tribes (to the extent the State is aware of those policies and believes them to be applicable and meritorious). In addition, projects must be implemented in compliance with applicable laws and rules, including the consent decrees. As part of the evaluation of this criterion, the State assesses whether the alternative would potentially interfere, overlap, or partially overlap with the restoration work covered under current or planned consent decrees or restoration plans.

All alternatives are compliant with applicable law. The State would require or obtain all needed permits and authorizations.

[5] *Restoration Determination Plan for the Upper Clark Fork River Basin*, prepared by the NRDP, with assistance from Rocky Mountain Consultants, Inc., dated October 1995.

Resources of Special Interest to the Tribes and DOI: Pursuant to the State's Memorandum of Agreement (MOA) with the Department of Interior and Confederated Salish and Kootenai Tribes (Tribes), the State is to pay particular attention to natural resources of special interest to the Tribes and/or DOI, including attention to natural resources of special environmental, recreational, commercial, cultural, historic, or religious significance to either the Tribes or the United States.[6] The MOA also provides for the State to pay particular attention to "Tribal Cultural Resources" or "Tribal Religious Sites," as those terms are defined in the MOA.

Alternative 1 (the no action alternative) does not address resources of special interest to the Tribes and DOI. Alternative 2 (Priority 1 stream areas), and Alternative 3 (Priority 1 and Priority 2 stream areas) enhance resources of special interest such as native trout, with Alternative 3 expected to provide further enhancement. Alternative 2 and Alternative 3 have the potential for site disturbance of tribal cultural sites, and appropriate evaluation and coordination would be required.

Normal Government Function: The State will not fund restoration activities for which a governmental agency would normally be responsible or that would receive funding in the normal course of events. With this criterion, the State evaluates whether a particular alternative would be implemented if recovered natural resource damages were not available. The Restoration Fund may be used to augment funds normally available to government agencies to perform a particular action if such cost sharing would result in the implementation of a restoration action that would not otherwise occur through normal agency function.

Alternative 2 (Priority 1 stream areas), and Alternative 3 (Priority 1 and Priority 2 stream areas) do not replace normal government functions, as the State is prohibited from funding restoration activities for which a governmental agency would normally be responsible or that would receive funding in the normal course of events. However, Alternative 2 and Alternative 3 may augment normal government function, if funding is normally available to a government agency to perform a particular action, and such cost sharing would result in the implementation of a restoration action that would not otherwise occur through normal government function. This criterion is inapplicable to Alternative 1 (the no action alternative).

Price: Under this criterion, the State evaluates whether the land, easements, water rights, or other property interests proposed to be acquired are being offered for sale at or below fair market value. Fair market value of water rights may be difficult to evaluate, and the State may look at various information, including the cost to conserve an equivalent amount of water at another location.

Alternative 2 (Priority 1 stream areas), and Alternative 3 (Priority 1 and Priority 2 stream areas) are equivalent, as all land, easements, water rights, or other property interests proposed to be acquired under Alternative 2 and Alternative 3 will be require evaluation to assure that all interests are being offered for sale at or below fair market value. This will likely require a state appraisal and other due

[6] This MOA, dated November 1998, is available from the NRDP website at: http://doj.mt.gov/wp-content/uploads/2011/06/1998moatribes.pdf.

diligence, as well as negotiation of price. This criterion is inapplicable to Alternative 1 (the no action alternative).

3.1.4 Evaluation Summary

The criteria that are most influential in this analysis are cost: benefit and cost effectiveness. Under the no action alternative (natural recovery), any aquatic resource benefits derived from the proposed aquatic restoration actions in the Basin would not occur. The injury to this river has been documented and, even with the intense remediation and restoration effort targeted at remediating and restoring the upper 46 miles of this river, full restoration of the fishery will not occur without also improving aquatic resources of the priority tributaries connected to the mainstem Clark Fork River. Services normally provided by aquatic resources would continue to be greatly reduced.

Alternative 2 provides for restoration actions on the mainstems and ten Priority 1 stream areas, whereas Alternative 3 provides for restoration on the mainstems and twenty-eight Priority 1 and 2 stream areas. Both alternatives will significantly shorten the time of recovery of the Clark Fork River and Silver Bow Creek mainstem fisheries. By integrating proposed actions on Priority 1 and 2 stream areas as watershed projects, however, Alternative 3 accomplishes this restoration more cost-effectively and provides for greater benefits and cost-efficiencies compared to Alternative 2. Alternative 3 provides significantly more benefits over a larger geographic area compared to Alternative 2. Greater benefits would be gained to aquatic resources and the public's use and enjoyment of those resources as a whole by integrating restoration actions over a larger area, as proposed in Alternative 3, compared to Alternative 2. The State believes by working on the limiting factors within each of the fourteen watersheds in the mainstem and Priority 1 and 2 stream areas that restoration success will be more likely. The result should be improvement in the highest priority stream areas, thus restoring the fishery in the Clark Fork River and Silver Bow Creek mainstem, and also improving angling opportunities within the UCFRB. Alternative 3 also provides for more coordination with terrestrial restoration projects that will benefit both aquatic and terrestrial resources over a greater area compared to Alternative 2. Alternative 3 encompasses more concept proposals submitted by the public, providing greater opportunities for partnerships (which may increase cost-effectiveness).

Alternative 3 also does better than Alternative 2 based on the results of response actions and potential natural recovery criteria. Alternative 3 offers further enhancement of planned response actions by addressing a larger portion of the UCFRB watershed than Alternative 2. Alternative 3 would be expected to further advance the recovery period and enhance potential for natural recovery through its expanded and integrated approach of addressing the UCFRB through actions within the fourteen priority watersheds more than Alternative 2.

Based on the better results for Alternative 3 reflected for the four criteria summarized above, the State selects Alternative 3 as the Preferred Alternative. For the other six NRD criteria, Alternative 2 and 3 are comparable.

3.2 **Development of Proposed Alternative:** Restoration of Priority 1 and 2 Stream Areas as Watersheds

The State collectively addressed the three Priority 1 and 2 stream areas along mainstems of Silver Bow Creek and the Clark Fork River and lumped the twenty-nine Priority 1 and 2 Tributary stream areas into fourteen tributary watersheds, as shown in Figure 3-1 (updated in 2018). The focus of each watershed involves implementation of projects that reduce or eliminate the effects of factors that limit aquatic resources of the mainstems or these tributary watersheds in meeting restoration goals. The proposed actions are most likely to derive the greatest aquatic benefits for the mainstems and the priority tributaries, taking into consideration the restoration actions that the State already has or will be conducting on the mainstems and has already funded on the some of the tributaries.

To achieve the restoration goals in a cost-effective, cost/beneficial, and technically feasible manner the State proposes, within each tributary watershed, to address the factor(s) that most limit the aquatic resources (limiting factors) of each priority stream area first, then implement projects that reduce or eliminate the next most limiting factor(s). For example, in some stream reaches, instream flow augmentation may be needed before other restoration actions such as fish passage and riparian enhancement would be worth attention. Prioritizing actions within each watershed will ensure that restoration actions will have the greatest chance of success. By improving and increasing flow, fish passage, floodplain vegetation, and aquatic habitats, trout populations of the UCFRB are expected to trend towards a pre-mining baseline condition. In addition, recreational opportunities through the restoration and enhancement of natural resources will also be substantially improved.

For aquatic restoration actions (both the flow augmentation and other proposed watershed restoration actions), the State conducted the following steps in development of this aquatic resources restoration plan:

1. The State assessed how the restoration concept proposals submitted through the public scoping process fit with the guidance provided in the *2012 Process Plan* on encouraged aquatic restoration activities. This first entailed categorizing the concept proposals according to the categories of encouraged activities provided in that guidance assessment and then assessing feasibility, the extent to which the proposals addressed limiting factors (cost-effectiveness), and the magnitude of potential aquatic benefits (cost: benefit). The concept proposals submitted by the public that fit the guidance and offered high aquatic benefits were incorporated into the State's proposed restoration actions, although the State further refined the cost estimates provided through the public scoping process and adjusted budgets to work within the available budget allocation. Alternately, those concept proposals that did not fit the guidance or were not considered feasible or cost-effective were not incorporated in the State's Restoration Plan.

2. The State then identified what areas and activities should be added to further meet restoration needs, beyond those covered through the public scoping process. An example is the proposed

fish barrier on Silver Bow Creek that was recommended in the *Aquatic Prioritization Plan* but not covered in any abstracts submitted by the public.

3. Taking the results of steps 1 and 2, the State developed proposed restoration actions and associated budgets for those actions for the mainstems and the twelve priority tributary watersheds, using the limiting factor approach described above. Initially in many areas, assessment activities and an evaluation process will be necessary, due to the lack of adequate information needed to establish measurable objectives and to determine the types and magnitude of actions that could be taken to meet these objectives and achieve goals.

4. Since flow augmentation is the overall most important and highest priority restoration action as identified in the *Aquatic Prioritization Plan*, the State determined the budget for flow augmentation separate from other aquatic restoration activities. After determination of the flow augmentation budget, the State adjusted the budgets for the other restoration actions accordingly to stay within the total available aquatic allocation.

5. Separately, and as provided for in the *2012 Process Plan*, the State identified programmatic monitoring activities and associated budget that is covered in Section 3.2.3.

Flow augmentation is described separately from the other restoration actions (Section 3.2.2) due to differences in how these actions will be implemented. Flow augmentation will entail investigating available water rights to determine the amount of instream flow that can be protected through the change of use process and conducting valuations and negotiations on acquiring or leasing these rights. In contrast, the other watershed activities to be implemented primarily involve conducting needed assessments, to be followed by engineering design and construction. In Section 3.2.1, flow augmentation is addressed collectively for the two mainstem areas and the twelve tributary watershed areas. In Section 3.2.2, other proposed actions are addressed separately for two mainstem areas and each of the twelve tributary watershed areas.

Aquatic-related recreational projects are addressed separately in Section 5.0.

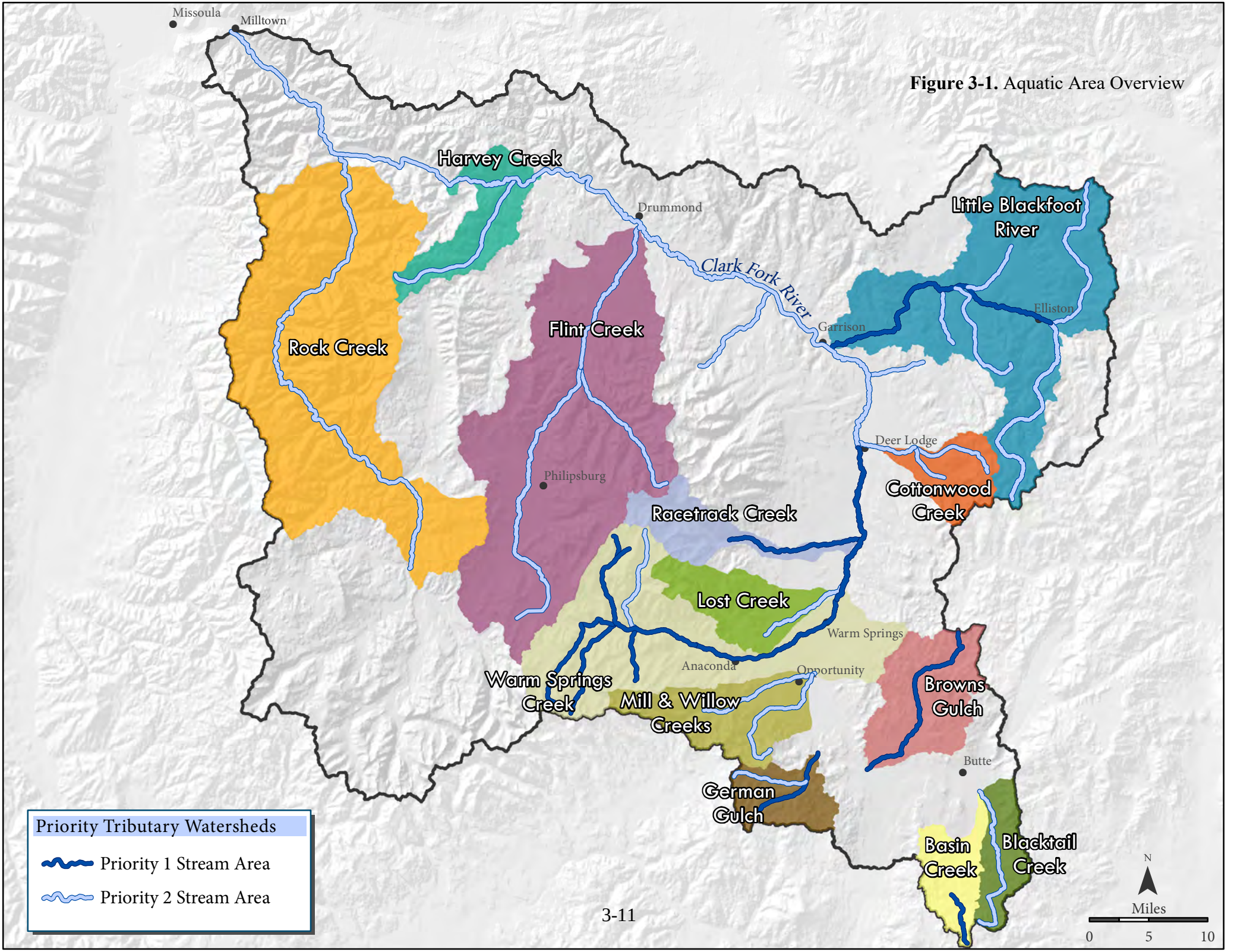


Figure 3-1. Aquatic Area Overview

3.2.1 UCFRB Flow Restoration Plan

Background

The UCFRB has many areas that have been identified as dewatered. The *Aquatic Prioritization Plan* clearly identifies the importance of and need to augment instream flows in dewatered areas in the UCFRB. The report indicates the benefits of increases to instream flow in Silver Bow Creek and the Clark Fork River will improve fish habitat, moderate water temperature, and dilute nutrients and metal loads. Flow augmentation projects as defined in Section 3.0, are projects such as: water right purchase, lease, establishing or improving~~ed~~ water storage, water management, or irrigation system efficiency improvements or combinations of these type of projects. The importance of these types of projects were identified after taking into consideration the restoration actions that have or will be accomplished through the already approved and funded integrated remediation and restoration efforts on the mainstems of Silver Bow Creek and the Clark Fork River.

In determining needed flow levels, FWP established flow targets for the UCFRB as a part of the *Application for Reservation of Water in the Upper Clark Fork River Basin* (Nov. 1986) filed with the Montana Department of Natural Resources and Conservation (DNRC). The report notes flow targets of 40 cfs as the minimum amount needed at Galen and 90 cfs as the minimum amount needed at Deer Lodge. It follows that if an additional 50 cfs was obtained between Galen and Deer Lodge, the worst dewatered area in the Clark Fork River would be addressed, the Group 1 project areas. These targets are only minimum flow targets, and additional water instream during the dry times of the year will likely supply increased benefits. Although specific minimum flow targets remain to be determined for Silver Bow Creek, increased base flow there could greatly improve the ability of the creek and other tributaries to support trout populations.

The FWP targets for other areas are summarized for the Priority 1 and 2 stream areas in Table 3-1. The 1986 flow targets differ from recent recommendations by FWP because the 1986 flow targets were based on upper inflection points, whereas other flow recommendations such as those in the *Aquatic Prioritization Plan* were based on the lower inflection point. Therefore, the recommendations represent a range, where the lower inflection point indicates the minimum flow needed to support aquatic life in that area based on channel geometry, and the upper inflection point is a target that should ensure the area is a fully functional aquatic system.

In addition to the dewatered area of the Clark Fork River between Galen and Deer Lodge, there are also several stream areas within the UCFRB that are, at least at some time during the year, significantly dewatered and in need of flow augmentation, such as, the Group 2 and Group 3 streams. Supplying instream flow to these areas is an important part of restoring the fisheries and riparian function, which will improve the aquatic health of the Basin. In some areas, unless there is sufficient instream flow to support a fishery, other restoration activities, such as fish passage and riparian enhancement, may not be worth pursuing until instream flow augmentation can be obtained.

Alternatively, some areas could be improved through these other types of restoration activities, even if additional instream flow cannot be obtained.

The *2012 Process Plan* lists flow augmentation as the highest recommended activity in five of the eleven Priority 1 Areas and in thirteen of the twenty Priority 2 areas, for a total of eighteen of the thirty-one Priority 1 and 2 Areas (58%). Since it has been established that instream flow augmentation is the most important part of aquatic restoration for the UCFRB, it follows that significant effort and resources should be placed on obtaining flow augmentation where it is most needed in the Basin. In response to the 2012 NRDP solicitation for restoration concept proposals, the public submitted 24 abstracts for obtaining flow augmentation and/or managing or valuing flow projects (abstracts #1, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 44, 55, 57, 58, 59, 66, and 69; Appendix A). These abstracts addressed many of the recommendations in the *2012 Process Plan* and covered all of the priority areas that the State targeted for flow augmentation. In 2015, no new restoration concept proposals for flow projects were submitted. In 2018, two abstracts (#98 and 100) were submitted, although each abstract was addressed in the 2012 Plan. In 2023, two abstracts were submitted (#117 and 118), and one abstract (#21) that was resubmitted is a flow project in conjunction with aquatic priority actions. Project abstracts received during all public comment periods are summarized in Appendix A.

An issue that was not fully considered in the *Aquatic Prioritization Plan* and the *2012 Process Plan* is the low fish population in the Clark Fork River from Flint Creek to Rock Creek. Results of recent fish population and fish movement studies have indicated a significant need for restoration in this area.[7] In addition to the known dewatered reaches of the Clark Fork River, the State is targeting flow augmentation in this area. Additional study is also proposed to better define the problems (see Section 3.2.3 on aquatic resource monitoring).

Instream Flow Project Implementation Process

Obtaining water for protectable instream flow is technically and legally challenging, and efforts usually take several years to accomplish. In some cases, the full amount of water anticipated for instream flow is not available for purchase or lease, and/or cannot be protected as far downstream as originally anticipated. Valuation of water for instream flow varies greatly based on the ability of water to be delivered where and when needed, and thus developing projects in these priority areas is important.

Priority Areas for Flow Augmentation

- Highest priority are projects (Group 1) that may supply instream flows to the area of the Clark Fork River between Galen and Deer Lodge, as they have the highest likelihood of

[7] Lindstrom, J. 2011. Upper Clark Fork River Fish Sampling: 2008-2010. Montana Fish, Wildlife and Parks. Helena, MT, and Pat Saffel, Region 2 Fisheries Manager FWP, Personal Communication, September 2012.

providing water to the most dewatered reach of the river and, thus, supply the best overall benefits to the restoration of the UCFRB.

- Second in priority are those projects that do not meet the Group 1 criterion but are in either Priority 1 areas or in Priority 2 areas that are also injured areas.
- Third in priority are flow projects in Priority 2 areas that are outside injured areas.

All Group 1 projects have been evaluated between 2012 and 2018 by NRDP and its partners. Based on NRDP's experience working with Group 1 projects, and because of the limited opportunities to implement flow augmentation due to the small number of water users in the area and the length of time needed to complete instream flow projects, starting in 2019, all projects in Group 1, Group 2 and Group 3 will be investigated at the same time. Thus, a wide-range of projects can be developed, which should lessen the time taken to meet instream flow targets and/or assist in increasing fish populations. Though Group 1 projects are still the highest priority, Group 2 and Group 3 projects will also assist in restoration of the resources even though they may not directly increase flow in the Clark Fork River dewatered areas. Increased flow in tributaries could also assist in recruitment of fish from these areas to the mainstems.[8]

Project Development

The project development phase will require a rigorous due diligence process, which includes working with each water right holder to determine current point of diversion, place of use, purpose of use and a potential place of storage, rate of diversion and volume of yearly water diversion and the historic use of each water right involved in the project. This process often involves irrigation flow data gathering or, if absent, measurement of current water use practices. The process to engage a water right holder and the gathering of the water use data often takes ~~more than a~~several years.

On all projects it is necessary to consult with DNRC about the water rights and flow augmentation benefits early in the project development process. It is also necessary to consult with FWP on resource benefits from flow augmentation in the specific project area. In this way, discussions occur about whether a water right change of use is necessary and if so, then what is the best pathway to successfully making a change of use for the water rights. On some specific projects where there is a demonstrable benefit to in-stream flows it may not be necessary or required to go through the DNRC's change authorization process. This decision will be made on a case-by-case basis.

There have been limited opportunities for water right acquisitions in the Upper Clark Fork Basin. However, water rights acquisitions remain a viable action to increase flows in the Upper Clark Fork River and tributaries. Any potential water right acquisitions will require rigorous due diligence as discussed above. In addition, a water right valuation analysis will be performed. In order to fund a water right acquisition, the NRDP staff will draft a funding recommendation that includes the cost-benefit, cost-effectiveness and all other applicable criteria necessary to judge the merits of the

[8] Lindstrom J. 2018, personal communication, Montana Fish Wildlife and Parks.

acquisition. This recommendation will be subject to public comment, consideration by the Advisory Council and Trustee Restoration Council, and the final funding decision by the Governor.

In 2023, the State recognizes to achieve the Restoration Plans goals for flow augmentation, projects need to include more than water right acquisitions. As defined in Section 3.0, projects such as: water right purchase, lease, establishing or improving water storage, water management, or irrigation system efficiency improvements or combinations of these type of projects may be necessary.

Since various projects may have different goals, each project may require different paths to reach full project development. All projects will be ~~Specific projects that require a~~ well-defined in how flow is protected (flow rate and/or, instream flow volume, ~~in a~~ specific reach of instream flow) and documented in a Project Specific Restoration Agreement. ~~to be able to judge whether the project can reach a goal, will be required to successfully go through the DNRC's change authorization process~~ A Project Specific Restoration Agreement is an enforceable contract between the water right owner and NRDP. The agreement will outline the State's intended actions, as well as what the water right holder agrees to in exchange for the funding. This agreement is designed to clearly state the terms prior to initiating the project. This often includes the flow rate and volume of instream flow and the protectable reach of the water body and if applicable, the requirement to participate~~,~~ in the change authorization process. A fully-~~-~~executed Project Specific Restoration Project Agreement is required prior to funding. ~~will sProject Specific prior to funding. Thus, it is necessary to consult with DNRC about the water rights associated with all flow augmentation projects early in the project development process.ns In this way, discussions about whether a water change is necessary and if so, then what is the best pathway to successfully making a change of use for the water rights.Plan revisionthe State proposed , except water rights acquisitions, All projects, including projects in development will be presented to the AC and TRC in annual project updates for consideration and input by the councils. The State will report on project development as part of its normal reporting requirements as provided in Section 6.0.~~

All flow projects, except water rights acquisitions, will be implemented per Section 6.0 of these Restoration Plans.

Where secondary and demonstrable benefits to in-stream flows can also be achieved, the Aquatic Priority Area restoration actions that are provided for in Section 3.2.2 may also be funded from the Flow allocation in proportion of the instream flow benefit to the aquatic restoration benefit. Whether or not these projects go through the change authorization process will be made on a project-by-project basis after completion of the water right due diligence. In-stream flow projects that are associated with Aquatic Priority Area Specific Plans outlined in Section 3.2.2 will not require public comment, consideration by the Advisory Council and the Trust Restoration Council and final funding approval decision by the Governor.

~~In some special situations when further development is necessary, project development costs may include up to an additional $50,000 in costs for a short-term agreement with water right holders, to help gather additional information for the change authorization process and/or inform the parties about how the water lease will affect the instream flow and the water users' ability to operate without the leased water. A short-term agreement with water right holders could be a water right lease,~~

~~diversion reduction or forbearance agreement, split-season lease, minimum flow agreement, single season agreement or other flow management agreement. Short-term agreements are limited to funding of up to $50,000 per project and may not exceed two years. The cost for any such agreement will be based on the data gathered by the State for similar transactions within the State, must be at or below the fair market value for use as instream flow, and would be applied toward any later transaction. The State will report on project development costs as part of its normal reporting requirements as provided in Section 6.0.~~

In the ~~other~~ cases~~, such as~~of the Silver Lake flow augmentation project, the change process has already occurred.~~,~~[9] ~~nonetheless, further due diligence analysis is needed to move the project forward.~~ As of ~~October 2018~~2023 the State has initiated three successful flow releases from Silver Lake. Each release demonstrated a significant resource benefit to Warm Springs Creek and the Clark Fork River. The 2021 release had measurable flow benefits as far downstream as Deer Lodge on the Clark Fork River. Further discussions with Butte-Silver Bow are necessary to determine the volume of water potentially available for future flow releases, the cost of available water and permanence of this as an option for flow augmentation. This information is necessary to for NRDP to evaluate the cost-benefit, cost-effectiveness of Silver Lake as a long-term flow augmentation to the Clark Fork River. ~~, but not completed, it's due diligence review of this proposed project.~~

~~Once a project has been developed, an agreement with the water right holder on the terms of the agreement is recommended. The agreement should outline the State's intended actions and funding sought, as well as what the water right holder agrees to in exchange for the funding. This agreement is designed to clearly state the terms prior to initiating the approval and funding process. This often includes the flow rate and volume of instream flow and the protectable reach of the water body and if applicable, is defined in the change authorization process.~~

~~In order to fund a project, the NRDP staff will draft a funding recommendation that includes the cost-benefit, cost-effectiveness and all other applicable criteria necessary to judge the merits of the project. This recommendation will be subject to public comment, consideration by the Advisory Council and Trustee Restoration Council, and the final funding decision by the Governor.~~

The State will report to the public, Advisory Council and Trustee Restoration Council on all projects, including projects in development and seek input as part of its normal reporting requirements as provided in Section 6.0.

Eligible Flow Projects

Projects that may supply instream flows to the area of the Clark Fork River between Galen and Deer Lodge receive the highest priority. Group 1 projects that meet this criterion are four projects located on the Clark River: The Westside, Whalen, Helen Johnson ditch improvement project, and the Clark

[9] This change is classified as a temporary change in effect until 2026, at which time it must be reconsidered for another 10-year renewal.

Fork Meadows acquisition project, though the latter two projects will not individually be likely to provide a large amount of flow (abstracts #7, 9, 17, and 18; Appendix A). The Silver Lake flow augmentation project also meets this criterion, since it involves an existing water right for instream flow that should be protectable from Silver Lake, through Warm Springs Creek, to the Clark Fork River at Gold Creek (abstract #1).

Also of highest priority are projects that address flow from Flint Creek to Rock Creek, which is an area of concern and restoration focus based on results of the recently completed trout movement study, as explained above. These include the Lower Flint Creek flow project and the Harvey Creek project (abstracts #8 and 55). Abstract #16, which generally targets flow augmentation on the Clark Fork mainstem below Deer Lodge, may also address this area of concern, and is therefore included. If upon further investigation, a Group 1 project remains viable but is determined not to likely provide instream flow to the dewatered reach of the Clark Fork River, it will be reclassified as a Group 2 project and be evaluated with the Group 2 projects.

Second in priority are those projects that do not meet the Group 1 criterion but are in either Priority 1 areas or in Priority 2 areas that are also injured areas (e.g., the mainstem of Silver Bow Creek). Group 2 projects include those that originate in Warm Springs Creek and tributaries to Warm Springs Creek, such as Barker Creek, Storm Lakes Creek and Twin Lakes Creek, and other Priority 1 tributary areas, such as Lower Racetrack Creek, the Lower Little Blackfoot River, Silver Bow Creek, and the Clark Fork River Flow Projects below the City of Deer Lodge (abstracts #4, 11, 12, 16, and 44).

Third in priority are flow projects in Priority 2 areas that are outside injured areas. Group 3 projects that have been identified through the NRDP public scoping process are on Lost Creek, Mill Creek, Willow Creek, and Dempsey Creek (abstracts #10, 19, 20, and 66).

It should be noted that a few of the concept proposal abstracts set forth above involve multiple actions, rather than solely flow augmentation (abstracts #1, 7, 8, 9, 55, and 66). The State addresses the other aspects and benefits of these abstracts in the Priority Areas component of the Aquatic Restoration Plan (see Section 3.2.2). For some of these projects, such as Harvey Creek, it is the combination of benefits of all project components, not solely the flow component, which led to its inclusion. Abstract #69, that generally suggests increased flow on Warm Springs Creek, overlaps other proposals, such as abstracts #1 and #12, and thus was not included in the analysis.

In addition to the flow projects identified, needed programmatic flow-related activities involving the valuation of flow augmentation projects and the monitoring/oversight of funded projects (abstracts #58 and 59, respectively) will be funded. Valuation and monitoring/oversight activities are flow restoration components, as further explained in the next section on project development and implementation.

There were other programmatic flow-related concept proposals offered by the public that the State considered but did not choose to include as a component of this proposed Flow Restoration component (abstracts #6, 14, and 57). The State considered the management of an Emergency Drought Response Fund (#6) to have less likelihood of success and benefits in the long-term when compared to the selected flow projects that involve more permanent solutions. The suggested concept proposal to establish pilot flow projects as a landowner incentive (#14) and develop a 30-year flow augmentation program (#57) will essentially occur as the State pursues development and implementation of the selected flow projects, consistent with the flow project strategies outlined above.

Table 3-2 provides a summary table of all instream flow abstracts, including which ones are to be funded and which are not.

Many of the abstracts submitted by the public identified potential matching funds (abstracts #4, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 44, 55, 57, 58, 59, and 66). While matching funds are not required as part of the project development efforts, matching funds to leverage the Aquatic Priority Funds will be pursued to expand flow augmentation efforts and benefits to the maximum extent possible. Section 6.0 further explains how the State will partner and coordinate with the other entities to accomplish flow augmentation projects.

~~The 2023 flow-related abstracts are and (in conjunction with aquatic priority actions).~~

The 2018 flow-related abstracts are 98 and 100. Abstract 98, which is the Little Blackfoot River, is a Group 2 Project. Abstract 100, which is Silver Lake, is a Group 1 Project that was offered under abstract 1 in 2012. Since both project abstracts are in priority areas and included in Group 1, 2 and/or 3, these abstracts are proposed to be included in future development work for flow augmentation.

The 2023 flow-related abstracts are 117 and 118. Abstract 21 was resubmitted in 2023 and includes a flow component (in conjunction with aquatic priority actions).

FWP has not established flow targets for all the streams in Group 2 and Group 3 areas, such as Willow Creek, Dempsey Creek and Mill Creek. As a part of project development for these areas a flow target will need to be established. In addition, the flow target for Reach 2 of Racetrack Creek needs to be reevaluated since the current target of 3 cfs, is too low.[10]

When a project requires a ~~In conjunction with the~~ DNRC change of use process, which requires a flow monitoring plan, the State will plan and fund the follow-up monitoring and oversight activities that would include the same requirements as other water rights under Montana Law. Funding for implementation will also include costs necessary for instream flow oversight. These include self-administration or the use of a court-appointed water commissioner. Under the Water Use Act, a commissioner and the district court judge can utilize a temporary or preliminary decree issued by

[10] Lindstrom, J. 2018, Personal communication, Montana Fish Wildlife and Parks.

the Water Court. Water commissioners on multiple streams in the UCFRB are using these water court enforcement projects to administer water rights. The State will fund the applicable avenues specific to the acquired instream flow project to conduct monitoring and oversight for that project as is deemed necessary to accomplish flow restoration and assure benefits in the long-term consistently and efficiently.

Percentage of Aquatic Flow Funding for Instream Flow

As discussed previously, the Aquatic Prioritization Plan placed flow augmentation as the highest recommended activity in 58% of the State's priority stream areas. In 2012, flow augmentation exhibited the highest level of funding sought by the public through the publicly submitted concept proposals ($85 million total in 2012). It follows that flow augmentation should receive a substantial funding allocation to ensure that the State achieves its restoration goals for instream flow. Thus, the State is allocating 50% of the Aquatic Priority Fund, or approximately $20.5 million to the development, purchase, monitoring, and management of flow augmentation projects. This budget includes approximately $500,000 for flow monitoring and oversight activities, as further explained in Section 3.2.3 on aquatic resource monitoring.

Monitoring of projects will need to be conducted for the project life of each individual project, which is likely to occur for many years.

Table 3-1. 1986 FWP Flow Targets[11]

Relevant Reach	Priority	Flow Requested (cfs)	Flow Requested (ac-ft)
Clark Fork River Reach #1 (Galen to Deer Lodge)	1	180	130,314
Clark Fork River Reach #2 (Deer Lodge to Gold Creek)	1	400	289,587
Warm Springs Cr. Reach #1	1	50	36,198
Warm Springs Cr. Reach #2	1	40	28,959
Barker Cr.	1	12	8,688
Storm Lake Cr.	1	10	7,240
Twin Lakes Cr.	1	13	9,412
Lost Cr.	2	16	11,583
Racetrack Cr. Reach #2	1?	3	2,172
Dempsey Cr.	2	3.5	2,534
L. Blackfoot R. Reach #1	1	85	61,537
Snowshoe Cr.	2	9	6,516

[11] *Application for Reservation of water in The Upper Clark Fork River Basin*, Fish, Wildlife and Parks, November 1986.

Dog Creek	2	9	6,516
Flint Cr. Reach #1 (Georgetown to Boulder Cr.)	2	50	36,198
Flint Creek #2 (Boulder Creek to mouth)	2	45	32,578
Boulder Cr.	2	20	14,479
Harvey	2	3	2,172
Willow Creek	?	NA	NA
Dempsey Creek	?	NA	NA
Mill Creek	?	NA	NA

? Uncertain data. More information needed.

Table 3-2. Aquatic Flow Groups

AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
Group 1	1	Aquatic improvements to the Silver Lake Water System: BSB proposes numerous activities to repair the Silver Lake water system in exchange for instream flow augmentation in Warm Springs Creek via releases of stored water.	Warm Springs Creek	1
	7	Clark Fork Meadows Ranch Land and Water conservation easement or purchase.	CFR Mainstem, south of Deer Lodge	1, INJ
	8	Flint Creek aquatic habitat conservation (upper and lower). Proposes to seek opportunities to work with landowners to implement aquatic restoration projects – flow augmentation, and other restoration activities.	Flint Creek drainage	2
	9	Helen Johnson Ditch flow enhancement project. Improve Dry Cottonwood Ranch irrigation system to provide up to 5 cfs of instream flow to the CFR.	CFR Mainstem, south of Deer Lodge	1, INJ
	13	Pauley Ranch Flow Enhancement. Acquire 9 cfs of irrigation water rights for instream flow in Warm Springs Creek and Lost Creek.	Warm Springs and Lost Creeks	1
	15	Racetrack Water Users Assoc. Irrigation Efficiency and Energy Conservation Project – Phases 1, 2, 3. A series of irrigation pipeline improvement projects that would benefit agriculture and provide instream flow to Racetrack Creek, improve fish passage, and eliminate fish entrainment.	Racetrack Creek	1
	17	West Side and Whalen Ditch Water Conservation Project. Consolidate the West Side and Whalen ditches into a single ditch to conserve water and provide 20 cfs to the CFR.	CFR Mainstem above Deer Lodge	1, INJ
	18	CFR Flow Enhance Project (above Deer Lodge). Identify, develop, and implement projects with private landowners that enhance flows in the CFR above Deer Lodge.	CFR Mainstem above Deer Lodge	1, INJ
	55	Harvey Creek Integrated Restoration. Proposal to work on private and state land to complete water rights acquisition for instream flow, and other restoration activities.	Harvey Creek	2

AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
Group 2	4	Silver Bow Creek Stream flow augmentation investigation and acquisition: determine need, survey existing rights, identify waters, and purchase rights.	SBC	2, INJ
	11	Lower Racetrack Creek Flow Enhancement. Identify, develop, and implement projects with private landowners that enhance flows in Racetrack Creek.	Lower Racetrack Creek	1
	12	Warm Springs Creek Flow Enhancement. Identify, develop, and implement projects with private landowners that enhance flows in Warm Springs Creek.	Warm Springs Creek	1
	16	CFR Flow Enhancement (below Deer Lodge). Identify, develop, and implement projects with private landowners that enhance flows in the CFR below Deer Lodge.	CFR Mainstem below Deer Lodge	2, INJ
	44	Little Blackfoot Streamflow Restoration. Project would identify reaches of Little Blackfoot River and its major tributaries to develop minimum flow targets to improve water quality and fish habitat, survey existing water rights to identify potential partners, prioritize available water rights to achieve flow targets, build funding portfolio and implement water leases or acquisitions, and design and implement water monitoring program.	Little Blackfoot River	1
Group 3	10	Lost Creek Flow Enhancement. Identify, develop, and implement projects with private landowners that enhance flows in lower Lost Creek.	Lost Creek	2
	19	Willow Creek Flow Enhancement. Identify, develop, and implement projects with private landowners that enhance flows in Willow Creek near Opportunity.	Willow Creek near Opportunity	2

AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
	20	Dempsey Creek Flow Enhancement. Identify, develop, and implement projects with private landowners that enhance flows in Dempsey Creek.	Dempsey Creek	2
	66	Mill Creek Fish Passage and Flow Restoration Project. Development of project to install 3 fish screens, improve diversion structures and install flow measurement equipment and attempt to develop in-stream flow water rights.	Mill Creek near Opportunity	2

AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
Programmatic Flow Proposals Indirectly Included in Restoration Plan	58	Flow Augmentation Basin-Wide Programmatic Monitoring Program Proposal. Proposal would develop monitoring plan and training for water commissioners to ensure purchased water was making it to and staying instream.	UCFRB	1 2 INJ
	59	Water Rights Transaction Pricing and Valuation Framework Proposal. Proposal for establishing a framework and value for acquisition of water rights both general guidelines for water right values in the UCFRB and specific values for projects.	UCFRB	1 2 INJ
Abstracts Not Included in Restoration Plan	6	Emergency Drought Response Fund for CFR. Develop, design and implement drought fund to ensure CFR flows are maintained for fish during drought years.	CFR Mainstem	1 2, INJ
	14	Pilot Flow Project. Work with private landowners to establish pilot study flow restoration projects to teach landowners the benefits of flow restoration.	CFR	1 2 INJ

AQUATIC FLOW GROUPS				
Group	**Abstract No.**	**Concept Proposals**	**Location**	**Priority Stream**
	57	Flow Augmentation Basin-Wide Program Proposal. Proposal to develop a flow augmentation program for the UCFRB funded for 30-years to advise NRDP on water right purchases.	UCFRB	1 2 INJ
	69	Numerous ideas that ADLC further categorized as three types of projects: Overlaps with abstract #1, it was not included in further evaluation.	Anaconda	2, INJ

3.2.2 Aquatic Priority Area Specific Plans

The following sections provide specific actions that are proposed for each of these fourteen watershed priority areas developed under the State's preferred alternative. They include Silver Bow Creek and the Clark Fork River mainstems and twelve priority tributary watershed areas comprised of Priority 1 and 2 stream areas.

3.2.2.1 Other Proposed Actions for the Silver Bow Creek and Clark Fork River Mainstems

The State's proposed restoration actions for the mainstems include flow augmentation of both mainstems (Section 3.2.1), riparian protection/enhancement of some areas along the Clark Fork River mainstem, a fish barrier on the Silver Bow Creek mainstem, evaluating and as warranted, implementing actions to address low trout populations between Flint Creek and Rock Creek.

In 2018, the State proposes restoration actions to enhance fish passage on the Clark Fork River mainstem upstream of Deer Lodge, as proposed in concept proposal abstract #83 (Appendix A). The modification of diversions on the mainstem of the Clark Fork River will improve fish passage and recreational activities within this reach will be considered on a case-by-case basis. In 2023, the State proposes to allocate $750,000 from Aquatic interest to modify mainstem diversions to improve fish passage and recreational activities.

~~The State does not propose any other restoration actions on the mainstems associated with the substantial restoration work already completed or to be completed pursuant to the integrated remediation and restoration plans involving already dedicated site-specific settlement funds.~~

Riparian Habitat Protection/Enhancement

The State proposes to protect riparian habitat and upland habitat through easement and land acquisitions on the Clark Fork River mainstem and ecological enhancements at the Milltown restoration site. Proposed easements and acquisitions are addressed in the terrestrial resource restoration plan, due to their dominant terrestrial benefits. Concept proposals offered by the public or generated by the State that were specific to easements or acquisitions along the Clark Fork River mainstem (abstracts #7, 48, 52, and G6; Appendix A) have been incorporated into proposed restoration actions specified in Section 4.2.4 of this Restoration Plan. The potential easement/acquisition areas cover approximately 13,000 acres along the Clark Fork River mainstem. Two projects are located south of Deer Lodge, (abstracts #7 and #52) and one project is near Rock Creek (abstract #48). The State's concept proposal (abstract #G6) generally provides for potential easement/fee-title acquisition along the Clark Fork mainstem between Deer Lodge and Milltown, inclusive of the Milltown restoration site.

To ensure restoration success at the Milltown restoration site, the State proposes $400,000 be allocated for monitoring and maintenance (abstract #G5) of the restoration actions as specified in

the *2005 Milltown Restoration Plan Monitoring and Maintenance Plan*. This will provide for completion of the fifteen years of monitoring proposed (years 3, 5, 10, and 15), as well as provide for maintenance actions as determined necessary for this project to achieve the goals and objectives set forth in the *2005 Milltown Restoration Plan*.

The budget for these habitat protection and enhancement efforts on the Clark Fork River mainstem, inclusive of the Milltown restoration site, totals $6.9 million with funding to be split between aquatic and terrestrial priority accounts as specified in Table 6-1.

In 2012, the State did not propose any additional riparian protection/enhancement along the Silver Bow Creek mainstem because the integrated remediation and restoration work being conducted under the Streamside Tailings Operable Unit (remediation) and Silver Bow Creek Greenway project (restoration) would accomplish the needed riparian protection and enhancement efforts judged to be cost-effective. In 2023, with remediation mostly completed and the Greenway Service District focusing its resources on the Greenway trail system, the State allocates the first $500,000 from the reimbursement funds from Parrot Tailings project to Silver Bow Creek to develop and implement aquatic, and riparian protection/enhancement along the Silver Bow Creek. Opportunities to enhance aquatic and riparian resources will be identified and implemented by FWP and NRDP as a priority for improving aquatic and riparian habitat in Silver Bow Creek.

Fish Passage

In the *Aquatic Prioritization Plan*, the State recommended investigating the feasibility of having a fish barrier that would allow the re-establishment of a native trout fishery in Silver Bow Creek.[12] A 2011 potential fish barrier site evaluation indicated several possible appropriate locations of such a barrier on Silver Bow Creek just downstream of its confluence with German Gulch, with an estimated cost of $250,000. The State proposes that this amount be allocated to construction of this fish barrier (abstract G1).

Mainstem Clark Fork River (Flint Creek to Rock Creek) Fish Population Evaluation and Follow-up Actions

An evaluation of the Clark Fork River between Flint Creek and Rock Creek will be performed to determine the reason(s) for the low trout densities in this reach (abstract G4). Habitat protection/enhancement, fish passage, fish entrainment, and/or in-stream habitat actions will be implemented as warranted from the results of this study. $1.5 million was provided for these Clark Fork River mainstem actions.

[12] As a part of the 2005 NRDP-funded German Gulch Restoration Project, a fish barrier was to be constructed in German Gulch by the George Grant Chapter of Trout Unlimited. Since that time and, in large part due to the success of Silver Bow Creek remediation and restoration actions, FWP has determined that a more desirable barrier location would be on Silver Bow Creek.

In 2018, the State allocated an additional $500,000 to this action to facilitate implementation of pilot projects proposed because of the evaluations started in 2012.

-Studies conducted pursuant to this section have identified extensive algal blooms due to elevated nutrient concentrations as potential factors contributing to the low trout densities,- and found that the Lost Creek/Dutchman Complex is a significant source of nutrients to the Clark Fork River. In March 2022, the Lost Creek/Dutchman Complex Master Plan was finalized, which identifies potential projects and treatments within the Lost Creek/Dutchman Complex that can be implemented to address some of the larger sources of nutrients. In addition, the Master Plan provides guidance on selecting projects to pursue. Funding for the Clark Fork River between Flint Creek and Rock Creek is being used to implement projects in the Master Plan.

Concept Proposals

Some concept proposals offered by the public are not included in the State's proposed restoration actions for the mainstem (abstracts #38, 40, 71, and 77; Appendix A). The State does not propose funding upgrades of the Deer Lodge Wastewater Treatment Plant (abstract #38) and the Drummond sewage lagoon (abstract #77) because these upgrades are a normal government function. In addition, water from these wastewater treatment systems returns to the Clark Fork River mainstem, either through direct discharge or groundwater returns, thus the cost: benefit relationship of the upgrades in terms of restoration of aquatic resources is low since flow quantity is a higher priority than nutrient reduction for the mainstem. While the Deer Lodge wastewater treatment upgrade would reduce treatment inflows, it would not augment flows to the Clark Fork River, and other aquatic benefits are low compared to costs. The State does not propose funding any stormwater management activities in Butte (abstract #71) and Rocker (abstract #40) because such activities are a normal government function. For Butte, any needed stormwater management is either normal government function, or should be part of the approved remedial actions for Butte Priority Soils Operable Unit.

3.2.2.2 Summary of Proposed Actions and Funding in Priority Tributary Watersheds

The State's proposed actions to restore the fishery of the Clark Fork River and Silver Bow Creek mainstems, beyond the already approved restoration actions to be implemented with remediation along the mainstems and the additional proposed actions identified in the previous section, is to work on the limiting factors of the Priority 1 and 2 tributary streams areas as, following tributary re-evaluation of priority streams in 2018, fifteen watershed projects. The fifteen tributary watersheds all have factors that limit their ability to provide more fish to the mainstems or provide more angling opportunities. The State has identified riparian habitat, fish passage, fish entrainment, in-stream habitat, and flow as the resource areas that will be targeted within the UCFRB watersheds that contain Priority 1 and 2 tributary stream areas. The fifteen watersheds where these restoration actions will be implemented are listed below and shown on Figure 3-1:

1. Blacktail Creek near Butte
2. Browns Gulch, north of Rocker

3. Cottonwood Creek (includes Baggs Creek) east of Deer Lodge
4. Dempsey Creek southwest of Deer Lodge (Re-classified to Priority 3 in 2018, no longer eligible for funding)
5. Flint Creek (includes Boulder Creek), south of Drummond and near Philipsburg.
6. German Gulch (includes Beef straight Creek), west of Ramsey.
7. Harvey Creek south of the Clark Fork River east of Clinton
8. Little Blackfoot River (includes Spotted Dog, Snowshoe, Trout and Dog creeks), east of Garrison.
9. Lost Creek, west of the Clark Fork River south of Deer Lodge
10. Mill/Willow Creeks, east of Anaconda
11. Racetrack Creek, near Warm Springs
12. Warm Springs Creek (includes Barker, Twin Lakes, Storm Lake, and Foster creeks), east and west of Anaconda.
    Watersheds added in 2018:
13. Basin Creek (Upper) south of Butte
14. Gold Creek – Lower, south of the Clark Fork west of Garrison
15. O'Neil Creek, North of Deer Lodge
16. Rock Creek, East of Missoula

Prior to working on any of the watersheds, evaluations of each of the watersheds' targeted resources are needed to prioritize and implement restoration actions in the most cost-effective method. The following is a brief description list of the five (5) general proposed actions for the fifteen tributary watersheds collectively. Also included below are the budgets for the project development tasks entailing further resource evaluations, engineering and design, and project management.

The State is allocating 50% of the Aquatic Priority Fund, or approximately $20.4 million to the development and implementation of restoration actions on the Clark Fork River and Silver Bow Creek mainstems and the twelve watersheds that include the Priority 1 and 2 streams (listed above). The cost to plan and implement the Aquatic Priority Specific Plans watershed actions is approximately $13.1 million. The State is allocating $2.8 million for contingency for the Aquatic Priority Specific Plans watershed actions because of the conceptual nature of these actions as well as the uncertainties associated with these types of actions. This budget also includes $1.5 million for monitoring and maintenance of these actions, as further explained in Section 3.23 on aquatic resource monitoring.

As of 2018, the State also has the ability to work on tributaries, such as spring creek tributaries, with connection to Priority 1 and 2 tributaries to improve connectivity and habitat if the resource managers agree these are priority actions.

The following Table 3-3 provides an evaluation and implementation schedule for the 17 aquatic priority watershed areas. The State will evaluate and implement priority actions in all the priority watersheds starting in 2019.

Table 3-3. Evaluation/Implementation Schedule for Priority Watershed Areas

Watershed	Evaluation Schedule	Implementation Schedule
Blacktail Creek	2013	2014
Browns Gulch	2013	2014
Cottonwood Creek	2019	2019
Dempsey Creek*	NA	NA
Flint Creek	2013	2015
German Gulch	2013	2013
Harvey Creek	2013	2013
Little Blackfoot River	2013	2015
Lost Creek	NA	NA
Mill/Willow Creek	2019	2019
Racetrack Creek	2019	2019
Warm Springs Creek	2013	2014
Silver Bow Creek	2013	2014
CFR Study/Implementation	2013	2015
2018 New Watersheds		
Basin Creek (above reservoir)	2019	2019
Gold Creek	2019	2019
O'Neil Creek	2019	2019
Rock Creek	2019	2019

*Dempsey Creek no longer meets criteria for funding with a priority change from 2 to 3 in 2018.

Riparian Habitat Protection/Enhancement: Actions to enhance or protect the riparian habitat in all ~~fifteen~~ seventeen watersheds are proposed. Actions taken within each of the fifteen watersheds will vary; however, actions could include: installing riparian fencing, revegetation, developing off-stream water sources, developing grazing management strategies, and establishing long-term management agreements and/or permanent conservation easements to protect the investments in the riparian habitats for these areas. The total estimated cost for riparian habitat enhancement/protection within these watersheds is approximately $3.5 million.

Fish Passage Improvement: Fish passage improvements in all ~~fifteen~~ seventeen watersheds are proposed based on ongoing monitoring and evaluation of tributaries within the UCFRB. Fish passage will address movement of fish upstream and downstream at, but not limited to, irrigation diversions, culverts, and bridges. The total estimated cost for fish passage projects within these watersheds is approximately $5.5 million.

Fish Entrainment Reduction: Fish entrainment projects in all ~~fifteen~~ seventeen watersheds are proposed. Fish entrainment will address the loss of fish down irrigation intakes by various methods, which may include installing fish screen or alternative irrigation source water endeavors such as installing a well. The total estimated cost for fish entrainment within these watersheds is approximately $7.3 million.

In-stream Habitat Improvement: In-stream habitat improvements within eight of the fifteen watersheds are proposed. In-stream habitat improvements include, but are not limited to, streambank construction, channel construction, and /or channel function projects. The estimated cost for these various projects within the eight of the twelve watersheds is $851,530.

Flow Quantities Improvements: Flow is listed as a limiting factor in all ~~fifteen~~ seventeen of the watersheds. Flow is addressed within Section 3.2.1 of this Restoration Plan.

Watershed Evaluations: In 2023, the Warm Springs Creek watershed will be evaluated to determine the remaining priority projects. In 2018, the four watersheds added as part of the 2018 Tributary Prioritization Plan need to be evaluated prior to implementation of the above work actions in order for the work to be worth the investment. The estimated cost for these various projects within the four watersheds is $609,796.

Engineering and Design and Project Management Costs: In 2018 engineering, design, and project management costs were included in the costs for the restoration actions within each watershed. Splitting these costs separately, as presented in 2012, resulted in inaccurate cost accounting since the cost of engineering, design, and project management has been found to be specific to each action being implemented.

Following are more detailed descriptions of the proposed actions and restoration budgets for each of the twelve priority tributary watersheds. These sections also address the concept proposals generated by the public or by the State that are relevant to a particular watershed.

3.2.2.3 Blacktail Creek Watershed

Blacktail Creek is a Priority 2 headwaters tributary to Silver Bow Creek that originates in the Highland Mountains south of Butte, Montana. The Blacktail Creek watershed has westslope cutthroat trout in headwaters reaches upstream of Thompson Park, and brook trout in downstream reaches near Butte. Genetic sampling indicates a 100% pure westslope cutthroat trout population. The *2012 Process Plan* lists the following encouraged restoration activities (listed in the *2012 Process Plan* in the order of priority based on the best available information at the time) for Blacktail Creek that, when implemented, will improve the fishery of Blacktail Creek as well as the mainstem of Silver Bow Creek.

In 2018, the *Restoration Plans* re-prioritized the proposed restoration actions based on new data and information NRDP and other stakeholders gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage-scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Blacktail Creek

1. Fish Passage: Fish passage improvement at select irrigation diversions and culverts (e.g., diversion or crossing redesign or retrofit to allow for fish passage); throughout drainage.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; throughout drainage.

3. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily downstream of Nine Mile, with greater preference given to projects where flows are protectable to or beyond the mouth.

4. Riparian Habitat: Riparian habitat improvement (e.g., riparian fencing, woody shrub and tree plantings); primarily on private lands downstream of Nine Mile.

5. Instream Habitat: Channel reconstruction in select, localized areas where projects would benefit stream function; originally identified at locations where channel has been diverted into a ditch; however, Blacktail Creek has returned to the valley bottom, and this is no longer a priority at this location. At present, the primary area identified for channel restoration is through the Butte Country Club. These areas were identified and described in the 2009 Restoration Study of Blacktail Creek prepared by Pioneer Technical Services, Inc. for the Mile High Conservation District and City-County of Butte-Silver Bow. A conceptual design for the Butte Country Club has been completed.

Proposed Actions

Actions specific to Blacktail Creek are set forth below, summarized in Table 3-4, and shown in Figure 3-2.

1. Fish Passage: Inventory and assessment of irrigation diversions and road culverts for upstream and downstream fish passage along Blacktail Creek was completed in 2013. In 2018 the State is removing one identified fish barrier and installing a fish friendly irrigation diversion. Evaluations of other fish passage barriers identified in Blacktail Creek are ongoing.

2. Fish Entrainment: Inventory and assessment of irrigation diversions for fish entrainment along Blacktail Creek was completed in 2013. A single irrigation diversion, being addressed for fish passage issues, was identified as a risk for entrainment of fish in Blacktail Creek. The diversion has been designed to incorporate a fish screen to eliminate fish entrainment in the irrigation ditch. Evaluations are ongoing for other fish entrainment structures identified in Blacktail Creek.

3. Water Quantity: Further evaluation is necessary, and this process is addressed in Section 3.2.1.

4. Riparian Habitat Protection and Enhancement Implementation: An assessment of riparian and stream habitat in Blacktail Creek was completed in 2013. Priority areas for riparian protection and enhancement were identified. Project develop is ongoing.

5. Instream Habitat Improvement: Channel reconstruction may be implemented after the implementation and evaluation of the success of other Blacktail Creek actions are complete and if reconstruction activities are warranted. Channel reconstruction areas were documented in a 2009 Restoration Study of Blacktail Creek,[13] including: creation of approximately 1 mile of new, naturalized channel through the golf course.

These actions along Blacktail Creek will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concepts proposed through the public scoping process. The concept proposals submitted by the public for the Blacktail Creek drainage are set forth in abstracts #28, 39b, and 76 (Appendix A). Overlap amongst concept proposals were merged (fencing, in-stream construction). The proposed actions for this watershed generally cover the concepts in the abstracts. These concepts adequately focus on the factors within Blacktail Creek that limit restoration of the Silver Bow Creek mainstem without a need of additional State-generated alternatives.

No new concept proposals were received in 2018 or 2023.

Costs

The costs to implement the Blacktail Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $1,157,245 (increased by $200,000 in 2018) is preliminarily estimated to implement the proposed actions in the Blacktail Creek.

Implementation Schedule

2018:

- Replace an existing irrigation diversion with a new passable diversion and fish screen to eliminate entrainment.

2019:

[13] Pioneer Technical Services, 2009, "Restoration Study of Blacktail Creek: Summary Report," for Mile High Conservation District, Butte, MT.

- ~~Remove the Butte Silver Bow sanitary sewer line causing a fish passage barrier.~~
- Evaluate remaining restoration dollars allocated to Blacktail Creek.
- Identify and plan additional projects that meet the encouraged actions for Blacktail Creek.

2024:

- Remove the Butte Silver Bow sanitary sewer line causing a fish passage barrier
- Replace irrigation diversion with passable diversion and fish screen at the Butte Country Club irrigation pond.

Table 3-4. Relationship of restoration plan components to limiting factors and encouraged activities for Blacktail Creek

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Riparian Habitat	Riparian habitat improvement (e.g., riparian fencing, woody shrub, and tree plantings) primarily on private lands downstream of Nine Mile.	Identify locations for TBD riparian protection and/or enhancement projects. Implement riparian protection and enhancement projects.	Habitat management (Fencing, grazing management, off-stream water development) followed by active revegetation where needed after evaluating effects of passive management.	Evaluation of specific types and location of riparian protection and enhancement. Completion of designs.	$150,000
Fish Passage	Fish passage improvement at select irrigation diversions and culverts (e.g., diversion or crossing redesign or retrofit to allow for fish passage); throughout drainage.	Implement 1 diversion replacement or retrofit and ~4 culverts for fish passage issues.	Replace or retrofit existing diversions, road crossings, and other water control structures to ensure fish passage.	Evaluate existing irrigation diversions, water control structures, and culverts for fish passage. Completion of designs.	$619,495
Instream Habitat	Channel reconstruction in select areas with stream function issues.	Identify and implement channel reconstruction on TBD feet of stream channel.	Stream reconstruction.	Evaluate whether stream reconstruction is warranted. Complete channel and floodplain designs.	$350,000

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each component.	$37,750
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analyses of flow as set forth in Section 3.2.1.	N/A
				Total	**$1,157,245**

TBD: To Be Determined as part of the project work plan development.

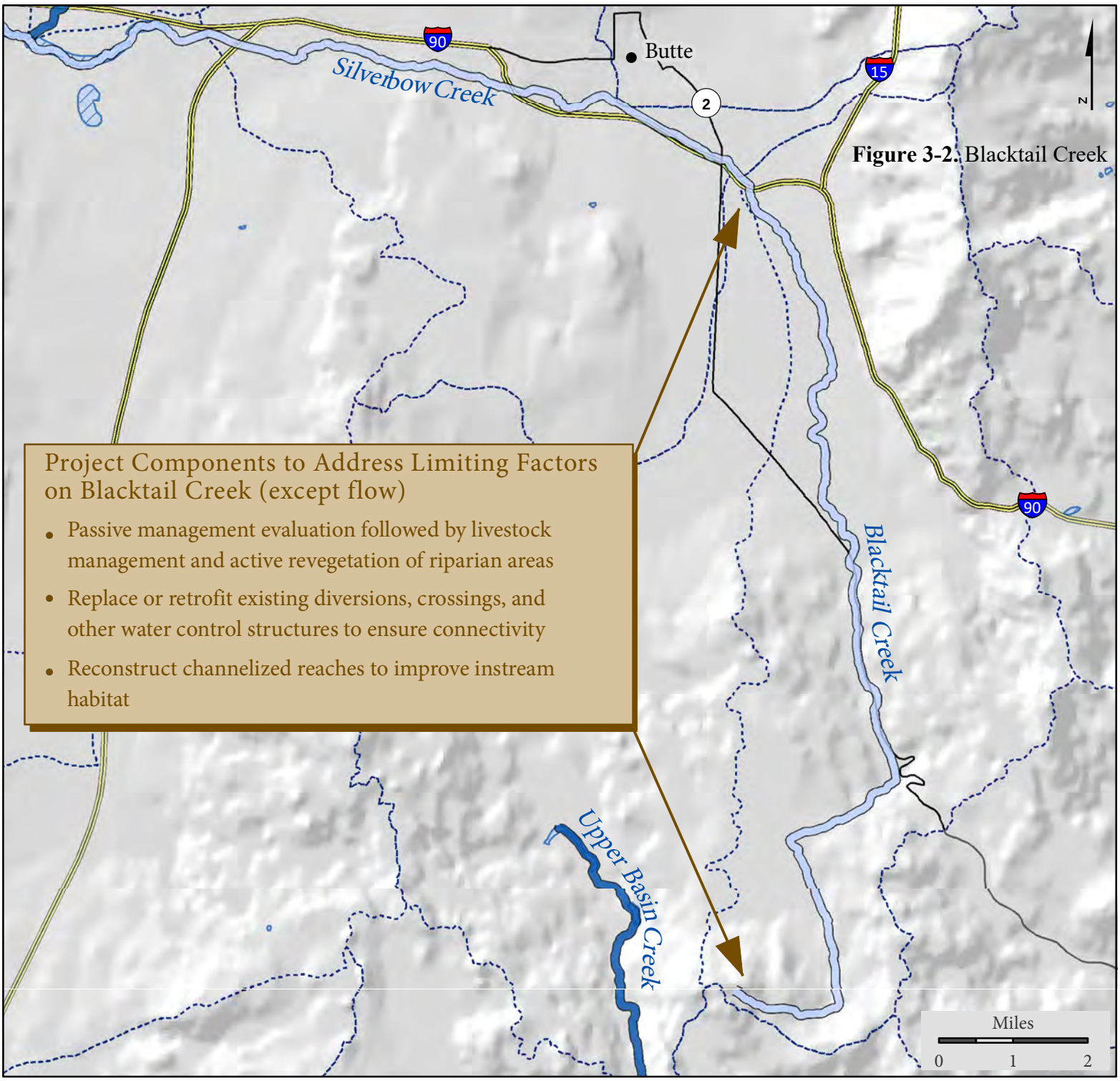
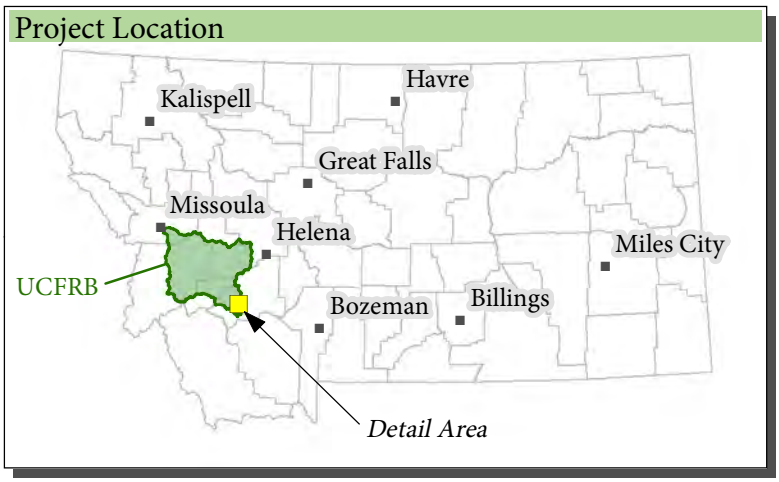


Figure 3-2. Blacktail Creek



NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.4 Browns Gulch Watershed

Browns Gulch is a Priority 1 tributary to Silver Bow Creek. The Browns Gulch watershed has its headwaters in the Boulder Mountains on the Continental Divide north of Butte, Montana, and drains approximately 85 square miles (54,380 acres) down its 19-mile length to its confluence with Silver Bow Creek near Ramsay. Browns Gulch is chronically dewatered and suffers from sedimentation and habitat loss. Several tributaries to Browns Gulch are known to host populations of genetically pure westslope cutthroat trout, and adult cutthroat tagged in Silver Bow Creek have been observed in Browns Gulch.[14] The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Browns Gulch that, when implemented, will improve the fishery of Browns Gulch as well as the mainstem of Silver Bow Creek.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Browns Gulch

1. Flow Augmentation: Water right purchases, water leases, irrigation efficiency improvements; etc., particularly in lower reaches closer to mouth.

2. Fish Passage Improvement: at select irrigation diversions. Diversion redesign or retrofit to allow for fish passage throughout drainage.

3. Fish Entrainment: To reduce fish entrainment into irrigation ditches; throughout drainage.

4. Riparian Habitat Protection/Enhancement: Riparian fencing, woody shrub plantings; etc., primarily on private lands in lower 14 miles – especially in areas completely devoid of woody vegetation.

5. Sediment Reduction/Bank Stabilization: At select, localized areas where project would benefit stream function; throughout drainage.

Proposed Actions

Actions specific to Browns Gulch are set forth below, summarized in Table 3-5, and shown in Figure 3-3.

[14] MT NRDP. 2005. Silver Bow Creek Watershed Plan. Montana Natural Resource Damage Program and Confluence Consulting Inc. Bozeman, MT.

1. Water Quantity: Flow needs for Browns Gulch, particularly, the lower reaches, will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

2. Fish Passage: Nine of the 14 Browns Gulch diversions impair fish passage.[15] However, Browns Gulch contains genetically pure stocks of westslope cutthroat trout that are currently isolated from Silver Bow Creek. As Silver Bow Creek contains aggressive non-native trout species that readily hybridize with or out-compete the westslope cutthroat, the broader implications of reestablishing stream connectivity here will first be evaluated. Where appropriate, diversions will be designed and reconstructed to reestablish connectivity.

3. Fish Entrainment: All Browns Gulch diversions have a potential for fish entrainment. An entrainment evaluation for the other diversions will be performed. Screens for the other diversions will be designed and implemented if warranted.

4. Riparian Habitat Protection and Enhancement Implementation: Riparian and in-stream habitat were assessed in 2013 and 2014 to determine the specific types and location of the following actions: installing riparian fencing, developing off-stream water sources, and developing grazing management strategies.

5. Channel Reconstruction/Bank Stabilization: Channel reconstruction will be implemented only after implementation of other Browns Gulch actions, and subsequent evaluation concludes reconstruction activity is warranted. Two sites on lower Browns Gulch and four sites on upper Browns Gulch exhibit severe channel instability and habitat degradation issues, resulting in a loss of channel form and function and heavy loads of fine sediment deposited in the stream channel and flushed downstream into Silver Bow Creek. In addition, long term agreements for site access to permit maintenance of the project will be implemented.

The actions along Browns Gulch will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concepts proposed through the public scoping process. The concept proposals submitted by the public for the Browns Gulch drainage are set forth in abstracts #26, 27, 42 and 65 (Appendix A). The proposed actions for this watershed generally cover the concepts in the abstracts. These concepts adequately focus on the factors within Browns Gulch that limit restoration in the UCFRB, without a need for reliance on additional State-generated alternatives.

[15] WRC-TU. 2012. Upper Clark Fork diversion inventory. Watershed Restoration Coalition (WRC) and Trout Unlimited. Deer Lodge, MT.

No new concept proposals were received in 2018.

In 2023, seven (7) new concept proposals were received (#107, 108, 109, 110, 111, 112, 113). A movement study by FWP is being completed in 2023 to determine if fish from the mainstem Silver Bow Creek use and are able to enter Browns Gulch. Funding will not be allocated to these projects in 2023 until results of the FWP study show recruitment benefits.~~.~~

Costs

The costs to implement the Browns Gulch actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $~~923,403~~1,123,403 (increased by $150,000 in 2018 and $200,000 in 2023) is preliminarily estimated to implement the proposed actions in Browns Gulch. In 2023, the State proposes 10% of the reimbursement funds from Parrot Tailings project, after the first $500,000 goes to Silver Bow Creek, go to Brown's Gulch, not to exceed $200,000.

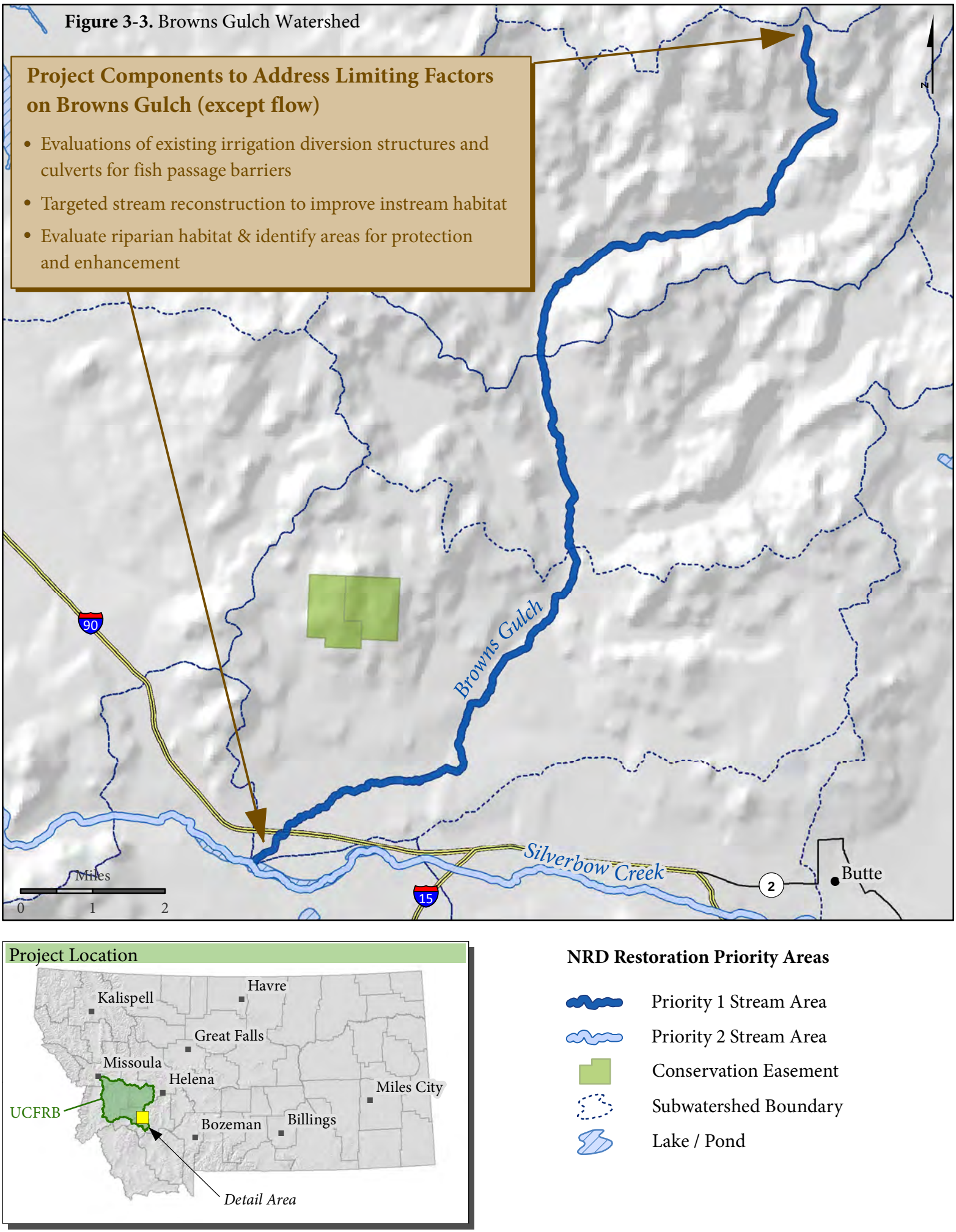
Table 3-5. Relationship of restoration plan components and limiting factors and encouraged activities for Browns Gulch

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1, and irrigation infrastructure improvements.	Further analysis of flows as set forth in Section 3.2.1.	NA
Fish Passage	Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage) with passage issues.	Implement identified diversion replacements or retrofits and 2 culverts for fish passage issues.	Implementation of existing irrigation diversion structures and culverts for fish passage barriers.	Completion of design.	$~~380,452~~430,452
Instream Habitat	Channel stabilization/reconstruction in select reaches with severe instability.	Implement ~1100 feet of channel restoration needed in Lower Browns Gulch.	Stream reconstruction.	None – to be implemented in 2018	$~~200,000~~250,000
Riparian Habitat	Riparian habitat improvement (e.g., riparian fencing, woody shrub plantings) primarily on private lands in lower 14 miles – especially in areas completely devoid of woody vegetation.	Implement riparian protection and/or enhancement projects at identified locations.	Riparian protection and enhancement.	Evaluation of specific types and location of riparian protection and enhancement. Completion of designs.	$71,000

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Fish Entrainment	Ditch fish screening to reduce fish entrainment into irrigation ditches.	Implement fish screen projects in the Browns Gulch watershed.	Evaluations and installation of fish screens on diversions where necessary, coincident with fish passage improvement projects.	Evaluation of diversions with potential for fish entrainment. Completion of designs.	$~~241~~341,451
Data Gaps and Feasibility Questions	Develop overall project work plan.	Complete integrated project work plans for each component.	Fill data gaps and answer feasibility questions.	Described above for each component.	$30,500
				Total	$1,123,403~~923,403~~

TBD: To Be Determined as part of the project work plan development.

Figure 3-3. Browns Gulch Watershed



NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.5 Cottonwood Creek Watershed

Cottonwood Creek is a Priority 2 tributary to the Clark Fork River that drains east of I-90 for over nine miles before reaching the Clark Fork River near Deer Lodge. Baggs Creek is a Priority 2 tributary to Cottonwood Creek. Cottonwood Creek is over nine miles long and the fishery is comprised entirely of brown trout. Baggs Creek flows for approximately 8.0 miles before entering Cottonwood Creek and the fishery is comprised of brook trout and westslope cutthroat trout. A natural waterfall creates a fish barrier isolating westslope cutthroat upstream at stream mile 5.3. The *2012 Process Plan* provides the following guidance on encouraged activities (listed in order of priority) for Cottonwood and Baggs Creek that, when implemented, will improve the fishery of these tributaries as well as the mainstem of the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Baggs Creek

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); in lower extent of drainage.

2. Fish Passage: Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage); throughout drainage with special focus on the Cottonwood Creek diversion that crosses the stream near the mouth.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; in lower extent of drainage.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing); on private grazing lands and Forest Service allotment.

5. Instream Habitat: Sediment reduction/bank stabilization in select, localized areas where projects would benefit stream function; mostly on private lands in lower extent of drainage.

Cottonwood Creek – Lower and Upper

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

2. Fish Passage: Fish passage improvement at select irrigation diversions and culverts (e.g., diversion or crossing redesign or retrofit to allow for fish passage); throughout reach.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; throughout reach.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing); mostly on private lands above Interstate 90.

5. Instream Habitat: Channel reconstruction in select, localized areas where projects would benefit stream function; mostly on private lands upstream of Interstate 90.

Proposed Restoration Actions

Actions specific to Cottonwood Creek and Baggs Creek are set forth below, summarized in Table 3-6, and shown in Figure 3-4.

1. Water Quantity: Past projects have addressed flow in the Cottonwood Creek watershed. Further flow needs will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

2. Fish Passage: Eleven diversions along Cottonwood Creek and Baggs Creek were evaluated in 2010 and 2011 by Trout Unlimited[16] to determine whether improvements to specific diversion structures would improve fish passage. All diversions and culverts will first be evaluated, then where appropriate diversions will be redesigned and reconstructed to reestablish fish passage.

3. Fish Entrainment: All irrigation diversions that limit fish passage on Cottonwood Creek and Baggs Creek may also pose a risk of fish entrainment. An entrainment evaluation for each diversion will be performed. Screens for diversions will be designed and implemented if warranted.

4. Riparian Habitat Protection/Enhancement Implementation: Further data collection and other information gathering will first be performed to determine the specific types and locations of the following actions: fencing, grazing management, and off stream water. Revegetation will also be performed upon evaluation of the success of other actions.

5. Instream Habitat: Channel reconstruction will be considered only after the other actions have been implemented and subsequent evaluation of those actions concludes such reconstruction activity is warranted. A section of Cottonwood Creek that is straightened for approximate ½

[16] Trout Unlimited, 2012. Upper Clark Fork Diversion Inventory.

mile long just east of Deer Lodge may be reconstructed with appropriate channel dimensions and planform geometry.

These actions along and near Cottonwood Creek and Baggs Creek, when implemented as an integrated project, and after complete evaluation of the drainage area, will have high net benefits in terms of accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and will be technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concept proposed through the public scoping process. The concept proposals submitted by the public for the Cottonwood Creek drainage are set forth in abstracts #21, 22, 23, 24, 45, 46, 60, 82 (Appendix A). The proposed actions for this watershed generally cover the concepts in six abstracts. These concepts adequately focus on the factors within Cottonwood Creek and Baggs Creek that limit restoration in the Clark Fork River mainstem, without a need for reliance on additional State-generated alternatives.

The State does not propose restoration actions specific to the reach of Cottonwood Creek in the Deer Lodge urban area as proposed in abstracts #45 and 46 because such work serves more for flood control planning and mitigation purposes, rather than restoration purposes, with minimal aquatic benefits, and involves actions considered to be a normal government responsibility.

In 2018, one abstract (#82) proposed restoration specific to the reach of Cottonwood Creek in the Deer Lodge urban area similar to the actions proposed in 2012, but with more restoration purposes associated with instream habitat and riparian enhancement. Those aspects of the abstract involving restoration and not involving flood control and mitigation purposes are proposed to be implemented.

In 2023, two abstracts proposed four (4) restoration projects (#82, 22, 21, and 106) in Cottonwood Creek and Baggs Creek. These projects will be completed on a priority basis addressing the limiting factors within this watershed.

Costs

The costs to implement the Cottonwood Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of about $1.7 million is preliminarily estimated to implement the proposed actions in the Cottonwood Creek watershed. In 2023, an additional $500,000 from the Aquatic fund is

allocated to the Cottonwood Creek watershed to fund priority projects, for a total allocation of $2.2 million.

Implementation Schedule

Beginning in 2019:

- Implement fish passage and entrainment reduction projects previously identified and established by project partners using outside funding.
- Identify and plan additional projects that meet the encouraged actions for Cottonwood and Baggs Creek.

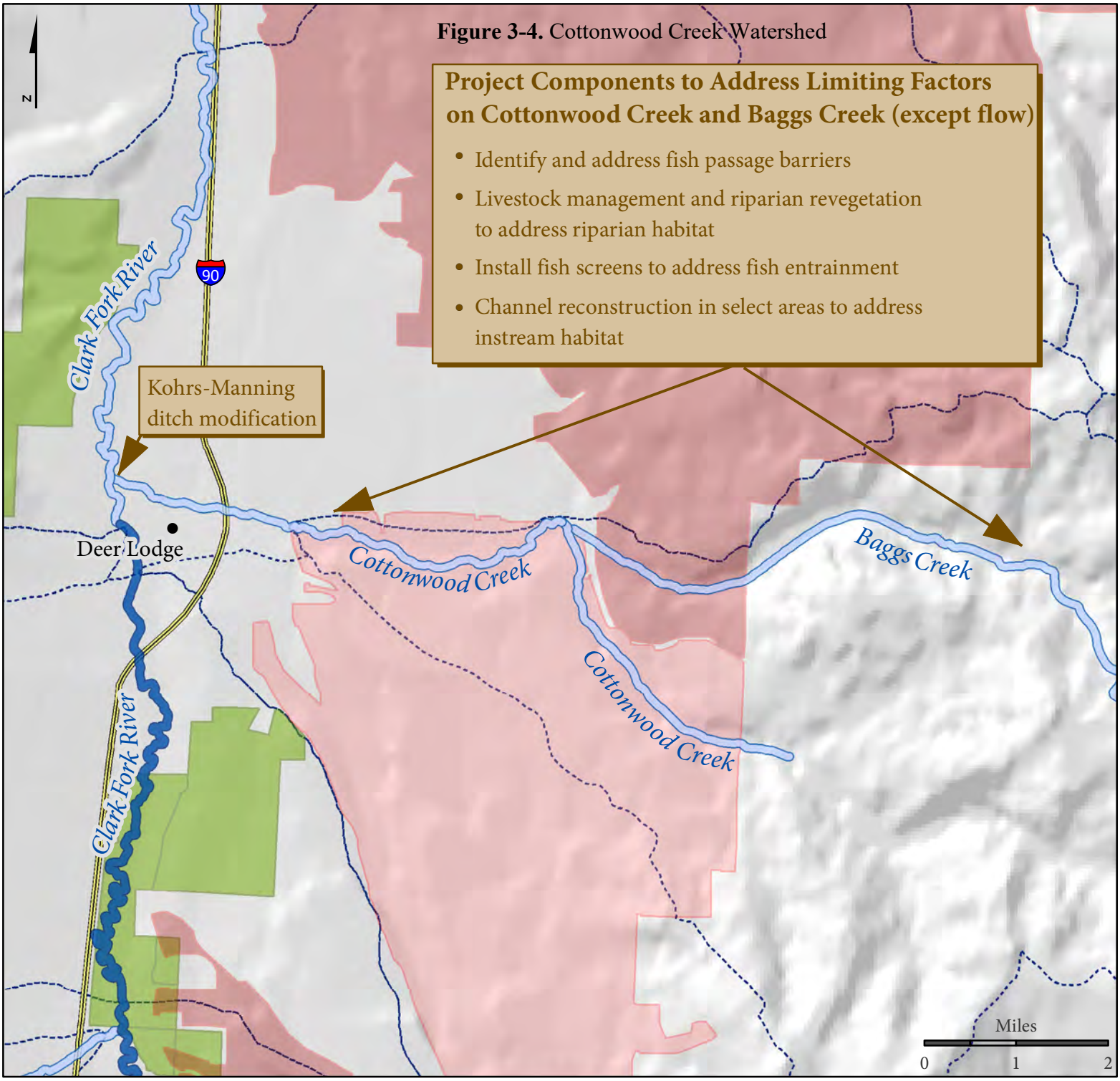
Table 3-6. Relationship of restoration plan components to limiting factors and encouraged activities for Cottonwood Creek watershed

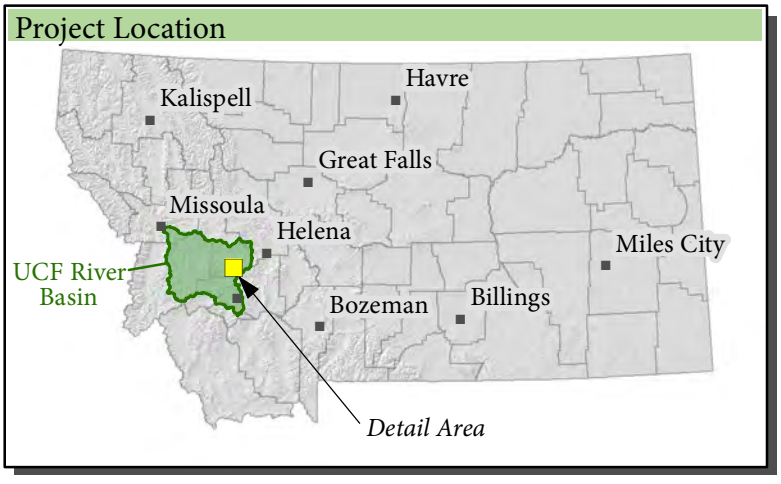
Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase flow by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions and culverts (e.g., diversion or crossing redesign, fish ladders, step pools, etc.) to allow for fish passage throughout reach.	Implement TBD diversions or culverts replacements or retrofits to improve fish passage.	Implementation of Kohrs-Manning ditch modification and other diversions and culverts to ensure fish passage.	Evaluate all diversions and culverts for fish passage. Completion of designs.	$~~289,836~~53 9,836
Riparian Habitat	Riparian habitat protection/enhancement (e.g., riparian fencing, revegetation); mostly on private lands above Interstate 90 and Forest Service allotment on Baggs Creek and within the Deer Lodge urban area.	Identify locations for TBD riparian protection/enhance ment projects.	Habitat management (Fencing, grazing management, off-stream water development) followed by active revegetation where needed after evaluating effects of passive management.	Evaluation of specific types and locations of riparian protection and enhancement. Completion of designs.	$70,000

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Fish Entrainment	Ditch fish screening to reduce fish entrainment into irrigation ditches.	Implement TBD fish screen projects in Cottonwood and Baggs creeks.	Evaluation and installation of fish screens on diversions where necessary, coincident with fish passage improvement projects.	Evaluation of diversions with potential for fish entrainment. Completion of designs.	$1,~~130,000~~ 380,000
Instream Habitat	Channel reconstruction in select areas where projects would benefit stream function, upstream of Interstate 90 and within the Deer Lodge urban area.	Identify and implement channel reconstruction on TBD feet of Cottonwood Creek within upstream of Deer Lodge.	Stream reconstruction.	Evaluate whether stream reconstruction is warranted. Complete channel and floodplain design.	**$**133,800
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$63,000
				Total	**~~1,686,6362~~2, 189,636**

TBD: To Be Determined as part of the project work plan development.

Figure 3-4. Cottonwood Creek Watershed





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.6 Dempsey Creek Watershed

Dempsey Creek, re-evaluated in 2018 as part of the update to the *Aquatic Prioritization Plan*, is now a Priority 3 tributary to the Clark Fork River and no longer eligible for funding. Dempsey Creek drains approximately twenty-eight square miles west of Interstate 90. The channel flows for approximately seventeen miles before entering the Clark Fork River between Racetrack and Deer Lodge. A mixed trout population resides in Dempsey Creek including a 100% genetically pure westslope cutthroat trout population.[17] Because of Dempsey Creek being changed to a Priority 3 tributary prior allocation of funds to Dempsey Creek will be re-allocated to higher priority tributaries.

Costs

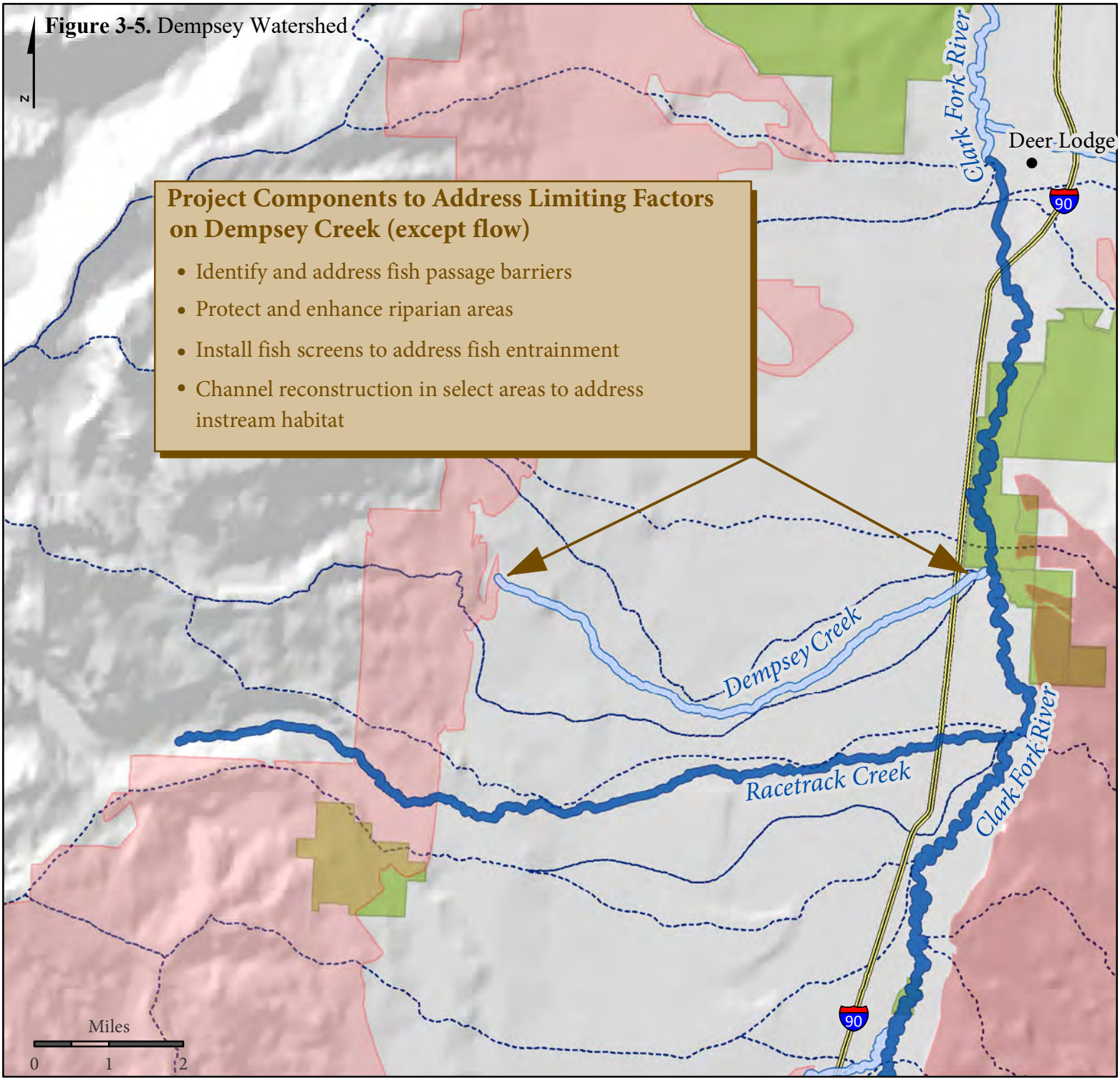
A total cost of $0 is preliminarily estimated to implement the proposed actions in the Dempsey Creek watershed based on re-prioritization to a Priority 3 stream.

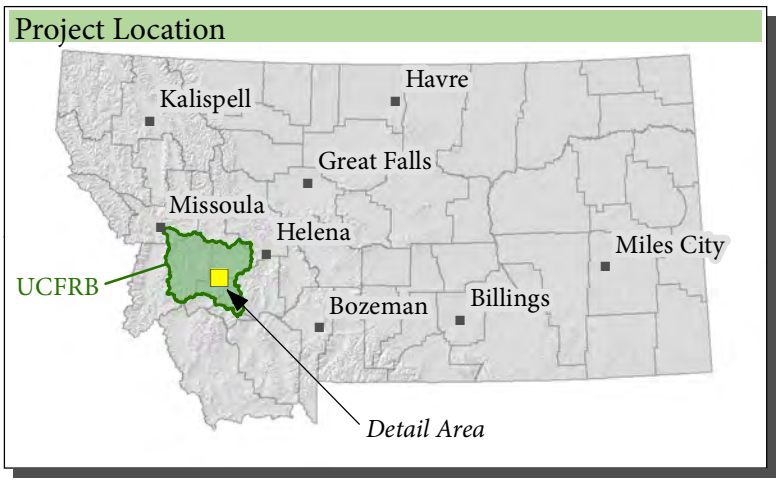
Implementation Schedule

- NA – now a Priority 3 stream

[17] WRC-TU 2012 Upper Clark Fork Diversion Inventory.

Figure 3-5. Dempsey Watershed





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.7 Flint Creek Watershed

Flint Creek is a Priority 2 tributary to the Clark Fork River that drains south of Interstate 90 for approximately thirty-five miles from Georgetown Lake before reaching the Clark Fork River near Drummond. Boulder Creek is a Priority 2 tributary to Flint Creek. Flint Creek and Boulder Creek are designated as Critical Habitat for bull trout and Flint Creek is a migration corridor for fluvial bull trout from the Clark Fork River. The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Upper and Lower Flint Creek and Boulder Creek that, when implemented, will improve the fishery of these tributaries as well as the mainstem of the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Flint Creek – Lower

1. Water Quantity: Flow augmentation downstream of Allendale Diversion (e.g., water right purchases, water leases, irrigation efficiency improvements); with greater preference given to projects that allow flow protection to the mouth.

2. Fish Entrainment: Reduction in fish entrainment at irrigation diversions via ditch screening; throughout reach.

3. Fish Passage: Fish passage improvement particularly at irrigation diversions with passage issues (e.g., diversion design or retrofit to allow for fish passage); throughout reach.

4. Riparian Habitat: Riparian habitat improvement including riparian fencing/protection, woody shrub and tree plantings, off-site watering; throughout reach.

Flint Creek – Upper

1. Fish Passage: Fish passage improvement particularly at irrigation diversions with passage issues (e.g., diversion design or retrofit to allow for fish passage); throughout reach – particularly important below the mouth of Boulder Creek.

2. Fish Entrainment: Reduction in fish entrainment at irrigation diversions via ditch screening; throughout reach – particularly important below the mouth of Boulder Creek.

3. Riparian Habitat: Riparian habitat improvement including riparian fencing/protection, woody shrub and tree plantings, off-site watering; throughout reach.

Boulder Creek

1. Fish Entrainment: Reduction in fish entrainment at irrigation diversions via ditch screening; between the mouth of Boulder Creek and Maxville.

2. Riparian Habitat: Riparian habitat improvement including riparian fencing/protection and woody shrub and tree planting; downstream of Princeton (only a portion of this reach is impacted by riparian grazing).

3. Land Conservation: Acquisition of or placement of conservation easements on private in-holdings adjacent to Boulder Creek.

Proposed Restoration Actions

Actions specific to Flint Creek and Boulder Creek are set forth below, summarized in Table 3-7, and shown in Figure 3-6.

1. Water Quantity: Flow needs for Flint Creek and Boulder Creek, specifically, the lower reaches of Flint Creek below the Allendale diversion will be addressed through the Flow Augmentation process in Section 3.2.1).

2. Fish Entrainment: More than 40 irrigation diversions are located on Flint Creek and Boulder Creek. Preliminary evaluation of all diversions was completed in 2013. Further evaluation, including numerical modelling of fish entrainment risk, is ongoing, but the area of highest priority for fish entrainment reduction is in Boulder Creek and Lower Flint Creek. Where appropriate, fish screens for diversions will be designed and implemented based on entrainment risk and net benefit to fish populations.

3. Fish Passage Improvement: As many as 10 irrigation diversions and 6 culverts potentially impair fish passage along Flint Creek and Boulder Creek. Priority sites for fish passage improvement have been identified, and project development is ongoing.

4. Riparian Habitat Protection and Enhancement Implementation: Riparian and instream habitat assessments were completed in 2014. These assessments guide specific actions and location of the following: installing riparian fencing, developing off-stream water sources, and developing grazing management strategies in cooperation with landowners and managers to reduce livestock impacts to the riparian and aquatic habitat.

These actions in Flint Creek and Boulder Creek, when implemented as a watershed project and after complete evaluation of the drainage area, will have high net benefits in terms of accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and will be technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concept proposals submitted through the public scoping process. The concept proposals submitted by the public for Flint Creek and Boulder Creek are set forth in 2012 abstracts #8, 51, 56 and 2018 abstracts 85, 90, and 91 (Appendix A). The proposed actions for this watershed generally cover all the concepts in the abstracts. These concepts adequately focus on factors within the Flint Creek watershed that limit restoration of the Clark Fork River, without the need for reliance on additional State generated alternatives. A proposed study of mercury contamination in the Flint Creek drainage, abstract #67, is addressed in the terrestrial resources restoration plan (Section 4.2.5).

The State does not propose concept proposals as proposed in abstracts #51, 53 or 68. Abstract #51 and 53 involving a proposed conservation easement on Barnes Creek and Lower Willow Creek have aquatic resource components, but these components are not for a Priority 1 or 2 stream area. The proposed weir and culvert replacements and streambank stabilization on Flint Creek below the powerhouse that are suggested in abstract #68 are unlikely to contribute significant to restoration goals and involves some activities considered to be normal government function.

In 2023, with the completion of the Allendale fish screens, the State determined restoration projects benefiting recruitment to the Clark Fork River should be continued. Monitoring data shows fish from the mainstem passing upstream and downstream in Flint Creek.

Costs

The costs to implement the Flint Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness and cost benefit, rather than concept proposal estimates.

A total cost of approximately $5.5 million (increased by $2.5 million in 2018 and additional $500,000 from the Aquatic fund in 2023) is preliminarily estimated to implement the proposed actions in the Flint Creek watershed.

Implementation Schedule

2018:

- Monitor effectiveness of riparian and stream restoration in Boulder Creek.
- Obtain environmental permits for the Allendale Diversion and Fish Screen.
- Continued project development in Lower Flint Creek.

2019:

- Construct the Allendale Diversion project.
- Implement additional fish passage and entrainment reduction projects.
- Evaluate remaining budget for Flint Creek.
- Prioritize and prepare projects for implementation in 2020 and 2021.

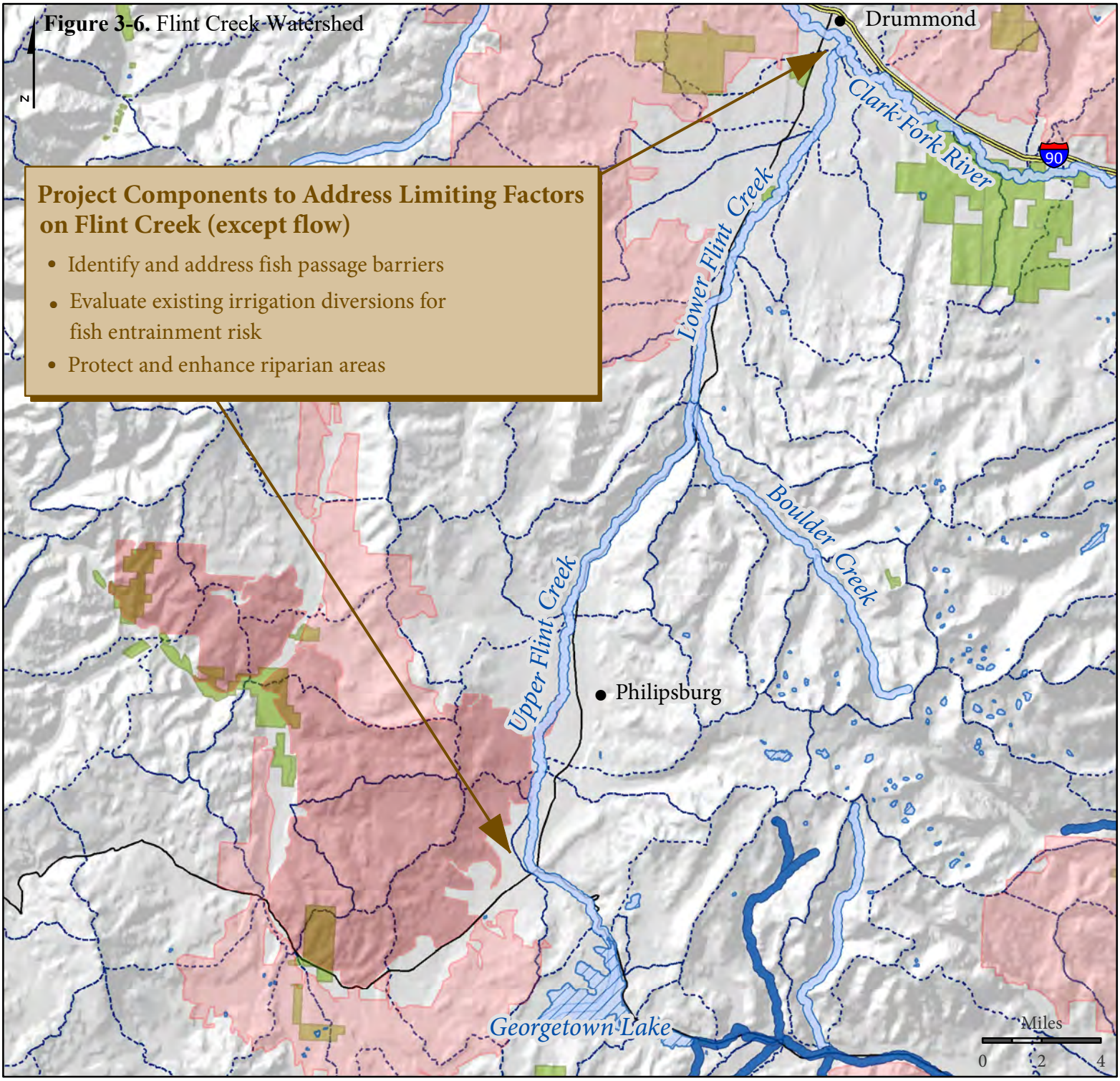
Table 3-7. Relationship of restoration plan components to limiting factors and encouraged activities for the Flint Creek watershed.

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analyses of flow as set forth in Section 3.2.1.	N/A
Fish Entrainment	Ditch fish screening to reduce fish entrainment into irrigation ditches.	Implement fish screen projects.	Evaluation and installation of fish screen on irrigation diversions where necessary.	Evaluation of diversions for fish entrainment. Completion of design.	$2,750~~0~~,000
Fish Passage	Fish passage improvement at select irrigation diversions and culverts (e.g., diversion or crossing redesign or retrofit to allow for fish passage); throughout watershed.	Implement diversion replacements or retrofits and culverts for fish passage.	Replace or retrofit existing irrigation diversion structures and culverts to ensure fish passage barriers.	Evaluate existing irrigation diversions and culverts for fish passage. Completion of design.	$1,~~675~~925,000
Riparian Habitat	Riparian habitat improvement (e.g., riparian fencing/protection, woody shrub and tree plantings).	Identify locations for riparian protection and/or enhancement projects.	Habitat management (Fencing, grazing management, off-stream water development) followed by active revegetation where needed after evaluating effects of passive management.	Evaluation of specific types and locations of riparian protection and enhancement. Completion of designs.	$760,750

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Data gaps and feasibility questions	Develop overall project work plans.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$100,000
				Total	$5,~~0~~535,750

TBD: To Be Determined as part of the project work plan development.

Figure 3-6. Flint Creek Watershed



Project Components to Address Limiting Factors on Flint Creek (except flow)

- Identify and address fish passage barriers
- Evaluate existing irrigation diversions for fish entrainment risk
- Protect and enhance riparian areas

Project Location

NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.8 German Gulch Watershed

German Gulch is a Priority 1 tributary to Silver Bow Creek that is approximately 8.4 miles long with a 41 square mile drainage area located about 6 miles south of Opportunity. Beefstraight Creek is Priority 2 tributary to German Gulch. The German Gulch watershed has westslope cutthroat trout and brook trout. Westslope cutthroat trout from German Gulch have recolonized Silver Bow Creek in recent years and have maintained near 100% genetic purity. The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for German Gulch and Beefstraight Creek that, when implemented, will improve the fishery of these tributaries as well as the mainstem of Silver Bow Creek.

In 2018, NRDP (with FWP) evaluated the proposed restoration actions based on new data and information gathered and analyzed since 2012. The original prioritization is still valid and has not changed.

In 2023, the State determined restoration actions are complete in German Gulch. Remaining funds allocated to this watershed are re-allocated to other priorities.

German Gulch

1. Riparian Habitat: Riparian habitat protection and improvement (e.g., riparian fencing, woody shrub plantings) within livestock allotment area.

2. Water Quantity: Additional flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements) near mouth.

3. Land Conservation: Acquisition of or placement of conservation easements on the remaining private inholdings along the channel.

Beefstraight Creek

1. Riparian Habitat: Riparian habitat protection and improvement (e.g., riparian fencing) at impacted areas within livestock allotment area.

Proposed Actions

Actions specific to German Gulch and Beefstraight Creek are set forth below, summarized in Table 3-8, and shown in Figure 3-7.

1. Riparian Habitat Protection/Enhancement Improvement: Approximately 7,000 cubic yards of streamside tailings will be removed from lower German Gulch by the Montana Department of Environmental Quality (DEQ) in 2013. Also, further data collection and other information gathering will be performed to determine the specific types and location

of the following actions: fencing, grazing management, and off stream water. Revegetation, weed control, and floodplain reconstruction will also be implemented if warranted after completion and assessment of other actions.

The actions along German Gulch will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concepts proposed as part of the public scoping process. The concept proposals submitted by the public for the German Gulch watershed are set forth in abstract #64 (Appendix A). The proposed actions for this watershed generally cover the concepts in the abstract. These concepts adequately focus on the factors within the German Gulch watershed that limit restoration in the Silver Bow Creek mainstem without a need for reliance on additional State generated alternatives.

No new concept proposals were received in 2018 or 2023.

Costs

The costs to implement the German Gulch actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g. engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $329,242 (decreased by $100,000 in 2018) was preliminarily estimated to implement the proposed actions in the German Gulch watershed.

In 2023, the remaining $100,000 is re-allocated to other Aquatic priorities.

Implementation Schedule

2019:

- Identify remaining projects needed to complete priorities.

2020:

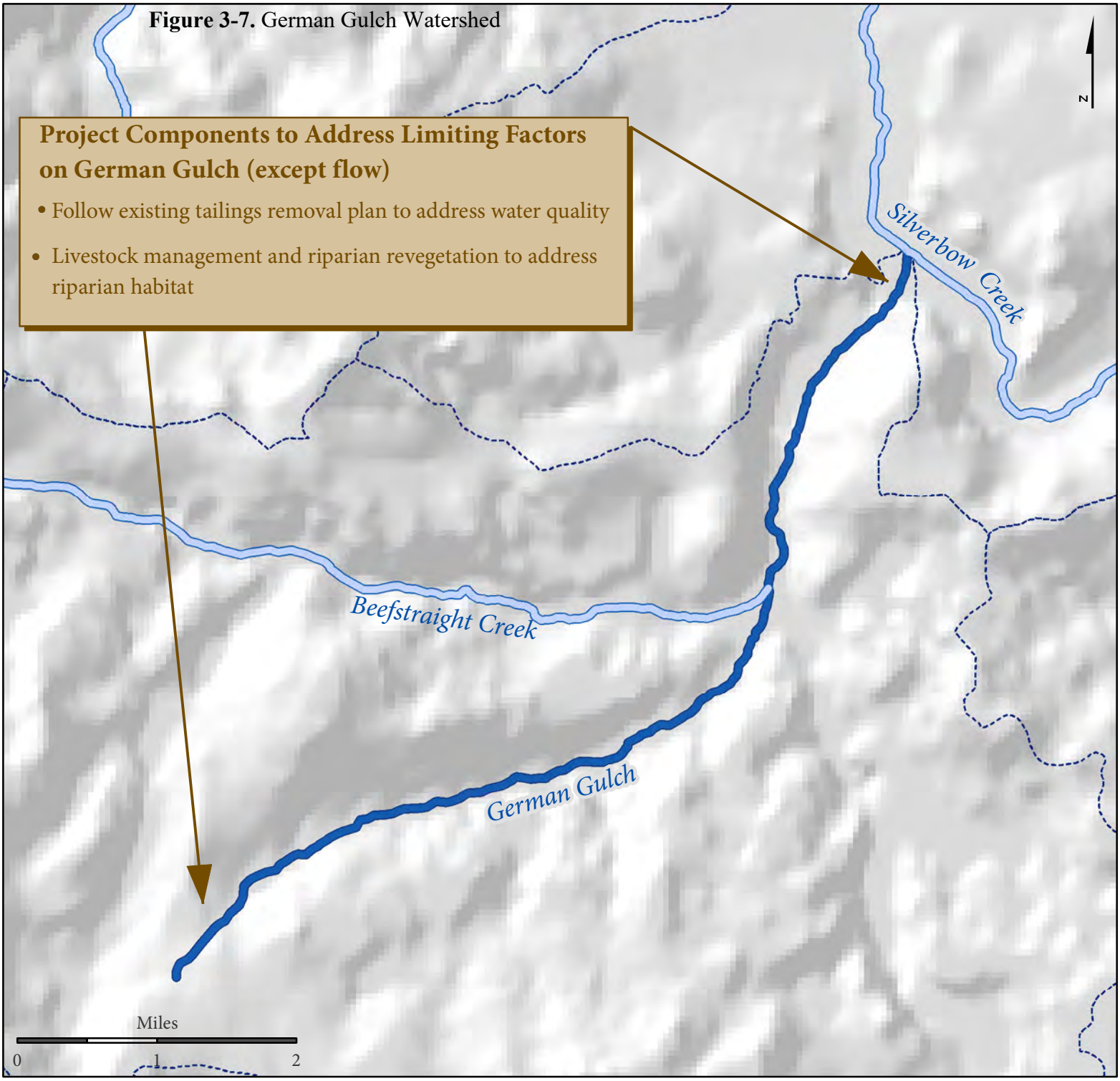
- Implement remaining projects, closeout watershed.

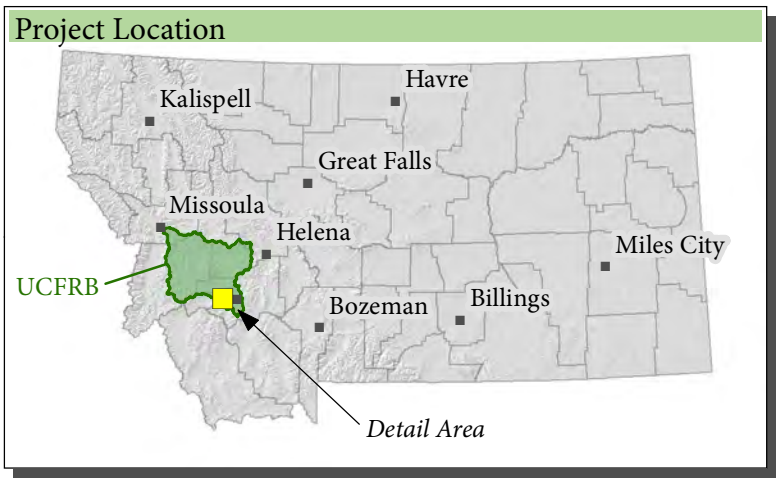
Table 3-8. Relationship of restoration plan components to limiting factors and encouraged activities for German Gulch

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimate Cost
Riparian Habitat	Riparian habitat protection and improvement (e.g., riparian fencing, woody shrub plantings) within livestock allotment area; floodplain reconstruction in select areas impacted by historic mining activities.	Install riparian fencing on up to TBD feet of riparian habitat.	Habitat management (Fencing, grazing management, off-stream water development) followed by active revegetation where needed after evaluating effects of passive management.	Evaluation of specific types and locations of riparian protection and enhancement. Completion of designs.	$304,242
Data gaps and feasibility questions	Develop project work plan.	Complete project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$25,000
				Total	**$~~329,242~~0**

TBD: To Be Determined as part of the project work plan development.

Figure 3-7. German Gulch Watershed





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.9 Harvey Creek Watershed

Harvey Creek is a Priority 2 tributary to the Clark Fork River that drains forty-two square miles south of Interstate 90. The channel flows for approximately eighteen miles from the John Long Mountains before it enters the Clark Fork River twenty miles east of Clinton, Montana. A native bull trout and westslope cutthroat trout population in the stream is isolated and protected by a grade control structure just upstream from the mouth of the creek that forms a permanent, year-round fish passage barrier.[18] The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Harvey Creek that, when implemented, will improve the fishery of Harvey Creek as well as the mainstem of the Clark Fork River.

In 2018, NRDP (with FWP) evaluated the proposed restoration actions based on new data and information gathered and analyzed since 2012. The original prioritization is still valid and has not changed.

Harvey Creek

1. Riparian Habitat: Riparian habitat improvement including riparian fencing/protection and woody shrub and tree planting, off-site watering; throughout drainage.

2. Land Conservation: Acquisition of or placement of conservation easements on private in-holdings adjacent to Harvey Creek.

3. Fish Entrainment: Reduction in fish entrainment at irrigation diversions via ditch screening and potentially the development of a siphon at the lowest diversion; primarily below county road.

4. Fish Passage: Fish passage improvement at lowest irrigation diversion (e.g., diversion redesign, retrofit – approximately 50 meters above mouth) and potentially selective passage of bull trout at barrier located just below county road crossing.

5. Water Quantity: Flow augmentation downstream of lowest diversion (approximately 50 meters above mouth) – may be necessary to provide adequate water for up- and downstream fish migration should fish entrainment or upstream passage be improved at this diversion (e.g., water right purchase or water lease).

Proposed Actions

Actions specific to Harvey Creek are set forth below, summarized in Table 3-9, and shown in Figure 3-8.

[18] WRC-TU 2012, Upper Clark Fork Diversion Inventory.

1. Riparian Habitat Protection and Enhancement Implementation: Fencing riparian pastures occurred between 2013 and 2018. Based on current property ownership, no additional fencing is available at this time. Should land ownership change, the potential for additional fencing may become an option. Additional fencing on the east side of Harvey Creek, outside the scope of this restoration plan, was completed in 2012, funded by Future Fisheries and USFWS Partners in Wildlife.

2. Fish Entrainment: A fish screen and siphon will be installed at the main diversion structure located just upstream from the mouth where documented fish entrainment has been documented.[19] Detailed costs and designs have been developed for this fish screen and siphon project. Five other diversions have the potential for fish entrainment.

3. Fish Passage Improvement: Irrigation diversions and a road culvert are known fish passage barriers on Harvey Creek. Elimination of fish passage and entrainment issues at the remaining diversions is ongoing and will be completed by 2019.

4. Water Quantity: Flow needs for Harvey Creek will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

These actions along and near Harvey Creek will have high net benefits in terms of accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and will be technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the concept proposals submitted through the public scoping process. The concept proposals submitted by the public for Harvey Creek are set forth in 2012 abstract #55 and 2018 abstract 89 (Appendix A). The proposed actions for this watershed generally cover the concepts in this abstract. These concepts adequately focus on the factors within Harvey Creek that limit restoration of the Clark Fork River mainstem without a need for reliance on additional State-generated alternatives.

Costs

The costs to implement the Harvey Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

[19] Ibid

A total cost of $586,902 (increased by $300,000 in 2018) is preliminarily estimated to implement the proposed actions in the Harvey Creek.

Implementation Schedule

2018:

- Monitor restoration actions effectiveness.
- Maintain restoration actions as needed.

2019:

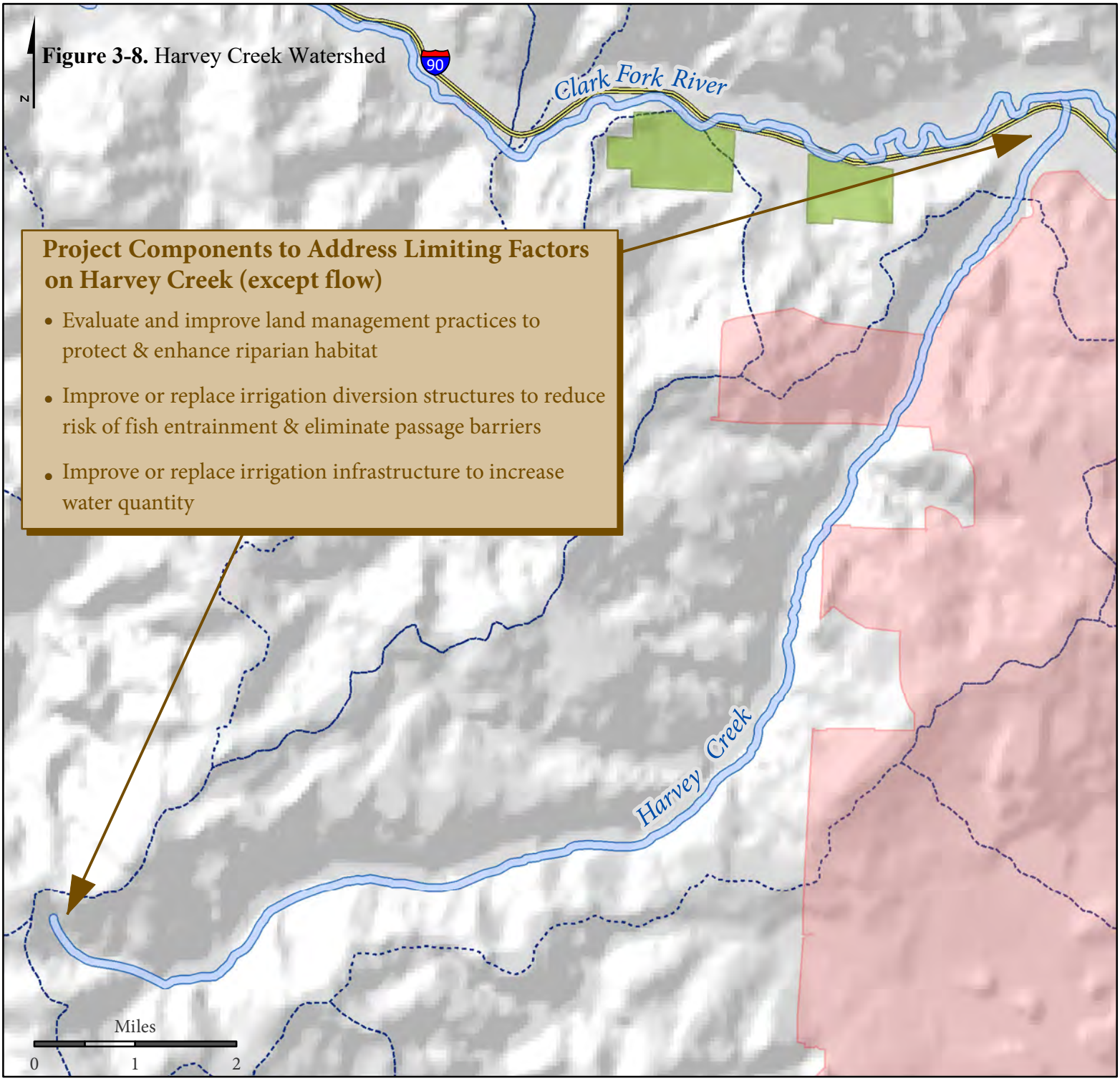
- Monitor restoration actions effectiveness.
- Complete irrigation diversion consolidation and remove obsolete diversion structures.
- Eliminate fish entrainment at the diversion located below Mullan Road.

Table 3-9. Relationship of restoration plan components to limiting factors and encouraged activities for Harvey Creek.

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Riparian Habitat	Riparian habitat improvement including riparian fencing.	Install TBD feet of riparian fencing.	Install riparian fencing on the west side of Harvey Creek.	Evaluate riparian areas near proposed irrigation diversion replacements to refine fence locations.	$20,000
Fish Entrainment	Reduction in fish entrainment at irrigation diversions via ditch screening and siphon installation.	Install 2 fish screens at irrigation diversions and build a siphon at the diversion near the mouth of Harvey Creek.	Install a fish screen and siphon at irrigation diversion near the mouth of Harvey Creek.	Evaluate existing entrainment structures. Completion of design.	$441,902
Fish passage	Fish passage improvement at select irrigation diversion and culvert (e.g., diversion redesign, retrofit).	Implement 2 irrigation diversions replacements or retrofits on Harvey Creek and replace culvert at Mullan Road to protect the upstream fish passage barrier.	Replace existing irrigation and culverts to protect the upstream fish barrier and preserve the native trout population.	Evaluate existing irrigation diversions and culvert for fish passage. Completion of designs.	$100,000
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analyses of flows as set forth in Section 3.2.1.	N/A
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$25,000
				Total	**$586,902**

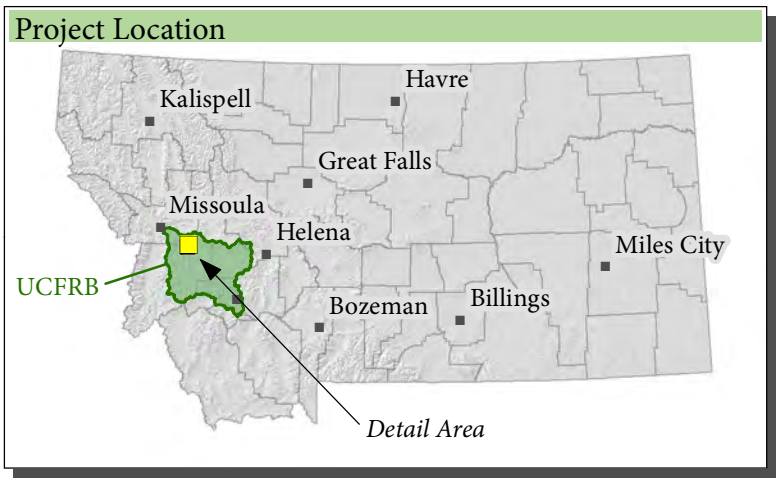
TBD: To Be Determined as part of the project work plan development.

Figure 3-8. Harvey Creek Watershed



Project Components to Address Limiting Factors on Harvey Creek (except flow)

- Evaluate and improve land management practices to protect & enhance riparian habitat
- Improve or replace irrigation diversion structures to reduce risk of fish entrainment & eliminate passage barriers
- Improve or replace irrigation infrastructure to increase water quantity



NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.10 Little Blackfoot River Watershed

The Little Blackfoot River is a Priority 1 tributary to the Clark Fork River that drains approximately 413 square miles east of Interstate 90. The channel flows for approximately forty-seven miles before entering the Clark Fork River near Garrison. Dog Creek, Snowshoe, and Spotted Dog Creek are Priority 2 tributaries to the Little Blackfoot River. The *2012 Process Plan* lists the following encouraged activities (listed in order of priority) for these tributaries that, when implemented, will improve the fishery of these tributaries as well as the mainstem of the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Little Blackfoot River – Lower

1. Fish Passage: Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage); throughout reach.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; throughout reach.

3. Riparian Habitat: Riparian habitat improvement (e.g., riparian fencing, woody shrub and tree plantings); primarily on private lands downstream of Elliston.

4. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily downstream of Elliston, with greater preference given to projects closer to the mouth or those where flows are protectable to or beyond the mouth.

5. Bank and Channel Stability: Bank stabilization/channel reconstruction in select, localized areas where projects would benefit stream function; primarily on private lands downstream of Elliston.

Dog Creek

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily in lower extent of drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

2. Fish Passage: Fish passage improvement, if/where found necessary.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches, if/where found necessary.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, woody shrub and tree plantings); on private lands with reduced quality riparian habitat.

5. Bank and Channel Restoration: Channel or bank reconstruction in select, localized areas where projects would benefit stream function, if/where found necessary.

Snowshoe Creek

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout reach.

2. Fish Passage: Fish passage improvement, if/where found necessary.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches, if/where found necessary.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, woody shrub and tree plantings); on private lands with reduced quality riparian habitat.

5. Bank and Channel Restoration: Channel reconstruction/bank stabilization in select, localized areas where projects would benefit stream function; throughout reach.

Spotted Dog Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout reach.

2. Fish Passage: Fish passage improvement, if/where found necessary.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches, if/where found necessary.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, woody shrub, and tree plantings); throughout reach.

5. Bank and Channel Restoration: Channel reconstruction/bank stabilization in select, localized areas where projects would benefit stream function; throughout reach.

Proposed Actions

Actions specific to the Little Blackfoot watershed are set forth below, summarized in Table 3-10, and shown in Figure 3-9.

1. Fish Passage: More than 30 irrigation diversions and road culverts in the Little Blackfoot River, Dog Creek, Snowshoe Creek and Spotted Dog Creek impair fish passage.[20] A watershed evaluation will first be performed to determine the specific locations where fish passage projects will be implemented. Redesign or retrofits of barriers will be completed and implemented where warranted.

2. Fish Entrainment: All irrigation diversions will be evaluated for fish entrainment. Screens for diversions will be designed and implemented were warranted.

3. Riparian Habitat Protection/Enhancement Implementation: Riparian habitat protection and enhancement for the Little Blackfoot watershed will focus on the mainstem Little Blackfoot River below Elliston to the confluence with the Clark Fork River; throughout Dog Creek; lower reach of Snowshoe Creek; and the lower 6.6 miles of Spotted Dog Creek. Further data collection and other information gathering will first be performed to determine the specific type and location of the following actions: riparian fencing, off-stream water sources, grazing management strategies, long-term management agreements and/or permanent conservation easements, and roads and railroads erosion occurring along the streams.[21]

4. Water Quantity: Flow needs for Little Blackfoot watershed will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

5. Streambank and Channel Reconstruction: Channel reconstruction will be implemented only after implementation of other actions and subsequent evaluation determines reconstruction is warranted. A study of the lower 32 miles of the Little Blackfoot River found 30,000 feet of eroding streambanks and 5,000 feet of critical sediment sources.[22] Streambank erosion along Dog Creek and Spotted Dog Creek identified active channel bank erosion and poor riparian vegetation health. All reaches will be evaluated the potential for natural recovery or the need for active restoration treatments.

[20] WRC-TU. 2012. Upper Clark Fork diversion inventory. Watershed Restoration Coalition (WRC) and Trout Unlimited. Deer Lodge, MT.

[21] Montana DEQ, 2011, "Little Blackfoot River Watershed TMDLs and Framework Water Quality Improvement Plan," Helena, November.

[22] Land and Water Consulting, 2002," Little Blackfoot River: Physical Features Inventory and Riparian Assessment," for Deer Lodge Conservation District, Deer Lodge, May.

These actions for the Little Blackfoot River, Dog Creek, Snowshoe Creek, and Spotted Dog Creek, when implemented as a watershed project and after complete evaluation of the drainage area, will have high net benefits in terms of accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and will be technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the concept proposals submitted through the public scoping process. The concept proposals submitted by the public for the Little Blackfoot River watershed are set forth in 2012 abstracts #29, 30, 31, 43, 44,61 and 2018 abstracts 92, 93, 94, and 95 (Appendix A). The proposed actions for this watershed generally cover the concepts in the abstracts. These concepts adequately focus on factors within the Little Blackfoot River watershed that limit restoration in the Clark Fork River mainstem, without the need for reliance on additional State generated alternatives. The exception is abstract #G10 for habitat protection and enhancement projects within the Spotted Dog wildlife management unit. 2018 abstract 96 for Trout Creek will be addressed under settlement funding allocated to the Spotted Dog WMA.

No new concept proposals were received in 2023.

Costs

The costs to implement the Little Blackfoot River actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of around $3.~~75~~ 25 million (increased by $329,453 in 2018 and decreased by $500,000 in 2023) is preliminarily estimated to implement the proposed actions in the Little Blackfoot River watershed.

In 2023, the State re-allocates $500,000 from the Little Blackfoot River watershed, Streambank and Channel Reconstruction action, to other priority Aquatic priorities since there are limited priority projects at this time available for implementation in this watershed.

Implementation Schedule

2018:

- Implement fish passage and fish screens on a side channel of the Little Blackfoot River, Spotted Dog Creek, and Snowshoe Creek.
- Complete channel restoration on Spotted Dog Creek.

Post 2018

- Evaluate fish entrainment in Lower Little Blackfoot River.
- Design and implement fish entrainment reduction projects in the Lower Little Blackfoot River.

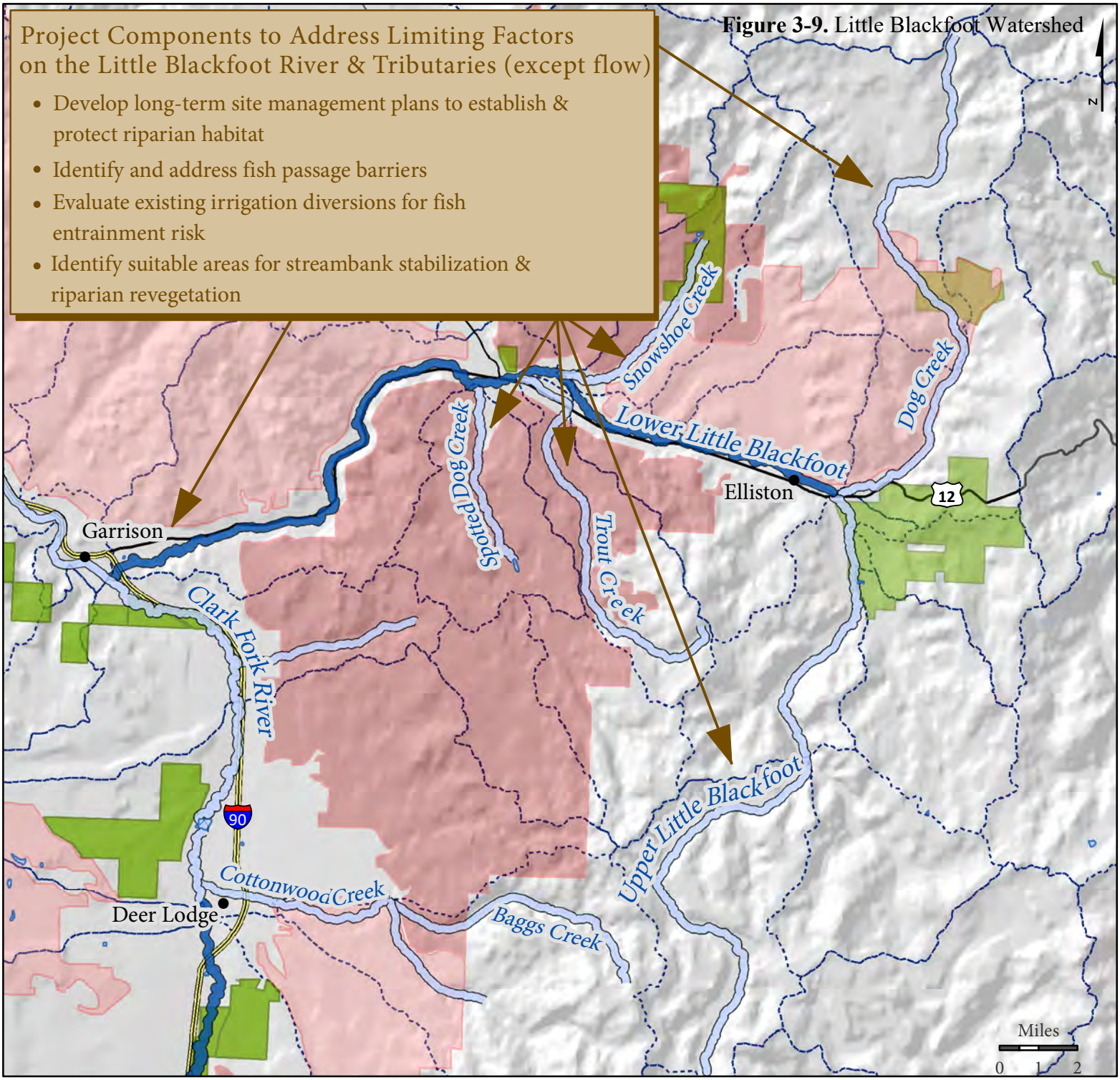
Table 3-10. Relationship of restoration plan components to limiting factors and encouraged activities for the Little Blackfoot watershed.

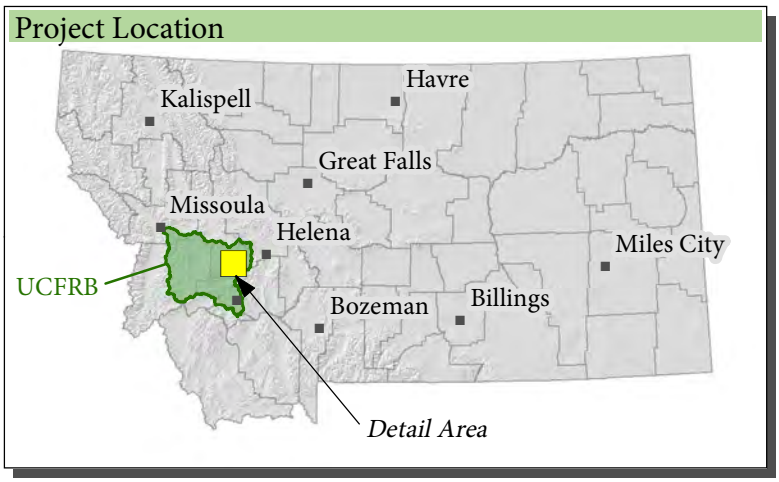
Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Riparian Habitat	Riparian habitat protection/enhancement implementation (e.g., riparian fencing, off-stream water systems, woody shrub and tree plantings, and streambank stabilization); long-term management plans and/or permanent conservation easements.	Identify TBD riparian protection/ enhancement projects.	Habitat management (Fencing, grazing management, and off-stream water systems), establish long-term site management plans and/or conservation easements.	Evaluate riparian areas throughout watershed for specific types and locations of riparian protection/enhancement. Completion of designs.	$1,440,000
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analyses of flows as set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage).	Implement TBD diversion or culvert replacements or retrofits in the LBR watershed.	Implementation of diversion and culvert structures for fish passage.	Evaluate existing diversions, culverts for fish passage. Completion of design.	$350,000
Fish Entrainment	Ditch screening to reduce fish entrainment into irrigation ditches.	Implement TBD fish screen projects in the LBR watershed.	Implementation of fish screens on irrigation diversion structures where necessary.	Evaluation of diversion with potential for fish entrainment. Completion of design.	$1,116,482

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Streambank and Channel Reconstruction	Channel reconstruction in select, localized areas where projects would benefit stream function.	Restore TBD linear feet of streambank and TBD linear feet of channel.	Stream reconstruction.	Evaluations whether stream reconstruction is warranted. Completion of design.	$~~750,000~~250,000
Data Gaps and Feasibility Questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$100,000
				Total	$3,~~756~~256,482

TBD: To Be Determined as part of the project work plan development.

Figure 3-9. Little Blackfoot Watershed





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.11 Lost Creek Watershed

Lost Creek is a Priority 2 tributary to the Clark Fork River that drains approximately sixty square miles west of Interstate 90. The channel flows for approximately twenty-three miles before reaching the Clark Fork River near Warm Springs. A mixed trout population and brown trout reside in the middle and lower reaches of Lost Creek, respectively. Brook trout and westslope cutthroat trout comprise the trout population in the upper reaches of Lost Creek above a natural waterfall that likely acts as a fish passage barrier.[23] The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Lost Creek that, when implemented, will improve the fishery of Lost Creek as well as the mainstem of the Clark Fork River.

In 2018, NRDP (with FWP) evaluated the proposed restoration actions based on new data and information gathered and analyzed since 2012. The original prioritization is still valid and has not changed.

Lost Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily between Dutchman Dike and mouth.

2. Fish Passage: Fish passage improvement; primarily at Dutchman Dike and Gardiner Ditch.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; throughout reach.

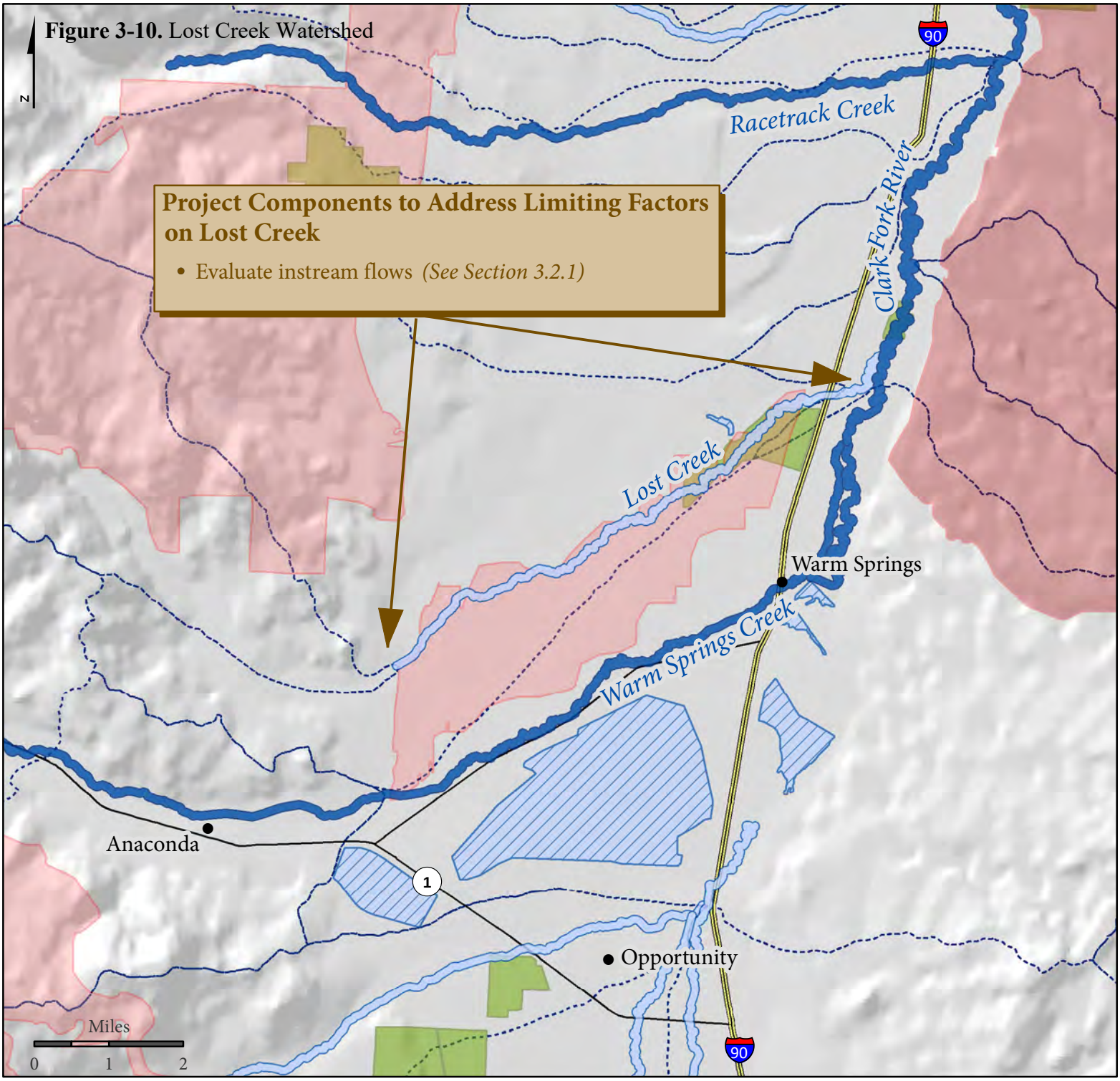
4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, conservation easements, woody shrub, and tree plantings); in locations where protections are not already in place or where additional enhancement would speed riparian recovery.

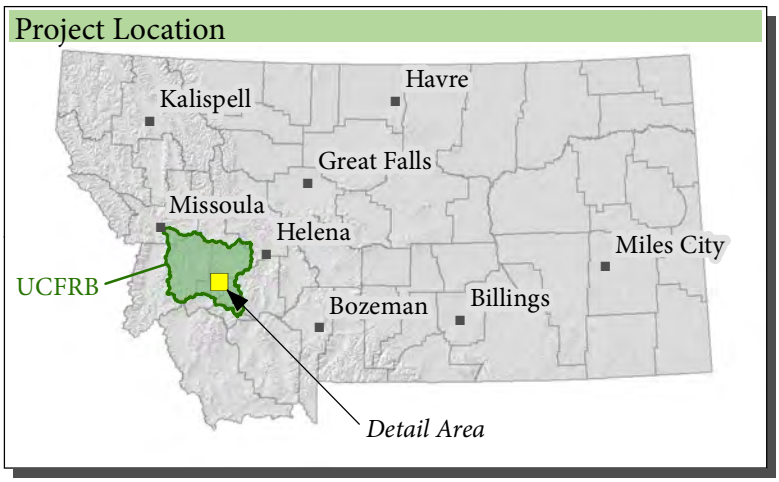
Proposed Actions

Flow augmentation has been identified as a limiting factor for this watershed and flow needs will be considered prior to addressing any other restoration components. Further analyses of flows will be addressed as set forth in Section 3.2.1. The State does not propose actions for Lost Creek due to the limited water quantity issues. No concept proposals were submitted by the public for aquatic actions in the Lost Creek watershed. The Lost Creek watershed is shown on Figure 3-10.

[23] WRC-TU. 2012. Upper Clark Fork diversion inventory. Watershed Restoration Coalition (WRC) and Trout Unlimited. Deer Lodge, MT.

Figure 3-10. Lost Creek Watershed





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.12 Mill-Willow Watershed

Mill and Willow creeks are Priority 2 headwaters of the Clark Fork River Mill and Willow creeks are collected into the Mill-Willow Bypass downstream of the town of Opportunity and routed around the Warm Springs Ponds. The twenty miles of Mill creek drain approximately forty-nine square miles of contributing watershed. Willow creek is shorter at thirteen miles from its headwaters to the Mill-Willow Bypass, and its watershed is correspondingly smaller at twenty-nine square miles. Both streams are considered chronically dewatered by Montana FWP.[24] Westslope cutthroat trout are present in both streams, and the westslope cutthroat trout populations in the upper reaches of Mill Creek have 100% genetic purity. The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Mill and Willow creeks that, when implemented, will improve the fisheries of these tributaries, as well as the mainstems of Silver Bow Creek and the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Mill Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily in lower extent of drainage, with greater preference given to projects where flows are protectable to mouth.

2. Fish Passage: Fish passage improvement, if/where found necessary.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches, if/where found necessary.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, conservation easements, woody shrub, and tree plantings); on private lands.

Willow Creek

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); primarily in lower extent of drainage below Wildlife Management Area, with greater preference given to projects where flows are protectable to mouth.

[24] MFISH 2003.

2. Fish Passage: Fish passage improvement, if/where found necessary.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches, if/where found necessary.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, woody shrub, and tree plantings); on private lands below Wildlife Management Area.

5. Instream Habitat: Channel reconstruction/bank stabilization in select, localized areas where projects would benefit stream function; on private lands below Wildlife Management Area.

Proposed Actions

Actions specific to Mill Creek and Willow Creek are set forth below, summarized in Table 3-11, and shown in Figure 3-11.

1. Water Quantity: Flow augmentation has been identified as a limiting factor for this watershed and flow needs will be considered prior to or in coordination with addressing any other restoration components. Further analysis of flows is addressed as set forth in Section 3.2.1.

2. Fish Entrainment: Ten diversions in Mill and Willow creeks have potential to entrain fish. The design and installation of fish screens will be implemented on three diversion structures on Mill Creek and two diversions on Willow Creek. Further evaluation of other structures will be performed, and fish screens designed and installed if warranted.

3. Riparian Habitat Protection/Enhancement Implementation: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

4. Instream Habitat: Channel reconstruction will be implemented only after implementation of other actions and subsequent evaluation determines reconstruction is warranted on Willow Creek.

The actions along Mill and Willow creeks will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on encouraged activities identified in the *2012 Process Plan*, taking into consideration the restoration concept proposals as part of the public scoping process. The concept proposals submitted by the public for the Mill-Willow watershed are set forth in abstracts #32, 66 and 69 (Appendix A). The State's actions, after or in coordination with addressing flow limitations,

generally cover the concepts in the abstracts. These concepts adequately focus on factors within Mill and Willow creeks that limit restoration of the Clark Fork River and Silver Bow Creek mainstems, without a need for reliance on additional State generated alternatives.

No new concept proposals were received in 2018 or 2023.

Costs

The costs to implement the Mill and Willow Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $662,730 is preliminarily estimated to implement the proposed actions in the Mill and Willow Creek watershed.

Implementation Schedule

2019:

- Identify and evaluate potential projects.

2020 and beyond:

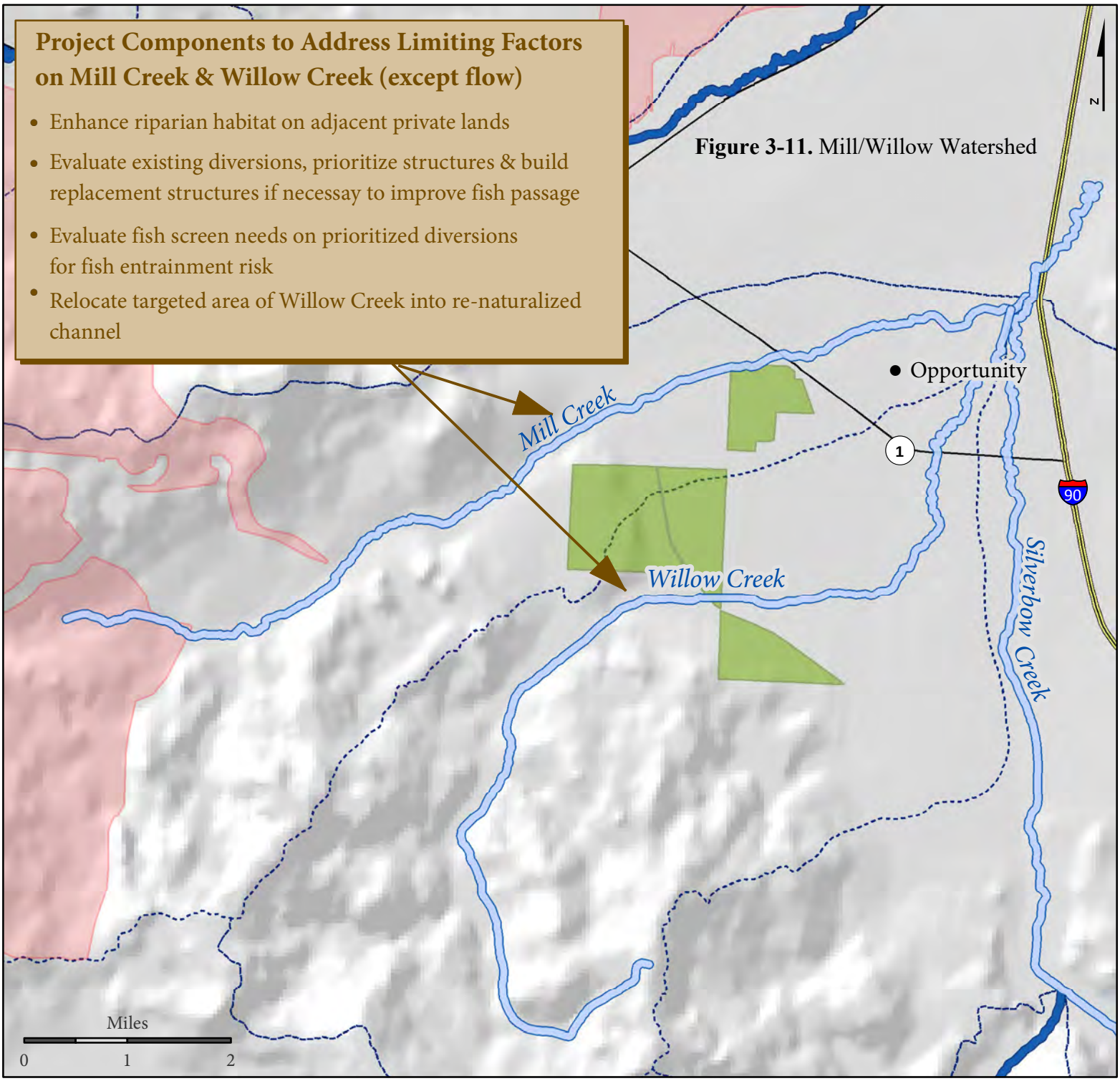
- Design and implement identified projects.

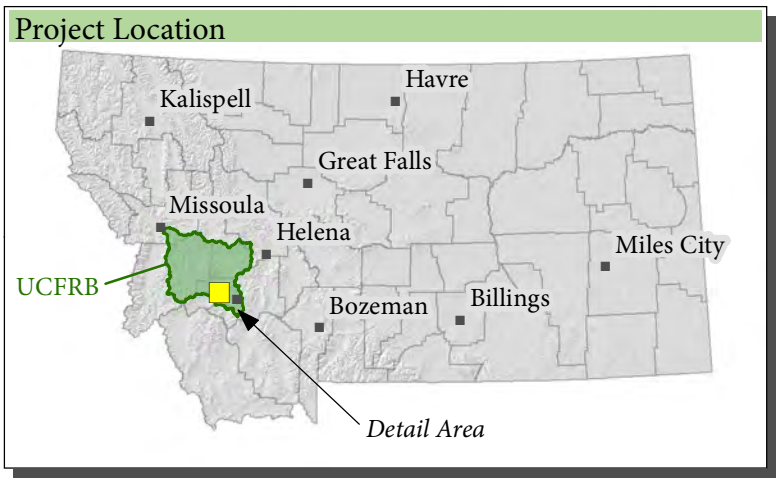
Table 3-11. Relationship of restoration plan components to limiting factors and encouraged activities for Mill and Willow Creeks

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows as set forth in Section 3.2.1.	N/A
Riparian Habitat	Riparian habitat protection and improvement (e.g., riparian fencing, woody shrub plantings) on Mill and Willow creeks.	Install TBD feet of riparian fencing, revegetate TBD miles of floodplain, and develop land management plan.	Implement riparian habitat enhance though off-stream stock water development, grazing management, fencing, etc.	Evaluation of specific types and location of riparian protection/enhancement. Completion of design.	$245,000
Fish Entrainment	Ditch screening to reduce fish entrainment into irrigation ditches.	Install five fish screens on Mill and Willow creeks. Confirm that five other diversions are not fish entrainment issues.	Implement fish screen implementation. Evaluate fish screen needs on other diversions.	Evaluation of diversions with potential for fish entrainment. Completion of design.	$255,000
Instream Habitat	Stream channel reconstruction/bank stabilization where project benefit stream function.	Identify locations for TBD instream habitat enhancement projects.	Relocate TFB feet of Willow creek into renaturalized channel.	Evaluate stream bank stabilization needs.	$132,730

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Data Gaps and Feasibility Questions	Develop overall work plans.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each component.	$30,000
				Total	**$662,730**

TBD: To Be Determined as part of the project work plan development.





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.13 Racetrack Creek Watershed

Racetrack Creek Watershed

Racetrack Creek is a Priority 1 tributary to the Clark Fork River, approximately twenty-three miles long that flows into the Clark Fork River from the west near Galen, Montana. A mixed trout population is present in Racetrack Creek that includes hybridization of rainbow and westslope cutthroat trout.[25] The *2012 Process Plan* lists the following encouraged restoration activities (listed in order of priority) for Racetrack Creek that, when implemented, will improve the fishery of Racetrack Creek as well as the mainstem of the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Racetrack Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); from Cement Ditch to mouth, with greater preference given to projects where flows are protectable to mouth.

2. Fish Passage: Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage); throughout reach.

3. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; throughout reach.

4. Riparian Habitat: Riparian habitat improvement/protection (e.g., riparian fencing, woody shrub plantings); throughout reach.

5. Bank and Channel Restoration: Bank stabilization/channel reconstruction in select, localized areas where projects would benefit stream function, throughout reach.

Proposed Actions

Actions specific to Racetrack Creek are set forth below, summarized in Table 3-12, and shown in Figure 3-12.

[25] Lindstrom, J., B. Liermann, and R. Kreiner. 2008. *An Assessment of Fish Populations and Riparian Habitat in Tributaries of the Upper Clark Fork Basin*. Montana Fish, Wildlife and Parks.

1. Water Quantity: Flow augmentation has been identified as a limiting factor for this watershed and flow needs will be considered prior to or in coordination with addressing any other restoration components. Further analysis of flow is addressed as set forth in Section 3.2.1.

2. Fish Passage: Five of eleven irrigation diversions on Racetrack Creek impair upstream fish passage. Fish passage evaluation for all diversions will be performed and replacement or retrofits will be designed and implemented if warranted.

3. Fish Entrainment: Only one of the eleven irrigation diversions on Racetrack Creek is screened and fish entrainment is documented at six of the other diversions. Data collection and other information gathering will be performed to complete designs and implementation of known entrainment diversions. Further data collection will be performed for the remaining diversions and designs and implementation of screens completed if warranted.

4. Riparian Habitat Protection and Enhancement Implementation: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

5. Streambank and Channel Reconstruction: Channel reconstruction will be implemented only after implementation of other actions and subsequent evaluation determines reconstruction is warranted.

These actions along Racetrack Creek will have high net benefits in terms of accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and will be technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concepts submitted through the public scoping process. The concept proposals submitted by the public for the Racetrack Creek watershed are set forth in abstracts #33 and 34 (Appendix A). These concepts adequately focus on the factors within Racetrack Creek that limit restoration in the Clark Fork River mainstem, without a need for reliance on additional State-generated alternatives.

No new concept proposals were received in 2018 or 2023.

Costs

The costs to implement the Racetrack Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed

are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $734,960 is preliminarily estimated to implement the proposed actions in the Racetrack Creek watershed.

Implementation Schedule

- To be determined.

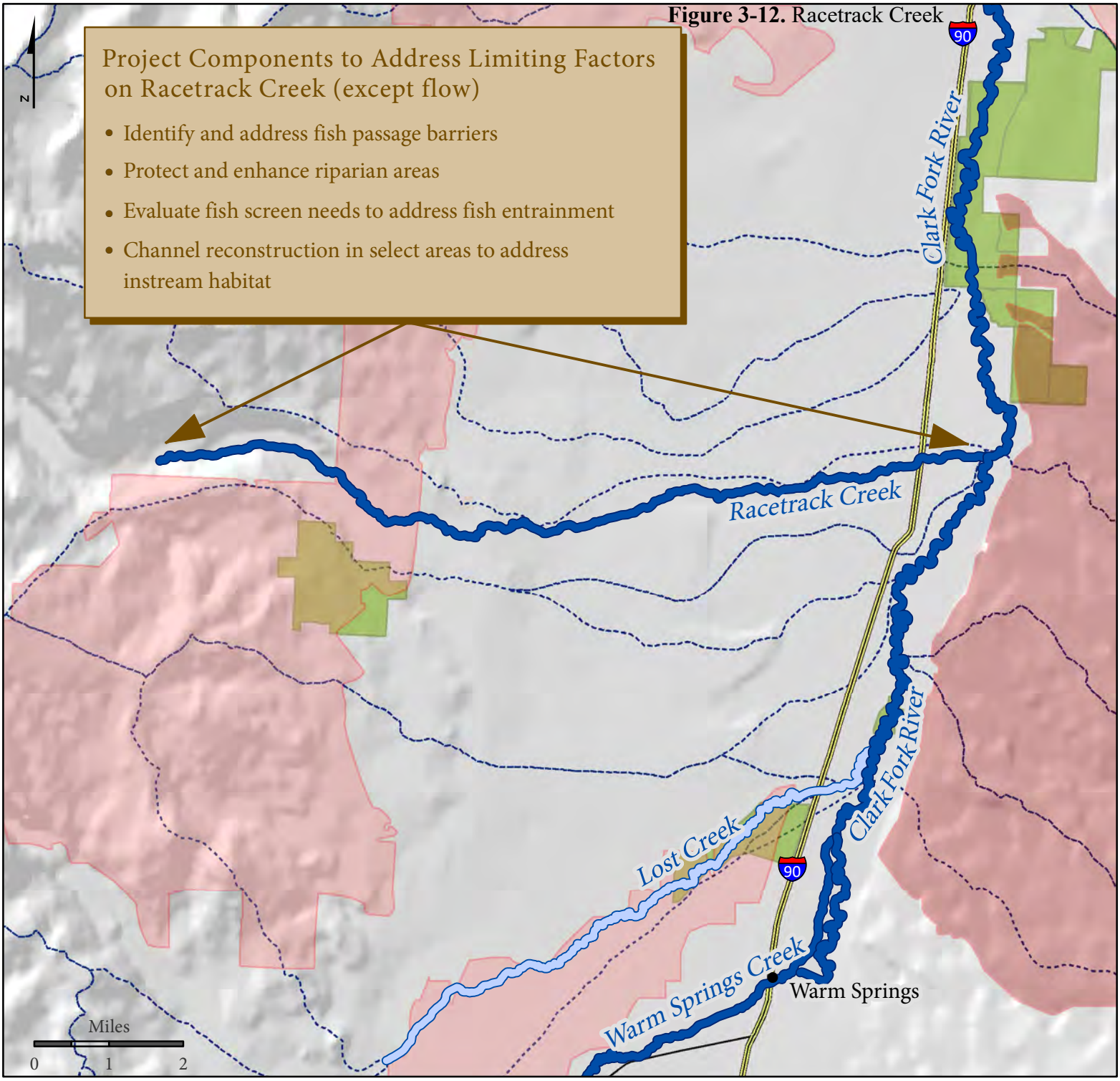
Table 3-12. Relationship of restoration plan components to limiting factors and encouraged activities for Racetrack Creek

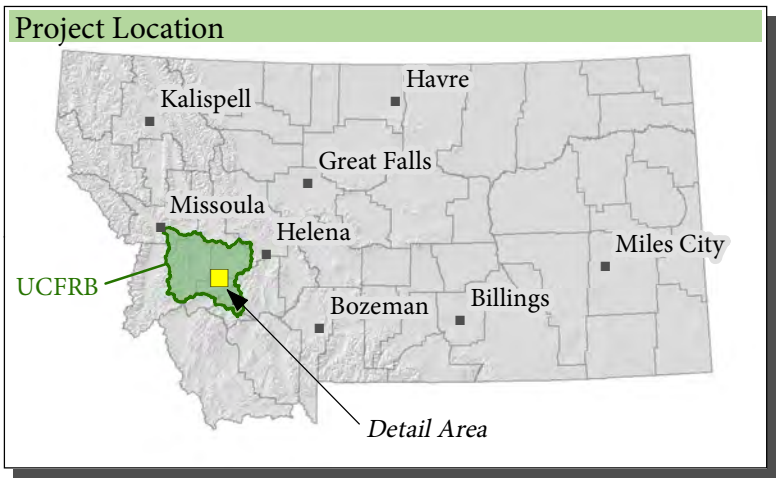
Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Flow augmentation set forth in Section 3.2.1.	Further analysis of flows set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage).	Replace or retrofit TBD irrigation diversions to improve fish passage.	Evaluation and implementation of diversion replacements or retrofits for fish passage.	Evaluate all diversions and culverts for fish passage. Completion of designs.	$200,000
Riparian Habitat	Riparian habitat improvement/protection (e.g., riparian fencing, woody shrub plantings).	Identify locations for TBD riparian protection/enhancement projects.	Habitat management (fencing, grazing management, off-stream water development), active revegetation where needed if natural recovery is not possible.	Evaluation of specific types and locations of riparian protection and enhancement. Completion of designs.	$50,000
Fish Entrainment	Ditch fish screening to reduce fish entrainment into irrigation ditches.	Install TBD fish screens on irrigation diversions.	Evaluation and installation of fish screens on diversions where necessary.	Evaluation of diversions with potential for fish entrainment. Completion of designs.	$359,960

Limiting factor	Encouraged activities to address limiting factors	Objectives	Project components to address limiting factor	Data gaps and feasibility issues	Estimated Cost
Streambank and Channel Reconstruction	Bank stabilization/channel reconstruction in select, localized areas where projects would benefit stream function.	Restore TBD linear feet of Racetrack Creek channel and streambanks.	Stream reconstruction.	Evaluate whether stream reconstruction is warranted. Complete channel and floodplain design.	$100,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$25,000
				Total	**$734,960**

TBD: To Be Determined as part of the project work plan development.

Figure 3-12. Racetrack Creek





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.14 Warm Springs Creek Watershed

Warm Springs Creek is a Priority 1 tributary to the Clark Fork River, draining a 100-square mile basin. Barker Creek, Twin Lakes Creek, Storm Lake Creek, and West Fork of Warm Springs Creek are listed as Priority 1 tributaries and Foster Creek is listed as Priority 2 tributary to Warm Springs Creek. The Warm Springs Creek watershed contains the farthest upstream population of bull trout in the Upper Clark Fork and is designated as Critical Bull Trout Habitat. In addition to bull trout and westslope cutthroat trout, the Warm Springs Creek fishery includes rainbow trout, brown trout, brook trout, and mountain whitefish.[26] The *2012 Process Plan* lists the following encouraged activities (listed in order of priority) for the Priority 1 and 2 tributaries in the Warm Springs Creek drainage that, when implemented, will improve the fishery of these tributaries, as well as the mainstem of the Clark Fork River.

In 2018, the Restorations Plans re-prioritized the proposed restoration actions based on new data and information gathered and analyzed since 2012. The new order of priority for encouraged restoration actions reflects a better understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The revised order of the proposed restoration actions follows.

Warm Springs Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches; Gardiner Diversion is a priority.

3. Fish Passage: Fish passage improvement

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands.

5. Instream Habitat: Channel reconstruction in select, localized areas where projects would benefit stream function; if/where found necessary after remediation efforts are completed.

Warm Springs Creek – Upper

1. Water Quantity: Flow augmentation/protection (e.g., water right purchases, water leases); throughout reach.

[26] Lindstrom, J., B. Liermann, and R. Kreiner. 2008. *An Assessment of Fish Populations and Riparian Habitat in Tributaries of the Upper Clark Fork Basin*. Montana Fish, Wildlife and Parks.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches throughout reach.

3. Riparian Habitat: Riparian habitat protection/enhancement (e.g., riparian fencing, conservation easements, woody shrub plantings); on private grazing lands.

4. Instream Habitat: Fish habitat improvement; in simplified/channelized reaches along Highway 1 corridor. Primarily the accelerated placement of large woody debris into the channel.

Barker Creek

1. Fish Passage: Fish passage improvement, if/where found necessary.

2. Riparian Habitat: Riparian habitat protection (or improvement if appropriate) on private lands near mouth.

Twin Lakes Creek

1. Fish Passage: Selective fish passage structure; at existing Silver Lake diversion.

2. Water Quantity: Flow augmentation/protection; below Silver Lake Diversion.

3. Fish Passage Improvement: At highway/road crossings near mouth.

4. Fish Entrainment: Ditch screening to reduce fish entrainment; at Silver Lake diversion.

5. Riparian Habitat: Riparian habitat protection; on private lands near mouth.

Storm Lake Creek

1. Fish Passage: Selective fish passage structure; at existing Silver Lake diversion.

2. Water Quantity: Flow augmentation/protection; between Storm Lake and Silver Lake.

3. Instream Habitat: Fish habitat improvement; on lower mile where channelized/ditched.

4. Riparian Habitat: Riparian habitat protection; on private lands near mouth.

Foster Creek

1. Fish Passage: Fish passage improvement, if/where found necessary.

2. Riparian Habitat: Riparian habitat protection (or improvement if appropriate); primarily on private lands near mouth.

Proposed Actions

Actions specific to the Warm Springs Creek watershed are set forth below, summarized in Table 3-13, and shown in Figure 3-13.

1. Flow Quantity: Flow needs for Warm Springs Creek watershed will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

2. Fish Entrainment: All diversions in the Warm Springs Creek drainage have a potential for fish entrainment. Entrainment evaluation for all diversions will be performed and fish screens designed and implemented if warranted.

3. Fish Passage Improvement: Active diversion dams and other fish barriers on Warm Springs Creek,[27]Twin Lakes Creek, Storm Lake Creek, and the West Fork of Warm Springs Creek are known to impair fish passage in the Warm Springs watershed. Removal of culvert on West Fork of Warm Springs Creek will be implemented. Further analyses will first be performed on all structures as native trout species protection within this watershed needs to be evaluated prior to implementation of design and implementation of fish passage actions or where appropriate installation of fish barriers are needed to protect native trout within the Warm Springs Creek watershed and to the Clark Fork River.

4. Riparian Habitat Protection/Enhancement: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

5. Instream Habitat Improvement: Channel reconstruction will be implemented only after implementation of other actions and subsequent evaluation determines reconstruction is warranted. Habitat conditions on 6 miles upstream of Meyers Dam may be improved for through placement of large woody debris.

The actions within the Warm Springs Creek watershed will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the *2012 Process Plan*, taking into consideration the restoration concept proposals offered the public scoping process. The concept proposals submitted by the public for the Warm Springs Creek watershed are set forth in abstracts #1, 5a, 12, 13, 62, and 63 (Appendix A). The proposed actions for this watershed generally cover the concepts in the abstracts. These concepts adequately focus on factors within the Warm Springs Creek watershed which limit restoration in the Clark Fork River mainstem, without the need for

[27] WRC/TU. 2011. Upper Clark Fork diversion inventory. Watershed Restoration Council and Trout Unlimited.

reliance on additional State generated alternatives. Besides the addition of the proposed removal of the culvert on West Fork of Warm Springs Creek (abstract G11).

Several of the ideas included in abstract #1 concerning the diversions at Myers Dam, Twin Lakes Creek and Storm Lake are addressed in Section 3.2.1 on Flow Restoration. Note that abstract #5 was subdivided into three projects and that only the fish trap component (abstract #5a) is included here for further consideration. The concept proposal set forth in abstract #5b for a fish hatchery at Myers Dam is not included because this concept, at this time, does not fit with the goals and objectives for restoring the Clark Fork River and Silver Bow Creek fishery.

Abstract #69 proposes active stream restoration along 35 miles of Warms Springs Creek. Evaluation for stream restoration will be performed for Warm Springs Creek; however, 35 miles of stream restoration is not technically feasible, cost effective or have a high-cost benefit. The amount of stream restoration considered by the State in its cost estimate provided is considered adequate for the amount of stream restoration judged to be cost-effective at this time.

No new concept proposals were received in 2018.

In 2023, public proposal #115 suggested a watershed evaluation and prioritization of aquatic resources. The State will complete a watershed evaluation to prioritize the remaining restoration projects.

Costs

The costs to implement the Warm Springs Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of around $1.~~6~~8 million (increased by $200,000 in 2023) is preliminarily estimated to implement the proposed actions in the Warm Springs Creek. In 2023, the State proposes $100,000 from the Aquatic fund and 10% of the reimbursement funds from Parrot Tailings project after the first $500,000 goes to Silver Bow Creek, not to exceed $100,000, go to Warm Springs Creek.

Implementation Schedule

~~2018:~~

- ~~Implement fish passage and fish screen at the Gardiner Diversion.~~

~~2019~~2024:

- Implement fish trap/selective passage structures at Myers Dam, Silver Lake, Twin Lakes Creek, and Storm Lake Creek diversions.

2025:

- Implement fish passage and fish screen at the Gardiner Diversion.

Table 3-13. Relationship of restoration plan components to limiting factors and encouraged activities for the Warm Springs Creek Watershed

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows as set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions and structures (e.g., diversion redesign or retrofit to allow for fish passage).	Provide selective fish passage in the Warm Springs Creek watershed.	Implement fish trap/selective passage structures at select diversions or culverts. Other fish passage projects TBD.	Evaluate diversions and road crossings for fish passage. Completion of designs.	$836,900
Fish Entrainment	Ditch fish screening projects at diversions in the Warm Springs Creek watershed.	Implement TBD fish screen projects in the Warm Springs Creek watershed.	Implement fish screening projects at diversions where warranted.	Evaluate need for fish screens at Twin Lakes Creek and Storm Lake Creek diversions, and all other diversions. Completion of designs.	$577,920
Riparian Habitat	Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands along Warm Springs Creek and priority tributaries.	Identify riparian protection and/or enhancement projects.	Habitat management (fencing, grazing management, off-stream water development), active revegetation where needed if natural recovery is not possible.	Evaluate specific types and locations of riparian protection/enhancement. Completion of designs.	$98,000

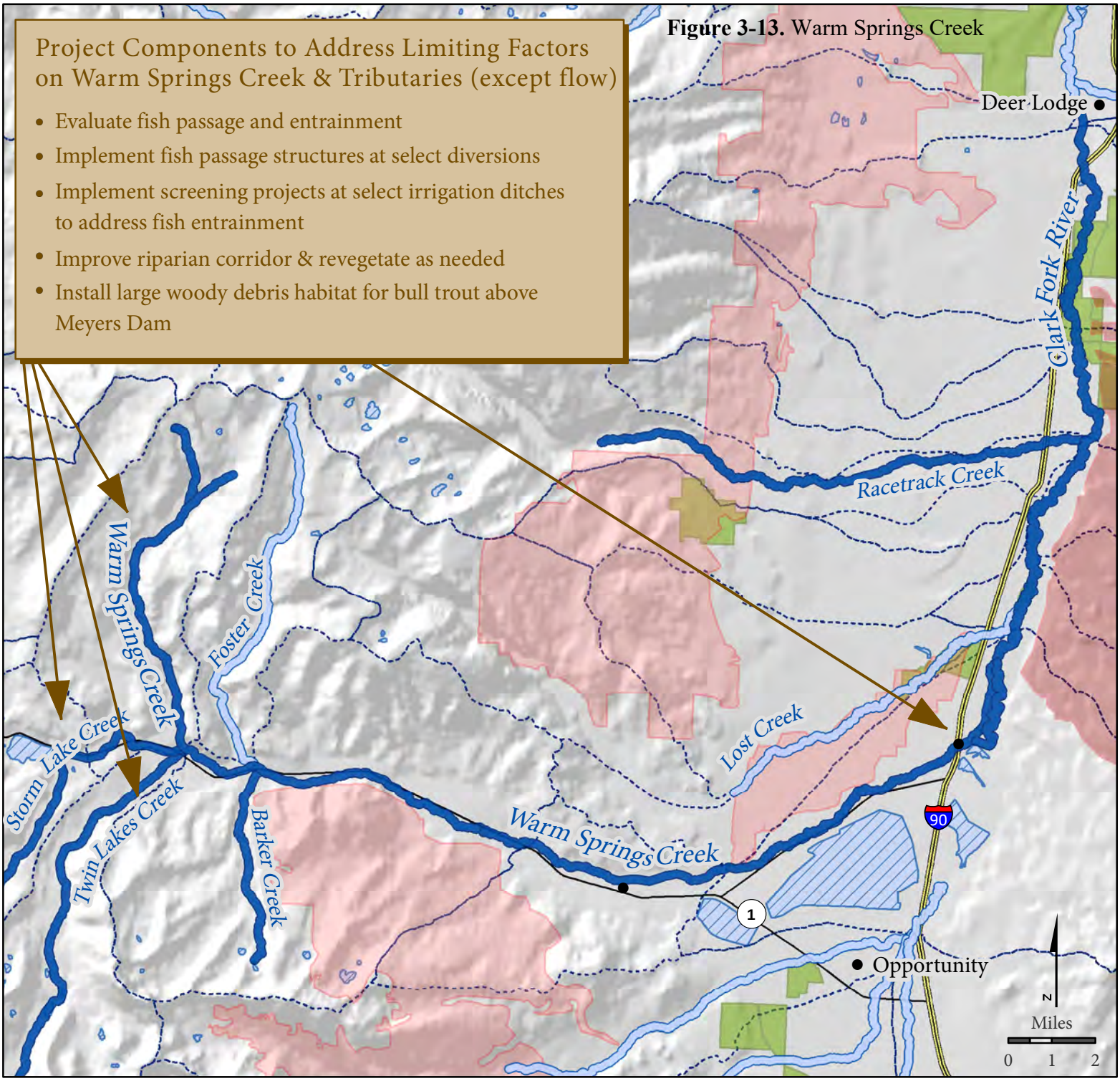
Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Instream Habitat	Channel reconstruction in select, localized areas of lower Warm Springs Creek where projects would benefit stream function.	Improve TBD feet of instream habitat in Warm Springs Creek above Meyers Dam. Other instream habitat objectives TBD.	Install large woody debris habitat in Warm Springs Creek above Meyers Dam. Other reconstruction as warranted.	Evaluation of additional habitat improvements in reaches of Warm Springs Creek Completion of design.	$35,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$63,546
				Total	**$1,6811,366**

TBD: To Be Determined as part of the project work plan development.

Figure 3-13. Warm Springs Creek

Project Components to Address Limiting Factors on Warm Springs Creek & Tributaries (except flow)

- Evaluate fish passage and entrainment
- Implement fish passage structures at select diversions
- Implement screening projects at select irrigation ditches to address fish entrainment
- Improve riparian corridor & revegetate as needed
- Install large woody debris habitat for bull trout above Meyers Dam



Project Location

NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.15 Basin Creek Watershed

Basin Creek is a headwaters tributary to Silver Bow Creek that drains for approximately 16 miles before joining Blacktail Creek to form Silver Bow Creek within the City of Butte. The upper reach of Basin Creek, upstream of Basin Creek Reservoir, is a Priority 1 area. Upper Basin Creek contains genetically pure Westslope cutthroat trout and no nonnative trout species. In 2018 the proposed restoration actions were prioritized based on available data and information gathered and analyzed by FWP. The order of priority for encouraged restoration actions reflects current understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The following is an encouraged restoration activity for Upper Basin Creek that, when implemented, will improve the fishery of the tributary as well as the fishery in Silver Bow Creek mainstem.

Basin Creek – Upper

1. Fish Passage: Fish passage improvement at select irrigation diversions (e.g., diversion redesign or retrofit to allow for fish passage); throughout reach.

Proposed Actions

Actions specific to the Basin Creek watershed are set forth below, summarized in Table 3-14, and shown in Figure 3-14.

1. Fish Passage: Improve fish passage at sedimentation impoundment near the inlet to the lower reservoir to provide connection to 3 miles of spawning habitat.

The actions within the Basin Creek watershed will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the 2018 update to the *Aquatic Prioritization Plan*, taking into consideration the restoration concept proposal offered the public scoping process. The concept proposal submitted by the public for the Basin Creek watershed is set forth in abstract #97 (Appendix A). The proposed action for this watershed generally covers the concepts in the abstract. This concept adequately focuses on factors within the Basin Creek watershed which limit restoration in the Silver Bow Creek mainstem, without the need for reliance on additional State generated alternatives.

Costs

The costs to implement the Basin Creek actions are estimated by combining the costs for the concept proposal plus additional funds due to the conceptual nature of project proposal and additional unknown costs associated with project implementation (e.g., engineering, permitting,

fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $300,000 is preliminarily estimated to implement the proposed actions in the Basin Creek Watershed.

In 2023, the State re-allocates the remaining funding ($150,000) from this watershed to other Aquatic priorities after the project proposed in 2018 was delayed for numerous years (5 to 7 years) at the request of Butte-Silver Bow.

Implementation Schedule

2019:

- Evaluate fish passage issues at sedimentation pond inlet and design fish passage project.

2020:

- Implement fish passage project.

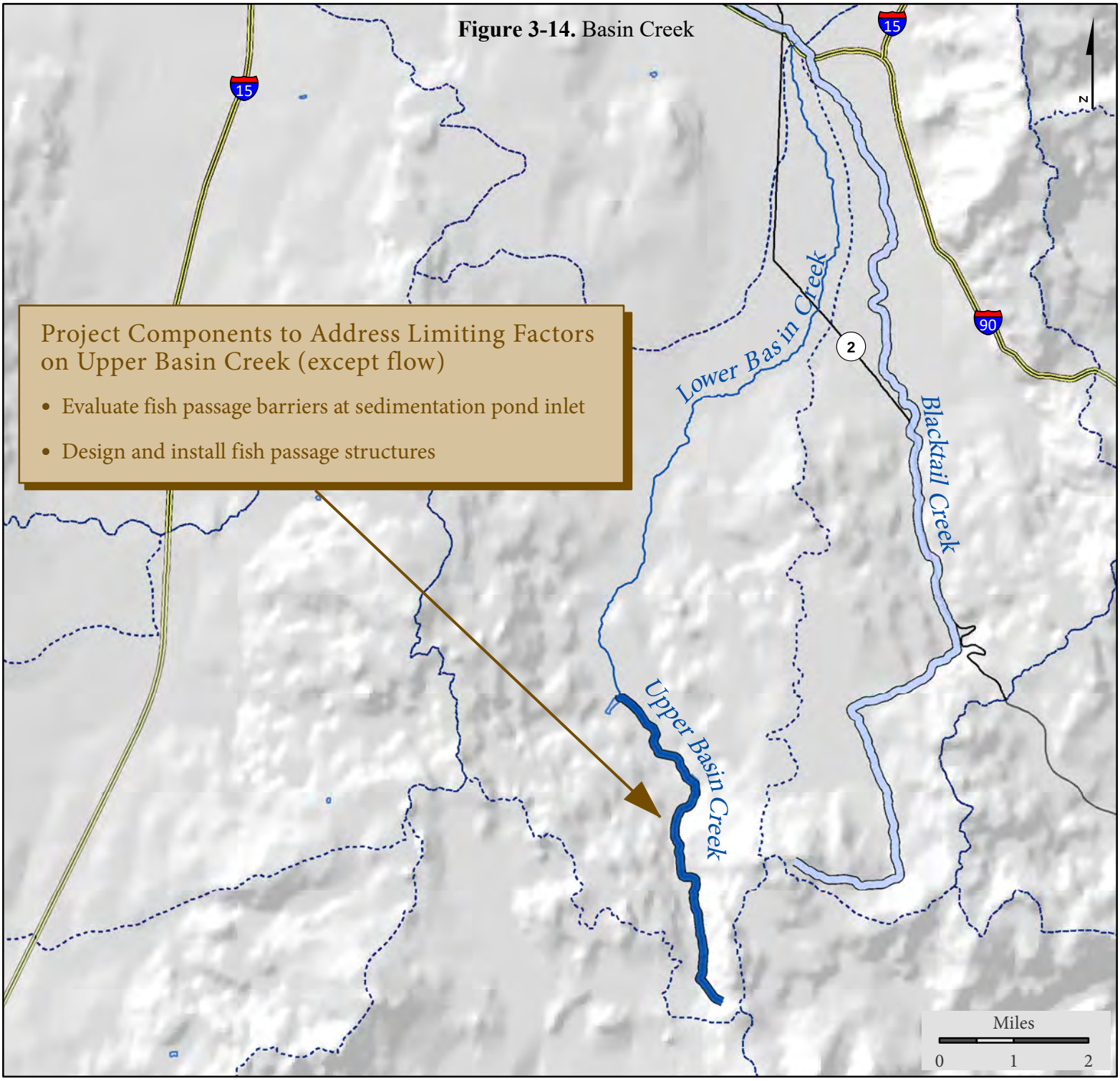
2023: To be determined.

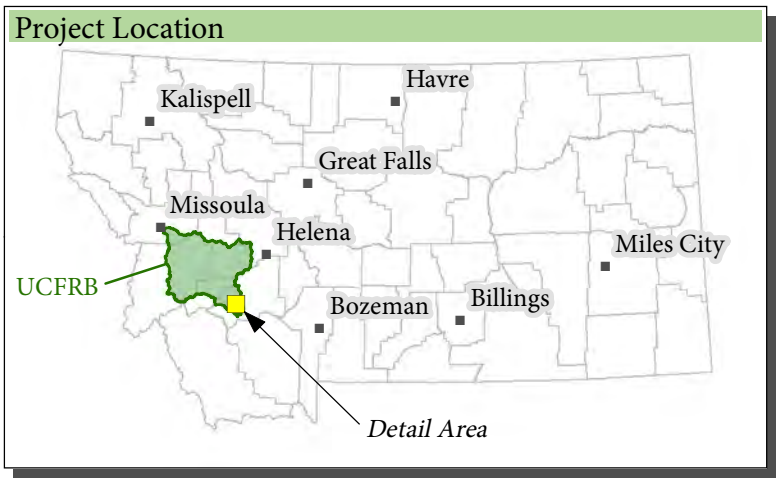
Table 3-14. Relationship of restoration plan components to limiting factors and encouraged activities for the Basin Creek Watershed

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Fish Passage	Fish passage improvement at select irrigation diversions and structures (e.g., diversion redesign or retrofit to allow for fish passage).	Provide fish passage in the Upper Basin Creek watershed.	Implement fish passage structures at other fish passage projects TBD.	Evaluate barrier to migration. Completion of designs.	$275,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$25,000
				Total	**$~~300,0000~~**

TBD: To Be Determined as part of the project work plan development.

Figure 3-14. Basin Creek





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Conservation Easement
- Subwatershed Boundary
- Lake / Pond

3.2.2.16 Gold Creek Watershed

Gold Creek is a Priority 2 tributary to the Clark Fork River that drains for approximately 15 miles before reaching the Clark Fork River. The lower portion of Gold Creek supports high densities of juvenile brown trout, and this area has been documented to be a major source of brown trout recruitment to the Clark Fork River. In 2018 the proposed restoration actions were prioritized based on available data and information gathered and analyzed by FWP. The order of priority for encouraged restoration actions reflects current understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The following are encouraged restoration activities for Gold Creek that, when implemented, will improve the fishery of the tributary as well as the fishery in the mainstem of the Clark Fork River.

Gold Creek – Lower

1. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches.

3. Fish Passage: Fish passage improvement.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands.

Proposed Actions

Actions specific to the Gold Creek watershed are set forth below, summarized in Table 3-15, and shown in Figure 3-15.

1. Flow Quantity: Flow needs for Gold Creek watershed will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

2. Fish Entrainment: All diversions in the Gold Creek drainage have a potential for fish entrainment. Entrainment evaluation for all diversions will be performed and fish screens designed and implemented if warranted.

3. Fish Passage Improvement: Active diversion dams and other fish barriers on Gold Creek are known to impair fish passage in the Gold Creek watershed. Fish passage evaluation for all diversions will be performed and replacement or retrofits will be designed and implemented if warranted.

4. Riparian Habitat Protection/Enhancement: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

The actions within the Gold Creek watershed will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the 2018 update to the *Aquatic Prioritization Plan*, taking into consideration the restoration concept proposal offered the public scoping process. The concept proposal submitted by the public for the Gold Creek watershed is set forth in abstract #84 (Appendix A). The proposed action for this watershed generally covers the concepts in the abstract. These concepts adequately focus on factors within the Gold Creek watershed which limit restoration in the Clark Fork River mainstem, without the need for reliance on additional State generated alternatives.

No new concept proposals were received in 2023.

Costs

The costs to implement the Gold Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $600,000 is preliminarily estimated to implement the proposed actions in the Gold Creek Watershed.

Implementation Schedule

2019:

- Evaluate fish passage and entrainment issues in Gold Creek.
- Evaluate riparian habitat.

2020 and ongoing:

- Design fish passage and entrainment reduction projects.

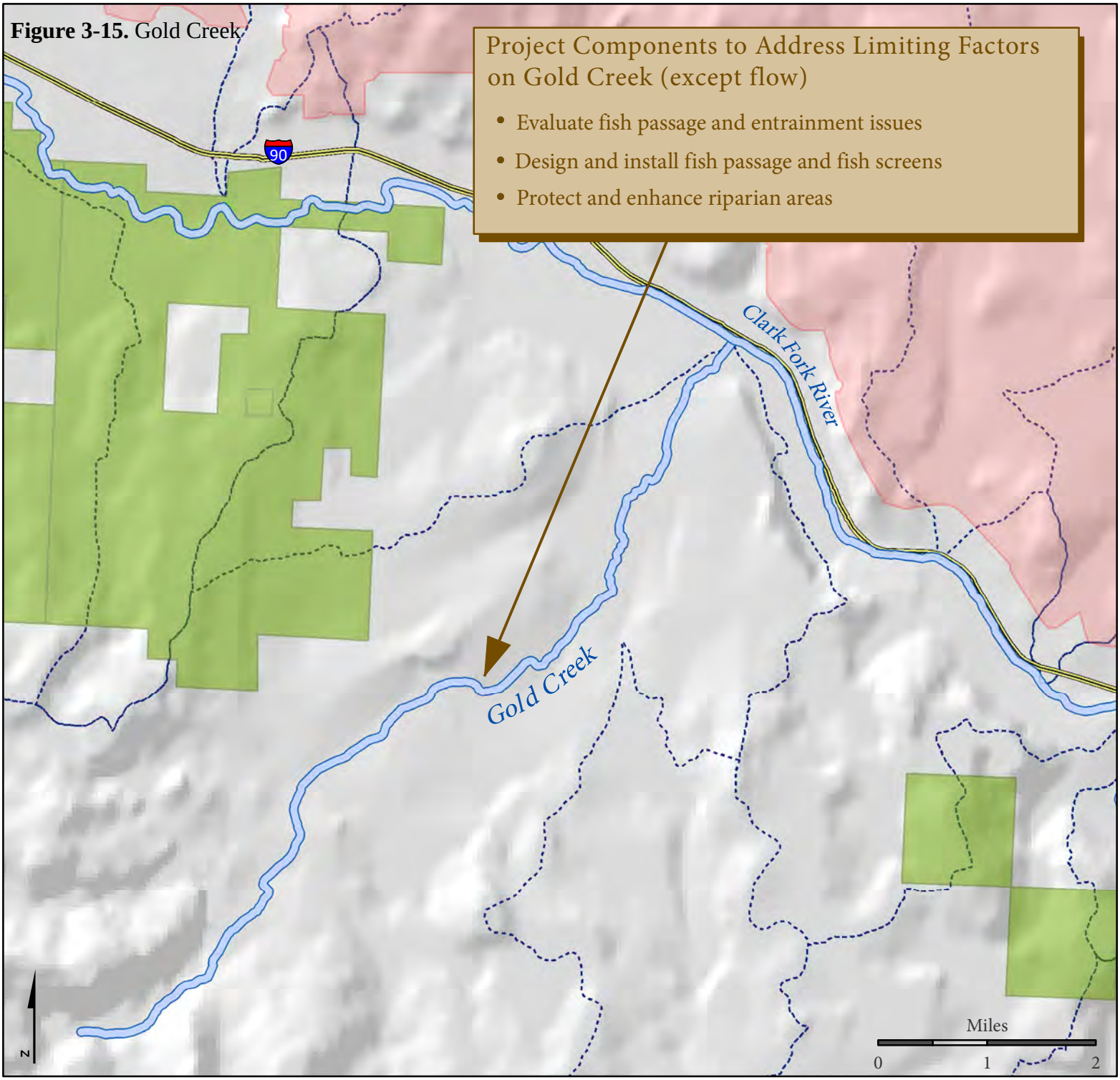
- Implement fish passage and entrainment reduction projects.
- Evaluate watershed budget and develop riparian projects based on available funds.

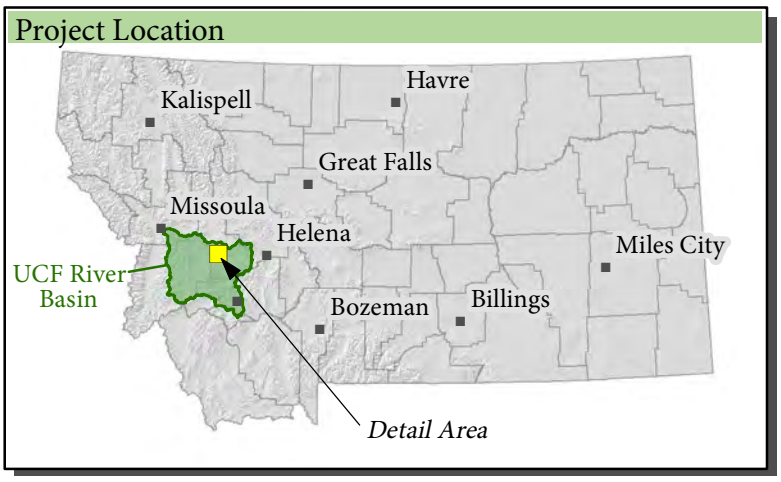
Table 3-15. Relationship of restoration plan components to limiting factors and encouraged activities for the Gold Creek Watershed

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows as set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions and structures (e.g., diversion redesign or retrofit to allow for fish passage).	Provide fish passage in the Gold Creek watershed.	Implement fish passage structures at select diversions or culverts. Other fish passage projects TBD.	Evaluate diversions and road crossings for fish passage. Completion of designs.	$150,000
Fish Entrainment	Ditch fish screening projects at diversions in the Gold Creek watershed.	Implement TBD fish screen projects in the Gold Creek watershed.	Implement fish screening projects at diversions where warranted.	Evaluate the need for fish screens at all other diversions. Completion of designs.	$250,000
Riparian Habitat	Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands along Gold Creek and priority tributaries.	Identify riparian protection and/or enhancement projects.	Habitat management (fencing, grazing management, off-stream water development), active revegetation where needed if natural recovery is not possible.	Evaluate specific types and locations of riparian protection/enhancement. Completion of designs.	$150,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$50,000
				Total	**$600,000**

TBD: To Be Determined as part of the project work plan development.

Figure 3-15. Gold Creek.





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.17 O'Neill Creek Watershed

O'Neil Creek is Priority 2 tributary to the Clark Fork River that drains for approximately 5 miles before entering the Clark Fork upstream of the Little Blackfoot River. Connectivity between the O'Neil Creek and the Clark Fork River is seasonal in most years, with the lower reaches appearing to support flow only during spring runoff. O'Neil Creek supports a genetically pure Westslope cutthroat trout population, and this population likely provides a source of recruitment to the Clark Fork River when flows allow. In 2018 the proposed restoration actions were prioritized based on available data and information gathered and analyzed by FWP. The order of priority for encouraged restoration actions reflects current understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The following are encouraged restoration activities for O'Neill Creek that, when implemented, will improve the fishery of the tributary as well as the fishery in the mainstem of the Clark Fork River.

O'Neill Creek

1. Fish Passage: Fish passage improvement.

2. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches.

3. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands.

Proposed Actions

Actions specific to the O'Neill Creek watershed are set forth below, summarized in Table 3-16, and shown in Figure 3-16.

1. Fish Passage Improvement: Active diversion dams and other fish barriers on O'Neill Creek are known to impair fish passage in the O'Neill Creek watershed. Further analyses will first be performed on all structures prior to implementation of design and implementation of fish passage actions.

2. Fish Entrainment: All diversions in the O'Neill Creek drainage have a potential for fish entrainment. Entrainment evaluation for all diversions will be performed and fish screens designed and implemented if warranted.

3. Flow Quantity: Flow needs for O'Neill Creek watershed will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

4. Riparian Habitat Protection/Enhancement: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

The actions within the O'Neill Creek watershed will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the 2018 update to the *Aquatic Prioritization Plan*, taking into consideration the restoration concept proposal offered the public scoping process. The concept proposal submitted by the public for the O'Neill Creek watershed is set forth in abstract #86 (Appendix A). The proposed action for this watershed generally covers the concepts in the abstract. These concepts adequately focus on factors within the O'Neill Creek watershed which limit restoration in the Clark Fork River mainstem, without the need for reliance on additional State generated alternatives.

No new concept proposals were received in 2023.

Costs

The costs to implement the O'Neill Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $200,000 is preliminarily estimated to implement the proposed actions in the Gold Creek Watershed.

Implementation Schedule

2019:

- Evaluate fish passage and entrainment issues in Lower Gold Creek.
- Evaluate riparian habitat.

2020 and ongoing:

- Design fish passage and entrainment reduction projects.

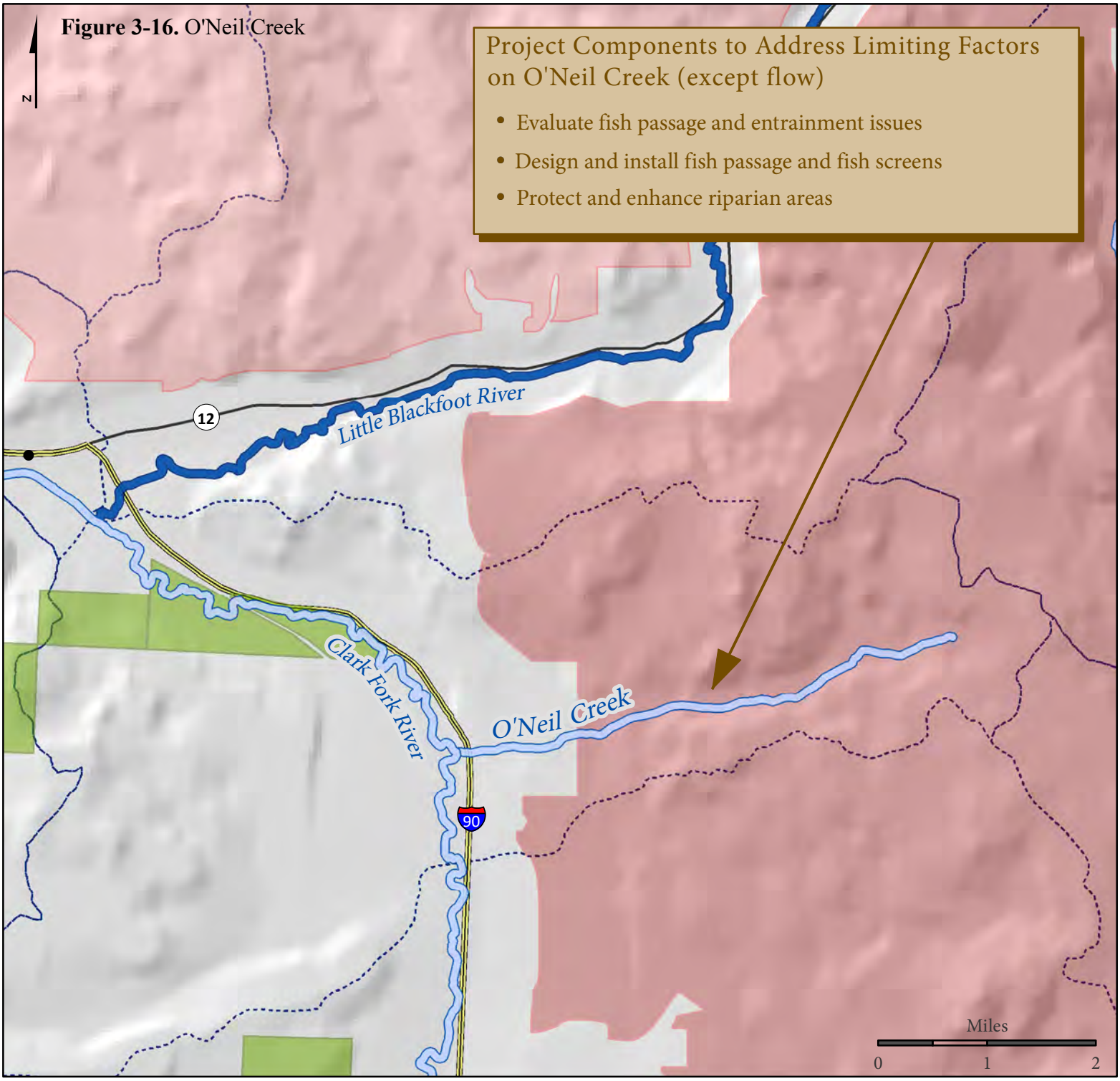
- Implement fish passage and entrainment reduction projects.
- Evaluate watershed budget and develop riparian projects based on available funds.

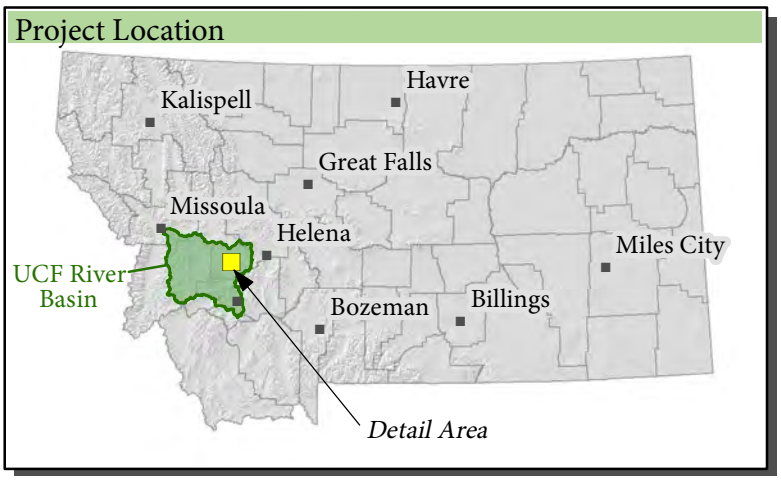
Table 3-16. Relationship of restoration plan components to limiting factors and encouraged activities for the O'Neill Creek Watershed

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows as set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions and structures (e.g., diversion redesign or retrofit to allow for fish passage).	Provide fish passage in the O'Neill Creek watershed.	Implement fish passage structures at select diversions or culverts. Other fish passage projects TBD.	Evaluate diversions and road crossings for fish passage. Completion of designs.	$50,000
Fish Entrainment	Ditch fish screening projects at diversions in the O'Neill Creek watershed.	Implement TBD fish screen projects in the O'Neill Creek watershed.	Implement fish screening projects at diversions where warranted.	Evaluate the need for fish screens at all other diversions. Completion of designs.	$90,000
Riparian Habitat	Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands along O'Neill Creek.	Identify riparian protection and/or enhancement projects.	Habitat management (fencing, grazing management, off-stream water development), active revegetation where needed if natural recovery is not possible.	Evaluate specific types and locations of riparian protection/enhancement. Completion of designs.	$50,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$10,000
				Total	**$200,000**

TBD: To Be Determined as part of the project work plan development.

Figure 3-16. O'Neil Creek





NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.2.18 Rock Creek Watershed

Rock Creek is a Priority 2 Tributary to the Clark Fork River that flows for 52 miles before joining the Clark Fork River upstream of the town of Clinton and downstream of the town of Drummond. The mainstem of Rock Creek contains robust populations of Westslope cutthroat trout, rainbow trout, and brown trout which, combined with excellent public access, makes Rock Creek one of the most popular fisheries in Montana. Bull trout are found throughout mainstem Rock Creek and comprise a large meta-population with fish moving throughout the drainage and the Clark Fork River to complete their life history. Rock Creek is also a major source of Westslope cutthroat trout and brown trout recruitment to the Clark Fork River. In 2018 the proposed restoration actions were prioritized based on available data and information gathered and analyzed by FWP. The order of priority for encouraged restoration actions reflects current understanding of drainage scale fish population limiting factors and the cost-benefit of proposed actions. The following are encouraged restoration activities for Rock Creek that, when implemented, will improve the fishery of the tributary as well as the fishery in the mainstem of the Clark Fork River.

Rock Creek

1. Fish Entrainment: Ditch screening to reduce fish entrainment into irrigation ditches.

2. Fish Passage: Fish passage improvement.

3. Water Quantity: Flow augmentation (e.g., water right purchases, water leases, irrigation efficiency improvements); throughout drainage, with greater preference given to projects where flows are protectable to or beyond the mouth.

4. Riparian Habitat: Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands.

Proposed Actions

Actions specific to the Rock Creek watershed are set forth below, summarized in Table 3-17, and shown in Figure 3-17.

1. Fish Entrainment: All diversions in the Rock Creek drainage have a potential for fish entrainment. Entrainment evaluation for all diversions will be performed and fish screens designed and implemented if warranted.

2. Fish Passage Improvement: Active diversion dams and other fish barriers on Rock Creek have the potential to impair fish passage in the Rock Creek watershed. Fish passage evaluation for all diversions will be performed and replacement or retrofits will be designed and implemented if warranted.

3. Flow Quantity: Flow needs for Rock Creek watershed will be addressed through the Flow Augmentation process set forth in Section 3.2.1.

4. Riparian Habitat Protection/Enhancement: Further data collection and other information gathering will first be performed to determine the specific types and location of the following actions: fencing, off-stream stock water development, and other grazing management improvements.

The actions within the Rock Creek watershed will have high net benefits with respect to accomplishing aquatic restoration goals and objectives, provide a cost-effective implementation approach, and are technically feasible to implement.

These actions were based on activities identified in the 2018 update to the *Aquatic Prioritization Plan*, taking into consideration the restoration concept proposals offered the public scoping process. The concept proposals submitted by the public for the Rock Creek watershed is set forth in abstracts #87 and #88 (Appendix A). The proposed actions for this watershed generally cover the concepts in the abstract. These concepts adequately focus on factors within the Rock Creek watershed which limit restoration in the Clark Fork River mainstem, without the need for reliance on additional State generated alternatives.

Costs

The costs to implement the Rock Creek actions are estimated by combining the costs for the concept proposals plus additional funds due to the conceptual nature of project proposals and additional unknown costs associated with project implementation (e.g., engineering, permitting, fluctuating construction material costs, etc.). As costs for individual projects within the watershed are conceptual, funding individual projects within the watershed will be based on identified priorities, cost-effectiveness, and cost benefit, rather than concept proposal estimates.

A total cost of $600,000 is preliminarily estimated to implement the proposed actions in the Rock Creek Watershed.

In 2023, a proposal was received (#116) to add additional funds to Rock Creek to better enable project partners to pursue matching funds. In 2023, ~~an~~the State proposes an additional $600,000 from the Aquatic fund be allocated to the Rock Creek watershed to fund additional priority projects.

Implementation Schedule

2019:

- Evaluate fish passage and entrainment issues in Rock Creek.

- Evaluate riparian habitat.

2020:

- Design fish passage and entrainment reduction projects.

2021 – Ongoing in 2024:

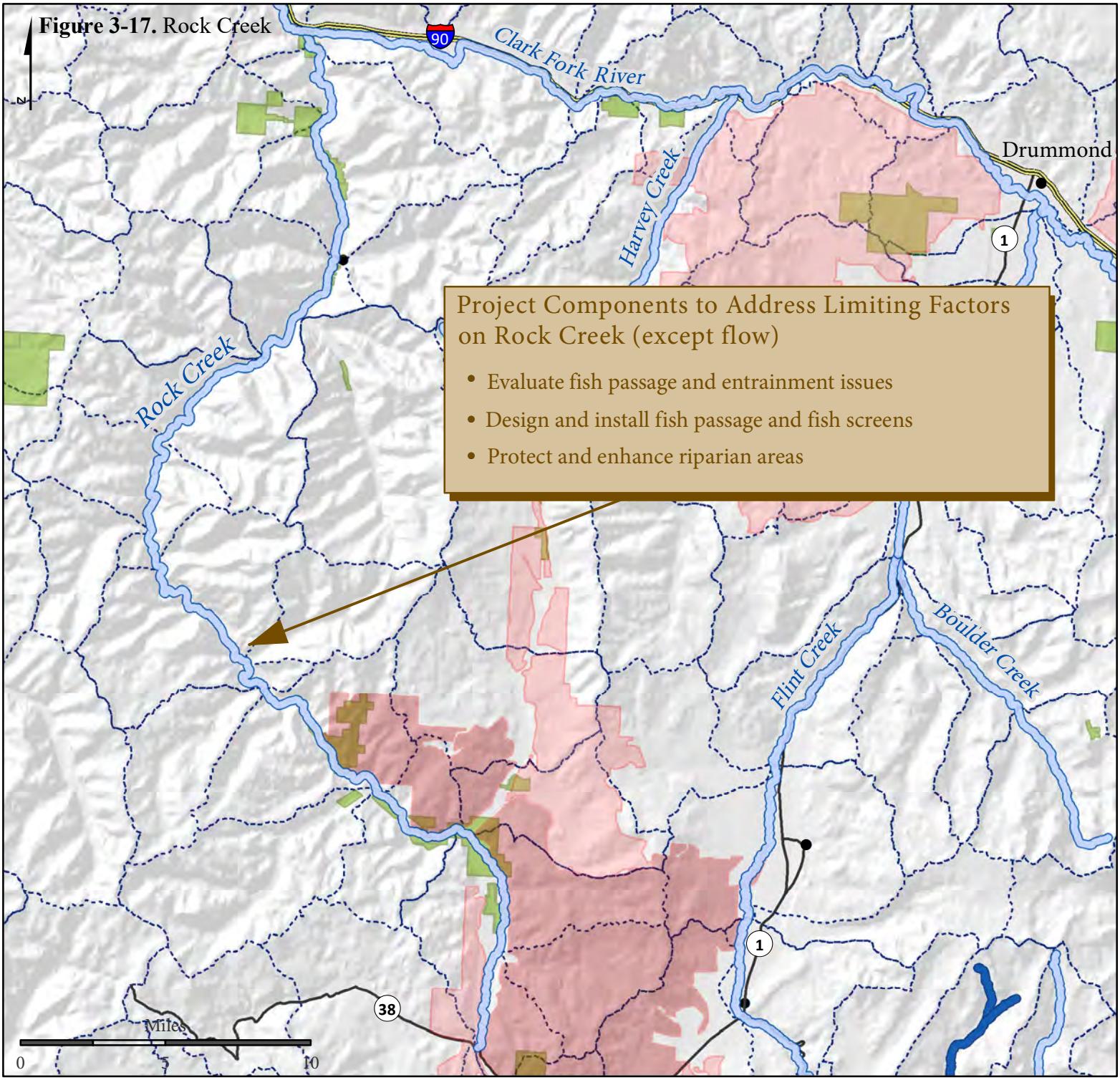
- Implement fish passage and entrainment reduction projects.
- Evaluate watershed budget and develop riparian projects based on available funds

Table 3-17. Relationship of restoration plan components to limiting factors and encouraged activities for the Rock Creek Watershed

Limiting Factor	Encouraged Activities To Address Limiting Factors	Objectives	Project Components To Address Limiting Factor	Data Gaps And Feasibility Issues	Estimated Cost
Water Quantity	Flow augmentation.	Increase instream flows by TBD cfs.	Augmentation of flows as set forth in Section 3.2.1.	Further analysis of flows as set forth in Section 3.2.1.	N/A
Fish Passage	Fish passage improvement at select irrigation diversions and structures (e.g., diversion redesign or retrofit to allow for fish passage).	Provide fish passage in the Rock Creek watershed.	Implement fish passage structures at select diversions or culverts. Other fish passage projects TBD.	Evaluate diversions and road crossings for fish passage. Completion of designs.	$~~14~~25,000
Fish Entrainment	Ditch fish screening projects at diversions in the Rock Creek watershed.	Implement TBD fish screen projects in the Rock Creek watershed.	Implement fish screening projects at diversions where warranted.	Evaluate the need for fish screens at all other diversions. Completion of designs.	$~~36~~50,000
Riparian Habitat	Riparian habitat protection/enhancement (e.g., conservation easements, riparian fencing); on private grazing lands along Rock Creek.	Identify riparian protection and/or enhancement projects.	Habitat management (fencing, grazing management, off-stream water development), active revegetation where needed if natural recovery is not possible.	Evaluate specific types and locations of riparian protection/enhancement. Completion of designs.	$100,000
Data gaps and feasibility questions	Develop overall project work plan.	Complete integrated project work plans for each restoration component.	Fill data gaps and answer feasibility questions.	Described above for each restoration component.	$25,000
				Total	**$~~600,000~~1,200,000**

TBD: To Be Determined as part of the project work plan development.

Figure 3-17. Rock Creek



Project Components to Address Limiting Factors on Rock Creek (except flow)

- Evaluate fish passage and entrainment issues
- Design and install fish passage and fish screens
- Protect and enhance riparian areas

Project Location

NRD Restoration Priority Areas

- Priority 1 Stream Area
- Priority 2 Stream Area
- Priority 1 Terrestrial Area
- Priority 2 Terrestrial Area
- Conservation Easement
- Subwatershed Boundary

3.2.3 Aquatic Resource Monitoring and Maintenance Plan

Monitoring is a critical component of the UCFRB aquatic restoration. Development of consistent monitoring protocols will allow the State and others to evaluate the effectiveness of the restoration actions being implemented and be able to make adaptive management and maintenance decisions about all the projects. Monitoring provides a mechanism to determine if the restoration projects are trending toward or are meeting the goals of this restoration plan and helps to guide adaptive management actions and site maintenance.

The UCFRB aquatic monitoring and maintenance plan will be tailored to the specific limiting factors that all the projects collectively propose to target water quantity, riparian habitat enhancement and protection, fish passage, fish entrainment, and instream aquatic habitat improvements. By addressing the limiting factors of the aquatic resources of the UCFRB, measurable improvements to aquatic habitat and biological populations should occur. For consistency, the parameters selected for monitoring will be standardized so the other similar restoration activities within the Basin and the overall performance of all the restoration activities in the Basin can be adequately measured. Also, monitoring parameters may need to be modified, if in the future, if they are determined to not adequately measure the success of the restoration activities.

The State proposes to develop an aquatic monitoring and maintenance plan specific to the aquatic restoration projects implemented with NRD funds. This plan will specifically detail the monitoring and maintenance activities and how the monitoring will be consistent throughout the basin (e.g., riparian habitat revegetation monitoring will be consistently monitored at all sites). It will not duplicate other monitoring efforts in the UCFRB, but specifically target the NRD-funded projects so that an adaptive management program can be established to ensure projects are not making the same mistake over and over again.

There are three levels of monitoring that will be developed in the aquatic monitoring and maintenance plan: project performance monitoring, watershed monitoring, and basin monitoring.

1. The project performance monitoring will look at individual projects. Project performance monitoring will be completed to ensure the project was completed as proposed, to determine if the project is functioning as proposed (fencing is up, off stream water is working). Flow augmentation project monitoring activities would include a water commissioner for applicable tributaries projects, as further explained in Section 3.2.1 on flow restoration.

2. The watershed monitoring will assess whether the watershed is functioning and if the restoration actions implemented to address the watersheds limiting factors are effective. For example, since improving fish passage is a goal in many of the watersheds, this monitoring plan will evaluate whether fish passage is occurring effectively and whether there is conductivity with the Clark Fork River or Silver Bow Creek mainstems. Similarly, since another goal is the preservation of native trout species in some streams, monitoring will be

completed to determine the trout population status within a particular watershed. Aquatic monitoring to measure the response of the acquired additional instream flow that would occur as a result of flow augmentation projects is another example of watershed monitoring.

3. The basin monitoring will measure the effectiveness of all the restoration projects and how they are contributing to the recovery of the Silver Bow Creek and Clark Fork River mainstem fisheries. Where fish come from and how different tributaries are contributing to the mainstems would be investigated with respect to habitat improvements. This monitoring would be implemented twice at five-year intervals (2017 and 2022) in order to assess the overall basin fishery and the effects of the NRD funded and implemented projects. An example of this type of monitoring that may be conducted is the four-year NRD-funded fish movement study by Montana State University completed in 2012.

In 2023, the State allocates funds to investigate the status of the fish population of the mainstem Clark Fork River between Warm Springs Ponds and Garrison (Reach A). ($1.0 million from Aquatic fund). These investigations will help identify the factors impacting the mainstem fish populations, which in 2023 were at a historic low on the Clark Fork River. The State anticipates the information will assist in allocating available funding to the address the factors limiting the fishery.

In 2023, a new project proposal was received (#119; Appendix A) that would produce an integrated geochemical and metagenomic model of microbial community structure and function in the Upper Clark Fork Basin. The State will consider funding this project along with other investigations based on the potential for these studies to identify strategies for recovering mainstem trout populations.

The maintenance aspect of this monitoring and maintenance plan will be developed to ensure the implemented projects meet the goals and objectives of this restoration plan for the expected life of the project. A decision matrix will be developed following the outline provided below to determine maintenance implementation. Maintenance will only be implemented if work is needed to ensure the project is trending towards the goals and objectives of the specific project and the UCFRB. For example, maintenance will be implemented if fencing is down, and the riparian habitat is being affected or a fish screen is not functioning correctly.

Maintenance Process

A. Document visual inspections of changes and identify potential maintenance sites.

B. Hypothesize causes of changes, trends, and risk in the context of project objectives.

C. Confirm/reject hypotheses with data and analyses, if needed.

D. Assign risk to potential maintenance sites based on judgment and/or performance criteria.

E. Solicit input from peer reviewers for critical uncertainties.

F. Identify maintenance alternatives and priorities.

The monitoring and maintenance plan would specify how the State would accomplish the specified activities covered in the plan. In most cases, it is best to have an independent entity (i.e., an entity not involved in project implementation) conduct monitoring activities. Some work would be conducted by the State, and other work could be conducted by university entities, by other governmental entities (such as the U.S. Geological Survey), or by competitively procured contractors under State oversight.

With approximately $41 million dollars to be spent on restoration of the aquatic resources in the UCFRB, this monitoring program will assist the State in its role as the steward of the investment made in the restoration on the ground and focus on maximizing the returns on these investments.

Costs for the basin wide monitoring and maintenance program over a ten-year period are estimated to be about 5% of the total aquatic resources restoration budget ($41 million) or approximately $2 million, with approximately $500,000 specific to flow augmentation projects and $1.5 million specific to other aquatic restoration projects.

Many of the abstracts submitted that proposed specific stream restoration activities included a project monitoring component that will be essentially addressed as part of the State's proposed monitoring and maintenance plan. This plan also incorporates the habitat and fish passage maintenance program suggested in abstract #36.

In 2018, the State allocates $1.0 million specifically to maintenance of the aquatic actions. Based on maintaining these actions since 2012, the State ~~will~~ established this~~a~~ specific fund and implemented an operations and maintenance program to ensure the actions implemented are maintained and functional. Most of the actions (fish screens, fences, diversions, etc.) are installed on private property and without the proper funding to maintain these actions, many of these actions will fail.