

5.0 Management Plan

5.1 Background

The Management Plan is the heart of the Blackfoot Subbasin Plan. It consists of five elements: 1) a vision for the subbasin, 2) conservation objectives, 3) strategic actions, 4) research, monitoring and evaluation and 5) consistency with the Endangered Species Act and Clean Water Act. The Blackfoot Subbasin Management Plan is a living document that is based on a 10-15 year planning horizon. It reflects current understanding of conditions in the Blackfoot Subbasin and will be updated through an adaptive management process as knowledge of ecological processes and socioeconomic conditions in the subbasin grows. It is designed to serve as an iterative, community-based and science-driven document and we anticipate that additional objectives and strategies will emerge over time.

The Blackfoot Subbasin Management Plan will serve as a guide for partners working to sustain ecological, economic and cultural values and resources in the Blackfoot Subbasin. This document was developed collaboratively by the subbasin technical work groups which are comprised of a wide range of stakeholders including private landowners, public agencies, and non-profit organizations. Consensus among this diverse group will promote effective and collaborative implementation of the strategic actions outlined in Section 5.3.

5.2 Subbasin Vision

The vision for the Northwest Power and Conservation Council's Fish and Wildlife Program is a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife, mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem and providing the benefits from fish and wildlife valued by the people of the region (NPCC 2009). The vision for the Blackfoot Subbasin is based on this overarching vision for the entire Columbia River Basin. It describes the desired future condition of the subbasin and incorporates the values and priorities of a wide spectrum of stakeholders:

The vision for the Blackfoot Subbasin is for a place characterized by dynamic natural processes that create and sustain diverse and resilient communities of native fish and wildlife and the aquatic and terrestrial habitats on which they depend, thereby assuring substantial ecological, economic and cultural benefits. The efforts to conserve and enhance those natural resources will be implemented through a cooperative partnership between public and private interests that will seek to sustain not only those natural resources, but the rural way of life of the Blackfoot River Valley for present and future generations.

The Blackfoot Subbasin Assessment illustrates, both quantitatively and qualitatively, that ecological conditions in the subbasin are generally very good. At the subbasin scale, there are large, intact landscapes comprised of wilderness, natural areas and other federal or state-owned lands linked to protected and/or sustainably managed private working lands typically located in

the valley bottom. Due to a legacy of conservation and restoration partnerships led by private landowners since the 1970s, residential, resort and commercial development is limited to certain areas and native biodiversity, from wide-ranging mammals to localized rare plant populations, is largely intact. These characteristics, coupled with continued strong public-private partnerships, have resulted in identification of the Blackfoot Subbasin as a high priority site for conservation action by international, national and local partners. The Blackfoot Subbasin Vision will guide prioritization and implementation of conservation objectives and strategic actions to ensure the continued viability of ecological and human communities in the subbasin.

5.3 Conservation Objectives and Strategic Actions

The core of the Blackfoot Subbasin Management Plan consists of a comprehensive set of conservation objectives and strategic actions.³³ Conservation objectives and strategic actions were developed based on the results of the Blackfoot Subbasin threat assessment (Section 3.4). In most cases, the critical subbasin threats stem from incompatible human uses of land, water or natural resources. The conceptual framework for conservation objectives and strategic actions assumes that abating the critical threats in the subbasin will alleviate current or future stresses, resulting in healthy, viable conservation targets.³⁴ However, in many instances, a target has been degraded by historical threats that require some form of active restoration. In these situations, restoration strategies that directly enhance or restore the viability of the target are considered.

Conservation objectives and strategic actions were developed based on the following criteria: 1) economic, social and ecological feasibility, 2) existing partnerships or future cooperative opportunities to implement actions, 3) benefits to multiple targets and 4) the scope of threat abatement. Table 5.1 outlines the relationship between conservation targets, threats and conservation objectives in the subbasin.

³³ Conservation objectives are distinct from what BPA refers to as “biological objectives.” Conservation objectives are general guiding principles that provide a framework for specific and measurable strategic actions. Quantitative “biological objectives” for each conservation target are presented in the subbasin viability assessments (Section 3.3.3).

³⁴ A detailed discussion of Blackfoot Subbasin conservation targets and conservation target viability is provided in Section 3.3.3. Information on stresses and threats is provided in Section 3.4.

Table 5.1 Strategy Development Reference Table.

Threat ¹	Conservation Targets Affected ²	Objective Number
Unplanned Residential and Resort Development (VH)	native salmonids (H) moist site and riparian vegetation (H) native grassland/sagebrush communities (H) low elevation ponderosa pine/western larch forest (VH) mid to high elevation coniferous forest (M) grizzly bears (H) rural way of life (VH)	1, 2a, 2b, 2c, 3, 5, 6, 7, 8, 9a, 9b, 9c, 10
Climate Change (VH)	native salmonids (VH) herbaceous wetlands (H) moist site and riparian vegetation (H) native grassland/sagebrush communities (H) low elevation ponderosa pine/western larch forest (VH) mid to high elevation coniferous forest (H) grizzly bears (H) rural way of life (H)	1, 2a, 2b, 2c, 4, 5, 6, 7, 8, 9a, 9b, 9c, 10
Exotic/Invasive Species (H)	native salmonids (H) herbaceous wetlands (H) moist site and riparian vegetation (M) native grassland/sagebrush communities (H) low elevation ponderosa pine/western larch forest (H) mid to high elevation coniferous forest (H) grizzly bears (M) rural way of life (H)	1, 2a, 2b, 2c, 3, 4, 5, 6, 7, 8, 9a, 10
Lack of Fire (H)	moist site and riparian vegetation (H) native grassland/sagebrush communities (H) low elevation ponderosa pine/western larch forest (VH) mid to high elevation coniferous forest (M) rural way of life (H)	5, 6, 7, 8, 10
Incompatible Forestry Practices (H)	native salmonids (H) herbaceous wetlands (L) low elevation ponderosa pine/western larch forest (VH) mid to high elevation coniferous forest (M)	2a, 2b, 2c, 4, 7, 8, 10
Physical Road Issues (H)	native salmonids (H) low elevation ponderosa pine/western larch forest (H) mid to high elevation coniferous forest (M) grizzly bears (H)	1, 2a, 2b, 2c, 7, 8, 9a, 9b, 10
Conversion to Agriculture (H)	herbaceous wetlands (H) moist site and riparian vegetation (M) native grassland/sagebrush communities (H)	1, 4, 5, 6, 10
Mining (H)	native salmonids (H) grizzly bears (H)	2a, 2b, 2c, 9a, 10
Motorized Vehicle Use (M)	moist site and riparian vegetation (M) native grassland/sagebrush communities (M) low elevation ponderosa pine/western larch forest (M) mid to high elevation coniferous forest (M) grizzly bears (H)	5, 6, 7, 8, 9a, 9b, 10

Table 5.1 (continued).

Threat ¹	Conservation Targets Affected ²	Objective Number
Incompatible Grazing (M)	native salmonids (H) herbaceous wetlands (M) moist site and riparian vegetation (M) native grassland/sagebrush communities (M) grizzly bears (L)	2a, 2b, 2c, 4, 5, 6, 9a, 9b, 9c, 10
Drainage and diversion Systems (M)	native salmonids (H) herbaceous wetlands (M) moist site and riparian vegetation (M)	2a, 2b, 2c, 4, 5, 10
Channel Alteration (M)	native salmonids (H) moist site and riparian vegetation (M)	2a, 2b, 2c, 5, 10
Epidemic Levels of Native Insects and Pathogens (M)	low elevation ponderosa pine/western larch forest (H) mid to high elevation coniferous forest (M)	7, 8, 10
Non-motorized Recreational Use (M)	native salmonids (H) grizzly bears (M)	2a, 2b, 2c, 9a, 9b, 9c, 10
Existing Crop Production (L)	herbaceous wetlands (M)	4, 10
Filling of Wetlands (L)	herbaceous wetlands (M)	1, 4, 10
Lack of Human Tolerance (L)	grizzly bears (M)	9a, 9b, 9c, 10
Human-Caused Mortality (L)	grizzly bears (M)	9a, 9b, 9c, 10
Altered Wildlife Use Patterns (L)	native grassland/sagebrush communities (L)	1, 5, 10
Presence of Bear Attractants (L)	grizzly bears (L)	9a, 9b, 9c, 10

¹ Abbreviations in parentheses indicate the threat rank: VH = Very High; H = High; M = Medium; L = Low.

² Abbreviations in parenthesis indicate threat ranks by target.

For each conservation objective outlined in the following pages, we list the conservation targets affected and the set of strategic actions that will be employed by conservation and restoration partners in the subbasin to achieve the objective. Strategic actions consist of new actions that will enhance conservation and restoration in the subbasin as well as programs and projects already being implemented by agencies and private organizations. A number of strategies currently implemented by the Blackfoot Challenge, for example, are already addressing some of the key threats identified in the Blackfoot Subbasin Plan. Coordinated implementation and regular updating of this set of conservation objectives and strategic actions, as well as monitoring measures proposed in Section 5.4, will ensure that the most effective fish, wildlife and habitat conservation in the Blackfoot Subbasin will be achieved.

Conservation Objective 1 – Maintain the large, intact working landscapes that sustain the natural resources and rural way of life in the Blackfoot Subbasin through support to local communities, counties and land conservation partners.

Conservation Targets Affected: All eight conservation targets: native salmonids, herbaceous wetlands, moist site and riparian vegetation, native grassland/sagebrush communities, low elevation ponderosa pine/western larch forest, mid to high elevation coniferous forest, grizzly bears, rural way of life

Strategic Actions:

1. Through the Conservation Strategies Committee (CSC), maintain the Blackfoot Challenge Conservation Resource Database, watershed map and other GIS-based resources to prioritize areas and pool resources for conservation, stewardship and land-use planning efforts.
 - a. Integrate baseline data, objectives and strategic actions for vegetation targets and other data associated with the subbasin plan into future conservation and stewardship activities.
 - b. Provide these resources as requested to Missoula, Powell, and Lewis and Clark Counties and local communities and/or host community forums pertaining to land-use planning efforts.
2. Through the Blackfoot Challenge's CSC and Conservation Easement Work Group, continue coordinating conservation easements to address conservation targets, adaptive management and coordinated monitoring; utilize the conservation easement brochure as a clearinghouse for information.
3. Continue coordinating with partners working at the regional level on conservation and stewardship projects (e.g., Cooperative Conservation Agreement for the Blackfoot Watershed, Montana Legacy Project, Missoula County Practical Landscape Assessment for Conservation and Enhancement (PLACE) Project, Seeley-Swan-Blackfoot Stewardship Summit, Crown of the Continent, Partners for Conservation).
4. Research and explore innovative conservation tools, such as the transfer of development rights and other incentives that reward sustainable residential development, and their compatibility with the communities, practices and resources in the Blackfoot Subbasin.
5. Explore/identify the qualities that define the rural way of life for communities across the subbasin and connections to public-private conservation, restoration and stewardship practices. Explore/identify community-benefit indicators to monitor effectiveness of programs for the long-term.

Conservation Objective 2a – Maintain and/or restore viable populations of bull trout within the three major population groups³⁵ in the Blackfoot Subbasin.³⁶

Conservation Objective 2b – Maintain and/or restore viable populations of migratory (fluvial and adfluvial) westslope cutthroat trout within each of the three major population groups³⁷ within the Blackfoot Subbasin.

Conservation Objective 2c – Maintain and/or restore viable populations of resident westslope cutthroat trout within each of the three major population groups within the Blackfoot Subbasin.³⁸

Conservation Targets Affected: Native salmonids (bull trout; westslope cutthroat trout). These species are widely distributed and represent the broad range of aquatic environments found in the Blackfoot. Conservation and restoration of these target species and their habitats will also provide benefits for other native fishes, aquatic organisms and riparian plant communities found throughout the subbasin.

The strategic actions described in this section incorporate the guidance found in the current prioritization strategy (Table 3.12), the Table of Potential Restoration Projects (Appendix M), the 2002 USFWS bull trout recovery strategy (Appendix K), and by future refinements to the strategy as the salmonid working group begins to assess the native fisheries to the 6th field HUC. The existing native salmonid recovery strategy, and the data on which it is based, will heavily inform the assessment of fisheries to the 6th field HUC.

³⁵ The three major bull trout population groups in the Blackfoot Subbasin are 1) Upper Blackfoot Basin upstream of Nevada Creek, 2) Clearwater River Basin, and 3) Lower Blackfoot Basin (outside of the Clearwater) below Nevada Creek.

³⁶ The Bull Trout Draft Recovery Plan (USFWS 2002) lists four recovery objectives for the Clark Fork Recovery Unit. The Blackfoot Subbasin Plan is consistent with those objectives which are as follows: (1) maintain current distribution of bull trout and restore distribution in previously occupied areas within the Clark Fork Recovery Unit; (2) maintain stable or increasing trends in abundance of bull trout in each subunit of the Clark Fork Recovery Unit; (3) restore and maintain suitable habitat conditions for all bull trout life history stages and strategies; and (4) conserve genetic diversity and provide opportunity for genetic exchange.

³⁷ The three major westslope cutthroat population groups in the Blackfoot Subbasin are 1) Upper Blackfoot Basin upstream of Nevada Creek, 2) Clearwater River Basin, and 3) Lower Blackfoot Basin (outside of the Clearwater) below Nevada Creek.

³⁸ Implicit in this objective is to protect and enhance resident, spawning and rearing habitats for isolated populations of genetically pure westslope cutthroat trout and to protect these populations from genetic introgression by non-native species.

Strategic Actions:

1. Continue to restore physical instream habitat suitable to native salmonids.
 - a. Continue to restore instream habitat connectivity by removing barriers (e.g., diversion barriers, culverts, temperature and pollution barriers) except where maintaining barriers is desirable to maintain physical and genetic isolation.
 - b. Continue to implement instream restoration projects that restore proper pattern, profile and dimensions to impacted channels.
 - c. Continue to implement water conservation/instream flow projects, particularly those that retain or enhance perennial flows over the long term or during low flow periods, and conserve cold waters necessary for native salmonids.
 - d. Continue to implement water quality improvement projects, particularly those that reduce water temperatures, instream sediment levels and other pollutants that are deemed harmful to native salmonids.
 - e. Continue to protect and restore riparian vegetation.
 - f. Continue to implement grazing and livestock management projects that benefit riparian and instream habitat. This includes developing grazing criteria consistent with bull trout habitat protection.
 - g. .
2. Continue work to reduce the threat of non-native fish interactions.
 - a. Promote restoration and/or maintenance of natural habitat and stream flow conditions that may provide native fish with an advantage over non-native species.
 - b. Promote and support public policy that favors native species and their habitats.
 - c. Coordinate efforts to identify the distribution of non-native fish, invertebrates and plants in aquatic habitats and how these species affect native salmonids.
 - d. Monitor the status of new invasive species in the area surrounding the Blackfoot Subbasin and promote the use of the state's response strategy for non-native species.
 - e. Continue to monitor, educate and devise strategies to prevent the introduction of non-native and/or invasive aquatic species to the subbasin.
 - f. Conduct public education/outreach about non-native species that threaten native salmonid populations in the subbasin.
3. Use existing climate models to assess how a climate change will affect the subbasin hydrologic regime.
 - a. Adapt or extend existing climate-hydrology models (e.g., Crozier et al. 2008, Issak et al. *in review*) to scale at the subbasin level and, if possible, to the three major fish population areas within the Blackfoot Subbasin. Use this information to inform stakeholders of potential changes in hydrology, water availability and water temperature and to guide and prioritize conservation and restoration efforts.
 - b. Exploit any long-term data sets that exist in the subbasin to refine and validate the "downsized" climate projections.

4. Promote the continuation and expansion of long-term data sets with a repository accessible to the public and research partners.
 - a. Reestablish and expand significant long-term data sets in the Blackfoot Subbasin that have been truncated due to lack of dedicated funding (e.g., stream discharge, water temperature, air temperature, and fisheries population data).
 - b. Continue historic data sets and create new data sets necessary for tracking impacts of climate change in river, tributary and lake habitats. Support long-term data collection efforts by public agencies (e.g., MFWP, USFS, BLM, DEQ, USGS). These long-term data sets are essential to adaptive management and conservation efforts.
 - c. Augment citizen based monitoring with Blackfoot Challenge coordinating consistent data gathering on private lands to complete data sets and improve management.
5. Develop a viability assessment based on the sixth code HUC level. Complete the aquatic species viability assessment (Section 3.3.3.1) for each bull trout and westslope cutthroat trout population described above based on a more complete sixth code HUC level data set that incorporates data from all public agencies and private organizations.
6. Coordinate implementation of native salmonid conservation objectives/strategic actions with terrestrial species and upland/wetland objectives/strategic actions. Integrity of terrestrial ecosystems influences and constrains aquatic systems. Integrated implementation of the Blackfoot Subbasin Plan will advance management and allow leveraging of limited resources by recognizing and resolving convergent and potentially conflicting objectives.
 - a. Conduct a spatially explicit assessment of terrestrial and aquatic resources and management conditions that will support development of integrated goals, objectives and opportunities for collaboration in conservation activities and recognition of joint restoration priorities.
 - b. Develop a water budget that acknowledges the interaction between surface water and groundwater. Subbasin wetland, stream and lake habitats are closely linked. An integrated hydrologic assessment is needed to manage any of these habitats effectively. This assessment would:
 - i. catalog existing information on groundwater-surface water interactions
 - ii. support development of a water budget
 - iii. include potential changes in water volume and temperature predictions based on climate change models

Conservation Objective 3 – Control existing noxious and invasive³⁹ plant species abundance and distribution and prevent establishment of all new noxious and invasive species in the Blackfoot Subbasin. Emphasis should be placed on protecting the highest quality habitats, which should be identified and prioritized by 2012.⁴⁰

Conservation Targets Affected: herbaceous wetlands, moist site and riparian vegetation, native grassland/sagebrush communities, low elevation ponderosa pine/western larch forest, mid to high elevation coniferous forest

Strategic Actions:

1. Expand current noxious and invasive weed management efforts by coordinating and cooperating with partners on an ecologically and economically sustainable approach to integrated weed management through the Blackfoot Challenge Weed Steering Committee.
 - a. Continue organization and facilitation of landowner-led Cooperative Weed Management Areas.
 - b. Emphasize prevention of new invaders and develop strategies for early detection and eradication.
 - c. Dedicate resources to education, awareness and outreach through one-on-one contact with landowners, resource users and the general public.
 - d. Coordinate efforts to eradicate, contain or control noxious weeds with conservation of rare plant species that occur in the subbasin (i.e., avoid or minimize impacts to known rare plant populations).
 - e. Monitor and evaluate effectiveness of weed program.
 - f. Continue building private and public partnerships for a sustainable approach to integrated weed management.
2. Develop a Blackfoot Watershed Weed Management Plan (utilize USFS-Region 1 Noxious Weed Risk Assessment and coordinate with other land management planning efforts).
 - a. Utilize baseline data for vegetation targets associated with the subbasin plan to inform the plan.
 - b. Coordinate efforts to work in the highest quality native plant habitats, contain existing invasive species to their present extent and attempt to restore native communities.

³⁹ May include pasture grasses in some areas, e.g., wetlands, riparian areas, and native grasslands/sagebrush communities. Definitions of “noxious” and “invasive” plants are provided in Section 3.2.7.3.

⁴⁰ The Blackfoot Challenge will be instrumental in accomplishing this objective at the subbasin scale.

3. Through the Blackfoot Challenge Weed Steering Committee, develop an Invasive Species Strike Team that will be collectively funded and organized. The team will provide coordinated integrated weed identification, management and control and will emphasize long-term biological control. However, the team will initially emphasize the use of all integrated pest management tools (chemical, biological, mechanical, vegetation management, etc.).
 - a. Estimate costs of assembling a strike team.
 - b. Determine how to share the costs (e.g., fee per acre that needs treatment) and obtain sources of outside funding to support/subsidize the effort.
 - c. Engage participation by as many private and public landowners as possible.
4. Address non-native pasture grasses on a site specific basis, where they are invasive and threatening native plant communities.
5. Incorporate weed management practices in forestry activities (e.g., use of minimal soil disturbing methods and equipment, reseeding with non-invasive and/or native mixes, equipment washing).
6. Increase emphasis on biological control of weeds by making more bio-control agents available and increasing funding for bio-control development and implementation.
7. Increase awareness among small acreage landowners about the importance of controlling noxious and invasive species on their property. (See conservation objective 10 for more information on how this strategic action will be implemented).
8. Use the Blackfoot Community Conservation Area and other sites to establish demonstration plots to explore, practice and transfer invasive species abatement strategies.
9. Partner with universities and other public and private entities interested in noxious weed research.
10. Use stewardship outreach with conservation easement holders to explore, practice, and export invasive species abatement strategies to other landscapes (e.g., the Centennial Valley and Rocky Mountain Front).
11. Integrate the Blackfoot Challenge weed program and Conservation Easement Work Group to develop a consistent, watershed-wide approach to monitoring and managing invasive plants on lands with conservation easements.

Conservation Objective 4 – Maintain or restore the viability of priority⁴¹ herbaceous wetlands based on historic conditions across the Blackfoot Subbasin.

Conservation Targets Affected: herbaceous wetlands

Strategic Actions:

1. Develop a baseline of historic and current vegetation communities.
 - a. Request proposals for baseline development.
 - b. Assemble team of experts to determine best methodology for developing a baseline (e.g., interpretation of historic aerial photographs; analysis stratified by vegetation type, temperature/moisture regimes).
 - c. Determine the acceptable level of departure from historic conditions (see parameters outlined in viability assessment, Table 3.12).
 - d. Conduct field inventory to classify existing and potential vegetation condition and to identify high-quality existing sites.
2. Analyze the degree of departure from historical conditions overlain with a baseline of developed, converted or otherwise altered areas where it is not feasible to restore and/or maintain those plant communities.
3. Develop a priority map for protection of intact areas and restoration of disturbed areas in critical native plant community areas. Coordinate this effort with actions/needs for other conservation targets, such as grizzly bears/wildlife linkage zones.
4. Determine a wetland community conservation goal (total area conserved) and timeline for achieving the goal.
5. Develop tools for maintaining healthy sites identified in the inventory and planning process, outlined above, and restore high priority degraded sites.⁴²
 - a. Address water manipulation and management in wetlands: timing, depth (draining wetlands or using as irrigation water storage devices).
 - b. Work with willing landowners of prioritized wetlands on water management plans.
 - c. Use the Blackfoot Community Conservation Area and other project sites to test and demonstrate restoration techniques.

⁴¹ “Priority” sites will be determined based on HRV analysis outlined in strategic actions. Significant information gaps exist for each of the Blackfoot Subbasin vegetation/forest targets, making it difficult to develop quantifiable objectives. Thus, many of the strategic actions in conservation objectives 4-8 are focused on filling these information gaps.

⁴² The 2008 USFS Restoration Policy (USFS 2008) defines *ecological restoration* as the process of assisting the recovery of resilience and adaptive capacity of ecosystems that have been degraded, damaged, or destroyed. Restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to make terrestrial and aquatic ecosystems sustainable, resilient, and healthy under current and future conditions.

6. Encourage sustainable development near priority herbaceous wetlands.
7. Monitor for viability of nested targets (herbaceous wetland-associated bird, plant, amphibian, and invertebrate Species of Concern). Develop action items if necessary for nested target protection. See Section 3.3.3.2 for more information on nested targets.
8. Coordinate with other land management planning efforts (e.g., the USFS National Forest Plans and BLM, DNRC, USFWS and MFWP planning updates).
9. Incorporate incentives for restoration and protection in private, public and interagency land management plans.
10. Evaluate, monitor and plan in an iterative way (adaptive management). Through ongoing monitoring and data gathering, refine viability indicator ratings (Table 3.12) necessary to maintain or restore the viability of priority wetland communities.

Conservation Objective 5 – Maintain or restore the viability of priority moist site and riparian vegetation based on historic conditions across the Blackfoot Subbasin.

Conservation Targets Affected: moist site and riparian vegetation

Strategic Actions:

1. Develop a baseline of historic and current vegetation communities.
 - a. Request proposals for baseline development.
 - b. Assemble team of experts to determine best methodology for developing a baseline (e.g., interpretation of historic aerial photographs; analysis stratified by vegetation type, temperature/moisture regimes).
 - c. Determine the acceptable level of departure from historic conditions (see parameters outlined in viability assessment, Table 3.13).
 - d. Conduct field inventory to classify existing and potential vegetation condition and to identify high-quality existing sites.
2. Analyze degree of departure from historical conditions overlain with a baseline of developed, converted or otherwise altered areas where it is not feasible to restore and/or maintain those plant communities.
3. Develop a priority map for protection of intact areas and restoration of disturbed areas in critical native plant community areas. Coordinate this effort with actions/needs for other conservation targets, such as grizzly bears/wildlife linkage zones.
4. Determine a moist site and riparian community conservation goal (total area conserved) and timeline for achieving the goal.
5. Develop tools for maintaining healthy sites identified in the inventory and planning process, outlined above, and restore high priority degraded sites.
 - a. Maintain sites closest to historic condition using fire or other vegetation management tools.
 - b. Use such tools as: NRCS Riparian Forest Buffers⁴³ and Riparian Proper Functioning Condition.⁴⁴

⁴³ A riparian forest buffer is an area of trees and shrubs located adjacent to streams, lakes, ponds and wetlands. Riparian forest buffers of sufficient width intercept sediment, nutrients, pesticides and other materials in surface runoff and reduce nutrients and other pollutants in shallow subsurface water flow. Woody vegetation in buffers provides food and cover for wildlife, helps lower water temperatures by shading waterbody and slows out-of-bank flood flows. In addition, the vegetation closest to the stream or waterbody provides litter fall and large woody debris important to aquatic organisms. Also, the woody roots increase the resistance of streambanks and shorelines to erosion caused by high water flows or waves (NRCS).

⁴⁴ Riparian Proper Functioning Condition (PFC) is a qualitative assessment of riparian conditions. A qualitative assessment is defined as “the process of estimating or judging the value or functional status of ecological processes (e.g., ecosystem health) in a location during a moment in time” (Pellant et al. 2005). A standard checklist of riparian attributes (amount, function etc.) is assessed by an interdisciplinary team along a selected reach (for lotic

- c. Use BBCTU's priority list, the Basin-Wide Restoration Action Plan for the Blackfoot Watershed, and other key plans.
 - d. Use the Blackfoot Community Conservation Area and other project sites to test and demonstrate moist site and riparian community restoration techniques.
6. Encourage sustainable development near priority moist site and riparian vegetation areas.
7. Monitor for viability of nested targets (riparian dependent birds). Develop action items if necessary for nested target protection. See Section 3.3.3.3 for more information on nested targets.
8. Increase awareness about the important role of fire and other ecological processes in the maintenance of moist site and riparian systems.
9. Coordinate with other land management planning efforts (e.g., the USFS National Forest Plans and BLM, DNRC, USFWS, and MFWP planning updates).
10. Incorporate incentives for restoration and protection in private, public and interagency land management plans.
11. Evaluate, monitor and plan in an iterative way (adaptive management). Through ongoing monitoring and data gathering, refine viability indicator ratings (Table 3.13) necessary to maintain or restore the viability of priority moist site and riparian communities.

assessments) or wetland (for lentic assessments). Although PFC is not a monitoring or inventory tool, it can be used to diagnose function and determine whether additional, quantitative data need to be collected. The assessment results in designating the system as one of the following: Proper Functioning Condition, Functioning-at-Risk, or Non-Functioning.

Conservation Objective 6 - Maintain or restore the viability of priority native grassland and sagebrush communities based on historic conditions across the Blackfoot Subbasin.

Conservation Targets Affected: native grassland/sagebrush communities

Strategic Actions:

1. Develop a baseline of historic and current vegetation communities.
 - a. Request proposals for baseline development.
 - b. Assemble team of experts to determine best methodology for developing a baseline (e.g., interpretation of historic aerial photographs; analysis stratified by vegetation type, temperature/moisture regimes).
 - c. Determine the acceptable level of departure from historic conditions (see parameters outlined in viability assessment, Table 3.14).
 - d. Conduct field inventory to classify existing and potential vegetation condition and to identify high-quality existing sites.
2. Analyze the degree of departure from historical conditions overlain with a baseline of developed, converted or otherwise altered areas where it is not feasible to restore and/or maintain those plant communities. Include an assessment of the extent of tree encroachment into native grasslands/sagebrush communities due to fire suppression.
3. Develop a priority map for protection of intact areas and restoration of disturbed areas in critical native plant community areas. Coordinate this effort with actions/needs for other conservation targets.
4. Determine a native grassland/sagebrush community conservation goal (total area conserved) and timeline for achieving the goal.
5. Develop tools for maintaining healthy sites identified in the inventory and planning process, outlined above and restore high priority degraded sites.
 - a. Maintain sites closest to historic condition using fire or other vegetation management tools.
 - b. Develop specific tools for maintaining the Three-tip Sagebrush–Rough Fescue Association.
 - c. Use the Bandy Ranch and Blackfoot Community Conservation Area to test and demonstrate grassland restoration techniques.
6. Encourage sustainable development in priority native plant community areas.
7. Monitor for viability of nested targets (grassland/sagebrush-associated bird and plant Species of Concern; ungulate winter range). Develop action items if necessary for nested target protection. See Section 3.3.3.4 for more information on nested targets.

8. Capitalize on wildland-urban interface funding and the need to restore grasslands and/or sagebrush communities within the forest/grassland-shrubland interface to historic condition.
9. Increase awareness about the important role of fire and other ecological processes in the maintenance of native grassland/sagebrush communities.
10. Coordinate with other land management planning efforts (e.g., the USFS National Forest Plans and BLM, DNRC, USFWS, and MFWP planning updates).
11. Incorporate grassland/sagebrush protection and restoration, including prescribed fire burn plans and incentives for the use of managed fire, into private, public and interagency land management plans.
12. Evaluate, monitor and plan in an iterative way (adaptive management). Through ongoing monitoring and data gathering, refine viability indicator ratings (Table 3.14) necessary to maintain or restore the viability of priority native grassland and sagebrush communities.

Conservation Objective 7 - Maintain or restore the viability of low severity fire regime ponderosa pine/western larch forest communities⁴⁵ based on historic stand conditions across the Blackfoot Subbasin.

Conservation Targets Affected: low elevation ponderosa pine/western larch forest

Strategic Actions:

1. Develop a baseline of historic and current vegetation communities.
 - a. Request proposals for baseline development.
 - b. Assemble team of experts to determine best methodology for developing a baseline (e.g., interpretation of historic aerial photographs; analysis stratified by vegetation type, temperature/moisture regimes).
 - c. Include analysis of wildlife linkage areas and forest carnivore (Canada lynx, fisher) needs.⁴⁶
 - d. Determine the acceptable level of departure from historic conditions (see parameters outlined in viability assessment, Table 3.15).
 - e. Conduct field inventory to classify existing and potential vegetation condition, including understory vegetation, and to identify high-quality existing sites.
2. Analyze the degree of departure from historical conditions overlain with a baseline of developed, converted or otherwise altered areas where it is not feasible to restore and/or maintain those plant communities. In HRV analysis, emphasize the low elevation forest types if resources are limited.
3. Develop a priority map for protection of intact areas and restoration of disturbed areas in critical native plant community areas. Coordinate this effort with actions/needs for other conservation targets, such as grizzly bears/wildlife linkage zones.
4. Determine a low elevation ponderosa pine/western larch forest community conservation goal (total area conserved) and timeline for achieving the goal.
5. Develop tools for maintaining healthy sites identified in the inventory and planning process, outlined above, and restore high priority degraded sites using appropriate vegetation management tools (e.g., fire, mechanical treatments).
 - a. Maintain sites closest to historic condition using fire or other vegetation management tools.
 - b. Seek opportunities to restore forest stands to historic conditions where it overlaps with the needs of public safety within the wildland-urban interface.

⁴⁵ This includes mostly low-elevation, dry forest types, but may include more mesic stands, particularly larch-dominated stands in Clearwater drainage.

⁴⁶ The Blackfoot Subbasin planning team intends to focus future attention on wildlife habitat linkage and connectivity across and between nonfederal and federal lands, including strategies for coordinated management.

- c. Use Lubrecht Experimental Forest, the Blackfoot Community Conservation Area, and other project sites to test and demonstrate low elevation forest restoration techniques.
- 6. Promote forestry practices (e.g., thinning) that enhance resilient and sustainable stand conditions.
 - a. Consider effects of forest roads on hydrology, wildlife security, weed introductions, etc.
 - b. Through the Blackfoot Challenge Forestry Committee, coordinate fuels mitigation work in the wildland-urban interface to enhance sustainable stand conditions in conjunction with creating fire safety zones.
- 7. Maintain the viability of the local wood products industry through increased local production of wood products generated from restoration treatments. For example, support:
 - a. Construction and use of small co-gen plants for local energy production (burning chips, pellets)
 - b. Locally-produced pine/fir furniture
 - c. Small-diameter fir/larch flooring
- 8. Monitor for viability of nested targets (low elevation ponderosa pine/western larch forest-associated birds; ungulate winter range). Develop action items if necessary for nested target protection. See Section 3.3.3.5 for more information on nested targets.
- 9. Increase awareness about the important role of fire and other ecological processes in the maintenance of forest systems.
- 10. Coordinate with other land management planning efforts (e.g., the USFS National Forest Plans and BLM, DNRC, USFWS and MFWP planning updates).
- 11. Coordinate with Montana Forest Stewardship Steering Committee, UM Applied Forest Management Program and others to gain support for projects and funding on private lands.
- 12. Incorporate prescribed fire burn plans and incentives for the use of managed fire, as well as forest protection and restoration, into private, public and interagency land management plans.
- 13. Coordinate with Montana Forest Restoration Committee to gain support for projects and funding on USFS lands.
- 14. Evaluate, monitor and plan in an iterative way (adaptive management). Through ongoing monitoring and data gathering, refine viability indicator ratings (Table 3.15) necessary to maintain or restore the viability of priority low elevation ponderosa pine/western larch forest communities.

Conservation Objective 8 - Maintain or restore the viability of mid to high elevation coniferous forest communities based on historic stand conditions across the Blackfoot Subbasin.

Conservation Targets Affected: mid to high elevation coniferous forest

Strategic Actions:

1. Develop a baseline of historic and current vegetation communities.
 - a. Request proposals for baseline development.
 - b. Assemble team of experts to determine best methodology for developing a baseline (e.g., interpretation of historic aerial photographs; analysis stratified by vegetation type, temperature/moisture regimes).
 - c. Include analysis of wildlife linkage areas and forest carnivore (Canada lynx, fisher) needs.
 - d. Determine the acceptable level of departure from historic conditions (see parameters outlined in viability assessment, Table 3.16).
 - e. Conduct field inventory to classify existing and potential vegetation condition, including understory vegetation, and to identify high-quality existing sites.
2. Analyze the degree of departure from historical conditions overlain with a baseline of developed, converted or otherwise altered areas where it is not feasible to restore and/or maintain those plant communities. In HRV analysis, emphasize the low elevation forest types if resources are limited (see Conservation Objective 7).
3. Develop a priority map for protection of intact areas and restoration of disturbed areas in critical native plant community areas. Coordinate this effort with actions/needs for other conservation targets, such as wildlife linkage zones and critical Canada lynx habitat.
4. Determine a mid to high elevation coniferous forest community conservation goal (total area conserved) and timeline for achieving the goal.
5. Develop tools for maintaining healthy sites identified in the inventory and planning process, as outlined above, and restore high priority degraded sites using appropriate vegetation management tools (e.g., fire, mechanical treatments).
 - a. Maintain sites closest to historic condition using fire or other vegetation management tools.
 - b. Seek opportunities to restore forest stands to historic conditions where it overlaps with the needs of public safety within the wildland-urban interface.
 - c. Use Lubrecht Experimental Forest, Blackfoot Community Conservation Area and other project sites to test and demonstrate mid to high elevation forest restoration techniques.
 - d. Support the federal and state agency partners in their whitebark pine restoration efforts.
6. Promote forestry practices that enhance resilient sustainable stand conditions.

- a. Consider effects of forest roads on hydrology, wildlife security, weed introductions, etc.
 - b. Use the Blackfoot Challenge Forestry Committee to coordinate fuels mitigation work in the wildland-urban interface to enhance sustainable stand conditions in conjunction with creating fire safety zones.
7. Maintain the viability of the local wood products industry through increased local production of wood products generated from restoration treatments.
 - a. Pursue construction and use of small co-gen plants for local energy production (burning chips, pellets)
 - b. Locally-produced pine/fir furniture
 - c. Small-diameter fir/larch flooring
8. Monitor for viability of nested targets (mid to high elevation coniferous forest-associated birds; forest carnivores; whitebark pine). Develop action items if necessary for nested target protection. See Section 3.3.3.6 for more information on nested targets.
9. Increase awareness about the important role of fire and other ecological processes in the maintenance of forest systems.
10. Coordinate with other land management planning efforts (e.g., the National Forest plan revisions and BLM, DNRC, USFWS and MFWP planning updates).
11. Coordinate with Montana Forest Stewardship Steering Committee, UM Applied Forest Management Program and others to gain support for projects and funding on private lands.
12. Incorporate prescribed fire burn plans & incentives for the use of managed fire, as well as forest protection and restoration, into private, public and interagency land management plans.
13. Coordinate with Montana Forest Restoration Committee to gain support for projects and funding on USFS lands.
14. Evaluate, monitor and plan in an iterative way (adaptive management). Through ongoing monitoring and data gathering, refine viability indicator ratings (Table 3.16) necessary to maintain or restore the viability of priority mid to high elevation coniferous forest communities.

Conservation Objective 9a – Maintain functional connectivity for grizzly bears across biologically suitable habitats in the Blackfoot Subbasin.⁴⁷

Conservation Targets Affected: grizzly bears

Strategic Actions:⁴⁸

1. Address physical road issues (e.g., migration barriers, mortality) and recreational road use impacts through county planning efforts, private landowner stewardship projects, cooperative demonstration projects like the BCCA and travel management processes on public lands (NEPA and MEPA).
2. Address wildlife movement across Highway 200 and Highway 83.
 - a. Assist Montana Department of Transportation (MDT) in wildlife mitigation measures (Integrated Transportation and Ecosystem Enhancements for Montana (ITEEM) process, etc.).
 - b. Plan for potential road crossing structures and other wildlife mitigation using wildlife movement areas maps developed in January 2009.
3. Reduce presence of attractants. In partnership with MFWP, USFWS, USFS, other public land management agencies and the Blackfoot Challenge’s Wildlife Committee, continue work on “attractant security,” or making artificial food sources (e.g., household garbage, backcountry camps, livestock feed, birdfeed) unavailable to grizzly bears. Continue the Blackfoot Challenge’s “Neighbor Network” phone tree program and expand the program to Lincoln, Woodworth and the Avon-Helmville area to address attractants and other sanitation issues on private lands.
4. Address impacts of motorized recreational use on grizzly bears through USFS, BLM and DNRC public planning and public involvement in the NEPA and MEPA processes.⁴⁹
5. Address impacts of non-motorized recreation on grizzly bears through education and outreach efforts. Use new knowledge about grizzly bear behavior to help river

⁴⁷ It should be noted that while certain habitat types are preferred by grizzly bears and are seasonally influenced by food availability, improving habitat level connectivity for grizzly bears in a place like the Blackfoot Subbasin is largely a function of reducing the risk of mortality in the portions of this landscape that support grizzly bear life history needs. Large portions of the Blackfoot Subbasin are currently available or potentially available habitat for grizzlies. However, road densities, road access, and habitat alteration, loss and degradation are important cumulative factors that can impair functional habitat connectivity, largely through human-caused mortality.

⁴⁸ The Blackfoot Challenge’s Wildlife Committee has been and will continue to be pivotal in implementing strategic actions designed to improve management of human-wildlife interactions in the Blackfoot Subbasin.

⁴⁹ The BCCA Council has developed a motorized recreation use plan that addresses potential impacts to wildlife including grizzly bears.

recreationists, hikers, bikers, fishers, hunters, mushroom pickers, etc. learn how to safely live, recreate and work in bear country.⁵⁰

6. Address impacts of resource extraction on grizzly bears. The Blackfoot Challenge can serve as a forum for thoughtful dialogue among all invested stakeholders on mine site development and other resource extraction issues.
7. Use USFS Cumulative Effects Model (CEM) to determine amount and distribution of available grizzly bear habitat in the Blackfoot Subbasin.
8. Coordinate with public land management agencies (e.g., USFS, BLM, DNRC, MFWP) to identify public and non-federal lands that may be important wildlife linkage habitat necessary to sustain life history needs of species like grizzly bears. Emphasis should be placed on identifying potential acres of habitat that serve as important linkage zones and securing attractants that may be present in these same areas. This ensures that there is stable habitat and that the habitat is permeable or less lethal to species like grizzly bears.

⁵⁰ While non-motorized recreational use conflicts with grizzly bears in the watershed have been relatively few, this may become a more serious issue in the future as growth, development, and human population pressures increase levels of recreation in grizzly bear habitat.

Conservation Objective 9b – Reduce human-caused grizzly bear mortality in the Blackfoot Subbasin.

Conservation Targets Affected: grizzly bears

Strategic Actions:

1. Maintain and/or establish partnerships between the Blackfoot Challenge’s Wildlife Committee, livestock producers, managers, landowners, USFWS, MFWP, NRCS, DNRC and other partners throughout the subbasin to improve livestock production practices and reduce the risk of domestic livestock depredation and property damage by grizzlies.
2. Continue to systematically prioritize high risk areas (conflict hotspots) using GIS spatial analysis and expert opinion of MFWP to focus conflict abatement in geographically targeted areas in the most cost effective manner possible.
3. Continue to implement proven non-lethal deterrent practices to remove or secure attractants, e.g., electric fencing of calving areas, beehives, garbage; livestock carcass removal; and sanitation at the household and municipal levels.
4. Continue to work collaboratively with the community on a variety of education/outreach efforts through the Neighbor Network to better understand how to live, work and recreate safely in grizzly bear country.
5. Reduce direct mortality of grizzly bears.
 - a. Reduce illegal (including poaching) killing of grizzly bears through education and outreach efforts. MFWP and USFWS law enforcement are the lead agencies that address malicious or vandal killing.
 - b. Assist MFWP and the USFWS as requested to address mistaken identity killing of grizzly bears by black bear hunters.
 - c. Reduce self defense-related mortality of grizzly bears.
 - i. Improve access to hunter-safety education in the Blackfoot
 - ii. Provide workshops to improve hunter knowledge of bear behavior
 - iii. Target specific education efforts during poor bear food years to prevent hunter-grizzly conflicts resulting from more widely dispersed grizzly bear foraging activity.
 - d. Work with MDT to reduce direct highway mortality of grizzly bears related to vehicle collisions and highway attractants (e.g., garbage at rest stops, road-killed animals, tractor-trailer cargo spills, and roadside enhanced vegetation such as berries and grass).
 - i. Work with MDT to reduce/mitigate highway attractants.
 - ii. Work with MDT to improve wildlife passage across highways.

- iii. Work with MDT to mitigate the effects of potential highway improvements (e.g., construction of four-lane highways) on wildlife in the Blackfoot Subbasin.
- e. Reduce management action-related mortality of grizzly bears.⁵¹
- f. Reduce research and management (e.g., trapping)-related mortality of grizzly bears (MFWP/USFWS are primarily responsible for this).

⁵¹ The efforts of MFWP, USFWS, the WC, landowners and all partners over the past six years have helped to reduce reported and verified human-grizzly bear conflicts that can lead to “management removals” or grizzly mortality.

Conservation Objective 9c – Improve human acceptance of grizzly bears and wolves by building a community-supported conservation and management process that reflects the interests and values of residents and landowners throughout the Blackfoot Subbasin.

Conservation Targets Affected: grizzly bears

Strategic Actions:

1. Continue to maintain regular communication with community members and all stakeholders through inclusive decision making process⁵² using the Blackfoot Challenge’s Wildlife Committee and associated work groups and forums, e.g., Landowner Advisory Work Group, Sanitation and Waste Management Work Group, Neighbor Network training, and one-on-one visits with landowners.
2. Continue to engage with landowners and ranchers on participatory projects
 - a. Continue to use on-the-ground projects (e.g., electric fencing) as a positive way to improve tolerance for grizzly bears by reducing livestock depredation risk (also applies to wolves).
 - b. Select specific fencing projects to showcase during field tours to increase awareness of how this technology can deter grizzly bears in a non-lethal manner.
3. Conduct a survey on Blackfoot area rancher tolerance for grizzly bears (baseline data was collected in 2003 through a survey. If needed, a follow up survey could document possible changes or improvements in human tolerance for grizzly bears).
4. Continue community wolf monitoring/surveys
 - a. Document presence/absence of wolves and estimate distribution and relative abundance in subbasin.
 - b. Maintain annual surveys (begun in 2008-2009) into future
5. Use range riders to monitor livestock and wolves and reduce risk of livestock losses
 - a. Use human presence as a deterrent to wolves
 - b. Increase human vigilance of livestock to reduce depredation risk, implement non-lethal deterrent practices, confirm predation events and predator type, remove carcasses when detected and reduce the need for compensation to ranchers
6. Explore applied research opportunities
 - a. Improve husbandry practices to make cattle herds more robust to wolves
 - b. Test effectiveness of non-lethal deterrent strategies
 - c. Examine indirect economic costs of wolf presence on ranches and improve compensation policies

⁵² A major focus of WC work with USFWS, MFWP, landowners, and partners has been on changing specific land use practices and human behaviors that lead to conflicts with bears. Rather than trying to change the way people think about bears, the focus has instead been on trying to change the way people live, work and recreate around bears. When we as a community learn to live with bears, then attitudes and or perceptions of bears may improve.

Conservation Objective 10 – Increase public awareness and education about conserving and enhancing the natural resources and rural way of life in the Blackfoot Subbasin.

Conservation Targets Affected: All eight conservation targets: native salmonids, herbaceous wetlands, moist site and riparian vegetation, native grassland/sagebrush communities, low elevation ponderosa pine/western larch forest, mid to high elevation coniferous forest, grizzly bears, rural way of life

Strategic Actions:

1. Promote opportunities to engage private and public partners in implementation of the subbasin plan and future resource stewardship. Increase public awareness related to:
 - a. The important role of fire and other processes in the maintenance of forest systems and other vegetation communities.
 - b. The importance of controlling non-native and invasive species and each landowner's responsibility in managing noxious weeds on his/her property.
 - c. The top-ranked threats in the Blackfoot Subbasin Plan (unplanned residential and resort development; climate change; exotic/invasive species; lack of fire; incompatible forestry practices, physical road issues, conversion to agriculture, mining).
2. Promote the Rural Living Institute (RLI) to the all residents of the Blackfoot Subbasin. The RLI is a venue for providing information to new and current landowners through the Challenge by providing online informational resources, workshops and courses for aspects related to living in the Blackfoot Subbasin and being a good land steward.
3. Through the Blackfoot Challenge Education Committee and its partners, prepare and distribute new and progressive materials and engage partners in learning more about resource stewardship. Examples include video, website, field-based tours, targeted education brochures/magazines (for small acreage landowners, realtors, etc.), community meetings, etc.
4. Promote conservation measures and/or sustainable practices that strengthen rural economic sectors of the Blackfoot.
 - a. Promote energy efficiency particularly in the agricultural irrigation sector and assist landowners in implementing energy conservation projects.
 - b. Provide education on practices such as irrigation scheduling or sustainable timber harvesting that can provide economic benefits while conserving natural resources.
 - c. Provide education on links between economic stability and land stewardship.
 - d. Encourage exploration of alternative markets and other opportunities to diversify economic base of rural communities.

5.4 Monitoring, Evaluation, and Research Plan

While the Blackfoot Subbasin Monitoring and Evaluation Plan, as envisioned by the subbasin planning process, has not been fully developed as of the completion of Blackfoot Subbasin Plan, there is a substantial, monitoring, evaluation, and research effort as to the restoration of aquatic habitat that has been evolving and operational since 1990. This effort has largely been led by DFWP and has been characterized by annual data-gathering across a variety of monitoring values. There are currently 10 annual or biennial publication of reports that describe the and analyze the monitoring results (e.g. Peters, 1995; Pierce, 1997; Pierce 1999; Pierce, 2000; Pierce, 2004).

Since 1990, the research effort has included sport fishery harvest surveys, mark-and-recapture population surveys, redd counts, telemetry studies of both bull trout and westslope cutthroat trout, other life history surveys, disease and invasive species, genetics, temperature monitoring, water quality monitoring for a variety of chemical and physical parameters, and site specific habitat monitoring on 182 streams (Pierce, 2008). All of this existing data has provided insight into how angling behavior and habitat changes have affected native fish populations. As the restoration effort has progressed, the research, monitoring and evaluation effort has provided valuable information as to the status of those restoration efforts. This has allowed the restoration partners in the sub-basin to evaluate restoration projects and make adjustments suggested by the monitoring data. This experience is fully consistent with the iterative character of the overall restoration and management effort in the Blackfoot.

Restoration Effectiveness Monitoring Protocol for the Blackfoot Watershed (BC 2005)

In 2005, DFWP codified its years of monitoring and data-collection experience with a summation of potential restoration-based monitoring protocols (Pierce et al, 2005). This document was further refined and included in the Basin-wide Restoration Action Plan for the Blackfoot Watershed (Blackfoot Challenge, 2005; Appendix J; See Appendix L). The purpose of this document is to provide a common reference for restoration planners to determine appropriate monitoring parameters/activities and protocol to utilize on a given restoration project, and contemplates the use of the protocol both pre- and post-project. Specific objectives of this document include:

- Promoting inclusion of appropriate pre- and post-restoration monitoring in all stream and riparian area restoration projects within the watershed;
- Establishing monitoring protocol and procedures to be employed for restoration monitoring to ensure consistency in data collection efforts between projects and between various organizations/agencies involved with stream and riparian area restoration; and
- Providing a tool for use in the planning and design phase of restoration projects throughout the watershed.

These protocols include a specific description of the monitoring metrics applicable to a variety of restoration objectives (Table 5.2). The metrics include biological, physical, and chemical measurements. Table 5.2 organizes the metrics by objectives and impairments and notes the specific methodologies for each metric. The protocol also describes the specific methodologies

to be used in greater detail and how those methodologies are to be applied (Appendix L). The protocol is careful to note that the list of monitoring methods that it describes is by no means exhaustive but rather provides a reasonable spectrum of monitoring options, while acknowledging that other options are not precluded by this list.

TABLE 5.2 RESTORATION EFFECTIVENESS MONITORING METRICS APPLICABLE TO VARIOUS RESTORATION OBJECTIVES/SOURCES

METRICS	RESTORATION PROJECT OBJECTIVES/IMPAIRMENT CAUSES							
	In-Stream Flow Maintenance	Habitat Restoration	Reduce Substrate Siltation	Reduce Thermal Modification	Reduce Ag Runoff	Riparian Area Restoration	Reduce Elevated Metals	Reduce Elevated Nutrients
BIOLOGICAL METRICS								
Fish Population Surveys	X	X	X	X	X	X		
Redd Counts	X	X	X	X	X	X		
Macroinvertebrate Sampling	X	X	X	X	X	X	X	X
Periphyton Sampling	X	X	X	X	X			X
Chlorophyll-a					X			X
PHYSICAL PARAMETERS								
Habitat Assessments	X	X				X		
Riparian Assessment		X	X	X	X	X		
Water Temperature	X	X	X	X	X	X		
Flow Monitoring	X			X			X	X
Photo Points	X	X	X	X	X	X	X	X
WATER CHEMISTRY								
TSS Samples			X		X		X	X
Nutrient Sampling					X			X
Metals Sampling							X	
STREAM SUBSTRATE COMPOSITION								
McNeil Core Samples		X	X			X		
Percent Fine Sediment Content		X	X			X		

X – Metrics marked in bold should be given primary consideration for monitoring
TSS- Total Suspended Sediment

Current long-term water quality monitoring efforts in the Blackfoot Subbasin

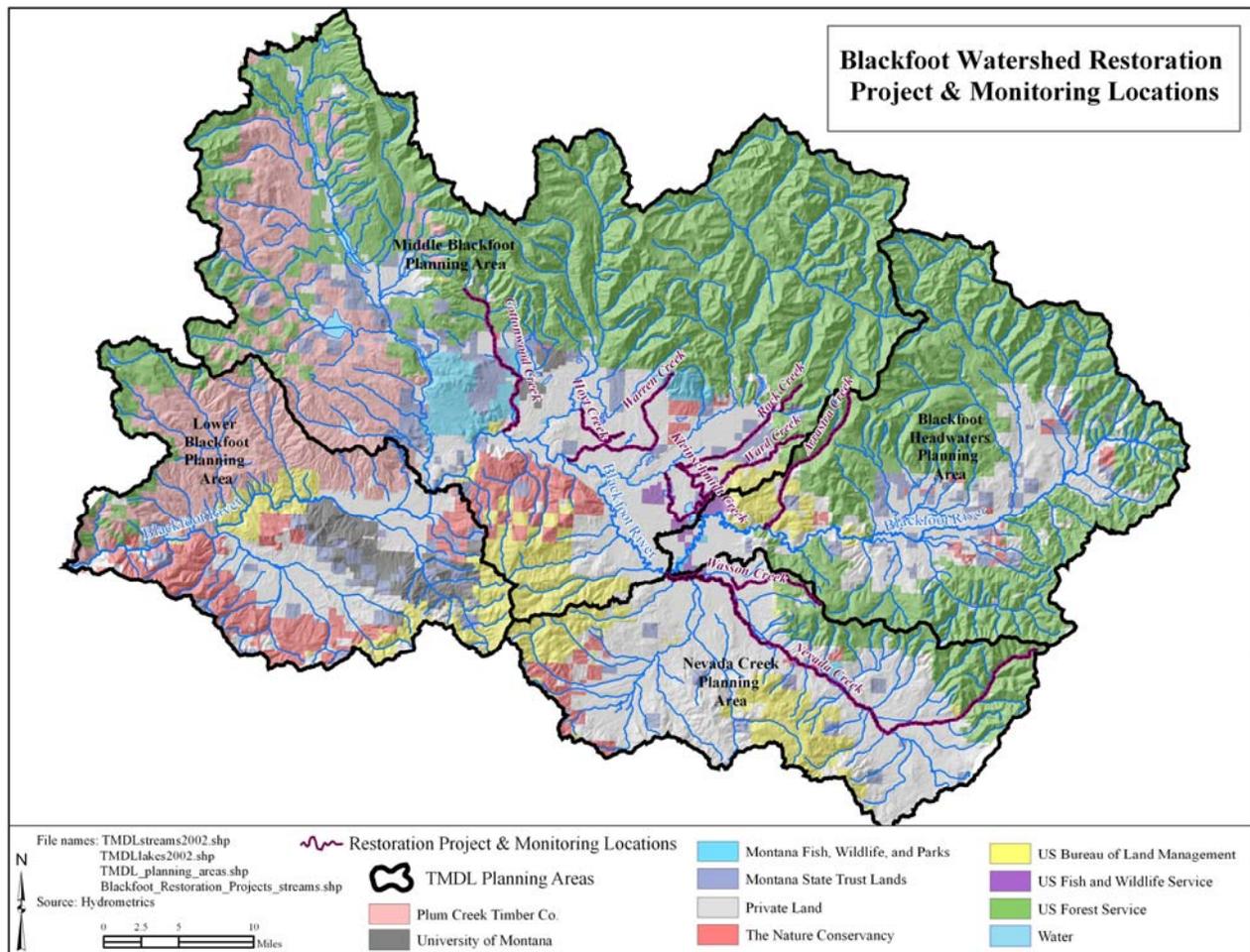
In addition to the restoration monitoring and protocol described above, the Blackfoot Subbasin hosts an ongoing, long-term water quality monitoring program (see Blackfoot Watershed Restoration Project and Monitoring Locations map below).

There are three major water quality monitoring programs in the Blackfoot: water quality assessment, restoration effectiveness, and status and trends.

The monitoring programs are complementary but are implemented for different reasons. Water quality assessment monitoring gives a basic understanding of streams and what water quality concerns are present. For example, assessment monitoring might identify stream bank erosion as a major source of sediment or illustrate that the highest nutrient concentrations in a certain stream are found in the valley bottom. Assessment monitoring also opens the door to restoration as the data are reviewed to identify potential solutions to these concerns.

If a restoration project occurs, it is important to understand how that project changed water quality conditions, if project goals were met, whether restoration practices need to be adjusted, and what else could be done. Restoration effectiveness monitoring does that as well as giving insight into expectations of future restoration efforts.

Figure 3.37 Blackfoot Watershed Restoration Project & Monitoring Locations



When multiple restoration efforts have occurred on a stream or in a specific area, status and trends monitoring helps to understand the cumulative effects of restoration work on water quality in the Blackfoot River and its tributaries (see Blackfoot Watershed Status and Trends Monitoring Network Map below).

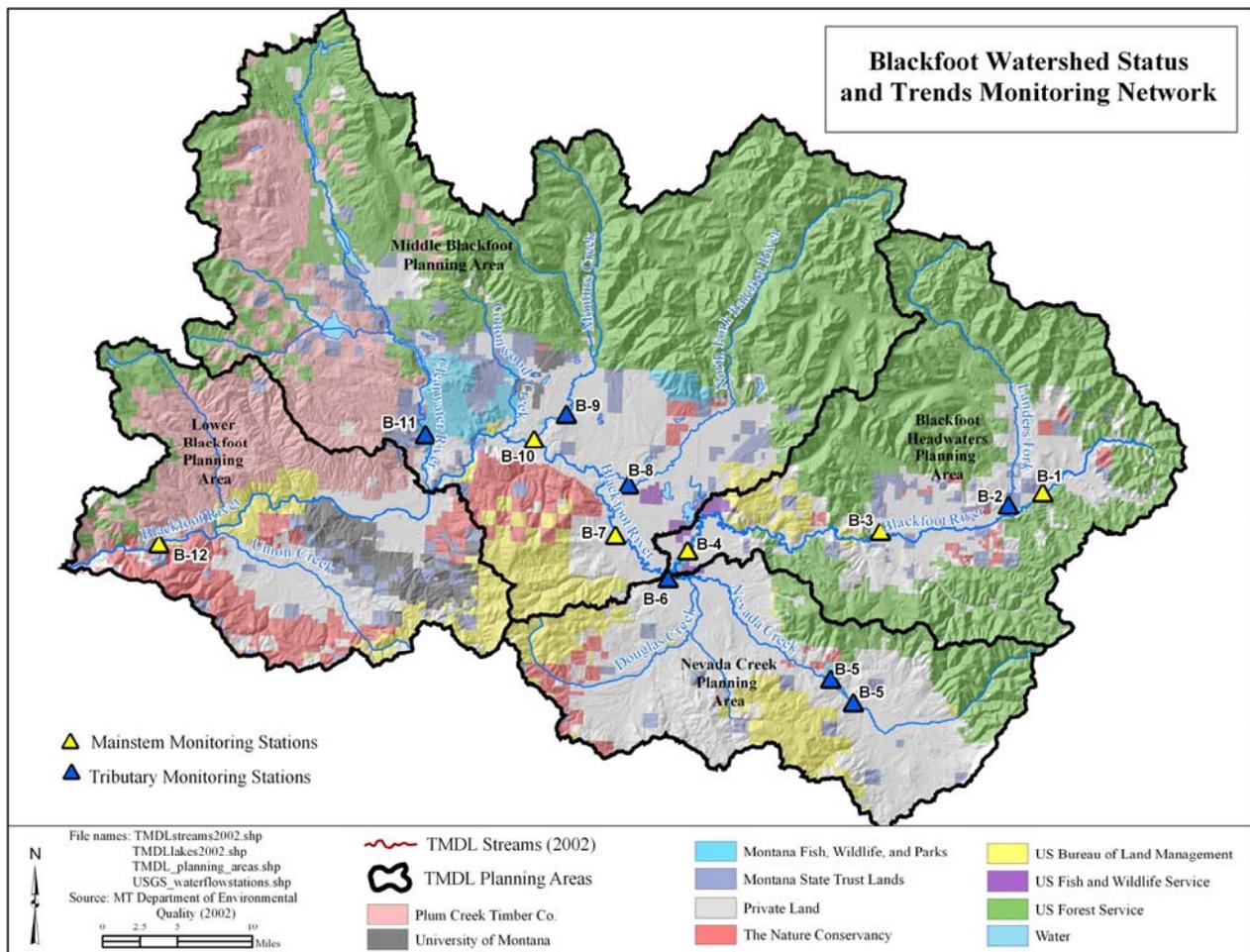
The Blackfoot River Valley Conservation Area Draft Plan (TNC and BC 2007)

Monitoring protocol for terrestrial and wetland species and habitats is not as fully developed as for aquatic habitats and populations. But The Nature Conservancy included a draft monitoring plan as part of its Blackfoot River Valley Conservation Area Draft Plan that, while incomplete, provides a useful point of departure for a terrestrial and wetland monitoring evaluation, and research plan (Appendix H). While the plan in Appendix H has overlap with the monitoring protocol described in Appendix L, that overlap can be easily resolved. The results of the Blackfoot Subbasin viability assessments that describe the current and desired viability ratings for a variety of indicators for each conservation target (Section 3.3) will complement the Conservation Area Plan efforts by providing valuable baseline and restoration target information.

These measures will provide a framework for expanded monitoring and evaluation of progress toward achieving conservation objectives in the subbasin.

Completion of the Blackfoot Subbasin Monitoring and Evaluation Plan will: 1) provide a framework for measuring conservation target viability over time, 2) ensure that strategic actions are abating the critical threats to conservation targets, and 3) verify that the stresses and threats identified in the Subbasin Assessment are, in fact, the factors that are limiting the viability of each conservation target. Through this process, existing strategies will be modified and new strategies will be developed. The process will also generate a cooperative research agenda to address management uncertainties and fill information gaps related to subbasin objectives and strategies.

Figure 3.38 Blackfoot Watershed Status and Trends Monitoring Network.



Ongoing Research Needs

The identification and planning of applied research applied has been an iterative process driven in part, by the accumulated information that has emerged from the continuing monitoring and

evaluation effort. In addition, the restoration effort itself has been instrumental in identifying research needs. The accumulated restoration and progress reports are replete with specific research projects initiated to inform the restoration efforts beyond what the annual and biennial efforts can do. To date, these efforts have included: telemetry studies of fluvial bull trout (Swanberg, 1997; Benson 2009) and fluvial westslope cutthroat trout (Schmetterling, 2001; Pierce, 2007); and mountain whitefish (Pierce, pending); whirling disease causes, distribution, and effects on rainbow trout (Pierce et al, 2008 and 2009); riparian conditions (Marler, 1997; Fitzgerald, 1997); mainstem and tributary temperatures (Pierce, 2000); research into the efficacy of certain fish screens and fish ladders (Schmetterling et al Pierce et al 2001); assessment of the geomorphic and temperature variables associated with bull trout spawning areas (Pierce, 2006); status review of mountain whitefish (Pierce, 2008).

As restoration projects unfold and as the ongoing fish population, streamflow, and temperature and other parameters continue, applied research needs will be identified. The biggest challenge to that continuation will be funding necessary to continue existing monitoring programs, including the continuation of long-term fisheries studies associated with restoration. Currently funding of monitoring and applied research has no dedicated funding source among any of the restoration partners. The Blackfoot Challenge and BBCTU have undertaken an effort to create a secure source of funding for future monitoring.

5.5 Endangered Species Act and Clean Water Act Requirements

For a subbasin plan to be adopted by the NPCC, the plan must conform to existing federal guidelines of the Endangered Species Act (ESA) and Clean Water Act (CWA).

ESA: The relationship of the Blackfoot Subbasin to ESA Planning Units and the status of threatened and endangered species in the subbasin are discussed in the Section 3.2.6.2 of the Subbasin Assessment. Nine of the Blackfoot Subbasin conservation objectives directly or indirectly address threatened and endangered species (grizzly bear, Canada lynx, bull trout) in the subbasin. Many of the strategic actions listed under these objectives directly support goals and objectives in relevant ESA recovery plans. Each of the conservation objectives will also support conservation of one or more Montana Species of Concern, which are listed in Tables 3.5 and 3.6.

CWA: Water quality conditions in the Blackfoot Subbasin are discussed in the Section 3.2.5 of the Subbasin Assessment. Many of the Blackfoot Subbasin conservation objectives incorporate strategic actions that will help to satisfy CWA objectives in the subbasin. The salmonid objectives and many of the vegetation-related objectives, in particular, address the CWA by including strategic actions that address forestry practices, road issues, livestock management, riparian vegetation, channel alteration, drainage systems and other factors that impact water quality in the subbasin.

Table 5.3 illustrates how the Blackfoot Subbasin conservation objectives are reflective of and integrated with recovery goals of ESA recovery plans and where they are supportive of and consistent with the CWA.

Table 5.3 Relationship of Blackfoot Subbasin Conservation Objectives to the ESA and CWA.

Conservation Objective	Addresses ESA	Addresses CWA
Conservation Objective 1 – Maintain the large, intact working landscapes that sustain the natural resources and rural way of life in the Blackfoot Subbasin through support to local communities, counties and land conservation partners.	√	√
Conservation Objective 2a – Maintain and/or restore viable populations of bull trout within the three major population groups in the Blackfoot Subbasin.	√	√
Conservation Objective 2b – Maintain and/or restore viable populations of migratory (fluvial and adfluvial) westslope cutthroat trout within each of the three major population groups within the Blackfoot Subbasin.		√
Conservation Objective 2c – Maintain and/or restore viable populations of resident westslope cutthroat trout within each of the three major population groups within the Blackfoot Subbasin.		√
Conservation Objective 3 – Control existing noxious and invasive plant species abundance and distribution, and prevent establishment of all new noxious and invasive species in the Blackfoot Subbasin. Emphasis should be placed on protecting the highest quality habitats, which should be identified and prioritized by 2012.		√
Conservation Objective 4 – Maintain or restore the viability of priority herbaceous wetlands based on historic conditions across the Blackfoot Subbasin.		√
Conservation Objective 5 - Maintain or restore the viability of priority moist site and riparian vegetation based on historic conditions across the Blackfoot Subbasin.		√
Conservation Objective 6 – Maintain or restore the viability of priority native grassland and sagebrush communities based on historic conditions across the Blackfoot Subbasin.	√	√
Conservation Objective 7 – Maintain or restore the viability of low severity fire regime ponderosa pine/western larch forest communities based on historic stand conditions across the Blackfoot Subbasin.	√	√
Conservation Objective 8 - Maintain or restore the viability of mid to high elevation coniferous forest communities based on historic stand conditions across the Blackfoot Subbasin.	√	√

Table 5.3 (continued).

Conservation Objective	Addresses ESA	Addresses CWA
Conservation Objective 9a - Maintain functional connectivity for grizzly bears across biologically suitable habitats in the Blackfoot Subbasin.	√	
Conservation Objective 9b – Reduce human-caused grizzly bear mortality in the Blackfoot Subbasin.	√	
Conservation Objective 9c –Improve human acceptance of grizzly bears and wolves by building a community-supported conservation and management process that reflects the interests and values of residents and landowners throughout the Blackfoot Subbasin.	√	
Conservation Objective 10 – Increase public awareness of the Blackfoot Watershed and the subbasin/conservation planning process, emphasizing the need to conserve the rural life, values and natural resources of the Blackfoot Subbasin.	√	√