

## **APPENDIX H RESTORATION PLAN**

The information presented in this appendix is intended to supplement the Restoration and Monitoring Plan for the Middle Blackfoot and Nevada Creek TMDL planning areas (**Section 10.0**).

### **Conservation Practices/BMPS**

The following is a list and description of conservation practices presented by Best Management Practice (BMP) category. These BMP categories correspond to the management recommendations and applicable treatments presented in **Section 10.2**. The majority of conservation practices come directly from the Natural Resource Conservation Service (NRCS) Field Office Technical Guide for Powell County and referenced by the NRCS practice standard number. Others sources of information are cited by name.

There are seven different BMP categories: Stream BMPs, Riparian Area BMPs, Upland BMPs, Grazing BMPs, Water Conservation BMPs, Forestry BMPs, and Road BMPs. Each BMP category is described in terms of water quality impairments they are intended to address and how and where they can be applied. Each BMP category contains a list of several different conservation practices giving landowners and land managers numerous options for implementation.

Implementation of conservation practices should be determined on a site specific basis. Water quality restoration objectives as well as landowner or land manager objectives should be evaluated prior to implementation. The conservation practices have been categorized to assist in this evaluation. Multiple practices from multiple categories may be needed to meet management objectives. Additional practices not listed in this Appendix may also be applicable. NRCS practice standards, specifications, job sheets, and other information sources should be consulted prior to implementation to achieve maximum effectiveness.

For private landowners, cost-share and technical assistance resources for implementation of conservation practices are often available. A “resource guide” is included in this appendix following the discussion of the BMP categories. For public land managers, partnerships with local watershed groups, Conservation Districts, and other public agencies have proven to be an effective tool in implementing desired conservation practices.

**Stream BMPs** – These conservation practices/BMPs have the primary purpose of affecting sediment, habitat, and metals impairments. Nutrients attached to sediment, primarily phosphorous, and temperature impairments are also addressed by this group of practices. Stream BMPs focus specifically on the stream channel and address impairments caused by alteration of the stream channel through active channel restoration or manipulation. When applied these practices are intended to have the following effects:

1. Reduction in sediment (as well as sediment bound metals and nutrients) from bank erosion through restoration, protection, or stabilization of streambanks

2. Improved or restored in-stream fish and aquatic habitat through the installation or restoration of habitat structures and features
3. Reduction in water temperatures through improved or restored channel form (width to depth ratio)
4. Improvement or restoration of channel form and function
5. Improved capacity for sediment and flow conveyance

**Stream BMPs include the following:**

- **Open Channel (582)** – Constructing, improving, re-creating, or restoring a channel in which water flows with a free surface. This practice may be applied to support the re-establishment or improvement of a channel to accommodate flows; provide for riparian vegetation establishment and growth on the flood plain; reduce bed and bank erosion; improve flood plain function and stability; modify sediment transport; provide improved water quality and habitat for aquatic species and improved riparian habitat for upland species.
- **Stream Crossing (578)** – A stabilized area or structure constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles. This practice applies to all land uses where an intermittent or perennial watercourse exists and a ford, bridge, or culvert type crossing is desired for livestock, people, and/or equipment. The purpose of this practice is to improve water quality by reducing sediment, nutrient, organic, and inorganic loading of the stream; reduce streambank and streambed erosion; providing for flood flows; reducing risk of washout and subsequent delivery of fill material; facilitating aquatic life passage; and provide crossing for access to another land unit.
- **Stream Habitat Improvement and Management (395)** – Maintain, improve, or restore physical, chemical, and biological functions of a stream. This practice applies to streams where habitat deficiencies limit survival, growth, reproduction, and/or diversity of aquatic species in relation to the potential of the stream. The purpose of this practice is to provide suitable habitat for desired aquatic species and diverse aquatic communities; provide channel morphology and associated riparian characteristics important to desired aquatic species; and provide aesthetic values and recreation opportunities associated with stream habitats such as angling and fish viewing.
- **Fish Passage (396)** – Modification or removal of barriers that restrict or impede movement or migration of fish or other aquatic organisms. The purpose of this practice is to improve or provide upstream or downstream passage for desirable fish and aquatic organisms.
- **Streambank and Shoreline Protection (580)** – Treatments used to stabilize and protect banks of streams or constructed channels, and shorelines of lakes, reservoirs, or estuaries. This practice applies to streambanks of natural or constructed channels and shorelines of lakes, reservoirs, or estuaries where they are susceptible to erosion where the problem can be solved with relatively simple structural measures (vegetation or upland erosion control practices). The purpose of this practice is to maintain the flow or storage capacity of the water body or to reduce the offsite or downstream effects of excessive sediment resulting from bank erosion; improve or enhance the stream corridor for fish and wildlife habitat, aesthetics, recreation; and to prevent, control, or minimize the loss of land or damage to land uses, or other facilities adjacent to the banks

including the protection of known historical, archeological, and traditional cultural properties.

- **Channel Stabilization (584)** – Measures used to stabilize the bed or bottom of a channel in the beds of existing or newly constructed channels, alluvial or non-alluvial, undergoing damaging aggradation or degradation that cannot be feasibly controlled by clearing or snagging, by the establishment of vegetative protection, by the installation of bank protection, or by the installation of upstream water control measures. The purpose of this practice is to maintain or alter channel bed elevation or gradient; modify sediment transport or deposition; and to manage surface water and groundwater levels in floodplains, riparian areas, and wetlands.
- **Grade Stabilization Structure (410)** – A structure used to stabilize the grade and control erosion in natural or artificial channels; prevent the formation or advance of gullies; and enhance environmental quality and reduce pollution hazards in areas where the concentration and flow velocity of water requires stabilization. Special attention shall be given to maintaining or improving habitat for fish and wildlife when applied.
- To maximize the efficacy of any Stream BMP, the concurrent implementation of one or several **Riparian Area BMPs** is recommended. Similarly, where Stream BMPs have been implemented in areas where either grazing or timber harvesting occurs, **Grazing BMPs** and **Forestry BMPs** are recommended.

**Riparian Area BMPs** – These conservation practices/BMPs have the primary purpose of affecting sediment, habitat, and temperature impairments. Nutrient impairments are indirectly addressed through implementation of these practices as are metals. Riparian Area BMPs focus on those areas adjacent to the stream channel and involve restoring vegetation communities. These practices are a more passive approach to restoration allowing the riparian areas and stream channel to recover over a period of time. Implementation is strongly encouraged in conjunction with Stream BMPs. Implementation of these practices is intended to have the following effects:

1. Reduction in sediment delivery (as well as sediment bound metals and nutrients) from bank erosion through stabilization or protection of streambanks
2. Reduction in sediment yield (as well as sediment bound nutrients and metals) from upland sources through increased filtering and infiltration capacity
3. Reduction in water temperatures through increased shading capabilities and reduction in water surface area
4. Improved or restored in-stream fish and aquatic habitat through the recruitment and retention of large woody debris
5. Improvement or restoration of channel form and function through streambank stabilization

**Riparian Area BMPs include the following:**

- **Channel Bank Vegetation (322)** – The purpose and definition of this practice is establishing and maintaining vegetative cover on channel banks, berms, spoils, and associated areas. The purpose of this practice is to stabilize channel banks and adjacent areas and reduce erosion and sedimentation; and to maintain or enhance the quality of the environment, including fish and wildlife habitat.

- **Fence (382)** – A constructed barrier to animals or people. This practice is applied on any area where management of animal or people movement is needed. This practice can also be used to facilitate the application of other conservation practices as a means to control movement of animals and people.
- **Use Exclusion (472)** – The temporary or permanent exclusion of animals, people, or vehicles from an area. This practice can be applied on all land uses and can also be used to facilitate the application of other conservation practices. The purpose of this practice is to prevent, restrict, or control access to an area; maintain or improve the quantity and quality of natural resources; and minimize liability and human health concerns.
- **Riparian Forest Buffer (391)** – An area predominantly trees and/or shrubs located adjacent to and up-gradient from watercourses or water bodies. Riparian forest buffers are applied on areas adjacent to permanent or intermittent streams, lakes, ponds, and wetlands. They are not applied to stabilize streambanks or shorelines. The purpose of this practice is to create shade to lower or maintain water temperatures to improve habitat for aquatic organisms; create or improve riparian habitat and provide a source of detritus and large woody debris; reduce excess amounts of sediment, organic material, nutrients, and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow groundwater flow; reduce pesticide drift entering the water body; restore riparian plant communities; increase carbon storage in plant biomass and soils.
- **Riparian Herbaceous Cover (390)** – Grasses, grass-like plants and forbs that are tolerant of intermittent flooding or saturated soils and that are established or managed in the transitional zones between terrestrial and aquatic habitats. This practice is applicable in areas adjacent to perennial and intermittent watercourses or water bodies where the natural plant community is dominated by herbaceous vegetation; where riparian areas have been altered and the potential natural plant community has changed or converted to cropland, pastureland, rangeland, or other commercial/agricultural uses; and where channel and streambank stability is adequate to support this practice. Related purposes of this practice include improving and protecting water quality by reducing the amount of sediment and other pollutants, such as pesticides, organic materials, and nutrients in surface runoff as well as nutrients and chemicals in shallow groundwater flow; help stabilize streambanks and shorelines; provision of food, shelter, shading, substrate, access to adjacent habitats, nursery habitat and pathways for movement by resident and nonresident aquatic, semi-aquatic, and terrestrial organisms.
- **The Montana Streamside Management Zone (SMZ) Law (77-5-301 through 307 MCA)** – see discussion under Forestry BMPs.
- When Riparian Area BMPs have been applied in areas where grazing and timber harvesting occur, it is strongly recommended that **Grazing BMPs** and **Forestry BMPs** are implemented to maximize the efficacy of riparian area conservation measures.

**Upland BMPs** – These conservation practices have the primary purpose of affecting nutrient and sediment impairments. These practices focus on upland areas which for the purposes of this document are defined as the area within 350 feet of streams and waterbodies. The practices emphasize improving vegetation conditions in these upland areas. While most of these practices are tied to agricultural land uses, many can be applied to other land uses. Implementation of these practices is intended to have the following effects:

1. Reduced delivery of sediment, sediment bound nutrients, and sediment bound metals; and nutrients from upland soil erosion sources through improved upland vegetation conditions and increased filtering and infiltration capacity.

**Upland BMPs include the following:**

- **Conservation Cover (327)** – Establishing and maintaining permanent vegetative cover to protect soil and water resources and applies on land to be retired from agricultural production requiring permanent protective cover, and other lands needing permanent protective cover. The purpose of this practice is to reduce soil erosion and sedimentation; improve water quality; enhance wildlife habitat.
- **Critical Area Planting (342)** – Establishment of permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical, or biological conditions that prevent the establishment of vegetation with normal practices and if left untreated could be severely damaged by erosion or sedimentation or could cause significant off-site damage. The purpose of this practice is to stabilize areas with existing or expected high rates of soil erosion by water or wind; restore degraded sites that cannot be stabilized through normal methods.
- **Filter Strip (393)** – A strip or area of herbaceous vegetation situated between cropland, grazing land, animal confinement areas, or disturbed land (including forest land) and environmentally sensitive areas such as streams or riparian areas. The purpose of this practice is to reduce sediment, particulate organics, and sediment absorbed contaminant loadings in runoff; to reduce dissolved contaminant loadings in runoff; to reduce sediment, particulate organics, and sediment absorbed contaminant loadings in surface irrigation tailwater; restore, create, or enhance herbaceous habitat for wildlife and beneficial insects; maintain or enhance watershed functions and values; utilize excess nutrients found in runoff water and groundwater; manage bacteria in runoff from livestock confinement areas
- **Forage Harvest Management (511)** – The timely cutting and removal of forages from the field as hay, green-chop or ensilage on all land uses where machine harvested forage is grown. The purpose of this practice is to optimize yield and quality of forage at the desired level; promote vigorous plant re-growth; maintain stand life; manage for the desired species composition; use forage plant biomass as a soil nutrient uptake tool; control insects, diseases, and weeds; maintain and/or improve wildlife habitat.
- **Grazing Land Mechanical Treatment (548)** – Modifying physical soil and/or plant conditions with mechanical tools by treatments such as pitting, contour furrowing, and ripping or sub-soiling. This practices may be applied on pasturelands, rangeland, grazed forest, and native pastures where slopes are less than 15% for the purposes of fracturing compacted soil layers and improve soil permeability; reduce water runoff and increase infiltration; renovate and stimulate plant community for greater productivity yield.
- **Heavy Use Area Protection (561)** – The stabilization of areas frequently and intensively used by people, animals, or vehicles by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures in agricultural, recreational, urban, or other frequently and intensively used areas requiring treatment to address one or more resource concerns. The purpose of this practice is to reduce soil erosion;

improve water quantity and quality; improve livestock health; improve air quality; improve aesthetics.

- **Nutrient Management (590)** – Managing the amount, source, placement, form, and timing of the application of plant nutrients and soil amendments where applied. The purpose of this practice is to budget and supply nutrients for plant production; properly utilize manure or organic by-products as a plant nutrient source; minimize agricultural nonpoint source pollution of surface and groundwater resources; maintain or improve the physical, chemical, and biological condition of soil; and protect air quality by reducing nitrogen emissions and the formation of atmospheric particulates.
- **Pasture and Hay Planting (512)** – Establishing native or introduced forage species where forage production and/or conservation are needed and feasible. The purpose of this practice is to establish adapted and compatible species, varieties, or cultivars for forage production; improve or maintain livestock nutrition and/or health; balance forage supply and demand during periods of low forage production; reduce soil erosion and improve water quality; provide food and cover for wildlife; improve soil quality/health; and increase carbon sequestration.
- **Range Planting (550)** – Establishment of adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees on rangeland, native or naturalized pasture, grazed forest, or other suitable locations where the principal method of vegetation management will be herbivores and where desirable vegetation is below the acceptable level for natural reseeding or grazing management is unsatisfactory. The purpose of this practice is to restore a plant community similar to its historic climax or the desired plant community; provide or improve forages for livestock; provide or improve forage, browse, or cover for wildlife; reduce erosion by wind and/or water; improve water quality and quantity; and increase carbon sequestration.
- **Upland Wildlife Habitat Management (645)** – Provide and manage upland habitats and connectivity within the landscape for wildlife. Treating upland wildlife habitat concerns identified during the conservation planning process that enable movement, or provide shelter, cover, food in proper amounts, locations and times to sustain wild animals that inhabit uplands during a portion of their life cycle.
- **Wetland Restoration (657)** – The rehabilitation of a degraded wetland or the re-establishment of a wetland so that soils, hydrology, vegetative community and habitat are in close approximation of the original natural condition that existed prior to modification to the extent practicable. The purpose of this practice is to restore wetland function, value, habitat diversity, and capacity by restoring hydric soils, restoring hydrology (depth duration and season of inundation, and/or duration and season of soil saturation), and restoring vegetation (including the removal of undesired species, and/or seeding or planting of desired species).
- **Integrated Weed Management** – The control of noxious and invasive weed species of foreign origin that directly or indirectly adversely impact agriculture, navigation, fish and wildlife, or public health. Integrated weed management involves the use of several control techniques in a well planned, coordinated, and organized strategy to reduce the impacts of weeds. Strategies include chemical, biological, and cultural control methods (Blackfoot Challenge, Draft 2006). **Pest Management (595)** is also applicable to weed management.

**Grazing BMPs** – These conservation practices have the primary purpose of affecting sediment, habitat, nutrient, and temperature impairments. Where livestock are present, Grazing BMPs can be implemented to reduce impacts to resources and sensitive areas while improving forage conditions for livestock. Where grazing occurs (i.e. irrigated or dry pastures, upland areas, or forests) implementation of these BMPs is highly recommended. Implementation of Grazing BMPs is strongly encouraged in areas where other conservation practices/BMPs (**Stream BMPs, Riparian Area BMPs, Upland BMPs**) have been implemented and where grazing occurs. Implementation of these practices is intended to have the following effects:

1. Reduction in sediment delivery (as well as sediment bound metals and nutrients) from bank erosion through controlling the timing, intensity, duration, and frequency of grazing in sensitive areas
2. Improved in-stream fish and aquatic habitat through controlling the timing, intensity, duration, and frequency of grazing in sensitive areas
3. Improvement of channel form and function through controlling the timing, intensity, duration, and frequency of grazing in sensitive areas
4. Reduction in sediment (and sediment bound nutrients and metals) and nutrient yield from upland sources through improved upland and riparian vegetation conditions, increased filtering and infiltration capacity; and uniform utilization of upland and riparian vegetation by livestock
5. Reduction in water temperatures through improved riparian vegetation conditions and increased shading capabilities

**Grazing BMPs include the following:**

- **Prescribed Grazing (528)** – Managing the controlled harvest of vegetation with grazing animals on all lands where grazing animals are managed. The purpose of this practice is to improve or maintain the health and vigor of plant communities; improve or maintain quantity and quality of forage for livestock health and productivity; improve or maintain water quality and quantity; reduce accelerated erosion, and maintain or improve soil condition; improve or maintain the quantity and quality of food and/or cover available for wildlife; promote economic stability through grazing land sustainability. Specific activities associated with prescribed grazing include:
  - Design a grazing management plan and determine the intensity, frequency, duration, and season of grazing to promote desirable plant communities and productivity of key forage species. Maintain adequate vegetative cover to prevent accelerated soil erosion, protect stream banks and filter sediments. Set target grazing use levels to maintain both herbaceous and woody plants. No grazing unit should be grazed for more than half the growing season of key species. (**Best Management Practices for Grazing in Montana, MT DNRC 1999; NRCS 2002**)
    - Create riparian buffer exclosures (**Use Exclusion – 472**) through fencing (**Fence – 382**) or develop riparian pastures to be managed as a separate unit through fencing. Fencing should be incorporated only where necessary. Water gaps can be included in riparian fencing. (MT DNRC 1999)
    - Ensure adequate residual vegetative cover and regrowth and rest periods. Periodically rest or defer riparian pastures during the critical growth period of plant species. (MT DNRC 1999, Mosley et. al. 1997)

- Distribute livestock to promote dispersion and decomposition of manure and to prevent the delivery of manure to water sources. (MT DNRC 1999)
- Provide off-site high quality water sources (MT DNRC 1999). **Watering Facility (614)** – A trough or tank installed to provide livestock watering facilities supplied from spring, reservoir, well, or other sources where there is a need for new or improved watering places to permit the desired level of grassland management, to reduce health hazards for livestock and to reduce livestock waste in streams. The purpose of this practice is to protect vegetative cover through proper distribution of grazing or through better grassland management for erosion control; reduce or eliminate the need for livestock to be in streams, which reduces livestock waste there. **Pipeline (516), Spring Development (574), and Water Well (642)** are also applicable practices for off-site water sources.
- Periodically rotate feed and mineral sites. Place salt and minerals in uplands, away from water sources (ideally ¼ mile from water to encourage upland grazing). Keep salt in troughs and locate salt and minerals in areas where soils are less susceptible to wind or water erosion. (MT DNRC 1999, Mosley et. al. 1997)
- Create hardened stream crossings for livestock to reduce the number of crossing areas and reduce erosion at crossings. (MT DNRC 1999)
- Encourage the growth of woody species (willow, alder, etc.) along the stream bank, which will limit animal access to the stream and provide root support to the bank. (MT DNRC 1999)
- Alternate season of use from year to year in a given allotment or pasture. Time grazing to reduce impacts based on limiting factors for system recovery. For example, early spring use can cause trampling and compaction damage when soils and stream banks are wet. Fall and early winter grazing can encourage excessive browse on willows. (MT DNRC 1999, NRCS 2002).
- **Animal Trails and Walkways (575)** – A travel facility for livestock and/or wildlife to provide movement through difficult or ecologically sensitive terrain such as steep rough terrain, across rock outcrops, through dense timber or brush, over lava beds, on marsh rangelands, and grazing lands susceptible to overflow by water. The purpose of this practice is to provide or improve access to forage, water, and/or shelter; improve grazing efficiency and distribution; and divert travel away from ecologically sensitive and/or erosive sites.
- Monitor livestock forage use and adjust strategy accordingly. (MT DNRC 1999)
- **Range Planting (550)** – Establishment of adapted perennial vegetation such as grasses, forbs, legumes, shrubs, and trees on rangeland, native or naturalized pasture, grazed forest, or other suitable locations where the principal method of vegetation management will be herbivores and where desirable vegetation is below the acceptable level for natural reseeding or grazing management is unsatisfactory. The purpose of this practice is to restore a plant community similar to its historic climax or the desired plant community; provide or improve forages for livestock; provide or improve



forage, browse, or cover for wildlife; reduce erosion by wind and/or water; improve water quality and quantity; and increase carbon sequestration.

**Water Conservation BMPs** – These conservation practices/BMPs have the primary purpose of affecting temperature, flow, and habitat impairments. Nutrient and sediment impairments are also addressed through these practices but to a lesser extent. These practices promote water conservation and improving water use efficiency to meet in-stream flow needs of water quality beneficial uses while providing sufficient water for agricultural and industrial production.

Implementation of these BMPs is intended to have the following effects:

1. Reduction in water temperatures through increased in-stream flows
2. Improved capacity for sediment and flow conveyance
3. Improved in-stream fish and aquatic habitat through maintenance of in-stream flows
4. Improved migration capabilities of fish and other aquatic species through the maintenance of in-stream flows
5. Reduction in water temperature through reduced tailwater/return flows through increased efficiency in water application
6. Reduced delivery of sediment, sediment bound nutrients, and nutrients from overland flow through increased efficiency in water application

**Water Conservation BMPs include the following:**

- **Water Banking (Blackfoot Challenge 2003)** – A water bank is simply an administrative mechanism by which water users may trade water among themselves in a given drainage. Water banks transfer water, not water rights. The “Temporary Change in Appropriation Right” provisions (85-2-407 MCA 2001) were developed in response to drought conditions in 1989. Again, relying upon the concept and criteria found in the Change of Appropriation Water Right section, this allows a water right holder to move his right temporarily to a new use, new user or new place of use and automatically revert to its original operation at the end of the temporary use. Although this section cannot be utilized to provide for instream flow it may be an effective water conservation and water efficiency tool, especially as linked to low water planning.
- **Leasing Water Rights and/or Converting Water Rights to In-Stream Flows (Blackfoot Challenge 2003)** – Sections 85-2-407 MCA, 85-2-408, MCA, 85-2-436, MCA and 85-2-439, MCA all allow for the temporary transfer of water rights. The last three of these provide for the transfer of water rights from a consumptive use to instream flows to protect the fishery resource. An appropriator may make a temporary change by simply changing the purpose and place of use, or by leasing the water right to another party. The instream leasing programs are all statutes operating under a sunset provision. Also, temporary changes can only be granted for a term not exceeding ten years or thirty years, if water is made available by a storage or conservation project. Water leasing/conversion are affect tools for supplementing and maintaining in-stream flows. Channel restoration and in-stream habitat improvements (**Stream BMPs**) used in conjunction with water leasing/conversion can greatly enhance results.
- **Irrigation Water Management (449)** – determining and controlling the volume, frequency, and application of water in a planned, efficient manner to manage soil moisture to promote desired crop response; optimize use of available water supplies;

minimize irrigation induces soil erosion; decrease non-point source pollution of surface and groundwater resources; manage salts in the crop root zone; and manage air, soil, or plant micro-climate. Irrigation Land Leveling (464) and Land Smoothing (466) which involve reshaping land surface can also be used to increase water application efficiency.

- **Irrigation Water Conveyance (Blackfoot Challenge 2003, NRCS 2007)** – Ditches and canals serve as integral parts of irrigation water distribution or conveyance systems. Ditches and canals can be lined with a variety of materials including Flexible Membrane (428B), Nonreinforced Concrete (428A), fabrics, polymers (Anionic Polyacrylamide: PAM (450)), chemicals or clay to improve management of irrigation water, prevent waterlogging of land; maintain water quality; prevent erosion; and reduce water loss. Clearing and Snagging (326) or removal of snags, drifts, or other obstructions can increase flow capacity of a ditch or canal as well. Pipelines (430AA, 430BB, 430CC, 430DD, 430EE, 430FF, 430GG, 430HH) are also used in irrigation water conveyance to prevent erosion or loss of water quality or damage to land; make possible proper water use; and reduce water conveyance losses.
- **Irrigation System Efficiency (Blackfoot Challenge 2003, NRCS 2007)** – Improving irrigation system efficiency is intended to efficiently and uniformly apply irrigation water to maintain adequate soil water for the desired level of plant growth and production without causing excessive water loss, erosion, or water quality impairment. Irrigation water management (449) can improve water use efficiency. In some cases however, improvements to infrastructure is also necessary. The most common change in irrigation infrastructure is conversion of flood or wheel-line irrigation systems to low pressure center pivot or sprinkler systems (442). Where these systems already exist, regular maintenance and replacement of worn equipment can maintain the intended system efficiency. Where center pivot or sprinkler systems are not feasible, additional surface and subsurface water-control structures can be installed for the efficient distribution of water (443 and 587).

**Forestry BMPs** – The Montana Department of Natural Resources and Conservation (MT DNRC) is charged with providing landowners and operators in Montana with information on BMPs that have been adopted to minimize non-point source water pollution from forest practices such as timber harvesting through preventing erosion and reducing delivery of sediment to streams. MT DNRC is also charged with monitoring the application and effectiveness of those BMPs. Two documents guide Forestry BMPs in Montana:

- **The Montana Streamside Management Zone (SMZ) Law (77-5-301 through 307 MCA)** – prohibits certain timber harvest activities within at least 50 feet of any stream, lake, or other water body including broadcast burning; operating wheeled or tracked vehicles except on established roads; clear cutting; constructing roads in the SMZ except when necessary to cross a stream or wetland; handling, storing, applying, or disposing of hazardous or toxic material in a manner that pollutes streams, lakes, or wetlands or that may cause damage or injury to humans, land, animals, or plants; casting road material into a stream, wetland, or watercourse; depositing slash in streams or other water bodies. This law must be followed for all commercial timber harvest activities. MT DNRC must approve any exceptions to these prohibited activities. While the law is intended to guide commercial timber harvesting activities in streamside areas, the principles behind the law (riparian area protection) can be applied to

numerous land management activities (i.e. timber harvest for personal use, agriculture, development). This plan promotes the use of SMZ practices across all land ownerships and streamside management activities.

- **Best Management Practices for Forestry in Montana** (MT DNRC/MT BMP Work Group – January 2006) – are a voluntary set of practices recommended for timber harvest activities outside of SMZs. These BMPs cover timber harvesting and site preparation, harvest design, other harvesting activities, slash treatment and site preparation, winter logging, and hazardous substances. The Montana Logging Association and MT DNRC offer regular Forestry BMP training sessions for private landowners and contract loggers. **Water Quality BMPs for Montana Forests** (MSU, 2001) is another excellent resource for information on forestry related BMPs.

In addition to these guiding documents, forestry related conservation practices described by NRCS include:

- **Prescribed Forestry (490)** – Managed forested areas for health, wood, and/or fiber, recreation, water, aesthetics, wildlife, habitat, and plant biodiversity. The purpose of this practice is to maintain or improve forest health, protect soil quality and condition, maintain or enhance water quality and quantity; maintain or improve forest productivity; maintain or improve plant diversity; improve aesthetic and recreational values; improve wildlife habitat; and achieve or maintain a desired understory plant community for forest products, grazing, and browsing. Prescribed Burning (338) can also be used as part of a forest management plan.

**Road BMPs** – Road BMP guidance is contained in the **Best Management Practices for Forestry in Montana** (MT DNRC/ MT BMP Work Group – January 2006). These BMPs are voluntary and are related to road construction and maintenance for timber harvesting activities but can generally be applied to all roads. Road related BMPs covered include planning and location, design, road drainage, construction, maintenance, stream crossings, and road construction and harvesting considerations. These BMPs were designed to limit sediment delivery from roads to streams, limit impacts of roads on stream habitat and water temperatures, and to maintain fish passage and migration corridors. Road construction is also addressed in the **Montana Streamside Management Zone (SMZ) Law (77-5-301 through 307 MCA)** which prohibits constructing roads in the SMZ except when necessary to cross streams or wetlands. **Water Quality BMPs for Montana Forests** (MSU, 2001) contains additional road related BMP information.

**Other Land Uses and Best Management Practices** – Grazing, Forestry, Water Conservation, and Road BMPs described in this Appendix cover the primary land uses in the Middle Blackfoot and Nevada Creek planning areas affecting water quality. Mining and residential/commercial development are less prevalent in these planning areas but still warrant some discussion.

- **Mining** – Historically mining played a larger role in the development and economy of the Blackfoot watershed. Current mining activities are fairly minimal (although many residual effects still linger), however, the potential for new mining activities is always present. All new mining activities must be approved through a permit authorized by the Montana Department of Environmental Quality. The standards and requirements set by

these permits provide protection or mitigation of water quality degradation as a result of new mining activities.

- **Residential/Commercial Development** – On a whole the Blackfoot watershed remains largely rural and undeveloped. Development has and will continue to increase over time and left unguided can significantly impact water quality. The Montana Non Point Source Management Plan (2007) speaks to controlling nonpoint source pollution from development. While the recommended BMPs focus more on an urban setting, the practices described (floodplain buffers, setbacks, conservation easements, etc) can generally be applied to all development activities and should be considered especially when sensitive areas and/or water quality are of concern.

## Resource Guide

The following is a list of resource contacts for private landowners. These organizations can provide assistance to landowners interested in conservation planning or conservation practice implementation.

### **Blackfoot Challenge**

Contact: Brian McDonald

Phone: (406) 793-3900

Email: [brian@blackfootchallenge.org](mailto:brian@blackfootchallenge.org)

Web: [www.blackfootchallenge.org](http://www.blackfootchallenge.org)

### **Big Blackfoot Chapter of Trout Unlimited (BBCTU)**

Contact: Ryen Aashiem

Phone: (406) 543-6454

Email: [ryen@montanatu.org](mailto:ryen@montanatu.org)

### **Montana Fish, Wildlife, and Parks**

Contact: Ron Pierce

Phone: (406) 542-5532

Email: [rpierce@mt.gov](mailto:rpierce@mt.gov)

Web: [www.fwp.mt.gov](http://www.fwp.mt.gov)

### **North Powell Conservation District**

Contact: Brad Weltzien

Phone: (406) 244-4420

Email: [weltzienb@yahoo.com](mailto:weltzienb@yahoo.com)

### **Missoula County Conservation District**

Contact: Tara Comfort

Phone: (406) 829-3395 Ext. 113

Email: [tara.comfort@mt.nacdnet.net](mailto:tara.comfort@mt.nacdnet.net)

### **U.S. Fish & Wildlife Service**

Contact: Greg Neudecker

Phone: (406) 793-7400

Email: [greg\\_neudecker@fws.gov](mailto:greg_neudecker@fws.gov)

Web: <http://ecos.fws.gov/partners/viewContent.do?viewPage=home>

**Natural Resources Conservation Service – Deerlodge**

Contact: Glen Green

Phone: (406) 846-1703 Ext. 304

Email: [glen.green@mt.usda.gov](mailto:glen.green@mt.usda.gov)

Web: [www.mt.nrcs.usda.gov](http://www.mt.nrcs.usda.gov)

**Natural Resources Conservation Service – Missoula**

Contact: Kris Berg

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