

STANDARD 5 – WATER QUALITY

Water quality meets state standards.

1) Characterization:

In 1972, the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, was signed into law. Its purpose is to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters.” The Act gave the Environmental Protection Agency the authority to implement pollution control programs through partnerships with each individual state. Provisions for establishing water quality standards were included in the Clean Water Act, as amended, and in the Wyoming Environmental Quality Act, as amended. Regulations are found in Part 40 of the Code of Federal Regulations and in Wyoming’s Water Quality Rules and Regulations. The latter regulations contain Quality Standards for Wyoming Surface Waters.

The State of Wyoming has surface water quality standards in place for streams rated from class I to IV. Each rating class has specific numeric and narrative water quality standards. Class I waters of the State are waters where no additional water quality degradation will be allowed. Classes II through IV waters are differentiated based on their ability to support fish and other human and wildlife uses. In general, Class II waters support fish populations, Class III waters are non-game fisheries, and Class IV waters do not have the potential to support fish, but have the potential to support other aquatic life. There are no Class I waters in the assessment area.

Water bodies that do not meet their designated beneficial uses are placed on the State 303(d) list for impaired water quality, with factors identified that contribute to the impairment. The following stream segments in the Upper Colorado River basin, which occur on BLM-administered public land, are listed as water bodies with threats on the current Wyoming State 303(d) list due to physical degradation, and for some excessive sediment, temperature, Total Dissolved Solids (TDS) and/or nutrients:

- Loco Creek (west fork), above the confluence with the main fork, Savery Creek drainage
- McKinney Creek, from confluence with Eagle Creek down to Muddy Creek
- Muddy Creek, from confluence with Littlefield Creek down to confluence with Alamosa Gulch
- Muddy Creek, from confluence with Barrel Springs Draw down to confluence with Little Snake River

The first three sites have livestock grazing identified as an impairment factor and are identified as Class II waters, although they currently do not support cold water fisheries. The last site on lower Muddy Creek has both livestock grazing and oil and gas development identified as impairment factors and is identified as a Class III water. Non-game fish species use it on a seasonal basis.

2) Issues and Key Questions:

Water quality usually relates to healthy riparian and upland habitats. Degradation of either or both of these habitats will lead to impairment. For the streams listed above, historic/current duration and season of livestock use are too long, resulting in streams that don’t meet proper functioning condition or desired future resource condition. Upland cover and watershed condition is generally good. In terms of oil and gas development being listed as an impairment factor, this does not have to do with degradation of riparian or upland habitats along Muddy Creek or in the Barrel Springs Draw watershed. Instead, this is due to accelerated erosion contributed by the oil and gas industry through soil-disturbing activities and road-induced alteration of surface hydrology. What best management practices (BMPs) need to be developed or further refined in order to remove these streams from the state 303(d) list or at least removed as the cause of impairment? How can road designs be improved to minimize impacts to surface water flows and reduce soil erosion caused by roads or other surface-disturbing activities and reclamation practices?

3) Current Conditions:

Water quality is difficult and expensive to directly monitor, with changes often fluctuating and more closely corresponding with climatic events than due to short-term changes in management and condition. Grab samples and some gauging station data have been collected, but they have not been consolidated for this document (picture 94-1). The best information is indirect data that relates to water quality, such as bank cover, species composition, and width/depth ratios.

Water quality trends in the 303(d) listed streams are quite variable, depending on current impacts and management.

- Loco Creek (west fork) originates for the most part on private lands before entering public lands in the West Loco and Morgan-Boyer allotments. This stream is slowly improving due to livestock management. Principal indicators are increasing species composition of perennial deep-rooted sedges and willows and reduced width/depth ratios. The five permittees using public lands are supportive of livestock management BMPs and have contributed in both livestock management and range improvements to improve this watershed. The primary action still necessary to meet this standard is completing the West Loco prescribed burn in order to remove dense sagebrush stands, improve livestock distribution, improve ground cover, and increase late-season stream flows.
- McKinney Creek flowing through the Bolten/Pine Grove allotment is improving due to ongoing livestock management and range improvements. Principal indicators are increasing bank cover, increasing species composition of perennial deep-rooted sedges and willows and reduced width/depth ratios. The single permittee is involved in two separate watershed projects, is strongly supportive of implementing and following any necessary changes in livestock monitoring, and has contributed extensively to both range improvement and monitoring efforts. The primary actions still needing to occur are shrub treatments to remove or reduce dense sagebrush, improve livestock distribution, improve ground cover, and increase late-season stream flows.
- Lower McKinney Creek and Muddy Creek from the confluence with Littlefield Creek down to the confluence with Alamosa Gulch, is in the Sulphur Springs allotment (picture 94-2). Water quality from the Osborne shipping pasture upstream is improving due to livestock management with fenced pastures, gradient control structures, and vegetative plantings. Water quality in McKinney Creek and Muddy Creek below the shipping pasture is slowly improving or static. The pastures in this portion of the allotment are mostly based on topography. Several short drift fences are planned, but there is a reluctance to have to maintain fences in rough terrain and increase impacts to movements of big game species. Principal indicators of improvement are increasing bank cover, increasing species composition of perennial deep-rooted sedges and willows, and reduced width/depth ratios. The single permittee is supportive of livestock BMPs and has contributed in both livestock management and range improvements to improve this watershed. The primary action still needing to occur is completion or extension of four drift fences to control livestock duration and season of use along streams.
- Muddy Creek, from the confluence of Barrel Springs Draw down to the confluence with the Little Snake River passes through six allotments and mostly private land near Baggs. Water quality is improving or not being impacted by livestock on five allotments, which have intensive management to control livestock season or duration of use. Principal indicators are bank cover, increasing composition of perennial deep-rooted grasses, sedges and willows, and reduced width/depth ratios. Water quality on the sixth allotment is static. Cherokee allotment is an 80,000 acre allotment with only one small pasture, nine permittees, and a nine-month season of use. An allotment management plan is currently being implemented to control livestock season and duration of use (along with other BMPs) which should help to improve water quality and remove livestock grazing as an impairment factor on the 303(d) list. However, impacts from roads on surface hydrology, primarily due to oil and gas development in the entire Muddy Creek watershed, will still need to be addressed in order to significantly improve water quality.

4) Reference Conditions:

The principal reference conditions are the historic accounts by Stansbury and Bryan in the 1850s about catching speckled trout in Muddy Creek from its confluence with Alamosa Gulch upstream to the headwaters. Other accounts also refer to catching trout in the Savery and Battle Creek drainages. The streams' ability to support trout imply that water quality conditions were similar to the Class II standard.

5) Synthesis and Interpretations:

Water quality issues in the Upper Colorado River basin relate to sediment and salinity delivery into perennial waters, which are primarily influenced by non-point impacts to vegetation from livestock grazing, roads, and other soil disturbance activities. Moderate amounts of natural erosion are produced due to local soils, vegetative cover, and climate conditions. Muddy Creek received its name in the early 1800s for a reason. However, impacts from grazing and roads have led to accelerated erosion and impairment of function in some creeks within the region.

The principal focus for improving water quality has been livestock management practices. In 1980, most allotments were used for long periods of time without pastures and little or no rotation. This practice, which had been encouraged by the range profession and agencies of the time, was based on the belief that light to moderate stocking rates and good distribution were the best prescription for range management. However, key species and key areas like riparian habitat were not treated well with this type of management. The emphasis now is to control duration and season of use more than intensity of use, in order to provide some growing season rest to maintain plant vigor in all habitats. A variety of techniques are used to accomplish this, referred to as BMPs. They include the use of pastures and herding, upland water developments and shrub treatments, and timing of use. The benefits of using BMPs has already been documented and discussed in the previous sections for other rangeland standards, particularly improvement in bank cover, species composition, and width/depth ratios. Another indirect form of monitoring water quality is through the use of macro-invertebrates.

Macro-invertebrates are the "bugs" that live in streams; many of them are larval stages of flying insects, such as mayflies, stoneflies, and dragonflies. Different species require specific types and quality of habitat to survive and flourish. The diversity and abundance of different "bugs" give a good indication of not only water quality, but the health of the entire watershed. Monitoring has occurred annually from 1994-2001 in the form of Benthic Macroinvertebrate sampling (picture 95-1). Using the BMPs discussed above, several streams have already been removed from the Wyoming 303(d) list of impaired streams, including Littlefield Creek, McKinney Creek above the confluence with Eagle Creek, Muddy Creek above the confluence with Littlefield Creek, and the main branch of Loco Creek. In the case of Littlefield Creek, the following macro-invertebrate indices showed an upward trend, indicating an improving trend in water quality. The Hilsenhoff Biotic Index indicates a drop in nutrient enrichment/sediment load from 1996 to the present. The Shannon Diversity Index indicates an increase in the number of distinct taxa and their relative abundance. And the Dominant Family Percent Contribution has dropped in most cases, and in those cases where it rose it was for a family requiring higher water quality conditions. Karr and Chu (1998) identified ten biologic metrics, which best demonstrate human disturbances on aquatic insect communities. From 1994 to 2001, seven of the ten parameters quantitatively analyzed from Loco Creek show a positive upward trend in improvement of the biological integrity of Loco Creek. The other three parameters have remained stable or slightly positive.

Other monitored trends, or in some cases observations, include lower peak stream temperatures/higher oxygen levels, lower turbidity, and increased base flow levels – even in dry years (picture 95-2). These are all indicators of improving trends in water quality conditions.

6) Recommendations:

Within the assessment area, water quality impairment has not been identified by the State of Wyoming for the majority of the area. The following stream segments in the Upper Colorado River basin, which occur on BLM-administered public land, are listed as threatened on the current Wyoming State 303(d) list of impaired waters:

- Loco Creek (west fork), above the confluence with the main fork, Savery Creek drainage
- McKinney Creek, from confluence with Eagle Creek down to Muddy Creek
- Muddy Creek, from confluence with Littlefield Creek down to confluence with Alamosa Gulch
- Muddy Creek, from confluence with Barrel Springs Draw down to confluence with Little Snake River

The first three sites have livestock grazing identified as an impairment factor. The last site on lower Muddy Creek has both livestock grazing and oil and gas development identified as impairment factors. Although specific compliance for the remaining segments is unknown, nothing within available data indicates this Standard is not being met.

Continue to implement or refine BMPs for livestock grazing, which promote perennial vegetation to stabilize streambanks and improve cover and litter on uplands. Season and duration of use are the principal factors in considering management changes to address this standard.

Identify and correct existing road problems that alter surface water flows and result in accelerated erosion. Incorporate measures into new projects and environmental assessments, which will mitigate alterations to surface water flows.

Promote mixed-age shrub and woodland communities with higher proportions of young and middle-aged stands, which have greater amounts of herbaceous cover to reduce runoff and soil erosion and increase infiltration and ground water recharge.