

2.3 Vegetation Including Wetlands and Riparian Areas

2.3.1 Study Area

The cumulative effects study area for vegetation includes the following subwatersheds in portions of Sheridan, Johnson, Campbell, and Converse counties: Upper Powder River, Little Powder River, Upper Belle Fourche River, Upper Cheyenne River, Antelope Creek, and Dry Fork Cheyenne River (**Figure 1-1**). It includes portions of the area administered by the BLM Buffalo and Casper field offices and a portion of the TBNG, which is administered by the FS (**Figure 1-2**).

2.3.2 Cumulative Impacts

As described in the Task 2 Report for the PRB Coal Review, Past and Present and Reasonably Foreseeable Development Activities (Appendices A and D) (ENSR 2005c), a total of approximately 220,688 acres of vegetation have been disturbed by development activities in the cumulative effects study area (as of 2003). Of the 220,688 acres of total disturbance, approximately 68,794 acres (31 percent) were associated with coal mining activities.

Of the 220,688 acres of total cumulative disturbance, approximately 111,786 acres (51 percent) have been reclaimed. The remaining 108,901 acres of disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 68,794 total cumulative acres of disturbance associated with coal mine development, approximately 21,238 (31 percent) have been reclaimed (as of 2003). Of the remaining 47,556 acres of disturbance, approximately 24,097 acres currently are not available for reclamation, as they are occupied by long-term facilities which are needed to conduct mining operations. These areas would be reclaimed near the end of each mine life. Reclamation of the remaining 23,459 acres, which represent areas of active mining and areas where coal has been recovered but reclamation has not been completed, would proceed concurrently with coal mining. (Note: minor discrepancies in acreages are the result of rounding.)

Potential impacts to vegetation within the cumulative effects area would be similar to those described in Task 1D Report of the PRB Coal Review, Current Environmental Conditions (ENSR 2005b). In general, impacts to vegetation can be classified as short-term and long-term. Potential short-term impacts would arise from the removal and disturbance of herbaceous species during a project's development and operation (e.g., coal mines, CBNG wells, etc.), which would cease upon project completion and successful reclamation in a given area. Potential long-term impacts would consist of permanent loss of vegetation and vegetative productivity in areas that would not be reclaimed in the near term (e.g., power plant sites, etc.). The removal of woody species also would be considered a long-term impact since these species take approximately 25 years or longer to attain a size comparable to woody species present within proposed disturbance areas. Indirect impacts may include the dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which would result in the displacement of native species and changes in species composition in the long term. In addition to these impacts, the discharge of produced water could result in the creation of wetlands in containment ponds, landscape depressions, and riparian areas along segments of drainages that previously supported upland vegetation, and the expansion of existing wetland/riparian areas, depending on the quality and quantity of water discharged. Alternately, the discharge of abnormally high flows or water with

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sodium absorption ratios of 13 or more could impact existing vegetation as discussed in the Task 1D Report for the PRB Coal Review, Current Environmental Conditions (ENSR 2005b). However, for agricultural uses, the current Wyoming water quality standard for SAR is 8.0 (WDEQ 2005). SARs of 5 to 10 have been observed in discharge waters throughout the study area, with SARs of 13 or more observed in the Upper Powder River subwatershed and in some locations in the western portions of the Upper Belle Fourche and Little Powder River subwatersheds (BLM 2003).

The effects to vegetation communities as a result of RFD activities in the PRB study area under two production scenarios (lower and upper production scenarios) for the years 2010, 2015, and 2020 are discussed below.

2.3.2.1 Year 2010 – Lower Production Scenario

General Vegetation

Under this scenario, past and projected activities in the study area would result in the total cumulative disturbance of approximately 339,912 acres of vegetation (or approximately 7.6 percent of the study area) by 2010. Of the 339,912 acres, it is projected that 98,662 acres (29 percent) of the vegetation disturbance would be associated with coal mining activities. The primary vegetation communities impacted by coal mining would include mixed- and short-grass prairie and sagebrush shrubland (55 and 40 percent of the projected disturbance, respectively, based on GIS mapping of projected future coal reserves and existing [2003] disturbance from coal mine development). Based on these percentages, these vegetation communities would account for 54,264 and 39,465 acres, respectively, of the projected coal mine-related disturbance area.

Of the 339,912 acres of total cumulative vegetation disturbance, approximately 205,113 acres (60 percent) would be reclaimed by 2010. The remaining 134,799 acres of disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 98,662 acres of disturbance associated with coal mine development, it is projected that approximately 44,938 acres (46 percent) would be reclaimed by 2010. Of the remaining 53,724 acres of coal mining-related disturbance, it is estimated that approximately 26,338 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 27,386 acres of disturbance would proceed concurrently with mining operations.

Riparian and Wetland Vegetation

RFD activities in the study area would result in the removal or disturbance of wetland and riparian vegetation located within the projected disturbance areas. As the discrete locations of future CBNG-related facilities and actual disturbance footprints of future coal mine disturbance areas are not currently known, the spatial relationship between these activities and the isolated wetland and riparian communities in the study area cannot be determined at this time. As a result, potential impacts under this scenario cannot be quantified. However, based on the types of wetland and riparian communities in the vicinity of projected future coal reserves, it is anticipated that wet meadow and shrubby riparian areas would be the primary communities impacted as a result of coal mining activities. As discussed in Section 2.2.2.1 of this report, disturbances to AVFs and wetlands are regulated by WDEQ and USACE. In the case of coal mining, wetlands that meet the requirements for USACE regulatory review must be identified, and special permitting procedures

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are required to assure that after mining there will be no net loss of wetlands. Wetlands that are not under USACE jurisdiction are restored as required by WDEQ/LQD (depending on the values associated with the wetland features), by the surface managing agency (on public land), or by the private landowner. For other types of development, such as oil and gas, disturbance of wetlands is avoided where possible. Where avoidance is not possible, mitigation for impacts to wetlands is evaluated on a project specific basis.

Operations associated with RFD activities in the cumulative effects study area would result in the use of groundwater. As of 2010, the annual water production associated with coal mine and CBNG activities would be approximately 36,803 million gallons per year (mmgpy). Most, if not all, of the coal mine-produced water would be consumed during operation. Approximately 34,545 mmgpy of CBNG-produced water would be discharged to impoundments or intermittent and ephemeral streams or reinjected. This discharge of water would result in the creation of wetlands in landscape depressions and riparian areas along drainages that previously supported upland vegetation. In addition, existing wetlands and riparian areas that would receive additional water would become more extensive and potentially support a greater diversity of wetland species in the long term. However, once water discharges have peaked and subsequently decrease in the long term, the extent of wetlands and riparian areas and species diversity would decrease accordingly. After the complete cessation of water discharges, artificially-created wetland and riparian areas once again would support upland species and previously existing wetland and riparian areas would decrease in areal extent.

GROUNDWATER DRAWDOWN EFFECTS TO BE EVALUATED PENDING COMPLETION OF GROUNDWATER MODELING.

Invasive and Non-native Species

RFD-related construction and operation activities likely would result in the dispersal of noxious and invasive weed species within and beyond the surface disturbance boundaries, which would result in the displacement of native species and changes in species composition in the long term. The potential for these impacts would be higher in relation to the development of linear facilities (e.g., pipeline rights-of-way, oil- and gas-related road systems, etc.) than for site facilities (e.g., mines, power plants, etc.) due to the potential for dispersal of noxious weeds over a larger area. In the case of coal mining, the mining and reclamation plans approved by WDEQ include plans to control invasion by weedy (invasive nonnative) plant species. Oil and gas operators currently are required to submit an Integrated Pest Management Plan as part of their applications to drill on federal oil and gas leases.

Special Status Species

Special status species are those species for which state or federal agencies afford an additional level of protection by law, regulation, or policy. Included in this category are federally listed and federally proposed species that are protected under the ESA, or are sensitive species considered candidates for such listing by the USFWS, as well as BLM, FS, and WGFD sensitive species.

In accordance with the ESA, as amended, land management agencies in coordination with the USFWS must ensure that any action that they authorize, fund, or carry out would not adversely

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affect a federally listed threatened or endangered species. In addition, as stated in Special Status Species Management Policy 6840 (6840 Policy) (Rel. 6-151), it also is BLM policy “to conserve listed species and the ecosystems on which they depend, and to ensure that actions requiring authorization or approval by the BLM are consistent with the conservation needs of special status species and do not contribute to the need to list any special status species, either under the provisions of the ESA or other provisions” identified in the 6840 Policy.

As discussed in Task 1D of the PRB Coal Review, Current Environmental Conditions (ENSR 2005b), special status species known to occur in the cumulative effects study area (**Figure 1-1**) include one federally listed species (Ute ladies-tresses), one BLM sensitive species (Nelson’s milkvetch), and one FS sensitive species (Barr’s milkvetch). In addition, two BLM sensitive species (Laramie columbine and William’s wafer-parsnip) potentially may occur in the cumulative effects study area. Two BLM sensitive species (many-stemmed spider-flower and Laramie false-sagebrush) are not expected to occur in the cumulative effects study area.

Potential direct impacts to special status plant species in the study area could include the incremental loss or alteration of potential or known habitat, which would include an unquantifiable portion of the approximately 339,912 acres of vegetation disturbance (native vegetation and previously disturbed vegetation) associated with past and projected activities. Direct impacts also could include the direct loss of individual plants within the cumulative effects study area depending on their location in relation to RFD activities. Indirect impacts could occur due to increased dispersal and establishment of noxious weeds, which may result in the displacement of special status plant species in the long term.

2.3.2.2 Year 2010 – Upper Production Scenario

General Vegetation

Potential impacts to vegetation as a result of RFD activities would be similar to those described under the 2010 – Lower Production Scenario, except approximately 3,786 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative study area are projected to result in the total cumulative disturbance of approximately 343,698 acres of vegetation (or approximately 7.7 percent of the study area) by the year 2010. Of the 343,698 acres, it is projected that 102,448 acres (30 percent) would occur in association with coal mining activities. Of the 102,448 acres of projected coal mine-related disturbance, approximately 55,322 acres (54 percent based on GIS) and 42,004 acres (41 percent based on GIS) would be associated with the short- and mixed-grass prairie and sagebrush shrubland communities, respectively.

Of the 343,698 acres of total cumulative vegetation disturbance, approximately 206,946 acres (60 percent) would be reclaimed by 2010. The remaining 136,752 acres of disturbance would be reclaimed incrementally or following a project’s completion, depending on the type of development activity and permit requirements. Of the 102,448 acres of disturbance associated with coal mine development, it is projected that approximately 46,771 (46 percent) would be reclaimed by 2010. Of the remaining 55,677 acres of coal mining-related disturbance, it is estimated that approximately 25,688 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine’s life. Reclamation of the remaining 29,989 acres of disturbance would proceed concurrently with mining operations.

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Wetland and Riparian Areas

Potential impacts to wetland and riparian vegetation as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of disturbance to wetland and riparian vegetation would be greater due to the increase in total projected disturbance acreage (an additional 3,786 acres) under this scenario.

Invasive and Non-native Species

Potential impacts related to invasive and non-native species would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of dispersing invasive and non-native species within and beyond the surface disturbance boundaries would increase due to the increased surface disturbance (an additional 3,786 acres) that would occur under this scenario.

Special Status Species

Potential impacts to special status species as result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of affecting potential or known habitat for special status plant species, or individual plants, would increase due to the increased surface disturbance (an additional 3,786 acres) that would occur under this scenario.

2.3.2.3 Year 2015 – Lower Production Scenario

General Vegetation

Potential impacts to vegetation as a result of RFD activities would be similar to those described under the 2010 – Lower Production Scenario, except approximately 86,172 additional acres would be disturbed. Under this scenario, past and present activities in the cumulative effects study area would result in the total cumulative disturbance of approximately 426,084 acres of vegetation (or approximately 9.5 percent of the study area) by the year 2015. Of the 426,084 acres, it is projected that 117,236 acres (27 percent) would occur in association with coal mining activities. Of the 117,236 acres of projected coal mine-related disturbance, approximately 64,480 acres (55 percent based on GIS) and 48,067 acres (41 percent based on GIS) would be associated with the short- and mixed-grass prairie and sagebrush shrubland communities, respectively.

Of the 426,084 acres of total cumulative vegetation disturbance, approximately 286,614 acres (67 percent) would be reclaimed by 2015. The remaining 139,472 acres of disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. (Minor discrepancies in total acreages are the result of rounding.) Of the 117,236 acres of disturbance associated with coal mine development, it is projected that approximately 61,188 acres (52 percent) would be reclaimed by 2015. Of the remaining 56,048 acres of coal mining-related disturbance, it is estimated that approximately 27,549 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 28,499 acres of disturbance would proceed concurrently with mining operations.

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Wetland and Riparian Areas

Potential surface disturbance-related impacts to wetland and riparian vegetation as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of disturbance to wetland and riparian vegetation would be greater due to the increase in total projected disturbance acreage (an additional 86,172 acres) under this scenario.

Potential impacts to wetland and riparian vegetation as a result of groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. An approximately 2,791 additional mmgy of groundwater would be discharged in association with CBNG operations, a portion of which would be discharged to impoundments or intermittent and ephemeral streams.

Invasive and Non-native Species

Potential impacts related to invasive and non-native species would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of dispersing invasive and non-native species within and beyond the surface disturbance boundaries would increase due to the increased surface disturbance (an additional 86,172 acres) that would occur under this scenario.

Special Status Species

Potential impacts to special status species as result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of affecting potential or known habitat for special status plant species, or individual plants, would increase due to the increased surface disturbance (an additional 86,172 acres) that would occur under this scenario.

2.3.2.4 Year 2015 – Upper Production Scenario

General Vegetation

Potential impacts to vegetation as a result of RFD activities would be similar to those described under the 2010 – Lower Production Scenario, except approximately 93,480 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative study area would result in the total cumulative disturbance of approximately 433,392 acres of vegetation (or approximately 9.6 percent of the study area) by the year 2015. Of the 433,392 acres, it is projected that 124,545 acres (29 percent) would occur in association with coal mining activities. Of the 124,545 acres, approximately 67,254 acres (54 percent per GIS) and 51,063 acres (41 percent per GIS) would be associated with the short- and mixed-grass prairie and sagebrush shrubland communities, respectively.

Of the 433,392 acres of total cumulative vegetation disturbance, approximately 290,822 acres (67 percent) would be reclaimed by 2015. The remaining 142,570 acres of disturbance would be

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reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 124,545 acres of disturbance associated with coal development, it is projected that approximately 65,396 acres (53 percent) would be reclaimed by 2015. Of the remaining 59,149 acres of coal mining-related disturbance, it is estimated that approximately 27,009 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 32,140 acres of disturbance would proceed concurrently with mining operations.

Wetland and Riparian Areas

Potential surface disturbance-related impacts to wetland and riparian vegetation as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of disturbance to wetland and riparian vegetation would be greater due to the increase in total projected disturbance acreage (an additional 93,480 acres) under this scenario.

Potential impacts to wetland and riparian vegetation as a result of groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. An approximately 2,791 additional mmgy of groundwater would be discharged in association with CBNG operations, a portion of which would be discharged to impoundments or intermittent and ephemeral streams.

Invasive and Non-native Species

Potential impacts related to invasive and non-native species would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of dispersing invasive and non-native species within and beyond the surface disturbance boundaries would increase due to the increased surface disturbance (an additional 93,480 acres) that would occur under this scenario.

Special Status Species

Potential impacts to special status species as result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of affecting known or potential habitat for special status plant species, or individual plants, would increase due to the increased surface disturbance (an additional 93,480 acres) that would occur under this scenario.

2.3.2.5 Year 2020 – Lower Production Scenario

General Vegetation

Potential impacts to vegetation as a result of RFD activities would be similar to those described under the 2010 – Lower Production Scenario, except approximately 163,173 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative study area would result in the total cumulative disturbance of approximately 503,085 acres of vegetation (or

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approximately 11.2 percent of the study area) by the year 2020. Of the 503,085 acres, it is projected that 137,443 acres (27 percent) would occur in association with coal mining activities. Of the 137,443 acres of coal mine-related disturbance, approximately 76,968 acres (56 percent per GIS) and 54,977 acres (40 percent per GIS) would be associated with the short- and mixed-grass prairie and sagebrush shrubland communities, respectively.

Of the 503,085 acres of total cumulative vegetation disturbance, approximately 367,999 acres (73 percent) would be reclaimed by 2020. The remaining 135,977 acres of disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 137,443 acres of disturbance associated with coal mining activities, it is estimated that approximately 79,463 acres (58 percent) would be reclaimed by 2020. Of the remaining 57,979 acres of coal mining-related disturbance, it is estimated that approximately 28,797 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 29,182 acres of disturbance would proceed concurrently with mining operations.

Wetland and Riparian Areas

Potential surface disturbance-related impacts to wetland and riparian vegetation as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of disturbance to wetland and riparian vegetation would be greater due to the increase in total projected disturbance acreage (an additional 163,173 acres) under this scenario.

Potential impacts to wetland and riparian vegetation as a result of groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Approximately 914 fewer mmgy of groundwater would be discharged in association with CBNG operations, a portion of which would be discharged to impoundments or intermittent and ephemeral streams.

Invasive and Non-native Species

Potential impacts related to invasive and non-native species would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of dispersing invasive and non-native species within and beyond the surface disturbance boundaries would increase due to the increased surface disturbance (an additional 163,173 acres) that would occur under this scenario.

Special Status Species

Potential impacts to special status species as result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of affecting potential or known habitat for special status plant species, or individual plants, would increase due to the increased surface disturbance (an additional 163,173 acres) that would occur under this scenario.

2.3.2.6 Year 2020 – Upper Production Scenario

General Vegetation

Potential impacts to vegetation as a result of RFD activities would be similar to the 2010 – Lower Production Scenario, except approximately 174,820 additional acres would be disturbed. Under this scenario, past and projected activities in the cumulative study area would result in the total cumulative disturbance of approximately 514,732 acres of vegetation (or approximately 11.5 percent of the study area) by the year 2020. Of the 514,732 acres, it is projected that 149,089 acres (29 percent) would occur in association with coal mining activities. Of the 149,089 acres of coal mining-related disturbance, approximately 83,490 acres (56 percent per GIS) and 59,636 acres (40 percent per GIS) would be associated with the short- and mixed-grass prairie and sagebrush shrubland communities, respectively.

Of the 514,732 acres of total cumulative vegetation disturbance, approximately 374,732 acres (73 percent) would be reclaimed by 2020. The remaining 139,998 acres of disturbance would be reclaimed incrementally or following a project's completion, depending on the type of development activity and permit requirements. Of the 149,089 acres of disturbance associated with coal mine development, it is projected that approximately 86,196 acres (58 percent) would be reclaimed by 2020. Of the remaining 62,890 acres of coal mining-related disturbance, it is estimated that approximately 28,345 acres would be unavailable for concurrent reclamation due to the presence of long-term facilities which would be reclaimed near the end of each mine's life. Reclamation of the remaining 34,545 acres of disturbance would proceed concurrently with mining operations.

Wetland and Riparian Areas

Potential surface disturbance-related impacts to wetland and riparian vegetation as a result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of disturbance to wetland and riparian vegetation would be greater due to the increase in total projected disturbance acreage (an additional 174,820 acres) under this scenario.

Potential impacts to wetland and riparian vegetation as a result of groundwater production and disposal would be the same as described under the 2010 – Lower Production Scenario with the following exception. Approximately 914 fewer mmgy of groundwater would be discharged in association with CBNG operations, a portion of which would be discharged to impoundments or intermittent and ephemeral streams.

Invasive and Non-native Species

Potential impacts related to invasive and non-native species would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of dispersing invasive and non-native species within and beyond the surface disturbance boundaries would increase due to the increased surface disturbance (an additional 174,820 acres) that would occur under this scenario.

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Special Status Species

Potential impacts to special status species as result of RFD activities would be the same as described under the 2010 – Lower Production Scenario, with the following exception. The probability of affecting potential or known habitat for special status plant species, or individual plants, would increase due to the increased surface disturbance (an additional 174,820 acres) that would occur under this scenario.