

MONITORING THE BIOLOGICAL, PHYSICAL, AND CHEMICAL INTEGRITY OF THE POWDER RIVER: IMPLICATIONS FOR THE SUSTAINABLE DEVELOPMENT OF COALBED NATURAL GAS^{AFS}

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Coalbed natural gas (CBNG) is an emerging energy source with significant development slated for the Powder River basin in Montana and Wyoming. Water is the principal by-product of CBNG extraction and wastewater disposal strategies have an unknown effect on fish and aquatic life. The objective of this investigation was to document the existing biological, chemical, and physical integrity of the Powder River in Wyoming, upstream and

downstream of areas with CBNG development. The investigation included assessments of fish, periphyton, macroinvertebrates, water chemistry, riparian vegetation, and instream habitat. Comparing results with existing data provided a means to evaluate temporal trends associated with current levels of CBNG development. Factors influencing macroinvertebrate and periphyton results included the difficulties related to sampling this sand bed river. Fish populations reflected habitat availability and emphasized the importance of large woody debris in forming pools. The scarcity of sturgeon chub, especially compared to its distribution in the early 1990s, emerged as major concern, although the cause of the decline is unknown. Water samples collected downstream of CBNG wastewater discharges had anomalously high concentrations of salts. Invasion of salt cedar and the potential for increased salt loading from CBNG to give this nonnative species a competitive advantage over cottonwood may have long-term implications for fish habitat. Recommendations for sustainable development of CBNG included incorporation of the river's ability to assimilate wastewater given its unique hydrology and integration life history strategies and movements of native fishes.