



Powder River Biological Survey and Implications for Coalbed Methane Development

Prepared For:
Mr. Kevin Lind
Powder River Basin Resource Council
23 N. Scott
Sheridan, WY 82801
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Prepared By:

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Executive Summary

Coalbed methane development in the Powder River basin involves the discharge or surface storage of large quantities of saline water. This investigation presents the results of a monitoring and assessment approach to evaluate the effects of coalbed methane development on three streams in Wyoming, Clear Creek, Piney Creek and the Powder River. The analysis included characterization of baseline conditions at current levels of coalbed methane development and in some cases allowed inference on the impacts of existing coalbed methane development. Parameters assessed included fish populations, algal assemblages, aquatic invertebrate communities, habitat condition measures, and assessment of chemical water quality. Results provided the basis for the generation of management recommendations to promote the sustainable development of coalbed methane while conserving ecological and agricultural values.

Clear Creek and Piney Creek had high levels of biological, chemical, and physical integrity. These streams supported healthy aquatic communities and had water low in dissolved salts. Habitat conditions were typically excellent indicating existing agricultural practices were compatible with maintaining ecological values. Conservation of the agricultural and ecological significance of these streams should guide the sustainable development of coalbed methane development in these basins.

The Powder River also had a high level of biological, chemical, and physical integrity although its unique nature does not represent the typical ideal of a healthy stream. Nevertheless, the Powder River maintained a mostly native assemblage of fish, including species such as flathead chub and sturgeon chub that are in decline throughout their range. Evaluations of conditions in the Powder River provided cause for concern for the persistence of this rare and special ecosystem.

Analyses of water chemistry suggested that coalbed methane development might be resulting in degradation of water quality due to increased loading of salts. Sodium adsorption ratio, a measure of the suitability of water for irrigation uses, was substantially elevated above typical levels for this river below an area of considerable coalbed methane development. In addition, several sampling sites had relatively high levels of salts, compared to typical values. Furthermore, high concentrations of dissolved solids in Spotted Horse Creek, possibly the result of coalbed methane wastewater, may threaten an important channel catfish rearing area downstream in the Powder River.

The biological communities sampled in the Powder River were adapted to the high turbidity, great variability in flows, and moderate salinity. Of concern, however, was the rarity of the sturgeon chub, a Wyoming and Montana species of special concern. Biologists captured only two sturgeon chub at one location on the Powder River. Sampling in the early 1990s found sturgeon chub to be present at considerably more locations in the Powder River. These results emphasize the need for additional investigation into the status and trend of sturgeon chub in the Powder River.

Another concern was the prevalence of salt cedar, an introduced shrub along most of the Powder River. This species may have a competitive advantage over cottonwood, especially with increased loading of salts. Cottonwoods, however, are vital to both wildlife and fish along the Powder River. They provide critical habitat features for wildlife such as nesting, roosting, and cover. Cottonwoods also provide large woody debris that forms pools, important habitat features for fish. Management of CBM wastewater should consider concerns regarding recruitment and maintenance of cottonwood stands along the Powder River.

The use of an adaptive management approach to coalbed methane development was the major recommendation from this investigation. Adaptive management entails a strong monitoring component to provide feedback and continual refinement of management activities. The amount of uncertainty regarding the potential impacts of coalbed methane development necessitates an adaptive approach.

**** Powder River Note:

Powder River has the entire Confluence Report available. If you are interest please email your request to info@powderriverbasin.org. Thank you