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**Biological Survey of Powder River and Tributaries  
Recommends Adaptive Management of CBM:  
Stresses Protection of Powder River Ecosystem**

The Powder River Basin Resource Council today released the results of a two year study on the biological, chemical, and habitat conditions in the Powder River and its tributaries Clear Creek and Piney Creek. The objective of the study, according to Carol Endicott of Confluence Consulting, Inc. who conducted the study, was to describe and analyze "baseline conditions" in the three waterways at current levels of coalbed methane development, and to evaluate the impacts of the current level of development on overall stream integrity, including fish populations, aquatic communities, and habitat health.

Confluence Consulting assessed twelve sites among the three streams, which allowed comparisons of biological, physical, and chemical conditions above and below CBM development along the Powder River. Parameters included fish populations, algal assemblages, aquatic invertebrate communities, habitat conditions, and water chemistry.

Clear Creek and Piney Creek exhibited "high levels of biological, chemical and physical integrity," the study reported, making for healthy aquatic communities and optimal habitat conditions, even in sites where limited livestock grazing and recreational homes were a factor. However, the study warned that water produced and discharged by CBM development has the potential to affect sauger migrating from the Yellowstone River in Montana to Clear Creek. It also pointed out that many fish move from the Powder River to Clear Creek for spawning and rearing purposes, further demonstrating its biological importance to the greater watershed. "Land use activities, including coalbed methane development should be managed carefully to protect these sensitive beneficial uses," the study cautioned.

Confluence found that the Powder River, in spite of its natural turbidity and tolerance for salt leaching from clay soils, is showing "the marked effects of water quality degradation" brought about by increased loading of salts from CBM discharge water and from other toxic constituents of the water, including arsenic. The sodium adsorption ratio or SAR, which is a measure of the suitability of water for irrigation uses, was substantially elevated above typical levels for the Powder, especially directly below Burger Draw, an area of substantial CBM development. Burger Draw receives water discharges from the Big George coal seam, which according to recent WET (Whole Effluent Toxicity) testing by the Wyoming Department of Environmental Quality, exhibited characteristics of toxicity to a number of tested aquatic organisms.

Study results also showed high concentrations of dissolved solids in Spotted Horse Creek, another site that receives continuous CBM discharge flows, threatening an important channel catfish rearing area downstream in the Powder.

While the biological communities sampled in the Powder are adapted to the high turbidity, variability in flows, and moderate salinity of the river, the fact that researchers captured only two sturgeon chub in only one location was cause for concern; a 1998 study had found the species at half of eight sites sampled. The Powder River provides the "most substantial habitat" for this declining species of "special concern" in both Wyoming and Montana, the Confluence report said. Other declining species that are known to occur in the river including sauger, shovelnose sturgeon, and burbot, or *Lota lota* were also absent from the samples.

Another cause for concern in the Powder River ecosystem was the encroachment of noxious weeds, particularly salt cedar along the banks of the river, which traditionally supported healthy cottonwood stands. "The role of increased salt loading from CBM development to favor salt cedar over cottonwoods may have ramifications for many other

species including wildlife and fish," the study pointed out. Bald eagles, western wood peewees and great blue herons rely on cottonwoods for roosting and nesting, deer and wild turkey use the cottonwood "galleries", and fish require the large woody debris from the trees to maintain "pool habitat."

Confluence concluded the report with a series of recommendations to promote the sustainable development of CBM while conserving the ecological values of the Powder River and its tributaries. They recommended using an "adaptive management" approach, including continued and increased monitoring and evaluation of potential impacts of CBM over time, as well as additional investigations into fisheries, macroinvertebrates, reptiles, amphibians, and birds. "Adaptive Management," the report said, "Entails a strong monitoring component to provide feedback and continual refinement of management activities."

Powder River Basin Resource Council initiated the study in order to address some of the "data gaps" associated with evaluating the cumulative effects of CBM water disposal practices. "Field studies on the ecological response of rivers and streams to large amounts of CBM water containing anything from salts to heavy metals simply do not exist," said PRBRC Board member Clay Rowley. "And while we can guess and make inferences from what we see happening, there is no body of scientific data that analyzes all the parameters in a systematic way. I just wish the state or the BLM had done this kind of analysis earlier, he added, "So we'd have some pre-CBM baseline information."

PRBRC is concerned that the rapid development of coalbed methane, combined with the ongoing and cumulative effects of discharging millions of gallons of CBM water into surface waters, not only presents an unacceptable risk to the environment and to landowners who rely on high quality water for irrigation, but it may place the state of Wyoming in violation of the Clean Water Act. "This study was one way we felt we could provide important management tools that agencies, regulators, and industry could use to oversee the development," said PRBRC Board chair, Nancy Sorenson.

There has been sufficient national concern over the impacts of CBM development on the Powder River to warrant its listing in American Rivers' "Most Endangered Rivers of 2002." The publication named it "a healthy remnant of the once vast, unspoiled river ecosystem spanning the Great Plains." Nature Conservancy recognized the river in 1999 as supporting the most intact assemblage of fish species of all rivers in the Great Plains of Wyoming.