May 6, 2002

Mary Bloom
Bureau of Land Management
111 Garryowen Road
Miles City, MT 59301

Dear Ms. Bloom,

This letter provides comments from the Montana Chapter of the American Fisheries Society (MCAFS) on the draft environmental impact statement (EIS) addressing coalbed methane in Montana. The Montana Chapter of the American Fisheries Society is an organization of professional fisheries scientists and students from agencies, universities, and the private sector across Montana. Our objectives are: conservation, development and wise utilization of Montana's fisheries; promoting educational, scientific and technological development; advancement of fisheries science and practice; and exchange and dissemination of knowledge about fish, fisheries and related subjects. After reviewing the draft EIS, we have grave concerns regarding the impacts of the development of this resource, as currently designed, on fisheries, wildlife, and Montana's aquatic resources.

Our concerns as fisheries professionals with the draft EIS fall into several categories:

- **Failure to adequately address several species of special concern,**
- **Poor understanding of prairie river ecology,**
- **Lack of a proposed monitoring plan to be used in adaptively managing this resource,**
- **The reliance on evaluations of acute toxicity of highly tolerant organisms to guide management decisions, and**
- **Failure to develop or promote alternatives that adequately address the uncertainty regarding the potential effects of this industry on Montana's aquatic resources,**

Our assessment of these issues is described in detail below. Furthermore, we provide recommendations in managing coalbed methane to protect water quality, fisheries, and associated aquatic life.

Species of Special Concern
An obvious deficiency in the draft EIS is the omission of several species of special concern listed by the Montana Natural Heritage Program in collaboration with Montana Fish, Wildlife & Parks and MCAFS. These include sauger (*Stizostedion canadense*), sturgeon chub (*Macrhybopsis gelida*), sicklefin chub (*Macrhybopsis meeki*), and pearl dace (*Margariscus margarita*). While the Bureau of Land Management may not be required to fully protect species that lack federal status, the effects on these fishes should be disclosed and discussed. Furthermore, the State of Montana's participation in the draft EIS necessitates a higher level of consideration be given to the needs of these species.

Another concern of fisheries scientists includes species whose status is unknown but under

review. The Montana Natural Heritage Program lists several species of fish likely to occur within the planning areas as under review. These include brook stickleback (*Culea inconstans*), Iowa darter (*Etheostoma exile*), brassy minnow (*Hybognathus hankinsoni*), plains minnow (*Hybognathus placitus*), burbot (*Lota lota*), northern redbelly dace (*Phoxinus eos*), and creek chub (*Semotilus atromaculatus*). Recent research in prairie streams suggest some of these species may indeed be declining in Montana (Dr. Robert Bramblett, MSU, personal communication). Coalbed methane development needs to be managed to avoid causing further declines in some of these potentially sensitive species, which could result in a trend toward federal listing under the Endangered Species Act.

Prairie River Ecology

The draft EIS focuses primarily on species occurring within the planning areas but does not address their natural history strategies or the chemical and physical conditions that support these organisms. This is especially true of the warm water systems in the Billings and Powder River RMP areas. An understanding of prairie stream ecology is essential to the responsible management of coalbed methane.

Of considerable concern to fisheries biologists is the status of the Powder River as a rare and special ecosystem. The draft EIS fails to recognize the high biological integrity and ecological value of this river, describing it as having limited diversity and abundance of fish because of water quality and water quantity conditions. The draft EIS cites Elser et al (1980) in attributing the supposed low diversity to erratic flows, fair to poor water quality, hardness, and moderate to high turbidities.

Unfortunately, conclusions in the draft EIS regarding the diversity of the Powder River ignore a sizable amount of evidence that indicates that the Powder River supports not only a diverse community but represents the sole remnant of a once widespread Great Plains riverine community of fish and invertebrates. For example, Hubert (1993) describes the Powder River as unique in that it supports 32 species of fish with the majority (25 species) being native to the drainage. Furthermore, the Powder River provides substantial habitat for the sturgeon chub, a species that has been extirpated from much of its historic range. In a study on changes in Wyoming's fish fauna, the Powder River was identified as supporting an abundance of species adapted to turbid rivers (flathead chub [*Platygobio gracilis*], plains minnow, western silvery minnow [*Hybognathus argyritis*] , river carpsucker [*Carpoides carpio*], and channel catfish [*Ictalurus punctatus*]) that have been greatly reduced or eliminated from other drainages (Patton et al 1998).

Fisheries professionals are also concerned about other forms of aquatic life, including macroinvertebrates. The invertebrate communities in the Powder River are as rare and special as the fishery. Rehwinkel (1978) concluded that the Powder River supported the most unique community of benthic invertebrates in Montana. More recent investigations by Dr. Dan Gustafson indicate numerous species of exceedingly rare invertebrates (Table 1). These species were probably quite common in prairie rivers in the northern Great Plains, but have been eliminated throughout most of their historic range due to impoundments and other river alterations.

Ironically, the factors the draft EIS attributes to the alleged low diversity and abundance of fish in the Powder River are the very factors that have shaped this now imperiled and unique community. Conditions such as flashy flow regime, moderate salinity, warm temperatures, high turbidity and sandy substrate should be considered critical elements of the physical and chemical integrity of this unregulated prairie river. In fact, these elements form the essential

habitat components for the organisms adapted to survive there. As one of the few rivers its size lacking a main stem dam, the Powder River may be the only remaining opportunity to preserve this important piece of Montana's and North America's natural heritage.

Another aspect of prairie river ecology that was not adequately addressed in the draft EIS is the role of rivers such as the Tongue and Powder rivers in recruitment of fish to the lower Yellowstone River. For example, the Powder River has been identified as the primary spawning area for the lower Yellowstone River sauger population (Rehwinkel 1978), a Montana species of special concern. Other species that migrate from the Yellowstone River to these tributaries to spawn include a species of special concern, the blue sucker (*Cycleptus elongatus*), as well as shovelnose sturgeon (*Scaphirhynchus platorhynchus*), burbot, and channel catfish. Discharge water from coal bed methane wells has the potential to disrupt spawning migrations by altering the chemical "signature" of streams, thus impairing the homing ability of fish. Furthermore, increased salt loading may negatively impact fish reproduction as eggs and alevins are typically more vulnerable than adult fish to toxic substances (McKim 1985). Management of coalbed methane development in these drainages must address the role of these rivers as recruitment areas for the larger watershed.

There seems to be no acknowledgement in the draft EIS of the fisheries values of intermittent streams and ephemeral channels. A significant body of research in the Great Plains indicates that not only do intermittent streams support fish, they also play an important role in the biodiversity of the region. Zale et al. (1989) concluded that while fish assemblages in intermittent streams show relatively few species, abundances are often high. Interestingly, prairie streams often support greater species diversity than highly valued trout streams. In addition, intermittent streams were identified as important nursery areas for juvenile fish. Fausch and Bramblett (1991) determined that persistent pools in intermittent prairie streams in Colorado provided refuge to fish during periods of no flow. These pools were a critical source for recolonization and recruitment when flow resumed. And in intermittent streams in eastern Montana, Bramblett and Zale (2000) collected western silvery minnow, a Wyoming species of special concern. Intermittent prairie streams also support other aquatic life, such as invertebrates, that are protected under the Clean Water Act.

The Montana Chapter of the American Fisheries Society is also concerned about the potential effects of coalbed methane development on the popular recreation fishery in the Tongue River. The Tongue River Reservoir supports an excellent crappie and smallmouth bass fishery that attracts large numbers of anglers and is an important component of the local economy. The potential for coalbed methane development to impact this popular resource needs to be fully addressed in the EIS.

Toxicity of Salts

A serious deficiency in the effects discussion for the preferred and other alternatives is the reference to bioassay studies using cladocerans and fathead minnows (*Pimephales promelas*) as indicators of the suitability of water produced during development of coalbed methane. These investigations were studies of acute toxicity, whereas chronic levels may have an equally devastating effect over a longer period of time. Levels of dissolved solids resulting in chronic toxicity are unknown for most other species. This distinction is critical because significant effects on aquatic biota occur at levels far below acute toxicity. These effects cannot be ignored or dismissed.

Another significant limitation in applying this research is that the organisms examined are highly tolerant of poor water quality, including salt loading. Traditionally, toxicity studies

use organisms that are easily cultured in the lab. By default, this results in use of tolerant species with high reproductive potential that can be considered "weedy" species. Weedy species are more likely to dominate a community that is under some kind of physical, chemical, or biological stress. Therefore, management decisions based on these investigations will not protect the more sensitive members of the community.

The most commonly used taxa in toxicity studies include cladocerans and fathead minnows. There are several limitations associated with the use of these organisms. First, while cladocerans may be present in persistent pools in intermittent reaches, their presence in flowing water is more often incidental. We recommend caution when using lentic species to predict toxicity to stream-dwelling species. Furthermore, cladocerans are commonly collected from waters with high salinity. For example, in a study of the invertebrates of the Redwater River, a major tributary of the Missouri River in eastern Montana, cladocerans were the most abundant taxa in the most saline reaches of this river where specific conductance exceeded 11,000 µmhos/cm (Bollman 1999). In comparison, specific conductance measured in the Powder River ranges from 600 to 4250 µmhos/cm with a median value of 2140 µmhos/cm (USGS database).

Similarly, reliance on toxicity studies of fathead minnows may not protect other members of the native fish assemblage or popular, introduced game fish. Fathead minnows are widely acknowledged as being highly tolerant of pollution, including salts (Barbour et al 1999, Peterka 1972). Consequently, discharge stipulations based on studies of fathead minnows or cladocerans are unlikely to protect the numerous other species living in these waters.

Instead of basing the effects analysis on laboratory experiments with highly tolerant species, a community level approach should be used. This approach is consistent with section 101(a) of the Clean Water Act, which states "The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters." Biological integrity has been defined as "The ability to support and maintain a balanced, integrated, adaptive assemblage of organisms having species composition, diversity, and functional organization comparable to that of natural habitat of the region" (Karr and Dudley 1981, Karr et al. 1986). Clearly, management decisions geared to the most tolerant of species do not meet the objectives of the Clean Water Act.

Another issue associated with toxicity of discharged water is the lack of numeric standards for most salts. This, combined with the uncertainty regarding the ability of most species to withstand these toxic constituents, makes it difficult to effectively manage discharges to protect fish and aquatic life. It is imperative that surface waters being impacted by this development be assessed prior to development and monitored thereafter. Similarly, a commitment from agencies and industry to fund the studies to determine salt tolerance (especially sodium bicarbonate) of the native fish assemblage and sport fish should be incorporated into plans for this development.

Monitoring Plan

The absence of a meaningful monitoring plan in any of the alternatives is a significant deficiency of the draft EIS. A review of streams in the Powder River basin alone indicates that fisheries data are available for about 5% of streams (Montana Rivers Information System database). Furthermore, most of these records are between 20 and 30 years old. Note that this database contains only a fraction of existing streams within the basin that are likely to support fish. Data are similarly lacking for other streams likely to be impacted by coalbed methane development in other regions. Recently, Dr. Bob Bramblett (personal

communication) of Montana State University found 37 fish species in 63 prairie streams across eastern Montana, most of which were previously unsurveyed. According to the MRIS database, fish populations have not been recently sampled in many streams that potentially could be impacted in Gallatin and Park counties. Some of these streams are likely to support populations of westslope or Yellowstone cutthroat trout, which are highly susceptible to disturbance. The lack of data sorely limits both the effects analysis of the draft EIS and ultimately, the agencies' ability to adaptively manage this industry to avoid serious impacts on aquatic resources.

Development of coalbed methane must be combined with requirements for monitoring which capture the potential impacts on aquatic biota, stream morphology, habitat conditions, and riparian function. Environmental monitoring and assessment program (EMAP) protocols developed by the US Environmental Protection Agency are a preferred method within Montana and throughout the Northern Great Plains. Currently, researchers at Montana State University are developing an index of biotic integrity for prairie streams using this methodology. The index integrates fish, invertebrates, and periphyton (attached algae) to evaluate the biological integrity of streams. Furthermore, this method examines stream morphology, riparian structure and function, and human influences. The final EIS should require a monitoring component utilizing this methodology or a similar approach.

Examination of Alternatives

The draft EIS does a commendable job of listing the many potential harmful effects of coal bed methane development on aquatic resources in general, but then fails to provide a realistic assessment of the probable cumulative impact on the aquatic community. Instead, effects are consistently understated and dismissed by claiming that stipulations and mitigation measures will protect these resources from degradation. We are very concerned that the serious depletion of groundwater resources predicted in the draft EIS will in fact decrease available surface flows in the longterm. We firmly believe that Alternatives A, C, D and E are all likely to have serious adverse effects on fisheries and aquatic invertebrates, despite the assertions in the EIS that discharge permits and mitigation will avoid all but minor impacts. The suggestion that highly saline discharge waters would "probably provide some refuge for aquatic organisms" during extreme drought conditions is completely unfounded. More likely, these untreated discharges will make baseflow conditions intolerable to native aquatic organisms.

We have major concerns with Alternative E (Preferred) as described in the draft EIS, and strongly disagree with the conclusion that it would have the same effects on aquatic resources as Alternative B. It is simply not credible for the BLM to claim that 2.9 billion cubic feet of saline discharge water per year from 16,500 coalbed methane wells over a 20-year period can be successfully regulated by discharge permits and water management plans. By any realistic account, a majority of producing wells would be forced into water treatment, reinjection or prolonged shutdowns if degradation of surface waters is actually to be avoided, but this scenario is hardly mentioned in the draft EIS. We see no evidence that the regulatory agencies will have the resources to meet this overwhelming challenge, let alone administer the necessary discharge permits. On what basis and record of success are the envisioned mitigation and "protective measures" mentioned in the draft EIS deemed to be effective? How can these possibly be reasonable expectations given the scale and magnitude of development described in the draft EIS?

Alternative B, though far from benign, offers the best protection for aquatic resources by requiring reinjection of production water. We support this approach as the most

effective mitigation available, and believe a reasonable precedent has been set for using reinjection technology to avoid adverse effects from oil and gas wells on aquatic resources. We also believe that a phased-in approach to coalbed methane development is essential, given all the unknowns about local aquatic communities, quality and quantity of discharge waters, salt toxicities, recipient stream hydrology and pattern of coalbed methane development across this large area. Adaptive management with information feedback loops can only be successful if controls exist on the rate at which these many thousands of potential wells are developed.

Conclusions and Recommendations

In conclusion, the draft EIS needs a significant amount of revision to adequately address issues related to fisheries, water quality, and stream ecology. Mandatory re-injection of all water produced by coalbed methane wells would alleviate many of the concerns we have about this development plan. Much more consideration should be given to all fish species of special concern and other species that are potentially declining. Furthermore, the unique character of the Powder River must be considered in developing management plans for coalbed methane. A monitoring component that examines fish, invertebrates, algal associations, riparian structure and function, and stream morphology should also be required for streams likely to be impacted. Likewise, until additional studies of chronic toxicity of salts on more members of the aquatic communities are conducted, including organisms less tolerant of pollutants, stipulations regarding acceptable salt loading should be considerably more conservative than envisioned by the draft EIS. Given the predicted volume of water to be produced by these wells, we expect adverse effects on aquatic resources unless the discharges are reinjected or treated to meet ambient surface water quality.

Sincerely,

Pat Clancey
MCAFS President

cc: Greg Hallsten, Montana DEQ
Tom Richmond, Montana BOGC

Electronic copies to:
Wes Wilson, Bill Wuerthele, Ayn Schmit, Max Dodson, Bruce Zander, EPA
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Eric Knudsen, President, Western Division AFS

Table 1. Rare invertebrates collected from the Powder River by Dr. Dan Gustafson, Montana State University, Bozeman.

Analetris eximia **Edmunds**
Acanthomola pubescens **Whiting and Lehmkuhl**

Raptoheptagenia cruentata **(Walsh)**
Ametropus neavei **McDunnough**
Homoeoneuria alleni **Pescador & Peters**
Lachlania saskatchewanensis **Ide**

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