

# REGIONAL WATER SUPPLIES, DEMANDS AND THE ROLE OF COALBED METHANE (CBM) PRODUCED WATER IN THE ARKANSAS RIVER BASIN

## ARKANSAS RIVER BASIN FACTS

- The Arkansas Basin is the largest in Colorado, covering 28,268 square miles, or 27% of the state
- Water supplies include snowpack, precipitation, groundwater and trans-mountain diversions from the Colorado, Rio Grande and Gunnison Basins, along with CBM water
- Arkansas River flows vary by location, from an average of 53,000 acre-feet per year near Leadville to 648,000 acre-feet per year downstream of Pueblo
- In many areas of the Basin, water supplies are over appropriated and water rights cannot be fully met
- Irrigation is the largest water use in the Basin
- By 2050, irrigation shortages of over 370,000 acre-feet are anticipated, along with at least 36,000 acre-feet of municipal and industrial shortages



### *Water Uses and Shortages in the Purgatoire River Sub-Basin*

The Purgatoire River is a major tributary of the Arkansas River. Purgatoire Sub-Basin water supplies, demands and shortages are reflected in the larger context of the Arkansas River Basin. This sparsely populated Sub-Basin contains uplands to the west and high plains to the east. Sub-Basin water supplies come from snow pack, periodic precipitation events, groundwater and coalbed methane (CBM) water production.

Many surface water rights go unfulfilled in the Sub-Basin during the summer and early fall. Agriculture is the dominant water use in the Sub-Basin; irrigated agriculture receives about 25,700 acre-feet (AF) per year on average, compared with 41,000 AF of water requirements. Water is in such short supply that as much as half the irrigated land lies fallow in dry years. Environmental and recreational water uses include creation of wildlife and fish habitat, water for several upland fishing lakes, as well as Trinidad Reservoir. Municipal water needs outside Trinidad are generally met through groundwater; Trinidad utilizes 2,200 AF in an average year, supplied from North Lake, Monument Lake and Trinidad Reservoirs.



### *Water Uses and Shortages in the Arkansas River Basin*

**Agriculture** - The Basin contains 428,000 irrigated acres, with about one million AF of crop water demand annually. Current irrigation shortages exceed 450,000 AF per year. Given the projected decrease in future irrigated acres, shortages are anticipated to be more than 370,000 AF per year by 2050.

**Municipal and Industrial (M&I) Use** - M&I water use is currently a small portion of Basin demand. Due to future population growth, M&I demands are projected to increase by up to 170,000 AF by 2050; shortages of at least 36,000 AF are anticipated by 2050.

**Environmental and Recreational Use** - Environmental needs in the Basin include water for wetlands, birding areas, threatened and endangered species. Recreational needs include water for boating, fishing and hunting.

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## *Arkansas River Compact of 1948*

The Compact apportions the waters of the Arkansas River between Colorado (60%) and Kansas (40%). Administration of the Compact occurs through use of storage accounts in, and releases of water from, John Martin Reservoir. Compact requirements, in combination with existing uses and water rights, result in little to no water availability for new uses. This accentuates the importance of developing and supporting new water supplies.

## *CBM Water Production*

CBM development in Las Animas County began in the late 1990s; annual gas and water production has increased since that time. **Between 7,000 and 8,000 acre-feet of CBM produced water is discharged into Purgatoire River tributaries each year, resulting in about 4,000 acre-feet of water contributed to the mainstem of the Purgatoire River (8% of total flows on average). Water in the mainstem of the Purgatoire is acceptable for these beneficial uses: (1) agriculture; (2) aquatic life; (3) recreation and; (4) water supply.**



## *Importance of CBM Water to the Arkansas Basin*

CBM water discharged into Purgatoire River tributaries and the 4,000 acre-feet of water that CBM activity adds to the Purgatoire mainstem annually provides water for agricultural and recreational activities and helps alleviate the pressure on other water supply sources. CBM water becomes more important in dry years when it represents a greater portion of total supply. CBM water is generally available throughout the year; its value increases in low flow periods of the growing season. The loss of CBM water would result in a reduced volume of water in the Purgatoire for all uses and associated benefits.



## *Future of Las Animas County CBM Production*

Raton Basin gas production has an estimated 20 to 40 years of productive life remaining. Under favorable conditions, up to 100 new wells per year might be drilled for 12 years or more. The pace and amount of future CBM extraction and water production depends on:

- ◆ Gas prices – natural gas prices are volatile
- ◆ Production costs, including drilling, materials and transportation costs
- ◆ Costs of produced water treatment and injection

Regulation of produced water impacts disposal costs and affects the scale of gas and water production. Changes in permit limits or other regulations could result in re-injection of all CBM produced water in the county or industry curtailment.

Sources: Harvey Economics obtained data and information from federal and state agencies, CBM operators and interviews with local groups and landowners.