

**Determination of Available Surface
Water and Ground Water in the
Northeast Wyoming River Basin**

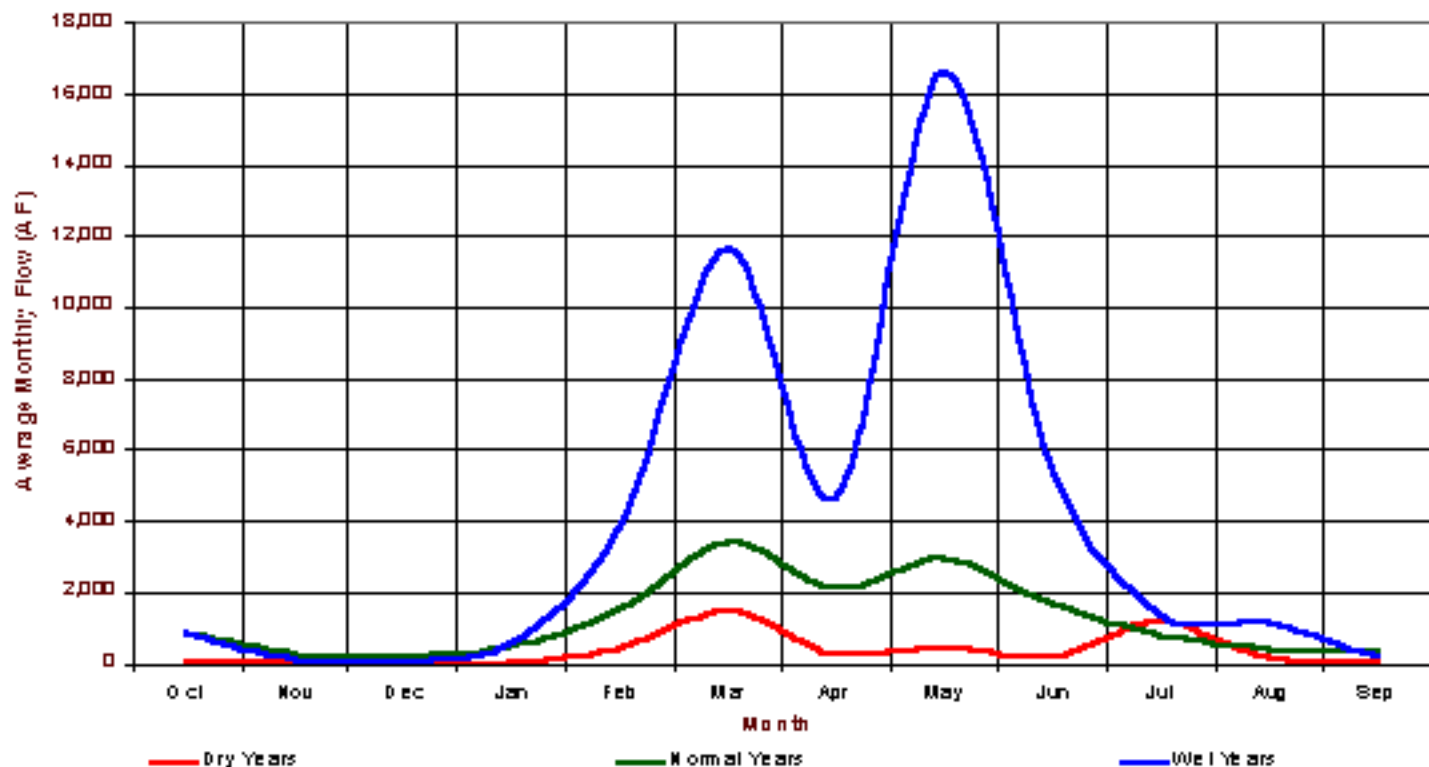
Surface Water Hydrology

- Needed for Water Availability Modeling
- Selected 1970 to 1999 as Study Period
- Compiled Streamflow Records from 25 gaging Stations
- Estimated Streamflows where Records are missing
- Estimated Streamflows at 51 Ungaged Model Nodes
- Determine Streamflows for Dry, Normal, and Wet Years



Average Monthly Streamflows (1 of 76)

AVERAGE MONTHLY STREAMFLOW
FOR DRY, NORMAL, & WET YEARS
BELLE FOURCHE RIVER, BELOW MOORCROFT, WY (Station 06426500)



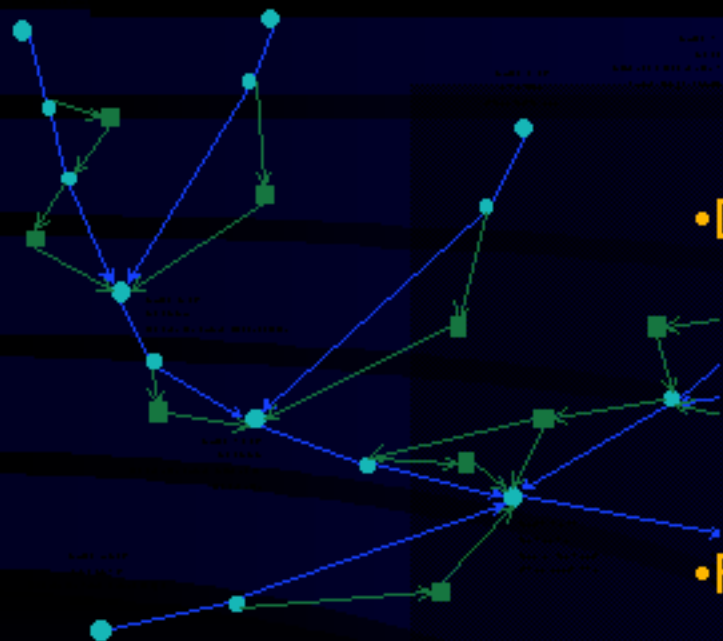
Summary of Selected Streamflows

River Basin	Location	Hydrologic Condition		
		Dry	Normal	Wet
Belle Fourche	Doukey Creek Near Moorcroft	481	3,245	11,952
	Belle Fourche River Below Moorcroft	4,517	15,059	46,519
	Belle Fourche River at Wyoming - South Dakota State Line	38,668	70,878	119,333
Red water	Sand Creek Near Ranch A Near Beloit	12,026	16,772	21,266
	Red water Creek at Wyoming-South Dakota State Line	18,836	28,387	36,778
Beaver	Stockade Beaver Creek Near Newcastle	7,879	8,400	9,827
	Beaver Creek Near Newcastle	14,674	21,439	30,731
Cheyenne	Antelope Creek Near Teckla	698	2,882	12,273
	Black Throated Creek Near Hampshire	1,272	4,326	14,298
	Lance Creek Near Riverview	4,547	14,809	39,593
	Cheyenne River at Edgemont, SD	14,811	45,044	127,050
Niobrara	Niobrara River at Wyoming-Nebraska State Line	1,716	2,210	3,293

Determination of Available Surface Water

- Available Flow in Excess of Existing Diversion and Instream Flow Demands
 - For each of 75 modeled stream reaches
- Available Flow Limited by Belle Fourche River Compact

Water Availability Modeling



- **Developed 4 Spreadsheet Models**

- *Belle Fourche*
- *Redwater*
- *Beaver Creek*
- *Cheyenne*

- **For Dry, Normal, and Wet Year Conditions**

Available Flow

Available Flow in Excess of Existing Irrigation and Instream Flow Demands

Sub basin	Hydrologic Condition		
	Wet Years	Normal Years	Dry Years
Belle Fourche River	151,000	71,000	13,000
Redwater Creek	34,000	26,000	17,000
Beaver Creek	30,000	20,000	14,000
Cheyenne River	103,000	31,000	5,000

Available Flow

Wyoming's Apportionment of Available Flow per Belle Fourche River Compact

Hydrologic Condition	Acre-feet
Wet Years	15,600
Normal Years	7,400
Dry Years	1,100

Available Ground Water in the Northeast Wyoming River Basins

Available Ground Water Determination

Purpose and Objectives

- Prepare GIS wells data themes
- Summarize existing information
- Summarize potential effects of ground water development
- Characterize impacts of coal bed methane development

Summary of Results

Summary of WSEO permit data

- 308 Permitted Active Agricultural Wells with Production Rates > 49 gpm
- 76 Permitted Active Municipal Well with Production Rates > 49 gpm
- 608 Permitted Active Industrial and Miscellaneous Wells with Production Rates >49 gpm
- 2760 Permitted Active Domestic Wells
- 6756 Permitted Active Stock Wells
- 5285 Permitted Active CBM Wells

Summary of Results

Six Principal Aquifer Systems

- Quaternary Alluvial Aquifer System
- Middle Tertiary Aquifer
- Fort Union/Wasatch Aquifer System
- Fox Hills/Lance Aquifer System
- Dakota Aquifer System
- Madison Aquifer System

Summary Comments

- Ground water is major source of water for most uses
- Importance of Aquifer system is based on type of use, water quality, production capability, and the cost of withdrawal
 - Madison Aquifer System
 - Fox Hill Lance Aquifer System
 - Fort Union/Wasatch Aquifer System
 - Tertiary Aquifer (Arikaree Formation)
 - Alluvial Aquifer System
 - CBM related considerations

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Questions?