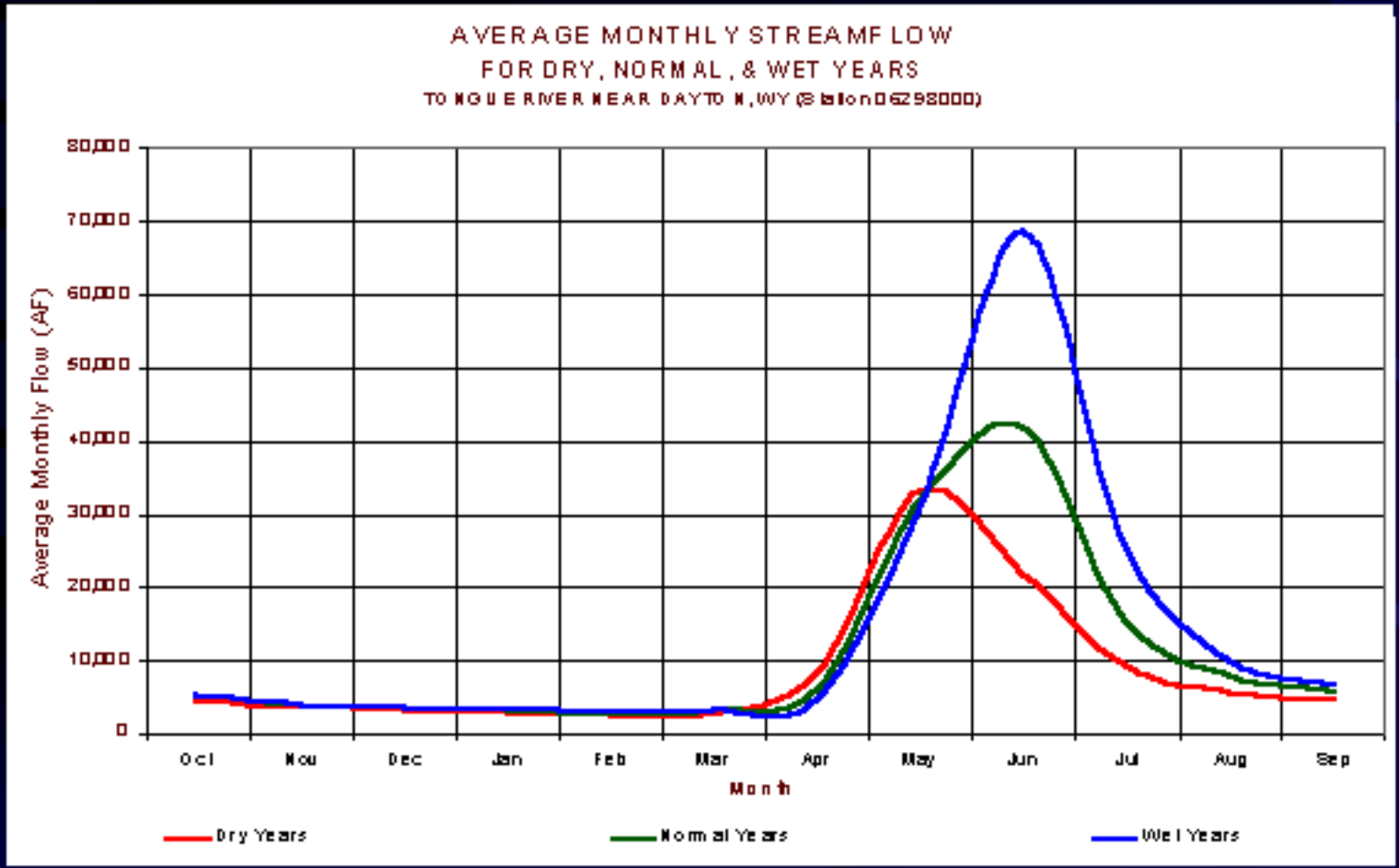
Determination of Available Surface Water and Ground Water in the Powder-Tongue River Basin

Surface Water Hydrology

- Needed for Water Availability Modeling
- Selected 1970 to 1999 as Study Period
- Compiled Streamflow Records from 75 gaging Stations
- Estimated Streamflows where Records are missing
- Estimated Streamflows at 13 Ungaged Model Nodes
- Determine Streamflows for Dry, Normal, and Wet Years

Average Monthly Streamflows (1 of 88)



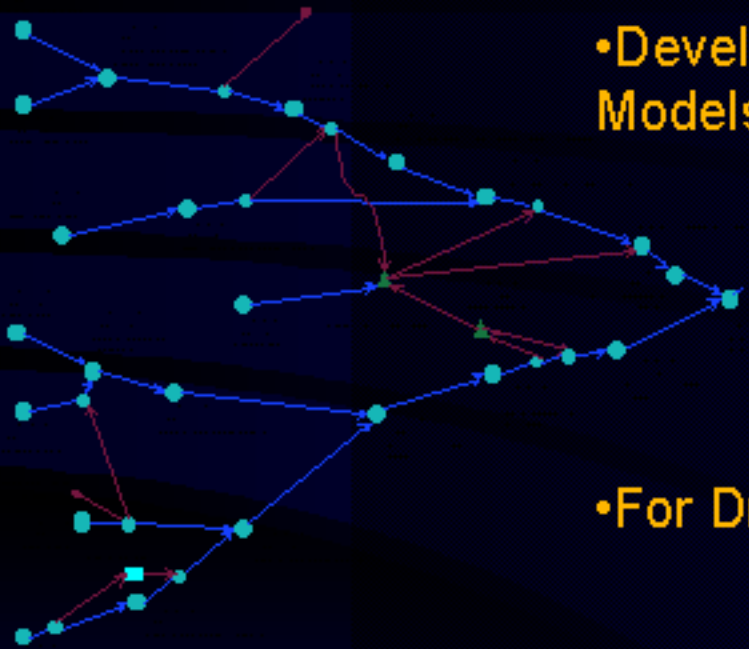
Summary of Selected Streamflows

River Basin	Location	Hydrologic Condition		
		Dry	Normal	Wet
Little Bighorn	Little Bighorn River at State Line Near Wyola	80,523	112,704	152,367
	East Pass Creek Near Dayton	8,364	12,016	15,555
Tongue	Goose Creek Near Acme	84,857	126,209	198,541
	Prairie Dog Creek Near Acme	23,719	30,078	39,972
	Tongue River at State Line Near Decker	217,843	326,123	473,035
Powder	Middle Fork Powder River Above Kaycee	41,898	54,536	68,105
	North Fork Powder River Below Pass Creek Near Mayoworth	21,128	25,116	33,386
	South Fork Powder River Near Kaycee	15,923	27,086	46,315
	Powder River at Sussex	98,450	157,741	240,143
	Crazy Woman Creek at Upper Station Near Arvada	17,466	31,956	63,330
	Rock Creek at Mouth Near Buffalo	15,052	23,701	43,372
	Piney Creek at Ucross	50,904	63,527	111,616
	Clear Creek Near Arvada	80,849	125,096	217,115
	Powder River at Moorhead	193,770	324,023	546,537
Little Powder	Little Powder River Above Dry Creek Near Weston	3,189	12,582	48,430

Determination of Available Surface Water

- Available Flow in Excess of Existing Diversion and Instream Flow Demands
  - For each of 85 modeled stream reaches
- Available Flow Limited by Yellowstone River Compact

Water Availability Modeling



- Developed 6 Spreadsheet Models
  - *Little Bighorn*
  - *Tongue River*
  - *Clear Creek*
  - *Crazy Woman Creek*
  - *Powder River*
  - *Little Powder River*
- For Dry, Normal, and Wet Year Conditions

Available Flow

Available Flow in Excess of Existing Diversion and Instream Flow Demands			
Subbasin	Hydrologic Condition		
	Wet Years	**Normal Years**	**Dry Years**
Little Bighorn River	**21,000**	**16,000**	**11,000**
Tongue River	**473,000**	**326,000**	**218,000**
Clear Creek	213,000	124,000	80,000
Crazy Woman Creek	69,000	32,000	16,000
Powder River	**547,000**	**324,000**	**194,000**
Little Powder River	**48,000**	**12,000**	**3,000**

Available Flow

Wyoming's Remaining Allocation of Available Flow per Yellowstone River Compact			
Hydrologic Condition	Tongue River Basin		Powder River Basin
	Conservative Estimate	**Liberal Estimate**	
Wet Years	163,000	189,000	211,500
Normal Years	90,000	117,000	131,100
Dry Years	40,000	67,000	74,300

Available Groundwater in the Powder-Tongue River Basin

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

- 111 Permitted Active Agricultural Wells with Production Rates > 49 gpm
- 8 Permitted Active Municipal Well with Production Rates > 49 gpm
- 301 Permitted Active Industrial and Miscellaneous Wells with Production Rates >49 gpm
- 4,646 Permitted Active Domestic Wells
- 4,546 Permitted Active Stock Wells
- 6,820 Permitted Active CBM Wells

Summary of Results

Five principal aquifer systems

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

Summary Comments

- Ground water is the major source of water for many 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
  - CBM related considerations

Summary of Results

Summary of WSEO permit data

- 111 Permitted Active Agricultural Wells with Production Rates > 49 gpm
- 8 Permitted Active Municipal Well with Production Rates > 49 gpm
- 301 Permitted Active Industrial and Miscellaneous Wells with Production Rates >49 gpm
- 4,646 Permitted Active Domestic Wells
- 4,546 Permitted Active Stock Wells
- 6,820 Permitted Active CBM Wells

Questions?