Ephemeral Streamflow in the Powder River Basin

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Overview of Presentation

Basic Hydrologic Model in an Ephemeral Stream

- Does streamflow contribute to field productivity along ephemeral streams absent artificial irrigation?

Surface Runoff/Overbank Flow—a Limited Contributor

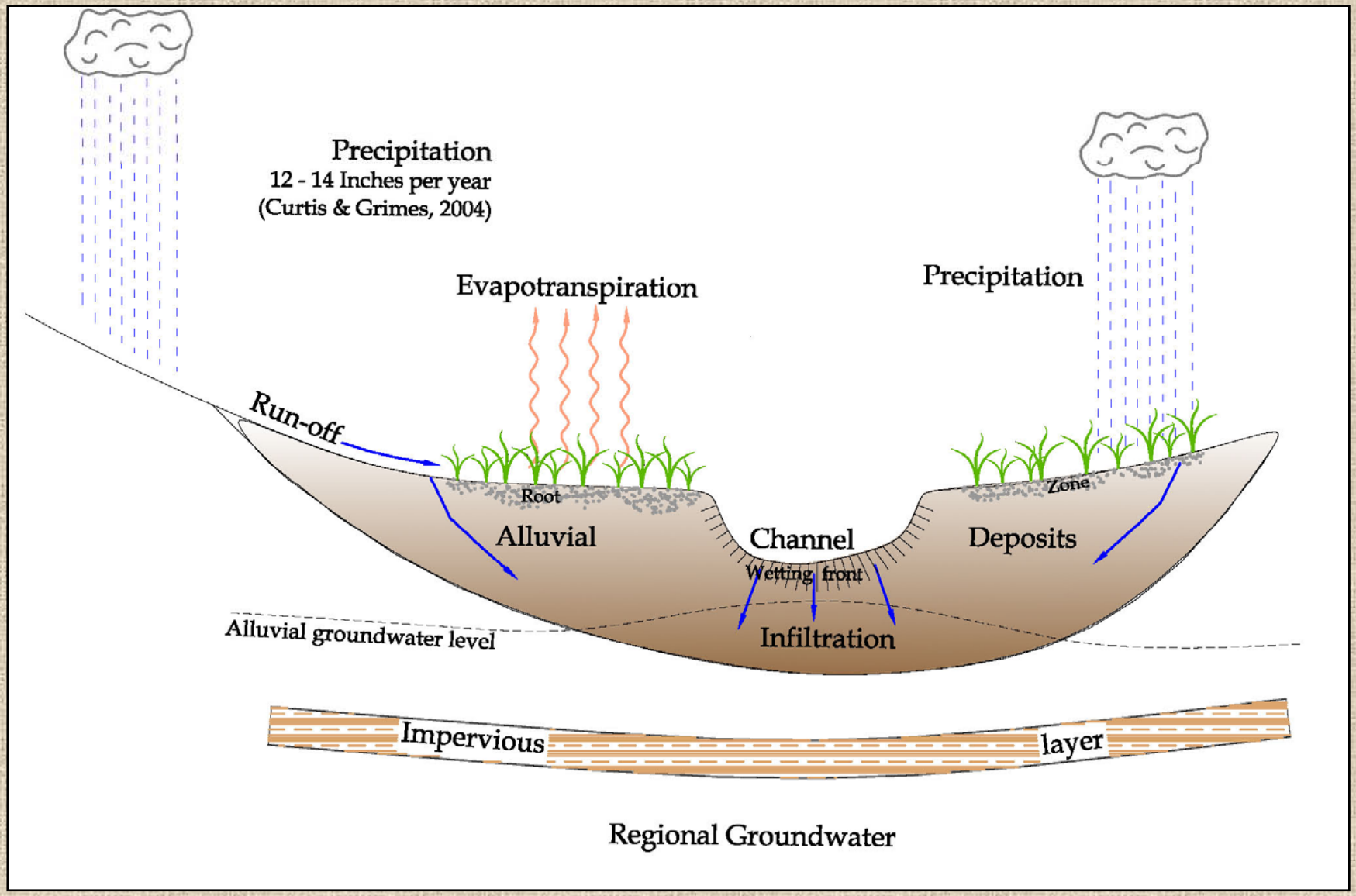
- Present data from flow event that provided overbank flow – recorded by Watershed Monitoring Program equipment
- Discuss the frequency of overbank events
- Demonstrate the influence of precipitation versus flow down a channel

Alluvial Groundwater

- Alluvial aquifer data
- Impact of flow regimes on alluvial aquifer levels

Summary

Basic Hydrologic Model - Ephemeral Streams
Surface Water/Overbank Flow



Pumpkin Creek at Iberlin Ranch – Discharge Hydrograph of June 2003

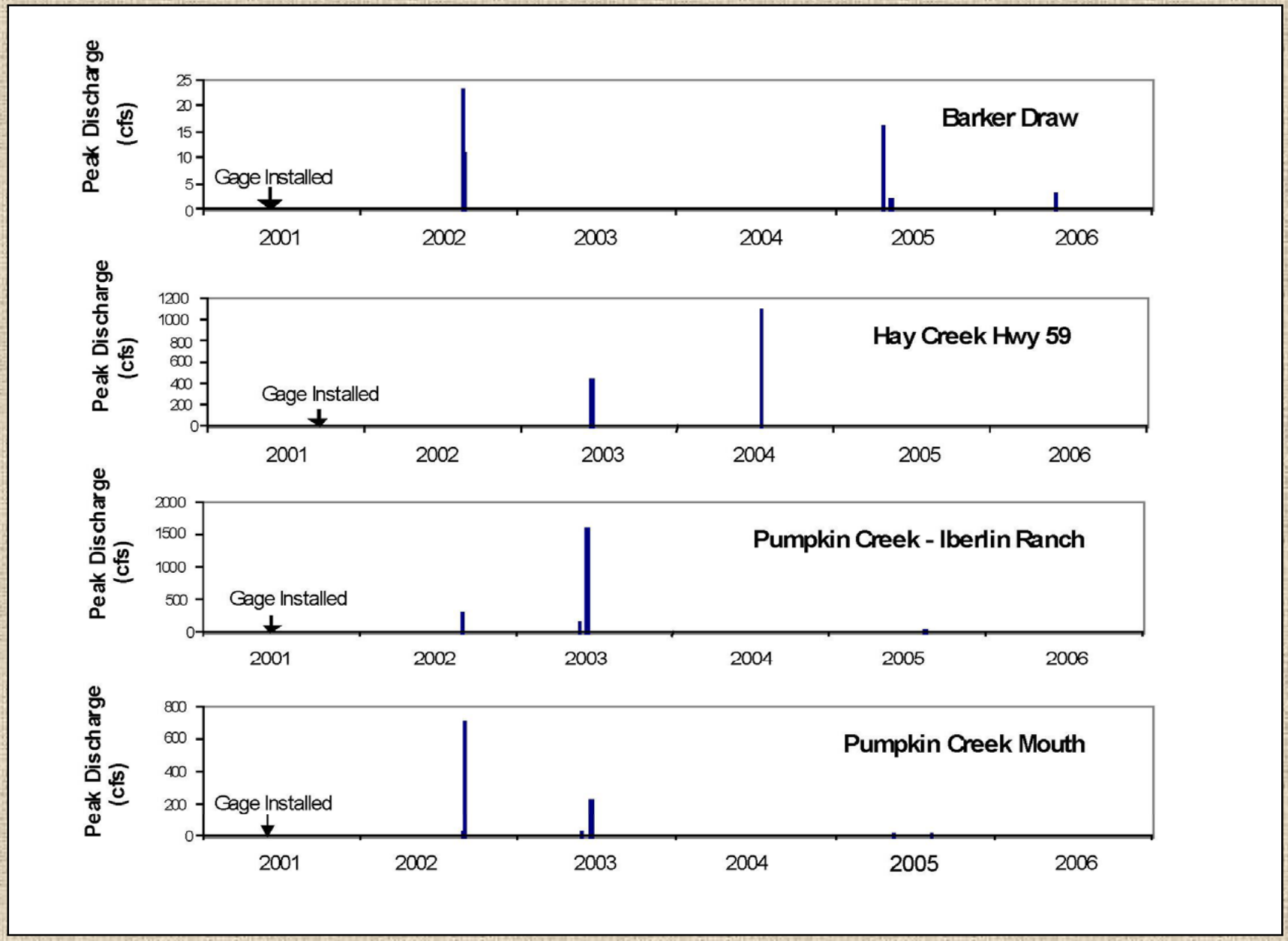
532 cfs - Bankfull Discharge
The duration of the runoff event greater than bankfull discharge is 3.2 hours.

Discharge (cfs)

1600
1400
1200
1000
800
600
400
200
0

6/16 18:00
6/16 21:00
6/17 0:00
6/17 3:00
6/17 6:00
6/17 9:00
6/17 12:00
6/17 15:00
6/17 18:00
6/17 21:00

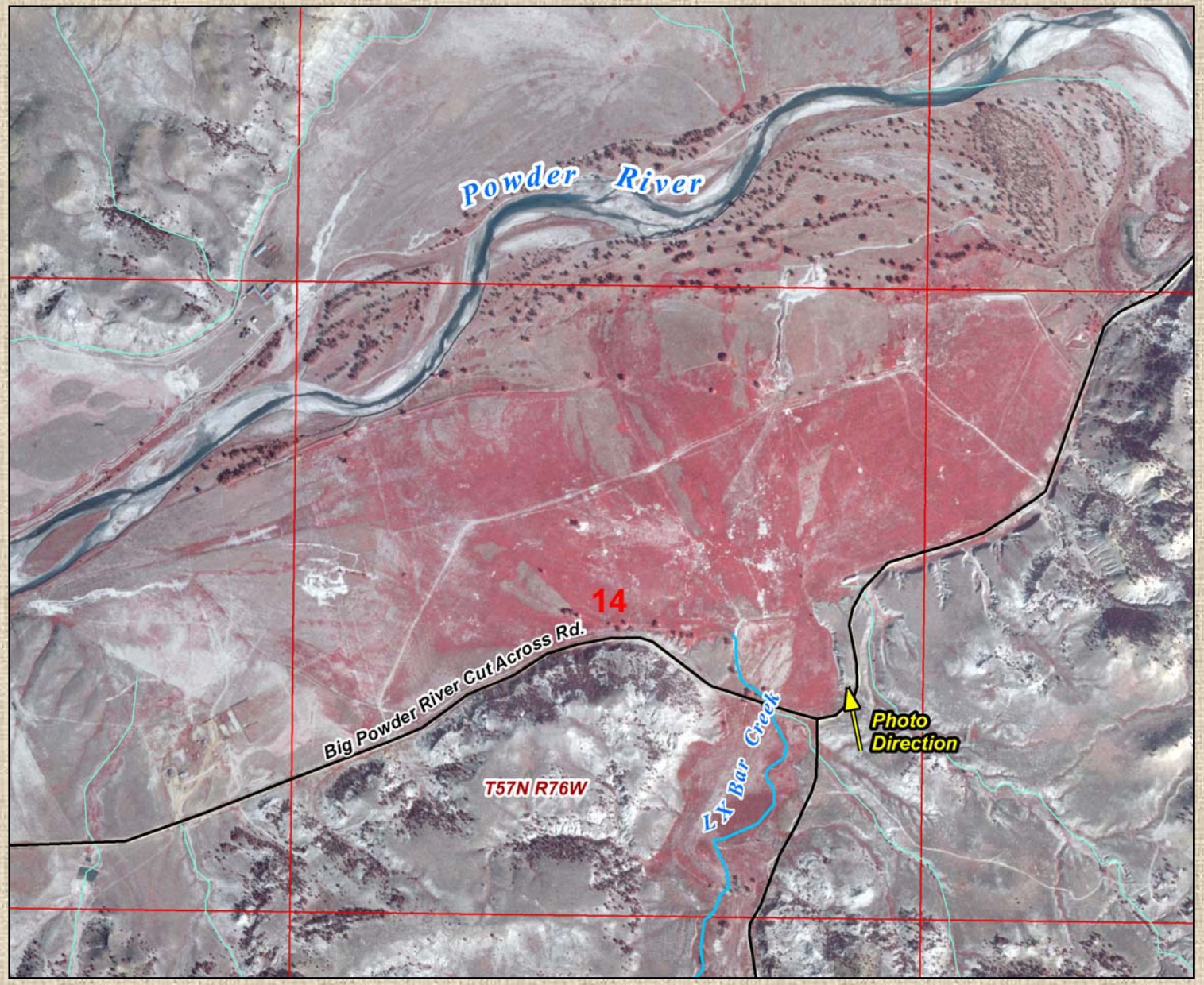
Flow Events from Streamgaging Program



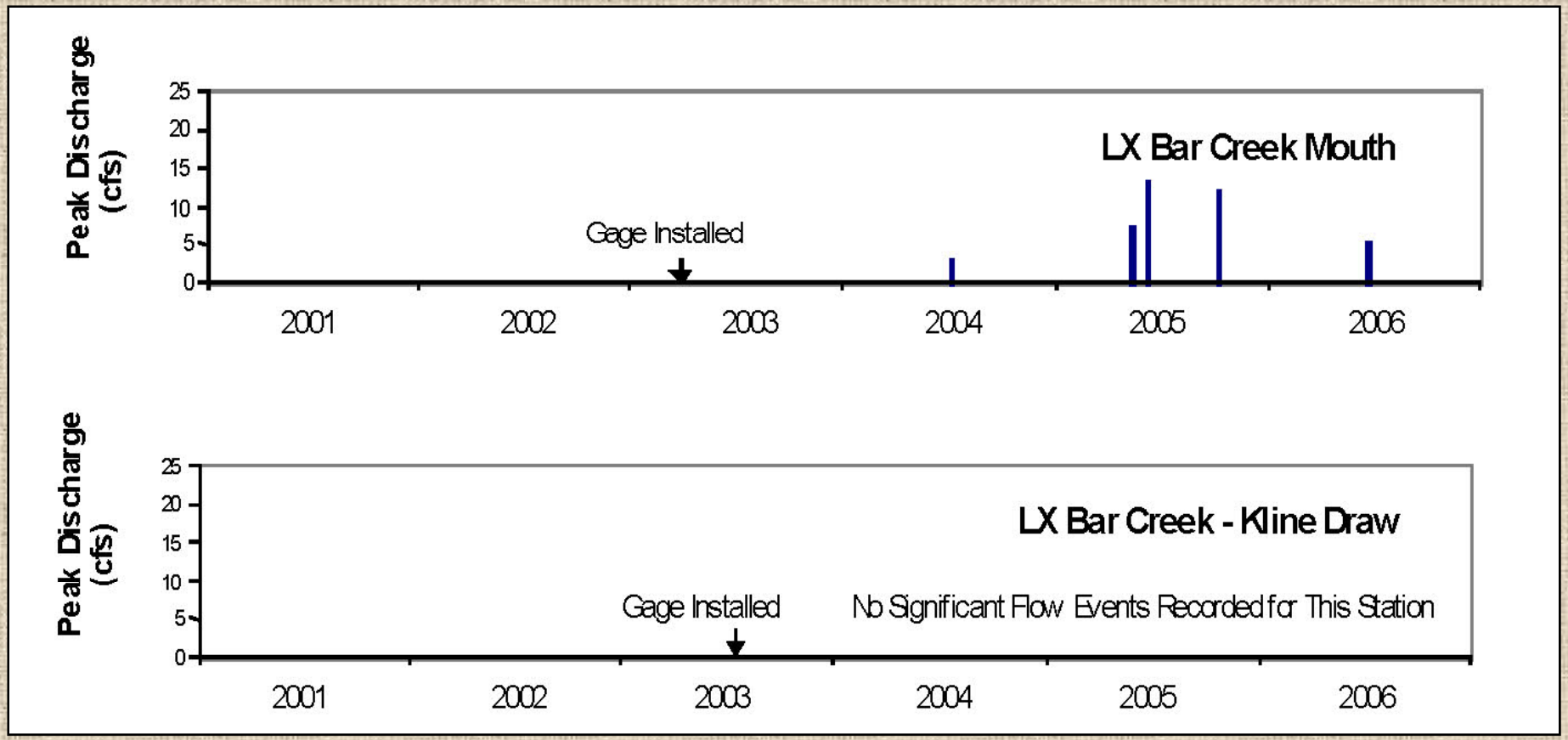
LX Bar Creek – June 2003

LX Bar Creek – July 2004

Color Infrared Imaging - Mouth of LX Bar Creek



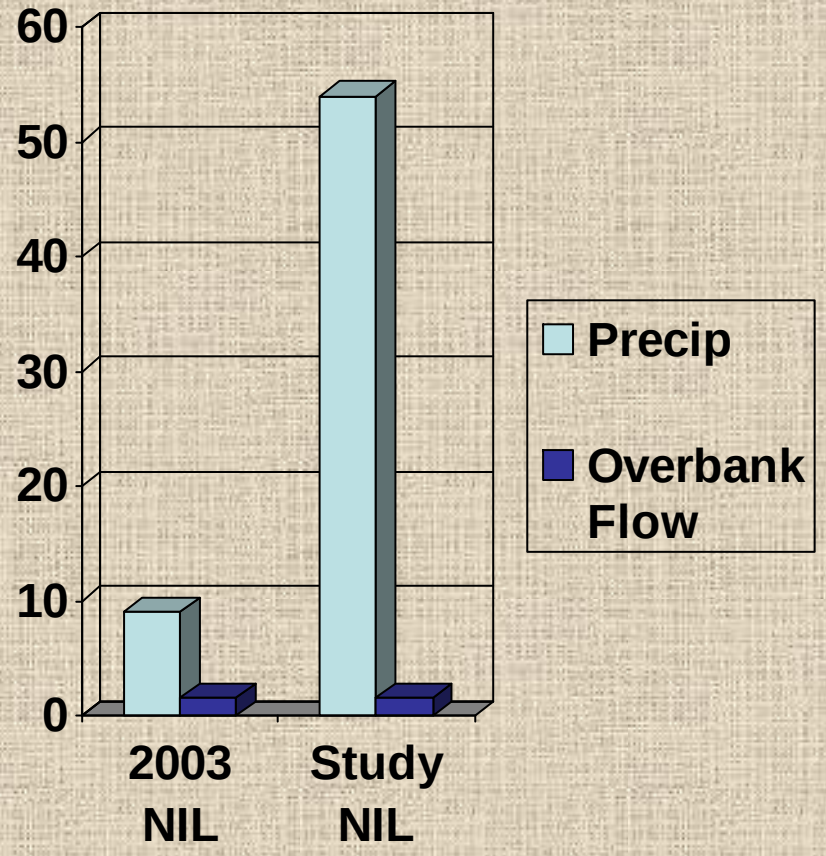
Flow Event Log - LX Bar Creek



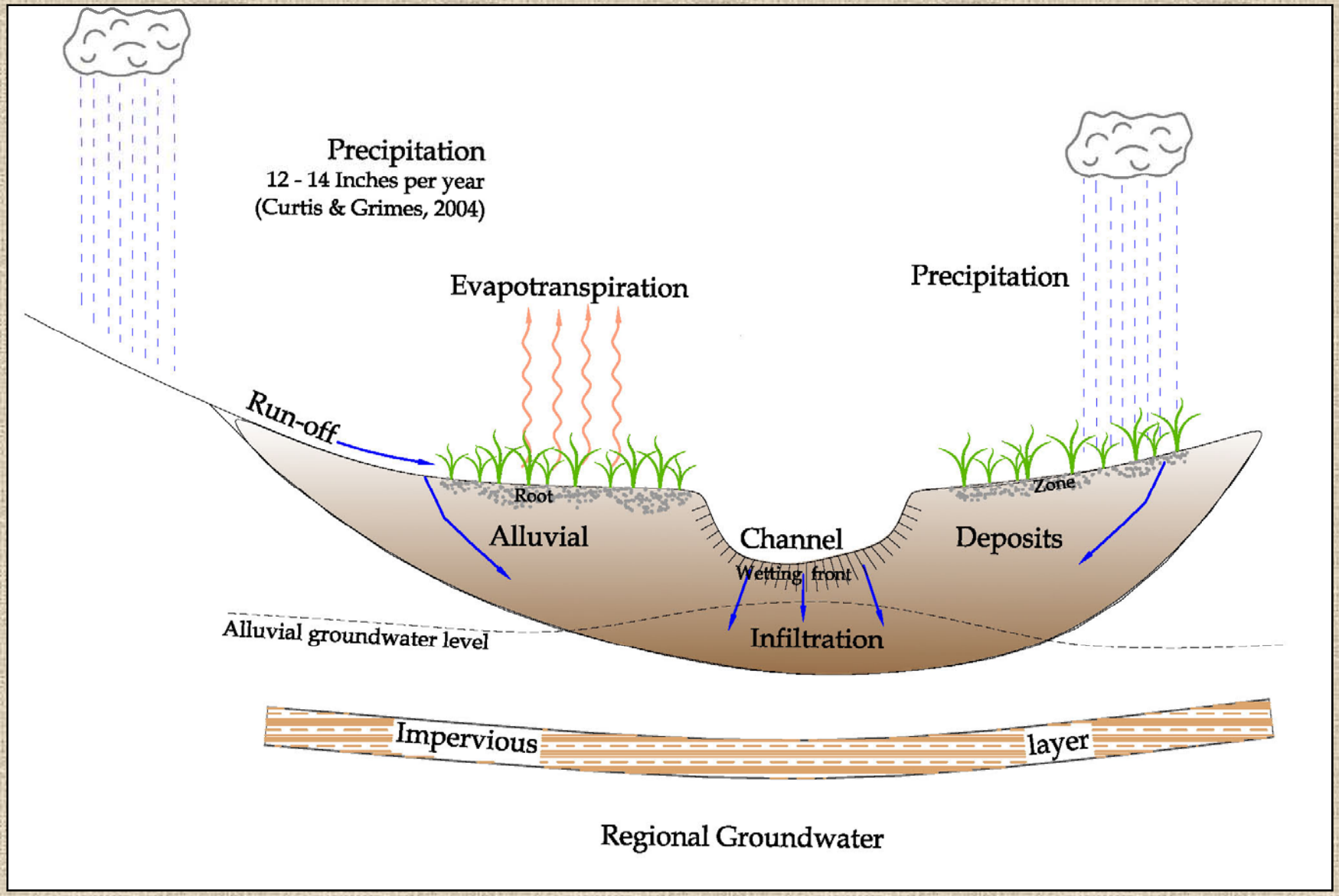
Surface Water Summary

Main Points

- Overbank flows are rare, of short duration and provide limited input to moisture on the floodplain
- Direct precipitation, soils, and topography are the main factors responsible for field productivity
- CIR is one NIL locator tool, but should not be overweighted

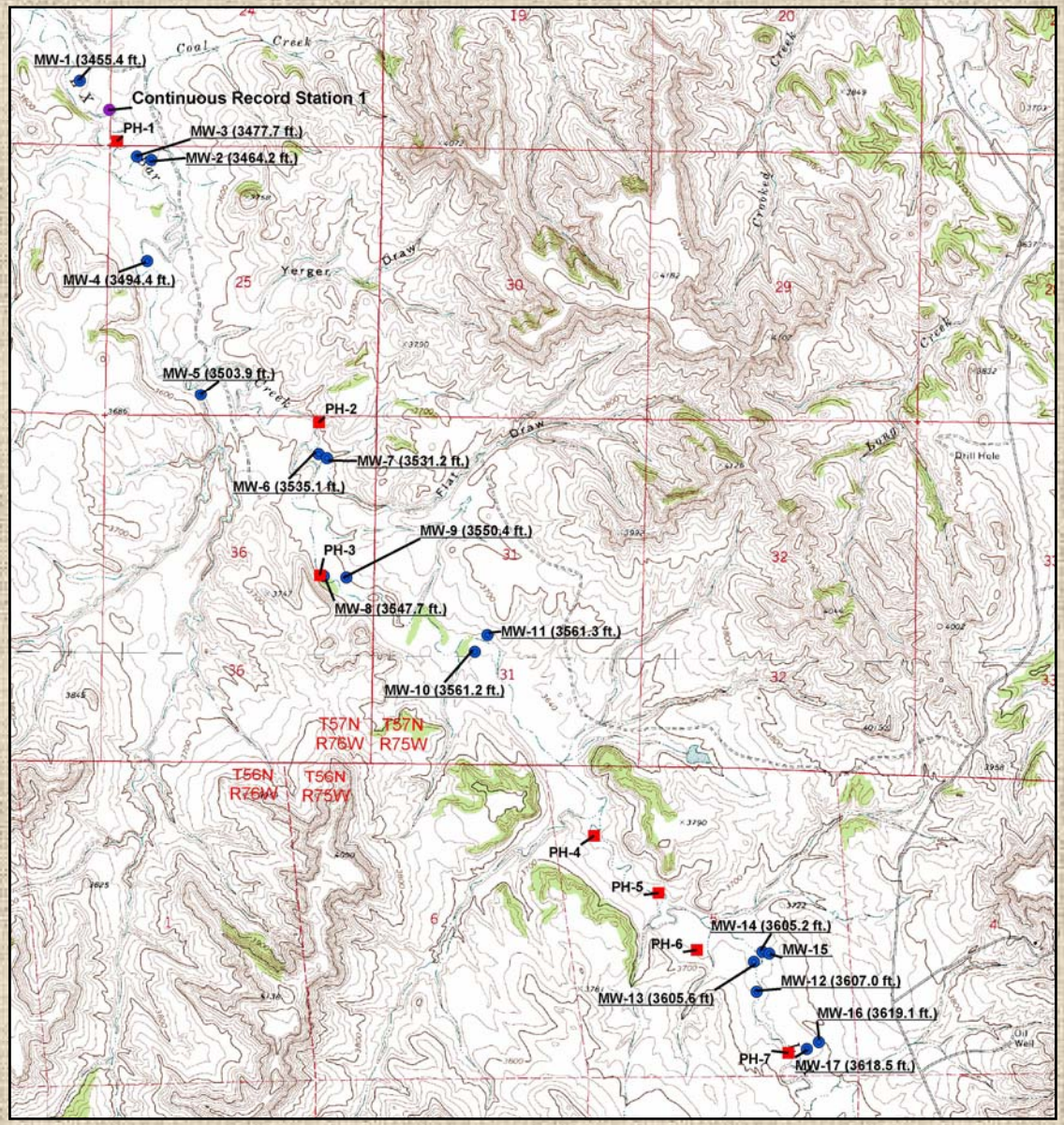


Basic Hydrologic Model - Ephemeral Streams Alluvial Groundwater

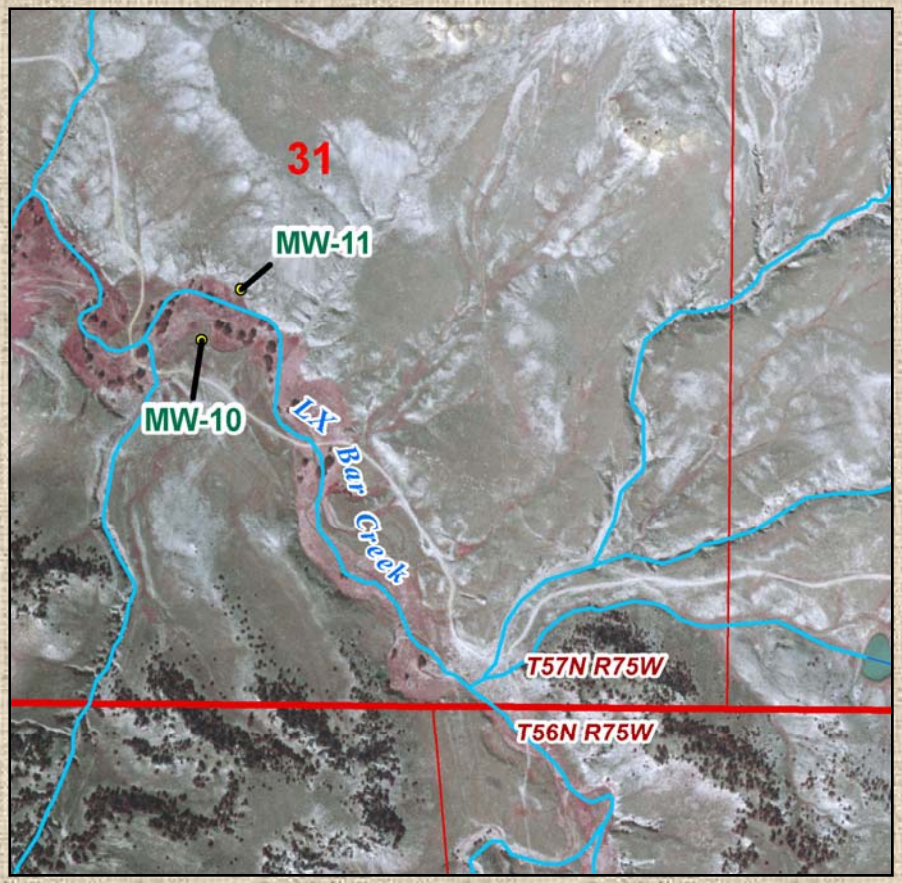


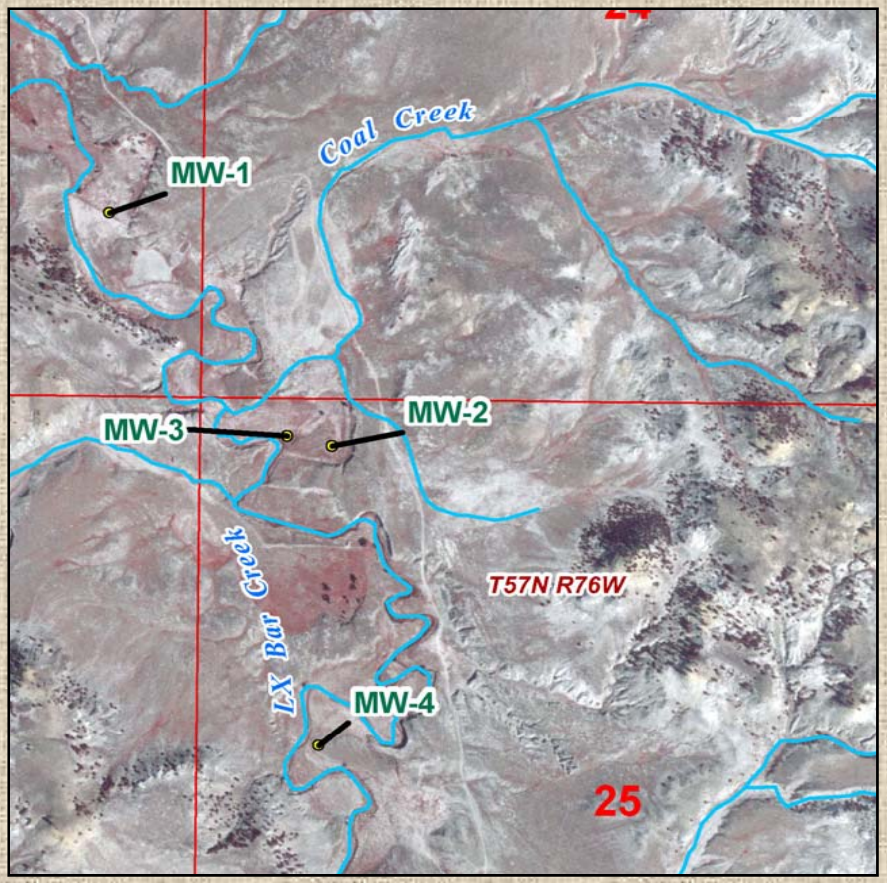
Alluvial Aquifer Study on LX Bar Creek

Geochemical monitoring of 18 wells in the shallow aquifer



CIR map showing monitor well locations





Data From LX Bar Shallow Aquifers

	Depth to First Water (Aug 21 – 24, 2003)	Specific Conductance @ 25°C (umhos/cm)	Sodium Adsorption Ratio (SAR)	Total Dissolved Solids @ 180°C (mg/L)
Mean	12.8	7503	10.6	6971
Median	12	7230	10.3	6740
Max	21	15800	28.5	14900
Min	8	4200	4.2	2960

Alluvial Aquifer Summary

Main Points

- Depths to alluvial aquifer indicate water is out of reach for most vegetation in the floodplain
- Water quality is generally poor in the shallow aquifer
- The quantity of CBNG produced water discharged is rarely sufficient to raise alluvial groundwater to plant rooting zone

Summary

- Watershed monitoring program has focused on good science using actual data, and it covers the PRB.
- **Appendix H is very conservative because:**
  - Overbank flows are rare and of short duration and do not supply significant water to NILs
  - CBM discharges are overwhelmed volumetrically by storm runoffs when they occur
  - Precipitation/topography/soils are the dominant factors that dictate field productivity
  - CBM discharges rarely are sufficient to raise the alluvial groundwater level
  - Alluvial water quality is generally poor throughout the PRB

Surface Water/Overbank Flow

Springflow and pothole water – related to geologic conditions not streamflow