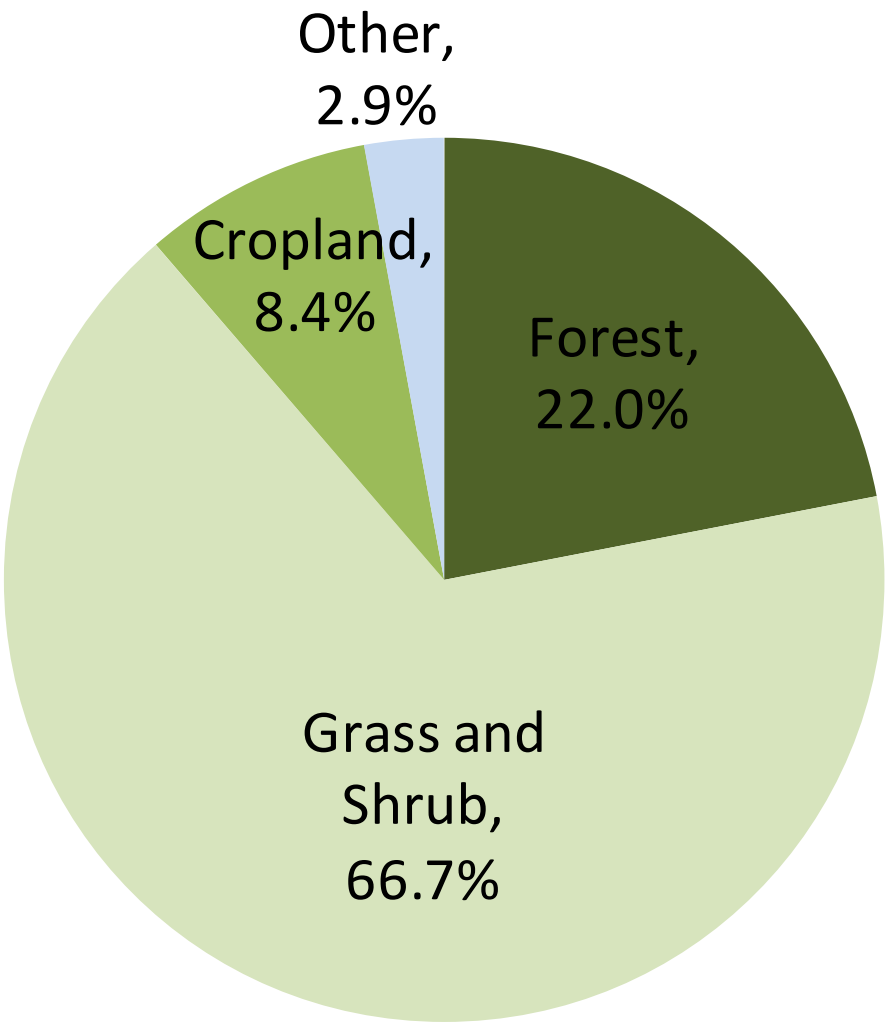
The Upper Missouri River Basin

An Overview

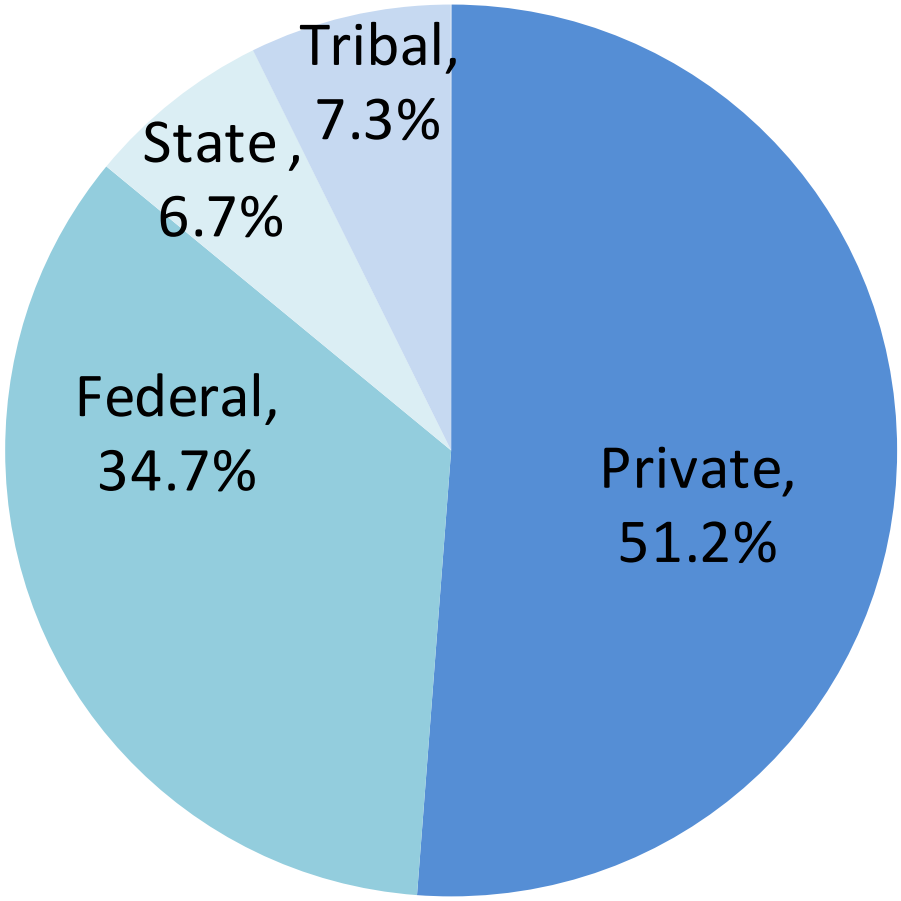
Land Use

Land Cover in the Upper Missouri Basin



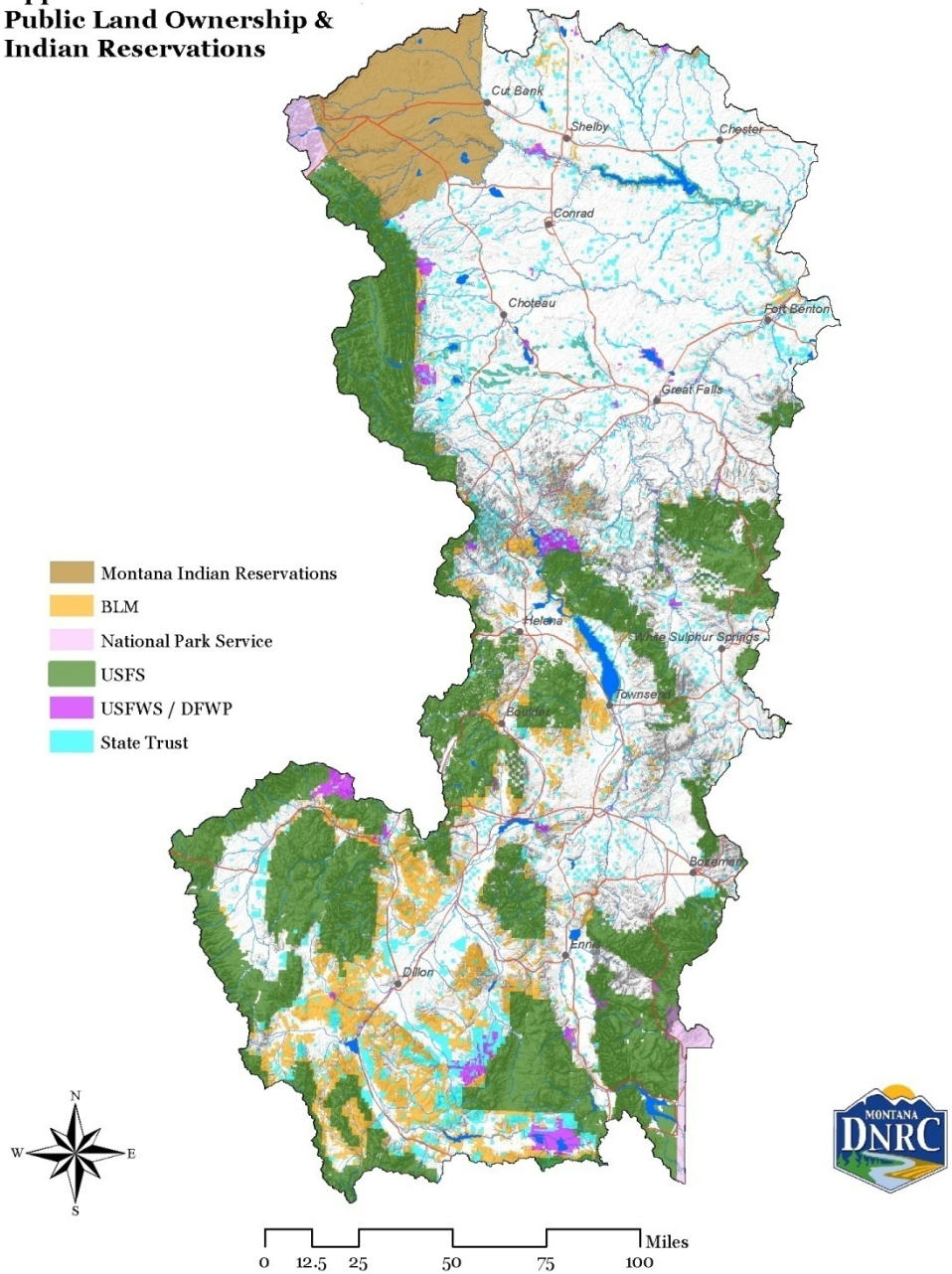
Source: headwatereconomics.org

Land Ownership in the Upper Missouri Basin



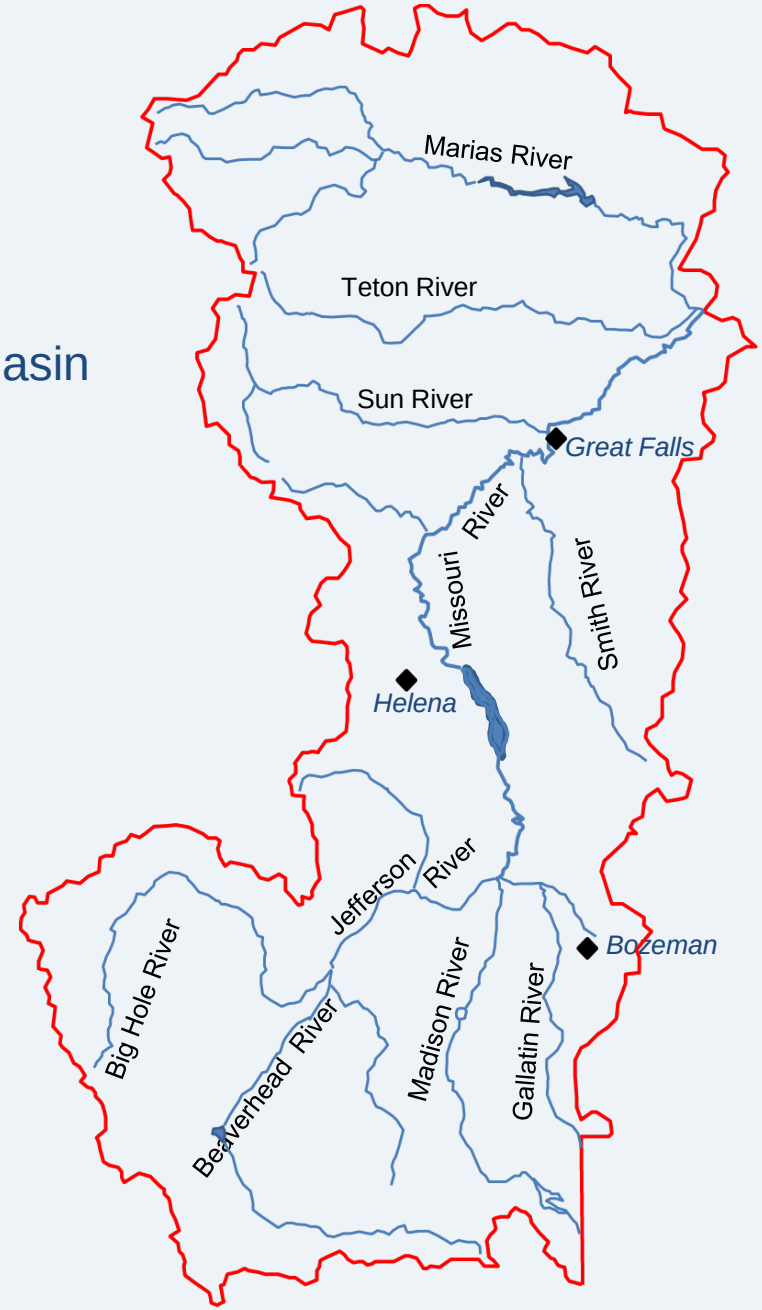
Source: headwatereconomics.org

Upper Missouri River Basin Public Land Ownership & Indian Reservations



Water Supply

Upper Missouri River Basin Major Streams



Big Hole River

Mike Roberts

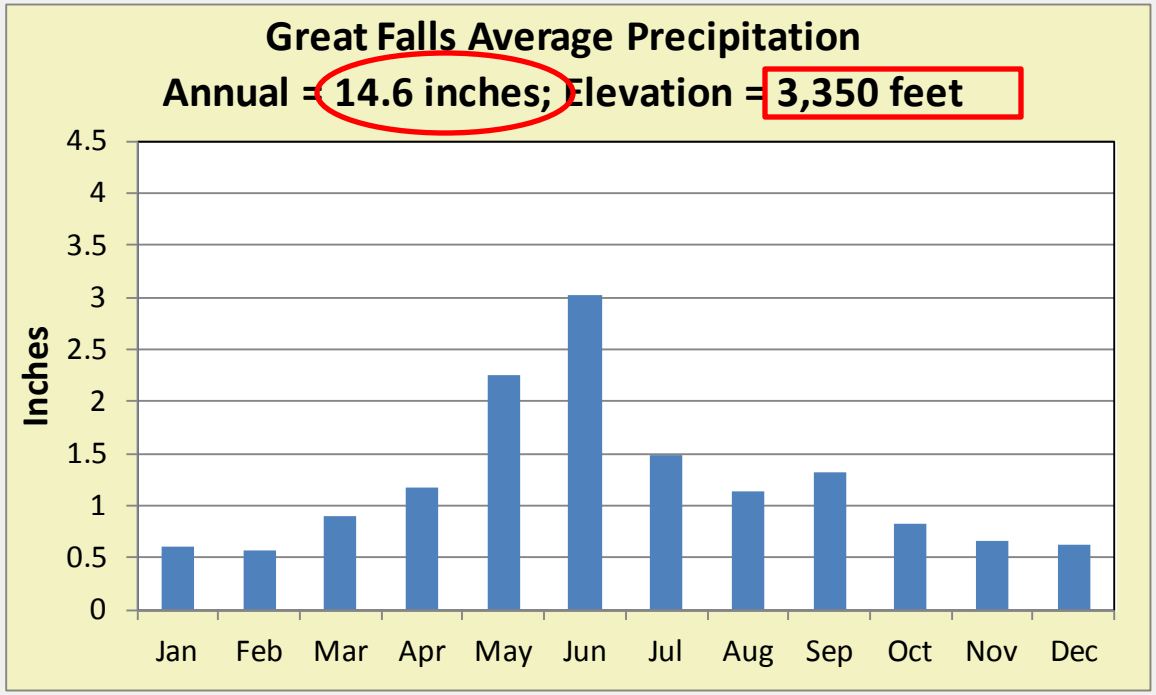
Sun River

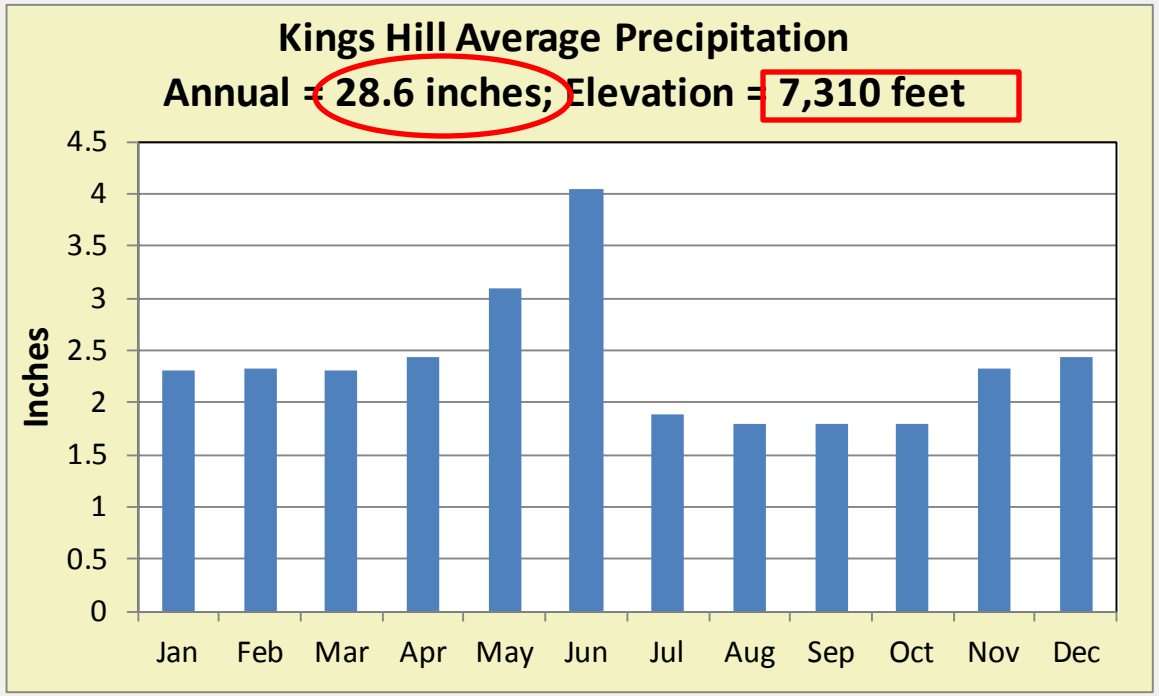
Precipitation

Upper Missouri Basin Average Annual Precipitation (1971-2000)

Average Annual Precipitation, Inches

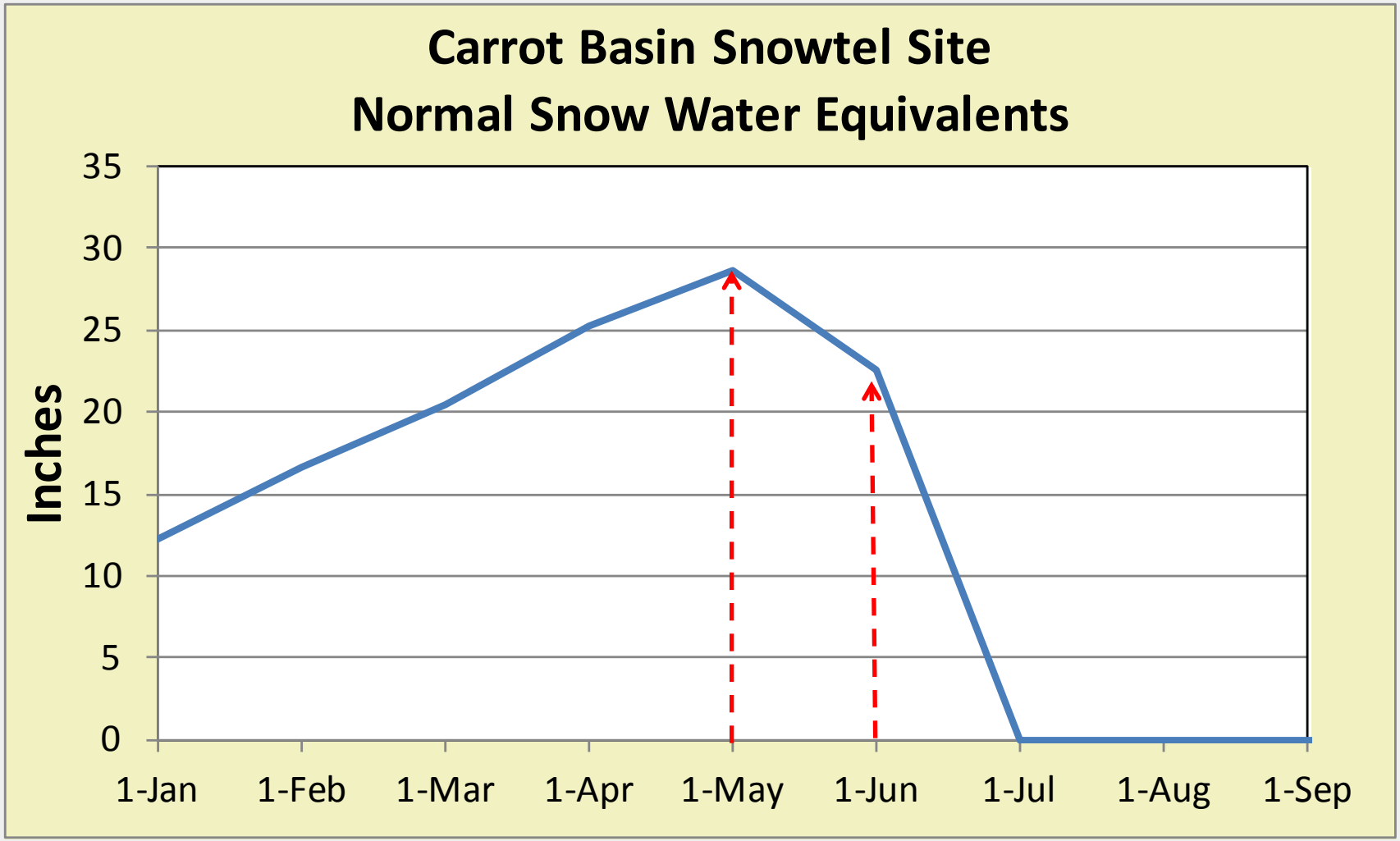
- 6-12
- 12-14
- 14-16
- 16-22
- 22-34
- 34-60
- 60-85
- Over 85


Great Falls Average Precipitation
Annual = 14.6 inches; Elevation = 3,350 feet
Inches
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

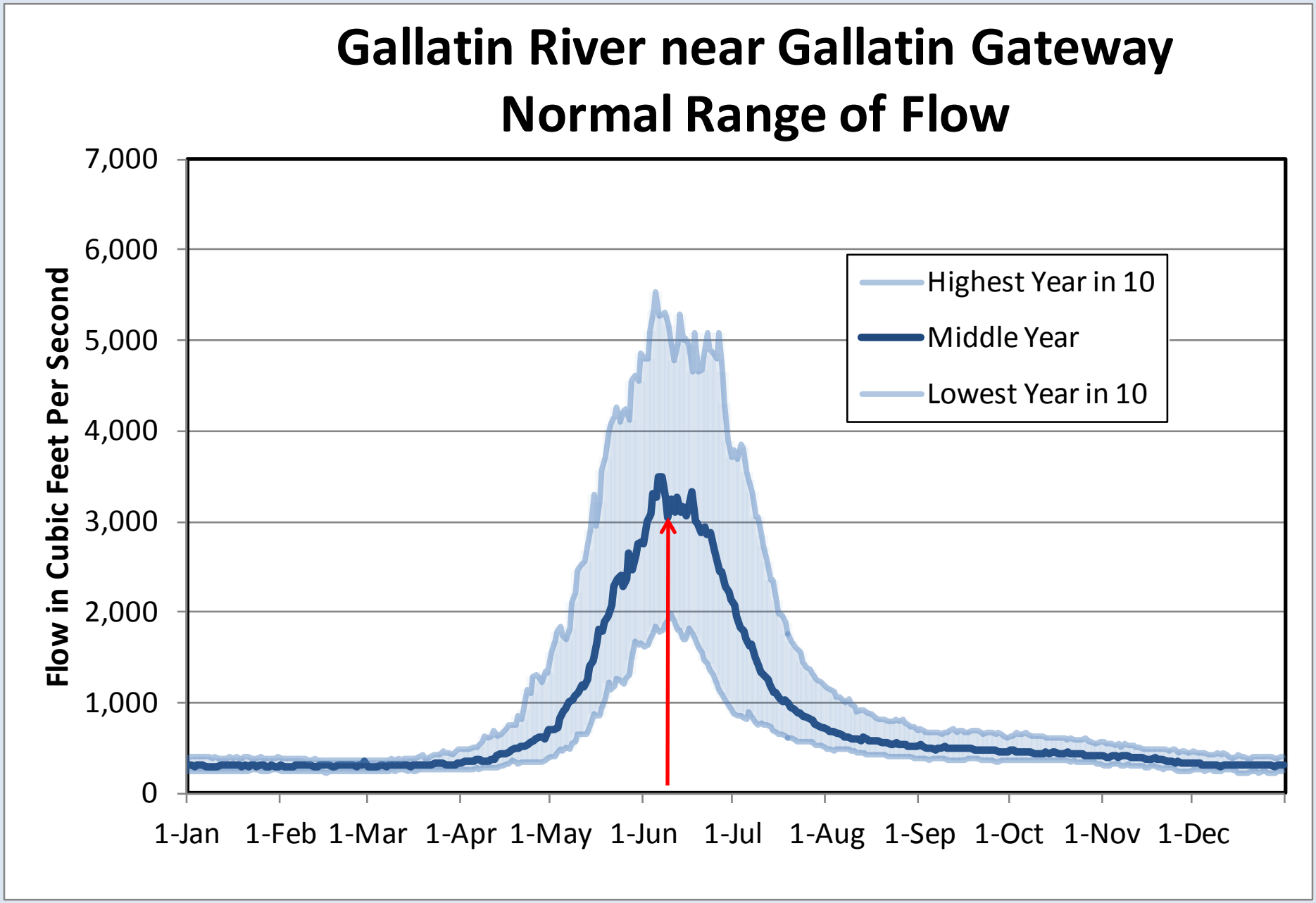

Kings Hill Average Precipitation
Annual = 28.6 inches; Elevation = 7,310 feet
Inches
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

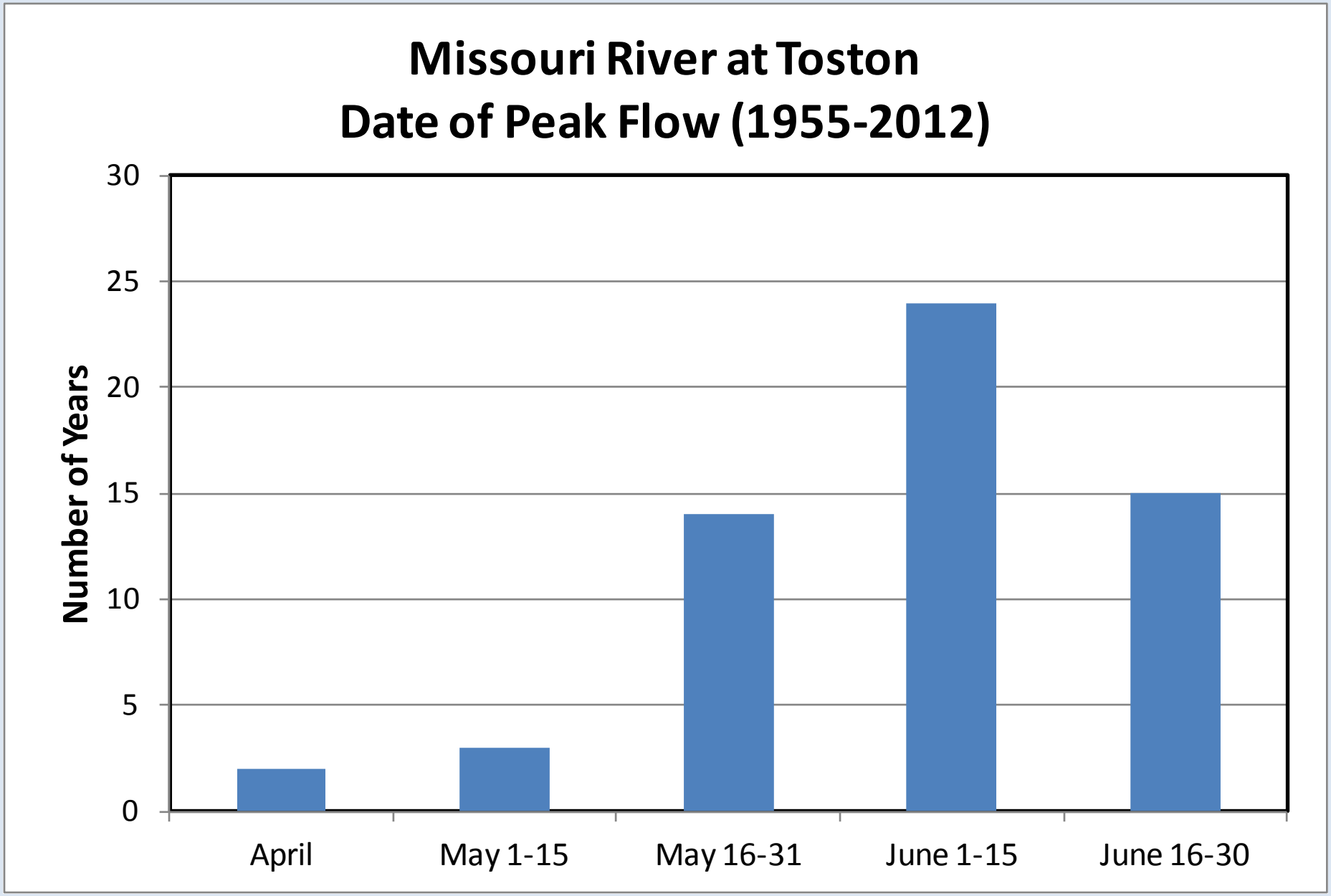
Snow

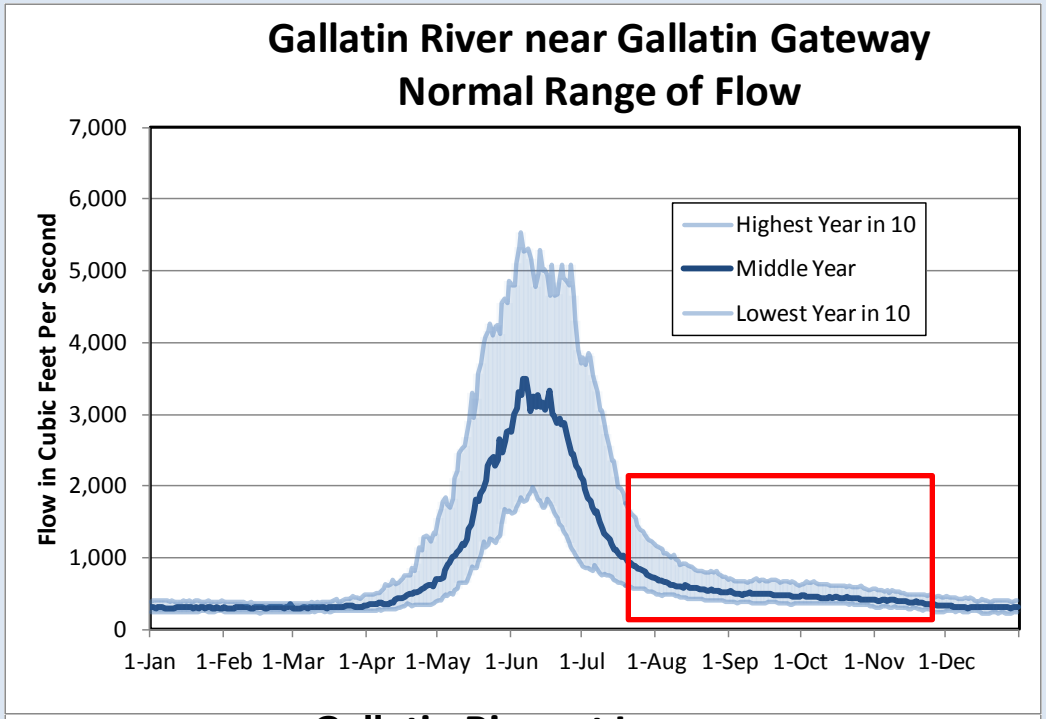
Normal 1st of Month Snow Water Equivalents for Carrot Basin Snowtel Site
Madison Range; Elevation of 9,000 feet
Average Annual Precipitation = 43 inches

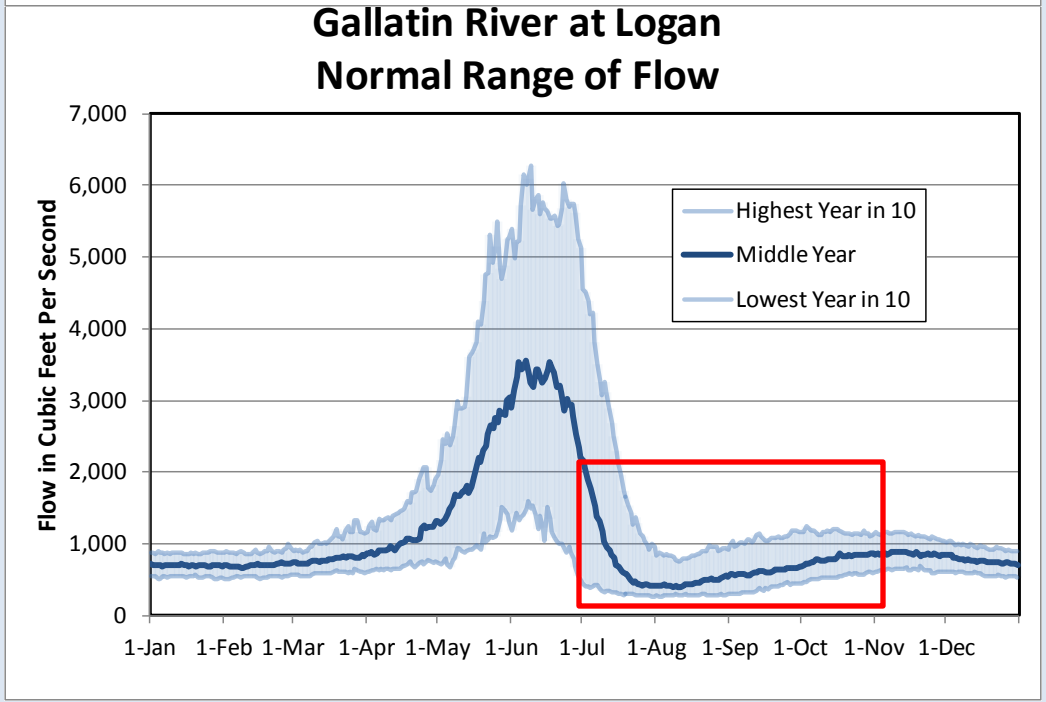


Streamflow


Gallatin River near Gallatin Gateway
Normal Range of Flow
Flow in Cubic Feet Per Second
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Highest Year in 10
Middle Year
Lowest Year in 10


Missouri River at Toston
Date of Peak Flow (1955-2012)
Number of Years
30
25
20
15
10
5
0
April
May 1-15
May 16-31
June 1-15
June 16-30


Gallatin River near Gallatin Gateway
Normal Range of Flow
Flow in Cubic Feet Per Second
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Highest Year in 10
Middle Year
Lowest Year in 10


Gallatin River at Logan
Normal Range of Flow
Flow in Cubic Feet Per Second
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Highest Year in 10
Middle Year
Lowest Year in 10

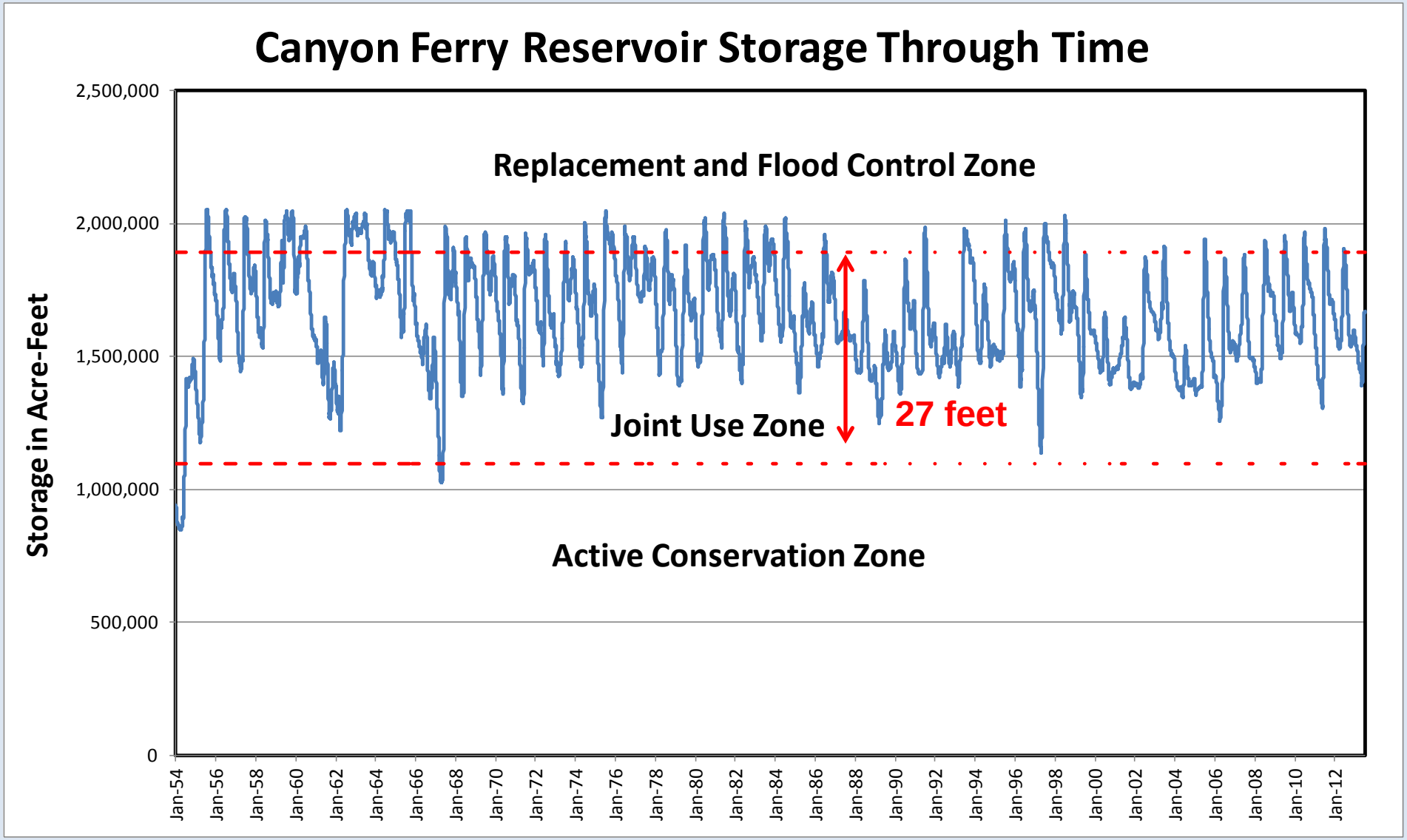
Reservoirs

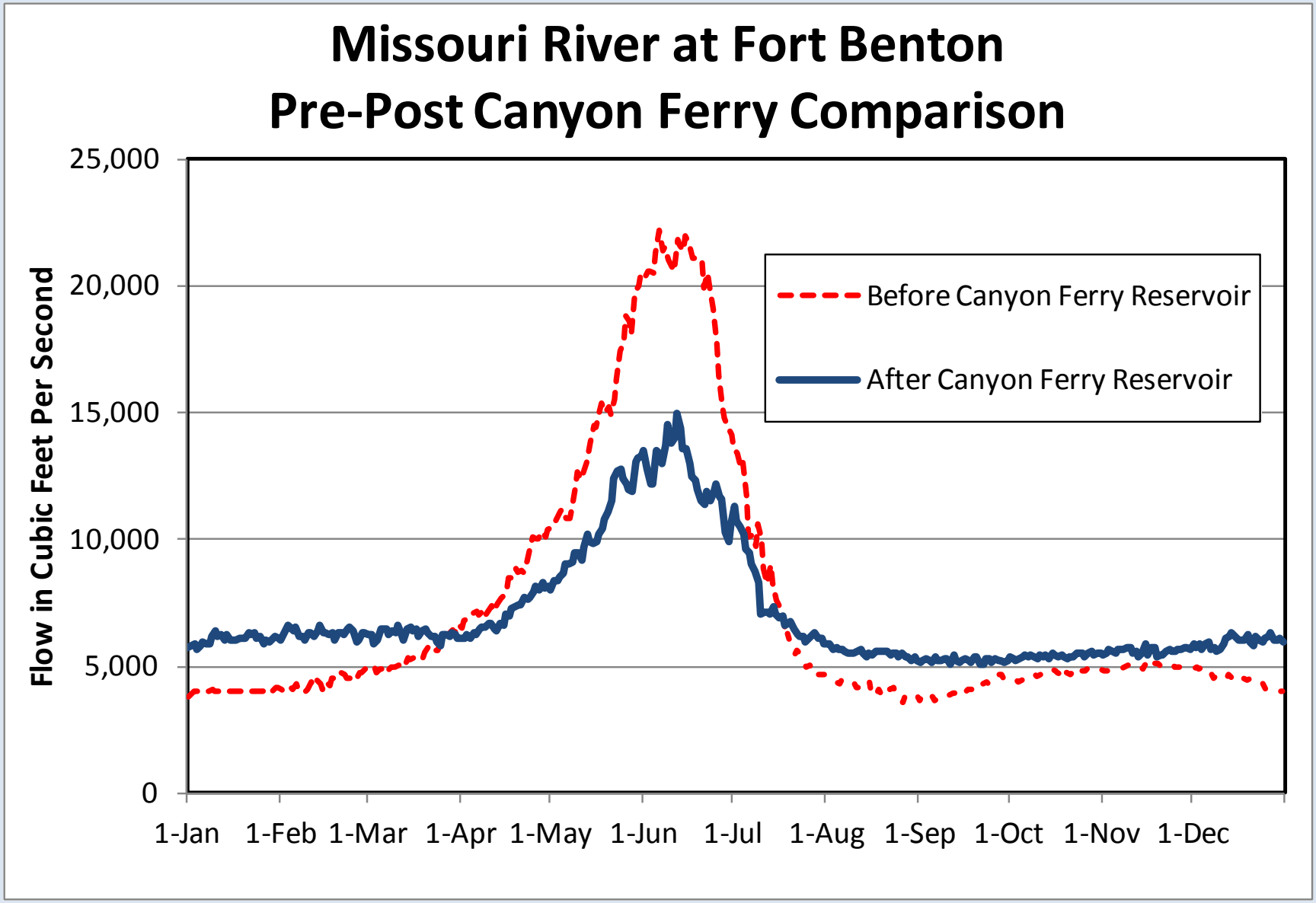
Upper Missouri River Basin
Great Falls
Helena
Bozeman
Missouri
N
W
E
S
0
12.5
25
50
75
100
Miles

Gibson Reservoir Near the End of the Irrigation Season

Canyon Ferry Reservoir

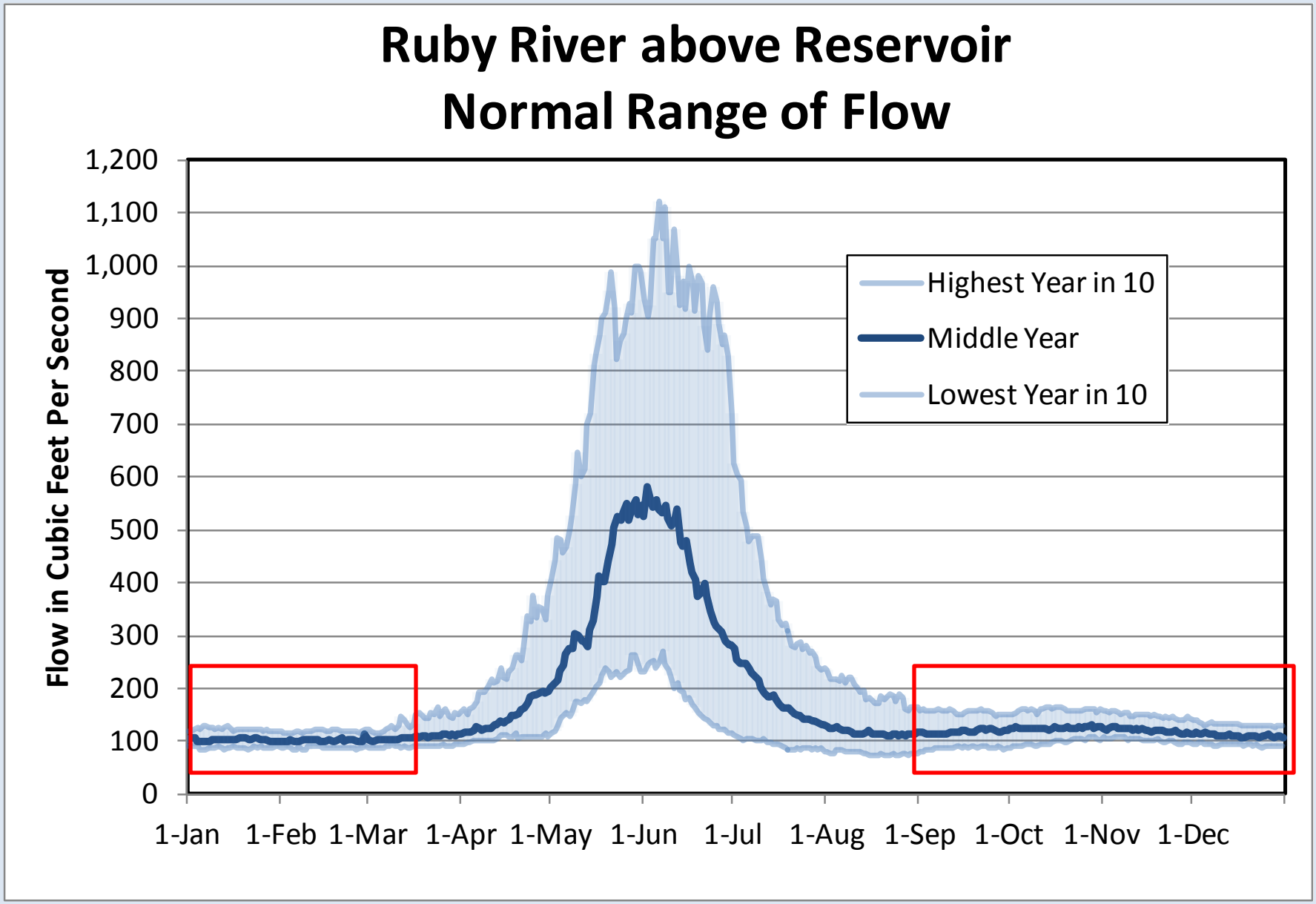
Photos from
U.S. Bureau of Reclamation

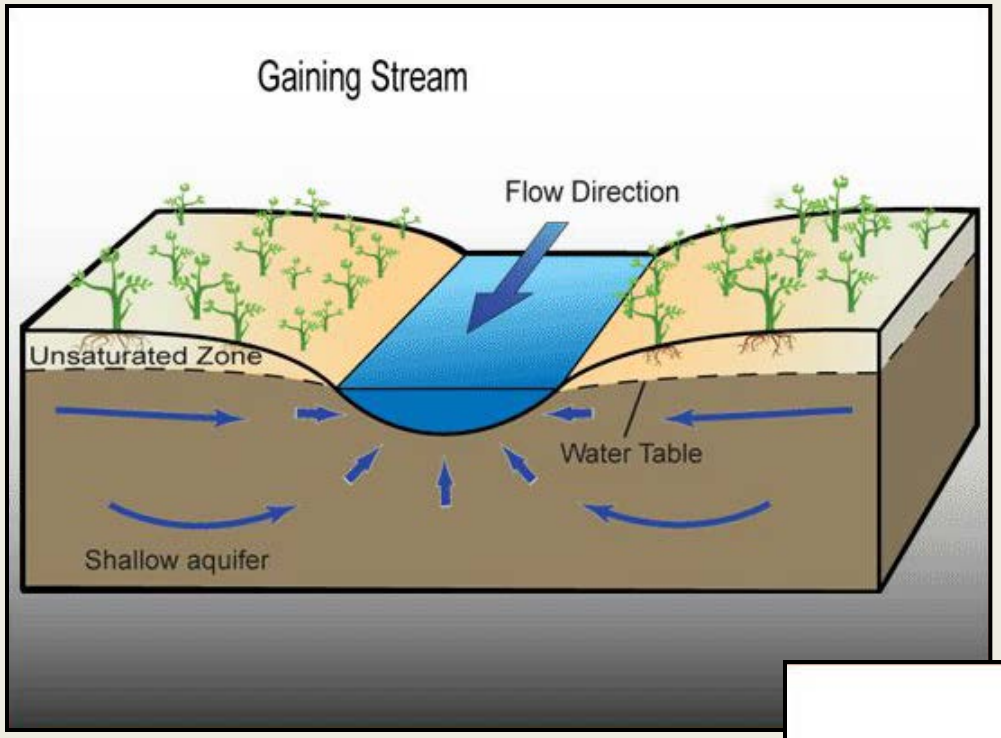

Canyon Ferry Reservoir Storage Through Time
Storage in Acre-Feet
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Replacement and Flood Control Zone
Joint Use Zone
27 feet
Active Conservation Zone
Jan-54
Jan-56
Jan-58
Jan-60
Jan-62
Jan-64
Jan-66
Jan-68
Jan-70
Jan-72
Jan-74
Jan-76
Jan-78
Jan-80
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12

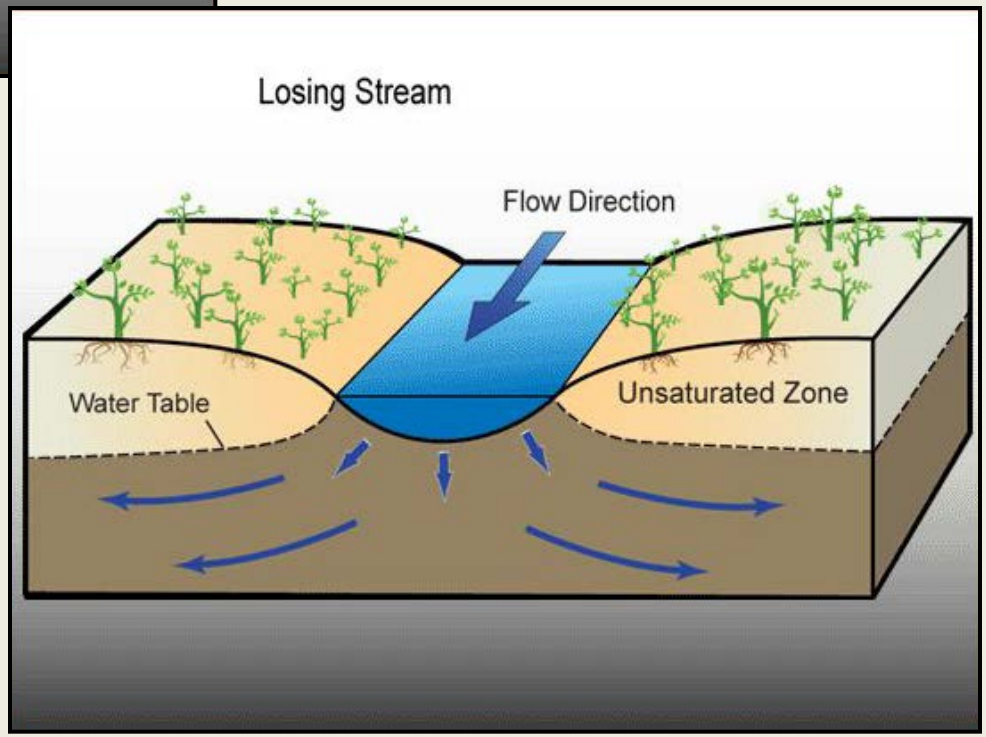

Missouri River at Fort Benton
Pre-Post Canyon Ferry Comparison
Flow in Cubic Feet Per Second
25,000
20,000
15,000
10,000
5,000
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Before Canyon Ferry Reservoir
After Canyon Ferry Reservoir

Surface Water-Ground Water

Base Flow

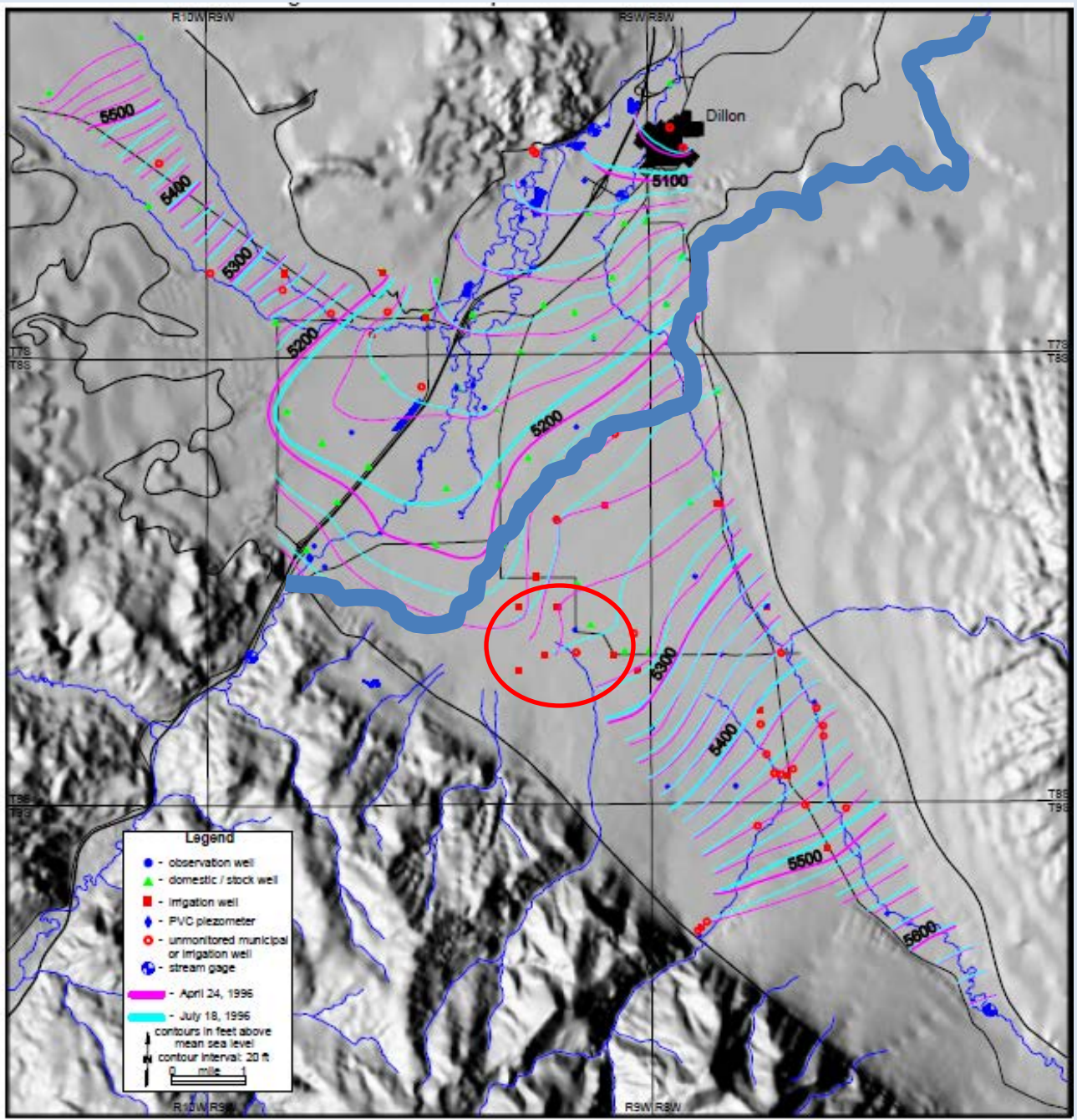

Ruby River above Reservoir
Normal Range of Flow
Flow in Cubic Feet Per Second
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
1-Jan
1-Feb
1-Mar
1-Apr
1-May
1-Jun
1-Jul
1-Aug
1-Sep
1-Oct
1-Nov
1-Dec
Highest Year in 10
Middle Year
Lowest Year in 10





Source: US Geological Survey

Beaverhead Valley Groundwater Elevations 1996



Questions/Discussion ?