

# **Technical Memorandum 1.3**

## **Irrigation Management Systems in Montana**

Revised June 2008

Prepared by PBS&J (subcontractor) for ECONorthwest (contractor) and the Montana Department of Natural Resources and Conservation



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## I. INTRODUCTION

This memorandum describes in general terms, the occurrence of irrigation throughout Montana. It provides estimates of where irrigation takes place and categorizes irrigation systems differentiating among several categories of ownership.

The number of acres irrigated in Montana varies from year to year. According to the Census of Agriculture statistics, the total number of irrigated acres over the last 40 years has ranged from a low of 1.76 million acres in 1974 to a high of 2.1 million acres in 1997<sup>1</sup>. The irrigation systems that serve this land are managed by a variety of different entities. Some systems rely completely upon individual private ownership of the means of diversion, means of conveyance and of the water rights. Other systems rely on State or Federal projects where the government agency owns the water rights and is responsible for all or a part of the infrastructure. There are both public and private water user organizations (irrigation districts, ditch companies, water user associations, etc.) that rely on shared responsibility for water right and infrastructure ownership. Some systems include a combination of these various management regimes.

In order to identify the proportion of irrigation systems that are managed by these various entities, we look to the information in the Department of Natural Resources and Conservation's (DNRC) water rights database<sup>2</sup>. While the water rights data are not reliable for accurately determining numbers of irrigated acres, the ownership information contained in the database provides a means to estimate the distribution of irrigation systems by ownership category. For irrigated acreage figures, we used the Water Resources Surveys that were conducted by the Montana State Engineer's office from 1946 – 1970<sup>3</sup> and the Census of Agriculture<sup>4</sup>.

## II. METHODS

To simplify the analysis, we divided the state into six drainage basins;

- Western Montana
- Upper Missouri
- Lower Missouri
- Milk-Marias
- Upper Yellowstone

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<sup>1</sup> USDA National Agriculture Statistics Service (NASS). Census of Agriculture website. <http://www.nass.usda.gov/census/>. Accessed May 2008.

<sup>2</sup> State of Montana ftp site. <ftp://nris.mt.gov/dnrc/>. Statewide water rights data downloaded February 25, 2008.

<sup>3</sup> See appendix A for a listing of the Water Resources Surveys and the dates that they were published.

<sup>4</sup> USDA National Agriculture Statistics Service (NASS). Census of Agriculture website. <http://www.nass.usda.gov/census/>. Accessed May 2008.

- Lower Yellowstone

The main distinction we attempted to make was between "non-private" ownership and "private" ownership. The goal was to differentiate systems that are managed or maintained by governmental agencies and collections of users (non-private) from systems maintained by individual users that are solely responsible for the ownership of the infrastructure and water rights (private). We then further subdivided the non-private group into 8 categories in order to further define the entity or entities that are responsible for management of the various irrigation systems. The categories we identified are;

- Tribal
- Federal Irrigation Districts
- Non-Federal Irrigation Districts
- Federal
- State
- Conservation Districts
- Municipalities
- Irrigation Companies and Associations
- Private

The Tribal information that is available is limited. While the DNRC water rights database and the Water Resources Surveys (WRS) contain some information about the Tribes' water rights, the data is not complete. We categorized all water rights listed in the name of the US Dept of Interior Bureau of Indian Affairs (BIA) as Tribal. Still, it is possible that the Tribal water use is under-represented in the statistics reported below.

Irrigation Districts are quasi-governmental entities that are formed under MCA, 85-7-101 through 110. The local district court has statutory authority over irrigation districts which it does not have over other types of irrigation companies or water users associations. Some irrigation districts were formed because of the development of a federal water project by the Bureau of Reclamation (BOR). Others have been formed in the absence of any federal infrastructure project. We make the distinction between Federal and Non-Federal Irrigation Districts because we concluded that if the ownership of a particular project includes the federal government in the form of the BOR then that agency must share some amount of financial responsibility with the irrigation district supervisors and share holders. In the case of non-federal project related irrigation districts, the district is not supported by nor is it beholden to the BOR.

The remaining Federal ownership includes water rights that are held by federal agencies without the association to an irrigation district or company.

- US Dept of Agriculture
  - Farm Service Agency
  - Forest Service
  - Research Service

- US Dept of Army
  - Army Corp of Engineers
  - Montana National Guard
- US Dept of Energy
- US Dept of Interior
  - Bureau of Land Management
  - Bureau of Reclamation
  - Fish & Wildlife Service
  - National Park Service
- US Marshall Service
- US Postal Service
- US Dept of Veterans Affairs
  - Veterans Administration

In many cases of federal ownership of water rights, the owner listed on the water rights is the same agency that is responsible for management of the land on which the water is used. The main exception to this is the BOR. Water rights owned by the BOR but

not affiliated with an irrigation district, may be used by private land owners through private ditches or ditches belonging to irrigation companies or associations. Most public land to which irrigation water rights are appurtenant is managed by two agencies, the Bureau of Land Management and the Forest Service.

Project Name	Acre Feet of Water Marketed
Ackley Lake	4,766.00
Broadwater-Missouri	29,217.00
Deadman's Basin	40,500.00
Flint Creek	27,180.00
Fred Burr	515.00
Frenchman	7,000.00
Middle Creek	10,184.00
Nevada Creek	8,440.00
Nilan	8,500.00
North Fork Smith River	11,000.00
Painted Rocks	10,000.00
Rock Creek	21,770.00
Ruby River	38,845.00
Tongue River	40,000.00
Upper Musselshell	21,718.00
Willow Creek	11,900.00
Yellow Water	2,000.00
<b>Total Volume</b>	<b>293,535.00</b>

**Table 1. Active State Water Projects**

The State of Montana owns and operates several storage projects. These are managed by the DNRC Water Resources Division State Water Projects Bureau (SWPB). SWPB manages these projects based on acre-feet (ac-ft) of water marketed. The State does not keep a record of the number of acres

served. Each project is affiliated with a water users association which is responsible for the distribution of the water. This arrangement allows the water to be used in various locations but there is still only a finite amount of water available. Identifying the number of acres served by these projects is difficult because the water is typically used

as supplemental water on ground that is irrigated with privately owned water rights. The name and the volume of water marketed by each active SWPB project are listed below in Table 1.

The Conservation District category includes the State Water Reservations. This category was distinguished from other State owned water due to its unique nature. The Water Reservations were set up as a means to protect use of Montana's water for the future. Some of this water has been put to use on the ground but the remainder of it is still available for those who wish to initiate new irrigation projects or supplement existing ones. The water is mainly delivered through private conveyance facilities though some irrigation districts and associations have put some of this water to use.

Several municipalities in Montana own irrigation water rights. The municipal category also includes Water and Sewer Districts. Water and Sewer Districts are similar to Irrigation Districts except they are typically formed to manage water and sewer for more densely populated areas such as subdivisions or groups of subdivisions. Some Water & Sewer Districts may be more like Irrigation Districts but the amount of land and water involved does not merit that level of detailed analysis.

The final non-private category includes Irrigation Companies and Associations. We separated these from the Irrigation Districts because they do not operate as quasi-governmental agencies as Irrigation Districts do. Districts are public corporations for the promotion of the public welfare while the companies and associations included in this category do not have that same responsibility and they do not answer to the same authority, i.e. the District Court.

Finally, the remaining water systems fall into the Private category. To the best of our ability, we included in this category all ownerships of private corporations that did not appear to span multiple ownership entities as well as water that is obviously held in the name of private individuals.

### **III. BASIN STATISTICS**

The percentages that are reported below are based on our analysis of the information in the water rights database<sup>5</sup> (WR Data). As a comparison, we provide a total acres figure for each basin that is based primarily on the Water Resources Survey (WRS) data<sup>6</sup>. For the counties that have no WRS data, we supplemented with information from the 2002 Census of Agriculture<sup>7</sup>.

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<sup>5</sup> State of Montana ftp site. <ftp://nris.mt.gov/dnrc/>. Statewide water rights data downloaded February 25, 2008.

<sup>6</sup> See appendix A for a listing of the Water Resources Surveys and the dates that they were published.

<sup>7</sup> USDA National Agriculture Statistics Service (NASS). Census of Agriculture website. <http://www.nass.usda.gov/census/>. Accessed May 2008.

From years of experience, we are aware that the information in the water rights database tends to be duplicative and overstated when it comes to identification of irrigated acres. Even with that limitation though, we recognize that this is the most comprehensive data set that is available. Through careful filtering of the information, we have greatly reduced one aspect of the data problem, namely the duplication of records.

The other aspect, the overstatement of acres, cannot be accounted for on this level of analysis so the figures reported in the tables below must still be considered to be inflated. We believe though that this information is useful in comparing the relative amounts among the various categories of ownership since it is likely that the overstatement of acreage is approximately equivalent across all ownership types.

### West Slope Basin

This basin includes both the Clark Fork River drainage area which covers most of Western Montana and the Kootenai River drainage which covers just the far northwest portion of the State. Map 2 depicts the basin boundaries and the location of private versus non-private irrigation. Table 2 lists the distribution among the ownership categories and total acreage figures for each data source.

Private ownership is the largest category in this basin. However, there are several irrigation projects including the Bitter Root Irrigation District and the Missoula Irrigation District which are non-BOR Districts. Additionally, the West Slope Basin has the Big Flat Irrigation project which is operated by the BOR and the Flathead Irrigation Project for which the BIA is partly responsible.

<b>Owner Category</b>	<b>Percent of Total (Based on WR Data)</b>
Irrigation Company or Association	7%
Federal	1%
Municipal	1%
Non BOR IR Dist	15%
State	5%
Tribal	8%
Non Private total	37%
Private	63%
<b>Data Source</b>	<b>Acres</b>
WR Data Total Acres	659,959
WRS Crop Stats Acres	472,984

**Table 2. West Slope Ownership Categories and Acreage Figures**

## Upper Missouri River Basin

The Upper Missouri River Basin includes the headwaters of the Missouri down to the confluence of the Marias, the Teton and the Missouri River. Map 3 depicts the basin boundaries and the location of private versus non-private irrigation. See Table 3 for the ownership distribution and total acreage figures for each data source.

<b>Owner Category</b>	<b>Percent of Total</b> (Based on WR Data)
Irrigation Company or Association	16%
Federal	10%
Federal / BOR IR District	11%
Municipality	1%
State	8%
Percent Non Private	47%
Percent Private	53%
<b>Data Source</b>	<b>Acres</b>
WR Data Total Acres	1,413,677
WRS Crop Stats Acres	791,428

**Table 3. Upper Missouri Ownership Categories and Acreage Figures**

The split between private and non-private in this basin is closer to 50 – 50. A large part of the non-private irrigation is attributable to the Greenfields Irrigation District which is the largest Irrigation District in the state. There are also a number of relatively small ditch companies in this basin that have formed to distribute water. Many are organized around an individual ditch or canal.

The large difference between the irrigated acres reported in the water rights data and the WRS and crop statistics estimates is due in part to irrigation that was developed after the WRS era. However, it also reflects overstatement of many water right claims in this basin. The supplemental nature of water use from Clark Canyon Reservoir and several State projects also contribute to the acreage discrepancy.

## Lower Missouri Basin

The Lower Missouri River Basin includes the Missouri River From the confluence of the Marias, the Teton and the Missouri down to the State line. This also includes the Musselshell River and Fort Peck Reservoir. Map 4 depicts the basin boundaries and the location of private versus non-private irrigation. Table 4 lists the ownership categories and total acres figures.

The majority of irrigation in this basin appears to be managed through private ownership. The State is the largest non-private ownership category. This is mostly attributable to the State's storage projects at Deadman's Basin (over 25,000 acres served) and Ackley Lake (over 4,000 acres served).

<b>Owner Category</b>	<b>Percent of Total</b> (Based on WR Data)
Conservation District	6%
Irrigation Company or Association	9%
Federal	1%
Non BOR IR District	3%
State	18%
Percent Non Private	36%
Percent Private	64%
<b>Data Source</b>	<b>Acres</b>
WR Data Total Acres	224,931.64
WRS Crop Stats Acres	214,687.15

**Table 4. Lower Missouri Ownership Categories and Acreage Figures**

There is a close correlation between the water right data and the WRS and crop statistic estimates. This indicates that there has not been much change in the amount of irrigation development since the 1960s and 70s.

### Milk and Marias Rivers Basin

This basin includes the Montana portion of the Milk River drainage and all of the Marias

<b>Owner Category</b>	<b>Percent of Total</b> (Based on WR Data)
Irrigation Company or Association	38%
Federal	2%
Federal / BOR IR District	21%
State	2%
Tribal	14%
Percent Non Private	63%
Percent Private	37%
<b>Data Source</b>	<b>Acres</b>
WR Data Total Acres	726,563
WRS and Crop Stats Acres	543,450
<b>Table 5. Milk – Marias Ownership Categories and Acreage Figures</b>	

River drainage. This basin encompasses the hi-line area of Montana. Map 5 depicts the basin boundaries and the location of private versus non-private irrigation. Table 5 lists the distribution among the ownership categories and total acreage figures for each data source.

The split between non-private and private ownership is 63% to 37%. The major portion of the non-private ownership falls in the category of Irrigation Companies and Associations.

The total acres estimated from the water rights data are higher than the acres identified by the WRS and the 2002 crop statistics. A portion of this difference can be attributed to development of new irrigation since the 1960s and 70s, especially in the northern parts of the basin. Most of this development has been in the form of installation of new pivot irrigation systems supplied by groundwater. The remainder of the difference is most likely the overstatement of acreage in the water rights data.

<b>Company or Association Name</b>	<b>Acres</b> (Based on WR Data)
Pondera Co Canal & Reservoir Co	85,358
Teton Co-Op Reservoir Co	30,600
Farmers Co-Op Canal Co	21,204
Teton Co-Op Canal Co	17,202
Brady Irrigation Co	17,080
Eldorado Co-Op Canal Co	15,420
<b>Table 6. Milk – Marias Irrigation Companies and Associations</b>	

Table 6 lists the six largest Irrigation Companies that are within the Milk – Marias Basin. The largest of these is the Pondera County Canal & Reservoir Company which is the largest such company in the state.

### Upper Yellowstone River Basin

The Upper Yellowstone River Basin includes the Yellowstone River drainage and including the Big Horn River. Map 6 depicts the basin boundaries and the location of

private versus non-private irrigation. Table 7 lists the distribution among the ownership categories and total acreage figures for each data source.

<b>Owner Category</b>	<b>Percent of Total (Based on WR Data)</b>
Conservation District	1%
Irrigation Company or Association	27%
Federal / BOR IR District	5%
Non-BOR IR District	1%
State	3%
Tribal	13%
Percent Non Private	50%
Percent Private	50%
<b>Data Source</b>	<b>Acres</b>
WR Data Total Acres	671,157
WRS and Crop Stats Acres	451,930
<b>Table 7. Upper Yellowstone Ownership Categories and Acreage Figures</b>	

The percentage distribution between private and non-private is 50-50 in this basin. The Irrigation Companies or Associations category is the largest non-private owner in this basin followed by tribal ownership.

There is not a close correlation between the water rights data and the WRS and crop statistics acreage figures. Based on the water right data there has been development of approximately 45,000 acres of new or supplemental irrigation since 1973 but the remainder is due to inaccuracies in the water right records.

### **Lower Yellowstone River Basin**

The Lower Yellowstone River Basin includes the Yellowstone River drainage below the Bighorn River. It also encompasses the Tongue and Powder River drainages as well as the small portions of the Belle Fourche River, the Little Missouri, Little Beaver and Beaver Creeks that are within the State boundary. Map 7 depicts the basin boundaries and the location of private versus non-private irrigation. See Table 8 for the ownership distribution and total acreage figures for each data source.

<b>Owner Category</b>	<b>Percent of Total (Based on WR Data)</b>
Conservation District	6%
Irrigation Company or Association	9%
Federal	1%
Non BOR IR District	3%
State	18%
Percent Non Private	36%
Percent Private	64%
<b>Data Source</b>	<b>Acres</b>
WR Data Total	224,931.64
WRS Crop Stats Acres	214,687.15
<b>Table 8. Lower Yellowstone Ownership Categories and Acreage Figures</b>	

The State of Montana is somewhat under-represented in this information because the Tongue River Dam water rights do not list any acres. As is shown in Table 1, the Tongue River project provides approximately 40,000 ac-ft of water to users in this basin. Even with this under reporting, the State is still the largest ownership category. It appears that there is a large amount of State owned land with irrigation water rights.

## IV. SUMMARY

The Water Rights Data reports approximately 3.9 million acres of irrigation while the Water Resources Survey reports 2.7 million acres and the 2002 Census of Agriculture 1.98 million acres. The relative ownership of the water is shown below in Table 9. The

<b>Owner Category</b>	<b>Percent of Total (Based on WR Data)</b>
Total Private	52%
Total Non Private	48%
Irrigation Company or Association	17%
Federal / BOR IR District	9%
State	6%
Tribal	6%
Federal	5%
Non-BOR IR District	4%
Conservation District	1%
Municipality	Less than 1%
<b>Table 9. Statewide Ownership Categories</b>	

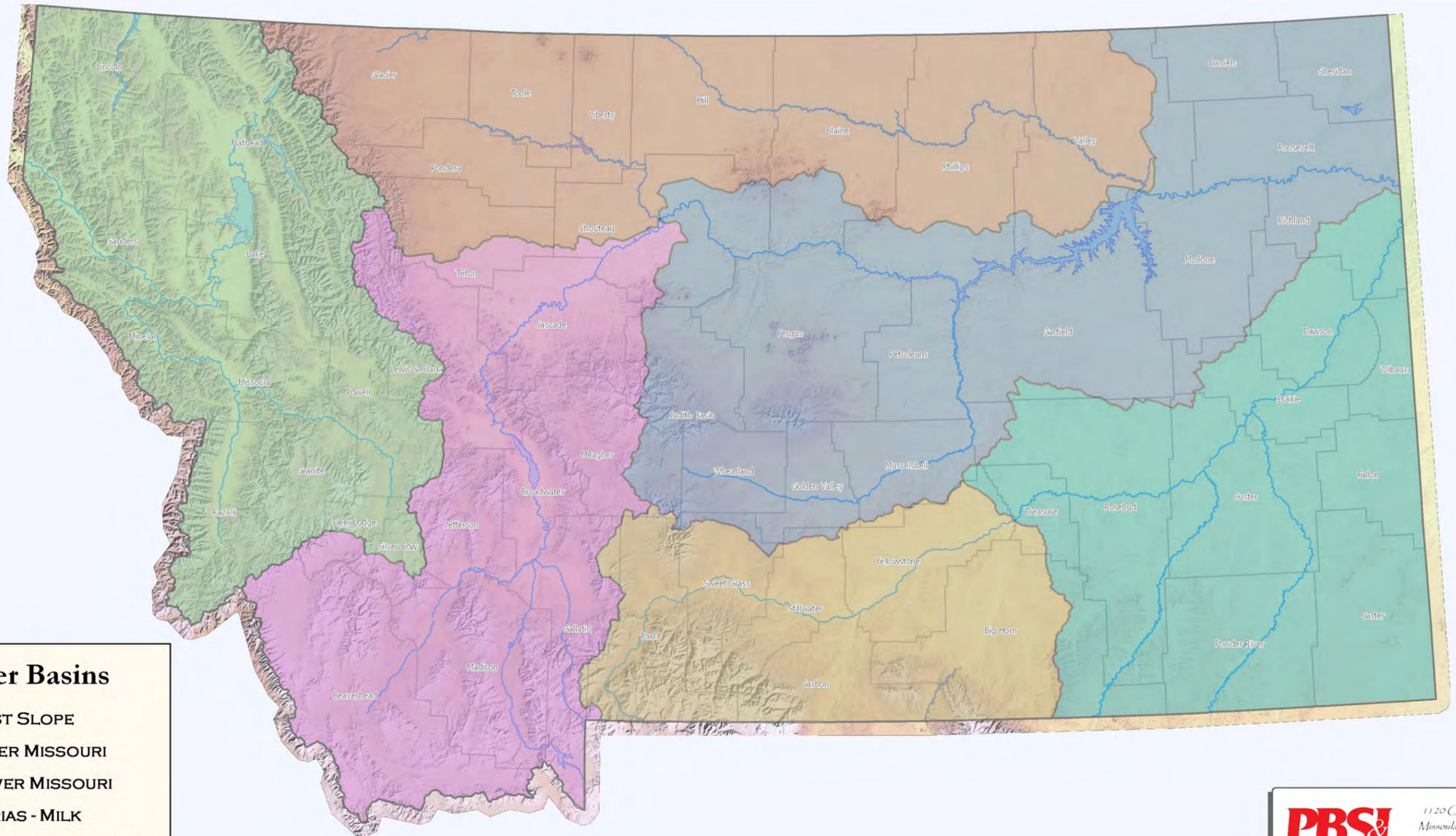
ratio between private and non-private ownership is close to 50-50 when viewed on a statewide scale though this varies from one basin to the next.

While slightly more than half of the systems are privately owned, the largest non-private ownership category is Irrigation Company or Association with 17%. The Federal government is involved in about 14% of the irrigation systems (BOR IR Districts and other Federal ownership), State and local governments have about 12% and the

Tribes about 6%.

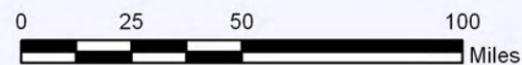
Based on this information, it appears that in the majority of cases, management of irrigation systems are not supported directly by any federal, state or local governmental authority. The relatively large percentage of Irrigation Companies and Associations seems to indicate that water users do derive some benefit from being part of an organization of water users even if that organization does not involve a government agency. Such organizations include large operations such as the Pondera County Canal and Reservoir Company which irrigates over 75,000 acres and others such as the Big Hole Co-op which irrigates a few hundred acres. In either scenario and in all those in between, the costs of operation and maintenance of the infrastructure are shared among the users. Individual irrigators on their own private diversion systems do not enjoy this benefit.

# Map 1. Irrigation Management Systems in Montana River Basins and County Boundaries



**River Basins**

-  WEST SLOPE
-  UPPER MISSOURI
-  LOWER MISSOURI
-  MARIAS - MILK
-  UPPER YELLOWSTONE
-  LOWER YELLOWSTONE

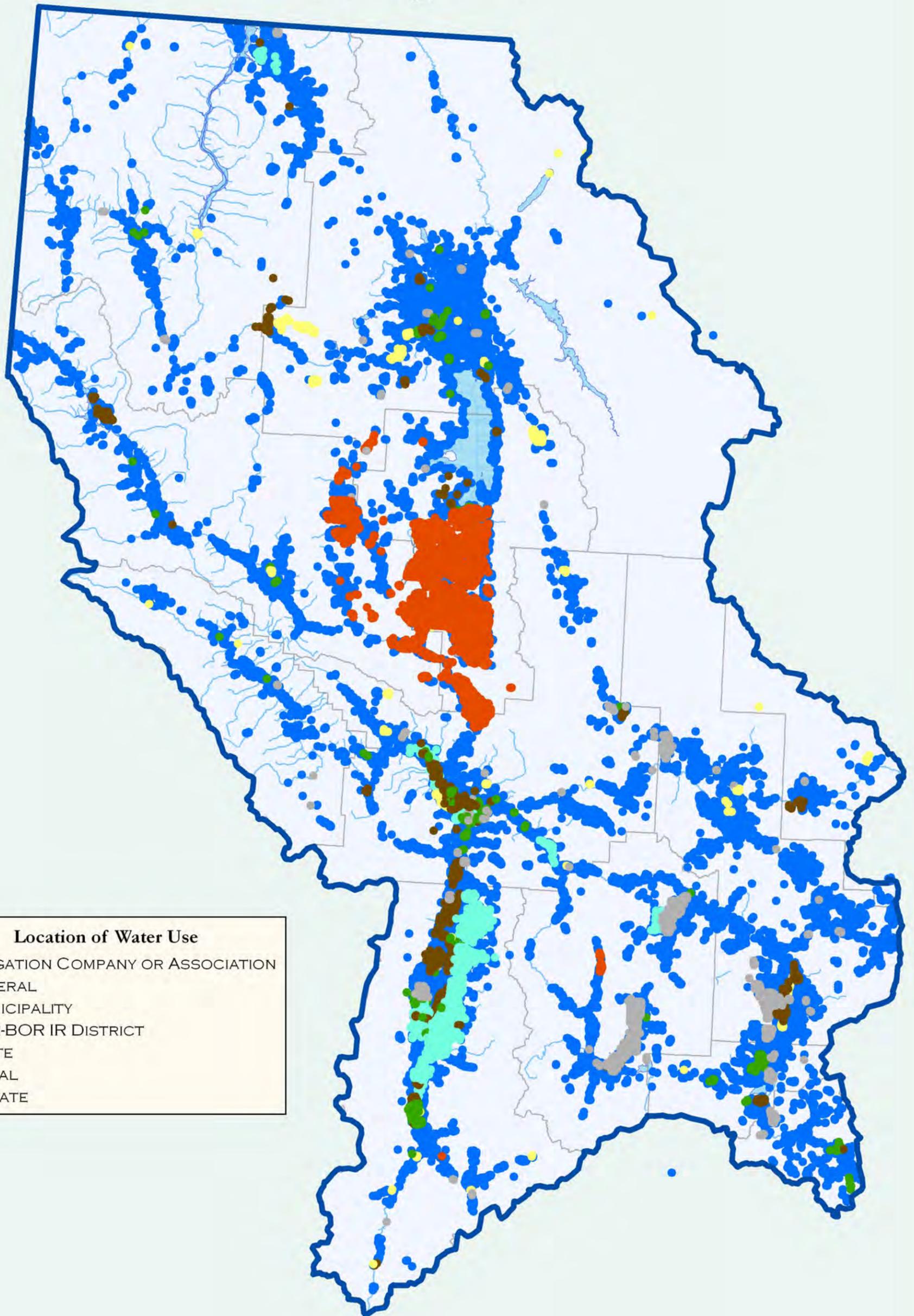


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Missoula, MT 59802

Project#: B12629  
Date: March 2008  
File: IR\_Sys\_Memo\_Map\_1.mxd

  
Project Manager: J. Westenberg  
Drawn By: JMM

# Map 2. Irrigation Management Systems in Montana West Slope Basin



**Location of Water Use**

- IRRIGATION COMPANY OR ASSOCIATION
- FEDERAL
- MUNICIPALITY
- NON-BOR IR DISTRICT
- STATE
- TRIBAL
- PRIVATE



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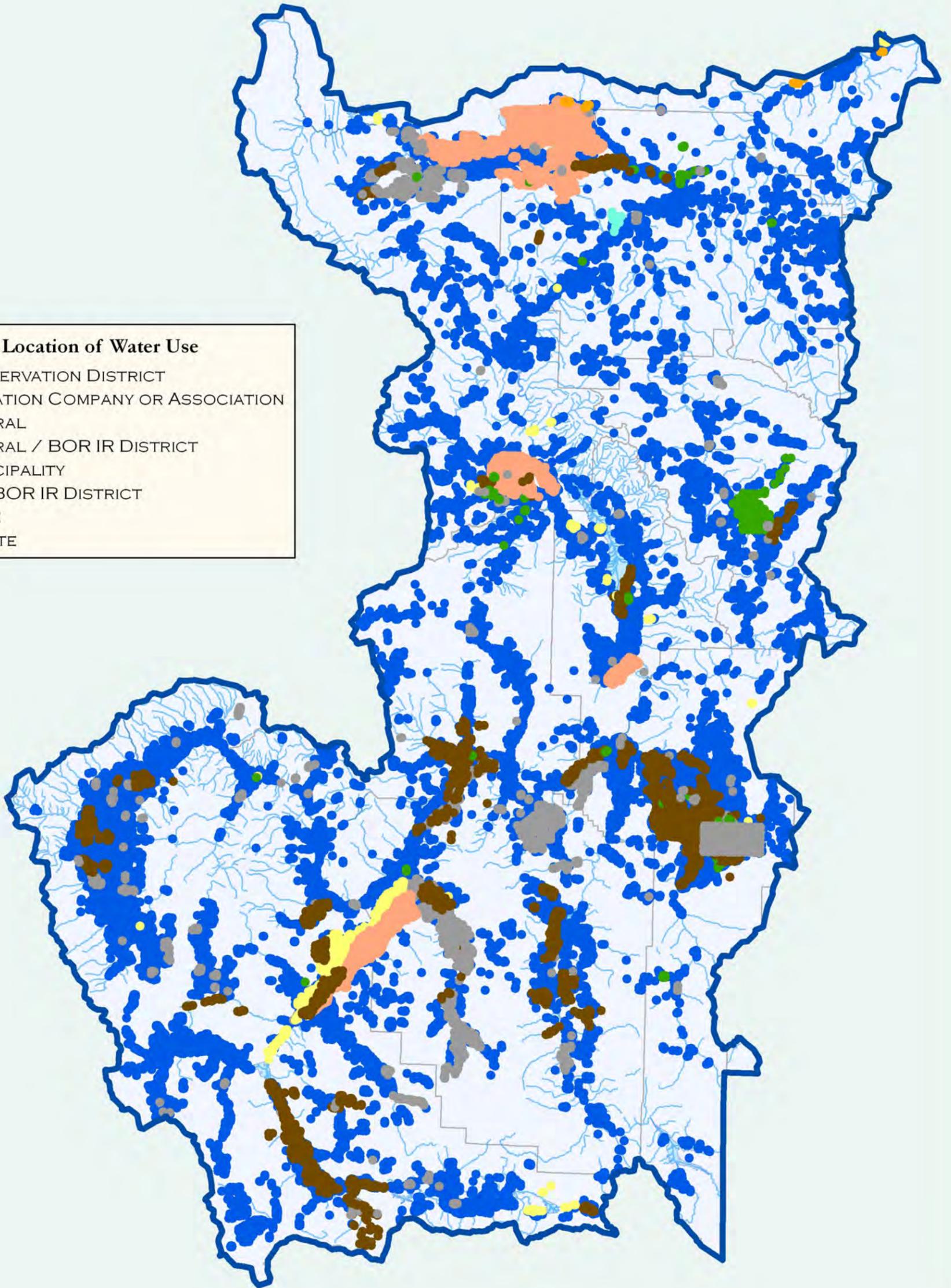
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# Map 3. Irrigation Management Systems in Montana Upper Missouri River Basin



- Location of Water Use**
- CONSERVATION DISTRICT
  - IRRIGATION COMPANY OR ASSOCIATION
  - FEDERAL
  - FEDERAL / BOR IR DISTRICT
  - MUNICIPALITY
  - NON-BOR IR DISTRICT
  - STATE
  - PRIVATE



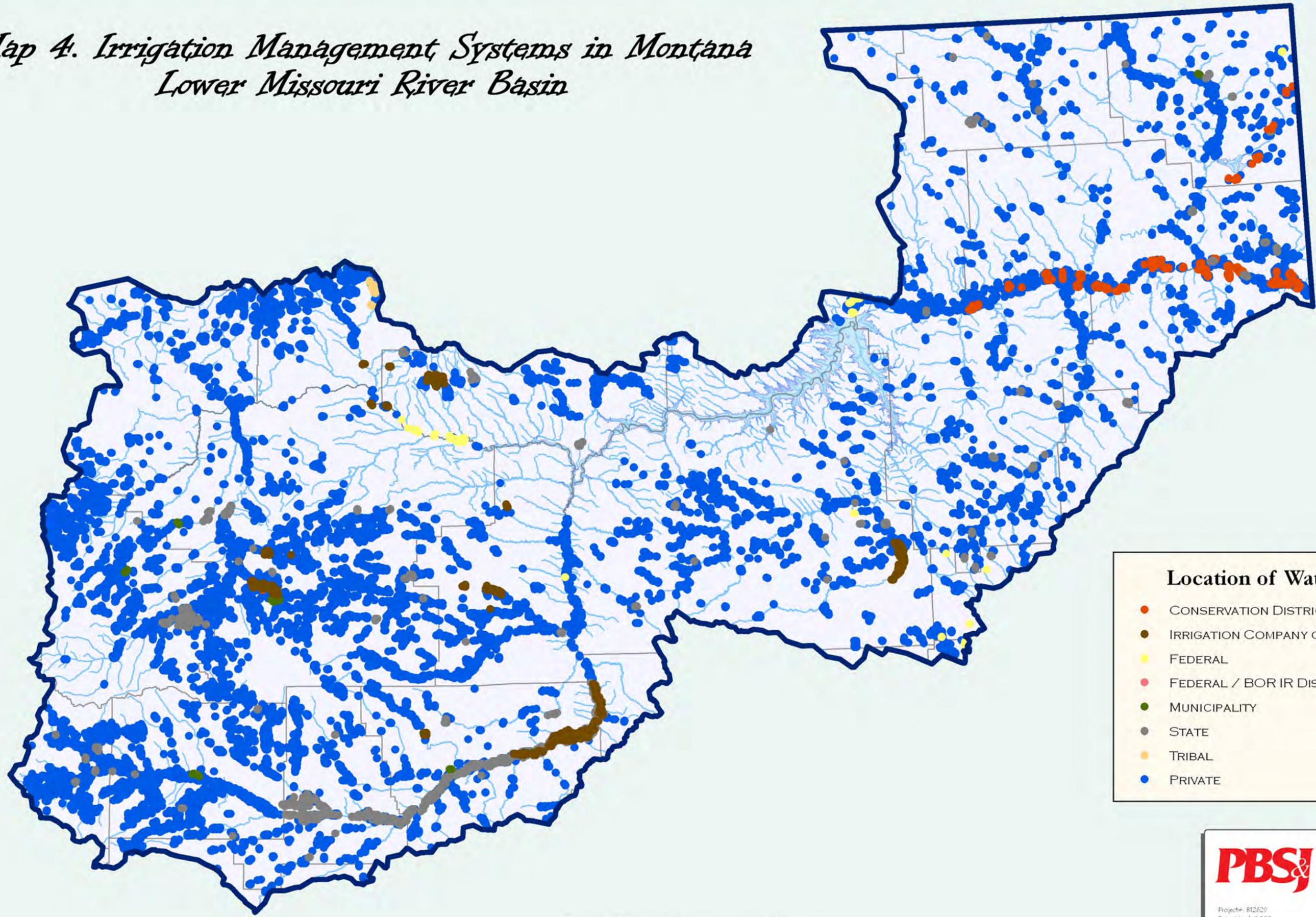
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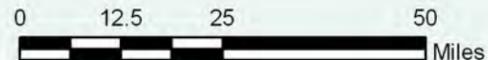
Project Manager: J Westenberg  
Drawn By: JMM

*Map 4. Irrigation Management Systems in Montana  
Lower Missouri River Basin*



**Location of Water Use**

- CONSERVATION DISTRICT
- IRRIGATION COMPANY OR ASSOCIATION
- FEDERAL
- FEDERAL / BOR IR DISTRICT
- MUNICIPALITY
- STATE
- TRIBAL
- PRIVATE

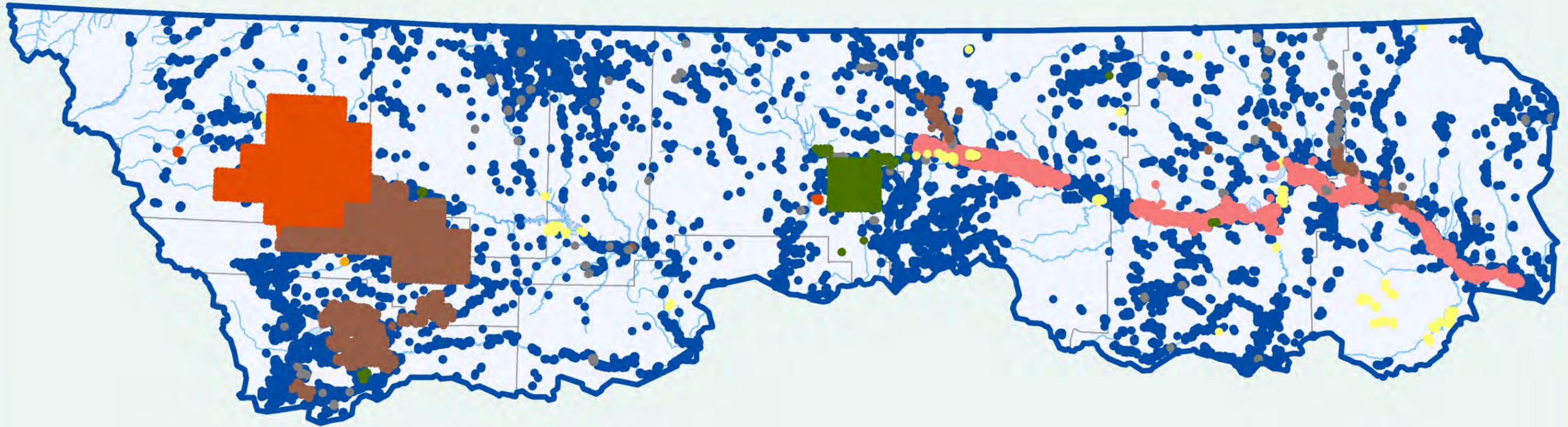


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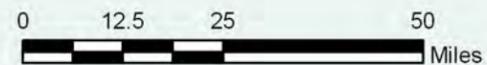
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*Map 5. Irrigation Management Systems in Montana  
Milk and Marias Rivers Basin*



**Location of Water Use**

- CONSERVATION DISTRICT
- IRRIGATION COMPANY OR ASSOCIATION
- FEDERAL
- FEDERAL / BOR IR DISTRICT
- MUNICIPALITY
- STATE
- TRIBAL
- PRIVATE

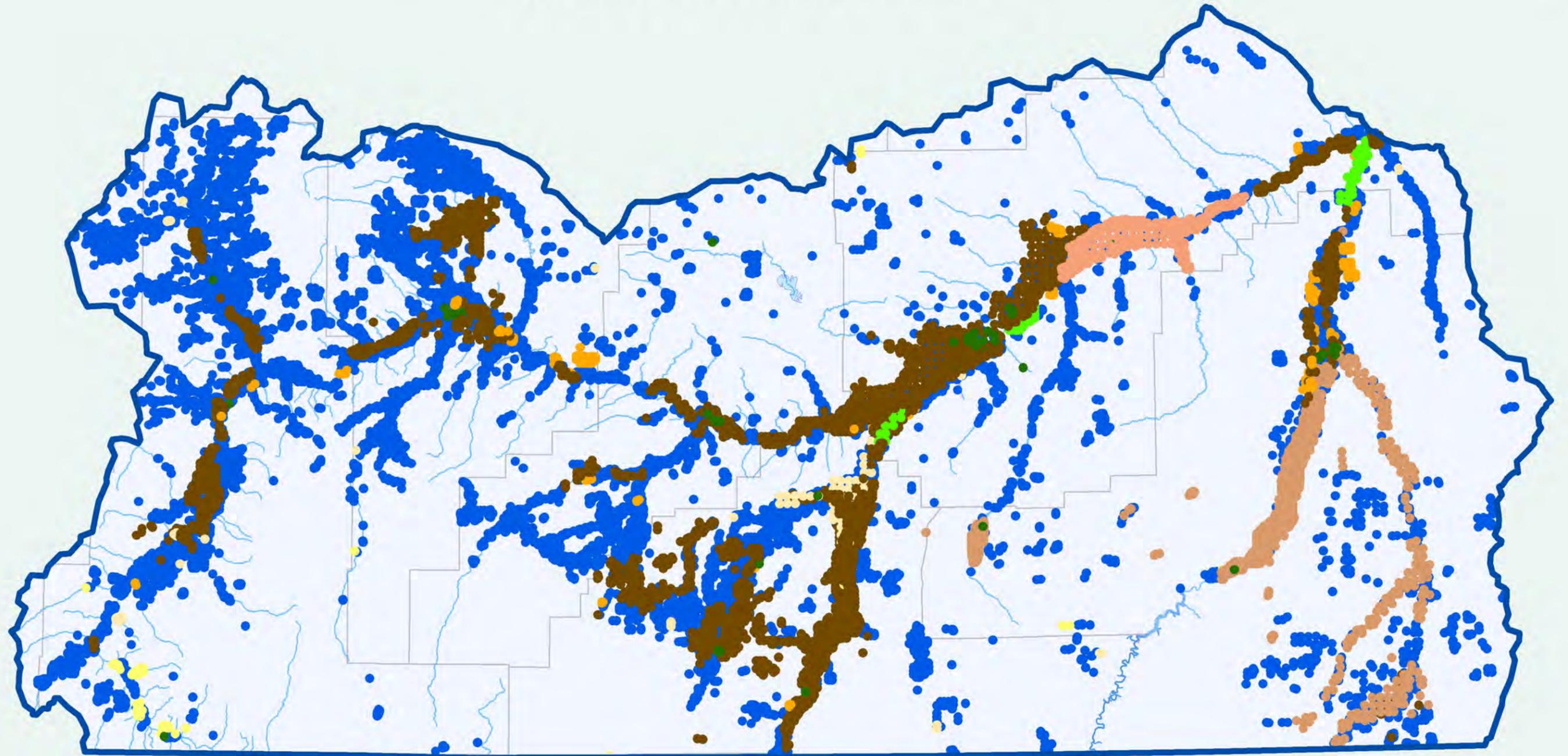


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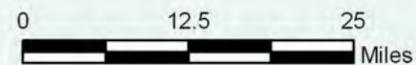
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# Map 6. Irrigation Management Systems in Montana Upper Yellowstone River Basin



### Location of Water Use

- |                                     |                       |
|-------------------------------------|-----------------------|
| ● CONSERVATION DISTRICT             | ● MUNICIPALITY        |
| ● IRRIGATION COMPANY OR ASSOCIATION | ● NON-BOR IR DISTRICT |
| ● FEDERAL                           | ● STATE               |
| ● FEDERAL / BOR IR DISTRICT         | ● TRIBAL              |
|                                     | ● PRIVATE             |

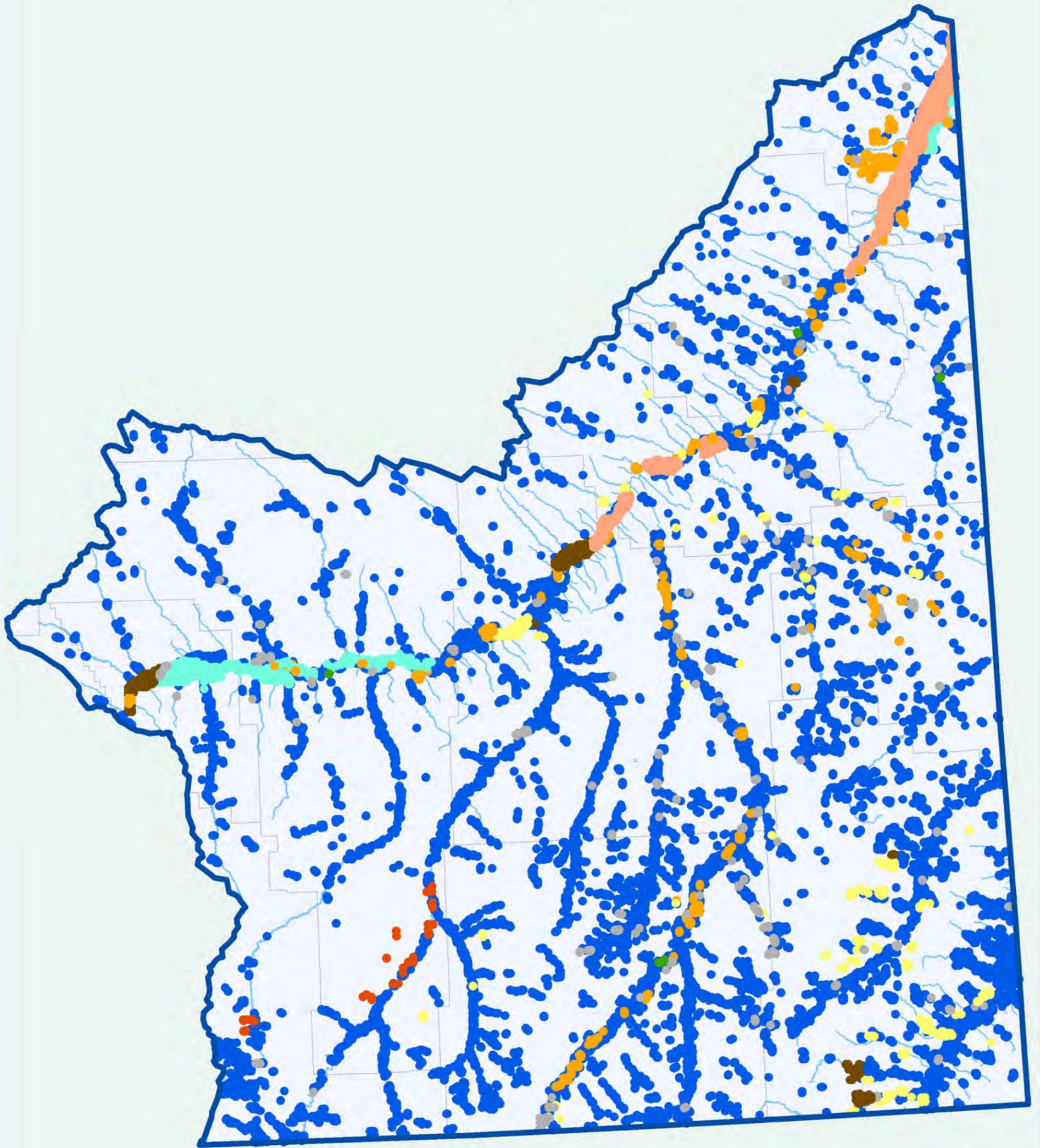


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# Map 7. Irrigation Management Systems in Montana Lower Yellowstone River Basin



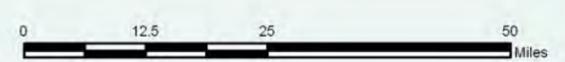
**Location of Water Use**

- CONSERVATION DISTRICT
- IRRIGATION COMPANY OR ASSOCIATION
- FEDERAL
- FEDERAL / BOR IR DISTRICT
- MUNICIPALITY
- NON-BOR IR DISTRICT
- STATE
- TRIBAL
- PRIVATE

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# APPENDIX A:

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## WATER RESOURCES SURVEY REFERENCE INFORMATION

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*TECHNICAL MEMORANDA 1.3*

Between 1943 and 1971, the Montana State Engineer's Office in cooperation with the State Water Conservation Board and the Montana State Agricultural Experiment Station, conducted surveys of the water resources of the majority of the counties in Montana. These documents are one of the main sources of historical information about water use for irrigation.

All of the documents were authored and published by the State Engineer's Office in Helena, Montana. Following is a list of the 49 counties for which a water resources survey was completed and the year that it was published.

<b>County</b>	<b>Date</b>	<b>County</b>	<b>Date</b>
Big Horn	1947	McCone	1971
Blaine	1967	Meagher	1950
Broadwater	1956	Mineral and Sanders	1969
Carbon	1966	Missoula	1960
Carter, Fallon and Wibaux	1960	Musselshell	1949
Cascade	1961	Park	1951
Chouteau	1964	Phillips	1968
Custer	1948	Pondera	1964
Dawson	1970	Powder River	1961
Deer Lodge	1955	Powell	1959
Flathead	1965	Prairie	1970
Gallatin	1953	Ravalli	1965
Glacier	1969	Richland	1971
Golden Valley	1949	Rosebud	1948
Granite	1959	Silver Bow	1955
Hill	1967	Stillwater	1946
Jefferson	1956	Sweet Grass	1950
Judith Basin	1963	Teton	1962
Lake	1963	Treasure	1951
Lewis & Clark	1957	Valley	1968
Liberty and Toole	1969	Wheatland	1949
Lincoln	1965	Yellowstone	1943
Madison	1954		

These documents can be viewed at the DNRC website:  
[http://www.dnrc.mt.gov/wrd/water\\_rts/survey\\_books/default.asp](http://www.dnrc.mt.gov/wrd/water_rts/survey_books/default.asp)