# GROUND WATER ASSESSMENT STEERING COMMITTEE

STATE OF MONTANA

**Prioritization criteria and nominating form for GWIP project areas**

The following list is used to rank nominated project areas under the Ground Water Investigation program. The criteria name is highlighted to show which column heading is used in the ranking matrix. Please address all points. Possible sources of information are suggested, but other sources are likely available for most criteria. Each criterion is assigned a ranking value by the Ground-Water Steering Committee.

| | |
|---|---|
| Project title: | Jefferson River Ground Water Study |
| Watershed: | Jefferson River Watershed Council (JRWC) |
| Nominating Group or individual: | Gary Nelson Chairman, JRWC |
| Contact name: | Ted Dodge |
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| County: | Jefferson/Madison |

Problem Description: Attach additional pages as necessary.

The Ground water study is being requested in order to determine the potential effects of increased ground water development in the Upper Jefferson River Watershed Area on the Jefferson River main Stem. (See letter submitted earlier to john Wheaton, for a more detailed discussion of the issue).

Overview of the magnitude of the problem: Attach additional pages as necessary.

1. **Subdivision** growth rate
   a. Actual number of new lots permitted during the previous 5 years **354**.
   b. Data source: Madison County Planning Board (Ruby Jefferson Area)

2. **New Wells**
   a. Actual numbers of wells recorded in GWIC during the previous 5 years **152**.
   b. Data source: MBMG-GWIC

3. Designated **Closed Basin**
   a. Is the project area within a Closed Surface Water Basin or a Controlled Ground Water Area Yes **X**,
   b. Data source: DNRC

4. Flood to **Sprinkler** conversion
   **a.** Number of acres that changed during the previous 5 years **Estimated 2,000 to 3,000 acres.**
   b. Data source: NRCS

5. Impaired **Water Quality**
   a. Is the surface-water body on the State TMDL, 303(d) list Yes **X,** .

b. Data source: DEQ

6. Expansion of **Industrial** water use **No expansion at this time**.
   a. New industrial and municipal wells during the previous 5 years .
   b. Data source: local input

7. Expansion of **Agricultural** water use **No expansion at this time**
   a. Number of new industrial and municipal wells during the previous 5 years **none**.

8. **Population** density
   **a.** Total number of people impacted **Approx 2,000, including population from The confluence of the Jefferson River to Cardwell. However the Fisheries and recreation potential that stands to be impacted affects southwestern Montana.**
   b. Data source: Local

9. **Water Class** or usability
   a. Water-quality classification or description **Surface water B1**
   b. Data source DEQ

10. **Information** already known
    Existing hydrogeologic data and reports can enhance new studies. (See attachment 1 TROUT UNLIMITED GROUND WATERS STUDY WATERLOO AREA.

    Data source: JRWC Watershed Restoration plan

11. System **Complexity** **Unknown**
    a. Is the hydrogeologic system simple and straightforward or is the project scientifically complex? Provide information if possible. The Steering Committee will address this criterion.

12. County **Growth Plan** in place
    **a.** Does the County have a formal growth plan and is this a high density area **There are county growth plans. The overall area is not a high density area.**
    b. Data Source counties

13. **Contentious**/ litigious

    a. Is the issue locally sensitive, potentially headed for court? **No X** **Since 2000 the JRWC has worked with local irrigators, FWP's and others to conduct a voluntary drought mitigation plan (the plan is attached (Attachment 2). The concern is that with decreased water availability due to increased groundwater drawdown the voluntary mitigation plan will not be workable.**

    b. Local input, NRCS, Watershed Council

14. Highly valued **Ecological** water system
    a. Is the surface water body a commissioned stream **If the question is are there ditch riders the answer is yes?** Are Murphy rights involved? **NO** Provide information if possible. The Steering Committee will address these criteria.
    b. DNRC,

15. Basin fill or bedrock **Aquifer Systems** or both **Unknown**
    a. Similar to the complexity issue, but allows more direct inclusion of geologic controls. Provide information if possible. The Steering Committee will address this criteria.
    b. MBMG, DNRC

16. **Efficiency** of effort

    **a.** Adjacent project areas can allow for more efficient investigations. Provide information if possible. **There are existing MBMB ground water studies in the Upper Missouri area.**
    b. Data source MBMG

17. **Diversity** of hydrogeology and issues **Unknown**
    a. Similar to complexity criteria but emphasizes the need to investigate a wide range of issues. Provide information if possible. The Steering Committee will address this criterion.

18. **Controlled** groundwater A**rea**
    a. Is the project area within a Controlled Ground Water Area? **No X**
    b. Data source DNRC

19. Availability of **Matching Funds**
    a. Priority for other funding sources
        **i.** Are matching funds available Yes _____, No **X**
        If yes, attach a letter of commitment and indicate the source and amount.

        ii. Have matching funds been requested but not committed? Such as a grant application that has not been approved.. Yes _____, No **X**.
        Indicate the source and amount requested.
    b. Data source Local input

## Attachment 1 Related Studies Question 10 Information Known

## Trout Unlimited Ground Water Study of the Waterloo Area

Prepared by Water & Environmental Technologies; prepared for Trout Unlimited and the Jefferson River Watershed Council May 22, 2006.

The Waterloo area ground water study was performed in order to define the ground water/surface water interaction in the Waterloo area of the Jefferson River. Three major irrigation ditches are located in this reach of the river, (Creeklyn, Parrot, and Fish Creek) and water shortages regularly occur during low flow summer conditions when irrigation needs are high. The project study area consists of the area between the Jefferson River and the Tobacco Root Mountain Range, from the parrot Ditch diversions to the confluence of willow Springs. Parsons Slough and Willow Springs, two important spawning tributaries, are located in the study area.

The specific goals of the project were to define the nature of water movement though the study area and broadly define the interaction between the Jefferson River, spawning tributaries, the Parrot Ditch,

mountain recharge and ground water flow. The project completed during the second half of the 2004 irrigation season and the entire 2005 season was completed using a combination of historical data review, groundwater and surface water monitoring, aquifer testing, and interviews.

Irrigation in the Waterloo area generally begins in mid April when the parrot Ditch is opened and runs through early July, when the first cutting takes place. During this time period, spring precipitation and snowmelt results in high river flows and there is an excess of water for both irrigation and fisheries needs. /the ditch is generally shut down for a week over the 4th of July weekend, and reopened in mid-July through late October. During the period from mid-July through mid September irrigation needs are the greatest at a time when river flows are at their lowest and water temperatures are at their highest. This two-month period is when frequent water shortages have occurred in the Jefferson River, creating a strain on both the fishery and agriculture operations: and the potential exists to dry up the river.

A detailed evaluation of monitoring results shows a complex connection between ground water, surface water, and irrigation practices throughout the study area. In the first part of the irrigation season, ground water and surface water exhibit distinct characteristics that would generally be expected in a system with no ground water/surface water interaction: warmer ground water temperatures, stable water quality parameters, and rising ground water elevations and surface flows in response to spring precipitation and snowmelt. A component of ground water inflow from the Tobacco Root Mountains is also visible in water quality results. The parrot ditch is shutoff in early July and there is a brief stop in irrigation, while ranchers harvest their first cutting. The impacts of this shutdown can be seen in groundwater elevations across the Parson-Willow area, which indicates a connection between irrigation practices and ground water. Ground water quality begins to show impacts from surface water, specifically in the Parson-willow area.

During the peak irrigation season (mid-July through mid-September), groundwater elevations continue to rise due to irrigation impacts, and surface water temperature and conductivity values show strong correlations with ground water. During this critical time, ground water and irrigation return flow provide the majority of water to the Jefferson River in the study area. Ground water inflow enters the river as discharge through various slough channels, Parson's Slough, Willow Springs, and direct flux into the river. Irrigation return flow appears to be the primary component of ground water inflow, and enters the aquifer by ditch seepage, crop return flow, and flood irrigation returns.

Late in the irrigation season (September-October), ground water elevations reach their seasonal highs, most notably in the lower project area, as the ditch continues to flow but the majority of late season irrigation is flood irrigation. Surface flows in Parson's Slough and Willow springs are also at their peak levels, which is consistent with a strong groundwater/surface water Interaction. Ground waters and surface water are very well mixed based on uniform water quality parameters throughout the valley. During the off-season (November-march), data show ground water and surface water slowly returning to base flow conditions.

During periods of low stream flow and high irrigation needs, the river flows remain only due to conservation efforts by irrigators, and a significant amount of ground water and irrigation return flows. The first reaction to remedy this situation is to decrease ditch diversions, and increase on farm efficiency by converting from flood to sprinkler irrigation methods. Although some water savings can be achieved by more closely managing diversions and irrigation needs, and an increase in the minimum base flow in the river is needed, caution should be taken before making widespread changes to the current irrigation regime.

Irrigation return flow supplies water to the alluvial aquifer, which in turn discharges to surface water bodies and helps maintain river flows during the late season water shortages. If this important ground water recharge source is reduced to drastically, it could change the hydrologic system and reduce or

eliminate historical return flow that helps support the river during critically low flows. A certain percentage of base flow during the off-season exists due to irrigation return flow from the precious season: however, it is unknown what that amount is

The study concluded that there are a number of improvements and water savings that can be achieved, but the majority of these savings are aimed at water delivery and reduction of blow off water then on-farm efficiency. Stakeholders must walk a fine line between finding available water savings without significantly altering the hydrology of the valley.

Specific recommendations include:

Surface Water Administrative Efforts

1) Increasing ditch oversight and management by the ditch walker.
2) Find a long term funding source to continue the JRWC Drought Management Plan.
3) Conduct a return flow study between the USGS station near Twin Bridges to the mouth of Willow Springs.
4) Educate landowners on Irrigation Timing.

Surface Water Structural Efforts

1) Installation of new canal structures with continuous flow monitoring equipment on the three major irrigation ditches.

Ground Water Conservation Efforts

1) Development of a scaled back groundwater monitoring network to be implemented annually in conjunction with JRWC Drought Management plan Monitoring.
2) Maintaining the current irrigation practices in the willow Springs area in their current configuration, as any significant changes could lead to a different flow and temperature regime in the stream, which could impact the valuable Rainbow trout spawning tributary,.
3) Implementation of a pilot study in the Parson;\'s Slough area that consist of stopping flood irrigation in the immediate area, and closely monitoring impacts on the slough.
4) Limit Ground Water Withdrawal within the Study Area.

## Attachment 2 Answer to question 13 is the is the issue locally sensitive, potentially headed for court?

## Drought Management Plan

**Background:** The purpose of the Drought Management Plan is to reduce resource damage and to aid in the equitable distribution of water resources during water critical periods. The plan is a voluntary effort involving local interests including agriculture, conservation groups, anglers, municipalities, businesses, and government agencies.

The first Drought Management Plan was prepared and approved by the Jefferson River Watershed Council on 25 July, 2000. The plan was implemented for five years (2000 through 2004) and increased flow at the target location (Waterloo Gage below Fish Creek Canal) was documented by monitoring river and irrigation canal flows during the period. The drought management plan goal of maintaining at least 50 cfs at Waterloo was not always met during these years, but cooperation by water users helped improve

flows at this critical location. Prior to developing the drought plan, the Jefferson River was severely dewatered at this location during dry years, and in 1988, only 5 cfs was measured at the Waterloo Gage location.

**Drought Management Plan Triggers:**

The 2000 version of the Drought Management Plan established flow triggers for directing actions of anglers, water users, and government agencies. The triggers were revised in February 2005 based on observations of the previous 5 years of plan implementation. As of 2007, the current drought plan triggers are listed below.

The following prescribed actions are to occur when the river flow drops below the following levels or when maximum daily water temperature exceeds 73 degrees F for three consecutive days at the Twin Bridges Gaging Station (06026500):

**600 cfs:** The 600 cfs trigger flow at the Twin Bridges Gage serves to alert water users and anglers of declining flow conditions and requests voluntary water conservation measures and angler awareness of stress caused by fishing during periods of low flow and high water temperature. A press release will be issued to inform the public of low flow conditions on the Jefferson River.
**280 cfs:** Montana Dept. of Fish, Wildlife & Parks will evaluate the need for a mandatory fishing closure throughout the Jefferson River at this flow level at the Twin Bridges Gage. Voluntary reduction of irrigation and municipal water use is also initiated when the river drops below 280 cfs, and weekly meetings with water users will be coordinated by JRWC. The meetings will update water users on inflows to the river, ditch withdrawals, and status of the flow at the Waterloo Gage to attempt to maintain a minimum flow of 50 cfs at Waterloo. The angling closure will remain in effect until flows reach or exceed 300 cfs for seven consecutive days at the Twin Bridges Gage.
**73 Degrees F:** Independent of stream flow level, Montana Dept. of Fish, Wildlife & Parks can implement a mandatory time of day closure to prohibit angling throughout the Jefferson River between the hours of 2:00 PM to 12:00 AM (midnight) when maximum daily water temperature equals or exceeds 73 degrees F (23 degrees C) for three consecutive days. Lifting of summer temperature restrictions will be conducted on September 15 unless an earlier/later date is designated by the FWP Commission.

**Objective:** Continue implementation of the Drought Management Plan in cooperation with FW&P's, Trout Unlimited, & local irrigators.