Potential Expansion Of Consumptive Use
Through Flood To Sprinkler Irrigation Conversions

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Introduction

Every water source is unique and has its own unique flow regime. Any change in irrigation practices has the potential to alter water availability and pattern of stream flow. Altering water availability and pattern of stream flow can adversely affect other water rights. Water right holders may change their water rights, as they were historically used, if they comply with MCA 85-2-402, including proving lack of adverse affect to other appropriators.

In many locales highly efficient sprinkler irrigation is replacing highly inefficient flood irrigation. Irrigation conversions may have positive or negative impacts. Contrary to popular opinion, however, it is not unusual for water consumption to increase when changing to a more efficient irrigation method. DNRC's water right change authorization process only requires administrative approval for changes from flood to sprinkler irrigation if the point of diversion or place of use being converted lies outside the bounds of the historical flood irrigation system. The analysis of conversion effects should be site specific, and can be complicated. This document considers several points to dispel the notion that all flood to sprinkler conversions "save" water or are beneficial to existing water users. It is general in nature and not meant to apply to all situations, and is not reflective of an adverse view of sprinkler systems. The positive aspects of conversions are not explored in this discussion.

1. All water sources are not created equal. Some sources flow abundant irrigation water throughout the growing season, some flow through the end of June, and some flow every other year. The general pattern of stream flow is important when assessing historic and future water use. Many water sources are susceptible to impacts from flood to sprinkler irrigation conversions for a multitude of reasons. Additionally, flow regimes of some streams have been influenced by historic irrigation practices, and water users have become dependent on these altered regimes.

2. Many flood to sprinkler conversions take place on land other than leveled, highly productive land immediately adjacent to a reliable water source. Often it's land that's incapable of uniform coverage by flood irrigation (crop coverage may be poor). Keep in mind that simply because land lies down gradient of a supply ditch, does not mean it was irrigated or the field was capable of full/uniform irrigation coverage. Contrast this with sprinkler irrigation, where the irrigated crop coverage can be nearly 100%. By switching to more uniform systems, the practical effect is an expansion of irrigated acres. Increased production and decreased labor costs are two primary driving factors for conversions, and more gain can potentially be realized by converting lesser efficient land.

3. If a sprinkler system is designed to cover a new place of use (POU), the land a producer often attempts to "*exchange out*" (remove from irrigation so that new land may be added) through the water right change process is his least productive, remaining irrigated land. Often the old flooded POU was intermittently or rarely irrigated, and the application coverage was poor. Producers commonly make application in DNRC's water right process to change a place of use to which they historically had trouble applying water to.

4. With flood irrigation, a typical POU may have experienced two irrigations per year, based on cultural practice and water availability (note: you have to consider the labor constraints associated with historical flood irrigation, not simply water

availability). Irrigation did not occur constantly. But with sprinklers, a more constant supply of water is applied throughout the season. Pivots can be programmed to apply water at any time, if water is available. This can exacerbate conditions during critical low-flow periods.

5. With flood irrigation, there had to be sufficient flow in the source for the system to properly operate (there had to be sufficient head to push water down the ditch). With sprinkler irrigation, water can be pumped out when water flows are minimal in the source. Consequently, a producer can now appropriate water he historically couldn't or didn't. Impacts of timing can affect other water rights (i.e. the sprinkler system can divert water when historically the flood system could not, and those stream flows were used by others).

6. Number 5 above is also true *within* ditches with multiple irrigators. A rotation plan was often in place because there was not enough water to supply all irrigators. With conversions to sprinkler irrigation, one can expand historic consumption because he can now pump minimal flows within the ditch, or increase physical water availability by changing to a separate pump site directly on the source. Changing to a point of diversion outside the ditch means the irrigator now does not have to comply with a rotation plan. This provides not only his personal expansion and increased consumption, but it also allows other irrigators within the ditch to expand their consumption because they have one less water user with which to contend.

7. The volume of water consumed by a crop often increases with a conversion from flood to sprinkler irrigation (producers often report substantial increases in yield, particularly compared to the acres being exchanged out), because water is more easily accessed (pumped from the source) throughout the irrigation season and varying flow regimes, and is more effectively managed within the root zone. This is why more crops are produced under sprinkler systems as opposed to inefficient flood systems. You do not significantly increase crop production by decreasing crop water consumption. Crop production is positively related to crop water use. Sprinkler systems simply maximize the potential for higher service irrigation, which in many situations in Montana did not occur under inefficient flood irrigation.

8. Return flows are curtailed with a conversion from flood to sprinkler irrigation, yet many irrigators have historically relied on return flows to satisfy their downstream rights later in the season. Water management studies exist that show "reuse" of water (return flows) several times over in a drainage.

9. The addition of storage (reservoir) is not uncommon in a conversion situation. This can increase consumption by capturing water at times when the former flood irrigation wasn't occurring, or wasn't capable of utilizing all of the stream flow, and therefore water wasn't being used and consumed. Storage provides an opportunity to expand a water right. This is why one must seek a change authorization from DNRC to add a place of storage.

10. As sprinkler irrigation progresses and replaces flood irrigation, the pattern of stream flows will be altered. Changes of water rights allow water users to retain their old priority date. If water consumption increases due to a conversion, the producer may have expanded his water right and impacted other water users on the source. He may also make "call" in the future on junior water rights under his *increased* consumption of water, when, perhaps, those junior users were not historically called upon. In general, other appropriators have a vested right to have stream conditions maintained substantially as they existed at the time of their appropriation.