SUMMARY OF SELECTED FINDINGS FOR *DEVELOPMENT OF PRACTICAL ALTERNATIVE AGRICULTURAL WATER TRANSFER METHODS*

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Colorado Water Conservation Board
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INTRODUCTION

The Colorado Corn Growers Association, Ducks Unlimited, and The City of Aurora, Colorado were awarded funding for a project that includes development of guidance tools for agricultural producers and others for implementation of alternative water transfer methods. The Lower South Platte Co-op group joined the project team to help explore the potential for facilitating transfers from water owners (primarily, agricultural users) to potential water users (municipalities and other agricultural users).

The guidance tools, along with other data and information, will be used and tested in the development of three demonstration projects. In developing the tools, several studies were conducted including assessments of exchange capacity, alluvial aquifer characteristics, locations of potential water supplies to be included in alternative transfers, legal and administrative considerations and impediments to alternative transfers, and economic impacts of alternative transfers. The tools will consist of a spreadsheet-based evaluation tool to help an agricultural producer understand potential economic implications and benefits of a transfer and a guidance manual to help a producer understand technical, administrative, and legal considerations associated with alternative transfers.
The demonstration projects are being conducted in an effort to further actual alternative water transfers. A second objective of the projects is to test and further develop the guidance tools. The demonstration projects are described in more detail later in this document.

Current Project Status

The following bullets summarize the current status of the project. The project will be complete by the end of September 2010.

- Technical analyses referenced in the application are complete.
- The demonstration project for the Lower South Platte Co-op is complete.
- Legal analyses of various alternative methods are complete.
- Barriers to alternative transfers and solutions to those barriers have been considered.
- The economic evaluation tool is complete. The project team is currently in the process of providing training on the economic evaluation tool.
- The guidance manual is under development.
- The remaining two demonstration projects are underway.

Format of This Report

The findings presented in this report will be presented in the context requested by the CWCB. The request is summarized in the following bullets:

- The summary report should focus on addressing issues presented in the February meeting among grant participants. These issues were raised and documented in the SWSI Phase II Report in Section 3, *Alternative Agricultural Water Transfer Methods to Traditional Purchase and Transfer*.
- The issues and project findings that help inform solutions or answers to these issues should be presented in technical, legal/institutional, and financial/economic sections in the summary report.
- The summary report should also help answer the question: "What would it take to make an alternative agricultural transfer program work in Colorado?"

This summary report was written with these requests in mind and is organized into three sections: technical, legal/institutional, and financial issues/economic considerations. Responses are provided throughout the report to help inform solutions regarding how to make alternative transfer programs work in Colorado. Before providing responses to the issues described in the CWCB request, it is informative to provide a description of the demonstration projects (or alternative water transfer programs) included in this grant project. The demonstration projects are described below:

DT Ranch (Interruptible Water Supply Agreement)

DT Ranch owns shares of the Fort Morgan Reservoir and Irrigation Company ("FMRIC") that it is willing to lease to a municipal or industrial (M&I) user on an interruptible supply basis. The study group is exploring two possible avenues in its efforts to facilitate a lease.

FMRIC is a relatively large, complex system, with both agricultural and M&I end users. The Company has already adjudicated an augmentation plan for well users under the ditch that includes a change in use of the Company's Jackson Lake shares and recharge activities. As a result, opportunities exist within the FMRIC system for DT Ranch to lease its shares to M&I end users. Though the DT Ranch shares are not changed for M&I use, an M&I end user may be able to make use of the shares by trading them to FMRIC or another shareholder for recharge credits. Because of the opportunities that exist under the FMRIC system, it is possible that DT Ranch could enter into an interruptible supply lease without the necessity of quantifying the historical consumptive use of its shares or relying upon the Interruptible Water Supply statute, §37-92-309, C.R.S. for administrative approval. Such a lease would be subject only to the agreement between the parties and FMRIC operational rules and regulations.

The study group considers this first approach for DT Ranches to be representative of the opportunities that may exist under large, relatively sophisticated ditch systems that have both agricultural and M&I users. Ditch companies in this transitional stage have often already undertaken some form of change in use or augmentation plan, and are receptive to intra-ditch leases from agricultural users to M&I end users. Each system is unique, but the DT Ranch example suggests that there may be opportunities for leases and/or trades that do not require quantification of the agricultural shares or any administrative approval beyond the ditch company.

As a second alternative, the study group is exploring the potential for an interruptible water supply agreement with a water user outside the FMRIC system pursuant to §37-92-309, C.R.S. The §37-92-309 IWSA is an existing tool that has not been used very frequently, if at all. The study group considers this second DT ranch project approach to be an important opportunity to "get inside" the IWSA process and gain an understanding of its strengths and weaknesses in the hope that it can make some recommendations for improving the process and encouraging greater use of this tool.
The study group is facilitating discussions between DT Ranch and several potential lessees. Once DT secures a lease, the study will focus on the selected approach with a goal of understanding the nuances of interruptible supply leases and reporting its findings to the CWCB, along with recommendations for potential improvements.

PVIC/WISE Private Water Market (Rotational Fallowing; Reduced Consumptive Use; Purchase/Leaseback; Interruptible Supply)

The Private Market concept combines elements of long term rotational fallowing, reduced consumptive use, purchase, leasing and interruptible supply. The Private Market is a water court approved contractual relationship between one or more M&I users and one or more agricultural suppliers. The agricultural user provides two types of water to the M&I user, referred to as "Base Consumptive Use" (Base CU) and "Flex

Consumptive Use" (Flex CU). Base CU is a small portion of the CU associated with the agricultural user's shares (10% is a suggested number) that is permanently sold to the M&I user. Flex CU is the remaining 90% of the CU, which remains titled in the agricultural user, and can be leased to the M&I user on terms agreed upon between the agricultural user and the M&I user. These leases could be for short terms, longer terms or interruptible supply.

The agricultural user manages his or her land through rotational fallowing or reduced CU to produce the Base and Flex CU for the M&I user each year. Recharge sites, installed in cooperation with Ducks Unlimited, meet conservation goals and serve as vehicles for the delivery of CU and return flows.

The Flex CU can be sold by the agricultural user at any time, whether to the M&I partner or to another water user, subject to a right of first refusal for the M&I user partner. The agricultural user and M&I user cooperate in a Water Court application to seek approval of a change in use of 100% of the agricultural user's water, to establish terms under which the delivery "Base" and "Flex" CU will be administered. The program is intended to establish a mutually beneficial partnership between the M&I user and agricultural user that supplies additional water for M&I needs while creating conditions conducive to maintaining a healthy agricultural economy within the ditch system.
This demonstration project pairs shareholders in the Platte Valley Irrigation Company (PVIC) and the Water Infrastructure and Supply Efficiency Partnership (WISE) in exploring a potential private water market between these two entities.

Lower South Platte Co-op (Water Bank)

East of Fort Morgan, there are a number of well augmentation plans that rely upon recharge credits for operation. In most years, the sites owned and operated by members in these augmentation plans generate recharge credits in excess of the amount needed to offset well depletions. These credits accrue to the river and leave the state. Upstream, both M&I users and well augmentation plans have an acute need for additional water. The Lower South Platte Co-op is a group formed to identify the excess credits and develop a means to deliver them to upstream users. The study group adopted the Lower South Platte Co-op concept as one of its demonstration projects, and has performed an analysis of exchange potential from the reaches where these credits accrue to the river to likely points of delivery upstream.

The co-op program is in its early stages of development. As initially envisioned, it would not be a statutory water bank. However, the concept is best described as a form of banking. As downstream augmentation site owners generate excess credits, these credits could be exchanged upstream immediately to the end user, exchanged part way upstream and "parked" in a an upstream reservoir or recharge site, or re-timed by re-diversion at or downstream of the point of accrual. The conglomeration of credits controlled by the Co-op at any time could then be marketed to upstream users, who could withdraw them as user demand and exchange opportunities dictate.

TECHNICAL

Technical issues and responses to those technical issues within the context of the alternative transfer programs studied in this project are provided below:

Are there suitable irrigated lands (having adequate water yield and water quality) available for an alternative agricultural transfer?

The project team did not conduct a comprehensive study to address this question specifically. We do note that the adequacy of water yield and water quality depends on the needs of the end user. For example, a small community along the South Platte River with supplies consisting of alluvial wells will have a much different perception of adequate quantity and quality than a large municipality with treated surface water supplies.

- *DT Ranch* – This project is currently underway, and the team is evaluating potential partners for this demonstration project. Some potential partners are located on the same ditch system as DT Ranch and would use the water as an augmentation supply for use in recharge ponds. In this situation, quality is not a significant concern. Also, water demands by municipal or industrial users on the ditch are small enough that DT Ranch supplies temporarily transferred through an interruptible supply agreement can be attractive.
- *PVIC/WISE Private Water Market* – High costs associated with Water Court and administration of alternative transfer programs can be an impediment to their potential success. The private water market concept seeks to mitigate this by including the pooled resources of several shareholders into the market and by allowing for the expansion of the market. Several PVIC shareholders are involved with this demonstration project. Because they are under one ditch system, their pooled resource is attractive to WISE. Also, because the water market is expandable, the amount of water that could be transferred into the program can increase. Additionally, the PVIC service area is located just downstream of the Denver metropolitan area, and water quality issues can potentially be mitigated. There is the potential to exchange water from the PVIC service area to the Prairie Waters wellfield and into the shared infrastructure of the WISE Partnership. If water is exchanged to Prairie Waters, then the quality of the water being diverted by the Prairie Waters wellfield will be same as other waters diverted by the wellfield. In addition, the demonstration project is currently contemplating the use of constructed recharge wetlands (in partnership with Ducks Unlimited) to retime water deliveries or to provide for historical return flows. Use of wetlands for these purposes will improve water quality in the South Platte River.
- *Lower South Platte Co-op* – One objective of the Lower South Platte Co-op is to facilitate the transfer of excess recharge accretions that occur from time to time in augmentation plans. Work associated with this demonstration project found that approximately 17,000 acre-feet of excess recharge accretions occurred in District 1 in 2008 and 11,000 acre-feet occurred in District 64 in 2008. This is a significant amount of water that could potentially be exchanged and transferred to other agricultural or M&I uses. In addition, the Co-op could provide an important function in aggregating or pooling the water resources of individual or small groups of water users who are interested in alternative water transfers but who do not have the means to conduct these transfers individually.

How do infrastructure costs compare with traditional agricultural transfers?

- *DT Ranch* – It is not anticipated that necessary infrastructure associated with an interruptible supply program at DT Ranch will differ significantly from that needed to conduct a traditional agricultural transfer.

- *PVIC/WISE Private Water Market* – It is anticipated that infrastructure will need to be constructed as a part of the PVIC/WISE water market. However, it is not anticipated that this infrastructure will be significantly different from what might be needed for a traditional agricultural transfer. For example, one or more returns will need to be constructed from the PVIC delivery canal to the South Platte River or to Beebe Draw. However, the need for returns is commonplace in traditional transfers. Also, recharge facilities may need to be constructed to provide for historical return flows or to attenuate and normalize delivery of consumptive use. Both of these recharge facility functions could be beneficial in a traditional transfer. Note that if water for transfer is generated using deficit irrigation or other means of reducing consumptive use, additional measurement equipment will need to be installed or utilized (these types of equipment are being researched in other projects funded by this grant).
- *Lower South Platte Co-op* – Additional infrastructure to enhance exchange was explored in this demonstration project. This infrastructure could be useful for both alternative and traditional transfers. Infrastructure considered and the benefits of the infrastructure are as follows:
  - New storage
    - Could store water until exchange capacity is available.
    - Could store water to meet varying levels or seasons of demand.
  - Pumps and pipes
    - Could transport water from agricultural to M&I users.
    - Could relieve exchange bottlenecks.
  - Recharge
    - Could retime water saved through alternative means to provide for more regular deliveries
    - Could enhance habitat (DU wetlands for recharge)

How does geography affect alternatives?

Geography has a significant influence on the ability to market water from alternative transfers (and permanent transfers as well). However, in the research on the programs associated with the demonstration projects, it was not apparent that geography would impact transfer methods differently. For example, it was not apparent that a rotational fallowing program would have a greater chance of success compared to a deficit irrigation program based on geography. More significantly, as discussed below, alternative transfer methods can be extremely beneficial to overcoming geographic barriers to water transfers. Geographic considerations for the programs included in this project are described below:

- *DT Ranch* – The location of DT Ranch (just upstream of Fort Morgan) and the relatively small amount of water involved with the potential transfer limits the geographic area in which the water could be potentially marketed. Without the aid of a co-op or water bank, it is unlikely that water from the DT Ranch could be marketed to a water provider in the Denver metropolitan area.
- *PVIC/WISE Private Water Market* – The location of the PVIC makes it an ideal candidate for the private water market. It is located just downstream of the Denver metropolitan area, and it is possible to exchange water into facilities involved in the WISE Partnership. In addition, the PVIC diverts from the South Platte River but it can return water to the Beebe Draw. As a result, the water market could include South Platte River and Beebe Draw water users.
- *Lower South Platte Co-op* – The water users involved in the Lower South Platte Co-op are in Districts 1 and 64 and in some cases are significantly downstream of the Denver metropolitan area. For most of these water users, the ability to market water to municipal users in the Denver area is limited by geography – especially if they were to market their water as individual entities. There would be better access to smaller municipal water providers. The demonstration project showed significant potential

to exchange water from the downstream end of District 1 to the mouth of the Poudre River. Water exchanged to the mouth of the Poudre River could potentially be market to several water providers. Areas downstream of District 1 would have difficult time exchanging water without the aid of new infrastructure. However, a co-op could help to pool individual resources and could help bridge the geography gap by investing in infrastructure (i.e. new storage or pumps/pipelines) to transport and deliver water or to enhance exchange.

Water quality impacts

For each of the demonstration projects water quality would be impacted positively by the use of wetlands for recharge and/or the provision of return flows. Other water quality considerations were described in previous technical questions.

LEGAL/INSTITUTIONAL

Legal/institutional issues and responses to those issues within the context of the alternative transfer programs studied in this project are provided below:

Are there legislative/regulatory changes needed to implement the proposed programs?

- *DT Ranch* – No changes are necessary to implement the program. Because the DT Ranch Project relies upon an internal ditch company trade, no legislative or administrative approval is necessary.
- *PVIC/WISE Private Water Market* - No changes are necessary to implement the program, however, certain changes could encourage its use.

  The core elements of the Private Market concept do not require any additional legislative approval. Parties are already free to enter into contractual arrangements regarding the purchase, sale and lease of water rights. The 1969 Water Rights Determination and Administration Act provides for changes in use, and expressly recognizes the concept of rotational fallowing, one of the key implementation strategies. Reduced consumptive use strategies, though not expressly authorized by the Act, are probably within the definition of a "change in use" and could be approved so long as there is no injury to other water users. Recharge activities have been recognized by the Water Courts in Divisions One and Two as a viable means of delivering water to the aquifer as return flow replacement or later diversion from the river. The fact that the Water Court approves each "Private Market," including the operational details related to the delivery of water changed to new uses, provides protection to vested water rights.

  Several legislative changes could support the Private Market concept. The completion of ditch-wide change in use cases for major ditches would greatly improve the potential for the development of Private Markets, because of the certainty they provide regarding the amount of consumptive use available for alternative transfers. Recent decisions in Division One, including the FRICO 403 case, have made ditch companies wary of water court proceedings and reluctant to proceed with changes in use. Legislation providing protections and incentives to ditch companies who apply for ditch wide changes in use could serve to open up markets.

  In addition, a change to the statute recognizing reduced consumptive use as a viable change in use could bolster parties considering this approach and encourage implementation. Though the current statutes do not prohibit reduced consumptive use, neither do they expressly allow it. As a result, there are mixed opinions among legal counsel and other professionals as to whether this strategy is authorized by the Act. This uncertainty should be removed.
- *Lower South Platte Co-op* - No changes are necessary to implement the program, however, certain changes could encourage its use.

  The Lower South Platte Co-op proposal relies upon contractual relationships and a series of administrative exchanges to facilitate delivery of water. Presumably, the agricultural users who are members of the Co-op would be bound together in an organizational structure. In turn, this entity would enter into contracts for the delivery of water to end users. Though the organizational structure of the Co-op has not been determined yet, there are a number of viable options open to it, and Colorado law would allow an entity of this sort to enter into contracts with end users for the delivery of water via exchange. Exchanges are recognized by the 1969 Water Rights Determination and Administration Act. They may be operated administratively, without water court approval, or they

may be adjudicated to achieve a priority date. As such, no legislative changes are necessary to implement the Co-op program.

Although not a prerequisite, changes to the law recognizing the viability of "Exchange Wells" could facilitate implementation. "Exchange Wells" would be a type of "Headgate well." "Headgate Wells" are wells installed so close to the river that the depletive effect is instantaneous for administrative purposes. These wells can be used to boost surface flows during times of low flow - usually for the benefit of an identified surface user immediately downstream of the well – or can be used to divert water from the river for decreed purposes. In some cases, the wells pump directly into a ditch, thereby supplementing ditch flows at times when river flows are very low.

An "Exchange Well" is a specific type of headgate well used strictly to facilitate an exchange. When a calling right in the exchange reach is preventing an exchange, an "Exchange Well" could pump the amount of water equivalent to the amount sought to be diverted upstream by exchange into the calling ditch, thereby negating the impact of the exchange on the calling right. Since the calling right is entitled to these flows, and the depletions from the Exchange Well are essentially instantaneous, it makes no difference to the calling right or downstream water users whether these flows come from the river or from the exchange well.

It is likely that the Co-op would use Exchange Wells in strategic locations to boost exchange capacity. Installation of these wells would ease river administration and increase the chances of successful exchange.

The 1969 Water Rights Administration Act does not explicitly recognize the concept of an Exchange Well. The Act defines "Augmentation Well," but this definition limits the use of such wells to replacing out of priority well depletions and meeting Compact obligations. §37-92-103(14)(a), C.R.S. Adding a definition of "Exchange Well" that allows wells installed within a specified distance from the river to operate as such would facilitate the exchanges proposed by the Co-op.

What is the water court process related to the program's approach and implementation?

- *DT Ranch* - No water court process is necessary. The interruptible supply agreement is subject only to the company's rules and regulations regarding leases between shareholders.
- *PVIC/WISE Private Water Market* - Water court approval would be necessary. The M&I user(s) and agricultural supplier(s) would jointly prosecute a water court application seeking to change the use of 100% of the agricultural users' shares to the M&I use. The water court decree would allow for the delivery of the Base and Flex CU amounts to the M&I user, and adjudicate any exchange desired to facilitate re-capture of unused credits. Substitute water supply plans could facilitate delivery of the water while the water court case is pending.

  Once the Private Water Market is decreed, additional M&I users or agricultural suppliers could join, subject to the water court's approval under retained jurisdiction.
- *Lower South Platte Co-op* - Water Court approval should be obtained. Though the exchange could operate administratively, the Co-op would want to adjudicate it and obtain a priority date. The initial exchange would be plead broadly to cover as many "exchange from" and "exchange to" points as possible. Should a future supplier or M&I recipient seek to add new "exchange from" or "exchange to" points after the decree was entered, it is not clear that the supplemental points would enjoy the same priority date as the initial exchange.

  An issue that the study group needs to examine is whether the individual decrees for the recharge projects involved allow transfers to upstream M&I users. Many of these decrees had limitations on

how and when excess credits could be transferred. If these restrictions are in place, these decrees would have to be amended, or new rights sought for the recharge sites that did not have these restrictions in order to allow the proposed leases.

Should the programs be administered by the end user, governmental agency, or by the agricultural water rights owners or ditch and reservoir companies?

- *DT Ranch* - The interruptible supply agreement would be administered by the ditch company, upon the request and direction of the ag user and M&I recipient.
- *PVIC/WISE Private Water Market* - Administration would be a cooperative effort between the ag user/supplier, the ditch company, and the M&I user, facilitated by a Private Market Administrator. The individual agricultural user or agricultural user group would be responsible for administration on each individual farm unit—taking deliveries into recharge, drying up appropriate acreage, accounting, etc. The ditch company would be responsible for coordinating deliveries to the individual farm units and/or to the river on the request of the agricultural user group. The M&I user would be responsible for administration from the point of delivery on the river to the point of use. The Private Market Administrator would be responsible for ensuring compliance with the Water Court decree and the contracts between the parties. In this role, he or she would facilitate communication between the parties, gather individual information and perform group accounting, and be the principal contact for the parties and the state and division engineers.
- *Lower South Platte Co-op* - Administration would be a cooperative effort between the individual augmentation credit providers, the Co-op, and the M&I users. The individual augmentation credit providers would manage their individual recharge activities and provide accounting to the Co-op. The Co-op would manage group accounting, direct re-diversion and re-timing, and manage deliveries to M&I users at specified locations. The M&I users would be responsible for administration from the point of delivery to the point of use.

  The study group has discussed the potential for a regional entity to play a role in the administration of co-op activities. An existing or newly created water conservancy district could play a role by providing a mechanism for funding necessary infrastructure and creating Class B, C and D contracts for the delivery of water to upstream users. A conservancy district or water conservation district could also play a role by creating a statutory water bank. *See* 37-80.5-104.5, C.R.S.

Can the program be successful if the agricultural user can sell or otherwise dispose of the water that is not available to the end user?

- *DT Ranch* - M&I users are traditionally reticent to make any capital investment in water sources that are not permanent. However, the ready access and low transactional cost associated with an intra-ditch transfer program could make the interruptible supply market more attractive.
- *PVIC/WISE Private Water Market* - The program is designed to provide a permanent component (Base CU) that justifies an investment by M&I users in Water Court and other transactional costs. The study group suggested 10% as the permanent component; however, this Base CU amount could be adjusted to fit the parties' needs. In addition to the permanent base supply, the right of first refusal given to the M&I user has value. The M&I user will be the only party approved for new uses by the Water Court at the time of any future sale, giving it a "leg up" on other prospective purchasers and increasing the likelihood that if the water is sold, it will be sold to the original M&I partner.

- *Lower South Platte Co-op* - The Lower South Platte Co-op program has some challenges related to permanence of supply, but none that cannot be overcome with careful planning and management.

  The program was initially envisioned as a means to retime surpluses from the lower river to the benefit of upstream users. As such, it is dependent upon hydrologic conditions – the junior rights that create the excesses may not be in priority in all years, and surpluses available may vary from year to year. The rights are junior, and may not represent a permanent, reliable supply for upstream users. In addition, deliveries are dependent upon exchange opportunities. For these reasons, the program was envisioned as a "spot market" sending water upstream during times of excess.

  However, the study group has found little support for the concept of a "spot market" with M&I users. As a whole, M&I users are interested in permanence. There may be a role for spot deliveries or short term contracts if the price is right and reservoirs are empty, but these opportunities are limited, and probably do not warrant the creation of elaborate infrastructure. M&I reluctance to engage in short term opportunities is evidenced by the water users' failure to implement the Water Bank statute, §37-80.5-104.5, C.R.S.

  There may be potential to create a more reliable supply through storage and retiming. If excesses can be captured and retimed by diversion into recharge sites or storage reservoirs, it may be possible to develop a relatively stable supply that would be available for exchange upstream. The potential for a relatively stable supply makes the project more viable for M&I users. Amounts may vary from year to year, but so long as there is some return each year, M&I users are more likely to invest.

  This stable but variable supply lends itself well to the conservancy district model. Like NCWCD, a new entity (whether a statutory conservancy district or not) could issue contracts entitling holders to a delivery of a specified portion of available supply, as opposed to a set acre foot amount. These contracts could be permanent, like C-BT contracts, or could be limited to a term. It is possible the contracts could be fungible, allowing development of a secondary market.

What program conditions are needed to ensure that private property rights are not impaired?

- *DT Ranch* - No additional conditions are necessary. In the DT Ranch case, the shares are assigned to another shareholder under the ditch, who in turn assigns them to the ditch company in exchange for recharge credits generated pursuant to the terms of a water court decree. The shares are ultimately used for irrigation, their decreed use.
- *PVIC/WISE Private Water Market* - The water court change in use process provides the forum for addressing concerns held by other water users. The decree entered by the court settles these issues and protects senior vested rights from injury.
- *Lower South Platte Co-op* - The water court exchange proceeding provides the forum for addressing concerns held by other water users. The decree entered by the court settles these issues and protects senior vested rights from injury.

FINANCIAL/ECONOMIC ISSUES

Financial and economic issues, and responses to those issues, are related below.

What are the costs to organize and administer a program and who are the parties that could contribute to the costs?

The project team did not make dollar estimates of the costs of organizing or administering the three selected demonstration projects. Conceptually, the administrative requirements and costs associated with these programs will vary by program.

- *DT Ranch* – Up front and administrative costs for the DT Ranch project will be minimal. The administrative requirements and associated costs for launching the DT Ranch Transfer will be minimal. The transfer would take place entirely within the same ditch system and it is possible that the transfer could be accomplished by an exchange of letters and a contract between the parties.
- *PVIC/WISE Private Water Market* –The up front and administrative costs for this project will be relatively substantial, however, these costs are shared among a number participants, and the resulting project has the potential to provide a permanent source of supply for the M&I user. The project will require up-front legal and engineering costs incurred by the parties in reconnaissance/negotiation stage, followed by the cost of prosecuting a Water Court application to completion. Infrastructure will have to be installed - recharge sites, bypass and delivery structures, and measuring devices. Once a decree is entered, there may be a need for a plan administrator to oversee operation. The staff members of the respective organizations can contribute many of the requisite skills required for organizing such a market, although outside expertise will also be needed. Presumably, the beneficiaries to this agreement would pay the costs pursuant to an agreement developed between them. Some grant funding may be available to offset the costs of organizing the market and installing infrastructure.
- *Lower South Platte Co-op* – Like the Private Market project, the up front and administrative costs for this project will be relatively substantial. However, these costs are shared among a number of participants, and once established, the resulting project has the potential to provide large amounts of water on a semi-permanent to permanent basis to upstream M&I users. The exchange will require upfront planning money, legal, engineering and other professional expertise, infrastructure installation, and support from the Co-op participants. Loans or grants may be available for up-front payments with recruitment of both up-front costs and ongoing costs designed into the exchange and leasing programs.

What portion of the total land and water rights value will need to be paid to an agricultural user as compensation for enrollment in a program?

In each of the three case studies, the answer to this question would be the same: each farmer will need to determine these values based upon their individual circumstances. That is, the financial returns of each farmer's individual operations would need to be gained in compensation plus any fixed costs, such as debt service. Further, each farmer will need to determine what risk premium they must have as incentive to enter into such a program. Over and above operating and fixed costs, how much remuneration would make participation worthwhile to a farmer? Each farmer will answer this differently, depending upon their individual financial circumstances, family situation, and risk tolerance. The project team recognized that this question must be answered by each farmer individually and, therefore, we designed the *AgLET* evaluation program so that farmers could independently evaluate their required financial returns for participation.

How do the annual local economic impacts of a rotating fallowing program compare with a permanent dry up that includes voluntary payment in lieu of taxes?

The annual local economic impacts of a rotating fallowing program will be less than a permanent dry up that includes voluntary payment in lieu of taxes for the following reasons:

1) The economic contribution from the farm would be lost to the local area under a permanent dry up, whereas they would only be reduced under a rotational fallowing program. Beyond the tax payments, expenditures, employment and income from that farm would be lost to the region.
2) The indirect or induced economic effects of the farm operation would be lost to the region. That is, as the farmers regional expenditures circulate through the local farming communities, additional economic effects occur which would also be lost as a result of the permanent dry up.
3) "Upstream" economic linkages or farm products, which are used by cattle or ethanol plants, would also be lost to the region. With less feed stock, higher prices, more constrained supply might occur.

In sum, rotational fallowing programs allow for a continuation of farming and the contributions that farming brings to a region and the State as a whole. Property tax payments, even held at an equivalent level, only represent a part of the economic contribution of irrigated agriculture.

Cost vs. supply certainty for municipalities purchasing water via alternative agricultural transfers

Aware of the tension between M&I user's desire for certainty and agricultural users' reluctance to commit to permanent transfers, the study team incorporated elements into each project that tried to strike a balance in a way that made the projects more attractive to agricultural suppliers and M&I users.

- *DT Ranch* – The DT Ranch Project has no element of permanence. However, by keeping the interruptible supply agreement within the FMRIC system, the transactional costs of the transfer are held so low that an interruptible supply agreement becomes a viable option for an M&I user positioned to take advantage of FMRIC deliveries. The study team postulates that M&I users' interest in less than permanent water supplies is inversely proportional to transaction cost. If an interruptible supply or short term lease can be achieved at a reasonable rate, M&I users may view an interruptible supply or short term lease as an acceptable component of a larger water supply plan.

- *PVIC/WISE Private Water Market* –The Private Market model addresses the permanence issue by including a portion of the agricultural user's water supply (10%) as a permanent transfer or sale to the M&I user, while the remaining 90% is subject to shorter term arrangements. M&I users are more interested in participating if there is some amount of water that they own permanently. Ideally, the amount of the permanent transfer is enough to justify the transactional cost in and of itself, and leasing opportunities are an added benefit. The Private Market also addresses the permanence issue by providing that agricultural users may sell the remaining 90% of their consumptive use to any party, subject to a right of first refusal to the M&I user partner.

- *Lower South Platte Co-op* –The Co-op was initially envisioned as a means to provide short term supplies to upstream M&I users on an on-demand/as available basis. However, with the appropriate infrastructure and management, it is also possible that the downstream surpluses could be stored or retimed and provided to upstream M&I users on a relatively stable basis. Further study is needed to determine how reliable the source might be and whether the contemplated exchanges could be

established and operated at a cost that is attractive to M&I users. Once a reliable exchange mechanism has been established, it is possible that Co-op agricultural members could provide additional water supplies by changing the use of senior irrigation rights and applying rotational fallowing and/or deficit/reduced irrigation techniques.