



Montana Department of Natural Resources and Conservation Trust Land Management Division

Water Rights Valuation

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Executive Summary

The Trust Land Management Division (TLM) of the State of Montana Department of Natural Resources and Conservation (DNRC) administers and manages the state trust timber, surface, and mineral resources for the benefit of the common schools and the other endowed institutions in Montana, under the direction of the State Board of Land Commissioners.¹ TLM manages 5.1 million surface acres with approximately 10,500 appurtenant water rights. Consistent with TLM's mission to generate revenue from state land and mineral assets, there is an expressed interest in generating revenue from their water assets.

As a first step towards monetizing water assets, Lotic LLC (Lotic) examined TLM's water rights with the initial goal of determining a high-level valuation of the portfolio. However, due to the widely varying attributes of TLM's portfolio and limited water right market data, the determination of a total value for TLM's water right was inconclusive. Alternatively, the analysis estimates the potentially transferable volume of water in TLM's portfolio. The analysis also includes water right value ranges exhibited in Montana. The analysis does not apply the water right value ranges to TLM's water right portfolio. The valuation of TLM water rights can only be considered on a water right specific level, which is beyond the scope of this report.

In the valuation analysis, Lotic examined TLM's entire water rights portfolio consisting of 10,500 water rights. Lotic made adjustments to the portfolio based on criteria established for stock water rights and estimated transferable volume of water. The resulting portfolio of TLM water rights is 2,280 water rights with a total of 99,834 acre-feet (AF) of estimated transferable volume.

Water right valuations are greatly influenced by water right specific and site-specific attributes. As a result, estimating the value of TLM water rights portfolio without analyzing and accounting for the individual water rights' attributes presents a challenge. This analysis was performed without water right specific evaluation and does not result in an estimated total value of TLM's water right portfolio. Instead, the analysis arrives at unit value ranges for water rights in Montana's urban and agricultural regions. The values presented are not applicable to TLM's portfolio of water rights. The values do not represent a fair market valuation or appraisal of TLM's water rights. The values in this report depict a range of value for water rights in Montana based on the information utilized in the analysis.

¹ http://www.dnrc.mt.gov/trust/about_us/overview.asp

Water rights prices vary depending on the use of the water. Urban water users commonly pay higher prices compared to agricultural and environmental water users. The valuation analysis considers market information and other valuation techniques to arrive at two unit value ranges for water rights in Montana's urban and agricultural regions. This analysis utilizes previous sales transactions in Montana to arrive at a value range for water rights within the urban areas. Although the Montana water market is relatively inactive, previous transactions provide price signals to estimate value. The valuation of water rights in the agricultural areas relies on a combination of previous transaction data, previous net farm income studies, a review of Bureau of Reclamation and DNRC State Water Projects reservoir water supply pricing, and a rudimentary land price differential analysis. The valuation analysis resulted in a range of \$290 to \$3,145 per AF in the urban areas and \$42 to \$3,614 per AF in the agricultural areas of the state.

Introduction

The Trust Land Management Division of the State of Montana Department of Natural Resources and Conservation administers and manages the state trust timber, surface, and mineral resources for the benefit of the common schools and the other endowed institutions in Montana, under the direction of the State Board of Land Commissioners.² TLM manages 5.1 million surface acres with approximately 10,500 appurtenant water rights.

Consistent with TLM's mission to generate revenue from state land and mineral assets, there is an expressed interest in understanding the value of their water assets. TLM requested that Lotic examine TLM's water rights and determine a high-level valuation of water rights in Montana as the first step in this process. However, water right valuations are greatly influenced by water right specific and site-specific attributes. As a result, estimating the value of TLM water rights portfolio without analyzing and accounting for the individual water rights' attributes presents a challenge. This analysis was performed without water right specific evaluation and thus does not result in an estimated total value of TLM's water right portfolio. Instead, the analysis arrives at unit value ranges for water rights in Montana's urban and agricultural regions. The values presented are not applicable to TLM's portfolio of water rights. The values do not represent a fair market valuation or appraisal of TLM's water rights. Instead, the unit values in this report depict a high-level range of water right values in Montana based on the data presented in this report.

² 1 *Ibid.*

Water Right Value Drivers

Valuation of a water right requires the analysis of water right and site specific factors. In this analysis, TLM water right specific factors were not evaluated and thus the analysis is unable to conclude on the value of TLM's water rights. However, the following section describes the commonly analyzed water right attributes and other factors that are considered when establishing value for a water right. Additional site specific factors may also influence value and would also require consideration when determining water right values.

Quantity

The quantity of water available from a water right can influence the water right's value. Frequently, large transactions have lower unit values compared to small quantity transactions. This can be due to transactions costs spread out across a higher quantity of water in large transactions, or may be due to a limited buyer pool that can utilize large quantities of water. In Montana, the amount of water that can be transferred and utilized by a new user is limited to the quantity of water historically used under the water right.³ Historic use of a water right is defined by Administrative Rule 36.12.1902, "The amount of water being changed for each water right cannot exceed or increase the flow rate historically diverted under the historic use, nor exceed or increase the historic volume consumptively used under the existing use."⁴ Under these rules, in general, a water right transfer from an agricultural use to an urban use is limited to a change in the amount equal to the historical consumptive use.

This rule explains that historic use for a Statement of Claim is the use as it was prior to July 1, 1973 and historic use for a Provisional Permit or Groundwater Certificate is the use at the time the Notice of Completion was filed.⁵ Eighty percent of the water rights in TLM's portfolio are Statements of Claims. Based on the high-level nature of the analysis, the consumptive use volume for all TLM's water rights are based on the standard for Statements of Claims, pre-1973 irrigation practices. Due to the difficulties in locating water use information from 1973, the DNRC has developed standard consumption calculations for irrigation water rights. These standards are based on estimated crop water requirements for alfalfa hay and county average farm efficiency factors. These standards, defined in ARM

³ 36-12-1901 (5)

⁴ 36-12-1902 (3)

⁵ 4 *Ibid.*, (1)

36-12-1902, are used to determine the consumptive use, and estimated transferable volume, of TLM's irrigation water rights.

Legal Transferability

When determining value of a water right it is important to determine the water right's legal ability to move to a new location and/or for a new purpose. General guidelines for water right transfers in Montana are provided by MCA 85-2-402. MCA 85-2-402 allows for a water right to be transferred to another entity, changed in place of use, point of diversion, or purpose of use, and become appurtenant to any other place of use without a loss of priority, if the change can be made without adverse affect to existing rights.⁶ To change a water right, an applicant must complete DNRC Form 606, Application for Change of Appropriation Water Right. The change application considers a number of factors about the proposed change including quantity, location, place of diversion, place of use, and adverse affect. Typically, the adverse affect criteria are the most constraining as they disallow the change to affect any current water users in the system. This is commonly referred to as the "no injury rule". In Montana, the adverse affect criteria is as follows: "The proposed change in appropriation right will not adversely affect the use of the existing water rights of other persons or other perfected or planned uses or developments for which a permit or certificate has been issued."⁷

Marketable Region

A key step in a water right valuation analysis is to identify the marketable region, or the feasible region in which the asset can be transferred. The marketable region can be defined by physical or natural limitations of moving the water right to a new user.⁸ The ability to move a water right to meet new demands can be enhanced by access existing or new infrastructure. For example, if a water right is moveable into a canal conveyance system the transferable region will be enlarged to include the entire canal service area. Institutional constraints can also influence the marketable region of a water right. For example, in some states individual counties have ordinances preventing water transfers across county borders. This effectively limits the marketable region of water rights to within county borders.

⁶ 4 *Ibid.*

⁷ MCA 85-2-402 (a)

⁸ Herzong, Steven J., CH2MHill, "Guidelines for the Appraisal of Water Rights in California", Prepared for U.S. Fish and Wildlife Services, August 31, 2006, pages ES6, ES11, 2-19

The buyers within the marketable region will influence value. For example, urban and industrial users generally pay more for water. Thus, a potential transfer to an urban user will garner a higher value compared to a water right that lacks this physical transferability. Thus, water right values are typically localized, with values higher in areas with urban and industrial users.

Marketable Region - Alternative Water Supply Options

The value of a water right can be influenced by the availability of existing water supplies and future water development opportunities within the region. If the demand within the marketable region can be met through obtaining or developing alternative water supplies, water right values may be limited. In contrast, if there are few, or costly, water supply alternatives in the region, water right values may be high.

In Montana, basin closures to new surface water appropriations and requirements for new groundwater appropriations to have offsetting mitigation are common. As of 2003, six basins are legislatively closed. In these closed basins, new appropriations are not allowed except under certain conditions. These exceptions include new appropriations for high spring flow surface water, new groundwater development with accompanying mitigation water, exempt well permits and non-consumptive use appropriations.⁹ There are also ten basins under administrative rule closures. Generally speaking, administrative rule closures limit new appropriations if the issuance of new appropriations would negatively impact existing water rights or the water source's quality and security. Regional restrictions on water right permitting, such as controlled groundwater areas (which are imposed by DNRC or organized petition) and compact closures (which are negotiated by federal agencies and Native American tribes) also exist throughout the state.¹⁰ Areas of the state not included in one of the closure rules described above are considered "open basins" in which water users are able to obtain a new appropriation.

Water Quality

The quality of a water source can influence the suitability of a water right for a potential new use. Poor quality water may require treatment before use for industrial or municipal purposes, or the poor quality of the water source could render the source entirely useless. For example, water with high saline content can be unsuitable for irrigation due to

⁹ 36-12-120

¹⁰ Montana's Basin Closures and Controlled Groundwater Areas. Helena: , Web. Dec 2003. <http://www.dnrc.mt.gov/wrd/water_rts/appro_info/basinclose-cgw_areas.pdf>.

undesirable impacts on the soil. If the quality of the underlying source water limits its ability to meet new demands, the highest and best use likely will be limited to the current purpose. This limitation can negatively impact the value of the water right. The evaluation of water quality is very site specific.

Historic Reliability

In Montana, water rights are subject to the principals of Prior Appropriation. Under the Prior Appropriation water rights are given a priority date according to the date the water use was first used.¹¹ Water rights are exercised according to their priority date, with the most senior water rights getting filled first. This concept is commonly referred to “first in time is first in right.”¹² When water flows are insufficient to fulfill all of the exiting water rights, the junior water rights holders must refrain from diversion allowing the senior water right holders to receive water. This system places importance on the relative priority date of a water right compared to other water rights on the same source. In areas with water supply limitations, the more senior the water right, the more reliable it is.

The seniority of a water right may impact the quantity of water historically provided to the water right holder. Source specific research into the local hydrology and relative priorities of existing water rights is required to determine the historic reliability of a water right. If a water right has not been historically fulfilled, limitations on the transferable water quantity may exist.

Typically, high value water users including municipal and industrial users want reliable sources of water. There are limited water users who have interruptible needs and would consider junior (less reliable) water rights as suitable options. To ensure a reliable source, water users typically procure senior water rights. Therefore most water rights traded in the market are senior and provide reliable water supplies.

Seasonality

Water rights in Montana have a defined period of use during which the water right holder can exercise their use of water. Often times, irrigation water rights are limited in their period of use to the spring and summer months. However, most high value water demands such as municipal and industrial demands require water on an annual, year-round basis. Resultantly, mismatches in the period of use from the original water right to the new use

¹¹ Doney, Ted J., Basic Montana Water Law, 1990, Updated by C. Bruce Loble, 2010. Page 1, 5.

¹² 11 *Ibid.*, Page 1.

occur. Infrastructure, such as an infiltration gallery, may be required to extend the period of use from a seasonal appropriation to an annual appropriation. If infrastructure is required to transform a seasonal period of use, these additional capital costs may negatively impact the value of the water right. There are many factors that are involved in assessing the suitability of an existing water right's seasonality compared to the new use. These factors should be evaluated on a water right specific basis.

Highest and Best Use

In water right valuations the highest and best use of the subject water right is defined in order to assess fair market value. Determination of an asset's highest and best use includes evaluation of physically possible, legally permissible, financially feasible, maximum productivity, and must result in the highest value.¹³ When formally appraising water rights to determine fair market value, highest and best use should always be driven by economic considerations and market forces. It is not commonly accepted to conclude a highest and best use for non-economic uses such as conservation, and preservation when formally appraising water rights.¹⁴ Highest and best use analysis is performed at the individual water right level based on site specific circumstances.

¹³ 8 *Ibid.*, page A 1-2.

¹⁴ 8 *Ibid.*, page 2-14.

Trust Land Management Water Right Assets

TLM holds approximately 10,500 water rights throughout the state of Montana appurtenant to the 5.1 million acres of TLM lands. These water rights are spread across eighty-one basins throughout the state. Adjustments to the water rights were made based on criteria established for stock water rights and estimated transferable volume of water. The section below describes the adjustments made to the original dataset of 10,500 water rights and concludes with potentially transferable water rights considered in the analysis.

Identification of TLM Water Rights

The dataset of water rights was obtained from the Department of Natural Resources and Conservation (DNRC) Water Rights Bureau on July 19, 2011. All water rights with owner name “State Board of Land Commissioners” were included in the dataset. Many of the water rights included in dataset have multiple owners with State Board of Land Commissioners being one owner. These water rights were all included in the data set with no adjustments made to isolate the portion of the water right owned by TLM. The dataset also includes water rights with the owner name “Montana, State of Dept of Natural Resources” that are actually owned by State Board of Land Commissioners.¹⁵ The water rights portfolio identified is inclusive of pre-1973 Statements of Claims and post 1973 water rights such as Groundwater Certificates, Provisional Permits, and Stockwater Permits – all referred to as “water rights” in this analysis.

TLM’s water right portfolio identified for this analysis does not include any ditch/canal company shares, Irrigation District (ID) shares or Water User Association (WUA) shares that may be held by TLM. There is no standardized query system to identify these water assets. Identification of ditch/canal company, ID and WUA shares would involve a parcel by parcel review and discussion with the local TLM representatives and/or land leasees. These water assets may have significant value.

TLM’s water right portfolio identified for this analysis also does not include unfiled stock and domestic water rights. In certain circumstances, stock and domestic uses sourced from groundwater or instream flow are exempt from filing claims.¹⁶

TLM may also have additional water rights beyond the 10,500 identified. Throughout the state there are circumstances in which a water right was filed in a third party name;

¹⁵ Identified by Dennis Meyer, DNRC Trust Land Management Division, August 5, 2011.

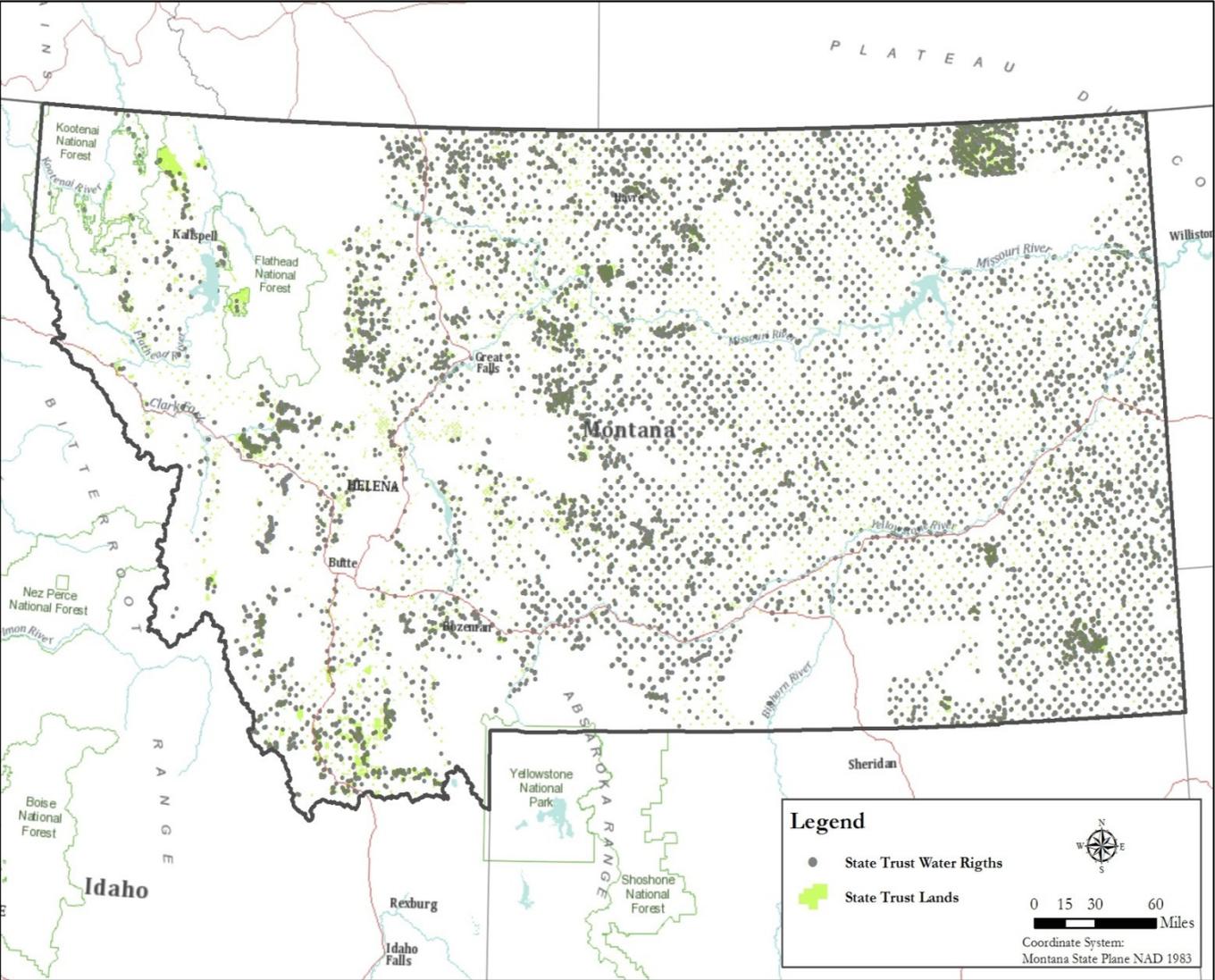
¹⁶ 85-2-221

however, both the point of diversion and place of use are on state trust lands. There is legal precedent that these water rights are actually owned by TLM.¹⁷ In discussion with TLM, it appears that the identification of these water rights is complicated. As a result, these water rights, which are currently filed in a third party name, but are actually owned by TLM, are not included in the TLM water rights portfolio.

The results of the query show that TLM owns 10,500 water rights. Figure 1 is a map of the water rights' locations.

¹⁷ Butler, Tom. "Ditch Rights across State School Trust Lands." Email message to Chris Corbin. 13 July 2011.

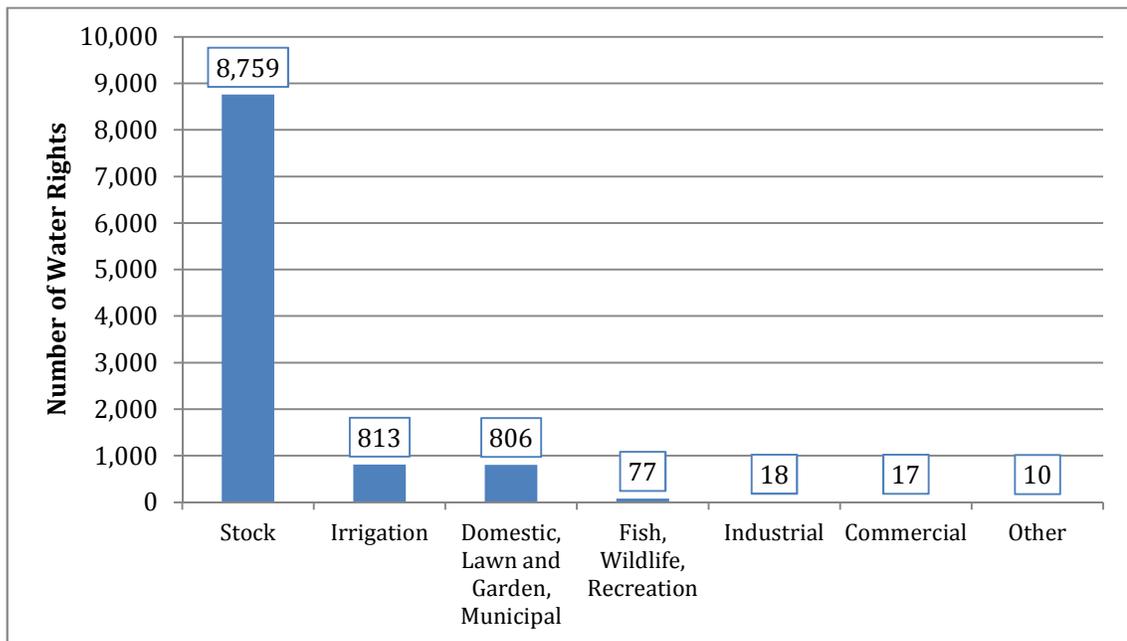
Figure 1: DNRC Trust Land Management Water Right Locations



Purpose of Use

Each TLM water right possesses a “purpose of use” that defines the water rights’ beneficial use. This analysis recognized seven purposes of use: Stock; Irrigation; Domestic; Lawn and Garden; Municipal; Fish, Wildlife, Recreation; Industrial; Commercial; and Other. One hundred and eight of TLM’s water rights hold multiple purposes of use. These water rights were assigned to one of the seven categories listed above without any proportionate adjustment. The distribution of water rights by purpose of use is shown in Figure 2.

Figure 2: TLM Water Rights’ Distribution By Purpose of Use



TLM Irrigation Water Rights

TLM’s water rights allow for 89,242 acres of irrigation across Montana. This figure is the sum of the paper water rights’ claimed irrigated acres.¹⁸ TLM does track irrigated cropland through annual Production Reports submitted by TLM leasees. In 2010, TLM had 6,321 reported acres of irrigated cropland.¹⁹ This figure is widely divergent from the paper water rights’ claimed irrigated acres for a number of reasons:

¹⁸ As noted below, the claimed irrigated acres may be overstated due to the likely existence of supplemental water rights in TLM’s portfolio.

¹⁹ Trust Land Management Division, Department of Natural Resources and Conservation Montana, “Report on Return on Asset Value by Trust and Land Office for State Trust Lands Fiscal Year 2010”, Table 1.

1. The 6,321 acres only includes irrigated cropland. Comparatively, TLM water rights' claimed irrigated acres allow for both irrigated cropland and irrigated pasture/grazing land. TLM does not track irrigated pasture and grazing acres.
2. TLM's irrigated cropland may be irrigated with water rights that are owned by a third party.
3. TLM's water rights may irrigate lands not owned by TLM.

Although TLM has a tracking mechanism for irrigated cropland, TLM does not track the use of their water rights. In Montana, a water rights' transferability is generally limited to the historic use of the claim. To maximize the transferable quantity of water it is important to ensure continued use of the water.

Adjustments to TLM Water Rights Portfolio

Stock Water Rights

TLM owns 8,759 stock water rights. The records obtained from DNRC include volume, animal units and flow rates. If the stock water right had a stated volume, the volume was used in this analysis. If the water right did not have a stated volume, but had a number of animal units, volume was calculated using the Water Use Standards guidelines under 36.12.115 of 0.017 AF per year per animal unit. Of the 8,759 stock water rights, 183 or 2.1%, have neither volume nor animal units indicated. No volume was assigned to these water rights.

Water for stock purposes in Montana is often obtained through exempt well permits. The exempt well statues generally allow for the DRNC to issue a water use permit for appropriations under 10 AF and 35 gallons per minute GPM.²⁰ Typically, stock water rights are easily replaced through applying for an exempt well permit. As a result, existing stock water rights possess limited value. Exceptions to this include stock water rights that exceed the exempt well criteria or located in areas with constrained physical water supply. In water short regions, the potential exists for all new water appropriations – even small stock water rights – to possess limited reliability due to junior priority. An existing, senior, stock water right may possess value under this scenario. However, in general, stock water rights are replaceable via a new exempt well permit and possess limited value.

²⁰ MCA § 85-2-306. There are some exceptions to this in controlled groundwater areas and when combined appropriations are involved.

Of the 8,759 stock water rights, 93.8%, or 8,220, fall under the exempt well criteria.²¹ These water rights are considered to have zero value in the analysis as they are easily replaced via an exempt well permit. The remaining 539, or 6.2%, of TLM's stock water rights exceed the exempt well criteria based on volume and/or flow rate exceeding 35 GPM and/or 10 AF. These 539 stock water rights represent a potentially transferable volume of 9,593 AF.

Transferable Volume Estimates

Determining the transferable volume is necessary to calculate water rights values. For stock water rights above the exempt well criteria threshold, the volume stated on the water right is assumed to be the transferable volume. If a stock water right did not have a volume stated, volume was calculated based upon number of animal units the water right allows for as described above. For domestic, lawn and garden, municipal, fish, wildlife, recreation, industrial, commercial, and other, the volume stated on the current water right is assumed to be the transferable volume.

Many water rights with the purpose of use, irrigation, do not state a volume on the water right. The parameters of the water right allow for an undefined volume of water to irrigate a defined number of acres. The potentially transferable volume of irrigation water rights can be determined by identifying the transferable volume of water per irrigated acre. Water right transfers from agricultural to urban purposes are typically limited to the consumptive use portion of the water right. The DNRC's standard consumptive use calculations described in ARM 36-12-1902 were utilized to determine transferable volume for the TLM's irrigation water rights.

To calculate the consumptive use, the Irrigation Water Requirements within a county were averaged and standardized to provide county-level average data.²² This county level irrigation water requirements data was then applied to the county management factor to arrive at a county level average consumptive use AF per acre (CU AF/AC). The county level CU AF/AC figures were then applied to allowable irrigated acres stated on each of TLM's irrigation water rights.

It is possible that the actual transferable volume of the water rights will vary from the stated volume on the water right and/or calculated consumptive use derived in this

²¹ The 183 water rights with no volume or animal units are assumed to be under the exempt well criteria. Of these 183 water rights, 38 have flow rates. All of these flow rates are under 35 GPM. Thus it is assumed all 183 with no volume or animal units are under the exempt well criteria and are not considered transferable in this analysis.

²² Deer Lodge and Daniels counties do not have estimated IWR or management factors. For Deer Lodge county the Granite county figures were utilized as an approximation. For Daniels county the Roosevelt county figures were utilized.

analysis. The exact transferable volume for each water right is typically assessed on an individual water right and situation specific basis.

Supplemental Water Rights

TLM's portfolio of water rights likely contains supplemental water rights. The Administrative Rules of Montana defines supplemental irrigation as "additional water provided to lands which are already irrigated or to lands which will receive water through another right."²³ The total amount of water diverted under all of the rights in a supplemental group is typically limited to the amount necessary to accomplish the beneficial use. This is generally less than the combined volume or flow rate allowed under each individual right. When a right in a supplemental group is transferred, the transferable volume is limited to the amount that each right contributed to the beneficial use.²⁴

Adjustments to groups of supplemental water rights are required to accurately reflect the sum of the total volume, flow rate and allowable irrigated acres. In most cases, the actual water application needs for the place of use is less than the sum of the supplemental paper water rights' flow rates, volumes, and irrigated acres. This level of analysis is beyond the scope of this project. As a result, it is likely that the sum of the allowable irrigated acres, volume, and flow rates calculated in this analysis overstate the transferable quantity of water.

Summary of TLM Assets

Based on the stock water right adjustments and transferable volume estimates described above, Table 1 summarizes the results of TLM's potentially transferable water rights portfolio.

Table 1: TLM Potentially Transferable Water Rights

Region	Total
Number of Water Rights	2,280
Claimed Allowable Acres Irrigated	89,242
Sum of Claimed Flow Rates (cfs)	1,907
Estimated Transferable Volume (AF)	99,834

²³ ARM 36.12.1010

²⁴ DRNC Application to Change a Water Right, Form No. 606 R 06/2010, Section C.

Valuation Analysis

The previous section describes TLM's water rights portfolio. This section considers market information and multiple valuation techniques to arrive at two unit values for water rights in Montana. The analysis arrives at a range of unit values in the urban and agricultural regions of the state. The unit value ranges derived are in dollars per acre-foot.

Valuation Methodology

Four valuation methods are commonly utilized to value water rights. In water right valuations, typically all four valuation techniques are considered. After consideration, one or more method(s) are selected based upon the attributes of the water rights as well as the availability and quality of information available.²⁵ Both the selection of the valuation technique and the valuation analysis itself are dependent on the specific characteristics of the water right and proposed transaction. The four commonly accepted water right valuation methods are described below.

1. Comparable Sales
2. Land Price Differential, commonly referred to as a "before and after" analysis
3. Replacement Cost
4. Income Capitalization

Comparable Sales:

Typically, a comparable sales analysis compares the subject water right(s) with similar water rights(s) and similar transactions. Each transaction is reviewed to ensure similarities in nature to the subject water right and proposed transaction. Elements of comparison include highest and best use, season of use, location, transferability, end use, and type of legal right.²⁶ Only those transactions that are truly comparable are utilized to determine value of the subject water right. When multiple comparable sales are available, this method represents a favored technique for valuation.

Land Price Differential:

This method compares values of property with water rights to property without water rights. The difference in value between the land with water and land without water is the value attributable to the water rights. The challenge associated with this methodology is excluding other factors that drive land values besides water such as parcel size, location, and building improvements. This valuation approach is time and data intensive.

²⁵ Herzog, Steven. "The Appraisal of Water Rights: Valuation Methodology." *Appraisal Journal* (2008) Spring.

²⁶ *Ibid.*, page 123.

Replacement Cost Approach:

This methodology focuses on estimating the incremental cost of replacing the subject water right with an alternative source of water that meets the same purpose, quantity and place of use. This methodology relies on premises that potential buyers will determine the value of the subject water right by evaluating the cost of their alternative supplies. For example, the cost of developing a groundwater well to replace a surface water right can represent the value of the subject surface water right. This valuation method often times possesses shortfalls associated with identifying a feasible replacement alternative. This method typically results in the maximum value associated with the water asset.

Income Capitalization:

This approach is designed to capture the value of forgone net income from an operation that utilizes water as one input to the production process. This method accounts for the lost revenue and avoided costs of production if the water was removed from the operation. The analysis then results in isolating the value of the water to the operation. One limiting factor in using this valuation methodology to value agricultural water rights is that the overall net income of an agricultural operation typically is dependent upon several factors including effort, efficiency, and design. It can be difficult to decouple the impacts from other factors to isolate the impact of the water on the operation. To utilize this approach in agricultural operations requires the development of a “farm budget analysis.” In a farm budget analysis all non-water costs are isolated and the portion of the revenue attributable to water is identified.²⁷ This approach is costly and time intensive.

Valuation Methodology Selected

Water rights values typically vary depending on the use of the water. Urban water users typically pay higher prices compared to agricultural and environmental water users. As a result, this valuation segregates values in the urban regions of the state from values in agricultural region of the state.

The urban regions in Montana span both open and closed basins. Although new water right appropriations are still available in the open basins, the new appropriations will be junior in priority and likely unreliable. Thus, although some basins are open, urban and municipal demands in all areas of the state will likely seek existing, senior water rights to expand their water supply portfolios.

²⁷ 8 *Ibid.*, page 2-12.

In this analysis, market transaction data provides a reflection of water values in the urban areas. This analysis utilizes previous water right transactions in Montana to estimate a range of value for water rights that fall within the urban areas. Although the Montana water market is relatively inactive, a select number of transactions provide price signals to estimate value. Due to the high-level nature of this analysis, all transactions for municipal use or mitigation to serve municipal groundwater development were considered.

In contrast to the urban areas, the majority of the state is dominated by agricultural uses of water. Agricultural regions possess limited market opportunities for water transfers to new uses. The highest and best use of many of these water rights will remain in the current agricultural production on the appurtenant land. Although limited opportunities to transfer these water rights to new, higher value purposes exist, they provide significant value to the agricultural productivity of the land.

The valuation of water rights in the agricultural areas relies on a combination of previous water right transaction data, a review of previous net income analysis, and a rudimentary land price differential analysis. The transaction data utilized includes instream flow leases and water right purchases, agricultural water right purchases. Additionally, non-market data including the water rates paid for use of water from state and federal storage facilities is considered in the analysis. The net income analysis includes a review of three Bureau of Reclamation studies performed in Montana, which identified the value of water in agricultural operations. The rudimentary land price differential analysis relies upon data from United States Department of Agriculture, National Agricultural Statistics Service (NASS).

All values in the report have been adjusted to 2011 dollars using the CPI.²⁸ All annual values in the analysis were capitalized to permanent values using 3.07%.²⁹

²⁸ Consumer Price Index - All Urban Consumers; 1982-84=100; Series ID # CUUR0000SA0

²⁹ NASS Montana Farm Real Estate, series update March 4, 2011, Irrigated Crop Land Rent to Value Ratio, average of 1998 to 2010.

Urban Region Water Right Values

While Montana's water rights market continues to emerge, water rights transactions are occurring in select markets. The most active markets in Montana are located near municipalities that will need additional water supplies for their growing populations. Demand in the growing urban areas stems from municipalities, developers in unincorporated areas, community water systems, and select industrial users. Many water supply development possibilities exist to meet the growing urban demands. These options include large-scale infrastructure projects to capture new water appropriations, re-use of effluent, and conservation methods. Although these methods to develop additional water supplies have been successfully implemented in other regions of the country, they likely remain cost prohibitive in Montana. Based on this assumption, it is feasible that the growing urban demands will be met through acquisition (or lease) of existing, senior, reliable water rights.

Cities across the state have recently begun to dedicate resources to securing additional water supplies. In July 2011, the City of Bozeman issued a Request for Proposals (RFP) to hire a firm to complete the Integrated Water Resources Plan (IWRP). Bozeman's IWRP will focus on identifying Bozeman's future water supply needs and evaluating different supply alternatives. In 2008, the City of Great Falls issued an RFP to hire a firm to identify and acquire water rights for the City's growing water supply needs. The City of Whitefish also issued a Request for Statement of Qualifications in 2008. Whitefish hired a firm to review and assess of the City's existing water rights as well as provide recommendations regarding sustainable water supplies. Additionally, the Clark Fork River Basin Task Force is continually evaluating water supply options to meet the growing needs within the Clark Fork River Basin.

This analysis does not draw distinction between the open and closed basins of the state. Although new water right appropriations are still available in the open basins, the new appropriations are junior in priority and potentially unreliable. In contrast, urban and industrial users typically seek reliable sources of supplies to augment their supply portfolios. Due to the prior appropriation system of fulfilling water rights, typically the existing senior water rights are the most reliable. In times of water shortages, the existing senior water rights may be the only water rights that receive water. Based on this system of fulfillment it is assumed new demands for water in fast growing urban areas, regardless of basin closure status, will be met through the acquisition and transfer of an existing senior water right.

The value of a specific water right will vary based upon water right specific attributes such as which urban area the water right is in and the proximity to existing infrastructure. For example, water rights in close proximity to existing municipal water intakes will capture

higher value to the new user because of reduced development costs. It is recognized that wide variations in individual water right values are not accurately reflected through the use of average or median values.

Urban Market Transaction Data

In Montana, the buyers in the majority of permanent transactions are municipal water users or developers seeking mitigation water for new groundwater development. Both end uses require the transfer of the consumptive portion of the original water right. As a result, the transaction unit prices are based on the consumptive use, or transferable volume.

Between 2005 and 2011 fourteen transactions in Montana involving water rights sold for mitigation or municipal use have occurred.³⁰ The transactions are concentrated in Missoula (greater Missoula market) and Lewis and Clark Counties (greater Helena market). The total volume of water sold was 1,585 AF. There was one large transaction in 2006. Absent this transaction, the remainder of the transactions were small with an median transaction size of 23 AF.³¹ There is no clear trend in number of transactions per year or volume sold.

Similar to the lack of trend in the volume, no clear trend in the prices paid for water for municipal and mitigation purposes exists. The prices paid vary significantly within individual years and over time. In this youthful market, few price signals exist to help market participants negotiate transaction prices. As price discovery continues, price dispersion among water transactions exists in the market. Between 2005 and 2011, the price paid by municipal and mitigation users ranged from \$290 to \$3,145 per AF.³²

As discussed in the previous section, Water Right Value Drivers, there are many water right or transaction specific attributes that may influence value and prices paid for water rights. The limited transaction data in Montana is not robust enough to conclusively determine the influence of these attributes on price. Table 2 displays a general relationship between the water right / transaction attributes and value.

³⁰ Transactions involving shares of ditch/canal companies or shares of water users associations were not included in the value range. There are unique rules surrounding the transferability of these assets and thus the transactions are not comparable to TLM's assets identified in this analysis. There is one transaction included that involves a sale of an agricultural water right to a speculator. The speculator has changed the water right to instream flow at the current time and hopes to eventually sell for municipal or mitigation purposes.

³¹ Review of approved and pending DNRC change applications as of August 30, 2011. Lotic water transactions database.

³² Lotic water transactions database.

Table 2: Water Right and Transaction Attribute - General Influence on Value

Transaction Attribute	General Influence on Value (+ / -)
Large Transaction Size	-
Poor Quality Water	-
Reliable / Senior Water Right	+
Annual Period of Use	+
Many Supply Alternatives Available to Buyer	-

Agricultural Region Water Right Values

With the exception of the growing urban areas described in the previous section, the primary use of water in the remainder of Montana is for agricultural purposes. Agriculture represents the 96.5% of water use in Montana. In 2000, this accounted for 11.6 million acre-feet.³³ Of the land in agricultural production, 65.2% of the acres are pasture and range, and 29.7% of the acres are harvested cropland.³⁴ According to an analysis of irrigation in Montana performed for the DNRC in 2008, of the harvested cropland acres in the state, only 18% are irrigated.³⁵ Crop types vary based on geography, soil types, and availability of water. Irrigated crops grown in Montana include irrigated wheat, corn, sugarbeets, barley, and other grains. Although irrigated cropland and irrigated pasture represent a small portion of the acres, irrigation tends to increase crop yield and allows some lands to produce higher value crops. As a result, although a small portion of the acreage and of the water use in the state, irrigated cropland represents a high percentage of overall agricultural income in the state.³⁶

The estimated water rights value ranges in agricultural regions of the state are presented cautiously for a number of reasons. In particular instances, the value of agricultural water rights is inherently included in the appurtenant land value. For water rights that remain in their current use, the value of the water right may already be reflected in the value of the land. Likewise, a water right owner must consider potential land value reductions, if the water rights are severed from the land. If one is to aggregate appurtenant land values with water right values, the potential to double count the value of a water right exists.

This analysis utilized five sources of data to arrive at a range in value for water rights in agricultural regions of Montana. These sources include:

1. Instream flow leases throughout Montana
2. Permanent transactions with new use agriculture or instream flow
3. Review of existing studies on effects of irrigation on farm net income
4. Bureau of Reclamation and DNRC State Water Projects storage water rates
5. Rudimentary land price differential analysis using NASS data

³³ Canon, M.R. and Dave R. Johnson. "Estimated Water Use in Montana in 2000, Scientific Investigations." United States Department of Interior, U.S. Geological Survey (2004) 2 April 2009 <http://pubs.usgs.gov/sir/2004/5223/>

³⁴ National Agricultural Statistics Service Montana Agricultural Facts 2010. USDA. Aug 2011 http://www.nass.usda.gov/Statistics_by_State/Montana/Publications/economic/agfacts.pdf

³⁵ ECONNorthwest, "Irrigation in Montana: A Program Overview and Economic Analysis", prepared for Montana Department of Natural Resources, September 2008, page iii.

³⁶ *Ibid.*

Instream Flow Leases

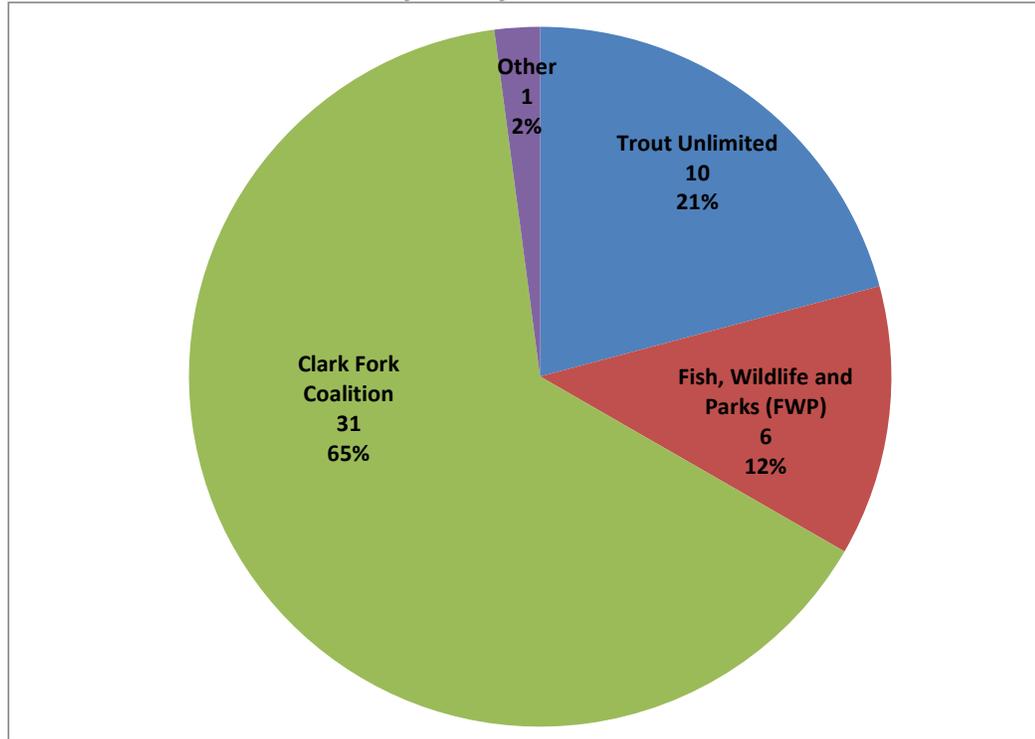
With over 4,000 miles of de-watered streams, Montana enabled protection of the streams through the passage of legislation in 1969. This legislation allowed Montana's Department of Fish Wildlife and Parks to appropriate new water rights to protect fish and wildlife. In 1989, further legislation was enacted which allowed the Department of Fish, Wildlife, and Parks to lease existing water rights for instream flows. And in 1995, the water leasing program was expanded once again, this time to allow individuals and private groups to lease water rights for instream use. This legislation enabled environmental organizations including Clark Fork Coalition and Trout Unlimited to actively engage in restoring fish habitats through water right leases and purchases. Today, this market includes more than fifty historic leases.

Instream flow lease rates are set based on two methods: 1) forgone net income of the agricultural operation, or 2) based upon the capital cost of infrastructure improvements that generate salvage water.³⁷ Instream flow leases in Montana are not typically set based on a non-economic value placed on the preservation of fish in the system. The use of instream flow lease values is not intended to imply that specific water rights have potential to be leased for instream flow. The use of the instream flow market values in this analysis is intended to represent a high-level approximation of water values in agricultural production. Due to the rate setting mechanisms used by instream flow lessors, many of the instream flow lease rates are reflective of the agricultural value of water.

There are three predominant entities that lease water in Montana for instream flow purposes: Clark Fork Coalition (formerly Montana Water Trust), Trout Unlimited, and Montana Fish Wildlife and Parks. The distribution of number of transactions by entity is shown below in Figure 3.

³⁷ Conversation with Laura Ziemer, Director Trout Unlimited's Montana Water Project, August 12, 2011.

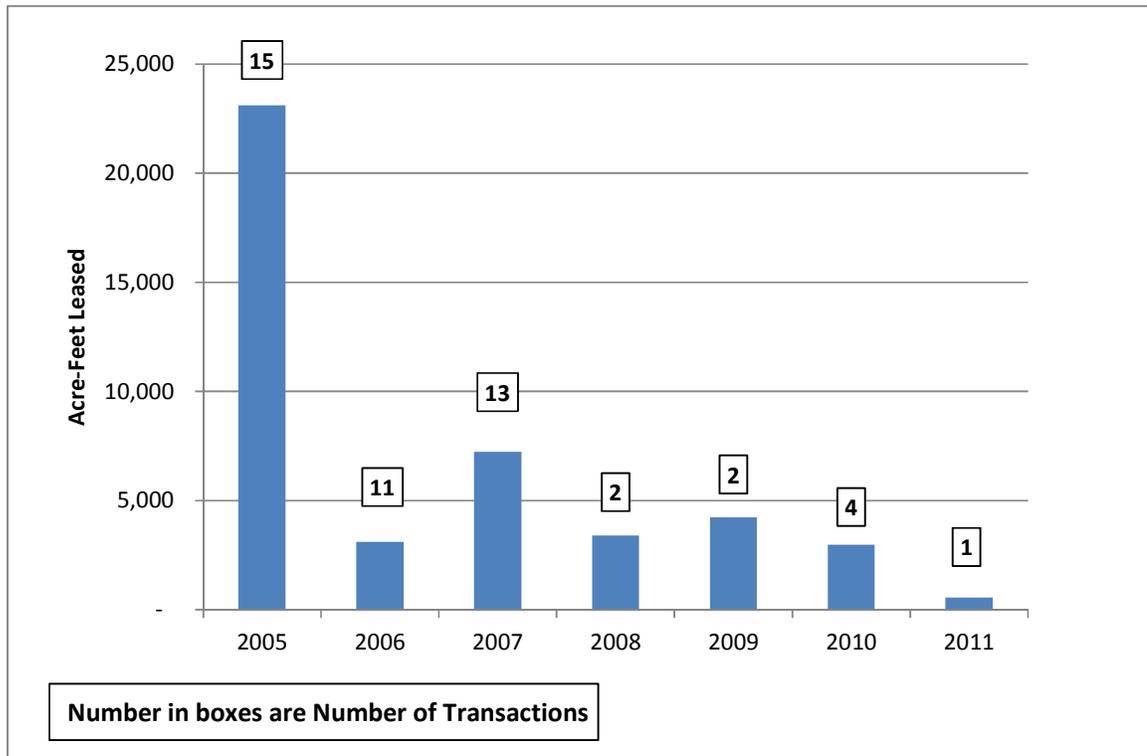
Figure 3: Percentage and Number of Lease Transactions in Montana by Entity, 2005 - 2011³⁸



The median transaction size between 2005 and 2011 was 371 AF with a range of 100 AF to 9,941 AF. As depicted in Figure 4, fewer instream flow transactions have occurred in recent years. The reduction in recent number of transactions and volume leased may be reflective of decreased funding due to an economic recession and increased transactions costs associated with water rights changes. Together, these underlying factors likely have restricted the deal flow in this market.

³⁸Columbia Basin Water Transactions Program website, <http://www.cbwtp.org/jsp/cbwtp/projects/index.jsp>. Transactions download, August 22, 2011. Various Fish, Wildlife, Parks leasing reports and communications, Fish, Wildlife & Parks Biennial Progress Reports 2008, 2009, 2010, 2011. Lotic water transactions database.

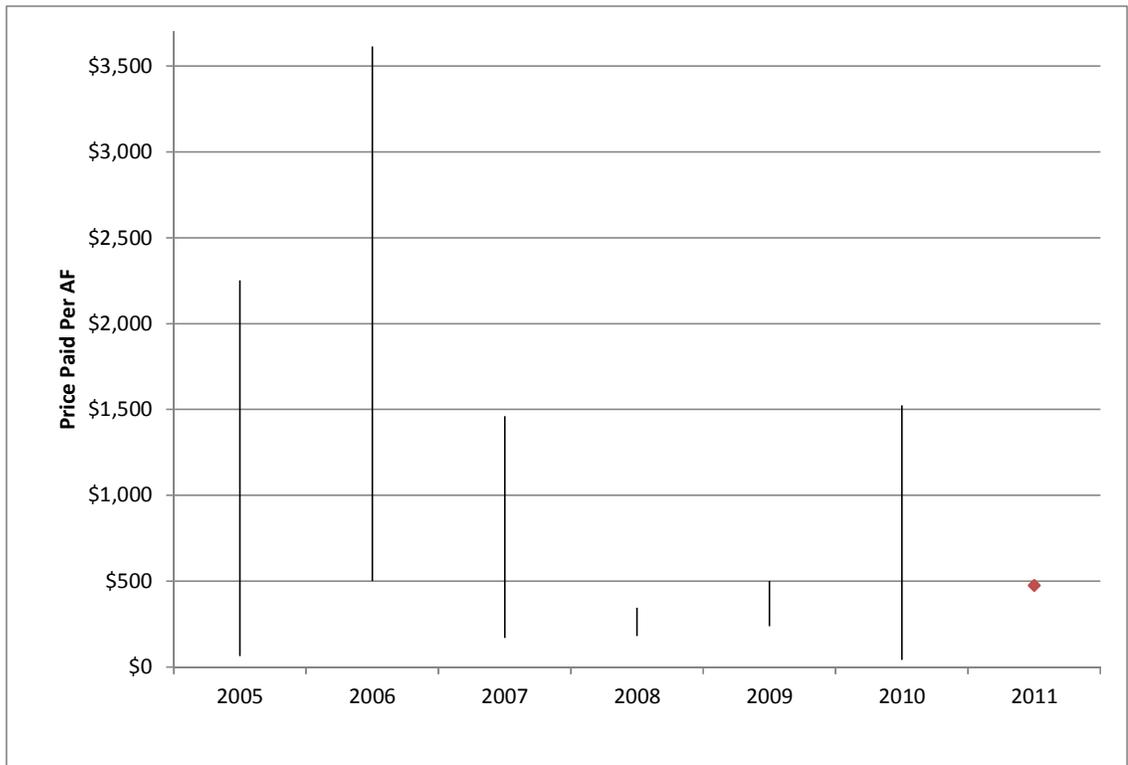
Figure 4: Annual Volume Leased in Montana For Instream Flow Purposes and Number of Transactions, 2005 - 2011³⁹



As shown in Figure 5, the capitalized price paid for instream flow leases between 2005 and 2011 ranges between \$42 to \$3,614 per AF. The prices paid in recent years appears to be stabilizing just under \$500 per AF. This may be reflective of the maturation of the market. The leasing entities may be leveraging comparable sales and market expertise to negotiate transactions. Potential future variations in the prices could arise from competition for urban water demands.

³⁹ 38 *Ibid.*

Figure 5: Montana Instream Flow Leases, 2005 to 2011
Capitalized Prices (\$ / AF)⁴⁰⁴¹



Permanent Transactions For Agricultural and Instream Purposes

Since 2004, seven transactions have occurred in Montana in which the water was sold on a permanent basis for agricultural or instream purposes. As mentioned above, because the instream flow rates are typically based upon forgone net income of agricultural operations they are reflective of the agricultural value of water. Additionally, the instream flow leases and purchases typically occur in the rural regions of the state and thus are relevant for valuing water rights in the agricultural regions of Montana. Between 2004 and 2011 a total of 3,422 AF was sold for agricultural or instream flow purposes. The transaction volume range was 17 to 1,771 AF per transaction. The price paid in these transactions ranges from \$65 to \$1,385 per AF.⁴²

⁴⁰ Unit prices for lease transactions are typically reported in dollars per acre-foot diversion (\$ / AF DIV / Year). No adjustments were made to the data to convert or standardize the units into \$ / AF CU / Year. Additional analysis of this dataset and its applicability is necessary for water right specific valuations.

⁴¹ 38 *Ibid.*

⁴² 32, 38 *Ibid.*

Review of Existing Studies on Effects of Irrigation on Farm Net Income

In 2008, ECONNorthwest prepared a report for the DNRC entitled, *Irrigation in Montana: A Program Overview and Economic Analysis*. The report analyzed the potential benefit of public investment in refurbishing existing and developing new irrigation infrastructure. As part of the analysis, the authors reviewed three exiting studies that determined the increase in annual net earnings farmers in and around Montana realize when they irrigate their crops. The studies cited in the analysis include three Bureau of Reclamation studies:

- 2003 farm budget analysis on the benefits of irrigation along the Milk River, Montana
- 2006 farm budget analysis for the Beaverhead Valley, Montana
- 1997 farm budget analysis in the Black Hills of South Dakota.

The three studies attempt to measure irrigation’s impact on net farm earnings using farm budget analysis. As cited in the report, the studies are site specific and rely on specific farm characteristics, cropping patterns, farming techniques, crop yields, and local market conditions for farm outputs. Although shortcomings exist, the results of the studies are informative in estimating the value of water in agricultural operations in Montana.

Table 3 summarizes the results of these three studies. The annual values summarized in the three studies are capitalized using 3.07%.⁴³ The capitalized per acre-foot value of water based on the three farm-budget analyses ranges from \$972 to \$1,184 per AF.

Table 3: Increase in Annual Net Farm Earnings Resulting From Irritation, Review of Previous Studies⁴⁴

Study	Annual Value Per AF	Capitalized Value per AF
Milk River Farm-Budget Analysis	\$33.55	\$1,093
Beaverhead Valley Farm Budget Analysis	\$36.34	\$1,184
Black Hills SD-WY Farm Budget Analysis	\$29.85	\$972

⁴³ 29 *Ibid.*

⁴⁴ 35 *Ibid.*, Technical Memorandum 2.2, Page 7 and Table 2. Figures were reported in 2007 dollars in the ECONNorthwest study. They are adjusted here in this analysis to 2011 dollars.

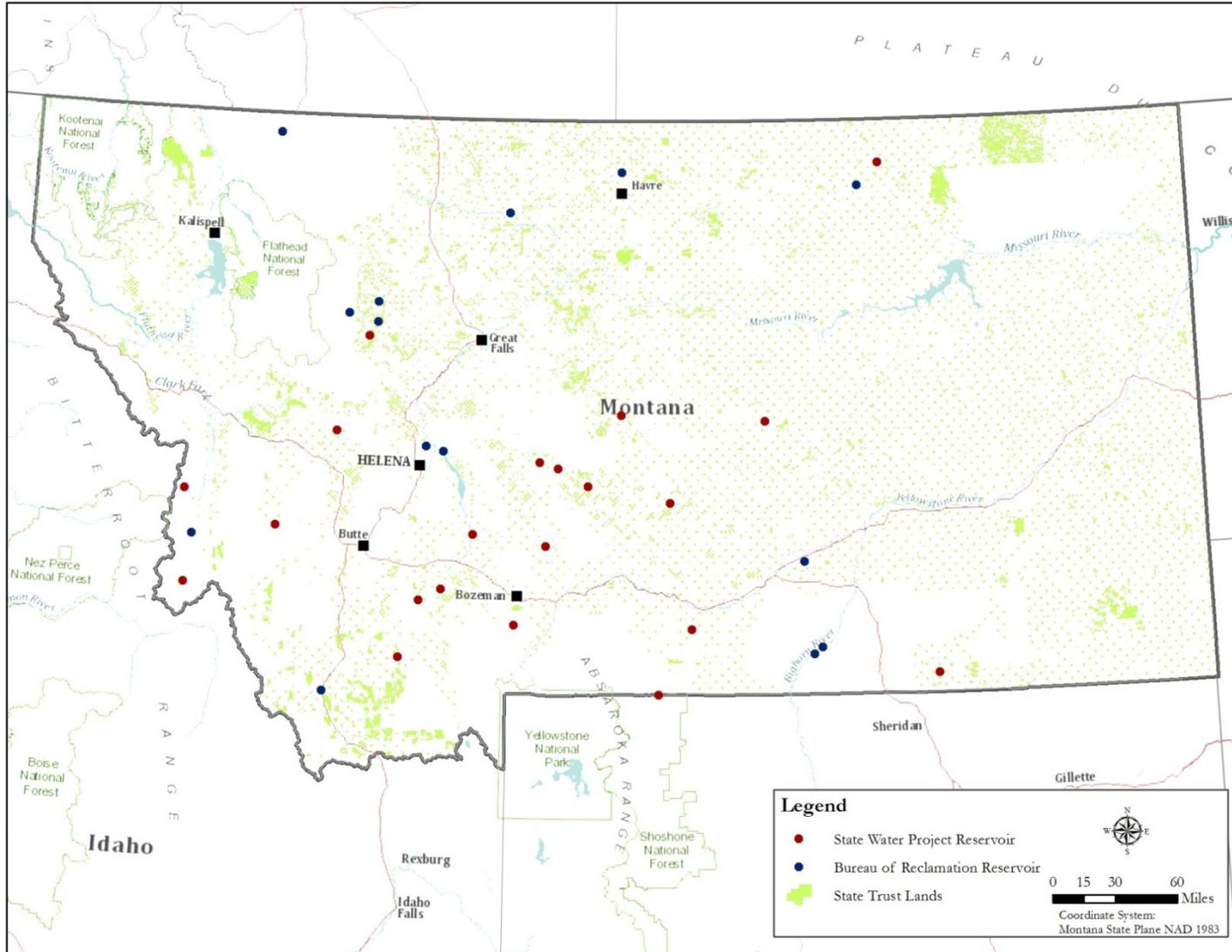
Bureau of Reclamation and DNRC State Water Storage Projects Water Rates

The Bureau of Reclamation (BOR) owns and operates thirteen storage facilities located throughout Montana. The storage facilities store over 1.1 million AF of water and lease it to agricultural, municipal, and industrial water users. The BOR facilities provide water for over 400,000 acres of irrigated land across the state.⁴⁵ DNRC Water Projects Bureau operates twenty-one reservoir storage projects throughout Montana. The DNRC reservoirs store over 350,000 AF.⁴⁶ The map in Figure 6 depicts the locations of these reservoirs.

⁴⁵ http://www.usbr.gov/gp/pf/mt_overview.pdf

⁴⁶ http://dnrc.mt.gov/wrd/water_proj/default.asp

Figure 6: DNRC State Water Projects and Bureau of Reclamation Reservoir Locations



The cost of water obtained from BOR and DNRC storage facilities are not set based upon market pricing. However, the prices paid for this water is an indication of the minimum willingness to pay for water in rural areas of the state. It is recognized that the water stored in these reservoirs is not a viable water supply replacement option for all rural water users in Montana. In that respect, it is not a valid value indication for water rights that are in locations in which BOR and DNRC stored water is inaccessible. However, despite the shortcomings, on a state-wide level the rates paid by agricultural users for BOR and DNRC stored water can serve as reference price point.

Water users lease water out of the BOR and DNRC reservoirs through short-term and long-term contracts. In addition to the water payments to the BOR or DNRC, the water users typically incur additional operations and maintenance (O&M) charges to operate the reservoir and convey the water from the reservoir to the desired place of use. These O&M charges may include reservoir O&M costs, amortized capital costs of constructing canals, canal maintenance, pumping costs, and administrative costs. Typically a Water User's Association (WUA) or Irrigation District (ID) contracts directly with the BOR or DNRC. The WUA or ID will pay the BOR or DNRC for the cost of the water. The WUA or ID then charges their shareholders a charge per acre-foot or per share on an annual basis. The charge from the WUA or ID to the shareholder will typically include both the water costs plus the O&M costs. Thus, the agricultural user pays one entity a total cost for both the water plus the additional O&M costs.

BOR and DNRC Agricultural Water Costs

According to BOR's general water rate setting policy, "Reclamation's water-related contracts must protect the Federal investment and ensure that repayment of the reimbursable capital cost is made in accordance with Reclamation law."⁴⁷ The rates paid specifically by agricultural water users are set based upon their ability to pay. If the irrigator's ability to pay is lower than the required capital cost recovery, then the agricultural rates are subsidized by revenue generated from power or through increased rates paid by M&I users.⁴⁸ The rates paid by agricultural water users also will vary based upon the stage of capital repayment. For example, the capital costs repayment requirements for the irrigation districts utilizing water from Sun River and Milk River projects are repaid. The current payment from those irrigation districts to the BOR is only based upon O&M of the reservoir.⁴⁹ Additionally, rates vary based upon the authorized uses of each reservoir. If

⁴⁷ Bureau of Reclamation, Reclamation Manual Directives and Standards, PEC 05-01, "Water Related Contract and Repayment Principles and Requirements, September 12, 2006, Section C.

⁴⁸ *Ibid.*, C. (1) (a).

⁴⁹ August 30, 2011, conversation with Mark Beatty, Repayment Specialist, Montana Area Office, Bureau of Reclamation.

a reservoir is single purpose, irrigation, the repayment rate for the irrigation users will be higher compared to a multi-purpose reservoir in which the power and M&I purposes subsidize the agricultural rates.⁵⁰

The DNRC State Projects agricultural water rates are also based on a combination of state capital costs repayment, construction loan repayment, reserve account deposits, operations and maintenance costs and assessments as needed to take care of additional repairs or maintenance that is not regularly scheduled.⁵¹

The water rates paid by agricultural water users at the BOR and DNRC facilities varies from \$2.32 per AF per year to \$ 7.50 per AF per year. Capitalized, this equates to \$76 to \$ 244 per AF.

Conveyance O&M Costs

Limited studies have been performed in Montana on the O&M costs to convey water from the BOR or DNRC water storage projects to the end users. As such, there is no current range of costs to utilize for this analysis.

Total End Cost of Water To Agricultural User

Combining both the BOR/DNRC water charges with the estimated O&M charges would result in a total cost paid by the agricultural user. Although no estimate of O&M costs were available, in 2008 DNRC State Projects Bureau surveyed ten irrigation districts that receive projects from DNRC State Projects reservoirs. The goal of the survey was to estimate the total cost of State Projects Bureau water delivered to the end user at their irrigation site. The costs identified in the survey were the WUA charges to their shareholders. The per-share charges are inclusive of both the water component (paid by the WUA to the DNRC) and the WUA O&M costs. The survey identified the cost of water delivered to an acre of land inclusive of accounting for conveyance evaporation loss estimates. The analysis then converted the costs to per acre-foot values using water application standards.⁵² The range of costs to the end user in the survey is \$5.80 to \$18.87 per AF per year.⁵³ Capitalized, this equates to \$189 to \$615 per AF.

⁵⁰ 49 *Ibid.*

⁵¹ 85-1-207, 85-1-211, 85-1-631. Personal Communications with Kevin Smith, DNRC Water Projects Bureau, July, August, September 2011.

⁵² Norberg, Matt, DNRC State Projects Bureau Resource Program Specialist, Memo titled "Water Value-Irrigation District ac-ft analysis", Prepared on December 5, 2008.

⁵³ Figures in 2008 analysis adjusted using Consumer Price Index - All Urban Consumers; 1982-84=100; Series ID # CUUR0000SA0

Although the data collected in this analysis was not standardized across reservoirs and the goals of the data collection efforts was for internal purposes only, this can serve as an estimate for the total cost of water from the BOR and DNRC storage facilities to the end user.

Land Price Differential

The before and after approach, otherwise known as the Land Price Differential Analysis, compares sale prices of agricultural land with water rights to agricultural land without water rights. The differential between the two being the indication of the contributing value of the water right to the property.⁵⁴ A comprehensive land price differential analysis considers all factors that contribute to land values such as buildings and structures, location, and parcel size. In addition, farmer's typically select the most productive ground to irrigate and thus in a land-price differential analysis it is important to keep factors such as soil type constant. A comprehensive land price differential analysis holds the various attributes constant and isolates the contribution of the water to the value of the land. The analysis done in this report cannot be considered a true land price differential analysis. It is only intended to arrive at a high-level estimation of the incremental value that water adds to the property. Despite the shortcomings, the land price differential provides an additional point of reference and a baseline for calculating agricultural water values across the state of Montana.

Land Price Differential Data

Ideally, the land price differential method is performed on a site specific basis including land sales in the immediate region of the subject asset and/or in areas with similar characteristics. However, due to the scope of analysis, this was not feasible. Instead, this analysis collected statewide data, from the United States Department of Agriculture, National Agricultural Statistics Service (NASS). The primary data derived from NASS utilized in this analysis consists of Real Estate Farm Values. The Real Estate Farm values are presented on a state-wide basis and includes irrigated versus non-irrigated crop land values and annual cash rents. NASS has historical record of this information from 1996 to the present. The data collection is based on aerial land based surveys. Crop estimates are calculated with aerial photographs and agricultural producers are surveyed to determine the value of their total operation and the value of their land.⁵⁵ The data utilized in this

⁵⁴ 25 *Ibid.*, page 122-123.

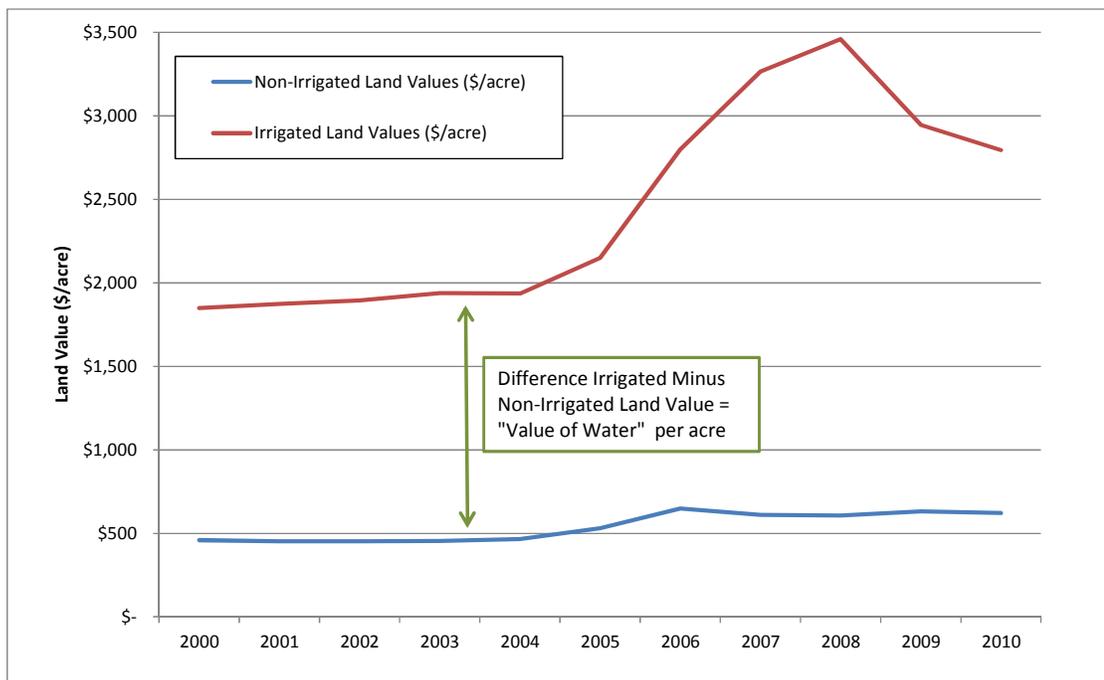
⁵⁵ Pachl, Christel. "NASS data collection." Personal interview. 4 August 2011.

analysis is the irrigated versus non-irrigated crop land values from 2000 to 2010. The historical prices have been adjusted using the CPI to June 2011 dollars.⁵⁶

Land Price Differential Analysis

This section highlights the water values derived from the NASS irrigated and non-irrigated crop land values. As shown in Figure 7, the differential between irrigated and non-irrigated land values has been rising in recent years. In 2000, the differential was \$1,390 per acre and has increased to \$2,174 per acre in 2010. This increased differential may be attributable to an increase in yield per acre, capital investment in irrigation efficiency equipment, removal of low yielding land from irrigation, errors in data collection, and an increased awareness in water values.

Figure 7: Irrigated vs Non-Irrigated Land Values in Montana⁵⁷



To estimate the quantity of water on a per acre basis, an average of all counties of the consumptive use AF/AC was determined using the DNRC standards described previously. This resulted in 0.952 CU AF/AC. This figure was then applied to the per acre irrigated vs non-irrigated land differentials to arrive at an estimated per acre-foot value of water. Table

⁵⁶ Consumer Price Index - All Urban Consumers; 1982-84=100; Series ID # CUUR0000SA0

⁵⁷ http://www.nass.usda.gov/Statistics_by_State/Montana/Publications/economic/realst.htm

4 below displays the estimated per AF value of water derived from this rudimentary land price differential analysis.

**Table 4: Estimated \$/AF Derived From
Rudimentary Land Price Differential Analysis**

Year	\$/AF Value
2000	\$ 1,322.77
2001	\$ 1,352.90
2002	\$ 1,373.65
2003	\$ 1,413.12
2004	\$ 1,399.21
2005	\$ 1,540.41
2006	\$ 2,046.55
2007	\$ 2,528.79
2008	\$ 2,714.75
2009	\$ 2,203.59
2010	\$ 2,069.48

Agricultural Region Value Summary:

The results of the five analysis methods for the agricultural region of the state are shown in Table 5.

Table 5: Summary of Agricultural Region Valuation Methodologies

	Low (\$ / AF)	High (\$ / AF)
Permanent Agricultural Transactions	\$ 65	\$ 1,385
Lease Transactions	\$ 42	\$ 3,614
Review of Existing Studies on Effects of Irrigation on Farm Net Income	\$972	\$1,184
BOR and DNRC Agricultural Rates	\$ 189	\$ 615
Land Price Differential Analysis	\$ 1,323	\$ 2,715

The land price differential analysis does not consider all the factors that drive land values to isolate the value contribution of water. As such, the total differential between irrigated and non-irrigated land values likely overstates the value of the water. Due to these factors, the per AF values derived from the land price differential analysis is not included in the results of this analysis. The values exhibited in the remaining four analyses range from \$42 to \$3,614 per AF.

Summary and Results

TLM’s water right portfolio consists of 10,500 water rights. Lotic made adjustments to the portfolio based on criteria established for stock water rights and estimated transferable volume of water. The resulting estimated transferable TLM water rights include 2,280 water rights with a total of 99,834 AF.

There is a wide range of water right values in Montana. The water rights market in Montana is in its infancy. Limited price signals exist that help to reduce price dispersion in the market. In addition to market price dispersion, the value of each water right is dependent upon many factors. This presents challenges in estimating water right values at a high-level. The existence of such a wide range also enhances the importance of determining value of a water right specific basis. It was beyond the scope of this analysis to evaluate each of TLM’s water rights’ specific attributes. As a result, the analysis does not arrive at an estimated value of TLM’s water right portfolio. Instead the analysis results in a range of unit values exhibited in urban and agricultural regions of the state. The summary of the valuation analysis is shown in Table 6.

The value ranges presented are applicable to TLM’s portfolio of water rights. The values do not represent a fair market valuation or appraisal of TLM’s water rights. Instead, the unit values depict a value range for water rights in Montana.

Table 6: Montana Water Rights Estimated Range of Value Results

Region	Agricultural	Urban
\$/AF Unit Value Range	\$42 to \$3,614	\$290 to \$3,145