

Opportunities for Surface Water Right Marketing in Idaho's Rapidly Urbanizing Treasure Valley

October 2016

Case Study

Final Report on
Political Economy
of Water Markets

Opportunities for Water Right Marketing in Idaho's Rapidly Urbanizing Treasure Valley

A Case Study for the Political Economy of Water Markets Project

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Preface

This paper is one output of a project entitled “The Political Economy of Water Markets.” The project was carried out by Ecosystem Economics LLC and AMP Insights LLC. The outputs of the project include a final report and a set of case studies.

The final report comes in three parts:

1. “Healthy” Water Markets: A Conceptual Framework by Bruce Aylward, David Pilz, Megan Dyson and Carl J. Bauer
2. Political Economy of Water Markets in the Western United States by Bruce Aylward, David Pilz and Leslie Sanchez
3. Comparative Analysis of Legal Regimes with Respect to Fostering “Healthy” Water Markets by David Pilz, Megan Dyson, Bruce Aylward, Carl J. Bauer and Amy Hardberger

The eight case studies consist of the following.

1. The Evolving Water Market in Chile’s Maipo River Basin by Carl J. Bauer
2. Addressing Overallocation and Water Trade in New South Wales, Australia: Namoi Basin Groundwater by Megan Dyson
3. Evolution of Australian Water Law and the National Water Initiative Framework by Megan Dyson
4. Opportunities for Surface Water Right Marketing in Idaho’s Rapidly Urbanizing Treasure Valley by Jeff Fereday
5. Texas Groundwater Markets and the Edwards Aquifer by Amy Hardberger
6. Oregon’s Umatilla Basin Aquifer Recharge and Basalt Bank by Martha Pagel
7. Truckee-Carson Surface Water Markets in Northern Nevada by Leslie Sanchez, Bruce Aylward and Don Springmeyer
8. Smart Markets for Groundwater Trading in Western Nebraska: The Twin Platte by Richael Young

The studies and reports can be downloaded from the AMP Insights website at <http://www.ampinsights.com/rock-report>.

For further information on this work please contact Bruce Aylward at bruce@ampinsights.com.

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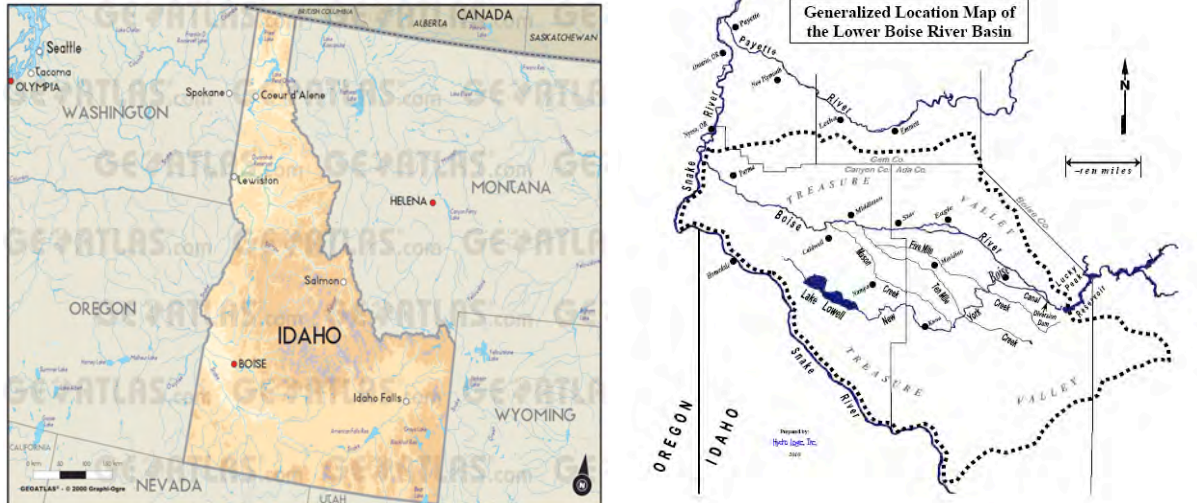
Author

Jeff Fereday is a partner and senior practitioner in natural resources and environmental law in the Boise, Idaho firm of Givens Pursley, LLP. He has been with Givens Pursley since 1985, a partner since 1987. Jeff began his law career as an Honors Program Attorney at the Department of the Interior in Washington, D.C., and later practiced water law and environmental law with the Denver firm of Davis, Graham & Stubbs. In Idaho, Jeff has been active on behalf of many clients in the Snake River Basin water rights adjudication since it began in 1987. He has argued several water and natural resources cases in the Idaho Supreme Court and in the federal courts. Jeff is co-author, with Chris Meyer and Mike Creamer, of the Idaho Water Law Handbook. In February 2001, the Lewis and Clark Law School conferred upon Jeff the law school's Distinguished Environmental Law Graduate Award.

I. BACKGROUND: THE POTENTIAL MARKET AREA AND THE PREMISE OF THIS STUDY.

This case study concerns irrigation water use and the potential for marketing surface-diversion irrigation water rights in Idaho's Treasure Valley, a 1,500-square-mile area comprising the lower Boise River drainage in Ada and Canyon Counties (Figure 1).

Figure 1



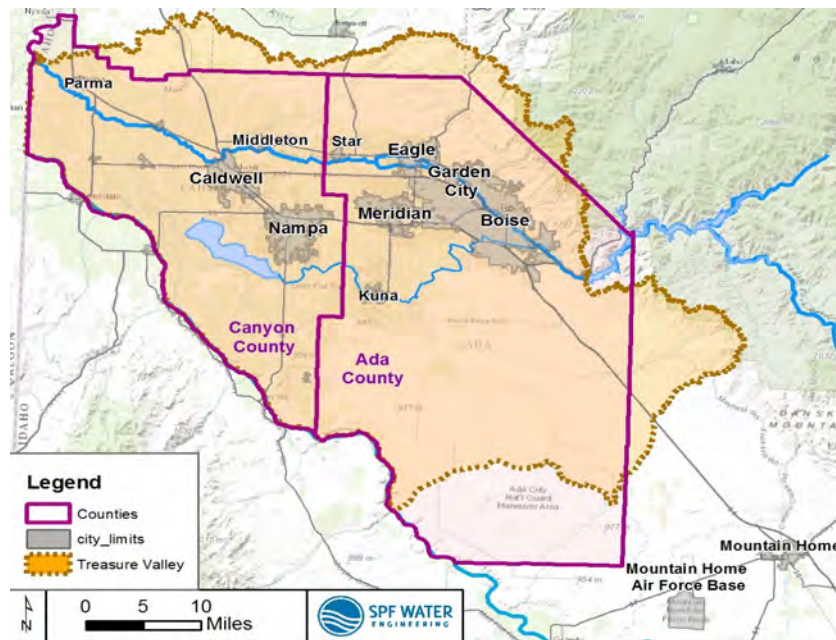
The water rights presumed to be available for marketing are those appurtenant to lands that have been permanently removed from irrigation due to commercial and residential development. Currently, few of these rights are being brought to market or made available for other uses. This study describes the beliefs and institutional arrangements behind this situation. It suggests the actions that might help bring about a robust market in surface irrigation water rights in the Treasure Valley.¹

¹ I prepared this case study in part as an outgrowth of the investigations and legal analysis my law partner, Michael C. Creamer, and I conducted in 2010 that resulted in our law review article, Fereday and Creamer, "The Maximum Use Doctrine and Its Relevance to Water Rights Administration in Idaho's Lower Boise River Basin," 47 Idaho L. Rev. 67, 92-94 (2010) ("Fereday and Creamer"). The present case study augments the 2010 article primarily by focusing more specifically on water right marketing, by addressing certain new developments and expert reports, and by conducting interviews with various stakeholders, including: legal counsel to the Boise Project Board of Control (and also an Idaho Water Resource Board member) (Albert Barker, Esq.), the Director of the Idaho Department of Water Resources (Gary Spackman); a former Director of IDWR and currently-active water rights engineer (David Tuthill, PhD, Idaho Water Engineering, LLC); the author of the Demand Study referenced frequently herein (Christian Petrich, PhD); Terry Scanlan, P.E., P.G., Principal Engineer/Hydrogeologist, SPF Water Engineering LLC; representatives of the U.S. Bureau of Reclamation (Matt Howard, Esq., Gail McGarry, and Ryan Patterson); the Public Works Director, City of Meridian (Thomas Barry) and his staff (Kyle Radek and David Miles); Boise City Council member Lauren McLean; and Dan Steenson, counsel for Nampa and Meridian Irrigation District.

A. Treasure Valley's increasing municipal water demand.

Treasure Valley is home to approximately 630,000 residents in several communities, including Idaho's two largest cities, Boise and Nampa.² These and other Valley cities—such as Meridian, Kuna, Caldwell, Star and Eagle (Figure 2)—are experiencing some of the Nation's most rapid population growth.

Figure 2



Demand Study, p. 4

According to the August 8, 2016 *Treasure Valley DCMI Water-Demand Projections (2015-2065)* (SPF Water Engineering 2015) (“Demand Study”) conducted for the Idaho Water Resource Board (“IWRB” or the “Water Board”),³ the Valley is projected to have 1.57 million residents by 2065. The Demand Study focused on the future water needs of municipal and industrial users—in Idaho this is commonly referred to as “domestic, commercial, municipal and industrial, or “DCMI” water needs; in terms of a typical household, the municipal element

² 2014 Census, as cited in Treasure Valley Future Water Demand Study (Petrich 2015), p. 1.

³ The Idaho Water Resource Board was created when Idaho's Constitution was amended in 1964 following reports that the Bureau of Reclamation was studying ways to divert water from Idaho's Snake River to serve cities in the Southwest. The amendment vests this state “water resource agency” with authority to build water projects and “to formulate and implement a state water plan for optimum development of water resources in the public interest.” Idaho Const. Art. XV § 7. A statute officially names this agency the Idaho Water Resource Board and directs that its plan be guided by principles such as: “Optimum economic development in the interest of and for the benefit of the state as a whole shall be achieved by integration and coordination of the use of water and the augmentation of existing supplies” Idaho Code § 42-1734A(1)(a). The Board's duties with respect to storage projects includes “[c]onserving the highest use of the water for all purposes” and the “prevention of wasteful, uneconomic, impracticable or unreasonable use of the waters involved.” Idaho Code § 42-1737(b)(1) and (5). The Board has control over, and adopts rules governing, the State water supply bank. Idaho Code § 42-1761.

includes both indoor and outdoor (i.e., lawn and landscape irrigation) uses. Citing the Demand Study, IWRB issued a press release stating that in fifty years the Valley’s “demand for water supplies may grow by 245 percent to 357 percent above today’s current rates.” (IDWR, March 29, 2016.)

However, as the Demand Study itself makes clear, the “demand for water supplies” to which the Water Board refers is not water demand overall, but demand for DCMI water supplies. Water demand for agricultural irrigation, which accounts for over 90% of the Valley’s water use, is expected to *decline* substantially in that period—likely more than 40%—as agricultural lands are converted into impervious surfaces due to development.⁴

It is not explained why the Water Board refers broadly to a future where the Valley’s “demand for water supplies” will triple in the next fifty years while simultaneously avoiding the question of irrigation water use for agriculture over that period. The message seems to be that the Board believes either no irrigation water will go unused in the conversion of agricultural land to subdivisions and commercial development, or that any unused irrigation water—of whatever amount⁵—is not a subject for discussion.

B. Irrigated cropland replaced by development.

Much of the Valley’s growth so far (residential subdivisions, commercial areas, roads, shopping malls, etc.) has occurred on the Valley floor as the cities’ boundaries have expanded onto agricultural lands that historically were irrigated with natural flow and storage water diversions from the Boise River. Future growth is projected to continue this trend. The Demand Study states that “[m]ost of the population and household growth is expected to occur in the central portion of the valley (Boise, Meridian, Kuna, Eagle, etc.).”⁶ Converting these lands from surface-irrigated agriculture to urban and suburban uses—and even assuming ditch water will irrigate lawns and landscaped areas—of course reduces the parcel’s irrigated area. An earlier investigation by the Demand Study’s author states that in urban subdivisions, the impervious area resulting from agricultural land development averages 62% of the original farm parcel.⁷

⁴ See Demand Study, p. 7 (WRIME Report chart, projecting a 44 percent decline in agricultural irrigation by 2060). The City of Meridian’s Public Works Director believes this figure is low, and that by 2065 the decline in the Treasure Valley’s agricultural irrigation water demand will be closer to 60 percent. Personal communication with Thomas Barry, P.E., June 9, 2016.

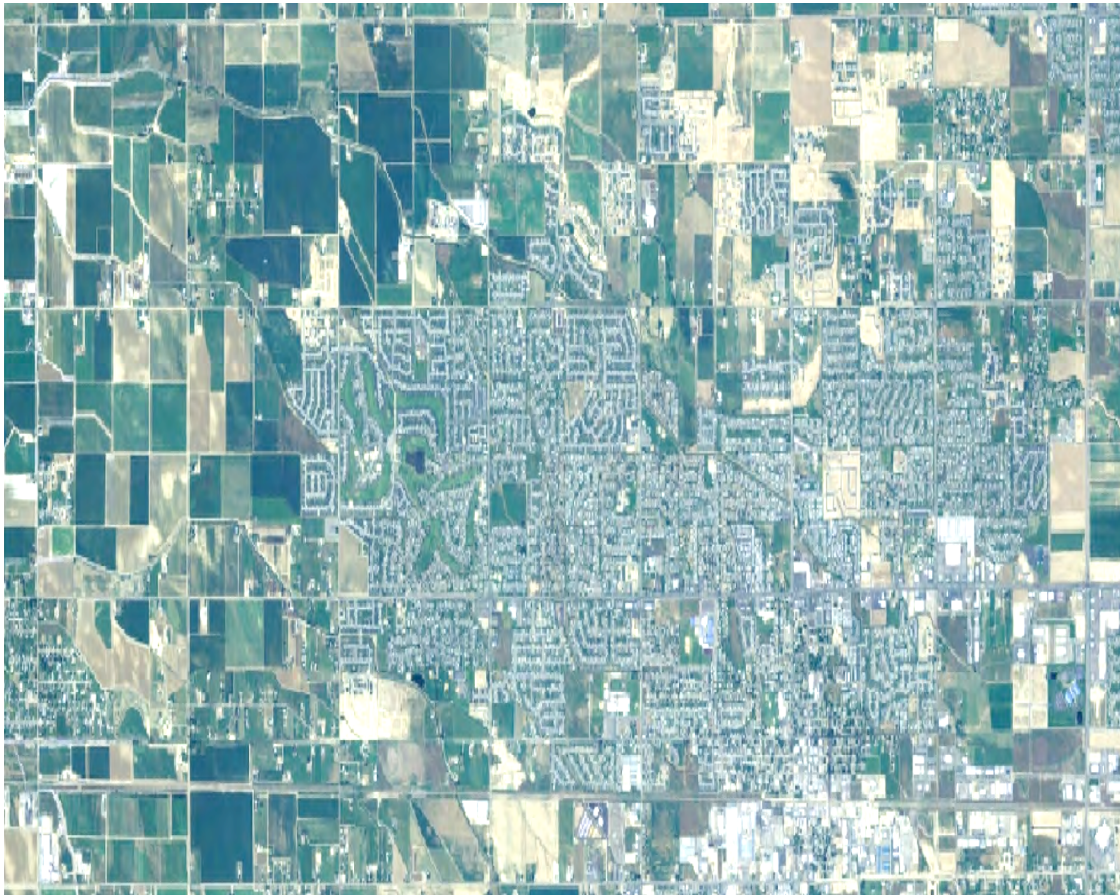
⁵ As noted elsewhere in this case study, it is not known how much agricultural irrigation water actually will be available for new uses as a result of Treasure Valley urbanization. One contention here is that the various stakeholders (the State, irrigation entities, cities, municipal water suppliers, NGOs) would benefit from finding out.

⁶ Demand Study, pp. 41 and 54, Fig 21. Some of the Valley’s growth will occur on lands that previously were not irrigated, such as foothills properties or high desert land in south Ada County. It is possible that portions of the growing wine grape industry will develop vineyards on previously non-irrigated land. The amount of such development is difficult to project, but the trend, and the projection through 2065, is that the majority of development will occur on surface-irrigated land in the valley. Demand Study p. 54, Fig. 21.

⁷ SPF Water Eng’g, LLC, *Estimate of Non-Irrigated Acres in the Twin Falls Canal Company Service Area* p. 1 (2007).

Figure 3, an aerial view of a portion of the historically agricultural area west of Boise illustrates the pattern of Treasure Valley development. Figure 4 illustrates the substantial portion of impermeable (non-irrigated) land surface before and after development. One premise of this study is that land development in the Treasure Valley should make portions of agricultural irrigation water rights representing annual diversions of many thousands of acre-feet available for sale, lease and transfer to new uses in the Valley.⁸

Figure 3



⁸ Each of the Valley's municipal water providers (cities and a few private utilities) rely exclusively on groundwater except Suez (f/k/a United Water Idaho), a private utility serving Boise, which has two water intakes on the Boise River and uses treated river water for about 40% of its supply. In the future, it is reasonable to predict that Suez's need for Boise River water will increase, and that other Treasure Valley cities and municipal suppliers will turn to surface water to supplement their groundwater supplies if it is available.

Figure 4



Despite its focus on DCMi requirements, the Demand Study did provide useful figures, including the following chart (Figure 5) displaying water demand projections for both agricultural irrigation and DCMi through 2060. This projects that the amount of annual agricultural irrigation demand—primarily surface water diversions from the Boise River—will be some 650,000 acre-feet year *less* in 2060 than in 2010:

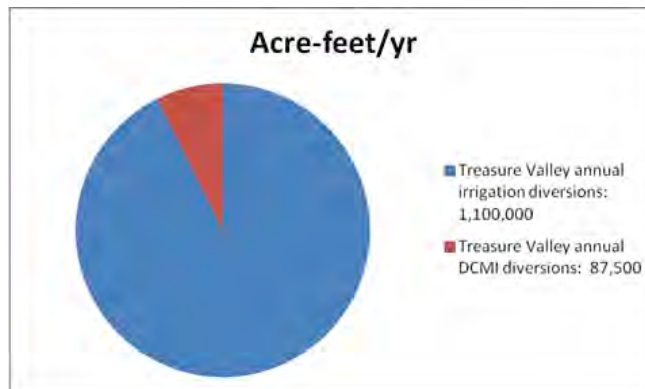
Figure 5

Summary of 2010 Water Demand Projections ⁽¹⁾ (AF/Year)			
Year	DCMI	Agricultural ⁽²⁾	Total
2010	228,535	1,487,412	1,715,947
2020	307,210	1,413,773	1,720,983
2030	416,050	1,375,116	1,791,166
2040	564,491	1,171,831	1,736,322
2050	759,797	977,256	1,737,053
2060	962,077	836,760	1,798,837
Net projected change 2010-2060	733,542	-650,652	82,890
Percentage change 2010-2060	321%	-44%	5%
Notes : (1) Taken from WRIME (2010), Tables 6-1, 6-2, and 6-3. (2) "Average" moisture conditions .			

Demand Study p. 7 (citing WRIME Report, 2010).

Thus, according to this projection, the net increase in overall water demand in the Treasure Valley will be a mere five percent by 2060, despite projected DCMI demand growth of 321 percent. This makes sense, as illustrated by the pie chart below, Figure 6: Even small percentage decreases in agricultural water demand easily can account for much more water than larger percentage increases in DCMI water needs.

Figure 6



Irrigated farmland in the Treasure Valley comprised approximately 332,000 acres in 1978. By 2007, due primarily to urbanization, that amount had declined to about 254,000 acres,⁹ a 23 percent (78,000 acre) decline in that 20-year period. Ada County (home to Boise, Meridian, Kuna, Eagle and Star) experienced a 42 percent decline in agricultural land in this period. As noted in the Demand Study, the pace of farmland conversion does not appear to be slowing.¹⁰ Consequently, the additional reduction in the Valley's irrigated agricultural acres from 2007-2015 likely is in the range of 20,000 acres, or another 8 percent, although these figures have not yet been compiled. Annual consumptive use of water on irrigated farmland in the Treasure Valley ranges from 2-3 acre-feet per acre.¹¹

These circumstances, together with ordinary market forces, should make the unneeded portion of these “urbanized” (or “suburbanized”) surface irrigation water rights available for lease or sale for uses elsewhere in the Valley, for both irrigation and non-irrigation purposes, and should entail a commensurate reduction of demand for storage water.¹² However, there is little or no market activity around these changes in water usage and it is unclear when, or whether, it might begin. Because the changes in water demand and use due to urbanization are occurring in place, with no water right transfers moving unneeded water to other uses, some portion of the diverted irrigation water must simply be running through subdivisions and other developed areas, leaking to shallow aquifers and/or returning through drain ditches to the Boise River. There is little question water rights marketing could play a significant role in the Valley.

Likewise, there is no real question that water marketing is, or at least can be, an important tool in addressing drought and water scarcity in the West. Indeed, there is a good argument that a robust water rights market system is the most promising means to address these challenges. At the very least, water rights marketing promotes efficiency of water use. Selling and changing water rights also is fully compatible with, and encouraged by, Idaho's Prior Appropriation

⁹ These figures come from the Census of Agriculture, conducted in conjunction with the decadal census. They do not differentiate between ground water irrigated land and surface irrigated land. Over the last fifty years, there has been a significant amount of ground water irrigation developed in the Valley, but very little (or no) net new surface water-irrigated land. This case study is concerned primarily with the potential market for surface irrigation water rights that formerly served agricultural land that has been urbanized. There are no compiled figures breaking out these categories. Consequently, the amount of surface irrigated land in the Valley probably has experienced a steeper decline than reported here.

¹⁰ Demand Study, Table 8, p. 47. While there are no definitive figures on the amount of water used by commercial and industrial users in the Treasure Valley, the amounts are assumed to be a minor percentage of overall DCMI use. The largest industrial water users likely are Micron Technologies, Hewlett-Packard, and food processing plants such as Amalgamated Sugar, Simplot, and Sorrento Lactalis. Each of these uses ground water for its main supply.

¹¹ See Richard G. Allen and Clarence W. Robison, “Evapotranspiration and Consumptive Irrigation Water Requirements for Idaho (University of Idaho, 2007).

¹² Diverting less water to account for the irrigation entities' reduced irrigated acreages also should allow these entities to leave more water in reservoir storage, thus serving as a hedge against multiple-year drought and lessening any perceived need for additional storage facilities on the Boise River.

Doctrine water law system.¹³ It is not a stretch to say that, for the Doctrine really to function in service of growing western communities, an efficient water market is essential.

C. Continued full irrigation diversions to declining irrigated land base.

The irrigation districts and a few large mutual canal companies who together control the bulk of the Valley's surface water rights¹⁴ have followed a tradition of continuing to divert their full surface water entitlements, and serving more subdivisions each year, despite the decline in their actually irrigated acres. With few exceptions, the irrigation entities have not marketed or otherwise moved surplus or unneeded water rights to other irrigation enterprises, or to industries or cities.

In its discussion of what water sources might supply the growing DCMI demand, the Demand Study dismissed surface irrigation diversions as a potential source in part because:

Irrigation-delivery entities in the Treasure Valley generally have not accounted for impermeable land in determining delivery rates for urban areas to which they deliver surface water for irrigation. Instead, they have continued to deliver water based on pre-development irrigated acreage (i.e., "gross acres") rather than post-development net irrigated acreage.¹⁵

Because of this practice, the Demand Study "assumed that future demand for indoor, *potable* DCMI uses will not be supplied by surface water"¹⁶

The Demand Study provides these reasons for this practice—reasons presumably articulated by irrigation entity representatives:

(1) urban turf requires more water than some lower water-use crops (e.g., grains), (2) irrigation seasons may be longer in urban

¹³ Idaho's "first-in-time, first-in-right" water law system is coupled with the obligation to divert only to "beneficial uses" and without waste under a policy of "optimum development of water resources in the public interest." Idaho Constitution, Art. XV, §§ 3 and 7; Idaho Code § 42-220 (2010) (no licensee or claimant of a decreed right "shall at any time be entitled to the use of more water than can be beneficially applied . . ."). In Idaho, as in other western states, the policy of "maximum use" of water also is part of our water law. *See, e.g.*, *Wash. State Sugar Co. v. Goodrich*, 27 Idaho 26, 44, 147 P. 1073, 1079 (1915); *Poole v. Olaveson*, 82 Idaho 496, 502, 356 P.2d 61, 65 (1960). Idaho Code §§ 42-222 and 42-108 authorize and regulate transfers. Failure to use a water right for a sufficient period can result in its forfeiture. Idaho Code § 42-222.

¹⁴ In the Treasure Valley, the largest irrigation districts in the fastest urbanizing areas are the New York, Nampa & Meridian, Settlers, Pioneer, Riverside, and Boise-Kuna Irrigation Districts. The larger canal companies in these areas are the Farmer's Union Ditch Co., Ballentyne Ditch Co., Boise Valley Irrigation Ditch Co., and New Union Ditch Co.

¹⁵ Demand Study, p. 20.

¹⁶ *Id.*, p. 19.

areas (i.e., irrigation may start earlier, and may not cease during previous “harvest” times), and (3) the greater delivery rates for “gross acres” are necessary to meet a more variable urban irrigation demand.¹⁷

None of these rationales is supported by any data or analysis, and the justifications appear weak. For example, the irrigation season in the subdivision will be exactly the same as all other users on the canal each year because the season of use is governed by the irrigation entities’ water right decrees; any early or late irrigation would be supplied by the municipal provider. It is plausible that suburban lawns, at least, could account for more irrigation water demand per acre over a season than, say, an alfalfa field due to the absence of harvest interruptions in the case of lawn and landscape irrigation. But even accounting for a high-demand crop (such as turf) on all of the remaining irrigated acres and assuming no pauses for harvest, replacing a fully irrigated agricultural parcel with a partially-irrigated one still is almost certain to result in substantial reductions in beneficial use (and consumptive use) of irrigation water. The exact numbers can and should be determined by an analysis of actual data, such as the one called for by this case study.

As explained in Fereday and Creamer, various rationales can be advanced for this “prevailing system of over-deliveries and diversions”: 1) it enables subdivisions to have constant high flows to support a “peaking capability” during periods of high demand; 2) it “minimizes both complaints from homeowners about low water pressure during peak irrigation times and labor and management costs for the delivery entity”; 3) it accommodates the suburban lifestyle, where homeowners want to use their lawns during the day and irrigate at night; and 4) it enables irrigation entities simply to deliver to lateral ditches and canals, and avoid monitoring or measuring water use.¹⁸

To be sure, an as-yet unquantified portion of this unused water doubtless “returns to drains, canals, streams, shallow aquifers and ultimately, the river.”¹⁹ And while some of this now-unused water “may be picked up in other canals for use on other lands by other irrigation entities,” *id.*, this “does not satisfy the prior appropriation doctrine’s mandate” that diverted water

¹⁷ Demand Study, p. 20. Consequently, the Demand Study assumes that agricultural irrigation water supplies will not be transferred/changed to supply some of the growing DCMI demand, and that “[o]ptions for supplying the net DCMI demand could include (1) diversions from the Boise River (through increased surface-water storage, use of flood flows for aquifer storage and recovery strategy, or direct diversions from the Boise River below Star, Idaho [where return flows traditionally have made the river under-appropriated]), (2) additional development of Treasure Valley groundwater, (3) new diversions from the Snake River, or (4) reuse of treated municipal effluent.” Demand Study, p. 129. Conspicuously absent from this list of highly capital-intensive infrastructure development is the conversion of some agricultural irrigation water rights to DCMI uses.

¹⁸ Fereday and Creamer, p. 98. Subdivisions could deal with the need to supply peak amounts of irrigation water, as often as daily, by constructing ponds from which to pump. This can accommodate both the peaking demand and the need to maintain a constant flow to the subdivision in an amount that comports with the beneficial use obligation. A few subdivisions in the Treasure Valley use such ponds. A data gathering effort could reveal where they are and how this technique could be expanded to accomplish lower diversions per-irrigated acre.

¹⁹ *Id.*

be placed to a beneficial use in the first place, and on particular lands.²⁰ In any event, any such re-used amounts have never been quantified.

The Idaho Department of Water Resources does not routinely evaluate or measure actual beneficial use of diverted surface water. The Boise River Watermaster, who technically works for the Department but is elected by the water users whose water rights he or she administers, measures water into canals and laterals, but not beyond that. End uses are not measured, much less evaluated in comparison to the acres actually being irrigated. Despite the legal requirement to divert only to beneficial use without waste, diversions often do not change with changing circumstances on the ground.

On the other hand, the fate of the diverted irrigation water, including its consumptive use, always follows strict and immutable rules: the laws of physics. If irrigation ceases on a portion of a farm that has been sold for commercial development, the farm's consumptive water use decreases, even though the ditch serving the farm still may be diverting and carrying as much water from the river as it ever did.

If a true market existed, the water right for the farm's developed portion would be sold or leased and thus made available for transfer to a new place or type of use elsewhere.²¹ That portion of the water right could continue to be placed to beneficial use and thus retain both its priority and its validity. This is what routinely occurs in other western states. In Idaho, it also could be placed in the water bank, a subject discussed below at page 23.

D. The amount of surface irrigation water that could made available for other uses through urbanization depends on several factors, but it is assumed to be substantial.

It is not known how much surface water would be made available, through marketing or otherwise, for other uses in the Treasure Valley if canal diversions were reduced to correlate to the amount of actually irrigated land in the subdivisions and other developed areas. And certainly there are complicating factors. For example, in most years most Treasure Valley irrigators run out of natural flow and must rely on their storage accounts to finish the season. In some years they grow lower-consumptive crops than, say, alfalfa, which has a consumptive demand roughly equivalent to the turf grass that makes up subdivision lawns. Nearly every year involves periods, such as harvest, where the farmer interrupts irrigation altogether. Thus, agricultural irrigation may involve lower average annual consumptive use per acre than suburban irrigation.

²⁰ *Id.*

²¹ Any such transfer would require an evaluation of such things as historical consumptive use and would require reducing the original diversion at the original place of use. But with neither sale nor transfer, state authorities likely are unaware of the farmer's reduction in irrigated acres, and the farmer (or his irrigation district or canal company) still would hold the license or decree specifying a water right at its historical point of diversion, with its full original flow rate and for the entire farm parcel.

As noted, one must assume that a significant portion, perhaps half, of the foregone agricultural irrigation water—the estimated 650,000 acre-feet annually by 2060 as reported in the Demand Study—will be taken up by subdivision lawn and landscape irrigation. However, there is little doubt that a substantial portion (again, perhaps half) will be unneeded to serve the suburban uses and could be marketed. This is part of what would be revealed by a study of Treasure Valley irrigation practices, such as that proposed in Attachment A.

E. Past sales of irrigation water rights.

Some sales of Boise River water rights have been consummated over the past thirty years, but only sporadically and in small amounts.²² Moreover, such sales typically have been difficult to achieve and involve significant transaction costs because the entities diverting the rights are reluctant to allow sales or transfers. Sales also usually occur only where the right is individually held (which is rare) or is owned under shares in a small mutual canal company. For what appear to be political or cultural reasons, such sales do not take place where the right is held by an irrigation district.²³ Treasure Valley irrigation districts typically do not allow their water rights to be used outside district boundaries, although there is no legal prohibition of it.

F. The argument for more Boise River storage.

From 2014 through 2016, irrigation entities, together with the U.S. Army Corps of Engineers, the Bureau of Reclamation and the Idaho Water Resource Board, investigated the possibility of constructing new, or enlarging existing, storage projects on the Boise River. The irrigators were interested in more storage for agriculture, but serving the increased DCMI demand also was cited as a reason. Some of this evaluation continues. For example, the Demand Study states that the “[o]ptions for supplying the increased net DCMI demand could include ... diversions from the Boise River [] through increased surface-water storage....”²⁴

Moreover, the irrigators’ primary political voice, the Idaho Water Users Association, has stated that “[w]ithout new sources of water, increasing urban and environmental demands threaten to deplete existing agricultural supplies and seriously threaten the future of Western irrigated agriculture.”²⁵ Similarly, the Boise River Watermaster contends that “increased water

²² In the 1980s, Suez purchased irrigation water rights in small amounts from shareholders in the Thurman Mill Ditch Company, the South Boise Water Company and the Boise City Canal Company, each serving heavily urbanized areas. Indeed, many entities in the Boise area now serve very little actual agricultural land.

²³ Irrigation districts hold the majority of the Valley’s surface water rights. Canal companies, which are private, non-profit corporations, are the second-largest holders of irrigation water rights in the area. Some canal companies have been willing to allow or engage in sales and transfers of surface water rights represented by shares in their companies. However, most are governed by boards that hold views similar to those of the irrigation districts, and most remain resistant to such sales.

²⁴ Demand Study, p. 129.

²⁵ Testimony of Norman M. Semanko, Executive Director & General Counsel, Idaho Water Users Association, Inc. before the U.S. House of Representatives Committee on Natural Resources, Subcommittee on Water and Power Hearing on “Creating Abundant Water and Power Supplies and Job Growth by Restoring Common Sense to Federal Regulations,” April 5, 2011. It is not clear how the trend of urban development in the Treasure Valley threatens to “deplete existing agricultural supplies.” The decline in Treasure Valley irrigated

storage capacity is the only solution” for the problems of climate change and population growth in the Treasure Valley.²⁶ Nowhere is the suggestion that water marketing or moving unneeded diversions to other uses might be part of the solution.

Indeed, the Boise River Watermaster has dismissed the notion of better “water management” with the comment that “more than a century of Idaho law dictates exactly both the nature of use and the amount of water an individual farmer, a city, a homeowner or an entire irrigation district gets during the irrigation season.” He implies that the districts in the Treasure Valley’s urbanizing areas are strictly adhering to the statutory rule that irrigation diversions are to be solely for beneficial use and conform to a strict duty of water defined by decree or historical use. However, they are diverting more water per irrigated acre to subdivisions than they diverted to the farm previously located on the parcel. It is difficult to conclude that the irrigation entities are adhering to the rule of beneficial use or to the mandate to divert only an amount that comports with a reasonable duty of water.²⁷

Still, economic factors cannot be ignored. On May 18, 2016, the U.S. Army Corps of Engineers announced it would no longer study raising the Boise River’s Arrowrock Dam because building the increased storage did not pass a cost/benefit test even when irrigation was considered along with flood control. The news reportedly shocked the IWRB.²⁸ In making its determination, the Corps did not analyze the potential that increased storage carryover would occur if diversions were reduced to urbanized lands. If it had, presumably this would have made the new storage proposal even less feasible economically.

G. Environmental implications.

There are no studies addressing the environmental impacts of excess diversions of irrigation water in the Treasure Valley. However, it would appear that any significant amount of surface water diverted unused through subdivisions and commercial areas will transport sediment, street runoff, pesticides, fertilizers, heat, and other pollutants to the Boise River.

agriculture is a response to the housing and commercial real estate markets, and such declines reduce the number of acres seeking irrigation water, including storage. If the irrigation entities find a way to stop diverting unneeded portions of their water rights to non-irrigated portions of subdivisions, the trend for remaining agriculture should be more abundant natural flow and more successful storage.

²⁶ Rex Barrie, “Treasure Valley needs additional storage capacity,” Reader’s View, Idaho Statesman, Monday, December 2, 2013, p. A10.

²⁷ As documented in Fereday and Creamer (2010), “Comments from one valley irrigation district regarding the Treasure Valley water demand study commissioned in the CAMP process simply take the position that, if there is still a water right registered for the parcel, the question whether it is still irrigated is irrelevant: ‘The [report’s] conclusion, that land conversion from agriculture to urban land use will be a net loss of 154,718 acres of agricultural ground is not indicative of the change in demand on the appropriated water delivery system. If all of the acres converted from agricultural to urban land use have an appropriated water right associated with them, there is no issue.’ Comments of Gayle Batt, Wilder Irrigation District (October 12, 2010), on file with Idaho Department of Water Resources, Treasure Valley CAMP project.”

²⁸ Betsy Russell, Spokesman-Review, “Army Corps tells IDWR board that raising Arrowrock Dam doesn’t pencil out,” (May 19, 2016).

Aquatic habitat in the Boise River can be stressed due to low flows in winter and early spring when storage rights upstream (to fill Arrowrock, Anderson Ranch, and Lucky Peak reservoirs) are taking most of the river's natural flow.²⁹ Elevated temperatures in the Snake River downstream are doing significant damage to endangered salmon runs.³⁰

While there is a conservation pool in Lucky Peak devoted to instream flows in such periods, these amounts may not be sufficient in some years to provide optimal habitat. Fisheries and other instream values would benefit from an increased ability to supply winter and spring flows.³¹ Changing some natural flow or storage irrigation rights to instream purposes could provide opportunities to enhance the Treasure Valley's natural environment.³² Again, water rights marketing should be a tool available to policy makers in responding to these problems.

II. THE NEED FOR DATA.

To determine what amounts of natural flow or storage water might be available for marketing and transferring to new uses due to urbanization, it would be necessary to survey, among other things, the irrigation entities' diversions, their actually irrigated acres, and the fate of return and drain flows arising from these diversions. Attachment A sets forth a proposed investigation framework to accomplish this. To date, no entity has stepped forward to implement such a plan. For example, the Idaho Department of Water Resources ("IDWR") does not track how much land is being permanently converted from irrigated to non-irrigated in the Treasure Valley or elsewhere in the State. Nor is there an annual listing of water right transfers, although IDWR has this information because it processes them. IDWR almost certainly would be willing to participate in such a data-gathering effort, provided funding is available.³³

A. The peaking and overuse problems in subdivisions.

Nonetheless, some data has been developed on subdivisions' actual use of irrigation water in the Treasure Valley. The following graph, Figure 7, was prepared by a water resources engineering firm and was based on measured pumping data for a Boise subdivision that uses

²⁹ See, e.g., Boise River Enhancement Network, <http://boiseriverenhancement.net/page/appendices>, [BREN_Fisheries_7_15.pdf](#) (2015)

³⁰ Rocky Barker, "Columbia and Snake Sockeye Decimated by 2015's Warm Rivers," <http://www.idahostatesman.com/news/local/news-columns-blogs/letters-from-the-west/article71657737.html> (April 13, 2016).

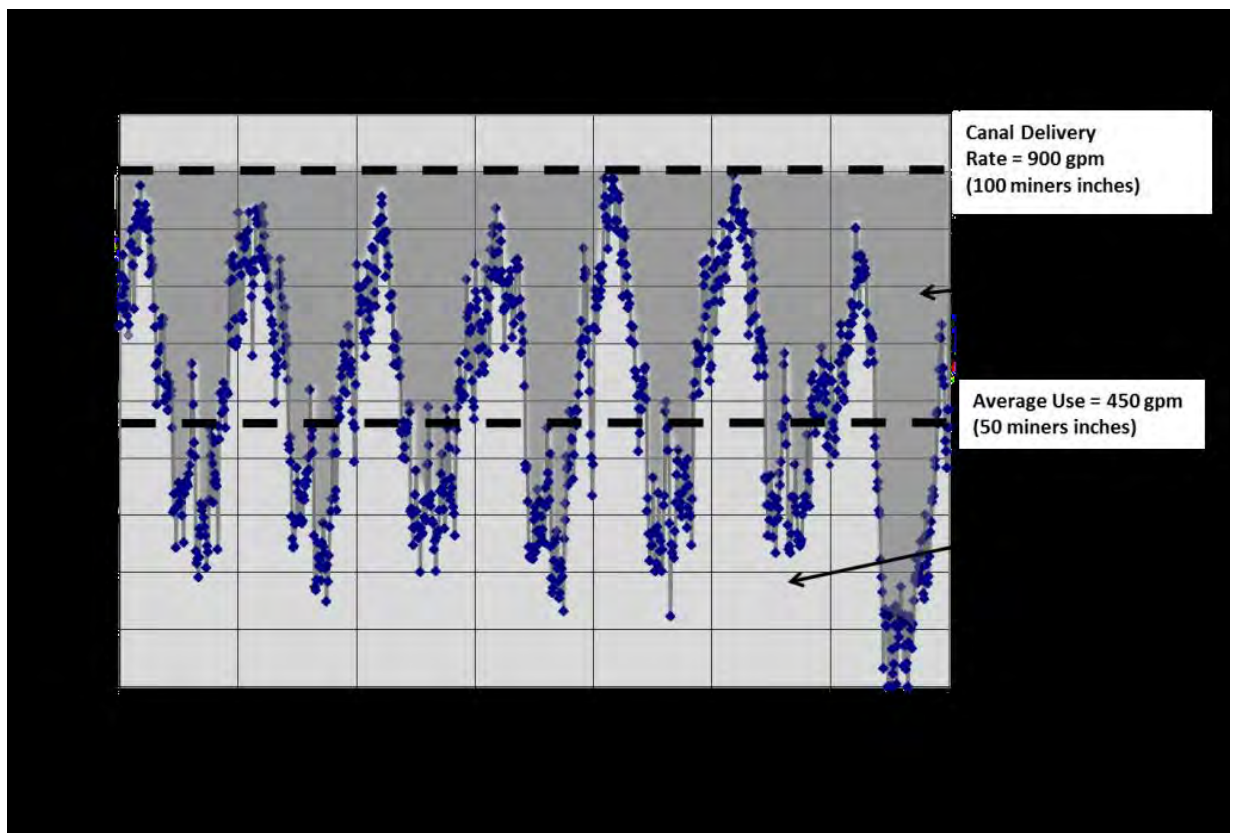
³¹ *Id.*

³² Idaho's minimum stream flow statute authorizes the Water Board to hold instream rights for purposes such as fish, wildlife, and recreational values. Idaho Code §§ 42-1501 to 42-1507. The statute does not expressly authorize the Water Board to purchase or accept a donation of a consumptive use water right, such as an irrigation right, and change its nature of use to instream flow. Although this is done routinely in other states, it has not yet been attempted in Idaho. In 1991 and 1992, the Idaho Legislature considered but rejected legislation drafted by the Department of Water Resources which would have established a procedure for transfers to instream uses that would have allowed a willing holder of a water right to assign or donate the right to the Water Resource Board, which, in turn, would seek approval to hold the right for instream purposes in a particular stream reach without loss of priority.

³³ Personal communication with IDWR Director Gary Spackman, May 27, 2016.

non-potable irrigation water for its lawns, landscaping and common area. The graph is scaled to represent a hypothetical 100-acre (i.e., gross acre) subdivision that is 50 percent impermeable.³⁴ The same 100 acres, when it was a farm field, would have been entitled to a maximum of 100 miner's inches of constant flow (900 gallons per minute, or about 2 cfs); conversely, 50 acres of irrigated area would be entitled to a maximum of 50 miner's inches (450 gpm, or about 1 cfs).³⁵ The upper dashed horizontal line denotes the maximum constant flow (900 gpm, or 2 cfs) the 100-acre farm field would need and be able to beneficially use. The lower dashed line denotes the maximum flow rate the hypothetical subdivision, which has half the irrigated acres, should receive. However, the subdivision continues to receive the entire 900 gpm constant rate of flow. This results in the darker shaded area, which is "water delivered but not used."

Figure 7



³⁴ This graph, which appears in Fereday and Creamer, p. 97, was prepared by Christian Petrich, PhD, of SPF Water Engineering of Boise, Idaho. Dr. Petrich was the principal author of the Demand Study and also produced the analysis of irrigated acreage in subdivisions described in footnote 7.

³⁵ As discussed above at footnote 23, the 0.02 cfs (9 gallons per minute, a/k/a one miner's inch) standard actually is a more generous constant flow rate than that diverted for much of Idaho's irrigated land, including that served by the Treasure Valley's irrigation entities. However, this "inch-per-acre" flow rate is used here because of its convenient relation to irrigated acres, because it is a statutory maximum, Idaho Code § 42-220, and because it would provide a very conservative (that is, permissive) standard upon which to estimate the efficiency of irrigation occurring in subdivisions served by the irrigation district or canal company. If carried out, the study called for in this report would display the actual per-acre diversion rates of the various irrigation entities, and would base any estimates of marketable water on these amounts.

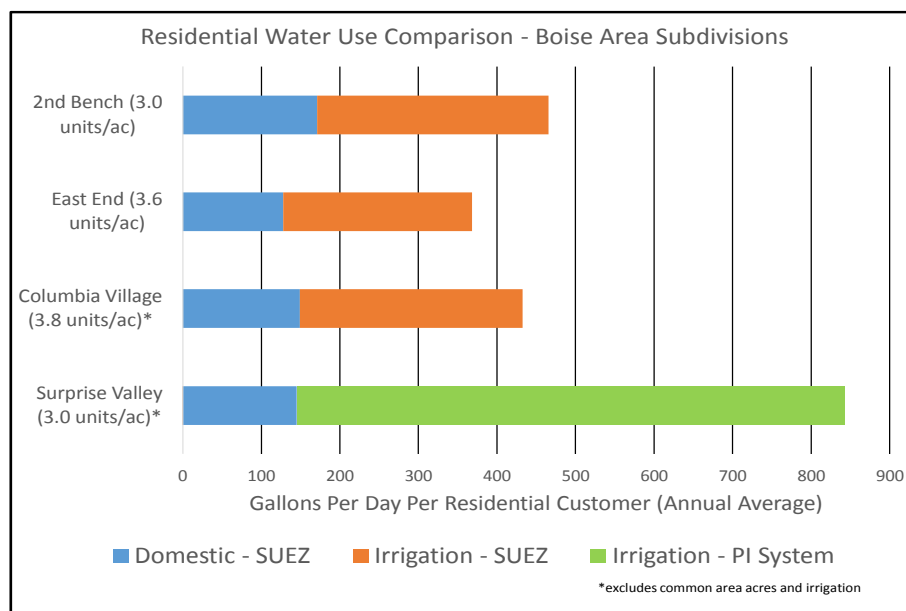
B. Boise's Surprise Valley subdivision.

In 2016, this same engineering firm collected irrigation data on four representative Boise subdivisions, each of which receives municipal water—i.e, potable or “domestic water—from the area’s municipal water provider, Suez, a private utility. Three of these subdivisions have no ditch water (unlike large parts of the Valley served by irrigation entities) and therefore irrigate with treated water from Suez. These are denoted 2nd Bench, East End, and Columbia Village.³⁶

The fourth subdivision, Surprise Valley, has a non-potable irrigation water supply. However, unlike most other Treasure Valley subdivisions using non-potable water for irrigation, Surprise Valley’s supply does not come from an irrigation entity but is diverted directly from the Boise River under the private surface irrigation water right that has been appurtenant to the parcel since the right was established in 1906.

The following graphs show: 1) the measured portion of each subdivision’s domestic usage, from Suez in each case (the blue portion); and 2) the measured portion delivered for lawn and landscape irrigation, using Suez treated water in 3 cases (orange) and non-potable river water in the Surprise Valley subdivision (green).³⁷

Figure 8a

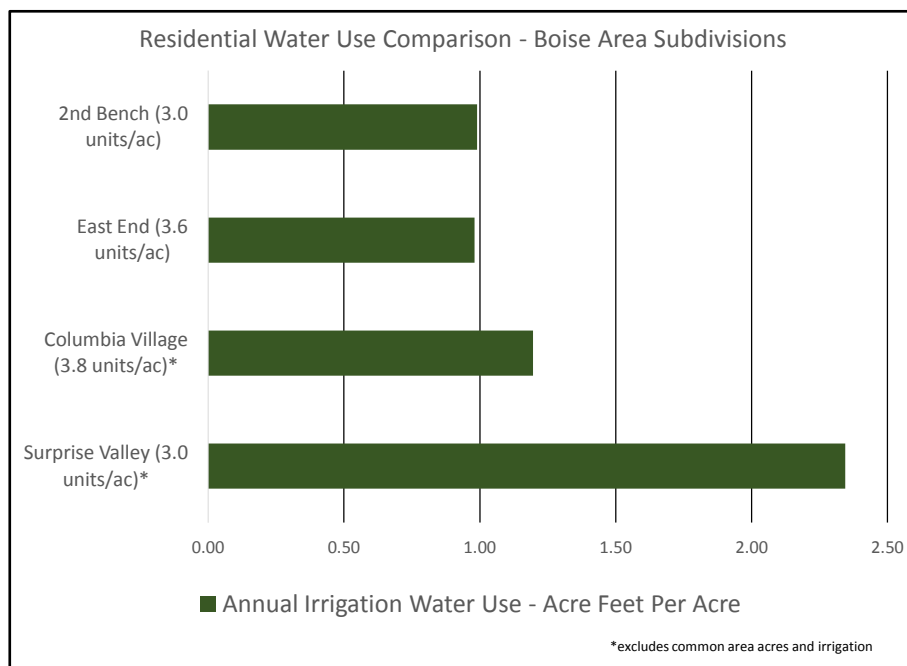


³⁶ Columbia Village actually has limited access to non-potable irrigation district water for its common areas, but all residential irrigation is served with municipal water from Suez.

³⁷ This and Figure 8b were prepared in by Terry Scanlan, P.E., P.G. of SPF Water Engineering LLC. “PI” is shorthand for “pressurized irrigation,” and refers to non-potable irrigation water—typically pumped from a ditch or lateral—supplied to suburban sprinkler systems.

Figure 8b shows the water deliveries per acre for irrigation uses in these four subdivisions:

Figure 8b



It is unclear why Columbia Village, which has slightly more homes per acre than either 2nd Bench or East End, has slightly more per-acre irrigation demand than these two other subdivided areas. In any case, the non-potable pressurized supply at Surprise Valley—untreated water delivered at a far cheaper per-gallon rate than that provided by Suez³⁸—has roughly double the usage for irrigation water per acre as compared to similar subdivisions irrigating their lawns with metered (and potable) municipal water. While there is no specific data on the subject, anecdotal reports, including my own observations, are that the turf and landscaping in Surprise Valley is in a condition comparable to that in the other three subdivisions. Each appears adequately watered.

The Surprise Valley example is instructive for at least two other reasons. First, water pricing. This subdivision covers 225 acres, with 116 irrigated acres irrigated, including residential lawns, common areas, and a school playground. Unlike the typical Treasure Valley subdivision that receives, through ditches and canals, the full diversion to gross acres as the original farm parcel received, Surprise Valley actually diverts no more than the statutory one-inch-per-actually-irrigated-acre amount. In other words, the system serving Surprise Valley diverts only to net irrigated acres. Furthermore, it has very small losses because it has no ditches and instead diverts from the Boise River through a pipe. Yet it still diverts far more per irrigated

³⁸ The cost of this non-Suez, non-potable irrigation water to a Surprise Valley homeowner has been described as “minimal,” and as “nothing in comparison to water supplied under the Suez rate.” Personal communication with Terry Scanlan (June 8, 2016).

acre than comparable subdivisions that rely solely on a municipal system for irrigation. This presumably is a result of pricing.

Second is the question of an appropriate “duty of water” in subdivisions served by pressurized systems using surface irrigation water. In planning the subdivision, Surprise Valley’s developer calculated the exact amount of irrigated area that would remain on the parcel, which had been an alfalfa field irrigated with a privately-owned surface water right. In determining the portion of the water right to be retained for lawn and landscape irrigation, the developer simply applied the 0.02 cfs per acre standard Idaho Code allows as a maximum. In fact, the former owner (the farmer) had diverted about 22 percent less than that per acre, and the developer removed the extra water (about 0.44 cfs) from the parcel and placed it in the state water bank.³⁹ Still, the result, though within statutory limits, was more water diverted per irrigated acre than before development.

The Surprise Valley example doubtless will be included in any data collection effort that might arise from this case study.

III. THE POLICY AND LEGAL FORCES IMPEDING WATER RIGHTS MARKETING IN THE TREASURE VALLEY.

A. City ordinances and a state statute contribute to the lack of a market response to the Valley’s agricultural land urbanization.

In the 1990s, in part at the urging of the irrigation districts and canal companies, each of the Treasure Valley’s cities adopted ordinances requiring new subdivisions to install a pressurized irrigation system using surface water from the existing canal and ditch system that served the development parcel before conversion from agricultural purposes.⁴⁰ Also at the urging of the irrigation entities, the Idaho Legislature then enacted a statute requiring the same thing.⁴¹ These laws require that lawns, gardens and landscaped areas on former agricultural lands be irrigated (during the entity’s irrigation season) with ditch water rather than treated municipal water. The cities’ leaders reasoned that ground water—the Valley’s principal municipal source—or other treated municipal water should be conserved for in-house uses. There was no discussion about the fact that surface water also is important to conserve, and that supplying it through the ditch systems comes with little incentive to use it wisely because it is not metered and is provided at a low annual fee. (The example of lawn and landscape irrigation in the Surprise Valley subdivision, discussed at p. 20, below, is a rare situation where actual non-potable irrigation water deliveries to a subdivision are measured, and the data correlate low pricing with over-use of irrigation water.)

³⁹ Personal communication with Terry Scanlan, P.E., P.G., June 7, 2016. In the typical Treasure Valley subdivision approval in an areas served by an irrigation entity, no such calculations are made. Instead, the developer will simply continue to receive, usually through a lateral ditch, all the irrigation water the parcel received when it was irrigated for agricultural purposes.

⁴⁰ E.g., Meridian City Code §§ 8-5-2 (draft, 2016), 9-1-28 and 12-5-2-N (2010); Boise City Code §§ 8-16-1 through 8-16-12; Idaho Code § 67-6537. *See generally* Fereday and Creamer, 47 Idaho L. Rev. 67, 92-94 (2010).

⁴¹ Idaho Code § 67-6537.

Moreover, neither the statute nor the ordinances mention the percentage of the farm parcel's surface water right that no longer can be put to beneficial use on the land post-development due to the replacement of alfalfa or corn with pavement, patios, and rooftops. They do not require any accounting of the amount of water involved. Nor do they address the potential of marketing this portion of the water right or consider the consequences of long-term non-use of these portions of the irrigation water rights.

In a more perfect world, both the ordinances and the statute would have noted that, after a farm field becomes a subdivision, the remaining irrigated acreage would be less than that indicated by either the duty of water—the legally permissible per-acre diversion amount—or the historical per acre amount delivered to the parcel under its original irrigation water right. These laws and ordinances could mandate that this unneeded portion must be transferred for beneficial use elsewhere.⁴² But they do not. Still, it is important to note that neither the ordinances nor the statute prohibit water right marketing or transfers, nor do they in any way alter the beneficial use requirement.

B. The Bureau of Reclamation has considered, but not implemented, the idea of a more robust agriculture-to-municipal water rights market involving the Boise River storage rental pool.

In a 2009 study of water management in the Treasure Valley, the Bureau of Reclamation addressed the option of water rights marketing—with which it certainly is familiar in other parts of the West, such as in its Big Thompson Project in Colorado, the Salt River Project in Arizona, and others. Giving the subject a cursory treatment, the Bureau simply laid out some boilerplate about markets; it did not address why few or no irrigation water rights are being marketed in the urbanizing Treasure Valley:

Market-based water management provides a mechanism for inter-regional and inter-sector water trading between suppliers and demanders. A market enables the holders of water rights to transfer water to other users willing to pay for it. Potential buyers may include M&I water users, agricultural users, or environmental programs.... In economics, market failure is a term which describes the condition wherein the allocation of goods and

⁴² Idaho Code § 42-220 mandates that the duty of water for irrigation is not to exceed diversions from the source of .02 cubic feet per second ("cfs") per irrigated acre. The Idaho Supreme Court has held that "in determining the duty of water, reference should always be had to lands that have been prepared and reduced to a reasonably good condition for irrigation . . . Economy must be required and demanded in the use and application of water." *Farmers Co-Op. Ditch. Co. v. Riverside Irrig. Dist.*, 16 Idaho 525, 535, 102 P. 481, 483 (1909). Many water right decrees (court-approved water right entitlements) assign less than .02 cfs as the right's limit. *See, e.g., State v. Twin Falls Canal Co.*, 21 Idaho 410, 446 (1911). Many of the Treasure Valley irrigation entities divert less than .02 cfs per acre. A water right for .02 cfs (also termed a "miner's inch") per acre will result in about 8 acre-feet of water per acre diverted over a 200-day irrigation season. Very few crops in Idaho receive surface diversions that large; indeed, diversions of 4.5 acre-feet per acre is considered ample. For irrigated land in subdivisions, irrigation entities probably are diverting much more than this. The exact amount is a subject for the data analysis called for here.

services by a market is not efficient. Market failures can result from limited competition for water, high transaction costs associated with water trades, inadequate information about markets among water users, or water allocation strategies that fail to consider impacts to third-party water users (Bator, 1958).⁴³

This statement is accurate as far as it goes, but it avoids discussing another reason for market failure: institutional refusal to allow marketing. As noted, and with minor exceptions, the irrigation entities, especially the Valley's irrigation districts, do not allow their water rights to be marketed. And to date they have denied that urbanization frees up any water rights to sell or lease. These are the primary impediments to marketing surface water rights in Idaho.

As part of a planning process in 2010, the Bureau met with Treasure Valley irrigators and IDWR to investigate feasibility of a "pilot project" that would amend the local storage rental pool procedures (which do not easily accommodate DCMI needs) to encourage irrigators to create a voluntary "supplemental pool" of water in wet years to make storage water available to DCMI users, such as municipal water providers.⁴⁴ There appears to be no impediment to implementing such an idea, but the irrigators backed away once an unrelated controversy (which has since given rise to litigation) arose between the irrigators and IDWR concerning refill rights in the Boise River reservoirs. So no change has occurred in the water bank (rental pool) procedures to make former irrigation water rights available for municipal and commercial uses in the Valley.

Other than these stalled attempts, the U.S. Bureau of Reclamation's Snake River Region⁴⁵ has shown little interest in facing the implications of declining agricultural irrigation demand for its storage water. For example, after many years of grappling with the issue the agency determined that storage water from federal dam projects should be supplied to residential subdivisions (i.e., a non-agricultural use) at a municipal and industrial ("M&I") rate, which is substantially higher than the rate agricultural irrigators pay. But it decided it will not impose this higher rate on any existing irrigation entity's subdivision diversions unless for some reason the entity seeks a new Bureau contract—an unlikely event this decision makes even less likely. In other words, all existing irrigation entities are grandfathered into the current paradigm, even as they continue to urbanize.⁴⁶

⁴³ U.S. Bureau of Reclamation and University of Idaho, *Modeling Spatial Water Allocation and Hydrologic Externalities in the Boise Valley: A Component of the Boise Valley Water Use Planning Program* (February 2009) ("BOR Externalities Study"), p. 14. This study investigated "the hydrologic and economic impacts of water conservation measures and/or market-based water management approaches which would either eliminate or internalize the externalities that result from Boise Project canal seepage." The Boise Project includes the bulk of the Boise River reservoir and canal systems. It is governed by a Board of Control consisting of representatives from the New York, Boise-Kuna, Nampa & Meridian, Wilder, and Big Bend Irrigation Districts.

⁴⁴ Matt Howard (U.S. Bureau of Reclamation) and Brian Patton (Idaho Water Resource Board), "WD 63 Rental Pool Pilot Project Proposal," powerpoint presentation, on file with the author (2010).

⁴⁵ The Boise River is a major tributary of the Snake, an interstate river.

⁴⁶ Reclamation Manual, Directives and Standards PEC 09-01, "Conversions of Project Water from Irrigation Use to Municipal and Industrial Use" (July 24, 2013).

Another example of the Bureau's commitment to the status quo is that it decided in the early 2000's to renew, in full, the irrigation entities' contracts for Lucky Peak storage water even though many had never used their full entitlement and their irrigated land base was declining yearly. (Fereday and Creamer, pp. 87-91, 2010).

The Bureau of Reclamation is part of the institutional system that has not yet embraced water right marketing or taken steps to evaluate how water actually is being used in the Treasure Valley. However, the Bureau has informed me that it will cooperate with a data gathering effort as described in this case study, and that it will not oppose water marketing provided its contractual and legal obligations are respected. But the Bureau is not likely to lead the charge.

C. Psychology.

While the legal, policy, and contractual underpinnings of the irrigation entities' water supply entitlements remain static in the Treasure Valley, the irrigation entities themselves are steadily transforming at least some aspects of their role. Historically they were suppliers of natural flow water and Bureau-contracted storage for agricultural irrigation on farms. The new era, by now several decades old, finds them increasingly in a role where they provide low-cost water for a diminished irrigated landscape in the suburbs,⁴⁷ but divert and deliver essentially the full amounts under their water rights as they did before these changes occurred. They appear to have little interest in examining whether their actual beneficial use of water has changed or whether there might be other uses they could accommodate.

And in the subdivisions prevails a similar disincentive for boat-rocking. The human tendency toward inertia, the fact that irrigating is easier if it does not need to be managed or scheduled, the desire to have the peaking capability delivered by high constant flows, and a general lack of knowledge among homeowners combine to favor the status quo. In all events, it is not obvious what incentives either the irrigation entities or the homeowners have to change, and neither the state nor federal government is pressing for change.

D. The IWRB's Treasure Valley Comprehensive Aquifer Management Plan did not advance the concept of moving water rights from parcels no longer irrigated.

IWRB is charged with producing and updating a State Water Plan ("Water Plan"). As a part of this effort in 2010 it produced the Treasure Valley Comprehensive Aquifer Management

⁴⁷ In the BOR Externality Study, the Bureau noted that "[i]n the 1980s and 1990s traditional agricultural landscapes in the Boise Valley began to be converted to residential uses. Since then, the rate of land use change has increased rapidly. Between 2000 and 2025 irrigated agricultural land in the Boise Valley is expected to be reduced by about 23,000 acres as a result of urbanization. An additional 17,500 acres of irrigated farm land is expected to be gone by 2050 (IDWR, 2000)." Conservatively, 40,500 acres represents some 121,000 acre-feet of annual river diversions, or about 12% of the total upstream storage on the river. However, this Bureau study was concerned with the potential economic externalities resulting from reduced seepage due to canal lining and other efficiencies; it did not attempt to grapple with the issue of full diversions to reduced irrigated acreage.

Plan (“TV CAMP”),⁴⁸ which then was incorporated into the Water Plan. The TV CAMP briefly addressed the “potential conversion of water use from agriculture to other uses,” confirmed that “[u]rbanization has changed some water demand from agricultural irrigation to residential irrigation and other uses,” and stated that “this trend is expected to continue....” TV CAMP p. 27. But the Water Board did not grapple with the issue of over-diversion. Instead, IWRB’s recommendations relating to urbanization are:

Continue to support the use of surface water on those lands that convert . . . using the existing irrigation entities; (2) Support voluntary cooperative arrangements between irrigation entities and municipal providers to deliver surface water recognizing the long-term challenges associated with maintaining Homeowners Association-owned systems; and (3) Encourage the use of water marketing to meet current and future needs including the use of the Rental Pool and the Bank.⁴⁹

Thus, the Water Board-sponsored planning effort in 2010 offered tepid support for water marketing (and perhaps implied that the Rental Pool and Water Bank are the only available mechanisms). But it endorsed existing subdivision irrigation supply arrangements without suggesting that they might involve diversions that no longer are being put to beneficial use. It did not suggest that urbanization itself presents a promising opportunity for water marketing.

The IWRB also called for actions to “enhance water data collection.” TV CAMP p. 26. However, of the eight areas of data collection described, only one—“[m]easure water-use changes and report demand trends to IWRB”—comes close to the type of data collection necessary to get a clear picture of the urbanization problem outlined in this case study. To date, such an effort has not been undertaken.

E. The Water Board is updating the State Water Plan to promote “water sustainability,” but does not address the issues raised in this case study.

In April 2016, the Idaho Water Resource Board announced it was adding a water sustainability policy to the State Water Plan to promote the “[s]tewardship of Idaho’s water resources,” which

begins with the realization that the water resources of the State are not inexhaustible and therefore it is necessary to manage, administer, and take action to sustain, maintain and enhance the resource. Stewardship, by necessity, also includes taking affirmative steps to address declining trends in the resource where

⁴⁸ The TV CAMP can be found at:
https://www.idwr.idaho.gov/waterboard/WaterPlanning/CAMP/TV_CAMP/TVdefault.htm

⁴⁹ TV CAMP, p. 27.

those trends exist and to establish policies that will prevent future unsustainable declines.⁵⁰

Several items in the IWRB's water sustainability policy include elements that would be furthered by, or are compatible with, the data collection recommended by this case study, such as:

- Inventory Idaho's water supply, current uses, and future water supply needs
- Evaluate long-term and short-term trends in water availability for present and future uses....
- Identify management alternatives and projects that optimize existing and future water supplies without compromising water quality
- Prioritize and implement management alternatives and projects where competing demands and future needs are most critical.
- Identify water conservation measures that water users, municipalities, governmental agencies and other entities can undertake to help protect the water resources of the State and provide guidance to those entities on best practices to implement those conservation measures....
- Improve data management – accurate and abundant data is necessary to assist with ensuring stewardship of Idaho's water resources to satisfy current and future uses⁵¹

The IWRB's plan amendment also suggests that at least water right transfers have a place in the mix:

- Enhance water transfer mechanisms in Idaho law, policy and regulations to allow future economic opportunities to utilize existing water supplies, while protecting existing uses...
- Measure utilization of water bank and transfer procedures to allow sustainable use of the resource
- Determination and implementation of measures and policies to enhance the utility of the water bank and transfer procedures⁵²

The Sustainability Plan does not mention the hundreds of thousands of acre-feet annually implicated in conversion of agricultural land to non-irrigated areas. Nor does it suggest, other than what might be implied by these vague references to enhancing water right transfer and water bank mechanisms, that water right marketing might figure into water supply or

⁵⁰ <https://www.idwr.idaho.gov/IWRB/water-planning/state-water-plan.html>, section 8A, Sustainability of Idaho's Water Resources ("Sustainability Plan").

⁵¹ Sustainability Plan, pp. 2 and 3.

⁵² *Id.*, pp. 2-3.

sustainability. Indeed, rather than suggesting a role for any free market activity in Idaho's water future, the Sustainability Plan highlights the importance of "[f]inancial programs and funding strategies that meet the future water resource needs of the State of Idaho" and the need to "[s]ecure funding and resources in cooperation with the Governor and legislature." *Id.* The Sustainability Plan states that "[r]eliable on-going, long-term funding will be needed to enable and support active stewardship of Idaho's water resources."⁵³ The idea of a private market is not on the list.

Such state funding would be needed to carry out the aquifer recharge or surface storage projects the Sustainability Plan promotes:

- Identify and provide funding for aquifer stabilization strategies throughout the state with due regard to the priorities of basin specific Comprehensive Aquifer Management Plans
- Pursue enhancement of surface water storage supply as a mechanism for meeting Idaho's future water needs
- Initiate and facilitate construction of additional surface water storage to meet current and future needs⁵⁴

It appears that the Idaho Water Resource Board, Idaho's water policy-making body, has not yet recognized, much less grappled with, the issues raised in this case study.

F. The role of Idaho's water banks.

Another legal and policy system in Idaho that bears on water rights marketing is the tightly-controlled (including price-controlled) water bank system, through which local "rental pools" managed by irrigators and the Idaho Water Resource Board engage in mostly annual, but sometimes multi-year, rentals of surplus storage water.⁵⁵ To be sure, Idaho's water bank system is an element of water marketing, and private bank-enabled deals are becoming more common, including deals that substantially increase the irrigator-established price through private, not officially sanctioned, and usually undisclosed agreements between parties.

However, some aspects of the rental pool system impede a truly free market. This is because of constraints such as bank rules that give a lower priority of assurance for non-irrigation uses of banked storage water, place special requirements on lease terms greater than five years, and impose a penalty for out-of-basin rentals.⁵⁶ The rental pool system also might effectively impede transactions that would permanently change unneeded water rights because

⁵³ *Id.*

⁵⁴ *Id.*, p. 3.

⁵⁵ The IWRB also operates a State Water Bank that can accept natural flow water rights that currently are not being used. Rights accepted into the Bank are not subject to forfeiture for non-use. Idaho Code § 42-223(5).

⁵⁶ Water District 93 (Boise River) Rental Pool Rules, <https://search.idwr.idaho.gov/search?utf8=%E2%9C%93&affiliate=idwr&query=wd+63+rental+pool+rules&commit=Search>

the system offers streamlined procedures (i.e., no need for a formal transfer) for obtaining at least temporary water supplies from storage.

But it is important to distinguish between using the Boise River rental pool, which involves short-term leases of storage surpluses, and the permanent acquisition of natural flow (or storage) water rights through a sale. Actual sales rarely occur because of the opposition of the irrigation entities.⁵⁷ This is why Idaho's cities and industries—or, for that matter, farmers or ranchers seeking to expand—do not have meaningful opportunities in Idaho to buy and transfer permanent surface water rights except to new places within their irrigation district or canal company and then only for irrigation purposes.⁵⁸

G. The role of irrigation districts and canal companies.

Another of the policy or cultural factors impeding a water market in the Treasure Valley may be that it does not occur to most farmers that the unused portion of the water right appurtenant to his or her now-subdivided farm might be marketed. This is because the right typically is held in the name of, or is otherwise controlled by, an irrigation district or canal company, and it is assumed, correctly or incorrectly, that only the organization's board can make such decisions. In any event, I am aware of no instance where a Treasure Valley irrigation district has reduced its diversion to account for non-use within its boundaries. The same goes for most mutual canal companies.⁵⁹

With reference only to the straightforward legal principles underpinning the Prior Appropriation Doctrine, one might imagine that each irrigation water right is owned by the individual irrigator, and that the irrigator has an incentive to realize economic value from the right when he or she sells the irrigated land. But this free market conception is not how the system usually works. Surface water rights delivered by irrigation districts are owned by the district itself, a quasi-public and statutorily-chartered entity, in trust for its irrigator-landowners.

As a practical matter, individual irrigators in a district never suggest that they might sell their portion of the district's water right along with their land. And as a legal matter, they could not consummate such a sale on their own. No sales or transfers can take place without the district's approval, and for many reasons district boards have not favored transfers or sales. Idaho

⁵⁷ On the question of allowing water to be transferred off impermeable areas, the Demand Study forthrightly states that, "the transfer of surface irrigation water for non-irrigation DCMI uses would require that landowners initiate, request, or at least consent to the removal (on a permanent or temporary basis) of surface-water rights from their lands. Furthermore, irrigation entity would also need to approve such a transfer. So far, such approvals have been rare." Demand Study, p. 20.

⁵⁸ Idaho law allows a relatively easy transfer of the place of use of a surface irrigation water right from one parcel to another within the same irrigation district or canal company. *See, e.g.*, Idaho Code § 42-2501 (allowing transfers within a certain type of canal company for up to one year).

⁵⁹ Those few, mostly small, canal companies that have sold shares (or allowed their shareholders to sell) have had to reduce their diversions accordingly. This may be why the others appear reluctant to allow sales. It may be that a particular canal or irrigation district board is more comfortable diverting water to no use than transferring that portion of the water right and reducing the diversion.

Code 42-108 specifies that any transfer of a water right delivered by an irrigation entity must receive that entity's approval. There is a question, which the Idaho Supreme Court to date has not been asked to address, whether this requirement is an unconstitutional restraint on a property right, or whether the company can unreasonably withhold its approval.

In Idaho, canal companies operate essentially the same way as irrigation districts, usually taking the position that the company itself owns the water right in trust for its shareholders, for use only on lands with the canal company's accustomed service area (i.e., the lands of its shareholders).⁶⁰ These companies often make rules restricting the sale or transfer of the company's water right. The water right typically is issued or decreed in the canal company's name, but the majority legal rule is that the individual shareholder is the "beneficial title" holder to his or her proportional share of the right and is entitled to sell that share to an outsider who then would be entitled, subject to board approval, to transfer it according to the ordinary rules governing water right transfers. (The most important of these transfer rules is the "non-injury" principle, which usually means that only the consumptive portion of the right may be transferred). In Idaho, in contrast to some other states, such as Colorado, sales of canal company shares are infrequent. Transaction costs can be high, in part because the transfer often requires substantial negotiation with the company board.

The result, whether inadvertent or intentional, is hoarding of water rights without use. This appears to be happening in the Treasure Valley and other urbanizing areas of Idaho, which may be the West's best—and perhaps only—example of this phenomenon.⁶¹

In sum, it appears that the "political economy of water markets" in Idaho's Treasure Valley comes down to the fact that longstanding customs, and lack of desire or incentive to change, override economic principles. The upshot is that there really is no effective market in Idaho, much less a free market, for surface water rights delivered by irrigation entities.⁶² And this despite circumstances—urban development replacing irrigated farmland—for which a market appears well suited.

H. The irrigation district position.

Representatives of the irrigation entities have confirmed that, as reported in Fereday and Creamer and in the Demand Study, they provide water to "gross acres" in subdivisions and have not reduced their diversions as urbanization has occurred. However, at least a few of the districts

⁶⁰ There are a few instances in the Boise area where mutual canal company shareholders have sold their portion of the company's water right for a use elsewhere (such as a municipal supplier's water intake). This of course requires the company to reduce its river diversion by the amount transferred.

⁶¹ See Fereday and Creamer, 2010.

⁶² In referring to a "free market" in water rights, I do not mean to suggest that such buy/sell transactions occur free of government involvement where the type or place of use, or point of diversion, is proposed to change. In Idaho as in other western state, such a transfer or change always entails agency review to prevent enlargement or the right or injury to other statutorily-protected interests, such as the public interest in the water resource. Idaho Code § 203A(5)(e). However, as a practical matter, in the Treasure Valley there will be few transfers or changes if marketing of water rights is not in play.

reportedly encourage moving water to irrigate other areas within district boundaries when the water no longer is needed in a given place due to “pave-over” or similar development. But there are no records or measurements describing this, so the extent of this practice is not known. If a study of irrigation water use in the Treasure Valley were undertaken, this should be one of the items evaluated.

The districts also make the point that farmers generally do not divert the full statutory amount allowed (0.02 cfs per acre), and that if additional water were available within that limit, they believe they would be able to use it beneficially. One theory the districts appear to advance is that the subdivision homeowners may be getting this “extra water” benefit, and making a more complete use than the farmer did in part because subdivisions have no down times in their irrigation demand, unlike the typical farmer who does not irrigate during harvest.

These contentions may have some validity, and they certainly would figure into how the irrigation entities analyze whether they have any water to market, should that eventually come to pass. But the premise is that, with as much as 62% of a given farmland parcel being converted to impermeable surfaces, and with a substantial percentage of all these entities’ land base no longer irrigated—and even accounting for differences between suburban and agricultural irrigation—there still should be a significant amount of the water right available for sale or lease.

Furthermore, a strict application of water transfer rules may not allow any enlargement of the per-irrigated acre water delivery to the farm-parcel-turned-subdivision. In a transfer application, IDWR usually will restrict the transferable amount to the historical consumptive use, and otherwise not allow a delivery enlarged beyond what the farmer experienced. For example, if the farmer’s average Boise River diversion was 0.015 cfs per acre and 3.7 acre-feet annually per irrigated acre, there is a strong argument that the subdivision should be restricted to the same amounts per acre. No Idaho court has taken up this issue in the context of a transfer application involving a subdivision, so it remains to be seen whether the effectively enlarged per-acre diversion would be allowed for subdivisions.

However, there is one instance in which an Idaho court ruled that a subdivision built on 328 acres of formerly irrigated farm land was entitled to a water right only for the 170 acres that still are irrigated within the development, and that percentage of the water right was allowed to be removed from the parcels.⁶³

One irrigation district representative noted that new state statutes might be useful to deal with the urbanization issue. The example he gave concerned one that would require rotation or other conserving measures in subdivisions.⁶⁴ He did not suggest any statutory changes to address any water surplus that might result from urbanization, through water rights marketing or otherwise.

⁶³ Fereday and Creamer, p. 95, citing Amended Special Master’s Report and Recommendation, *In re* SRBA, No. 39576, Subcases 63-00123D, 63-00123F, and 63-00123G (D. Idaho July 24, 2009) (on file with IDWR).

⁶⁴ Interview with Albert Barker, Esq., legal counsel to Boise Project Board of Control (May 26, 2016).

I. The Idaho Department of Water Resources.

The Idaho Department of Water Resources is the state agency charged with issuing water right permits and licenses, processing water right transfer (a/k/a change) applications, preparing recommended water right decrees, enforcing water laws, measuring water diversions, keeping records of water use and distribution, providing inventories of the state's waters, collecting data and conducting surveys and tests relating to availability of unappropriated water, conducting hearings, and performing staff functions for the Idaho Water Resource Board.⁶⁵

IDWR understands the challenge for water use and management presented by urbanization in the Treasure Valley and elsewhere in Idaho where cities are growing onto former agricultural land. Agency representatives do not deny that, in general, the irrigation entities may be delivering more irrigation water to their many subdivisions than can be put to beneficial use there. However, IDWR has taken no steps to inquire or gather information about irrigation water diversions and use in the urbanizing landscape. IDWR seems to regard this issue as a sleeping dog that it is loathe to kick, at least in the absence of some compelling need.

Moreover, IDWR's attempts to gather information from irrigation districts in the past have been met with claims that the districts, as quasi-public entities, have a legal status equal to that of IDWR, and that they do not have to provide any information they deem proprietary. If the funding were available, IDWR probably would conduct or participate in an investigation into the amounts of surface water diverted and beneficially used in the Treasure Valley, provided it could obtain buy-in from the irrigation entities.⁶⁶ Such buy-in currently seems unlikely.

IV. POTENTIAL POLICY AND LEGAL REFORMS THAT COULD UNLOCK THE MARKET.

1. Conduct a thorough inventory of water deliveries and uses, and the fate of unconsumed water, in the canals and ditches in the Treasure Valley. Such a study is outlined in Attachment A.
2. Convene a collaborative process involving all stakeholders to investigate ways the interests of all could be served by making unneeded irrigation diversions available for sale or lease at market prices. In other words, seek to educate, and to change attitudes.
3. Amend Idaho Code § 67-6537 and the city ordinances to require the developer or landowner to describe the subdivision's irrigable acreage, the amount of water to be supplied by the irrigation entity, and whether any unused portion of the water right will be transferred off the developed parcel. For example, the City of Meridian's pertinent city code section, Design Standards for subdivisions, section 8-5-2, could be amended as follows (underlined material proposed to be added):

Pressure irrigation plans shall show the intended point of delivery
for surface water and point of connection to municipal water or

⁶⁵ Idaho Code §§ 42-1801 *et seq.*

⁶⁶ Interview with IDWR Director Gary Spackman (May 27, 2016).

irrigation well. Irrigable square footage within the proposed subdivision shall be included for assessments and to allow the City to determine overall water deliveries per acre within city limits. The applicant shall specify the amount of water, as a daily average constant flow (in cubic feet per second), that will be supplied to the parcel on which the subdivision is to be built and shall inform the City whether any surface or groundwater rights are being transferred off the parcel.

4. Amend the irrigation district laws to allow, or even require, district boards to exclude lands from the district that no longer are irrigated. Current law allows exclusions only at the request of the landowner. Idaho Code § 43-1101. Other amendments could:
 - make clear that irrigation districts can deliver water, such as by lease, to lands outside their boundaries; more easily change their boundaries; market those portions of water rights no longer needed within the district; and institute variable pricing structures to charge more for deliveries to urban irrigation uses.
 - Enlarge their boundaries to allow them to serve more subdivision irrigation, again within strict per-irrigated-acre diversion requirements that reflect a reasonable duty of water.
5. Mutual canal and ditch companies could modernize their bylaws to allow water, and company shares, to be marketed (sales or long-term leases) both inside and outside the company, and for non-irrigation purposes. They too could change their service areas to provide non-potable irrigation in developed areas within strict per acre diversion limits.
6. Amend the water bank statutes and rules to make them conform more to free market principles and end the practice of disfavoring non-irrigation or out-of-basin uses of storage water in Bureau of Reclamation reservoirs.

V. CONCLUSIONS

This case study has shown, through existing studies, legal and technical analyses, interviews and other sources, that:

1. Due to ongoing urbanization in the Treasure Valley, substantial and growing amounts of irrigation water are being diverted by irrigation districts and canal companies to developed areas that are no longer irrigated. The result is that some portion of the water diverted is not being beneficially used as required by Idaho law.
2. There have been no studies to calculate the amount of such unused water and what its fate might be as it moves through canals, laterals, ditches, or drains. No studies evaluate how much of it is taken up by downstream irrigators, how much might go into drains or shallow aquifers, and how much might be flowing out of the State.

3. There have been no analyses of the value this water could have if made available for sale or lease.
4. A collaborative effort to gather all relevant data about this situation, including all irrigated acres, diversion amounts, drain flows and other factors, as outlined in Attachment A, would be an important step toward water rights marketing. Responses to such information probably would include improvements in system efficiencies and water management within the irrigation entities—and within the subdivisions relying on non-potable irrigation water.
5. A substantial percentage of the Valley's future DCMI demand could be supplied by transferring to municipal water systems those portions of agricultural water rights that are unused and unneeded by the irrigation entities' patrons after development.
6. The irrigation entities traditionally have been opposed to such transfers, and to leases or sales in general, and currently there appear to be no incentives for them to change. Limiting the districts' diversions to what can be beneficially used within subdivisions would require management and scheduling, such as rotational water use similar to what the farmer used pre-development, or facilities such as ponds, to accommodate peak usage episodes. The irrigation entity may not wish to suggest, much less enforce, this type of water management and it probably would be unpopular with the homeowners.
7. Neither IDWR nor IWRB appears keen to delve into the urbanization water use issue because the irrigation entities generally are opposed to any suggestion that their practices should change. However, at least IDWR is likely to support the data gathering suggested by this study.
8. The measures listed in Section IV, above, could help bring more robust water right marketing to Idaho.

Attachment A

Proposed Treasure Valley Irrigation Water Use Study: Urbanizing Areas

Issue Statement

As the Treasure Valley has urbanized onto former agricultural lands, the landscape contains substantially fewer irrigable acres. The irrigation entities continue to divert the same amounts to their service territories as they did before development occurred, and they supply irrigation water to irrigate lawns, gardens and landscaped areas in commercial and residential areas. One premise of this case study is that water beyond what can be beneficially used is being diverted from the Boise River. This data gathering effort is intended to determine the extent to which this is the case, and to calculate the amounts of water involved.

Project Goals

Use inter-disciplinary approach to determine whether current irrigation water management practices and policies optimize beneficial use of water under existing water rights in the Boise River Basin. Use GIS, remote sensing and IDWR's water accounting programs together with information about historical water supply, irrigated acreage, and Boise River diversions. Determine the amounts of natural flow and storage supplies delivered to the areas served by selected water delivery organizations and compare this to the amount that would be needed, based on reasonable irrigation requirements or duty of water, to irrigate the actually irrigated portions of these same areas.

Project Outline, Strategies and Methods

Canal companies and irrigation districts in the Treasure Valley hold senior natural flow water rights for irrigation of lands within their service areas, including lands that today are no longer irrigated due to various types of land development. These irrigation delivery entities for the most part nevertheless are authorized to call for and divert the same amount of water today as they did before these land use changes reduced the actually-irrigated portions of their service areas.

Some water delivery entities have seen greater reductions in actually-irrigated acres than others. Causes for these historical reductions in actually-irrigated areas include: conversion of former agricultural lands to residential, commercial or industrial uses; elimination of irrigated agriculture due to expansion of transportation and utility transmission corridors that either occupy formerly-irrigated lands or bisect and strand them; abandonment due to economics of farming including loss of access to water, to agricultural service providers (e.g., pest control and fertilizer vendors) and to markets (elimination of rail lines, spurs, grain elevators, etc.). Between 1978 and 2007, irrigated farmland acreage decreased in Ada County by approximately 41,000 acres (-41.7%) and in Canyon County by approximately 37,000 acres (-15.7%). Fereday and Creamer (2010); U.S. Census of Agriculture.

The most senior water rights in the Treasure Valley, holding priorities in the range of 1864 to about 1870, are generally held by small mutual ditch companies that deliver surface water by gravity flow through unlined ditches to lands in close proximity to the Boise River. These entities likely have experienced the greatest proportional decrease in historically irrigated area. The largest overall reductions in irrigated acreage are believed to have occurred within the various irrigation districts, which were formed later, serve large areas, and usually hold more junior water rights. Both canal companies and irrigation districts receive storage water under contract from the U.S. Bureau of Reclamation's ("Reclamation") Boise Project. As senior natural flow water rights are delivered in priority, diversions serving water rights with more junior priorities are shut off, requiring the junior entity to use storage.

Hypotheses:

1. To the extent senior water right holders divert the same amount of water today as they did before their actually-irrigated lands were reduced by development, the irrigation entities with junior water right priorities—typically the Valley's irrigation districts—are curtailed as if these reductions had not taken place. Therefore, the juniors must forego diverting natural flow that is being diverted but not placed to beneficial use by the seniors (we will refer to these diversions as "over-diversions"). They also must resort to their storage water accounts earlier than they would if such over-diversions were not taking place.

2. To the extent the irrigation districts also over-divert—that is, divert as if they also had experienced no reduction in their irrigated areas—deliveries to at least some of their actual irrigators are curtailed as if these irrigated area reductions had not taken place, and the districts are required to call upon more of their storage entitlement than they would if over-diversions did not occur.

3. To the extent over-diversions are taking place, return flows to ditches, drains, tributary creeks and the Boise River have increased as actual irrigation at duty-of-water rates has decreased. These return flow increases probably provide more supply to some irrigators than they would have had before irrigated acres were reduced by development, but there is no data on which to calculate this supply or to determine which irrigators might benefit. Those who benefit probably do so more as a function of their location on the canal system than as a function of water right priority.

4. To the extent the Valley's water right holders alter their practices in the future to divert only that amount of water necessary and legally supportable for beneficial use on actually irrigated acres, more natural flow should be available to junior right holders than is the case now, the demand for storage water should be lessened, and average year-to-year carryover in the reservoirs should increase. This change in diversion practices could make more reservoir storage available for water needs attributable to population growth and could place the Valley in a better position to endure drought that may occur due to climate change.

The purpose of this study would be to determine the accuracy of these statements.

Strategies, collaborating entities and resources.

This project would involve large and small irrigation delivery entities (including the Boise Project Board of Control), Reclamation, Idaho Department of Water Resources (“IDWR”), and university staff and students with a background in GIS, remote sensing, flow measurement, and water resources management. Reclamation and IDWR would be the source of historical water supply and delivery data and historical and current river/reservoir operations protocols. GIS and remote sensing technology would be used to determine historically irrigated and currently irrigated acres within the service areas of representative irrigation delivery entities. IDWR’s water accounting programs could be used to model outcomes in Boise River natural flow and storage deliveries to actually-irrigated acres and to determine outcomes for total reach allocations and diversions, accrual to storage, changes in storage and end of year carryover in storage over the historical period of record based on phasing out over-diversions and management to deliver only sufficient water to irrigate actually-irrigated acres.

Study structure.

A. Select a manageable and representative group of irrigation entities to study.

The leading possibilities:

1. New York Irrigation District
2. Nampa & Meridian Irrigation District
3. Boise-Kuna Irrigation District
4. Pioneer Irrigation District
5. Settlers Irrigation District
6. Farmers Union Ditch Co.
7. Thurman Mill Irrigation Co., Ltd.
8. Boise City Canal Co.
9. South Boise Water Co.
10. South Boise Mutual Irrigation Co.
11. Ballentine Ditch Co.
12. New Dry Creek Ditch Co.
13. Boise Valley Irrigating Ditch Co.
14. Middleton Mill Irrigation Co.
15. Middleton Irrigation Co.

B. Assemble diversion data.

For each studied irrigation entity for each year from 1987 to present (average rate in cfs, annual volume in acre-feet):

1. Decreed diversion rates and volumes
2. Contract storage volume
3. Diversions into main canal (natural flow and storage).
4. Re-diversions into laterals.
5. Diversions from drains.

6. Diversions from ground water by the irrigation entity or its patrons for supplemental irrigation.
7. Amounts of water supplied by the irrigation entity for non-irrigation purposes (e.g., aesthetic, recreation, wildlife).
8. Amounts of water leased or sold by the irrigation entity for non-irrigation entity uses.
9. Identify amounts and locations of irrigation water supplied by other entities within the service area.

C. Collect canal diversion and drain discharge data.

For each studied irrigation entity for each month from 1987 to present (in cfs and acre-feet), calculate:

1. Diversions from the entity's facilities into drains.
2. Drain discharges to river, streams or canals
3. Canal or ditch discharges (e.g., spills) to river, streams, drains or canals

D. Calculate irrigated area.

1. Calculate the gross area within each irrigation entity—i.e., the entire area within the district boundary, company service area, or area owned by shareholders to which the entity's water rights are appurtenant (collectively, "service area").
2. Obtain any records of use by patrons or shareholders, including acres irrigated, crop, days irrigated each year.
3. Compare the service area with the place of use described in the entity's SRBA decree.
4. Calculate the amount of the service area that actually is irrigated today with the entity's water, including all irrigated areas in subdivisions.
5. Calculate the amount of the service area that historically was irrigated but no longer is:
 - a. Identify lands within the service area that, due to physical constraints, cannot receive the entity's water.
 - b. Identify lands within the service area that can receive the entity's water but do not.
 - c. Identify lands that have been excluded from the service area.
 - d. Identify lands annexed into the service area since the SRBA decree.

E. Describe each irrigation entity's facilities.

1. Miles of:
 - a. Main canal(s)
 - b. Laterals
 - c. Ditches or other conveyances smaller than laterals
2. Miles of the canals, laterals, and ditches that:
 - a. Are lined with concrete

- b. Are piped
- c. Have been removed
- d. Are regularly maintained
- 3. All pumping stations.
- 4. All places where irrigation water is measured.
- 5. Each supplemental irrigation well.
- 6. Number of domestic wells in the service area.

F. Report flows in Boise River, its tributaries and drains.

G. Obtain historical data of measurements in cfs for the Boise River flows, including:

- 1. Boise River at each measuring gage, including at River's discharge to Snake.
- 2. Each tributary.
- 3. Each drain. Install gages on those drains that lack them.
- 4. Each creek or lateral that functions as a drain or carrier of return flow.

H. Questionnaire in aid of water diversion and use study.

A questionnaire along the lines outlined below could be sent to several irrigation districts and canal companies in the Treasure Valley with the explanation that we seek information about surface water use in light of the urbanization of farmland into non-agricultural and partially non-irrigated uses. It would invite any information, pro or con, they might have on this subject beyond their questionnaire answers. The questionnaire would seek responses to questions such as these:

- 1. The amount of water, in cfs and annual acre-feet, diverted in each of the last five years:
 - a. From Boise River into your canal system (please provide amounts of natural flow and storage diversions).
 - b. From main canal into laterals.
 - c. Into your system from wells.
 - d. Into your system from drains.
- 2. Gross area, in acres, within your company or district to which your company's or district's water rights are appurtenant—i.e., the total area within the district boundary, company service area, or area owned by shareholders.
- 3. Acres irrigated with diversions under your entity's water rights.
- 4. Rotation arrangements or other water sharing or allocation schedules used by your patrons or shareholders on irrigated non-agricultural lands such as residential lawns, landscaped areas, parks, playgrounds, and similar areas.

5. Rotations arrangements or other water sharing or allocation schedules used by farmers on agricultural lands within your service area.
6. How measurement of water is accomplished for deliveries:
 - a. From main canal(s) into laterals.
 - b. From laterals into supply ditches or pipelines.
 - c. To individual farmers.
 - d. To pressure systems in subdivisions.
 - e. To individual landowners in subdivisions.
7. Amount of water, in cfs and annual acre-feet, discharged from the entity's system into drains, other canals, or to a surface water body.
8. The acreage of patron or shareholder lands eligible for the entity's water deliveries, but which do not receive or use the water.
9. Estimate of annual ditch losses within the system in cfs and annual acre-feet.
10. The amount of water rights that has been transferred out of the irrigation entity to some other use (e.g., municipal, commercial, aesthetic).
11. Describe any historical shortfalls in annual diversions and explain whether a per-acre diversion increase for subdivisions is in part making up for this deficit.