

# Property Without Possession

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*This Article examines the definition of water rights in western water law and explores the relationship between that definition and the inefficiencies of the current doctrinal regime, as well as the current system's inability to accommodate increasingly valued instream uses. In doing so, the Article first flushes out a theoretical framework for analyzing the compositional choices of property right regimes, from usufructory to quantity-measured rights. The compositional definition of a property right has significant implications for the behavior of the rights, particularly in the transition between initial allocation and efficient equilibrium of existing entitlements. The Article then applies this framework to western water law and challenges the traditional conception of appropriative water rights. Lastly, the Article addresses the consequences of the usufructory nature of appropriative water rights for instream uses and concludes that only by complete quantification can privately held instream rights become a reality.*

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Introduction

Since the early 1970s, most western states have made a concerted effort to either maintain or augment the quantities of water flowing in their rivers and streams. Instream uses include boating, fishing, transportation, industrial uses, aesthetic purposes, wildlife habitat preservation, Native American subsistence, channel maintenance, hydroelectric power, enhancement of water quality, and groundwater recharge.<sup>1</sup> Yet, environmental interest groups, recreation industries, and those with aesthetic or other interests in increasing the amount of water in these natural channels have had little success in impacting instream flows in any material way. A promising solution is the privatization of rights to instream flows, such that private entities or individuals could purchase and enforce instream water rights; and instream uses of water could compete in the market for water against traditional consumptive uses. However, attempts by states to implement privately held instream rights have thus far been unsuccessful.

The problem of water scarcity in the West has increased dramatically over the past few decades, mostly due to the growth of cities. The rate of growth in many places is phenomenal. Between 1960 and 1990, domestic water use in the western states more than doubled, from 6.5 million acre-feet to 14 million acre-feet.<sup>2</sup> Because new collection and storage facilities (i.e., dams and reservoirs) are virtually impossible to construct due to environmental regulations, water must be transferred from current uses. Though most water is currently applied to agricultural uses, the marginal value is estimated at typically a third to a fourth of that of municipal use.<sup>3</sup> Microchips, for example, are more profitable

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1 “A flowing stream is generally more aesthetically pleasing than a dry streambed, probably even to the rancher who was previously diverting the water. . . . Flowing streams and healthy fisheries generate tangible economic benefits through recreation, tourism, sport and commercial fishing, amenity values, and pollution absorption.” Janet C. Neuman, *The Good, the Bad, and the Ugly: The First Ten Years of the Oregon Water Trust*, 83 NEB. L. REV. 432, 444 (2004).

2 Justice Gregory J. Hobbs, Jr., *Colorado Water Law: An Historical Overview*, 1 U. DENV. WATER L. REV. 1, 16 (1997).

3 Janis M. Carey & David L. Sunding, *Emerging Markets in Water: A Comparative Institutional Analysis of the Central Valley and Colorado-Big Thompson Projects*, 41 NAT. RESOURCES J. 283, 287 (2001).

and require far less water to produce than alfalfa, but commonly the most valuable water rights are held by farmers who produce the lowest value crops.<sup>4</sup>

A primary reason western water rights have failed to facilitate efficient management of the resource and have been unable to accommodate private ownership for non-consumptive uses of water is the definition of water rights established by the early western settlers. This Article proposes that appropriative rights as originally defined in the mid-nineteenth century are in fact usufructory rights, resulting both in the inability of water rights to function in markets and the difficulty of accommodating new and valuable instream uses.

Given the complete allocation and relative scarcity of water today, conversion of water rights to quantity-measured rights would facilitate markets, allow for privately held instream rights, and maximize efficient management and use.

The doctrine of prior appropriation, which in its simplest form operates as “first in time, first in right,” is complex in its history and motivated by a variety of factors, including economic efficiency, considerations of distributive justice, and other political forces.<sup>5</sup> As the story is most commonly told, the newly conceived water rights in the West were a complete break from the eastern system of riparianism—a new institution drawn on a blank slate, which created definitive private property rights in water which allowed the holder to capture and divert a specific quantity of water for a particular use. However, there are fundamental and important similarities between eastern riparian rights and western appropriative rights, not only in their procedural roots in the common law,<sup>6</sup> but also substantively, arising from the usufructory nature of both types of rights. Both riparian and appropriative rights are fundamentally use-measured rights rather than quantity-measured rights; That is, the boundaries of the right are determined by a specific use rather than a predetermined quantity.

Though particular quantities of water typically limit the boundaries of appropriative rights, the declaration that they are rights *to* specific quantities of

4 Janet C. Neuman, *Beneficial Use, Waste, and Forfeiture: The Inefficient Search for Efficiency in Western Water Use*, 28 ENVTL. L. 919, 970 (1998). Agricultural use is also inefficient as compared to water-based recreation. For example, agriculture composed about 90% of consumptive use of water in Colorado and produced only \$4.4 billion of the state’s GDP, while recreation (a non-consumptive use) brought in \$1.3 billion from fishing and an additional \$122 million from whitewater rafting. Jason S. Wells, *Leasing Water Rights for Instream Flow Protection: The Opportunities and Impediments to Improved Public Interest Involvement in Colorado’s Instream Flow Protection Regime*, 7 U. DENV. WATER L. REV. 309, 315-17 (2004). Even in 1985 then-governor Richard Lamm noted that alfalfa consumed 27% of water and produced \$156 million in revenue for the state, while recreation and tourism brought in nearly \$4 billion. *Id.* at 320.

5 See Terry L. Anderson & P.J. Hill, *The Evolution of Property Rights: A Study of the American West*, 18 J.L. & ECON. 163 (1975); David B. Schorr, *Appropriation as Agrarianism: Distributive Justice in the Creation of Property Rights*, 32 ECOLOGY L.Q. 3 (2005). Schorr provides very convincing evidence for the claim that the driving force behind the development of appropriative water rights in the West was not economic efficiency but considerations of distributive justice. *Id.*

6 Andrew P. Morriss, *Lessons From the Development of Western Water Law for Emerging Water Markets: Common Law vs. Central Planning*, 80 OR. L. REV. 861 (2001).

water is misleading. The right to use actually *determines* the quantity of water over which the right extends, as is true of riparian rights. In this respect, appropriative rights are essentially use-measured rights, though supplanted by quantity measures when the right to transfer is exercised. Use-measured rights have inherent advantages in addressing the challenges of initial distribution of a resource because they are statically efficient and capture the moral intuition that an individual has no right to more than he can use. Quantity-measured rights, on the other hand, lower transaction costs and are therefore adaptable to changing circumstances in which shifting efficiencies of use support transfer of rights. The existing hybrid regime includes use *and* quantity measures in an attempt to incorporate the advantages of both, and to accommodate the often-conflicting roles of the prior appropriation system in allocating and reallocating water to various types and locations of use. Yet today, circumstances have shifted from those faced by the creators of the western water regime; the allocation function of western water law is now rarely applicable because most western water has been allocated for a hundred years or more. Instead, the vestiges of the use measure in appropriative rights merely inhibit efficient reallocation with few offsetting advantages. Ironically, the very definition of the boundaries of appropriative rights, which is vital for the development of markets, is itself the biggest obstacle to desirable market-based transfers.

Hybrid rights are also antithetical to instream uses, resulting in the failure by western states to adapt their water regimes to allow for privately held instream rights, even where private instream rights might garner the necessary political support. Only by throwing off the remaining ties to use measures and turning to complete quantification can water rights take the final step to complete definition and thereby complete commodification.<sup>7</sup> This final step would allow instream uses to compete in an open market of privately held water rights and accomplish much needed reallocation of water to uses with higher marginal values.<sup>8</sup>

Part I of this Article outlines a framework for describing property rights along both a compositional and organizational spectrum, and it explains the ways in which the composition of a right, namely measurement in either

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7 Water rights will, however, remain property under a governance regime as long as states retain ownership of water and only grant narrow usufructory rights to private entities.

8 For the price of water rights in water markets to accurately capture the opportunity cost of water, groundwater rights would also have to be fully quantified. I do not discuss groundwater within this paper because the law governing groundwater, though related to that of surface water, is separate and distinct. The biggest obstacle to groundwater quantification would be integrating groundwater and surface water rights, because water is difficult to track if flowing underground. However, these difficulties are unlikely to be proportionately greater for groundwater than for surface water, and there may be less political resistance to the quantification of groundwater because removal of groundwater often already requires measurement. See, e.g., Order Approving Amended Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin (Nov. 30, 2005), available at [http://water.state.co.us/pubs/rule\\_reg/arkrule.pdf](http://water.state.co.us/pubs/rule_reg/arkrule.pdf); Rules Governing the Measurement of Groundwater Diversions Located in Water Division No. 3, The Rio Grande Basin (June 30, 2005), available at [http://water.state.co.us/pubs/rule\\_reg/div3measurementrules\\_proposed.pdf](http://water.state.co.us/pubs/rule_reg/div3measurementrules_proposed.pdf).

quantity or use, tends to affect the right's organizational characteristics. Part II describes both riparian and appropriative water rights in these terms and provides evidence that the two types of rights are usufructory in both organization and composition. Part III provides a brief history of the development of appropriative rights, relating their hybrid characteristics to the purposes that the rights were intended to accomplish in the agrarian frontier setting. Part IV specifically addresses instream water rights, providing an account of the various efforts by states to protect instream flows and the characteristics of these rights that prevent their incorporation into the current water law regime. Lastly, this Article presents a proposal for full quantification of water rights as a solution to many of the obstacles faced by instream rights.

## I. Property Regimes: Organization and Composition

Water rights are often considered an "advanced" form of property rights because of their usufructory characteristics.<sup>9</sup> The communal nature of water and its fundamental necessity for life are two likely reasons for the unique form of the rights that allocate management and use of the resource. Grants of rights by single uses rather than large bundles under exclusionary regimes enhance efficiency and promote maximum utilization. Fundamental choices in how society defines property rights influence the resource's efficient allocation and reallocation, the efficiency of the bundles in which rights to the resource are packaged, and whether primary decisionmakers regarding use of the resource are individuals, communities, or larger governmental entities.

In the following Sections, I analyze property rights as having two primary types of characteristics: those describing their organization and those describing their composition.<sup>10</sup> Both the organizational and compositional aspects of property rights can be charted on a spectrum. Organization varies on a range from exclusion to governance, and composition varies from quantity to usufructory measurement. Property rights can also be compositionally hybrid—they are subject to *both* quantity and usufructory measurement. These hybrid rights behave in unique ways and therefore can be a particularly efficient or inefficient choice of property regime depending on the circumstances.

### A. *The Organization of Property Rights*

The organizational aspect of a property right refers to the bundle of rights that make up the property right itself and circumscribe or limit acceptable uses for the underlying resource. As previously mentioned, the size and specificity

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<sup>9</sup> See Eric T. Freyfogle, *Context and Accommodation in Modern Property Law*, 41 STAN. L. REV. 1529, 1530 (1989).

<sup>10</sup> This form of analysis is adopted from the article by Henry E. Smith, *Exclusion Versus Governance: Two Strategies for Delineating Property Rights*, 31 J. LEGAL STUD. 453 (2002).

of this bundle of rights can fall anywhere on a spectrum from exclusion to governance.

An exclusionary regime grants the right-holder a general right to exclude and thereby provides a “protected zone, [in which] owners have open-ended choices of how to invest in or consume the asset”<sup>11</sup> by selecting among the many possible uses of the underlying resource. The traditional real property bundle of rights often attributed to Blackstone is the classic example of an exclusionary regime at its maximum. Ownership includes an absolute right to exclude, absolute privilege to use or abuse the land, and an absolute power to transfer the whole. Exclusionary regimes are supported by the “right to a thing” view of property—that property “appropriate[s] to individuals not the immediate use only, but the very substance of the thing to be used.”<sup>12</sup>

A governance regime, on the other hand, describes much more specifically those rights that the property owner may exercise on a use-by-use basis. Governance is one means to encourage maximum utilization of a resource. Usufructory rights are rights measured in, or restricted to, single uses, and such rights are one example of a governance regime. Historically, usufructory rights consisted of very specifically defined land use rights that were not transferable and that terminated upon the death of the owner. The rights also terminated and reverted to the common pool upon non-use. In other words, the right to non-use was not included in the bundle granted to the right-holder. A modern example of this type of usufructory right is the exercise of temporary dominion over public basketball courts; the right to occupy the court is returned to the common pool upon the basketball game’s completion.<sup>13</sup> Another example is the Maori system of usufructory property rights; property rights were allocated to “individuals and families on a functional rather than a geographical basis.”<sup>14</sup> The Maori rights also reverted to the tribe after a period of non-use, and could then be allocated to another tribe member.<sup>15</sup>

Almost all property rights fall somewhere between the extremes of full exclusion and complete governance.<sup>16</sup> Even real property is regulated with

11 Henry E. Smith, *Property and Property Rules*, 79 N.Y.U. L. REV. 1719 (2004).

12 WILLIAM BLACKSTONE, 2 COMMENTARIES \*4. See also Robert C. Ellickson, *Property in Land*, 102 YALE L.J. 1315, 1362-65 (1993).

13 See Ellickson, *supra* note 12, at 1366.

14 The Maori are the native New Zealand population. Stuart Banner, *Two Properties, One Land: Law and Space in Nineteenth-Century New Zealand*, in PERSPECTIVES ON PROPERTY LAW 321 (Robert C. Ellickson et al. eds., 3d ed. 2002). “[A] person would not own a zone of space; he would instead own the right to use a particular resource in a particular way.” *Id.* at 324.

15 *Id.* at 325.

16 The dichotomy of exclusion versus governance may be somewhat false when in fact most property rights are exceptions to these two categories. See Carol M. Rose, *Canons of Property Talk, or, Blackstone’s Anxiety*, 108 YALE L.J. 601, 603-04 (1998). “Blackstone himself was thoroughly aware of these pervasive and serious qualifications on exclusive dominion.” *Id.* at 603. However, it is useful to speak in these terms for purposes of description and to make predictions as to how certain property rights will behave.

respect to acceptable uses and the right to exclude.<sup>17</sup> Usufructory type rights often allow for transfer or the exercise of some discretion by the right-holder to select among various uses of the resource. Where a property right falls on the spectrum of exclusion to governance influences the behavior of the right: the degree of governmental control, the possibility of participation in markets, the potential for creative solutions to resource allocation problems through contractual or extra-legal means, and so forth.

### B. *The Composition of Property Rights*

The composition of a property right refers to that unit to which a certain bundle of rights attaches—that is, the unit in which the right is measured. The compositional aspect of property rights includes a range of possibilities. The most common and obvious way to measure property rights is in distinct quantities.<sup>18</sup> Quantification can be made in acres, feet, bushels, pounds, etc. Quantities can also be limited in various dimensions: vertically, horizontally, and temporally.<sup>19</sup> The units chosen to measure the resource can fall on a spectrum of more or less accurate proxies for measuring the valued characteristic of the object and will tend to vary depending on the cost of measurement.<sup>20</sup> Quantity is often the basis for exclusionary regimes, because it is a means to delineate a boundary over which the right to exclude extends without specifying each of the rights and liberties included by that boundary.<sup>21</sup> Though not the only option for measuring property rights, quantity measures are the most common and typically the most efficient.<sup>22</sup>

Another compositional possibility is to measure property in uses, such that the quantities of the underlying resource may fluctuate with respect to the rights granted. The use for which the right is granted determines the extent of the right—that is, how much of the underlying resource may be appropriated. A familiar example is that of certain types of easements. If I have a right to build

17 For example, land use is limited by the doctrine of nuisance and the doctrine of reciprocal easements of support. The right to exclude may also be limited depending on the use to which property is put, such as the regulation of common carriers.

18 I am distinguishing between defining resources and defining or measuring property rights in them. For most property rights, “resource” is the physical object(s) to which the rights refer. However, the same concept can sensibly be extended by analogy to intangibles. For example, the resource that is the subject of patent rights is an invention or idea. A use taken alone is not a resource, as I use the term, but must be associated with some other resource (either tangible or intangible).

19 For example, real estate may be divided into surface estates and mineral estates. Flyover rights are also typically separate from ownership of the surface. Leases are an example of property that is limited in time.

20 See Smith, *supra* note 10, at 467-74.

21 The efficiency advantages of quantity measures of property rights are similar to the efficiency advantages of the firm over numerous individual contracts, insofar as transaction costs render control over a fixed bundle of rights preferable to negotiating each individual right.

22 I am referring to an Anderson and Hill analysis of types of property definitions that compare the cost of different forms of measurement versus the benefits of more definitive property boundaries. Anderson & Hill, *supra* note 5.

a driveway across your land to access a road, there is no fixed quantity of land on which I have the right to build a driveway. Instead, I have the right to build on as much land as is necessary to gain access to the road. If circumstances should change such that I must use more of your land for the driveway to achieve the same end, then I may do so. Nothing has changed about my right, it has not grown, the bundle of rights associated with it remain the same, yet I am utilizing more of the object resource than before. Another example might be the right to divert and use enough water to irrigate thirty acres of alfalfa; the quantity described by the right will vary depending on the weather.

As there is a spectrum between exclusion and governance regimes, there is a like spectrum between quantity and usufructory-composed rights. The composition of property rights may be use-based with quantity limitations, or quantity-measured with organizational use restrictions. The same right can be described in different ways depending on one's choice of denominator. For example, if I want to purchase a right that will allow me to graze cattle on your land, there are several options. One possibility is to measure the right in blades of grass, such that I would have to determine how many blades of grass are necessary to feed the number of cattle that I have and buy exactly that amount from you. This is a strictly quantity-measured right—if I am wrong about the amount of grass my cattle need, my cattle might starve. Or I might purchase the right to graze my cattle on your land, such that I have the right to consume as much grass as is necessary for my cattle to survive and maybe even to get fat, depending on the terms of the deal. My right could be described as measured in use—because the amount of grass consumed by my cattle may vary without overstepping the bounds of my right—but with the quantity limitation that my use only extends so far as the boundaries of your land (let's say thirty acres). I only have the right to as much grass to feed my cattle as can be found on your thirty acres, and no more. On the other hand, this same right could be described as quantity-composed with usufructory organizational limitations. I have a right to consume the grass on your thirty acres, but regulated by the rule that I can only use the thirty acres of grass to raise my cattle, and if not used to raise my cattle, I may forfeit my right over the unused grass. This is where the spectrums of use- and quantity-composed rights meet. These mixed rights are easily treated ambiguously because it is unclear whether use or quantity defines the fundamental boundaries of the property right.

But the ambiguity problem is more pervasive than merely when use- and quantity-composed rights meet on the spectrum. Use- and quantity-composed rights can also appear ambiguous in their purest forms. For example, a license to watch a dramatic performance in a Roman theatre will include a right to exclude others from a seat and grant the licensee the liberty of occupying the

seat herself.<sup>23</sup> The license might be considered a sort of short-term property right over the seat. The right can either be described in quantity terms—the right to a standardized quantity accepted as the size of one seat on the bench; or it can be described in use terms—the right to enough space as is necessary to watch the performance in a seated position. One test to determine whether the right is measured in use rather than quantity, such that the right to occupy a seat is derivative from the right to watch the performance, is to ask what happens in the case of the extra-large or the extra-small Roman. If the short-term property right in the seat that arises out of the right to comfortably watch the performance is truly measured by use, then the extra-large Roman may occupy two seats.<sup>24</sup> And the extra-small Roman who only needs half the space to comfortably watch the performance does not have the right to rent out the excess to the extra-large Roman next to her, if her right to the seat is purely usufructory. The extra-small Roman has no right to any space that she cannot, or does not, use for the purpose of viewing the theatrical performance. Thus, not only can she not transfer it to someone else, she cannot use it to put down her bookbag, or any other use that is not ancillary to viewing the performance. Unused space is forfeited to the common pool.

In normal contexts, with average-sized Romans, there is typically no need to determine what measure is at the compositional essence of these ambiguous property rights. Measuring the property right in a theatre seat in quantity or use will almost always produce the same result, namely, the right to occupy the area normally required for a person to sit. The same situation arises with respect to western appropriative water rights. Whether a traditional appropriative water right is a right to irrigate thirty acres, or a right to the quantity of water typically required to irrigate thirty acres, is not immediately apparent. Again, under normal conditions, the relationship between use and the quantity of water necessary for that use will remain constant and therefore does not require a determination of the underlying measure of the right. Furthermore, most water rights are now adjudicated, which means that there are strict limitations on the quantity of water that may be diverted. The result might be a use right with a quantity limitation; or a quantity-based right under a usufructory governance regime. But the compositional regime underlying a right is not merely a matter of convenience or convention, particularly when positing how a property regime is expected to function. There are far-reaching consequences for the behavior of the right depending on whether it is fundamentally use- or quantity-measured.

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23 HUGO GROTIUS, *DE JURE BELLI AC PACIS LIBRI TRES* 186 (Francis W. Kelsey trans., 1925) (1625) (quoting MARCUS TULLY CICERO, *DE FINIBUS*, III.xx.67, n.d.). I use the Roman theatre example because of the continuous benches, such that individual “seats” are not clearly defined.

24 This precise issue has some resonance today with airline travel, though airline policy does not treat airline tickets as usufructory rights. See Brief of Respondent at 1, *Luther v. Southwest Airlines*, No. B147939 (Cal. Ct. App. June 28, 2001) (holding that an airline may have a policy requiring “a passenger, at the time of check-in, to purchase a second seat if it appears that she cannot be safely and comfortably accommodated in one seat”).

### C. *The Significance of Measurement*

The choice between quantity and use as the measure of a property right directly affects: (1) the default bundle of rights granted by the property right; (2) the homogeneity of the rights; and (3) the possibilities for division and recombination of the rights into more or less efficiently sized bundles.

A quantity-defined right tends toward a more exclusionary regime because quantities are only physical limitations on the extent of rights and do not address any limitation in use. Quantity-defined rights certainly can be, and usually are, regulated in ways that limit the owner's choices over use. In fact, quantity-measured rights often serve as the base upon which to apply a governance regime. However, the default state of the right allows the owner to use the resource in any way he or she chooses. That is, where the law remains silent, the right is with the owner and not with the common pool from which the right was carved.

A usufructory-defined right, on the other hand, will almost by definition result in a governance regime, because a right that is defined by a single use usually leaves very little choice by the owner as to how to apply the resource. However, the use in which the right is measured may encompass a number of included uses, creating a quasi-exclusionary zone in which the owner is free to choose. For example, one might have the right to enough water to irrigate thirty acres, leaving the owner to decide which crops shall be grown, which in turn affects how much water is necessary for the owner's use. But typically, usufructory-defined rights reserve the majority of rights to the commons, often controlled by the state, or the holder of the larger estate from which the right was carved. Resources that are considered to rightfully belong at least in part to the public seem best to fit in usufructory regimes. The choice between quantity and use to measure a right often brings up normative and empirical questions as to who is the best candidate to manage a resource: private individuals, a group of private individuals that share control of the resource, or the state.

Quantified property rights tend to be more homogeneous, and thereby more likely candidates for participation in markets.<sup>25</sup> Usufructory rights are often unique because they are imbedded in the context of the particular use for which the right was granted, tying them to the physical, geographic, and temporal characteristics of the use itself.<sup>26</sup> This context-dependent heterogeneity facilitates a complex web of interlocking rights in which rights may be overlaid onto existing rights and overlaid again. The result can be a highly efficient system of maximum utilization in which owners' use rights fit together like pieces in a jigsaw puzzle that leave no room for waste or non-use.

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25 "[R]ights that are based on exclusion are more easily transferable than those that are based more on use." Smith, *supra* note 10, at 469 n.52.

26 On the other hand, parcels of land are an example of a quantified property right that often has unique characteristics, resulting in some market friction.

The problem is that if the relative value of uses changes, reallocation without harm to third parties is nearly impossible. Changing a single use will almost inevitably infringe upon another's right and send a ripple effect throughout the web of interdependent rights and uses.

With quantified rights, the boundaries of the right are both theoretically distinguishable and less costly to determine, which in turn facilitates transfer.<sup>27</sup> The transaction costs from determining exactly what rights the buyer is purchasing are lowered, as is the risk that the buyer may be mistaken regarding the content of his purchase.<sup>28</sup> Homogeneous rights are much easier to value, both because there are other similar rights with which to compare prices and because the buyer has better information.

Lastly, quantified rights produce greater flexibility by allowing intentional division and recombination of rights. Reshuffling of the bundles of rights is possible because the boundaries of the underlying resource and associated rights and duties are more easily determined and tend to be more exclusionary in nature. Though the self-adjusting nature of usufructory rights may reallocate rights as a result of forfeiture, this reshuffling is not contracted for by the parties and therefore is less likely to track mutual gains. Quantified rights can be divided into a number of smaller units—two half-acres instead of an acre, four quarter-pounds instead of a pound—as well as divided across time, such as leases or seasonal use of land.<sup>29</sup> Another way to divide quantified rights is to break down an exclusionary right into a number of usufructory rights. These rights are compositionally usufructory but limited by the original quantity of the underlying asset. The division of property into particular uses allows for creative solutions to allocation problems through contracts for individual uses, restrictive covenants, or similar arrangements.

The downside of such numerous possibilities is the problem of fragmentation. Rights are more easily broken apart than reassembled because of the ratchet effect of transaction costs, so that property rights tend to be found in smaller units than is most efficient.<sup>30</sup> Use-defined rights avoid this problem

27 Definite boundaries encourage transfers by promoting four characteristics necessary to convert common property to individual property rights, which in turn induce market allocation. These four characteristics are:

(1) maximum exclusivity within the constraint of the physical nature of the resource; (2) free transfer at costs which are low relative to the value of the resource; (3) absence of positive and negative externalities that prevent transfer or impose excessive, unaccounted for costs on third parties; and (4) a clear, general definition of permitted and prohibited activities.

Hobbs, *supra* note 2, at 24-25.

28 See Thomas W. Merrill & Henry E. Smith, *Optimal Standardization in the Law of Property: The Numerus Clausus Principle*, 110 YALE L.J. 1, 24-38 (2000).

29 See Danaya C. Wright, *A New Time for Denominators: Toward a Dynamic Theory of Property in the Regulatory Takings Relevant Parcel Analysis*, 34 ENVTL. L. 175, 190-220 (2004) (discussing horizontal, vertical, functional, and temporal severance of property).

30 The effect is that of a "ratchet" because market forces drive the break-down of property rights into smaller units, but transaction costs prevent their reassembly even if reassembly would be efficient. Therefore the sizes of property rights ratchet down over time. See Michael A. Heller, *The Boundaries of Private Property*, 108 YALE L.J. 1163 (1999) [hereinafter Heller, *Boundaries of Private*

because they are very difficult to break down, in part because use rights cannot be broken into pieces that have no use—by definition, use rights are of a size that are useful. Secondly, use rights tend to overlap in such a way that any change in use will be likely to infringe on others' rights, so that transfers are discouraged. For example, if the extra-small Roman wants to sell some of her seat to one of her extra-large neighbors, she may not be able to do so under a usufructory regime if the Roman sitting behind her is using the space as a foot rest. The extra-small Roman would likely lose any right to that space because she was not using it herself and another individual had appropriated it. The self-adjusting character of usufructory rights has thwarted our extra-small Roman's attempt at more efficient bundling. However, usufructory regimes like that of seating in a Roman theatre avoid the problem of fragmentation and limit externalities that would otherwise produce third-party harm. The static character of use-right networks is not necessarily inefficient; the desirability of such a regime depends on the nature of the underlying resource and the values of its various uses.

## II. The Property Right in Water Rights

With the framework of the organizational and compositional aspects of property rights in place, we can analyze how water rights fit into the matrix. Eastern riparian rights are a paradigm of usufructory rights, both with respect to organization and composition. Appropriative rights on the other hand are commonly treated as if they were exclusionary, but I challenge this classification and instead suggest that appropriative rights are also part of a usufructory governance regime.

A riparian right is a right to a particular use of water on a particular watercourse with the restriction that the use may not unreasonably deplete the supply available for legitimate use by others.<sup>31</sup> Every right is subject to an organizational reasonableness standard so that each right is limited insofar as others in the same watershed have valid claims to the same physical resource. The riparian right to use is further restricted by the rule of appurtenance, which requires that the water be put to use only on parcels of land adjacent to the watercourse. As specific use rights, riparian rights do not involve a general right to exclude other than the extent necessary to protect the use that makes up the substance of the right.

The composition of riparian rights is use-based as well. The right is not to a fixed quantity of water, but to the amount necessary for a particular approved use. A riparian right can be highly variable in quantity, "expanding and contracting with the number of users and with the varying flow of the

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Property]; Michael A. Heller, *The Tragedy of the Anticommons: Property in the Transition from Marx to Markets*, 111 HARV. L. REV. 621 (1998).

31 For an example of riparian rights, see *Mason v. Hoyle*, 14 A. 786 (Conn. 1888).

stream.”<sup>32</sup> The doctrine of reasonableness is the ultimate limitation on the amount of water over which the right may extend, rather than any predetermined quantity of water. Riparian rights display the characteristics that one would expect of a use-composed right, because they consist of single or very limited bundles of rights. The rights are specific to a particular location and are appurtenant to the land. The heterogeneity makes them unsuitable for markets, and almost impossible to unbundle or reassemble into more efficient parcels. Far from typical private property, they are more like shares in a limited common property regime.<sup>33</sup>

Western water rights are assumed to be a complete commodification and privatization of water, and thus are often classified on the opposite extreme from riparianism, based partly on the belief that they are measured entirely in quantities and not uses. Admittedly, appropriative rights are somewhat more akin to real property than are riparian rights, allowing for a wider scope of authority over the resource by the right-holder. Yet, an accurate description of appropriative rights requires a much more nuanced examination of the nature of the right. In truth, western water rights are just a few steps away from the full-fledged usufructory rights that make up the riparian regime, and though the rights are measured in quantity in some respects, the core measure is in fact usufructory.<sup>34</sup>

As are riparian rights, appropriative rights are severely limited with respect to use.<sup>35</sup> The doctrines of waste, forfeiture, and public trust preclude any possibility of the exercise of absolute dominion by the right-holder.<sup>36</sup> There is also no right to non-use;<sup>37</sup> water that is not diverted is not removed from the common pool and therefore may be used by the next in priority. If the non-use continues for a certain statutory period, typically between five to ten

32 ROBERT G. DUNBAR, *FORGING NEW RIGHTS IN WESTERN WATERS* 60 (1983).

33 See Carol M. Rose, *The Several Futures of Property: Of Cyberspace and Folk Tales, Emission Trades and Ecosystems*, 83 MINN. L. REV. 129, 179 (1998).

34 “Water rights became more of a general water entitlement to use water rather than a right to a specific quantity . . . .” A. Dan Tarlock, *The Future of Prior Appropriation in the New West*, 41 NAT. RESOURCES J. 769, 771 (2001).

35 A water right may only be applied to the land for use on which the water was originally appropriated, unless a change of use has been approved by the water courts or agency. *Enlarged Southside Irrigation Ditch Co. v. John’s Flood Ditch Co.*, 210 P.2d 982 (Colo. 1949). The same is true for changes in type of use, such as conversion from use in powering a mill to irrigation. *Wash. State Sugar Co. v. Goodrich*, 147 P. 1073 (Idaho 1915).

36 The doctrine of waste prohibits the use of water for non-beneficial activities as defined by statute or common law. The doctrine of forfeiture holds that water left instream, and therefore unused for a certain statutory period, is forfeited and reverts to the common pool for appropriation. See Neuman, *supra* note 4, at 963. The public trust doctrine recognizes that the public has vested rights in some uses and bodies of water, for example for fishing or navigation, and a right-holder may not use his right in such a way as to interfere with the right of the public. GEORGE A. GOULD & DOUGLAS L. GRANT, *CASES AND MATERIALS ON WATER LAW* 526-28 (6th ed. 2000). All of these doctrines restrict the ways in which a right-holder may put water to use and thereby circumscribe the authority granted by the property right.

37 Janet C. Neuman & Keith Hirokawa, *How Good Is an Old Water Right? The Application of Statutory Forfeiture Provisions to Pre-Code Water Rights*, 4 U. DENV. WATER L. REV. 1, 24 (2000).

years, then the priority of the right is permanently forfeited with respect to that amount.

Evidence of the usufructory nature of these rights is also apparent from the rhetoric that surrounds early court descriptions of the right; “the appropriator does not own the corpus of the water, only its use,”<sup>38</sup> and the owner has the “right *only* to have the flow and use.”<sup>39</sup> The law of most western states includes a declaration that ownership of the water belongs to the people of the state.<sup>40</sup> The justifying intuition is that water ought not to be entirely controlled by private individuals because of the power this would imply over others who necessarily rely on this essential resource, particularly in the more arid states. Governmental entities have also been particularly active in the West in building water infrastructures, giving the government a sort of Lockean justification for retaining some rights in the water captured and transported by its system. The end result is that water rights granted to private persons are very limited, often to a single use; if rights in property are sticks in a bundle, then water rights are handed out one stick at a time.

The common belief that appropriative rights are entirely quantity measured arises from the quantity caps included in water decrees and the quantity measures that appear in court cases regarding transfers and changes of use.<sup>41</sup> In fact, these quantities are secondary to the use, which remains the primary standard of measure, and are determined by the use for which the right is decreed. Instead of a reasonableness limitation on the use-measured right as in the riparian system, limitations on appropriative rights are made through the mechanism of priority, “first in time, first in right,” and quantity caps. These rights are temporarily quantified only for the purposes of change in point of diversion or use, so that transfers are possible.

Western water rights combine the advantages of both a usufructory and a quantified system to produce a hybrid regime capable of handling the allocation and reallocation of this very difficult-to-measure resource. The confusion as to the fundamental characteristics of appropriative water rights is therefore unsurprising in light of the bifurcated property regime that includes both use and quantity measures. The older water law regimes in the western states seemed to treat use and quantity as if they were, for the most part, constant with respect to one another. Upon codification, many states adopted a presumption that the right to irrigate one acre was functionally equivalent to a right to a

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38 *Rock Creek Ditch & Flume Co. v. Miller*, 17 P.2d 1074, 1076 (Mont. 1933).

39 SAMUEL C. WIEL, *WATER RIGHTS IN THE WESTERN STATES* 289 (3d ed. 1911) (emphasis added).

40 The Colorado Constitution of 1876 states that “[t]he water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation as hereinafter provided.” COLO. CONST. art. XVI, § 5. *See also* Schorr, *supra* note 5, at 10; Frank J. Trelease, *Government Ownership and Trusteeship of Water*, 45 CAL. L. REV. 638, 639 (1957).

41 *See, e.g.*, *Santa Fe Trail Ranches Prop. Owners Ass’n v. Simpson*, 990 P.2d 46 (Colo. 1999); *Farmers High Line Canal and Reservoir Co. v. City of Golden*, 975 P.2d 189 (Colo. 1999).

particular quantity of water (in Montana, the legislature set the amount at one miner's inch per acre<sup>42</sup>). Therefore, whether use or actual quantity was the essence of the right was irrelevant to the shape of the property right, because one measure was identical to the other. However, this use-to-quantity formula breaks down when rights are transferred or new uses are introduced, resulting in the stagnation of water markets.

### III. Prior Appropriation: A Hybrid System of Rights

This Part of the Article further challenges the traditional notion of appropriative rights as exclusionary rights, and provides additional evidence that appropriative rights are actually a type of usufructory regime that is compositionally hybrid. First, I summarize the history of the rise and establishment of prior appropriation in the West. Next, I highlight the usufructory features of the common law and statutory doctrine of western water law. I then distinguish the limited role of quantity measures in water rights, and describe how the hybrid nature of water rights affects how they function in initial allocations, transfers (by which I mean markets generally), and adaptation to new uses.

#### A. *The Rise of Prior Appropriation*

The system of water law based on the doctrine of prior appropriation was adopted by states west of the hundredth meridian to meet the particular needs of the western settlers. Settlers were enticed to the arid lands of the West by the promise of land—land that was virtually worthless without water for irrigation. In *Left Hand Ditch*, the Colorado Supreme Court described the formidable landscape: “The climate is dry, and the soil, when moistened only by the usual rainfall, is arid and unproductive . . . . [A]rtificial irrigation for agriculture is an absolute necessity . . . .”<sup>43</sup>

The existing American system of water rights in the East was unsuitable to the Westerners for several reasons.<sup>44</sup> It failed to provide a satisfactory guarantee that there would be enough water for miners or farming families to survive, riparianism requires that each right-holder forfeit some water in periods of scarcity. Under such a system, *all* the crops in a community could fail from insufficient water—a highly undesirable result. Better that some irrigators are satisfied though some receive no water at all, and priority is an

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42 See *Conrow v. Huffine*, 138 P. 1094 (Mont. 1914). The presumption was rebuttable upon proof that more water was necessary to irrigate, for example due to particular soil conditions or a type of crop that required more water.

43 *Coffin v. Left Hand Ditch Co.*, 6 Colo. 443, 446 (Colo. 1882). The Court echoed this observation fifty years later in *People v. Letford*: “[T]he economic and industrial development of an arid state is directly dependent on its water supply.” 79 P.2d 274, 281 (Colo. 1938).

44 “If [riparianism] had been recognized and applied in this territory it would still be a desert.” *Stowell v. Johnson*, 26 P. 290, 291 (Utah 1891).

objective means to select the privileged right-holders.<sup>45</sup> Furthermore, the system must be able to accommodate the storage of water as a means to buffer against future drought. Because these miners and settlers were strangers to one another, the determinative system of water allocation that they developed did not rely on social norms of cooperation.<sup>46</sup> “First in time, first in right” provides a definitive, objective framework and ensures that early settlers will not be displaced by later comers. The arid landscape also made a limit of water rights to riparian owners inappropriate. There are many fewer water courses in the West, particularly in the Front Range area, and to limit water access to those owning land adjacent to the river would be to condemn the non-adjacent parcels as useless.

Prior appropriation responds to the shortcomings of riparianism and reflects several fundamental principles: (1) maximum utilization of water resources, because water is necessary for settlement and progress;<sup>47</sup> (2) prevention of speculation as a non-welfare producing, wasteful activity;<sup>48</sup> (3) prevention of monopolistic control over water resources and protection of the small farmer;<sup>49</sup> and (4) recognition that water is fundamentally public in character, belonging to the citizens of the state. Prior appropriation was generally accepted throughout the West by 1860 and was recognized by the U.S. Congress as the relevant water law in 1866.<sup>50</sup> Ultimately, nine states adopted prior appropriation as the sole water regime: Alaska, Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming; and nine others utilize prior appropriation concurrent with riparianism.<sup>51</sup>

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45 *Gilcrest v. Bowen*, 24 P.2d 141 (Mont. 1933) (stating that law and equity give first claimant of water sufficient quantity of water to irrigate his land). As stated by Frank Trelease, “[T]he rule of priority does guarantee a firm supply to all for whom the source is sufficient, and the senior irrigators can build a stable agriculture unmatched in humid climes.” Frank J. Trelease, *Climate Change and Water Law*, in CLIMATE, CLIMATE CHANGE AND WATER SUPPLY 702 (J. Wallis ed., 1977).

46 See ELINOR OSTROM, *GOVERNING THE COMMONS* (1990).

47 See *Fellhauer v. People*, 447 P.2d 986, 986 (Colo. 1968).

48 “The General Assembly and the courts of this state have often reinforced the policy of keeping the public water resource available to those who can and will use it beneficially, as opposed to those who wish to speculate in its value and price.” *Chatfield East Well Co. v. Chatfield East Property Owners Ass’n*, 956 P.2d 1260, 1270 (Colo. 1998). A modern example of water speculation is the Spencer-Rocky Ford Ditch grab, in which a speculator bought a sugar refinery in Colorado, including water rights to irrigate 4,000 adjoining acres, and sold it six years later to the city of Aurora for a \$9 million profit. Bruce Barcott, *There’s an Old Saying in Colorado: You Can Steal My Wife, But Not My Water*, LEGAL AFF., Aug. 2004, at 50. On the other hand, speculators may in some circumstances serve a useful economic function. See RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 54 (5th ed. 1998).

49 See Schorr, *supra* note 5, at 3 (claiming that “the appropriation doctrine actually was intended to express contemporary radical, agrarian ideals of broadly distributed property and antimonopolism”).

50 14 Stat. 253 (1866) (codified at 43 U.S.C. § 661 (2000)).

51 COLO. WATER CONSERVATION BD., *DECADES DOWN THE ROAD: AN ANALYSIS OF INSTREAM FLOW PROGRAMS IN COLORADO AND THE WESTERN UNITED STATES* 7 tbl.1 (2005).

## B. *The Usufructory Measure of Water Rights*

The composition of western water rights arose from the functions that prior appropriation was intended to serve: allocation and reallocation of water within the framework of the fundamental principles listed above. The outcome was a hybrid composition including both use and quantity measures, though the use measure of western water rights has been obscured by the commonly accepted description of these rights. Recognition of the use measure in water rights explains why even appropriative water rights have not resulted in successful water markets, and why fundamental changes are necessary to fully incorporate privately held instream rights into the existing regime.

The water law of the western states has codified three limitations on the amount of a water right: (1) the size of the original claim; (2) the capacity of the ditch or other diversionary mechanism; and (3) the amount of water put to beneficial use. The smallest of these three measures is the maximum measure of the right. Through the appropriation process, use actually defines the limit of the right in all three respects. The specific quantity caps such as cubic feet per second or other convenient measures serve merely as a proxy for use in defining the boundaries of the right to make those boundaries more distinct. Yet, quantity proxies are only imposed where use has first established the extent of the right.

The first step in acquiring a water right is to provide notice of intent to appropriate. Under contemporary water statutes in every state except Colorado, this step requires a permit for the particular use to which the water is to be applied.<sup>52</sup> The permit usually includes quantity limitations based on the declared use, often derived from statutory or administrative “water duties”<sup>53</sup> that define the total amount of water that may be applied per acre without waste.<sup>54</sup> The permit description of the water right is, in effect, an *ex ante* quantity limitation on the size of the right. These limitations arise directly from the stated purpose of the appropriation, and merely circumscribe the amount of water that may be used for that purpose without violating statutory restrictions against waste or intrusion upon others’ rights. The quantities stated in the permit are not definitive descriptions of the boundaries of the right itself, because the right has not yet vested. In early permit issues, “applicants for water right decrees typically based their claims on a rate of water diversion based on their own testimony as to the size of their facilities and the number of

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52 See, e.g., OR. REV. STAT. §§ 537.130, 537.990 (2003).

53 *Hough v. Porter*, 98 P. 1083 (Or. 1909) (defining “duty of water” as the quantity essential to the irrigation of any given tract).

54 The appropriation of water for a specific purpose, and a decree adjudicating the right to such appropriation, not only limits the use to the amount appropriated, but also to the quantity necessary for the purpose for which it is appropriated. See *Colo. Milling & Elevator Co. v. Larimer & Weld Irrigation Co.*, 56 P. 185, 186 (Colo. 1899); *Conrow v. Huffine*, 138 P. 1094 (Mont. 1914). See also *Larimer County Canal No. 2 Irrigating Co. v. Poudre Val. Reservoir Co.*, 129 P. 248 (Colo. App. 1912) (finding that an irrigator cannot take more water than is reasonably necessary to irrigate land).

acres to be irrigated.”<sup>55</sup> This lax approach was not mere laziness on the part of the courts or water bureaus—there was simply no need to strictly limit initial appropriations. Only the amount of water that was actually put to a beneficial use would vest into a valid right.

The second step in appropriation is to construct a ditch with a headgate or other means of diversion. Most western states require physical diversion of water for a valid appropriation,<sup>56</sup> even for non-consumptive uses such as mills. A modern statutory definition of diversion is to “remov[e] water from its natural course or location, or control[] water in its natural course or location, by means of a ditch, canal, flume, reservoir, bypass, pipeline, conduit, well, pump, or other structure or device.”<sup>57</sup> As such, diversion serves three essential purposes: capture, notice, and measurement.

As is true of other fugitive resources, such as oil and gas or wild animals, water is difficult to catch. Therefore, capture and exercise of control are commonly required to rightfully declare a portion of these fugitive resources removed from the common pool and privately owned.<sup>58</sup> By removing water from its natural course, others are also alerted that the water is claimed for use. Before statutory measurement requirements, measurement of exactly how much water was removed by a diversion was not necessary for notice purposes. The effects would be apparent to others by investigating the amount left instream. If the senior right-holding farmer downstream did not receive sufficient water for his crops at his headgate, then the more junior diverters upstream were wrongfully diverting water not available for use. A determination of the precise amount of water in question was unnecessary.

The diversion structure and the capacity of the ditch are also rough measurements of the quantity of water being removed from the stream. A vested water right cannot possibly be greater than the capacity of the ditch because a right-holder cannot put more water to beneficial use than is diverted.<sup>59</sup> Furthermore, the capacity of a ditch is likely to be a good proxy for how much water the right-holder expects to put to beneficial use, because there is little incentive to invest in a ditch with greater capacity than is useful. Therefore, though the capacity of the ditch is a second quantity limitation on the water right, it too is derivable from the use measure.

55 Lawrence J. MacDonnell, *Out-of-Priority Water Use: Adding Flexibility to the Water Appropriation System*, 83 NEB. L. REV. 485, 488 n.10 (2004).

56 *Nev. Ditch Co. v. Bennett*, 45 P. 472, 480 (Or. 1896); *Strickler v. City of Colorado Springs*, 26 P. 313, 316 (Colo. 1891) (stating that water running in its natural channel is the property of the public).

57 COLO. REV. STAT. § 37-92-103 (7) (2006).

58 See MacDonnell, *supra* note 55. Appropriation as a rule of capture rewards personal effort and therefore fits well with the individualism of the West as well as the Lockean notion of labor as the justification for property rights.

59 This is true even for non-consumptive uses such as mills, since diversion is required.

The final requirement for a water right to vest is to put the amount of water claimed to beneficial use.<sup>60</sup> The doctrine of beneficial use applies both compositionally and organizationally to limit both the specific activities to which water may be put and the measure of the right. Beneficial use not only measures the amount of the initial appropriation, but also the ongoing maintenance of the boundaries of the right. Beneficial use is “the basis, the measure, and the limit” of the water right.<sup>61</sup> In the process of appropriation, neither the initial decree nor the capacity of the ditch has the final force in determining the measure of the right; rather, the amount of water that is put to beneficial use determines the measure of this right.<sup>62</sup> There is no right to rent or sell “excess” water included in the water decree, since that amount has not vested.<sup>63</sup> Not all of the water listed in the initial decree must be put to use immediately to ultimately be included in the right with the same priority as the earliest of the appropriations. If the initial decree includes enough water to irrigate acreage that has not yet been developed, the right-holder must exercise reasonable diligence to put the water to use. In the meantime, the water left instream by the right-holder may be used by others. Once the recipient of the decree has developed the capacity to put the water to beneficial use and has in fact done so, then the right will vest for the full decreed amount.

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60 “All water rights are subject to beneficial use as the measure of the right.” *Farmers High Line Canal & Reservoir Co. v. City of Golden*, 975 P.2d 189, 200 (Colo. 1999) (quoting *In re Application for Water Rights of Midway Ranches Prop. Owners Ass’n*, 438 P.2d 515 (Colo. 1997)). Colorado defines beneficial use as “the use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made.” COLO. REV. STAT. § 37-92-103(4) (2006). Texas defines beneficial use as “the amount of water which is economically necessary for a purpose authorized by this chapter, when reasonable intelligence and reasonable diligence are used in applying the water to that purpose.” TEX. WATER CODE ANN. §11.002(4) (Vernon 1988). The uses to which water may be put that qualify as beneficial are often treated by the courts as interchangeable between states. The Ninth Circuit went so far as to state that “beneficial use” was a matter of general law among the western states. *United States v. Alpine Land & Reservoir Co.*, 697 F.2d 851, 854 (9th Cir. 1983) (“We do not deny or overlook the differences in water law among the various western states. However, on the point of what is beneficial use the law is ‘general and without significant dissent.’”) (citing 1 WATERS AND WATER RIGHTS § 19.2 (R. Clark ed., 1967)).

61 UTAH CODE ANN. § 73-1-3 (2003); N.M. CONST. art. XVI § 3. *See also Farmers High Line Canal & Reservoir Co.*, *supra* note 60, at 200 (“All water rights are subject to beneficial use as the measure of the right.”).

62 “[T]he fundamental purpose of a change proceeding is to ensure that the true right—that which has ripened by beneficial use over time—is the one that will prevail in its changed form.” *Santa Fe Trail Ranches Prop. Owners Ass’n v. Simpson*, 990 P.2d 46, 55 (Colo. 1999). “An implied limitation is read into every decree adjudicating a water right that diversions are limited to an amount sufficient for the purpose for which the appropriation was made, even though such limitation may be less than the decreed rate of diversion.” *Rominiecki v. McIntyre Livestock Corp.*, 633 P.2d 1064, 1067 (Colo. 1981). *See also Larimer County Canal No. 2 Irrigating Co. v. Poudre Val. Reservoir Co.*, 129 P. 248 (Colo. App. 1912).

63 *See* COL. REV. STAT. §§ 37-92-103(5), 302(1)(a), 305(3) (1997); *Orr v. Arapahoe Water and Sanitation Dist.*, 753 P.2d 1217 (Colo. 1988) (finding that a senior appropriator may not lend, rent, or sell any excess water); *Galiger v. McNulty*, 260 P. 401 (Mont. 1927). Only recently have some states adopted “conserved water statutes,” which authorize water users to retain and use water conserved by water saving techniques. Neuman, *supra* note 4, at 956.

In early appropriations, water rights were sometimes measured only in terms of the use to which the water was to be put. Contractual provisions entitling members or customers of a ditch company to their share of water might be entirely use-measured, for example “the right and privilege . . . to take from said Irrigating Ditch No. 10. . . a sufficient quantity of water to irrigate eighty acres of land and no more.”<sup>64</sup> This type of usufructory definition allows flexibility in the particular amount of water over which the right extends.<sup>65</sup> The lack of quantity specificity is not imprecision in the measure of the right; it is inherent to a genuinely use-measured right. Even today, eighty to ninety percent of the consumptive use of water in the West is for irrigation,<sup>66</sup> which is a well known standard use that easily translates into approximate quantities of consumption. When the types of uses for water are limited to a few that are well known and understood, employing use as a proxy for quantity is low-cost. There is no need to quantify at all, even for determining right infringement or transfer. The right to irrigate *x* number of acres is a sufficiently specific measure for the property regime to function well enough. However, problems arise when the density of rights in a watershed reach a threshold beyond which changes in use affect other right-holders.

### C. *The Quantity Measure of Water Rights*

Quantity measures play two roles in the prior appropriation system. They set limits on otherwise use-measured rights and are temporarily authoritative for the purposes of transfer and change in use. In recent years, increasing numbers of quantity limitations have been imposed on western water rights. As the amount of unallocated water decreases, rights become more and more interlocking, such that any change in use is likely to have third party effects. To avoid negative externalities, legislators and judges impose more stringent quantity limitations. These quantity limitations tend to freeze existing patterns of use and prevent changes or increases in diversion that might harm other right-holders. This development in the definition of rights goes hand in hand with improvements in technology that make such measurements both possible and economical. Water rights can and are limited with respect to flow, timing, and total volume.<sup>67</sup> Courts commonly impose seasonal limitations on the times of year that water may be diverted, particularly when the use is agricultural; a

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64 *East Ridge of Fort Collins, LLC v. Larimer & Weld Irrigation Co.*, 109 P.3d 969, 972 (Colo. 2005); *see also* *Wyatt v. Larimer & Weld Irrigation Co.*, 29 P. 906, 906-07 (Colo. App. 1892).

65 “Beneficial use necessarily varies with the humidity of seasons.” WIEL, *supra* note 39, at 507. “Different seasons require a different quantity of water. Different crops require different quantities of water.” *Sears v. Orchards Water Co.*, 236 P. 502, 505 (Or. 1925).

66 David J. Hayes, *Privatization and Control of U.S. Water Supplies*, 18 NAT. RESOURCES & ENV’T 19, 21-22 (2003).

67 For example, a 1918 decree recognizes an appropriation date of March 16, 1892 and a rate of flow of 4.0 cubic feet per second for irrigation use on 300 acres, not to exceed 900 acre-feet of water annually. *Ready Mixed Concrete Co. v. Farmers Reservoir & Irrigation Co.*, 115 P.3d 638, 640-41 (Colo. 2005).

change from a seasonal use to a year-round use, such as from agricultural to municipal water use, would greatly increase the total quantity of water diverted, though the flow would remain constant.<sup>68</sup>

Around the time that water rights became codified, many states held general statewide adjudications of water rights to place quantity limits on pre-code rights that were issued without a water decree.<sup>69</sup> The task was not to change the nature of the rights to quantity-measured, but merely to determine how much water each use implied. All in all, the process of adjudication was rather piecemeal. Today, some water certificates contain just a maximum flow, some include restrictions on the timing of intakes, and some include a maximum water duty,<sup>70</sup> or various combinations thereof. However, the quantification is still secondary to the use itself; one cannot have a right to more water than is necessary or has been actually put to beneficial use. The quantity limitations merely provide a concrete description of the amounts of water implied by the use that is the subject of the right. Recording quantity measures can be very useful in determining the boundaries of rights at a glance and are necessary for accomplishing transfers to prevent third party harm. Yet, these quantities remain subject to amendment upon proof of a pattern of historical use that does not match the written description. Though recent improvements in technology and changes in water regulation have resulted in more frequent and accurate measurement of water consumption, these measurements still lack authority across changes in use.<sup>71</sup>

For the most part, right-holders are allowed to vary their intakes within some “reasonable” range as is necessary to accomplish their particular purposes.<sup>72</sup> The policing of water use remains relatively lax and day-to-day regulation operates mostly on a loose honor system,<sup>73</sup> though there is a

68 See, e.g., *City of Westminster v. Church*, 445 P.2d 52 (Colo. 1968).

69 The Colorado Act of 1881 provided for the adjudication of water rights. Justice Gregory J. Hobbs, Jr., *Colorado's 1969 Adjudication and Administration Act: Settling In*, 3 U. DENV. WATER L. REV. 1, 6 (1999). A second round of adjudications in western states occurred in the 1970s and 80s, and litigation continues today. See John E. Thorson, et al., *Dividing Western Waters: A Century of Adjudicating Rivers and Streams (pt. II)*, 9 U. DENV. WATER L. REV. 299, 303-04 (2006).

70 A water duty is the amount of water used per acre for irrigation.

71 Both Oregon and Colorado have taken significant steps toward complete quantification of water rights. However, even these states still define the water right “as a beneficial use capped by a maximum rate and duty, rather than a rate and duty capped by beneficial use.” Krista Koehl, *Partial Forfeiture of Water Rights: Oregon Compromises Traditional Principles to Achieve Flexibility*, 28 ENVTL. L. 1137, 1150 (1998).

72 *Foster v. Foster*, 213 P. 895, 897 (Or. 1923) (“Appropriators of water with old established rights dating back to a settlement in the early seventies should be allowed a reasonable latitude for a change of cultivation of the land and rotation of crops, in order that the more remunerative products may be raised . . .”). “Farmers . . . will continue to treat their water rights as if the amount of water is highly flexible as long as they are using the water beneficially to themselves and as long as, on an overall average basis, they believe they are operating within the limits of their paper rights.” Neuman, *supra* note 4, at 977.

73 Interview with Howard Wertsbaugh, Dist. Hydrologist, U.S. Dep’t of the Interior: Bureau of Land Mgmt., in Cañon City, Colo. (Aug. 8, 2005); Neuman, *supra* note 1, at 467-68; Neuman, *supra* note 4, at 986.

growing trend for states to require the measurement of intake on head-gates. However, watermasters typically only respond to complaints and do not directly police diversion.<sup>74</sup> They also spend much of their time negotiating deals to satisfy all parties involved and to produce the best result for the community. Watermasters do not behave as if they were strictly enforcing clearly defined rights.

Written quantity decrees also do not prevent future appropriation of water. If the water is physically available, then it may be appropriated and put to a beneficial use. It is irrelevant that, according to issued water decrees, all of the water in the stream is held by right. The quantities listed in the decrees are not the true measure of the rights; the physical use, the amount of water applied outside of the natural course of the stream, is the authoritative measure. Therefore, streams can be “overappropriated” on paper, and are overappropriated in many watersheds in the western states.<sup>75</sup> Overappropriation, as a rule and not an exception, is only rational if the water certificates are supposed to be a limit on, or description of, the water right and not a substantive measure of the right itself.<sup>76</sup> The uses fit together in a comprehensive web that allots water to its rightful owners, which are not necessarily the quantities written in the paper certificates.

Quantity measures *are* temporarily authoritative to make certain changes, such as a change in the type of use or point of diversion, that are often associated with transfer of ownership. Quantity becomes the dominant measure of the right for these purposes so that the prior appropriation system can allow for continuity of rights across changes of use that would otherwise destroy a use-measured right. The quantity measure of the water right creates a limited and temporary exclusionary regime, a sphere within which the right-holder is free to make some choices regarding the application of the right.<sup>77</sup> As long as the new use falls within the quantity limits of the latest decree for that right, then it is a legitimate exercise of the right. As Demsetz’s theory predicts, the temporary definitions of water rights for purposes of transfer have become

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74 See Reed D. Benson, *Maintaining the Status Quo: Protecting Established Water Uses in the Pacific Northwest, Despite the Rules of Prior Appropriation*, 28 ENVTL. L. 881, 890-95 (1998) (describing passive enforcement). Watermasters are state officials responsible for coordinating and policing water rights.

75 Some rivers with average flows of a few thousand cubic feet per second (“cfs”) have recorded total appropriations of one million cfs. John D. Leshy, *A Conversation About Takings and Water Rights*, SK056 A.L.I.-A.B.A. 283, 305 (2005).

76 Overappropriation is not inconsistent with quantity-measured rights, but merely means that the junior rights will rarely “kick in.” However, the fact that so many streams are overappropriated suggests that there is a better explanation and that, by totaling the maximum limits on all the more senior rights and subtracting them from the amount of water available, these junior rights actually yield more water than one would expect.

77 The same process is apparent in changes of use that merely expand the amount of acreage under irrigation. This change is sufficient to destroy the underlying use-measured right (the right to irrigate thirty acres is different than the right to irrigate forty acres) and therefore is a type of transfer that requires quantification.

more definite as demand increases and the cost of measurement falls.<sup>78</sup> However, because the quantity decrees are not the permanent measure of the right and every transfer requires re-quantification under the historical use doctrine, legal obstacles thwart the advantages of efficient evolution of right definition.<sup>79</sup>

Historical use refers to the “true right” in a water decree—that is, the portion of the water decree that has ripened through application to beneficial use. Today, historical use refers both to an amount of diversion as well as an amount of return flow, the difference between which is assumed to be the amount of consumptive use. With every transfer, the amount of historical use is reassessed either by the state water agency, or in Colorado, by a water court.<sup>80</sup> Over a number of transfers, this process inevitably reduces the amount of water over which a right extends because the assessments will never increase, but rather, further limit the quantity of the right. Historical use assessments are necessary because paper rights often do not reflect actual patterns of use. Therefore, third parties may rightfully rely on water that has been historically left instream, even though that water may on paper be granted to a senior user. “[A]n appropriator cannot change the point of diversion or the place of use if the change increases the historical use to the detriment of other appropriators.”<sup>81</sup>

Before water was as scarce and valuable a commodity as it is today, the amount of water encompassed by a right in the process of transfer was not scrutinized very closely. The court or bureaucrat’s investigation might only go so far as to determine that the use was the same before and after the transfer. A 1995 report showed that out of 919 transfers prior to 1969, none had volumetric limits, 814 had no flow rate limit, 906 had no seasonal limits, and 810 had neither flow rate nor seasonal limits.<sup>82</sup> The reason such a system was workable at all is because most of these transfers were from one agricultural use to another, and therefore did not imply significant changes in patterns or volume of use. Many states have statutory provisions granting farmers the presumption that they are acting within the limits of their water rights, where the farmers

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78 See Harold Demsetz, *Toward a Theory of Property Rights*, 57 AM. ECON. REV. 347, 350 (1967) (“[P]roperty rights develop to internalize externalities when the gains of internalization become larger than the costs of internalization.”).

79 See *Santa Fe Trail Ranches Prop. Owners Ass’n v. Simpson*, 990 P.2d 46, 53 (Colo. 1999); *Okanogan Wilderness League, Inc. v. Town of Twisp*, 947 P.2d 732, 737 (Wash. 1997); Neuman, *supra* note 4, at 960; *Orr v. Arapahoe Water & Sanitation Dist.*, 753 P.2d 1217 (Colo. 1988).

80 See MacDonnell, *supra* note 55, at 492-93.

81 *Danielson v. Kerbs Agr., Inc.*, 646 P.2d 363, 373 (Colo. 1982). See also COLO. REV. STAT. ANN. § 37-92-305(9) (West 1989); *Weibert v. Rothe Bros., Inc.*, 618 P.2d 1367, 1371-72 (Colo. 1980); *City of Westminster v. Church*, 445 P.2d 52 (Colo. 1968); *Farmers Highline Canal & Reservoir Co. v. City of Golden*, 272 P.2d 629, 634 (Colo. 1954).

82 See James N. Corbridge, Jr., *Historical Water Use and the Protection of Vested Rights: A Challenge for Colorado Water Law*, 69 U. COLO. L. REV. 503, 513-14 (1998).

merely change the type of crop without expanding the number of irrigated acres.<sup>83</sup>

Aside from the transaction costs, the historical use requirement for transfer also has a chilling effect on trades because right-holders risk partial forfeiture of the water right with every attempt to transfer.<sup>84</sup> Today, with increasing diversity in water use, the burden of proof is much higher and is a significant transaction cost, arguably the primary reason that water markets have not fared better. The burden of proof rests on the right-holder to show that historical use is not less than the amount written in the water decree, while the court is likely to impose further quantity limitations, such as a required return flow or augmentation to ensure that third parties are not harmed by the trade.<sup>85</sup> Losses may result not only from actual decline in historical use, but also from inaccuracies in the measurement process which, even with modern technology, remains imprecise.<sup>86</sup>

#### D. *The Advantages of Quantity Measures*

The application of both quantity and use measures to appropriative water rights resulted in a system that, at the time of its inception, captured the most beneficial aspects of both regimes. Use measures were advantageous for determining the first-time allocation of water rights because use-measured rights promoted maximum utilization by ensuring that water would not be unused when there was demand.<sup>87</sup> Any instance of non-use forfeited the water to the next in priority who would put it to beneficial use. Use-based allocation of water rights was also egalitarian and anti-speculative,<sup>88</sup> consistent with the

83 DIVISION OF WATER RESOURCES, DEP'T OF NAT RESOURCES, STATE OF COLORADO, GUIDE TO COLORADO WELL PERMITS, WATER RIGHTS, AND WATER ADMINISTRATION (2006), available at <http://www.water.state.co.us/pubs/wellpermitguide.pdf>.

84 "Inadequate analysis of historical utilization or ambiguity in the law as to how that historical use should be measured can lead to uncertainty and confusion in the administration of the transfer system." Corbridge, *supra* note 82, at 504. See COLO. REV. STAT. ANN. §§ 37-92-305(3), -502(2) (West 1989); Farmer's Reservoir & Irrigation Co. v. Consolidated Mut. Water Co., 33 P.3d 799, 815 (Colo. 2001) (stating that a change of water right risks re-quantification based on actual historic consumptive use); Pueblo West Metro. Dist. v. Southeastern Colo. Water Conservancy Dist., 717 P.2d 955, 959 (Colo. 1986).

85 See, e.g., Danielson v. Kerbs, Ag., Inc., 646 P.2d 363, 373 (Colo. 1982); C. Carter Ruml, *The Coase Theorem and Western U.S. Appropriative Rights*, 45 NAT. RESOURCES J. 169, 176-77 (2005) ("If harm is shown, the transfer will be either blocked outright, or, more frequently, approved subject to modifications so that return flow appropriators will not be harmed.").

86 See Olen Paul Matthews et al., *Marketing Western Water: Can a Process Based Geographic Information System Improve Reallocation Decisions?*, 41 NAT. RESOURCES J. 329, 330-31 (2001).

87 Arguably, the Homestead Act is an example of an inefficient allocation of resources based on a standard quantity measure, because 160 acres of land may be insufficient for subsistence in certain arid regions of the west.

88 "Prior appropriation is egalitarian, equitable, and efficient in that: (1) beneficial uses are recognized without regard to the economic value which will be produced therefrom . . . ; (2) access to the available supply is based on need for a beneficial purpose; and (3) no more water belongs to the

Lockean justification for property rights and with republican ideals: “As much as any one can make use of to any advantage of life . . . so much he may by his labor fix a property in: whatever is beyond this, is more than his share, and belongs to others . . . .”<sup>89</sup> Every person had an equal right to obtain sufficient water to mine or irrigate his land, given the limitations of first in time, first in right, but could not appropriate more than necessary for his use. The appropriator must leave unused water instream, where it can be appropriated and put to use by others.

The problem with use-measured rights is that they are also rigid and resistant to change, freezing the initial allocation of rights in place. As values of water use changed, the allocation of water rights became increasingly inefficient. A method of transfer was necessary for economic pressures to funnel water into more valuable uses. Under the current regime, there is also little incentive for holders of use-measured rights to invest in new, water-saving technologies because conserved water is simply forfeited.

Quantity-measured rights tend to be the most workable for the reallocation, i.e., transfer, of rights. Quantities account for the exclusionary nature of tangible resources, like water, which cannot be used for more than one purpose at any given time, and do not admit overlap, at least in theory, the way use-measured rights often do. A primary advantage of quantification is that the number of units to which a property right applies remains constant, thereby making questions about the distinction between one owner’s rights and another’s predictable and relatively easy to determine. Of course, water is unique from other physical resources because rights to water are typically divided into usufructs, such that different users across space and time may have rights to the same physical molecules. Yet space and time are also quantifiable and can be accommodated into the quantity measure of a right. Quantity also allows for greater exercise of dominion by the right-holder to choose how to put his water to use, creating a sphere of authority in which markets can develop.

In sum, quantity measures are best at maintaining efficiency over time in changing circumstances, though not sufficient for addressing the problem of initial allocation. An arbitrary initial allocation of some fixed quantity of water is unlikely to reach an efficient solution through markets because water markets, even in the most ideal circumstances, include inherent sources of failure. There are significant transaction costs associated with water transfers, including the cost of measurement and transport. During the formation of the doctrine of prior appropriation, these costs were arguably so great as to be prohibitive, and remain severe limitations on water markets today. Allocation

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water right than the amount reasonably necessary under the circumstances to effectuate the use.” Hobbs, *supra* note 2, at 25.

<sup>89</sup> JOHN LOCKE, *THE SECOND TREATISE OF GOVERNMENT* § 31 (1690), *reprinted in* RATIONAL BASIS OF LEGAL INSTITUTIONS 197 (John H. Wigmore & Albert Kocourek eds., 1923).

based solely on efficiency also fails to address distributive justice concerns.<sup>90</sup> Those who are initially able to obtain the largest water rights reap the benefits of future trades to more beneficial uses.

Prior appropriation incorporates the best of both systems by utilizing use measures to define and allocate water rights, and by implementing a quantity measure for the purposes of transfer.<sup>91</sup> The outcome was not perfect, but withstood over 150 years of application. Yet now that water rights are virtually entirely allocated, even in years of well-above-average precipitation, we are free to ask—why not do away with the remainder of this use-based system? The remnants of use measures in water rights only serve to inhibit greater efficiency of water use and incentivize wasteful behavior.

#### IV. The Composition of Instream Water Rights

Before discussing the incompatibility of privately held instream rights with the current hybrid water rights regime in the West, I provide a brief history of states' efforts to protect instream flows. Many of these efforts support the proposition that private instream rights would be both successful and desirable, while highlighting the problems with awkwardly positioning these new types of rights within the framework of the current regime. I then defend my claim that complete quantification of water rights is the best and only way to achieve fully-fledged instream rights, as well as functioning water markets for both instream and consumptive rights, while pointing out some of the obstacles to such a significant change in the current water law.

##### A. *A Brief History of the Protection of Instream Flows in the West*

Water law in the West faces a dual task of accommodating changing values of uses for water, as well as addressing increasing scarcity that puts additional stress on an already fully loaded system. Traditional water law is resistant to the accommodation of instream uses because at the time that prior appropriation was formulated, the water left instream was considered a waste of a valuable resource. The water allocation system was built on the premise that

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90 The western settlers' sense of distributive justice seemed to require that each man be allowed enough water to irrigate his land when so doing would not infringe on others' ability to irrigate. "Law and equity give first locator of land and claimant of water sufficient quantity of water to irrigate his land." *Gilcrest v. Bowen*, 24 P.2d 141, 146 (Mont. 1933); see also Schorr, *supra* note 5.

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The objective of the water law system is to guarantee security, assure reliability, and cultivate flexibility in the public and private use of this scarce and valuable resource. Security resides in the system's ability to identify and obtain protection for the right of water use. Reliability springs from the system's assurance that the right of water use will continue to be recognized and enforced over time. Flexibility emanates from the fact that the right of water use can be changed, subject to quantification of the appropriation's historic beneficial consumptive use and prevention of injury to other water rights.

*Empire Lodge Homeowners' Ass'n v. Moyer*, 39 P.3d 1139, 1147 (Colo. 2001).

water in its natural channel is unused, and therefore open access. The Colorado Supreme Court stated in 1965 that “instream flow ‘is a riparian right and is completely inconsistent with the doctrine of prior appropriation.’”<sup>92</sup> Not only must instream uses be recognized as beneficial, but the diversion requirement must be amended, and ultimately, the very way in which water rights are measured must be reassessed.<sup>93</sup>

The existing methods of instream flow (“ISF”) protection in the West range from government regulation to private ownership. For private instream rights to fit into the prior appropriation system, the purpose for which the water is appropriated or transferred must be recognized as a beneficial use. Many states now recognize ecological preservation, fisheries, or recreation as beneficial uses, but states vary as to which or any of these three are legitimate.<sup>94</sup> Most instream beneficial uses came to be recognized through government programs designed to protect fisheries or river ecology.<sup>95</sup> Once the state legislature recognizes a use as a beneficial government purpose, courts are likely to uphold the use when carried out by private entities absent any specific statutes to the contrary. However, most states explicitly reserve instream water holdings to particular government agencies and will not apply property protections to instream flow rights (ISFs) held by private entities.<sup>96</sup> State water law also often includes a hierarchy of uses, and activities such as recreation are usually low on this list. Because most ISFs are controlled by government entities, they are subject to these legislative and judicially created hierarchies.

The second modification that states have made in an attempt to accommodate ISFs is to alter the diversion requirement. Some states have

92 Hobbs, *supra* note 2, at 22 (quoting Colo. River Water Conservation Dist. v. Rocky Mountain Power Co., 406 P.2d 798, 800 (Colo. 1965)).

93 “The main obstacles to market transfers of water instream are . . . the legal impediments that states enact—like constraints on ownership and transfer—not the nature of water itself.” George A. Kimbrell, *Private Instream Rights: Western Water Oasis or Mirage? An Examination of the Legal and Practical Impediments to Private Instream Rights in Alaska*, 24 PUB. LAND & RESOURCES L. REV. 75, 83-84 (2004).

94 Alaska, Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming all recognize at least one instream use as a beneficial use. COLO. WATER CONSERVATION BD., *supra* note 51, at 9 tbl. 3.

95 Some examples: In Utah, the Division of Wildlife Resources may convert consumptive water rights to instream flow for the propagation of fish, public recreation, and reasonable preservation or enhancement of that natural stream environment. UTAH CODE ANN. § 73-3-3(11)(a) (West 1953). The Washington Department of Ecology may establish minimum flows for protecting fish, game, birds, other wildlife, or recreation or aesthetic values in the public interest. See Jack Sterne, *Instream Rights & Invisible Hands: Prospects for Private Instream Water Rights in the Northwest*, 27 ENVTL. L. 203, 207 (1997). The Idaho Water Resources Board may appropriate water for fish and wildlife habitat, aquatic life, recreation, aesthetic beauty, navigation, transportation, or water quality. *Id.* at 209.

96 “[I]nstream flow rights held by private individuals or organizations are often perceived as constraints to future water development. As a consequence . . . most western state legislatures have authorized only governmental agencies to hold in-place water rights under programs that balance competing instream and consumptive uses.” Steven J. Shupe & Lawrence J. MacDonnell, *Recognizing the Value of In-Place Uses of Water in the West: An Introduction to the Laws, Strategies, and Issues, in INSTREAM FLOW PROTECTION IN THE WEST*, 1-1, 1-9, 1-10 (Lawrence J. MacDonnell & Teresa A. Rice eds., 1993).

adopted special statutes that bypass the diversion requirement specifically for ISFs; other states have simply recognized that diversion is not always required to maintain a water right.<sup>97</sup> Some states have also enacted particular exceptions for specific purposes, such as Colorado's Recreational In-Channel Diversions (RICDs) statute, under which municipalities may appropriate water instream for recreational purposes, allowing the construction of artificial features, such as those in a whitewater park, to satisfy the diversion requirement.<sup>98</sup>

The majority of ISF protection powers are restricted to government entities.<sup>99</sup> Roughly speaking, the protections can take two forms: that of a regulation, or that of a government held property right. Examples of regulations that protect ISFs include statutory minimum flows, the Wild and Scenic Rivers Act,<sup>100</sup> and the public trust doctrine. These limit other valid water rights and thereby protect water instream. Minimum flow statutes were some of the first efforts by states to maintain water instream, and the first ones were enacted in Oregon in 1955 and Washington in 1967.<sup>101</sup> These statutes prohibit the withdrawal of water below specified flows and require review of new appropriations.

States and the federal government can also reserve water. Reservations remove the water from the common pool so that it may not be appropriated, but typically the reservation must be for a specific public purpose. In other instances, state or local governments are authorized to appropriate water for instream uses. Most western states have enacted legislation that allow only particular government agencies to hold instream water rights for the purposes

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97 Alaska, California, Colorado, Idaho, Kansas, Montana, Nebraska, Oregon, Texas, Utah, Washington, and Wyoming all have special statutes that make an exception for ISFs from the diversion rule. Arizona and Nevada are states in which diversion is not always required. South Dakota is silent on the issue, but in practice has allowed, though not promoted, a few protected ISFs. COLO. WATER CONSERVATION BD., *supra* note 51, at 8.

98 The recognition of manmade whitewater features as sufficient to satisfy the diversion requirement was first made by the Colorado Supreme Court in 1992. *City of Thornton v. City of Fort Collins*, 830 P.2d 915, 930-31 (Colo. 1992) (stating that appropriation of water must be by "a structure or device which either removes water away from its natural course or location and towards another course or location or which controls water within its natural watercourse."). The court decision was followed by legislative action to restrict the instream appropriations to only that much water as was necessary for a "reasonable" recreation experience, that is, "the experience in and on the water that would allow individuals with suitable skills and abilities relating to the specific recreational activity for which the water right is being sought, to partake in that activity." 2 COLO. CODE REGS. § 408-3 (2001). This statutory language was a response to concerns that "under *Ft. Collins*, appropriators could obtain high recreational in-channel flows, severely hindering Colorado's future development." *Colo. Water Conservation Bd. v. Upper Gunnison River Water Conservancy Dist.*, 109 P.3d 585, 599 (Colo. 2005).

99 Political opposition to privately held instream rights is largely based on fear that instream rights will harm current consumptive rights by reducing return flows, fear that instream rights will hamper future economic growth and development, and a belief that water should be used on the land. *Sterne*, *supra* note 95, at 222-26. For example, both the Oregon Farm Bureau and the Cattleman's Association opposed the activities of the Oregon Water Trust in transferring consumptive water rights to instream uses. Tarlock, *Future of Prior Appropriation*, *supra* note 34, at 781.

100 Hobbs, *supra* note 2, at 24; Kimbrell, *supra* note 93, at 76.

101 Salmon are a likely reason why the Pacific Northwest is at the forefront of ISF protection. Ruth Mathews, *Instream Flow Protection and Restoration: Setting a New Compass Point*, 36 ENVTL. L. 1311, 1323 (2006).

of environmental protection or protection of fisheries and other recreational interests.<sup>102</sup> The Colorado Water Conservation Board, established in 1973 by the Colorado Water Right Determination Act, is one such agency with funding to acquire water.<sup>103</sup> Agencies may either appropriate available water or purchase existing rights and convert them to ISFs.

Recently, more flexible and creative methods have been approved to supplement these agencies' holdings, such as the amendments to the Colorado Water Right Determination Act that allow private individuals to donate rights to the CWCB or loan them for up to 120 days.<sup>104</sup> However, the success of such agencies has been limited, and the failings are often attributed to lack of funding and the ambivalent role that these agencies play in representing conflicting interests.<sup>105</sup> The inadequacy of government agencies has increased the demand for privately held instream rights that could harness the power of private resources to achieve a more optimal level of ISF protection.

Two states, Alaska and Arizona, explicitly allow private entities and individuals to hold instream rights.<sup>106</sup> Notably, as of 2002 less than a dozen of these rights have been granted in Arizona and none in Alaska.<sup>107</sup> Upon closer inspection, the ISF rights in these states are really second-class rights and are not equivalent to other traditional water rights.<sup>108</sup> In Alaska, instream rights are subject to review every ten years, and may be revoked at virtually any time if required by other water needs.<sup>109</sup> Watermasters are also not required to enforce the rights on the same basis as diversionary rights. Furthermore, there are significant transaction costs to proving the quantity of water necessary to achieve the intended purpose, such as protection of fisheries, which requires years of measurement and data compilation.<sup>110</sup> Because Alaska is not an arid state and instream flows have not been seriously impacted in the vast majority of watersheds, private entities have little incentive to invest the significant amount of capital necessary to obtain a right that could evaporate at any

102 Colorado, Idaho, Montana, Utah, and Wyoming allow specific state agencies to acquire water rights to protect fish, wildlife, and sometimes recreation. COLO. WATER CONSERVATION BD., *supra* note 51, at 10 tbl. 5, 13.

103 Colorado Water Right Determination Act, COLO. REV. STAT. § 37-92-102(3) (1973).

104 H.R. 03-1320, 64th Gen. Assem., 1st Reg. Sess. (Colo. 2003) (codified as amended at COLO. REV. STAT. § 37-83-105(2)(a) (2004)); Wells, *supra* note 4, at 361.

105 Kimbrell, *supra* note 93, at 80-81; Wells, *supra* note 4, at 310, 351.

106 Instream Flow Act of 1980, ALASKA ADMIN. CODE tit. 11, §§ 93.141-47 (2002); ARIZ. REV. STAT. ANN. § 45-152 (2003); In re General Adjudication of All Rights to Use Water in the Gila River System and Source (*Gila II*), 989 P.2d 739 (Ariz. 1999).

107 In Alaska there were 237 applications for instream flow rights from 1980-2002, but only 8 by private parties, none of which were granted. Kimbrell, *supra* note 93, at 89.

108 “[I]nstream rights that have been created lack legal ‘equivalency’ with appropriative rights because they generally operate outside the traditional water rights system or as a cumbersome and ill-fitting addition to it.” Sterne, *supra* note 95, at 206.

109 *Id.* at 228-30.

110 Arizona requires one year of on-site streamflow measurement once per month to be granted an initial permit and an additional four years to perfect the right. *Id.* at 226.

moment. The rights are also non-transferable and may not be converted to any other use.

In Arizona, the story is slightly different, likely because of the significantly more arid climate, and therefore, the increased value of water. Privately held instream rights were initially created judicially, and the appropriation process for instream rights is controlled by agency regulations.<sup>111</sup> However, the rights are expensive to acquire because they also require many years of data collection and analysis. In spite of the disincentives to invest, the Nature Conservancy obtained the first privately held instream right in Arizona in 1990, and went on to acquire nine others.<sup>112</sup> However, the further expansion of instream right holdings is limited because they may only be acquired by appropriation and not by transfer. Because virtually all of the water in Arizona was appropriated by 1919 and Arizona does not allow the transfer of consumptive rights to instream uses,<sup>113</sup> only a negligible amount of water is eligible for appropriation as instream rights.

Oregon and Washington are also pioneers in instream rights, and have managed a more effective incorporation of instream rights into their water law systems, though they do not allow fully-fledged, privately-held instream rights. Both allow private entities to acquire water for instream uses, but require the right to then be turned over to a state agency to be held in trust on behalf of the citizens of the state.<sup>114</sup> Holding the rights in trust prevents the state from selling the rights, a condition often also included in the contract negotiated between the right-holder and the trust. The inalienability thus achieved is desirable to the individuals that donate such rights for environmental protection purposes. However, the system is too static to accommodate instream uses that might be beneficial only in the short term,<sup>115</sup> and also does not accommodate other types of instream uses such as recreation.

Other states have also taken steps to harness private resources for preservation of ISFs. Montana and Oregon allow for temporary leases of water to private individuals or entities to promote fisheries.<sup>116</sup> California allows an

111 See *McClellan v. Jantzen*, 547 P.2d 494, 496 (Ariz. Ct. App. 1976); *Phelps Dodge Corp. v. Ariz. Dept. of Water Resources*, 118 P.3d 1110 (Ariz. Ct. App. 2005).

112 Sterne, *supra* note 95, at 227; COLO. WATER CONSERVATION BD., *supra* note 51, at 31.

113 Sterne, *supra* note 95, at 227.

114 *Id.* at 208-09 n.46, 213; Wells, *supra* note 4, at 336, 341; Mary Ann King, *Getting Our Feet Wet: An Introduction to Water Trusts*, 28 HARV. ENVTL. L. REV. 495 (2004). Recently, the Oregon Water Trust made a successful attempt to hold the permanent acquisition of water in its own name. The resulting instream right was called a "flow augmentation" right by the courts. *Id.* at 518.

115 This problem is true of other types of conservative easements. See Julia D. Mahoney, *Perpetual Restrictions on Land and the Problem of the Future*, 88 VA. L. REV. 739, 749 (2002).

116 Temporary means up to ten years. If the water is "salvaged water" that was made available by water saving methods such as improved irrigation methods or the lining of ditches, then leases may be extended for up to thirty years. Wells, *supra* note 4, at 323, 329. In 1994, the Bonneville Power Administration entered a lease with agricultural users for 150 cfs on the Snake River and 68.4 cfs on the Malheur River. In 2003, 215 leases for water were to be used instream: one-third made by the Oregon Water Trust, one-third made by the Deschutes Resource Conservancy, and one-third by the Water Resources Department. Neuman, *supra* note 1, at 442.

existing user to devote water rights to instream environmental uses, but not to appropriate for that purpose. However, because there are also statutorily required minimum streamflows in California, there is a tendency for the rights merely to be absorbed with no noticeable effect on the level of the flow.<sup>117</sup>

Water trusts are institutions that promote private purchase of water rights to convert to ISFs and have been successful in many states.<sup>118</sup> Trusts are a means to consolidate available resources; they also often act as brokers to facilitate deals and lower the costs associated with these types of transactions.<sup>119</sup> The trusts allow individuals interested in preserving instream flows to contribute to a fund, without necessarily committing the full cost to purchase the amount of water necessary to achieve their desired purpose, such as preservation of instream flow for fish, etc. The Oregon Water Trust is a particularly successful example, consisting of over 84 projects protecting a total of 117 cubic feet per second (“cfs”) instream.<sup>120</sup> The Trust also engages in creative methods to obtain water rights, offering to fund water saving improvements to irrigation infrastructure in exchange for one quarter of the quantity of water saved thereby. The development of water trusts is evidence that individuals are willing to pay for the conservation of instream flows,<sup>121</sup> and that privately held rights might function effectively in a water market. Though enjoyment of water instream is typically non-excludable and therefore a type of public good, the tendency for underinvestment would not necessarily be prohibitive to the success of private right-holders.<sup>122</sup>

Striking differences in protections or prohibitions of ISFs exist across the states, depending on whether they are created through appropriation or transfer from other uses. Many states allow one and not the other as a means for government agencies or private entities to acquire water for ISFs.<sup>123</sup> There are legitimate problems with both methods. Appropriation of water for ISFs can lock up entire watersheds and effectively prevent any further appropriation or

117 See Brian E. Gray, *The Shape of Transfers to Come: A Model Water Transfer Act for California*, 4 HASTINGS W.-NW. J. ENVTL. L. & POL'Y 23, 32 (1996). This is another problem that could be avoided by quantification of instream rights to be held in addition to that amount of water already in the natural channel.

118 Examples of water trusts include the Oregon Water Trust established in 1993, the Montana Water Trust established in 1998, the Washington Water Trust established in 1998, the Colorado Water Trust established in 2002, and the Columbia Basin Water Transactions Program established in 2002. Janet Neuman et al., *Sometimes a Great Notion: Oregon's Instream Flow Experiments*, 36 ENVTL. L. 1125, 1150-53 (2006); King, *supra* note 114.

119 King, *supra* note 114, at 518.

120 Sterne, *supra* note 95, at 221-22; Oregon Water Trust, Projects, available at <http://www.owt.org/projects.html>. One hundred and seventeen cfs is not a great deal of volume, but can be significant to maintaining healthy ecosystems in small channels.

121 See Sterne, *supra* note 95; Wells, *supra* note 4, at 343-44.

122 For one possible solution to the public good problem, see David D. Haddock, *Irrelevant Internalities, Irrelevant Externalities, and Irrelevant Anxieties* (Nw. Univ. Sch. of Law, Working Paper No. 03-16, 2003), available at <http://law.bepress.com/nwps/lep/art27>.

123 For example, Arizona only allows the state to transfer existing consumptive rights to instream uses, though private entities may only hold instream rights acquired through appropriation. COLO. WATER CONSERVATION BD., *supra* note 51, at 14 tbl.10.

upstream use.<sup>124</sup> Though efficiency arguments favor transfer to obtain water for ISFs, there are consequences to moving agricultural water off of the land, and these consequences create political resistance.<sup>125</sup>

Overall, the existing methods of instream flow protection are piecemeal and far from optimally efficient with respect to other types of water uses, and with respect to the high value that many citizens would place on maintaining more water instream.<sup>126</sup> Though the system of property rights might be expected to adapt to account for these changing values in resource use, a great deal of inertia must be overcome, not only in the form of political opposition, but also in the very structure of water rights as a property regime. Only by quantifying water rights, at least with respect to instream rights if not all water rights, can efficiency be achieved in balancing the value of both diversionary and instream water use.

### B. *The Failures of the Hybrid Regime*

Instream rights cannot be satisfactorily defined by the existing hybrid composition of water rights because the uses are novel and non-diversionary. Instream uses are not easily quantifiable, typically require large amounts of water, and by definition resist diversion as a convenient proxy to quantify the right. Because non-diversionary uses cannot avail themselves of this measurement proxy and therefore cannot easily shift from a use-measured to quantity-measured right, they cannot effectively function as hybrid rights. In effect, instream water rights can only be use-measured *or* quantity-measured, not both.

Instream uses differ from traditional uses for water in several significant respects. First, the purposes for which water might be left instream are generally not easily quantifiable. Unlike determining the amount of water necessary to irrigate thirty acres of alfalfa, the amount of water necessary to maintain a healthy trout fishery is a difficult scientific question, much less the amount of water necessary to satisfy aesthetic purposes. The quantity will vary widely depending on the size of the stream in question and other ecological factors. The uncertainty of the quantity of water encompassed by these types of uses results in risk of forfeiture by judicial or bureaucratic review under the doctrine of waste. Courts would also have more difficulty identifying speculative purchases or appropriation of water, which is a source of much of the political resistance to privately held instream rights.<sup>127</sup>

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124 See *infra* Section IV.B.

125 See *supra* note 96.

126 “The money is there to lease and purchase water rights for instream purposes, but mandatory state ownership or trust status . . . limits the willingness of many consumptive users to participate.” Jesse A. Boyd, *Hip Deep: A Survey of State Instream Flow Law From the Rocky Mountains to the Pacific Ocean*, 43 NAT. RESOURCES J. 1151, 1212 (2003).

127 *Id.*

Secondly, instream uses tend to require a relatively large amount of water, particularly in larger streams and river channels. As a result, an appropriation with the purpose of protecting a fishery or for recreational purposes may completely block upstream development.<sup>128</sup> Though a perfect market might dissolve such concerns, most states do not allow transfer from instream to consumptive uses, and vice versa, because of third party effects. If the value of instream uses cannot be compared to the value of consumption, the opportunity cost of keeping water instream versus diverting water is not considered, and the rights are isolated from market pressures. Though appropriation for a consumptive use has the same effect of “freezing” upstream uses into place, there are more possibilities for negotiation and contractual readjustment such that multiple uses may be satisfied. Because “instream flow rights held by private individuals or organizations are often perceived as constraints to future water development,” interest groups prefer such rights to be held by government entities, subject to political pressure.<sup>129</sup>

Another problem with rights issued for uses that require relatively large amounts of water is that such amounts are difficult to obtain. Because hybrid rights are essentially use based, rights for amounts of water less than that necessary to support a fishery or recreational use will ultimately forfeit. The only available option for obtaining these amounts is through appropriation, either because of state prohibitions on transfer from out-of-stream to instream use, or because of the lack of functioning water markets. However, almost all of the water in the West has been appropriated. The only possibility for instream appropriations is very high in the mountains, upstream of most users with prior rights. Otherwise, the appropriation will have virtually no effect on the water flow because of lack of priority, but will merely serve to block any future appropriation.<sup>130</sup>

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128 In the Senate Hearings leading up to S.B. 216 (allowing RICDs), Mike Shimmin testified that high volume instream appropriations may “effectively tie[] up the entire unappropriated flow of that stream. It will effectively prevent the construction of junior upstream storage projects.” *Hearing on S.B. 216* (Colo. 2001), *quoted in* Colo. Water Conservation Bd. v. Upper Gunnison River Water Conservancy Dist., 109 P.3d 585, 600 (Colo. 2005). The town of Gunnison, Colorado, sought to appropriate 270 to 1500 cfs for recreational use, depending on the season, approximately 157,000 acre-feet annually. This represents about 41% of the average annual flow on the Gunnison River Colo. Water Conservation Bd., 109 P.3d at 585.

129 Steven J. Shupe & Lawrence J. MacDonnell, *Recognizing the Value of In-Place Uses of Water in the West: An Introduction to the Laws, Strategies, and Issues, in* INSTREAM FLOW PROTECTION IN THE WEST, at 1-9 to 1-10 (Lawrence J. MacDonnell & Teresa A. Rice eds., rev. ed. 1993).

130 An example is the Recreational in Channel Diversions (RICDs) in Colorado, by which municipalities may appropriate water to guarantee minimum flows for recreational purposes, namely whitewater parks used by boaters. Buena Vista and Salida both applied for RICDs on the Arkansas River, which requests were denied because the water would be unavailable except during the spring floods even in a year of above average snowpack. The native water of the Arkansas River was fully appropriated by 1884, and year round flows in the river are only possible due to water imported from the Western Slope, which is unavailable for appropriation. John Gierard et al., *Executive Summary, in* USDI BUREAU OF LAND MGMT. ET AL., ARKANSAS RIVER WATER NEEDS ASSESSMENT § 1-1 (Roy E. Smith & Linda M. Hill eds., 2000).

The characteristic of instream uses that most inhibits accommodation by existing water law is lack of diversion. Diversion is required for non-consumptive uses in most western states because diversion is a means of notice, measurement, and establishment of exclusive use.<sup>131</sup> In combination, these functions allow for the transition from use to quantity-measured rights that is at the heart of the hybrid system.

Removal of water from the stream notifies others of one's intent to appropriate and how that appropriation will impact other right-holders.<sup>132</sup> Establishment of a water right has been analogized to the capture of wild horses—an individual may not claim ownership without first establishing control.<sup>133</sup> Diversion is also the means by which quantity limitations are imposed on the right. Headgates are a convenient means of measuring water flow, either by controlling the flow to a certain fraction of the ditch's capacity or by installing a floatmeter or other measurement device into the gate itself. The only examples of legitimate water use that did not require diversion before use were consumptive uses in which the water was directly removed from the stream. Other proxies were then employed for measurement purposes. For example, water used to raise cattle but not diverted from the stream prior to consumption was measured in heads of cattle. Today, water that is applied directly from the stream, such as for domestic purposes to water a lawn or garden, must be measured by some device.

Finally, diversion establishes exclusivity of use and a certain degree of separation or disentanglement of water rights necessary for quantification and transfer. In the early days of prior appropriation, when diversion was the entire measure of water rights, diversion was an easy means by which to make the transition from use to quantity-measured rights. This function has been somewhat eroded by the consideration of return flows, or of other changes in the stream condition which recognize the interdependency of water uses. However, the amount diverted for a use-based right is a low-cost translation of use measure to quantity measure for the purpose of transfers. But where a shift between types of measurement is not reasonably possible, as is the case with non-diversionary uses of water, transaction costs may be an insurmountable obstacle to transfers. In such a situation, a hybrid system simply will not function.

As a result, any established instream rights are effectively locked in place. The difficulty of converting an instream right back into a consumptive or diversionary right, because others come to rely on the water downstream,

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131 See *supra* Section III.B.

132 Some of the literature suggests that the days of diversion as a means of notice are over, due to the permitting system adopted in all of the Western states except Colorado and "modern communication." Boyd, *supra* note 126, at 1210. I would disagree and argue that diversion remains an important means of actual notice to this day.

133 J. CRAIG GREEN, INDEPENDENCE INSTITUTE, USE IT OR LOSE IT: COLORADO'S OLDEST AND BEST RECYCLING PROGRAM (2002), available at <http://www.i2i.org/articles/3-2002.pdf>.

prevents transfers away from the instream use. Furthermore, because there is no positive activity that demonstrates the right-holder's instream use of the water, there is essentially no applicable doctrine of forfeiture. The rigidity has several potential effects on privately held instream rights. First, private entities may underinvest, since purchasing instream rights is basically a sunk cost with little possibility for a future sale. Second, state governments will tend to put special restrictions on such rights because doctrinal checks to deter efficiency, such as forfeiture or waste, do not apply. State governments are also more likely to reserve the authority to hold such rights to a government entity acting in the "public interest" rather than to a private group, on the justification that such an entity is in a better position to weigh the opportunity costs and broader implications of the use of water instream, rather than consumptively. And finally, states may put restrictions on whether consumptive rights may be transferred instream, because of the concern that rights, once converted to instream uses, are permanently removed from diversionary or consumptive uses.

In sum, diversion allows a hybrid compositional regime for appropriative water rights to work. The functions of diversion explain much of the difficulty with instream rights that are not simply attributable to skepticism toward the validity of these new uses. Without a modification of the compositional regime, instream rights cannot be fully and efficiently incorporated into western water law.

### C. *Quantification of Instream Rights*

Eliminating the hybrid compositional regime and establishing a unified quantity-measured system of rights could overcome many of the difficulties faced by privately held instream rights. I am not attempting within the scope of this Article to make the case that instream rights should be privatized as opposed to government owned or regulated. There are valid concerns about the commodification of water and legitimate questions as to whether water use, instream or otherwise, should be controlled by a private property system.<sup>134</sup> I am making the more modest claim that *if* states are interested in legalizing privately held instream rights, then they must be quantified.<sup>135</sup> The definite and

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134 A common argument against private ownership of instream flows is that "instream flows are uniquely public in character, reflecting collective decisions." Wells, *supra* note 4, at 366-67. On the other hand, it might be argued that "constraint on ownership of instream rights is directly opposed to one of the basic principles of prior appropriation: water should be available to anyone who puts it to 'beneficial use' without waste." Kimbrell, *supra* note 93, at 77. Furthermore, many of the objections to the quantification of water rights are based on a concern that it may lead to increased scrutiny of consumptive rights, and thereby reveal waste and illegal use resulting in the loss of rights by many consumptive users. Sterne, *supra* note 95, at 226. These are not efficiency concerns, but concerns about redistribution.

135 Frank Trelease states:

An ideal water law should give a water right those characteristics that will encourage and enable people to make the best decisions as to water use in their own interest and hence ultimately in the

distinct boundaries of rights provided by quantification would reduce uncertainty regarding rightful ownership and lower transaction costs by facilitating beneficial transfers of all types of water rights. For instream rights, transfer of location of use is only possible by quantification. Though water markets are likely to include unavoidable sources of market failure, there are theoretical and empirical reasons to believe that privately held instream rights would be successful players in markets and would contribute to optimization of water use.

Complete quantification of water rights must include not only the quantity of diversion, the location (such that a change in location of diversion downstream might deduct some flow due to evaporation or seepage, etc.), the amount consumptively used if any, and the amount of return flow. The timing of the flows must also be specified both on a yearly basis, and possibly daily or hourly. Lastly, both a maximum flow of water and a total acre-feet amount must be included in the quantification for full definition. A non-consumptive but diversionary right would include an amount to be diverted and an amount to be returned, deducting for inevitable losses from in-channel flow. An instream use would include a measurement at a given "starting point" of the right and a quantity at the "end point," which incorporates deductions for loss from seepage, evaporation, or transpiration while flowing in the natural channel. In other words, a quantified instream right would be a right to a certain quantity of water over a length of natural channel, subtracting for natural losses as the water travels across that distance. Though the costs of accurately policing these rights might initially be high, at least in theory, water rights could be distributed in distinct and identifiable packages.

Measuring instream rights purely in quantity terms would include doing away with the beneficial use requirement necessary to vest a water right, and transfers would not be limited to the historical use of the right-holder. Instead, each water decree granting the owner the right to use would include the definite and permanent quantification of the right. The owner has the right to transfer and use the full amount; users who rely on water left unused by the right-holder do so at their own risk and such use cannot establish a claim of right. For example, a change in use that falls within the limits of the quantity terms, but that injures a junior right-holder, would be a valid exercise of the senior right-holder's authority. The doctrine of forfeiture might be modified to function in the quantity-measured water rights system analogously to adverse possession of

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public interest. Private uses of water should be based upon property rights not dissimilar to the property rights in more stable and tangible assets . . . .

Gregory J. Hobbs, Jr., *Priority: The Most Misunderstood Stick in the Bundle*, 32 ENVTL. L. 37, 45 (2002) (quoting Frank J. Trelease, *Policies for Water Law: Property Rights, Economic Forces, and Public Regulation*, 5 NAT. RESOURCES J. 1, 8-9 (1965)).

In general, for privatization "property rights must be clearly defined, defended against outside incursion and made divisible." Roy Whitehead, Jr. et al., *The Value of Private Water Rights: From a Legal and Economic Perspective*, 9 ALB. L. ENVTL. OUTLOOK J. 313, 336-37 (2004).

real property.<sup>136</sup> Hostile and open use of the water by others for a period of time might result in forfeiture of the right to the new user. By this means, absent or uninterested owners of water rights, including instream rights, whose behavior implies that their water use is inefficient might be divested of their rights.

Though use was a convenient means by which early miners and settlers initially allocated water for consumptive uses, the same does not hold true for instream uses. As previously discussed, appropriation of water for instream uses typically involves a great deal of water that is not necessarily available and merely serves to block future upstream development. These difficulties can be avoided by only allowing water for instream rights to be obtained through transfer rather than appropriation. Such a rule would provide some protection against speculators or rent seekers, who may wish to obtain a “blocking” right as a bargaining chip against future potential users.

Quantification of water rights, both instream and traditional, would facilitate transfers by lowering transaction costs and lowering the cost of detecting right infringement. Abolishing the historical use measure of water rights, and substituting a fixed quantity measure that may only be amended through voluntary sale or forfeiture akin to adverse possession, would also reduce many of the risks and costs of transfer. Eliminating the necessity of re-quantifying rights would greatly reduce the cost of measuring and re-measuring the same right over time. Owners would also avoid the risk of partial loss through requantification by the court or state water agency. By ensuring that the full measure of the right may be transferred, both buyers and sellers will have better knowledge about the bundle of rights for which they are bargaining. The increased definiteness of boundaries and homogeneity also facilitates accurate valuation of rights.<sup>137</sup> If instream rights actively compete with other types of water uses, market forces will ensure that only relatively efficient instream uses will be maintained, and will limit the need for regulatory and judicial efficiency oversight through the doctrines of waste and forfeiture.

Some states have taken steps to achieve complete quantification by eliminating circumstances in which rights must be requantified, making the quantity definition more robust. Oregon has already eliminated the historical

136 Adverse possession with regard to water rights was abolished in 1939, likely because it caused more confusion and dispossession of rightly acquired rights than it did transfer rights to more efficient users. The doctrine of adverse possession presupposes a system of definitive private property rights such that open and hostile use is possible. If there is uncertainty about the boundaries of rights, then there will be inherent uncertainty as to the hostility and openness of any attempt at adverse possession. A quantitative system of water rights could be sufficiently definitive for the doctrine to be sensibly applied. G. Oliver Melgar, *Sewage Effluent Happens: But Who Has the Right to Its Beneficial Use?*, 24 J. LAND RESOURCES & ENVTL. L. 587, 588 (2004).

137 There are several accepted water valuation techniques: sales comparison; income capitalization or farm-crop budget analysis, which estimates the revenues that agricultural users would forgo; land value differential, which compares the value of land with or without appurtenant rights; and development-cost approach, which considers the price competitive users would be willing to pay to develop new water supplies in lieu of those that had been sold. See Wells, *supra* note 4, at 376-77.

use measure of rights and adopted a paper right measure in its place.<sup>138</sup> In 1994, the Oregon legislature passed Senate Bill 869 to increase right-holders' flexibility in water use. In a letter to the Oregon Water Resource Commission, the Attorney General interpreted the Bill to state that "as long as a user has a facility capable [of] handling the full allowed rate and duty, and is otherwise ready, willing and able to make full use of the right, using less water to accomplish the beneficial use allowed by the right does not subject the right to forfeiture for nonuse."<sup>139</sup> Therefore, right-holders no longer face the burden of proof in showing historical use of the full quantity of water as stated in the paper right. Though transferors are still burdened with proof of "no injury" to junior users,<sup>140</sup> the removal of the necessity to provide evidence of historical use dissolves a large evidentiary obstacle.<sup>141</sup> Judicial language in Colorado also hints at a movement toward doing away with the historical use measure by applying the doctrine of *res judicata* to questions regarding the historical quantity of a water right where that right has been previously adjudicated.<sup>142</sup> However, as of today, the *res judicata* defense can be overcome by evidence of change in conditions and therefore is not robust against changes in use by the right-holder.

Complete quantification of water rights has been shown to facilitate markets in actual practice, as illustrated by the Northern Colorado Water Conservancy District (NCWCD). In Colorado, water diverted from its natural watershed is foreign water not subject to the doctrine of beneficial use and the no injury rule.<sup>143</sup> The Big Thompson Project diverts approximately 230,000 acre-feet of water from the Western to the Eastern slope of the Rockies every year to supply the NCWCD. Individual users own shares of the Colorado Big Thompson Project ("CBT") water, which are contractual agreements between the water district that owns the CBT rights and the individual water users. CBT shares are fully quantified both with respect to total acre feet, rate of diversion,

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138 See OR. REV. STAT. § 540.610(3) (1997); Koehl, *supra* note 71; Neuman, *supra* note 1, at 472.

139 Letter from Stephen E.A. Sanders, Assistant Attorney Gen., Or. Dep't of Justice, to Comm'n Members, Or. Water Res. Comm'n (Feb. 15, 1994) (DOJ File No. 690-001-NR002-94), *quoted in* Koehl, *supra* note 71; *Hearing on S.B. 869 Before the Senate Water & Land Use Comm.*, 69th Leg. (Or. 1997) (statement of Martha Pagel, Director, Oregon Water Resources Department).

140 Water is unusual in that transfers are subject to consideration of third party impacts. The transfer of other types of resources typically leaves negative third party effects uncompensated. Thomas J. Graff & David Yaras, *Reforming Western Water Policy: Markets and Regulation*, 12 NAT. RESOURCES & ENV'T. 165, 168 (1998). The unique treatment of water transfers may arise both from water's history of communal ownership as well as the difficulty of the current definition of water rights to internalize third party impacts. These two factors are linked: The tradition of communal ownership is related to the difficulties of privatizing the resource.

141 In opposition to removing the historical use standard, Krista Koehl argues that S.B. 869 will reduce efficient reallocation of water by blocking forfeiture. Koehl, *supra* note 71. I take the opposite stance, that by solidifying the boundaries of rights, more efficient transfers will occur through market processes than would have otherwise occurred through regulatory forfeiture of rights. See discussion, *supra* note 71.

142 See *Williams v. Midway Ranches Prop. Owners Ass'n*, 938 P.2d 515 (Colo. 1997).

143 See *City of Thornton v. Bijou Irrigation*, 926 P.2d 1, 70 (Colo. 1996).

and seasonal duration. Shares of CBT are more highly valued than even senior native rights because they are robust and well-defined property rights and have a reliable market value.<sup>144</sup> Therefore, an investment in a share of CBT is not a sunk cost. Furthermore, the homogeneity of the CBT shares makes them much easier to value, which decreases uncertainty in the investment. As a result, the NCWCD is considered to be one of the most developed water markets in the nation, and, on average, about thirty percent of its shares move through the rental market each year.<sup>145</sup>

There is no reason to believe that instream rights could not also participate in the CBT market, barring the current legal obstructions to such an experiment. Shares of instream CBT water could be purchased to ensure a quantity of flow *in addition to* that which was otherwise already instream. The consumptive rights to the same water could then be sold to users downstream. Water markets that do not include a centralized right-holder, like the NCWCD, which contracts with and guarantees water delivery to individual users, would probably incur larger transaction costs and have more difficulty in instituting a successful water market. The shift from hybrid to purely quantity-measured rights is only one step, though a significant step, towards facilitating such transfers. These transfers in turn promote the feasibility of privately held instream rights.

Obtaining instream flows through voluntary transfer rather than government regulation also aligns economic incentives with the public interest. There is growing opinion in the West that more water left instream for recreational, environmental, and aesthetic purposes would increase the general welfare. Government regulation is a popular proposal to achieve this end, and was the first type of instream flow protection implemented in the form of mandatory minimum flows. A more recent proposal is the “physical solution,” which makes explicit that only the use of water, and not any particular quantity of water, is protected by a water right. The “solution” requires users to apply water more efficiently, by protecting only that amount of water that is strictly necessary to accomplish the purpose for which the right was issued. Restricting the amount of water protected under each use would free up water that could be left instream.<sup>146</sup>

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144 For example, in April of 2000, CBT shares sold for about \$26,000 per acre-foot while native rights sold for about \$1,000 per acre-foot. This price difference is also attributable to the fact that CBT water is backed by storage to insure against a dry year. Peter D. Nichols & Douglas S. Kenney, *Watering Growth in Colorado: Swept Along By the Current or Choosing a Better Line?*, 6 U. DENV. WATER L. REV. 411, 422 (2003).

145 See Carey & Sunding, *supra* note 3, at 288.

146 MacDonnell, *supra* note 55, at 514-24.

However, coercive regulation inevitably fosters resistance,<sup>147</sup> and regulation is perceived as particularly egregious when it appears to constitute a taking by the government without any compensation to the right-holders. The enforcement of such regulations have given rise to deep-rooted feelings of injustice, such as those arising out of the battle in the Klamath River Basin in California in 2001.<sup>148</sup> This type of conflict not only sinks unnecessary dollars in litigation costs, but does not lay a foundation for future cooperation. As an alternative, free-market environmentalists suggest that individuals be paid for their rights to be used in a way that is beneficial to the environment and the public interest.<sup>149</sup> Much has been written on this topic.<sup>150</sup> The literature supports the theory that more efficient levels of conservation may be achieved when aligned with market incentives, rather than through the exercise of coercive governmental powers.<sup>151</sup>

In sum, the facilitation of transfers by quantification of water rights would promote privately held instream rights through the possibility for mutual welfare gains.<sup>152</sup> The effectiveness of water trusts is evidence of the willingness of private individuals and private entities to purchase rights for the purposes of maintaining instream flows. These types of non-profit organizations can provide the social risk capital that the state may not otherwise be able to provide.<sup>153</sup> Interest groups can bargain with water right-holders directly instead of attempting to influence instream flows through roundabout means such as government agencies<sup>154</sup> or lobbying of the legislature. But like the government, private entities such as the Nature Conservancy or Trout Unlimited can, at least partially, overcome the underinvestment problem of

147 See Graff & Yaldas, *supra* note 140. There is a tension between increasing scarcity that gives rise to government regulation to promote efficient use of water, and respect for vested property rights. “[T]he curtain is opening on the new drama of *maximum utilization* and how constitutionally that doctrine can be integrated into the law of *vested rights*.” *Fellhauer v. People*, 447 P.2d 986, 994 (Colo. 1968).

148 See Hayes, *supra* note 66, at 24.

149 I am assuming that entitlements shall be taken as they are. There may also be distributive justice concerns with respect to initial entitlements, creating resistance to a change in the water rights system such as the one I propose here, that would both confirm these initial entitlements and add to their value.

150 See, e.g., King, *supra* note 114, at 511.

151 Markets may not always be optimal in making water use decisions; for example, the protection of habitat for anadromous fish may pose a special collective action problem that justifies government intervention because these fish require continuous minimum flows over many miles from the ocean upstream to their breeding grounds. However, with functioning markets in place, the government may focus its resources on those situations in which there are reasons to suspect market failure.

152 See Wells, *supra* note 4, at 343.

153 See King, *supra* note 114, at 518-19.

154 For example the whitewater rafting outfitters on the Arkansas River in Colorado work closely with Colorado State Parks, which purchases additional water for late summer flows in exchange for a 0.25% water tax on the purchase price of each rafting trip. COLORADO WATER CONSERVATION BOARD, STATEWIDE WATER SUPPLY INITIATIVE § 4.9.2 (2007).

public goods by pooling resources to produce efficient investment choices.<sup>155</sup> One would expect alliances of recreational and environmental interests because of the non-consumptive character of instream flows that allow the preferences of many individuals to be satisfied simultaneously. There is also no reason to believe that all interests must be captured to achieve an efficient result. Optimal benefit to the majority of individuals may be obtainable by a few individuals' willingness to pay.<sup>156</sup>

On the other side of the transaction, right-holders such as farmers have many reasons why they might be willing to sell or lease their rights for instream uses.<sup>157</sup> Leasing is a particularly flexible means by which farmers might give up rights in the short term based on yearly weather patterns or crop rotation.<sup>158</sup> Right-holders will be much more likely to participate in such transfers if they do not risk loss or forfeiture of their rights because the measure of their rights are fully quantified and therefore are robust.

Viable water markets would also take into account the competing interests within the context of instream flows. More water instream is not necessarily better for all types of instream uses. Therefore, the opportunity cost of the consumption of the water is measured not only against instream and non-consumptive uses, but also, the opportunity cost of foregoing alternative flow levels. For example, the health of certain fisheries are optimized within a narrow range of water flows.<sup>159</sup> Too little water leads to grave problems for fish, such as lack of feeding surface area and warmer temperatures, but high flows are also unhealthy to fish populations. In strong currents, fish must expend much more energy and smaller fish may die. There are also fewer feeding areas during higher flows, further limiting the calorie intake and therefore growth of fish. On the other hand, whitewater rafting outfitters prefer higher flows. Higher water results in better photos, more T-shirts sales, and increased likelihood that clients will return. On the Arkansas River for

155 The opposite concern is that non-profit entities like these may have an "unfair" or inefficient advantage over other taxable private interests, which would result in too much water being held instream.

156 See Haddock, *supra* note 122.

157 Reasons to sell might include instability in the agricultural market, farm debt, and other considerations that are relevant to the interests of particular right-holders. Graff & Yardas, *supra* note 140, at 167.

158 There are two types of instream leases: the split-season lease, in which a portion is used for irrigation and a portion is left instream during critical seasonal periods for fish and other wildlife, and the dry-year lease. Dry-year leases come in several forms: (1) the insurance lease, in which one party agrees not to use the water in a dry year, (2) the option lease, in which the lessee provides additional payment for the exercise of the right to use in a dry year, and (3) the predictive lease, in which the lessor forgoes irrigation for the number of years that on average it would have been necessary to satisfy both uses. Leases can also come in short and long term forms. Wells, *supra* note 4, at 321-23. There are also a variety of creative means by which instream rights may be acquired in a free market system, such as that employed by Montana Trout Unlimited, who paid for the removal of a diversion dam in exchange for six months of instream flow. *Id.*

159 See Clay Bridges et al., *Natural Resource Assessment, in ARKANSAS RIVER WATER NEEDS ASSESSMENT*, *supra* note 130, §§ 5-11 to 5-16.

example, anglers prefer a flow between 200-500 cfs, while rafting outfitters prefer a flow of about 2,000 cfs.<sup>160</sup> Because the Arkansas River is undammed and uncontrolled for over one hundred miles from its headwaters to the plains, anglers and rafters cannot be simultaneously satisfied. In a market context, the two interest groups could bid against each other to obtain the highest value use, or compromise and work out an agreement by which each is benefited and welfare is maximized.

Quantification also allows for rights to be divided into more efficient sizes or bundles of rights. The right to consumptive use may be split from the right to instream flows. Some types of instream uses, such as the protection of anadromous fish or navigation, may require an instream right that applies from the headwaters to the ocean. However, the same water could also be held under an instream right upstream and a consumptive right downstream. Quantified rights may be split into smaller units without risking forfeiture where that amount is less than the full requirement for a specific use. Eliminating the beneficial use requirement obviates the onerous process of demonstrating the amount of water necessary for a given use. Without the necessity of purchasing all the required water in one transaction, the purchaser can acquire as much water as is available and hold these rights while searching for other water rights to fulfill the purpose that the owner has in mind. The role of government agencies or courts in regulating water use would be replaced (at least partially) by market forces. If water was not put to a beneficial use, the market forces would push towards sale and application of those rights to a more valuable use. In general, instream rights would be greatly promoted if governments did not inquire into particular uses of water as a prerequisite for property protection.

#### D. *Obstacles Facing the Solution of Quantification*

There are three problems, two practical and one political, with quantification as a solution to the obstacles faced by privately held instream rights. First is the free-rider problem: Inherent characteristics of water may result in market failure that leads to underinvestment in instream uses. Secondly, the technology of measuring and quantifying water rights may not be sufficiently developed to provide, at a reasonable cost, the level of accuracy necessary for full quantification of instream rights without proxies such as use. And lastly, ranchers and farmers are politically resistant to any type of amendment to the water rights regime that might promote transfer of water rights off of the land.

The problem with market forces replacing use measures as safeguards against waste and non-use of water is the possibility of market failure, though state governments that wish to encourage successful water markets may take

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160 See Bruce DiGennaro & Dave Taliaferro, *Recreation Assessment, in* ARKANSAS RIVER WATER NEEDS ASSESSMENT, *supra* note 130, §§ 6-31, 6-40.

steps to mitigate these difficulties. Instream uses present a potential free-rider problem because the benefits of increased instream flows are non-exclusive. However, because there is no prisoners' dilemma in that coordinated action of all interested parties is not necessary to achieve optimal results, the free-rider problem may not be a significant obstacle.

For example, a group of angling outfitters might get together to purchase water rights instream to protect their local trout fishery. However, other outfitters are not blocked from entering the market, nor are outfitters who already exist in the locality blocked from refusing to pay, and free-riding on the investment of the others. Associations that require membership for certain exclusionary benefits might be able to circumvent the free-rider problem to some extent, but the threat of "cheating" will remain. Direct regulation of access to water that flows in a natural channel is often very difficult, due to the public's protected interest in navigation. The simplest solution is to purchase the land that provides access to the waterway to obtain a method for exclusion, but streams and rivers tend to have many points of access and often are located on public land. Another means of exclusion is by the issuance of permits by government agencies, which would limit the number of individuals or entities allowed to use the water and therefore encourage bargaining among the permitted users.

Governmental coercive power can also be implemented to solve the free-rider problem in other ways. One possibility is to require taxes or permit fees for use of the waterways that is then put towards the purchase of instream water. Though government agencies would then make the choices regarding the amount of rights purchased for instream flows, the agency would merely be a participant in the market, albeit a privileged one. Another option would be to utilize something akin to a Business Improvement District, such that a majority of individuals in an area, such as riverfront landowners, could opt to form a "Water Purchase District" in which contribution towards the cost of instream flow augmentation would be mandatory. Or, in a more court-centric approach, individuals who benefit from water instream could be held liable for a share of the cost of the water right. For example, the angling outfitter who free-rides off the purchase of rights by other outfitters would be liable to them for an equal proportion of the cost of the water purchased, as determined by the court.

However, whether free-riding would result in suboptimal outcomes in the context of instream water rights is an entirely empirical question, because a small group of persons with a relatively high willingness to pay could render irrelevant the free-riding behavior of others, by footing the bill in its entirety.<sup>161</sup> In some sense, those who benefit from the protected instream flows but who did not contribute to the purchase price may receive a windfall. Even so, because more water instream is not always better, the optimal level of instream flows can be achieved without capturing all consumer surplus. Therefore,

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161 See Haddock, *supra* note 122.

whether or not free-riding is actually an obstacle to efficiency is entirely dependent upon the particular context.

Another potential problem with water markets is the separation of the non-consumptive and consumptive elements of a water right. Once rights are split and sold separately, transaction costs may prevent reassembly. If so, rights will tend to remain in less-than-efficient-sized bundles.<sup>162</sup> In the case of water rights, imagine that instream rights are sold upstream while the right to divert and consume the water is sold downstream. If an upstream consumptive user wants to purchase the right, transaction costs may prevent him from doing so, even where his use is more valuable than that of the instream and consumptive uses combined. The ratchet effect in favor of instream rights may actually offset the free-rider problem mentioned above. However, both are sources of potential market failure that could produce inefficient water usage. One solution to the fragmentation problem would be to prohibit the breakdown of water rights in this manner.<sup>163</sup> Rules preventing fragmentation are commonly applied to real property, restricting the types of estates that owners can carve out of the original.<sup>164</sup> Instead, individual contracts that include some reasonable end point must be negotiated. The same approach could be used to prevent water right fragmentation.

The second major obstacle to the quantification of water rights in general and to the policing of instream rights in particular is technology. Water rights began in the early settlement of the West as intangible rights, in part because water was so difficult to track and measure. The capture rule is a means to avoid the measurement problem, but capture is not the only means to provide notice of ownership.<sup>165</sup> A registry of quantified water rights combined with regular stream measurements could provide constructive and actual notice to others of the amounts claimed by private owners, without requiring removal from the stream.

Installing gauges at regular intervals to measure instream flows would be necessary to acquire the requisite data. With stream flow measurements, instream right-holders might police their rights and determine infringement by a junior consumptive user. In most western states diversions must be measured, so that the amount of water legally diverted from the stream is already known and available. The most difficult task is to determine the escape of water through uncontrolled means such as seepage, evaporation, and uptake by vegetation. Hydrologists are in the process of developing computer programs

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162 See Heller, *Boundaries of Private Property*, *supra* note 30, at 1174-75.

163 See Merrill & Smith, *supra* note 28.

164 See Heller, *Boundaries of Private Property*, *supra* note 30, at 1168-74, 1201 ("Anti-fragmentation mechanisms respond to predictable bargaining failures that lead owners to waste jointly controlled resources."); see also Julia D. Mahoney, *Perpetual Restrictions on Land and the Problem of the Future*, 88 VA. L. REV. 739, 749 (2002).

165 In contrast to the wild horse analogy previously mentioned, I suggest an analogy to branded cattle, in which water might be left in the commons yet designated on the record as privately owned.

that might be linked up with the Geographic Information System, to address the “spatial and temporal interconnections of the hydraulic system” to produce comprehensive models by which water flow may be tracked and the impact of changes in use or transfer of location of use predicted.<sup>166</sup>

An advanced measurement technology or modeling system is necessary for water markets to function seamlessly and without burdensome review processes for determining otherwise unaccounted-for third-party harms. However, an imperfect model might provide the basis for an agreement on definitive property boundaries.<sup>167</sup> An imperfect but authoritative method of quantification could still provide many of the benefits already described. As water rights are able to be quantified more definitively, transaction costs will continue to decrease.

Infrastructure necessary for water delivery is another technological obstacle to water markets and instream flows. Delivery is an additional transaction cost that prevents uses of water from competing with one another over larger geographical distances. In sum, water markets are likely to always suffer from technological imperfections that result in market friction.

In spite of the seemingly obvious efficiency advantages of a use-based system, a significant number of water rights-holders and others with related economic interests are politically resistant to any change in the existing regime that will encourage water transfers. Many rural irrigators regard municipalities as a menace and believe that Los Angeles will manage to acquire all of the West’s water to maintain its golf courses.<sup>168</sup> The transfer of water away from agriculture does give rise to legitimate concerns. It would ultimately lead to the end of a western way of life that has been in place for generations, as land from which the water rights have been sold would be left fallow to revert to its natural desert state. The small communities that rely on agriculture for an economic base would dry up and disappear. Because ranchers and farmers often resist *all* transfer of water off of the land, this includes use of water for instream flows. But if quantification could produce healthy water markets, high prices for water rights produced by competitive bidders seem likely to

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166 Matthews et al., *supra* note 86, at 331. The Hydrological-Institutional Model is used to predict how much water will pass through Colorado to Kansas for the purposes of the Arkansas River Compact, taking into account rain, snow, well pumping of groundwater, evaporation, canal seepage, trans-mountain imports, and reservoir storage. The model has the potential to under or over predict the amount of water by up to 22%. Yet the system seems to be satisfactory as a basis for determining the respective rights and duties of each party. See *Kansas v. Colorado*, 543 U.S. 86, 99-101 (2004).

167 See Matthews et al., *supra* note 86.

168 Whether or not cities are actually able to obtain more than an efficient amount of water through the political process is an open question, but there is a common perception that they can. Markets could remove the pressure point from legislative action to private transactions and provide greater legitimacy to the process. On the other hand, market transfers may prove just as contentious. See Gary D. Libecap, *Chinatown: Owens Valley and Western Water Reallocation—Getting the Record Straight and What it Means for Water Markets*, 83 TEX. L. REV. 2055 (2005) (arguing that the farmers in Owens Valley were fairly compensated for the agricultural value of their land, and the water transfers produced overall gains of trade, in spite of the common perception that Owens Valley was a disastrous abuse of political power by the City of Los Angeles).

overcome the social norms that currently prevent right-holders from selling. Though resistance to change in the water regime may be an initial obstacle for quantification, it is not a threat to the long term viability of a quantified water rights regime.

## V. Conclusion

The identification of western water rights as essentially use-measured rights highlights two important issues to current water policy. First, use measures are an inherent obstacle to the incorporation of privately held instream rights into the system of western water law and second, the use measure of water rights is a reason that even traditional diversionary water rights have resisted successful marketing. The early definition of western water rights incorporated the benefits of both use-measured and quantity-measured property regimes, producing a hybrid system that accommodated the two necessary functions of the property regime of water in the West: the initial allocation of water, and the reallocation and transfer of water once the rights had been granted and established. However, the values and principles behind these two functions remain in tension with one another. Today, with the virtually complete allocation of western water rights, we might ask whether the use measure is justifiable when divorced from the function of allocation. If states are interested in incorporating privately held instream water rights as a means to instream flow protection and preservation, then the answer must be no. For privately held instream rights to be a reality and not an illusion as they are now, quantification is a necessity.

The choice between use and quantity-measured rights, and the implications of such choices, is certainly not limited to water. Private property rights in many resources might benefit from measure in use. Fugitive resources in particular are often costly to measure in quantity terms such that a use measure proxy is an efficient means to define the property right. Use measures are particularly justifiable when faced with the task of allocating private property rights from a common pool. Such situations are not uncommon—new technologies, such as the radio spectrum and internet domain names, continue to reveal or produce valuable but limited resources. If allocation schemes based on use are adopted for these new resources, or for other common pool resources such as fisheries or clean air, we might expect analogous challenges and difficulties to those faced by the law of western water. Our choice in the compositional component of property rights should be made with those lessons in mind.

Pure use measures are effective when applied to resources for which use is non-exclusive, or resources for which change in use is either impossible or undesirable, so that the problem of transfer need not be addressed. The ability of use-measured rights to interlock and overlap can maximize productive use of the resource. Once a maximizing placement of rights is achieved, the nature of

the rights themselves resist change and inefficient fragmentation. However, for most resources, the relative value of various uses rarely remains static, so allowing for transfers of rights is beneficial. One option is the hybrid system of rights adopted by western water law. The system can both reap the advantages of use measures in initial allocation, responding to concerns of equity and efficiency, and retain the flexibility to adapt to shifts in optimal patterns of use. Hybrid rights function well where uses are closely correlated with specific quantities; oftentimes, the requirement of removal from the common pool can serve to make clear the quantity to which a use right refers.

Yet the story of western water rights illustrates the inefficiencies of hybrid rights, particularly when the resource is fully allocated and new uses depend on transfer from existing entitlements. Hybrid rights are also unworkable when uses of resources do not easily identify with a specific quantity, as is often the case with “conservative” uses: those uses that inherently do not involve removal from the common pool because removal would defeat the very purpose of the use. Some examples of conservative uses include leaving water instream, leaving a domain name “unused,” leaving a radio frequency blank, or leaving a fish to live and reproduce in the ocean.<sup>169</sup> Many of these conservative uses are potentially valuable, so that market efficiency would require that underlying property rights accommodate such uses. The solution is to measure these resources in quantities, so that resources can be left in the common pool and used non-consumptively while maintaining a claim of ownership. As technologies evolve and measurement costs decrease, quantification is more and more likely to be the most efficient means to define property rights in common pool resources that mix consumptive and non-consumptive uses. With quantification, the law does not require an individual to capture to own, or to remove to claim, because there can be property without possession.

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169 Yandle and Morriss mention the possibility of owning live whales through the development of GPS and DNA fingerprinting techniques, though under traditional whale appropriation customs, the only way to claim ownership of a whale was by killing it. Ownership of a live whale in the ocean is an example of a “conservative use” right. Bruce Yandle & Andrew P. Morriss, *The Technologies of Property Rights: Choice Among Alternative Solutions to Tragedies of the Commons*, 28 *ECOLOGY L.Q.* 123, 128-29 (2001).

