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Turning Instream Flow Water Rights Upside Down

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ABSTRACT: Conventional instream flow water rights protect up to a specified level of flow to be left in a stream and indirectly allocate the remaining flows for water development. Such instream water rights have been quantified with constant year-round or monthly values that bear little resemblance to a river's natural pattern of flow and that may maximize the reservation of water for development. In this paper, we examine whether instream flow water rights can be turned "upside down" by directly specifying a level of water development and protecting the remaining flows in the stream; review the structure of such upside down instream flow water rights and a host of examples under state and federal law; explore one case in which instream flows were protected upside-down, not with water rights but under a federal regulatory scheme; summarize our arguments for the legal recognition of upside-down instream flow water rights; and suggest that such rights be considered when seeking to protect complex and not easily predictable natural flow patterns.

KEY WORDS: Instream flow quantification, minimum flows, natural flows, river ecosystems, water development.

*"Nature is not only more complex than we think,
but more complex than we can think." Egler (1973).*

INTRODUCTION

Fresh waters have fueled human development and civilization for over 5,000 years (Collier et al. 1996). They give us clean drinking water, fish to eat, recreation, and aesthetic pleasure. We harness them to generate renewable energy, remove human waste, irrigate agricultural fields, and carry ships to port. Everywhere on Earth, from the smallest

village to the largest metropolis, our livelihoods are intimately intertwined with fresh, and often flowing, water (Allen and Flecker 1993).

As biological assets, freshwater systems are disproportionately rich, and the United States is a global center of this biodiversity (Master et al. 1998). Properly functioning freshwater

ecosystems also perform important services: water purification; aquifer recharge; opportunities for continued species evolution; the transportation of minerals and nutrients from higher to lower land and eventually to the sea, thereby enhancing soil fertility as well as estuarine and floodplain health; and natural flood control—intact floodplains absorb flooding waters, thereby protecting downstream areas from greater inundation. Yet, water development threatens to transform this resource, rendering it incapable of supporting native plants and animals and calling into question its ability to perform these important services. Water development, as referenced in this paper, includes the large-scale diversion of water from the stream for agricultural, industrial, and municipal use.

We examine how two kinds of instream flow water rights, conventional and "upside-down," have been applied in allocating flowing freshwater between human demands for water development and for maintaining biological diversity and ecosystem function. Conventional instream flow water rights protect up to a specified level of flow to be left in a stream and allocate the remaining unappropriated flows for water development.¹ Upside-down instream flow water rights specify a level of water development and protect the remaining flows in the stream. We begin by considering how much of a river's flow should be protected and by reviewing the structure of conventional and upside-down instream flow water rights. We turn next to

the legality of upside-down instream flow water rights, and consider a number of examples under federal and state law, along with one case in which the same kind of flow protection was achieved under a federal regulatory scheme. We then summarize our arguments in favor of legal recognition for upside-down instream flow water rights and conclude, subject to several qualifications, that they should be legally tenable, just as quantifiable as conventional instream flow water rights, and considered when seeking to protect complex and not easily predictable natural flow patterns.

The term upside-down instream flow water right was coined by The Nature Conservancy in Colorado and is conceptually similar to such approaches as "departure analysis" and "reverse quantification," which were developed by the National Park Service (NPS), and others. These terms may be freshly minted, but the underlying conceptual framework is not new. In reviewing a claim for a federally reserved water right for all of the remaining natural flows of the streams in a national forest, the Idaho Supreme Court observed in 1978 that: "The periodic natural variations in stream flows with just the flexibility which nature provides without interference by man are said to fulfill the varying needs of the United States more effectively than could be done by any attempt to specify these varying needs in terms of cubic feet per second or acre feet" (*Avondale Irrigation District v. North Idaho Properties*, 577 P.2d 9, 19 (Idaho 1978)).

HOW MUCH OF A RIVER'S FLOW SHOULD BE PROTECTED

Instream flow protection begins with the question of how much water should be left in the stream to meet ecosystem needs and not developed to meet agricultural, industrial, and municipal demands. The early answers to this question were simple and minimal so as to leave as much water as possible for development. These answers were often based on the flow needs of a single, sometimes non-native, fish species and were expressed as a single, year-round flow value, which was keyed to one life stage of that species or one component of its habitat.

¹ Where streams are fully appropriated, an instream flow water right can only be established by converting an existing water right to instream use.

The flow needs of a river ecosystem are now increasingly recognized as variable and complex. Each river has its own flow history with patterns that vary from hour-to-hour, day-to-day, season-to-season, and year-to-year in terms of magnitude, frequency, duration, timing, and rate of change of flows (Poff et al. 1997). The flows of one river may fluctuate greatly, influenced primarily by precipitation events, whereas another river may remain relatively steady due to a high groundwater table. Flow variables can significantly shape the ecology of a river, and flow variation in general has been called a "master variable" that "limits the distribution and abundance of riverine species and regulates the ecological integrity of a flowing water system" (Poff et al.

1997). Native species may need a range of flow variations to complete their life cycles and may depend on seemingly harsh flow events such as floods and droughts. The complexity increases when one considers that not only must there be a mix of high and low flows, but that the duration of these events must vary in length.

The natural ecosystem of any river is the product of millions of years of adaptation and evolution, which have created a myriad of variables and subtleties more complex than we can imagine. With each additional habitat type or species to be protected, determining how much water should be left in the stream to meet ecosystem needs is compounded and confounded. It soon becomes evident that one way to answer the question is to systematically characterize the natural flow patterns for a particular river or stream and to apply all aspects of that pattern to the question (Richter et al. 1997). This answer to the question of how much water should be left in a stream and not developed is known as the natural

flow paradigm. This answer follows more readily if the question of how much water should be protected in the stream is turned upside-down and asked in terms how much can we depart from the natural patterns of a particular stream to meet our water development demands and still retain enough semblance of a river's natural character to meet our ecosystem needs.

Whether instream flows are legally protected through conventional or upside-down instream flow water rights, the underlying question of how much water is allocated for water development and for functional river ecosystems is the same. When this question cannot be answered definitely, it must be addressed adaptively. Allocations of timing, duration, and magnitude may be as important as allocations of amount. For any river, we leave the actual balance of these two demands to better minds, and turn our attention to the structure and legality of these two kinds of instream flow water rights.

STRUCTURE OF INSTREAM FLOW PROTECTION: CONVENTIONAL AND UPSIDE-DOWN INSTREAM FLOW WATER RIGHTS

Conventional Instream Flow Water Rights

The western states recognize water rights as property rights that cannot be drastically modified and taken away without compensation, and that may even be burdened with a public trust. Most fundamentally, this class of western property rights is based on the beneficial use of water, which was commonly accomplished by diverting, transporting, storing, consuming, or otherwise applying water far from the source stream and riparian lands. The creation of such property by the diversion and beneficial use of water is known in the West as "appropriation," and is distinguished from eastern property water rights that arise by riparian land ownership and are not dependent on water use. Under modern statutory schemes, except in Colorado, the state's permission must first be obtained to appropriate a water right, but the essence of the right is still usufructuary.

Most western states now recognize that water can be put to beneficial use in the stream without a diversion or impoundment and authorize the appropriation of instream

flow water rights (MacDonnell and Rice 1993). Most of the more extensive statutes (e.g., Colorado, Oregon, Idaho, Wyoming) limit this authority to a state agency and are cautious about the amount of instream flows that can be appropriated. This caution poses basic legal questions about the amount of instream flow that can be appropriated as a property right under state law: Is the amount of the water right the minimum that is needed to serve the beneficial instream use? Is the amount of the water right definite and specific? Is the amount of the water right as definite and legally defensible as it would be for another beneficial use, like irrigation? Because leaving water undeveloped in the stream was once viewed as a waste of water, the rationale behind these questions might be understood as the minimization of such waste and the reservation of more water for development.

The easiest answer to these questions is a low, constant instream flow quantity that is available year round, even in the drier years. Figure 1 illustrates such a conventional instream flow water right for a constant quantity.

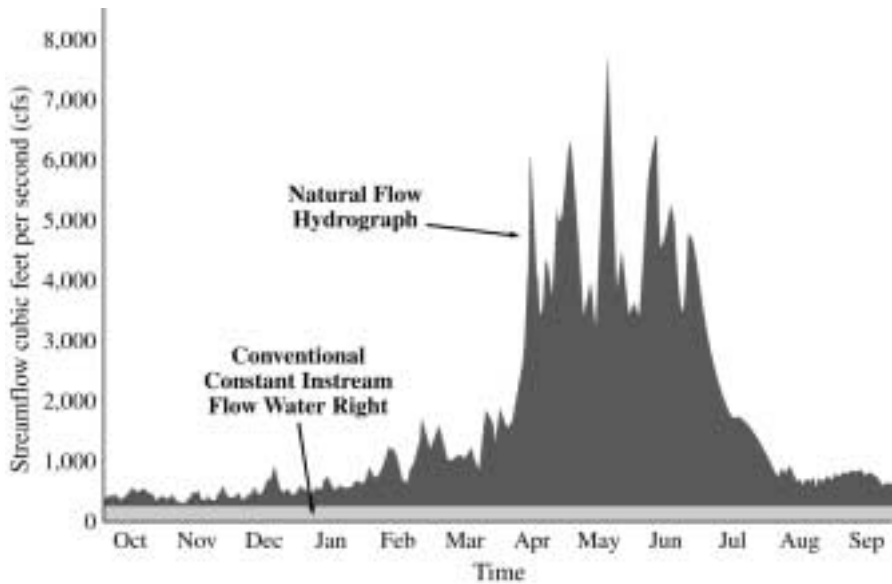


FIGURE 1. *Conventional constant instream flow water right.*

Although such an instream flow water right might protect one life stage or habitat component of a targeted riverine species, it would hardly protect the variable and complex flow regime of an entire river ecosystem. The question of how much flow should be protected for a river ecosystem has many more dimensions. Due to the hydrologic variation that defines the ecological niche of each species in such an ecosystem, we must also ask: What is the timing and magnitude of each flow level? How long does the flow level need to be maintained? How fast or slow should the rate of change be from the former and to the next flow level? Even if we could answer these questions for an individual fish or invertebrate species, to protect the full complement of native biodiversity living in a particular river we would have to answer these questions for all species in each river.

A small step toward expressing such flow variation in an instream flow right is to specify its amount by season or months. In Arizona, the amounts permitted for the appropriation of instream flow water rights for wildlife and recreational purposes have been based on median monthly flows. Such a step toward expressing hydrologic variation in an instream flow right converts one statistical value for that variation into a constant amount for any month and produces a stair-stepped flow quantification (Figure 2).

Another improvement is to add one differential flow to a constant year-round base flow

amount. In protecting the Little Bighorn River bordering the Little Bighorn National Monument, the State of Montana and the NPS agreed to a year-round instream right of 51 cfs in addition to a 15-day spring peak flow of 950 cfs (Mont. Code Ann. § 85-20-501, Art. II, § F). The result is a single, dramatic step up and then down from the base flow value that may still not protect all of the river's hydrologic variation.

Conventional instream flow water rights can be crafted to protect a complex or dynamic range of flows with the amounts increasing as the streamflow increases, varying day-to-day and year-to-year, thereby more closely simulating natural flow patterns. Though never implemented, the U.S. Forest Service (USFS) and the Colorado Water Conservation Board (CWCB) proposed to appropriate such a complex and variable conventional instream flow water right for the Piedra wilderness area in southwestern (Colorado USFS and CWCB 1992)². Figure 3

² The Piedra wilderness area was proposed for designation in the Colorado Wilderness Act of 1991, which was never passed by Congress. The proposed Piedra wilderness was located downstream of a number of previously established water rights, so any recognized federally reserved water right could potentially limit the development of these upstream rights. In an attempt to avoid this conflict, the 1991 Colorado Wilderness Act called for the USFS to protect the Piedra River where it flowed through the proposed wilderness area with an appropriative water right established under state law in conjunction with the CWCB.

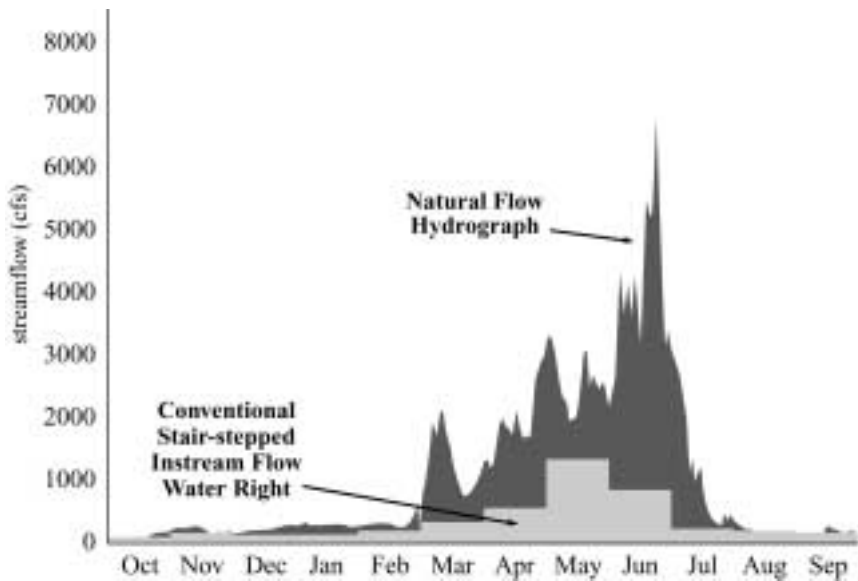


FIGURE 2. Conventional stair-stepped instream flow water right.

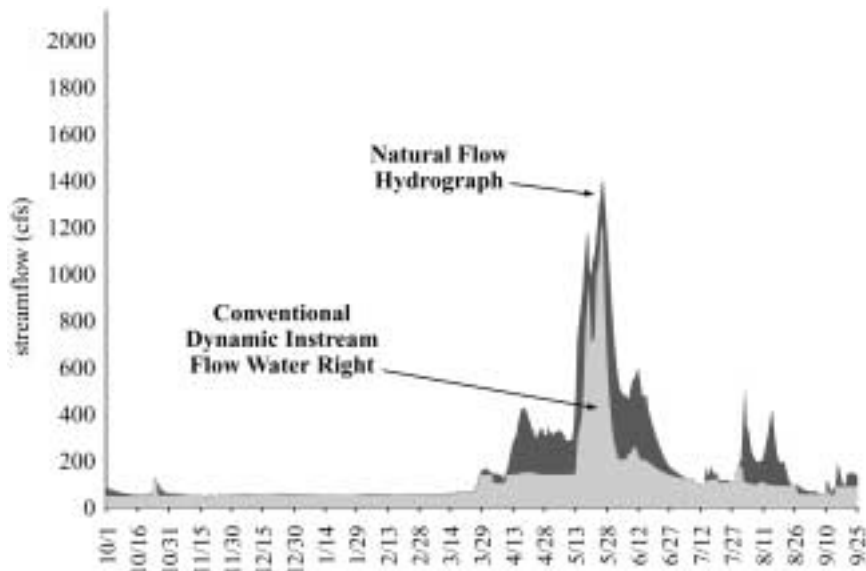


FIGURE 3. Conventional dynamic instream flow water right.

illustrates this type of conventional instream flow water right.

This proposal defined four flow values and each flow value defined the instream right depending on the actual streamflow. The first two flow values, a subsistence flow and a biological maintenance flow, were related to the low flows of winter and early spring and were based on the survival needs of fish and aquatic

insects. The third flow value was the average annual flow. The fourth flow value was the flow with a return period of 1.5 years, which closely approximates the flow level needed to reach the top of the active channel. The third and fourth flow values were based on the needs of both riparian vegetation and aquatic species. The instream flow water right, according to the proposal, would protect a dynamic

flow; as long as the actual flow was less than the biological maintenance flow, the subsistence flow must be met. The biological maintenance flow must be met as long as the actual flow was above the biological maintenance flow and less than the average flow. When the actual flow was between the average flow and the 1.5-year flow, a percentage of the streamflow would be claimed. When the actual flow was above the 1.5-year flow, the actual flow of the stream would be protected. This last component is an upside-down way of protecting instream flows, making this proposal a hybrid. This dynamic flow water right would still allow for some development of upstream water resources, yet would presumably protect the variable flows that the USFS and the CWCB agreed were associated with a wilderness area.³

Each of the above instream flow water rights are quantified conventionally, except for the last component of the Piedra proposal. That is, they all directly specify the amount of flow that should be left in the stream and, indirectly, define the amount reserved for development. These amounts and the structure of the instream flow water right can progress in complexity toward variable and dynamic flow patterns, like the Piedra proposal. Such complex instream flow rights may not be easy to formulate or implement, however, and may still not be dynamic enough to fully protect natural flow patterns.

Upside-down Instream Flow Water Rights

Can the difficulty of quantifying and exercising complex or dynamic instream flow

³ Once submitted to the CWCB, this proposal met with stiff resistance and was never adopted, possibly because it resembled the claim for channel maintenance flows being asserted by the USFS as a federally reserved water right elsewhere in Colorado. Congress then side-stepped the issue of water right protection for such downstream wilderness areas in Colorado by not designating the Piedra and three other downstream areas as wilderness in the bill that was passed in 1993, and directing only that these three areas be managed to maintain their wilderness character for potential wilderness designation at a later time (Gillilan and Brown 1997: 294). The Nature Conservancy and the USFS have also since purchased and retired the one big water development right upstream of the proposed wilderness area on the Piedra River.

water rights be addressed by turning conventional instream flow water rights upside-down? Perhaps. When instream flow water rights are turned upside down, the quantity of water needed for the river ecosystem is not directly specified in single or variable amounts. Instead, the sequence is reversed. First, the demands for water development are defined and met, then the rest of the water in the stream is allocated to serve ecosystem needs. The presumptions are that the dynamic nature of natural flow patterns cannot be completely described or fully predicted, and that simply protecting such natural patterns as they are, or as modified by a specified increment of water development, is legally necessary and beneficial. Figure 4 illustrates the naturally variable flows that could be protected with such an upside-down instream flow water right. The sum of the upside-down instream flow water right and the water reserved for development equals the total natural flow hydrograph, which is not depicted in subsequent figures.

The amount of water reserved for water development by an upside-down instream flow water right is shown at the top of the hydrograph in Figure 4 and at the bottom in Figure 5.

Ideally, specifying the amounts of an upside-down instream flow water right would begin by considering a river's natural flow regime and examining the critical thresholds within the various characteristics (flow frequency, magnitude, timing, duration, and rate of change) of the flow regime. Then, through modeling and experimentation, an increment of water development that does not demonstrably impair the river's ability to perform its ecological services, is set aside. The remaining streamflow is defined as the amount of the upside-down instream flow water right. The quantification of such an instream flow water right would be expressed as "all remaining unappropriated flows of a stream except for" a specified amount for water development. The appropriation date for such a water right would be the date on which the increment of future water development was specified, and would be junior to all previously appropriated and decreed water rights.

Potentially, the amount of water reserved for development by an upside-down instream flow water right could take all of the remaining low flows at a particular time, causing substantial ecological damage. This risk can



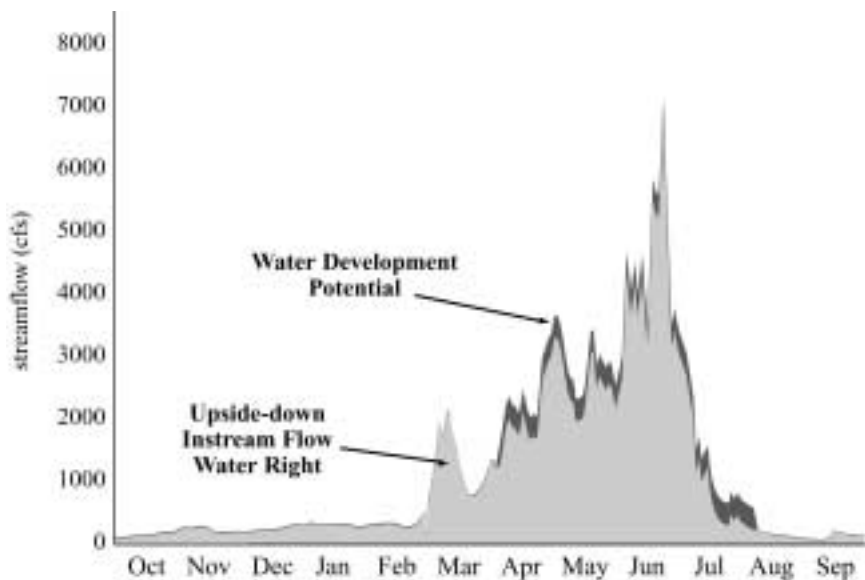


FIGURE 4. *Upside-down instream flow water right.*

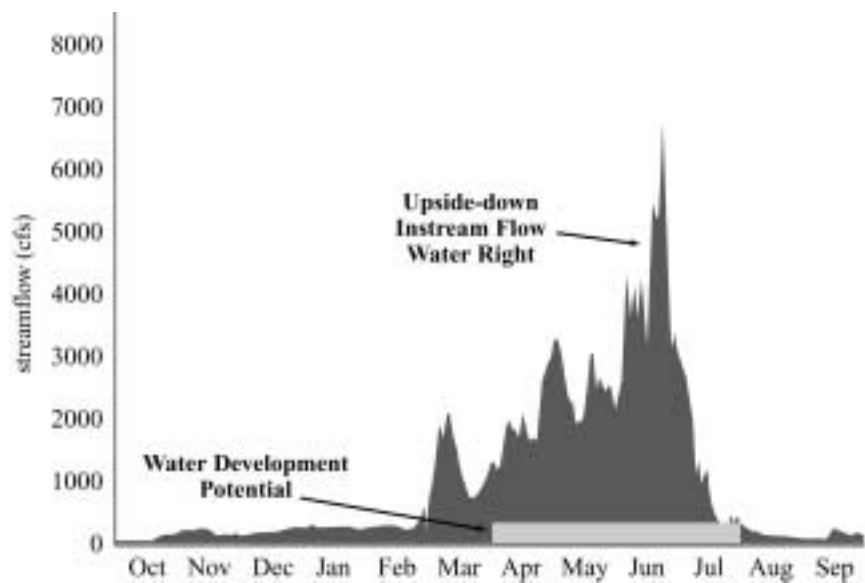


FIGURE 5. *Water development reserved by an upside-down instream flow water right.*

be managed by combining conventional and upside-down instream flow water rights: the amount of water for development can then be sandwiched between a conventional instream

flow water right protecting base flows and an upside-down instream flow right protecting a dynamic range of high flows. Figure 6 illustrates this combination.

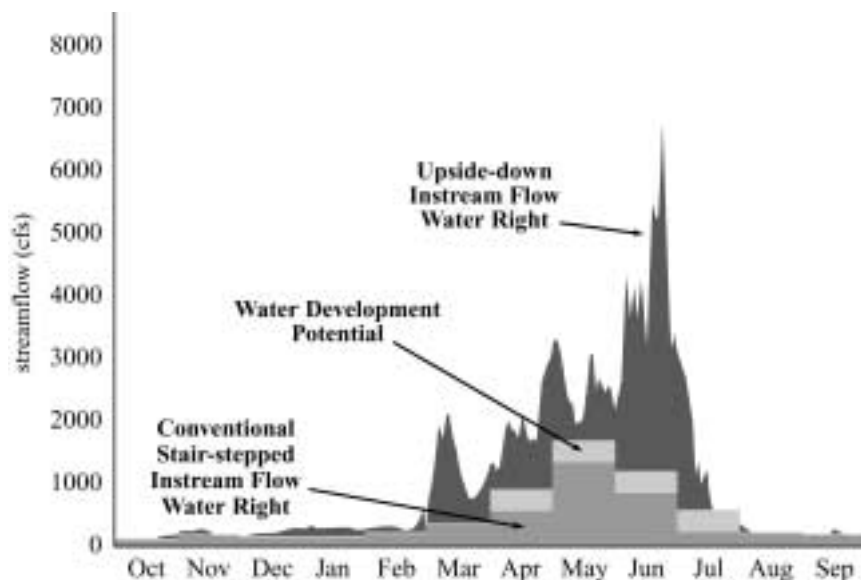


FIGURE 6. Water development potential sandwiched between conventional and upside-down instream flow water rights.

LEGALITY OF UPSIDE-DOWN INSTREAM FLOW WATER RIGHTS

We turn next to the legality of upside-down instream flow water rights, as federally reserved water rights or as water rights appropriated under state law. We also consider one case where an attempted appropriation of an upside-down water right under state law became entangled in a federal regulatory scheme and a water rights enforcement issue.

Federally Reserved, Upside-down Instream Flow Water Rights

The quantity of a federally reserved water right is the amount of water needed to serve the primary purpose of the federal reservation and does not depend on the beneficial use of water under state law. What may be considered a waste of water under state law may still be legally protected under a federally reserved water right. The amount of water needed to serve the primary purposes of a federal reservation can be, and often is, determined under state procedural laws in state court, if the amounts of all hydrologically related water rights, whether federally reserved or appropriated under state law, are determined under the same procedures in a "general adjudication." State procedures in a general adjudication cannot be applied, however, to frustrate

the substance of the federally reserved water right, which is still governed by federal law.

Several federal land designations may imply a federally reserved water right for instream flows to accomplish the primary purpose of the reservation. These rights can be structured as upside-down instream flow water rights. National parks are created for the purpose of conserving "the scenery and the natural and historic objects and the wild life therein" (NPS Organic Act of 1916, 16 U.S.C. § 1). Wild and scenic rivers are created for their "remarkable scenic, recreational, geologic, fish and wildlife" values (National Wild and Scenic Rivers Act of 1968, 16 U.S.C. § 1271). National wilderness areas are created to be "an area where the earth and its community of life are untrammelled by man" (Wilderness Act of 1964, 16 U.S.C. § 1131(c)). Where the primary purpose of the federal reservation implies "all" the remaining unappropriated flows, then this would be the amount of the upside-down instream flow water right. If the primary purposes of the federal reservation can be met with something less than "all" the remaining unappropriated flows, then an upside-down instream flow water right could still reserve some water for development. At the point where the amount reserved for development begins to impair the primary purposes of the

federal reservation, however, the upside-down instream flow water right would not be legally defensible because it would no longer fulfill those primary purposes.

National Park Service Approach. When negotiating the quantity of federal reserved water rights for instream flows, the NPS has employed "departure analysis" (Gillilan and Brown 1997: 213) to assess how much water development could occur without undermining the primary purposes of a unit of the national park system, and has quantified the federally reserved instream flow right in an upside-down manner. In seeking to establish such upside-down instream flow water rights, the NPS has sandwiched water reserved for development between a conventional instream flow water right (protecting streams from too much depletion at the wrong time) and the remaining flows of the stream (what remains of the natural hydrograph). Many park units are located high in the watershed, where little or no water need be reserved for development and where an upside-down instream flow water right may be the easiest way to quantify the natural flow patterns needed to serve the primary purposes of the national park. The NPS has also sometimes subordinated federally reserved, upside-down instream flow water rights to junior rights already appropriated under state law.

The NPS and the State of Montana negotiated two compacts concerning five units of the national park system: Glacier National Park, Yellowstone National Park, the Big Hole National Battlefield, the Big Horn Canyon National Recreation Area, and the Little Big Horn Battlefield National Monument (Mont. Code Ann. § 85-20-401). The agreements for these units started with departure analysis and ended with upside-down instream flow water rights that protected the natural flow regime of many streams in the parks. The Montana members of the negotiation team reported: "The difficulty of determining when to place a call for a flow that does not occur at a predictable time led the parties to seek an alternative approach. Rather than directly quantify the instream flow right, the parties agreed to cap future consumptive uses in the basins and leave the remaining flow instream" (Amman et al. 1995).

Streams within the Glacier National Park and Yellowstone National Park or the surrounding wilderness were completely dedi-

cated to instream flows (Amman et al. 1995). For streams originating outside of the parks, the instream flow water right was quantified as all the flows of the stream except for a "consumptive use" buffer ranging between 1% and 5% of the streamflow (Mont. Code Ann. § 85-20-401, Art. III, Sec. C. G.). The consumptive use buffer includes existing water rights and an increment for future water development. Further, the compact subordinates the federal right—whose priority goes back to 1872 for Yellowstone and 1910 for Glacier—to existing uses as of 1993, the date of the compact (Mont. Code Ann. § 85-20-401, Art. III, Sec. C. G.). The consumptive buffer, as defined here, is essentially a reservation of water for present and estimated future development.

One stream in Yellowstone National Park called for special attention. The federally reserved water right for Soda Butte Creek consisted of an upside-down instream flow water right for peak flow protection, minus a 5% development buffer (similar to other streams in the park), and a conventional instream flow water right for base flow protection (Amman et al. 1995). The base flow component was not subordinated to most existing uses, retaining its 1872 priority date, thereby leaving open the possibility of a conflict with existing water users during low flow months. Fortunately, the existing water use in the basin occurs mainly in high flow months, minimizing the potential conflict.

As part of the first compact, the NPS and the State of Montana negotiated a similar settlement for the waters of the Big Hole National Battlefield but with a few different features. The parties agreed to split the right seasonally so that a conventional constant instream flow water right of 10 cfs was established in the wintertime, while the summer right was quantified as all the flows of the creek minus 5% to accommodate existing and future water development (Mont. Code Ann. § 85-20-401, Art. III, Sec. A(3)). Because the creek is currently appropriated beyond the 5%, the agreement effectively prohibits future development by dedicating all the unappropriated water to instream flow (C. Pettee, personal communication).

At the Big Horn Canyon National Recreation Area, the NPS made no claim to a reserved right for the water in the reservoir at the recreation area, but did establish an upside-down instream flow water right for the tributaries feeding the reservoir (Mont.

Code Ann. § 85-20-401, Art. III, Sec. B). At the Little Big Horn National Monument, the NPS made the decision to quantify a conventional instream flow water right for both base and peak flows and not to subordinate its 1946 priority date (Mont. Code Ann. § 85-20-401, Art. III, Sec. E). This decision may have clarified the amount of peak flows left for development by Indian interests in a proposed reservoir upstream (C. Pettee, personal communication).

National Parks v. National Forests. A Colorado water judge confirmed a federal reserved right for all the unappropriated flows on the eastside of Rocky Mountain National Park, without subordinating its senior priority date (Decision, December 29, 1993, Case No. W-8439-76, Water Division 1). This state court found that the purpose of a national park was "the preservation of the natural conditions and scenic beauties" so as to leave them unimpaired for future generations, and that this purpose could be met only by reserving all of the water within the park that was unappropriated on the date that the park was established. The court implied that all unappropriated, natural flows was the minimum amount of water needed and was legally specific: "The fact that the entire flow is needed is a sufficient quantification of the right." One of the federal attorneys elaborated: "Indeed, it is neither possible nor necessary to quantify a reserved right for a national park in numerical terms. Natural systems are simply too complex and variable..." (Hill 1993). The same kind of water right protecting all unappropriated flows was recently stipulated for the west side of the park (Stipulation, September 29, 2000, Civil Action No. 1768, Water Division No. 5). Rocky Mountain National Park is an "upstream" park, with most of its streams originating within the park.

The same court that ruled on the eastside of Rocky Mountain National Park had previously denied a federally reserved water right protecting the instream flows thought to be needed to maintain the natural characteristics of stream channels in the national forest surrounding the park (Decision, December 29, 1993, Case No. W-8439-76, Water Division No. 1). The court distinguished the two cases on the strength of the primary purposes of the national park, as opposed to the primary purposes of the national forest. The court found that one of the primary purposes of a national forest was to maintain "favorable water

flows," but determined that the development of those flows was included in that purpose. Although the maintenance of stream channels in pristine condition would serve the purpose of a national park, it would frustrate the water development purpose of a national forest.

The NPS and the State of Utah reached an agreement concerning federal reserved rights for instream flows in Zion National Park (Zion National Park Water Rights Settlement Agreement, December 4, 1996, United States-Utah-Washington County Water Conservancy District-Kane County Water Conservancy District). For most of the streams of Zion National Park, the federal right has been decreed under Utah adjudication procedures as an instream right consisting of all the flows of the stream except for designated amount of future depletion. The NPS subordinated its reserved rights to any existing water right as of January 1, 1996, and any new diversions must be allowed under the future development portion of this upside-down instream flow water right. Zion National Park is not entirely an "upstream" park; large areas of the watershed for the streams flowing through the park are located outside the park.

Wild and Scenic Rivers and Wilderness Areas. The U.S. Bureau of Land Management (BLM) and the USFS have also negotiated upside-down instream flow water rights for wild and scenic rivers under their management. The BLM and the State of Montana have agreed to such a right for the upper Missouri River (Mont. Code Ann. § 85-20-501, Art. III, Sec. A). The compact endorses an instream flow right for all of the flows of the designated reaches of the Missouri River, subject to all existing water appropriations and to future development ranging from 35,000 acre-feet in September to 219,000 acre-feet in May. The USFS negotiated a federally reserved water right for the designated reaches of the Cache la Poudre River in Colorado that was quantified as the remaining, native flows in those reaches, subject to valid prior appropriations (Decree, April 13, 1993, Case No. 86CW367, Water Division 1).

As part of the Snake River basin adjudication, the Idaho Supreme Court acknowledged a federal reserved right for all unappropriated flows in three Idaho wilderness areas, finding that this quantity of flows was the minimum necessary to avoid the defeat the primary purpose of the wilderness designation (*Potlatch v.*

U.S., 1999 Lexis 119 (Idaho 1999)). Concerned that this finding would preclude all upstream water development after these wilderness areas were designated in 1964, 1978, and 1980, this court then reversed itself on rehearing and decided that wilderness areas implied no water right whatsoever (*Ibid*, 2000 Lexis 112 (Idaho 2000)). In the same general adjudication, the USFS was unable to secure all the flows of the wild and scenic portions of the Salmon and Rapid rivers in Idaho. The adjudication court found that a wilderness purpose could not be read into the wild and scenic designations for these rivers. The court consequently held that a federally reserved water right could not be quantified as all unappropriated flows as a matter of law, and that the USFS had to prove that such a quantification was the minimum necessary for their designated wild and scenic purposes (Decision, July 24, 1998, Case No. 39576, Snake River Basin Adjudication, Idaho 5th District Court.) This aspect of the opinion was not appealed. Once the wilderness purpose is cleared away, however, all the remaining flows might still be proven or negotiated as the minimum amount necessary for these purposes, as was decreed on the Cache la Poudre River in Colorado.

Appropriation of Upside-down Water Rights Under State Water Law

Upside-down instream flow water rights have been most frequently crafted as federally reserved water rights, but they can also be appropriated under state law.

Hanging Lake. The CWCB recently appropriated upside-down instream flow water rights to protect the streams flowing in and out of Hanging Lake, a pristine lake and local tourist attraction near Glenwood Springs, Colorado (Decrees, April 10, 1997, Cases Nos. 96-CW350, 351, 352, and 353, Water Division 5). The amount of these rights was specified as "all available unappropriated flows" of the Hanging Lake streams, subject to existing rights. Because there was only one existing water right upstream, it defined the amount of excepted water development. The CWCB appropriated this upside-down instream flow water right to protect the "truly unique and complex natural environment" of the Hanging Lake streams, finding that all of the

remaining flows were available for instream appropriation, and endorsing the opinion of the Division Engineer that the upside-down instream flow right would be easier to administer than the stair-stepped conventional instream flow water right recommended by the CWCB's staff (D. Merriman, Memorandum to CWCB, Agenda Item 20a, November 18, 1996).

Endangered Fish Recovery: The Upper Colorado River Basin. The appropriation of upside-down instream flow water rights under state law in Colorado was also attempted under a cooperative program to recover four endangered fish species in the Upper Colorado River basin. An initial premise for this recovery program was that the potential conflict between water development under state sanctioned water rights and the legal regulation of such water development under the federal Endangered Species Act (ESA) could be avoided by protecting the instream flows thought necessary for endangered fish recovery under state law. In Colorado, this premise meant that the CWCB had to appropriate instream flow water rights for large-order rivers that were near its border with Utah and downstream of significant existing water developments and opportunities for new water development within Colorado's share of the interstate compacts governing these rivers. A cooperative process was envisioned under which the U.S. Fish and Wildlife Service (USFWS) would quantify the instream flows needed for fish recovery, and then the CWCB would review whether sufficient water existed to meet those flows without compromising Colorado interstate compact shares.

Years of debate then ensued about whether the USFWS could defensibly quantify the needed instream flows and whether that quantification would conflict with the development of Colorado compact shares. A set of upside-down instream flow water rights was proposed as the test resolution of this debate on two large, downstream reaches—the 15-Mile Reach of the Colorado River between the major irrigation diversions in the Grand Valley and its confluence with the Gunnison River, and an 80-mile downstream reach of the Yampa River between its confluences with the Little Snake and Williams Fork rivers. Two water development "carveouts" were proposed for each reach, one to accommodate the immediately foreseeable upstream water

development, and one that could be adjusted in response to unforeseen shifts in the development of Colorado's compact shares. These compact shares are not explicitly allocated to each of the major tributaries to the Colorado River in Colorado, and there was as much uncertainty about where and when the compact shares would be developed as there was about whether the USFWS could defensibly quantify the instream flows needed for fish recovery. Instead of hypothetically presuming eventual and irreconcilable conflict between compact development and the instream flows needed by the fish, these upside-down instream flow water rights presumed that the immediately foreseeable increments of water development would not preclude fish recovery and, thus, deferred the reconciliation of the next increments of water development until there was greater certainty about what the fish needed and where compact development would occur.

Subject to such incremental adjustments, the remaining highly variable flows were quantified as the amounts needed for endangered fish recovery to be legally protected under state law. To guard against the water development carveouts depressing low flows below endangered fish tolerances, these upside-down instream flow water rights were to be coupled with conventional instream flow rights that were quantified in minimal, monthly stair-stepped amounts. Figure 6 illustrates this approach, although it only shows one water development carveout for simplicity. Both the upside-down water rights and the conventional instream flow water rights would have been new appropriations that were junior to all prior water development. After much negotiation, the CWCB determined to appropriate this combination of instream flow rights and filed applications in Colorado water court to confirm them. (Applications filed December 27, 1995, Case Nos. 95CW296 and 297 for the 15-Mile Reach of the Colorado River, and Case Nos. 95CW155 and 156 for the lower Yampa River, all in Water Division 5).

Although they were designed to avoid conflicts with water development, these instream flow water right filings were vigorously opposed in Colorado water court. The water developers opposing these filings maintained that protecting all of the remaining flows may not benefit endangered fish recovery, and that such beneficial water use had to be conclu-

sively proven in water court without deference to the determinations by the USFWS and CWCB that such flow protection would be beneficial. The upside-down instream flow water right was attacked as unquantified, and not a minimum flow. The adjustable water development carveout was maligned as indefinite and speculative. One counterproposal was that such a water right could only be decreed in Colorado as a conditional or unperfected water right, even though it is unclear under Colorado law whether the CWCB was authorized to appropriate a conditional instream flow water right. If such conditional instream flow rights could be decreed, the USFWS and CWCB would have had to prove in water court every 6 years that protecting the remaining flows for fish recovery was still beneficial and necessary. Instead of enabling the adaptive management of the potential conflict between water development and endangered fish recovery, the upside-down instream flow water rights and their carveout were also characterized as a state permit system for water development that was offensive to Colorado's doctrine of private appropriation.

The USFWS and at least one environmental group raised concerns that these instream flow filings might be too accommodating of water development. When these filings encountered such strong opposition from the water developers, the USFWS and the environmental groups withdrew their support for them. Without endorsement from any quarter, the CWCB withdrew these filings in early 1999.

Federal Regulation: Postscript on the 15-Mile Reach

The filing for the upside-down water right on the 15-Mile Reach of the Colorado River was entangled in a basic issue of how to apply the federal ESA to upstream water depletions, and this entanglement may have been the main pitfall. Beneath this issue lay another: How would the upside-down instream flow water right be enforced?

Because the upside-down instream flow water right was to be located below the points of return flow for most upstream diversions, the enforcement approach was not to sum all upstream diversions under junior rights at any moment, but to check the aggregate level of upstream water consumption under junior rights every 5 years. As

that aggregate level of junior depletions increased, the water development carveout for the upside-down instream flow water right would be used up. Once the level of junior depletions exceeded the carveout, they would be considered out-of-priority and the upside-down instream flow water right could be enforced against them. One problem was that a host of senior conditional (unperfected) water rights could be developed upstream. The enforcement issue was whether the water development carveout for the upside-down instream flow water right should be reduced, if and when the senior conditional water rights were developed. If senior conditional water rights were not indirectly included in the depletion accounting for the water development carveout, an unpredictably lower amount of instream flow would be protected by the upside-down instream flow water right.

The upside-down instream flow water right was entangled in the ESA because the water developers wanted the USFWS to conduct a "programmatic" biological consultation on all existing depletions above the 15-Mile Reach and on substantial blocks of new depletions and were not willing to rely on the carveouts for this instream flow water right to insulate water development from the ESA. The water developers also did not want senior conditional water rights to be included in the depletion accounting for the upside-down instream flow water right, which may have fatally weakened the instream flow protection in the eyes of the USFWS and the environmental groups. Most stakeholders eventually recognized that a workable biological opinion issued under federal law was not possible if it was conditioned on the acceptance of an upside-down instream flow water right for the 15-Mile Reach in state water court.

The delinking of the instream flow water right filings from the federal consultation was a turning point, and a programmatic biological opinion for the 15-Mile Reach was issued about nine months later (Final Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions in the Upper Colorado River Above the Gunnison River, USFWS

Region 6, December 20, 1999). The conceptual underpinnings of the upside-down instream flow water right for the 15-Mile Reach were carried forward into this opinion, however. The opinion covers two substantial blocks of new depletions that will be adaptively managed, just like the water development carveouts for the upside-down water right would have been. One weakness in the CWCB instream flow filings was that the criteria under which CWCB would adaptively manage the carveouts had not been spelled out. In contrast, the criteria for adaptively managing the depletion increments covered by the programmatic biological opinion got plenty of attention and are fairly well-defined. The most important of these criteria may be endangered fish population indicators. If these indicators signal a significant decline in one of the fish populations as upstream water depletions occur, the programmatic opinion must be reopened. Moreover, if these indicators do not show a substantial improvement in all of the downstream endangered fish populations, then the second increment of depletions is not automatically covered by the opinion.

The opinion avoided the question of whether new depletions developed under senior conditional water rights should be indirectly charged against a water development carveout for an upside-down instream flow water right—any new depletion will be charged against the water development increments covered by the opinion, regardless of whether it would have been senior or junior to the upside-down water right. As was considered for the upside-down instream flow water right, the depletion accounting will be done in the aggregate every 5 years, and will provide checkpoints for adaptive management, along with the fish population responses.

There is a circular perspective on this programmatic opinion. What began as a serious and concerted effort to apply state water law to avoid the regulation of water development under the ESA could be seen as ending with the upside-down protection of instream flows under that federal law. This time the federal regulatory briar patch did not turn out to be so bad.

ARGUMENTS FOR THE LEGAL RECOGNITION OF UPSIDE-DOWN INSTREAM FLOW WATER RIGHTS

In this section, we offer our arguments in favor of the legal recognition of upside-down instream flow water rights under federal and state law, and suggest that upside-down instream flow water rights can be an important negotiated solution.

As Federally Reserved Water Rights

The primary purposes of several federal land designations have been judicially determined to imply upside-down instream flow water rights for all remaining natural flows. Upside-down, federally reserved, instream flow water rights are not illegal for lack of specificity. As the Idaho Supreme Court reasoned: "a claim to the entire flow, if it is necessary, cannot be faulted for uncertainty," and "is sufficient quantification for the reserved rights claimed" if stating the claim in cubic feet per second (cfs) or acre-feet, as required by Idaho water law, would change the scope and nature of the reserved rights (*Avondale Irrigation District v. North Idaho Properties*, 577 P.2d 9, 19 (Idaho 1978)). The court also carefully examined the purposes for which instream flows could be reserved for a national forest and remanded the case to determine if the USFS could prove whether all of the natural flows were needed to fulfill these purposes.

Upside-down instream flow water rights have been formulated as a negotiated solution to the difficult conflicts posed by the exceedingly broad scope of federally reserved water right claims. One settlement approach has been to subordinate the priority of an upside-down, federally reserved, instream flow water right to all existing rights, plus a cushion for water development. In one stroke, such a settlement skirts countless and complex questions about the quantification of all the existing water rights and of the necessary natural flow patterns and reduces the issue to quantifying what could be a more predictable pattern of water development. Lastly, to guard against a mistake or unforeseen shift in circumstances, the accommodation for water development can be structured to be adjusted and adaptively managed. The conflicts posed by federal regulatory schemes to protect instream flows should be amenable to the same kind of settlement.

As Appropriations Under State Law

There is little question that leaving water undeveloped in the stream is not a waste and is instead a legally beneficial use of water that can be appropriated and recognized as a property right in the western states. Given the extensive and extremely valuable societal benefits of protecting instream flows, the underlying rationale running through many western statutes that instream flow water rights should be limited to minimal amounts because instream flows were once viewed as a waste of water, seems hollow and outdated. Another set of rationales may now be appropriate. All the remaining natural flows may be the minimum needed to sustain a river ecosystem. It may be more beneficial and less speculative to protect instream flows today than to reserve them for future development. Appropriating all the remaining flows for instream use may maximize the utilization of western rivers.

Even without considering this newer set of rationales, "minimum flow" limitations in many state laws have not meant a single, low flow value and do not necessarily preclude the appropriation of upside-down instream flow water rights. In Nebraska, the rate and timing of flow for an instream flow water right is limited by statute to "the minimum necessary to maintain the instream use or uses for which the appropriation is requested" (Neb. Rev. Stat. § 46-2, 115(4)). In the first far-ranging review of this statute, the Nebraska Supreme Court found that the purpose of the instream flow water right at issue was to maintain the fishery in the protected river reach, and that the habitat quality to keep the fishery from deteriorating was only provided by an optimum range of instream flows (*In re Application A-16642, Nebraska Games and Parks Commission v. 25 Corporation*, 463 NW2d 591 (Nebraska 1990)). The court then reasoned that the optimum instream flows for this purpose was the minimum permitted under the Nebraska statute, and that lower flows under which some fish might survive but which would not maintain the current fishery, were not mandated. The court even suggested that appropriation of the "entire unappropriated flow," if it had been sought, could have been considered the minimum flow needed to maintain the current fishery.

Although the Colorado statute limits instream flow water rights to "minimum stream flows...as the CWCB determines may be required...to preserve the natural environment to a reasonable degree" (Colo. Rev. Stat. § 37-92-102(b)(3)), the CWCB has found that all of the remaining flows of the Hang Lake tributaries were the minimum streamflow reasonably necessary to preserve that especially scenic and popular, natural environment. Idaho's statute conspicuously limits the appropriation an instream flow water right to the "minimum flow... and not the ideal or most desirable flow..." (Idaho Code § 42-1503(d)). Yet, this statute did not block the appropriation of the entire 200 cfs outflow of Minnie Miller Springs for an instream flow water right.⁴ Wyoming's statute limits instream flow water rights to the "...minimum amount of water necessary..." (Wyo. Rev. Stat. § 41-3-1003(b)), yet the Game and Fish Department generally recommends flows levels to maintain or improve fisheries that are closer to optimum flows for those purposes, and these recommendations are often accepted by the State Engineer in granting the instream water right (Gillilan and Brown 1977: 131).

The key question under state law is what is the objective or purpose of the instream flow water right. Where the purpose of the water right is the protection of relatively undeveloped instream habitat, the minimum amount of the instream flow water right can certainly be all the remaining, unappropriated flow. As with federally reserved water rights, a balance can also be struck under state law

between the use of instream flows for ecological purposes and their development by directly reserving water for development. The upside-down instream flow water right will then protect a minimum amount of instream flows to the extent that the reservation for water development can be maximized or adjusted without exceeding the ecological thresholds of the river's ecosystem that are supported by the remaining natural flows.

The judgments about the amount of instream flows that should be protected with appropriative water rights may be no more uncertain than they are for other beneficial water uses, like irrigation. The amount of an irrigation right is perceived and decreed, or permitted, as definite and clearly needed, sometimes down to the hundredths of a cfs. The connection between the precise increments of an irrigation right and the corresponding increments of direct benefit to the farm enterprise, however, can be hard to document. The relation between each increment of irrigation water and the indirect benefits to society may be no more apparent than for each increment of flow left in the stream for ecological purposes. Each reflects a societal judgment about the allocation of river flows, rather than hard scientific or economic facts about the beneficial use of water under state law. Upside-down instream flow water rights should not be faulted under state law because the beneficial use of water cannot be documented with greater scientific or economic certainty than irrigation water rights.

CONCLUSION

Upside-down instream flow water rights should be legally tenable, just as quantifiable as conventional instream flow water rights, and should be considered when seeking to protect complex and not easily predictable natural flow patterns. We offer the following qualifications to this conclusion based on our

review of this kind of instream flow protection:

- Upside-down instream flow water rights may be most applicable on relatively undeveloped rivers that do not face severe development pressure. Where streams are already heavily developed, upside-down instream flow water rights will not offer protection for low flows during dry periods of the year, but they can protect peak flows and the dynamics of the stream for the remainder of the year.
- An upside-down instream flow water right can be hedged by combining it with a conventional instream flow water right. This



combination can protect the instream use of both the bottom and top of the hydrograph, but still leave room for water development in the middle.

- Upside-down instream flow water rights may work best if they are adaptively managed to err on the side of the river ecosystem. It may be prudent to start out with a small reservation of water for development that is increased when the scientific understanding of the natural system indicates that it can absorb more water development and the need for additional development is certain.
- Upside-down instream flow water rights can only protect the natural environment if the water reserved for development is not so large that it will undercut the river's ecological health. Reservations that go beyond what a river can tolerate will defeat the purpose of an upside-down instream flow water right.
- Upside-down instream flow water rights can be combined with the purchase of existing water rights, which are then transferred to instream flows or retired. Generally, any transfer of any existing water right to instream flows, no differently than a transfer to some other use, must not injure any junior water right, while senior rights usu-

ally will not be affected because of their priority. Where there are no or very few water rights intervening in priority, the purchase and retirement of a pre-existing water right would increase the amount of remaining natural flows protected by an upside-down instream flow water right.

- The conflicts posed by federal reserved rights and regulatory schemes to protect instream flows are amenable to upside-down settlements, and this approach need not be limited to water rights appropriated under state law, or to water rights as property, at all.

It is well past the time to acknowledge that river flows should be legally protected within the patterns of nature. Natural flow patterns need legal protection or we will leave our western rivers barren of the richness that has endowed civilization from the beginnings of time. We must begin by understanding each river's unique natural flow regime and current degree of alteration and then consider whether a conventional or an upside-down instream flow water right (or a combination of both) works best to protect the natural pattern. Whether this natural pattern is legally protected rightside up or upside down, we must strike a balance based on what the stream will bear.

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