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### Improving Irrigation Water Uses for Agricultural and Environmental Benefits

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ANNE CASTLE, AMY BEATTIE, ZACH SMITH, DREW PETERNELL,  
TED KOWALSKI, ET AL., IMPROVING IRRIGATION WATER USES FOR  
AGRICULTURAL AND ENVIRONMENTAL BENEFITS (Getches-  
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# Improving Irrigation Water Uses for Agricultural and Environmental Benefits<sup>1</sup>

A Getches-Wilkinson Center Working Paper

## Introduction

Maximizing the benefits from uses of all available water resources has been a longstanding goal of Colorado water law and policy.<sup>2</sup> As demands for new and changed uses grow, the limits of the existing water supply become more apparent. As discussed throughout the Colorado Water Plan (Water Plan), we are concerned with finding ways that existing uses can be met with less water and important additional uses can be supplied. We are interested in improving irrigation water uses to strengthen agriculture.<sup>3</sup> We are interested in improving stream conditions for environmental benefits.<sup>4</sup> We want to increase the productivity of each unit of water that is used and the benefits provided by our streams. With irrigation accounting for approximately 90 percent of all diversions and withdrawals of water in Colorado, we are especially interested in ways to enhance the productivity of these water uses while providing additional benefits.

To illustrate the kinds of benefits that are being achieved through improvements in the manner and amount of use of some historically diverted water or by voluntarily reducing the amount of water diverted, we examined 13 recent agricultural and environmental enhancement projects in Colorado. In each case the changes to existing irrigation practices were made voluntarily, with the intention of improving existing irrigation uses or voluntarily reducing irrigation uses and simultaneously providing other benefits, generally to the environment. These case studies are described in Appendix A. They demonstrate the benefits of such enhancement projects to both the irrigation user and the downstream environment, resulting in more effective use of the limited water resource to meet today's needs.

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<sup>1</sup> For further information or to offer comments, contact Larry MacDonnell: [l.macdonnell@comcast.net](mailto:l.macdonnell@comcast.net). This paper benefited from the contributions of many persons who are committed to making the kinds of improvements highlighted here. Special thanks go to Anne Castle of the Getches-Wilkinson Center, Amy Beattie and Zach Smith of the Colorado Water Trust, Drew Peternell with Trout Unlimited's Western Water Project in Colorado, and Ted Kowalski of the Colorado Water Conservation Board.

<sup>2</sup> See, e.g., *Pagosa Area Water & Sanitation Dist. v. Trout Unlimited*, 170 P.3d. 307, 313-14 (2007) ("Within the priority system, maximum utilization spreads the benefit of the public's water resources to as many uses as possible, within the limits of the physically available water supply, the constraints of interstate water compacts, and the requirements of United States Supreme Court equitable apportionment decrees.").

<sup>3</sup> See, e.g., Colorado Water Plan, at 10-10 (stating three critical goals for agriculture).

<sup>4</sup> Water Plan, at 10-12 (watershed health goals).

The Water Plan called for working through the basin roundtables and with the agricultural sector to identify ways to improve agriculture's infrastructure, especially when those improvements could provide additional environmental benefits.<sup>5</sup> We propose development of a multi-agency State program directed specifically at this objective.

## **Agricultural and Environmental Enhancements**

There is widespread interest in implementing agricultural improvement projects that can benefit the irrigator and also provide benefits to the stream or overall environment. In each case, some interested party such as a government agency or an NGO works out a voluntary agreement with an irrigator that involves making some change in historical practices or altering the diversion structure or means of conveyance of water. The outside party(ies) bring(s) some or all of the funding and expertise necessary to make the change. The irrigator may be involved to whatever degree he or she wishes in designing and implementing the changes. Other interested parties, such as conservation districts or agencies funding agricultural improvements, may also be involved. If the change involves some reduction in water use that also reduces crop production, the irrigator may be compensated. Any associated water rights issues, such as making a change of use in Water Court or through an administrative process, must be addressed. The benefits produced by the change must be considered worthwhile by all the parties. While such arrangements are not easy, they are in fact being made increasingly. The policy challenge is to find ways to facilitate and encourage such beneficial transactions.

One important driver of changes to historical irrigation practices is the resulting improvement in water quality. As illustrated in the Uncompaghre and Lower Gunnison examples (Appendix A, Case Studies 11 & 12), state and federal funds have sometimes been available to make substantial improvements in irrigation water delivery and return systems to reduce amounts of salinity and selenium reaching streams from irrigated lands, especially if those lands are included in federal Bureau of Reclamation projects. In addition, as illustrated in Case Studies 2 and 3, smaller-scale efforts are underway to reduce erosion and improve riparian areas.

Another important driver is to improve stream conditions to benefit fisheries and the aquatic environment. One such opportunity involves the improvement of irrigation diversion structures to make them more fish-friendly by removing barriers to fish passage (Case Studies 1 and 2) and, in some cases, to enable them to divert only the amount of water actually needed for irrigation (Case Study 6). Such projects are generally straightforward legally, with obvious benefits to the irrigator and to the parties interested in fishery and water quality improvements. The primary issue is likely to be finding the funds needed to pay for the work.<sup>6</sup>

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<sup>5</sup> Water Plan, at 6-156 (Actions 14 and 15).

<sup>6</sup> In addition to public funds potentially available from state and federal agencies, options for bringing funds from the private sector are being explored. See LIQUID ASSETS: Investing for Impact in the Colorado

A related interest is the improvement of flows for fish in critical stream reaches that have substantial diversions of water for irrigation. Better control of diversions is one means that can help reduce unnecessary diversions. See Case Studies 1 and 2. More challenging is finding ways to reduce diversions by reducing the irrigator's need for the amounts of water historically diverted. Examples are provided in Case Studies 3 and 4. Another example is provided in Case Study 10 where, to improve flows in the 15 Mile Reach of the Colorado River to benefit endangered fish species, the Bureau of Reclamation and the State made improvements to delivery systems in the Grand Valley Project.

In some cases, a drought may trigger a need for short-term flow improvements to protect a fishery. It may be possible to establish a nondiversion agreement or to lease water rights from an irrigator willing to forego irrigation during part or all of the irrigation season on a short-term basis (Case Studies 5, 6, and 7). In other cases, the irrigator may no longer wish to irrigate as much land and is interested in seeing that water permanently dedicated to improving stream flows (Case Studies 8 and 9). In all cases, the irrigators are voluntarily agreeing to changes that enable sharing of historically-diverted water with streams. In these instances, the changes are instigated by NGOs or governmental agencies interested in water quality or stream flow improvements, with the willing participation of the irrigators and their water supply organization as well as other parties supporting the outcomes.

### **An Ag and Environmental Enhancement Program for Colorado**

As our case studies illustrate, considerable work is underway in Colorado to make improvements in historical irrigation practices and facilities. In addition to the benefits to the irrigators themselves, these projects are improving water quality, improving in-channel and riparian habitat while often enhancing stream flows. While the State is often a participant in these projects, it does not have a program specifically targeted at working with the agricultural community to make improvements in irrigation practices that can also benefit the instream and riparian environment.<sup>7</sup> Nor are its agencies with

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River Basin (2015) at pp. 165 et seq. Helpful summaries of public funding sources are provided at <http://www.coloradowater.org/Funding%20Opportunities%20List/#Governmental> and <http://www.riparianrestorationconnection.com/>. In addition, foundation grants may sometimes be available for certain types of projects.

<sup>7</sup> The CWCB offers grants and loans to irrigators and irrigation water supply organizations to upgrade facilities. These upgrades are for the benefit of the irrigators and are not contingent on including environmental benefits. For examples of the kinds of irrigation projects funded under the Small Projects Loan Program see Colorado Water Conservation Board, Construction Fund and Severance Tax Perpetual Base Fund, 2014 Small Project Loan Report, available online at <http://cwcbweblink.state.co.us/weblink/0/doc/194777/Electronic.aspx?searchid=cc6e8da6-781c-447b-94de-52e0642e15c2>. The Colorado Watershed Restoration Grant Program makes funds available to improve in-channel and riparian land conditions and has funded a few irrigation ditch improvement

programs aimed at improving water quality and stream flows well-coordinated with federal agencies such as the U.S. Department of Agriculture's Natural Resources Conservation Service that provide substantial funding for agricultural improvement projects.<sup>8</sup> As reflected in the Water Plan, there is interest both in enhancing irrigation and in improving stream environments, but they are discussed as somewhat separate goals.

In our view there is a need for the State to put in place an agriculture and environment enhancement program in Colorado that joins together our mutual interests in maintaining the continued viability of irrigated agriculture and our growing involvement in stream enhancement for ecological, recreational, water quality, and other benefits. We propose creation of a multi-agency program, including the Colorado Water Conservation Board (CWCB), the Colorado Water Quality Control Division (WQCD), and the Colorado Department of Agriculture, that would coordinate State efforts to support agricultural and environmental enhancement projects and that would also coordinate with related federal agency efforts as well as with local watershed groups and NGOs with similar interests.<sup>9</sup> A new, full time equivalent (FTE) position should be created to coordinate these efforts. We suggest this position be based in the CWCB since much of the available funding passes through this agency and its mission readily encompasses these activities.<sup>10</sup> Funds would be made available for projects that will improve existing irrigation water uses and provide other benefits.<sup>11</sup> Potential projects could be initiated either by parties interested in the environmental benefits or by irrigation water users desiring to implement improvements that will also have benefits in the stream. The State program would evaluate the proposed project for its viability, would search for

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projects but is not primarily targeted at agricultural improvements that provide other benefits. See <http://cwcb.state.co.us/LoansGrants/colorado-watershed-restoration-grants/Pages/main.aspx>. The Fish and Wildlife Resources Fund Grant Program provides funds for in-channel and riparian enhancements for fish benefits with no reference to agricultural improvements. See <http://cwcb.state.co.us/LoansGrants/fish-and-wildlife-resources-fund-grants/Pages/main.aspx>.

<sup>8</sup> The NRCS provides funding through Agricultural Management Assistance, the Conservation Stewardship Program, and the Environmental Quality Incentives Program. For information, see <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/?cid=stelprdb1048817>.

<sup>9</sup> We propose coordination along water basin and watershed lines. See Watershed Planning and Management in Colorado, Getches-Wilkinson Working Paper (2016).

<sup>10</sup> The Colorado Ag Water Alliance has called for the creation of what it called an Ag Water Program. Letter from Charlie Bartlett, President, CAWA, to James Eklund, Director, Colorado Water Conservation Board, March 31, 2015, CAWA Comments on the draft Colorado Water Plan, Comment 2. In Comment 3, CAWA called on the General Assembly to fund and staff this program, though it proposed locating it in the Colorado Department of Agriculture. CAWA's proposal does not include environmental enhancements.

<sup>11</sup> We recognize that the State's current fiscal situation and anticipated decreases in severance tax revenues may preclude the establishment of a new grant program. In that case, we recommend that irrigation projects that improve agricultural operations and also provide environmental benefit be given priority for existing CWCB and WQCD grants. As stated in the Water Plan, in the long term, new funding sources are essential to Colorado's ability to meet its future water needs, and reliance on existing programs and revenue streams will not be sufficient. Water Plan, at 9-20 to 9-21.

additional partners and funders for desirable projects, and would provide assistance as warranted with project implementation.

In some cases, such projects might make additional water available for enhanced stream flows. Colorado law has expanded to facilitate the temporary transfer of water under established water rights to instream flow use in recent years (see Appendix B). These statutory provisions could be used to address any temporary changes of water rights necessitated by agricultural and environmental enhancement projects.<sup>12</sup> We also suggest the optional management of such transactions in an enhanced State Water Bank.<sup>13</sup>

Considerations for development of an agricultural and environmental enhancement program include its purposes, the kinds of improvements it would seek to make, how opportunities are identified and by whom, the sources and amounts of funding, and how any water rights issues are managed. The Oregon and Washington programs (Appendix C) provide useful models for ways that Colorado could choose to establish its own program.

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<sup>12</sup> We would also encourage some additional revision of these provisions to facilitate desired changes. For example, we would suggest that the relaxation of the traditional historical consumptive use calculation authorized in SB 13-19 (see footnote 13, *infra*) be extended statewide, and not limited to Water Divisions 4, 5, and 6.

<sup>13</sup> See “An Enhanced Water Bank for Colorado,” Getches-Wilkinson Center, 2016.

## Appendix A – Conservation Case Studies in Colorado

These case studies provide an overview of what is being done in Colorado to improve irrigation water uses for other benefits. The first three examples (##1, 2, 3) involve projects making improvements to irrigation facilities and riparian lands for the benefit of fish, water quality, and the stream environment, spearheaded by NGOs with participation by multiple partners. The next two examples (##4, 5) illustrate voluntary reductions in historical diversions to benefit stream flows. One (#4) resulted from improvements in the irrigation delivery and use system that made possible reduced diversions. The other (#5) involved use of a new statutory provision that allows irrigators to participate in a conservation program enabling cessation or reduction in diversions for up to five years in a ten-year period without reduction in historic consumptive use under the water right. The next two examples (#6, 7) involve use of temporary leases of diversion water rights for instream flow use under a relatively recent statutory provision. The following two examples (##8, 9) include permanent dedication of water historically diverted for consumptive use to instream flows, again under relatively recent additions to Colorado law. The first (#8) includes a purchase of a portion of an irrigation right and its permanent change of use to instream flow in Water Court. The other (#9) represents the decision by the irrigator to retire lands and sell his water rights to the CWCB for permanent instream flow use. The next example (#10) illustrates a substantial undertaking to reconfigure a large irrigation water delivery system in a manner that significantly reduced its diversion requirements, with the water dedicated to flow enhancement in a stream reach regarded as critical habitat for endangered species of fish. Next are two examples (##11, 12) that concern significant alterations in historical water uses in irrigation projects to reduce seepage of water that carried loadings of selenium and salinity to adjacent rivers. These projects benefited from substantial federal funding. The final example (#13) takes note of work by multiple parties to develop mechanisms that can make water available in the Colorado River basin to meet system needs and to be able to respond to drought conditions and protect Lake Powell from dropping below critical elevations (such as elevation 3,490', the minimum elevation necessary to produce hydropower).

### 1. Diversion and Bank Restoration for W-Mountain Ranch

This description is provided by Trout Unlimited:

*This project is a partnership between Trout Unlimited, Gunnison County, Upper Gunnison River Water Conservancy District and the producers leasing the W-Mountain Ranch. W-Mountain Ranch is located on Tomichi Creek directly south of the City of Gunnison. Goals for this project are to improve riparian health, aquatic habitat, water quality, and to reduce erosion. This will be accomplished by:*

- *Replacing a problematic diversion that is creating channel instability, requires regular maintenance and is a barrier to trout*



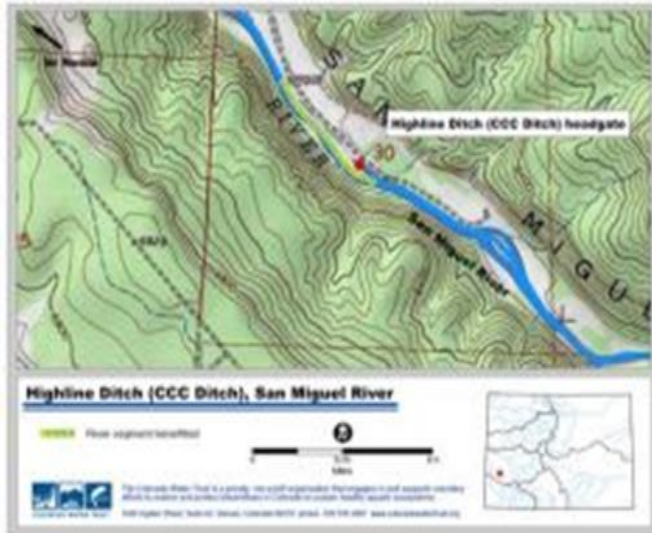
- Organize volunteer crews to plant willows and cottonwood on specific cut banks where highest levels of erosion are occurring.
- Installation of temporary fence and section of permanent fence to improve livestock grazing management on stream banks.

Phase 2 and 3 completed in spring of 2015. Phase 1 is scheduled for completion in fall of 2015.

## 2. Improving the CCC Ditch Diversion Structure – Infrastructure Solution

This description was provided by the Colorado Water Trust:

*In the forty years since the CCC Ditch diversion dam was built on the San Miguel River, a 1500 foot stretch of river below the diversion dam would go dry when the San Miguel dropped below 150 cubic feet per second (cfs). A decade-long project broke ground in 2011 when the Water Trust, the Colorado Water Conservation Board, and other partner groups installed a fish ladder and a low flow channel at the CCC Ditch diversion dam. In most low flow periods, streamflows are concentrated into a smaller, but still flowing, river channel with drop pools, improving river connectivity and fish passage. The project also physically bolstered the CCC Ditch diversion dam and pushed water towards its headgate, improving its longevity and efficiency.*





The San Miguel River flowing over the CCC Ditch check structure | Scott Hummer

*To meet the needs of the fish, recreationalists, and the ditch company, the Water Trust's contractor, FlyWater, designed a 200-foot long riffle that re-graded the San Miguel's channel downstream of the dam into a series of drop pools, bringing the downstream elevation of the river bed up near the height of the dam. This design shored up the diversion dam from erosion, eliminated a dangerous boating hydraulic, and provided a fish ladder to allow fast (trout) and slow (native) fish to migrate past the structure.*

*This infrastructure solution not only benefits the riparian ecosystem, fish populations, and recreationists, but it also does so without compromising a single drop of water that has historically been delivered to water users under the CCC Ditch.*

### **3. Improved Irrigation System for Deldorita Ranch**

This description was provided by Trout Unlimited:

*Trout Unlimited partnered with Deldorita Ranch and Upper Gunnison River District to purchase materials and construct 5 ditch check structures and 5 sluice gates to improve irrigation water management and reduce fish entrainment in irrigation ditches. This project is located on Cebolla Creek approximately 30 miles south of the town of Gunnison.*

*The new check structures replaced existing rock and trash dams to allow irrigators to more effectively get water to areas that are difficult to irrigate and dry out area that are permanently submerged. The sluice gates will be opened as the ditch headgate is shut*



*down which will allow trout an opportunity to escape before the ditch is dried up. The cost for construction and installation of the new infrastructure was \$13,000.*



Original Dedorita Ditch



Improved ditch

#### **4. Reducing Diversions on Castle Creek**

This summary is taken from a description provided by Trout Unlimited:

*Ohio Creek is a tributary to the upper Gunnison River near the town of Gunnison, Colorado. Castle Creek is tributary to Ohio Creek. The Ohio Creek drainage includes traditional cattle ranching, with the attendant irrigated hay meadows and cattle pastures. Ohio Creek and Castle Creek also support an outstanding recreational trout fishery.*

*An irrigation ditch draws water from Castle Creek just above its confluence with Ohio Creek. Like so many other agricultural water projects in this part of Colorado, it is an earthen ditch, and it delivers water for flood irrigation of approximately 600 acres of hay meadows and pastures owned by six different landowners.*

*The ditch is decreed to divert 70 cubic feet of water per second (“cfs”) from Castle Creek. At times, the ditch sweeps the entire flow of Castle Creek, and this has caused damage to the trout fishery in Castle Creek and Ohio Creek below the ditch.*



Castle Creek

*In 2013, Trout Unlimited (“TU”) began discussions with the water users on the ditch. We learned that these landowners were*

*interested in continuing their agricultural operations, but also were concerned about the health of the fishery below their diversion. With guidance from TU, the landowners established for themselves a voluntary flow target of 7 cfs, and an accompanying goal of maintaining their existing number of irrigated acres.*

*In early July of 2014, TU installed remote monitoring equipment at the ditch head gate. Sensors were installed in the ditch and Castle Creek to measure flows. These sensors transmit this data to a secure website, allowing the water users to see the amount of water they are diverting and whether they are meeting the flow target in the creek without having to make the trip up to the head gate.*

*At the end of the 2014 irrigation season, with technical assistance from the NRCS, TU and its other project partners began construction of a project intended to improve the efficiency of water use on the ditch. Specifically, we replaced 2000 feet of open, earthen ditch with an 8-inch pipeline. We installed a bubbler screen and a Reinke center pivot sprinkler system. We completed construction of this new infrastructure, and the system will be operational during the 2015 irrigation season. The new infrastructure, together with the remote monitoring equipment, will make it easier for the water users to meet the voluntary 7 cfs flow target.*

While there was interest in protecting the reduced diversions downstream, there is no provision in Colorado law that allows protection of the reduced diversions for instream use without going through a water court change-of-use case that would have been costly and time-consuming, and would produce uncertain results.

##### **5. Willow Creek (Caruthers) – Non-Diversion Agreement with Water Right Protection**

This description was provided by the Colorado Water Trust:

*Under the first use of the water right protections provided by Senate Bill 13-19<sup>14</sup>, water will be left in Willow Creek, near Granby, during low flow conditions to benefit streamflow. This project adds flows and protects the fishery in Willow Creek and the Colorado River by ceasing diversions at two irrigation ditches during certain low flow conditions without risk to the irrigator's water rights. SB19 allows operation of the Water Conservation Program (i.e. reduced historical consumptive use) for up to 5 years in any 10 year period. The Water Trust worked with the owners of the irrigation ditch water rights to develop the Water Conservation Program, and then submitted the Program to the Colorado River Water Conservation District ("River District") for*

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<sup>14</sup> This bill enables reduced diversion of water in Water Divisions 4, 5, and 6 for up to five years in a ten-year period for water rights enrolled in an approved conservation program or a water bank without penalty in any subsequent determination of historical consumptive use. Also important was the change in the statutory definition of abandonment that protects any water right that is unused because of participation in a conservation program, a water bank, a lease-fallowing program, or is temporarily used for instream flows. Colo. Rev. Stat. § 37-92-103 (2).

*approval, as required by the statute. The River District approved the Program on June 11, 2015. The water rights are the last diversions from Willow Creek above the confluence with the Colorado River and are junior to existing upstream water rights. These water rights are decreed for approximately 10 cfs and are used for stock water and irrigation near the Willow Creek/Colorado River confluence. In mid to late summer when upstream senior water rights are diverting, flows in Willow Creek decrease and the irrigation water rights can completely dewater Willow Creek in dry years. Under this Water Conservation Program, the water rights can be left in the river to benefit streamflow.*

Additional information is provided in an op-ed piece by Hannah Holm published in the Grand Junction Free Press on September 30, 2015 and in an article for National Geographic, available at <http://www.coloradowatertrust.org/our-work/projects/rio-colorado-willow-creek>.

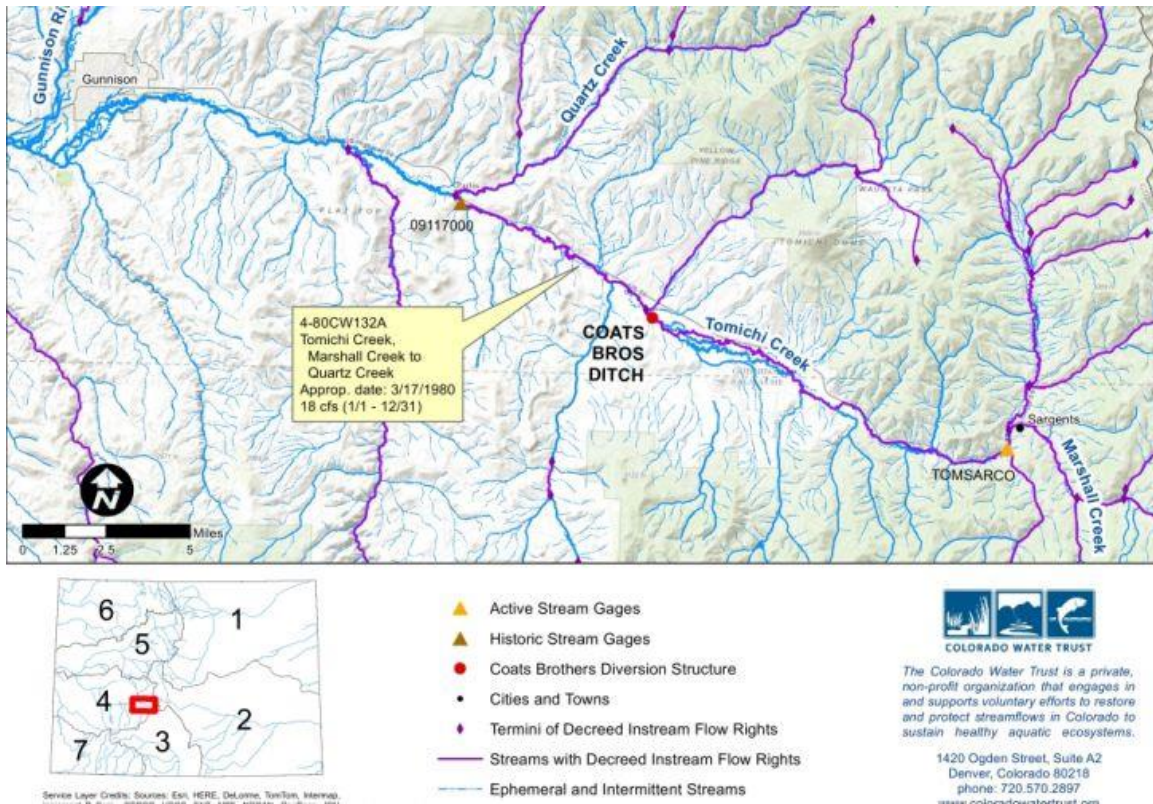
## **6. Coats Brothers Ditch Temporary Instream Flow Lease**

This description was provided by the Colorado Water Trust:

*The Coats Brothers Ditch diverts water from the west side of Tomichi Creek to irrigate the Kruthaupt Ranch, which is located on Tomichi Creek near Gunnison. The Ditch is decreed for more than 19 cubic feet per second (cfs) under 3 separate priorities with appropriation dates ranging from 1879 to 1887. The Kruthaupt family owns more than 3 cfs in the two senior-most priorities. In average and dry streamflow years, Tomichi Creek experiences localized dry ups, which affect river connectivity and present barriers to fish migration. Under this Temporary Instream Flow Lease (administratively approved for use in 3 out of 10 years, pursuant to § 37-83-105, C.R.S. (2015)), Trout Unlimited (TU), the Colorado Water Trust (Water Trust) and the Colorado Water Conservation Board (CWCB) partnered with the Kruthaupt family to share use of the Coats Brothers Ditch for both irrigation and instream flow purposes. During years when the lease is implemented, the Kruthaupts will use the water rights for irrigation of hay meadows and pasture grass on the same land historically irrigated by those water rights. In July or August, the Kruthaupts will cease diversions, and the CWCB will use Coats Brothers Ditch water rights to protect up to 12.3 miles of instream flows in Tomichi Creek. In May 2015, the Division of Water Resources (DWR), Water Division 4, approved the CWCB's application for a temporary, short-term lease for more than 3 cfs in the Coats Brothers Ditch for instream flow.*

*The water rights subject to the CWCB lease, and land the Coats Brothers Ditch irrigates, are encumbered by a conservation easement put in place prior to the water rights lease; however, the easement holders decided that such temporary and flexible water use would not impact the articulated conservation values of the easement. This arrangement demonstrates the water rights flexibility of some, but not all, conservation easements held in Colorado. As new conservation easements are contemplated for land*

conservation in the state, drafters should be aware of and allow for flexible water leasing arrangements that will not impact the conservation values of a property.



## 7. Bunte Highline Ditch / Willow Creek Temporary Instream Flow Lease

This description was provided by the Colorado Water Trust:

*The Water Trust's largest direct flow lease through its Request for Water 2012 program (a statewide drought leasing program implemented by the Water Trust in 2012 and 2013), this water right sustained flows in Willow Creek downstream of Willow Creek Reservoir to its confluence with the Colorado River, and then down the Colorado River through and past Windy Gap.*





Willow Creek, looking upstream from the Bunte Highline headgate. | Scott Hummer

*The Bunte Highline Ditch diverts from Willow Creek and has three separate priorities totaling 40 cfs. Under this Temporary Instream Flow Lease (administratively approved for use in 3 out of 10 years, pursuant to § 37-83-105, C.R.S. (2015), the water was leased to the CWCB to benefit four instream flow water rights on the Colorado River, to which Willow Creek is tributary; all four instream flow water rights were water-short in 2002.*

*The Bunte Highline water rights were the first irrigation water rights approved for instream flow use through the state's administrative approval process. Because these water rights are decreed to flood irrigate hay meadows, return flows historically trickled back to the Colorado River, and other water users relied on those return flows as a source for their water rights. The Division Engineer for Water Division 5 determined that the Water Trust and the landowners would need to operate a recharge pond to replicate return flows and implement the lease as it was proposed. The parties constructed a headgate to turn water out of the Bunte Highline Ditch and installed a measuring device to measure water as it flowed into an existing recharge pond, accounting for delayed return flows to the Colorado River.*

*The Water Trust worked closely with the other water right owner on the Bunte Highline Ditch to be sure that water administration practices and other water rights were not negatively affected by the lease. Water administration also required close coordination and cooperation with the local Water Commissioner and the Northern Colorado Water Conservancy District (Northern Water). Northern Water releases water from Willow Creek Reservoir to provide water to the Bunte Highline water rights; and they also*

*helped shepherd water through the Windy Gap Reservoir to benefit the Colorado River instream flow water rights downstream to which the water was leased.*

*This lease was officially approved on July 26<sup>th</sup>, 2012, and operated for 79 days that summer. The leased water benefitted four instream flow water rights totaling 34 Colorado River miles. From 2012, the administrative approval may be used another 2 out of the next 9 years.*

#### **8. McKinley Ditch and the Little Cimarron River – Permanent Water Sharing Agreement**

This description was provided by the Colorado Water Trust:



Little Cimarron River, Colorado | Scott Hummer

*The Little Cimarron River project is a pioneering attempt to permanently provide streamflow and ecological benefits for the Little Cimarron River while keeping agricultural lands in production. In January 2014, the Water Trust purchased 1.5 shares (5.89 cfs) in the McKinley Ditch, which diverts from the Little Cimarron River approximately 20 miles east of Montrose in the Gunnison Basin. The water rights historically irrigated almost 200 acres of pasture grass, producing one cutting and then grazing land. In partnership with Western Rivers Conservancy, the restoration project aims to keep water flowing through a 3-mile segment of what is often dry stream, restore flows to another 6 miles of stream, reconnecting habitat and allowing fish migration by adding flexibility of use to the senior water rights. The Water Trust and*



*CWCB applied for water court approval in December 2014 to irrigate as historically done in the early irrigation season, and as streamflows drop leave the historically used water in the Little Cimarron as a decreed instream flow. The timing of the switch between irrigation and instream flow in a given year will be determined by an agreement between the Water Trust, the landowner, and the CWCB.*

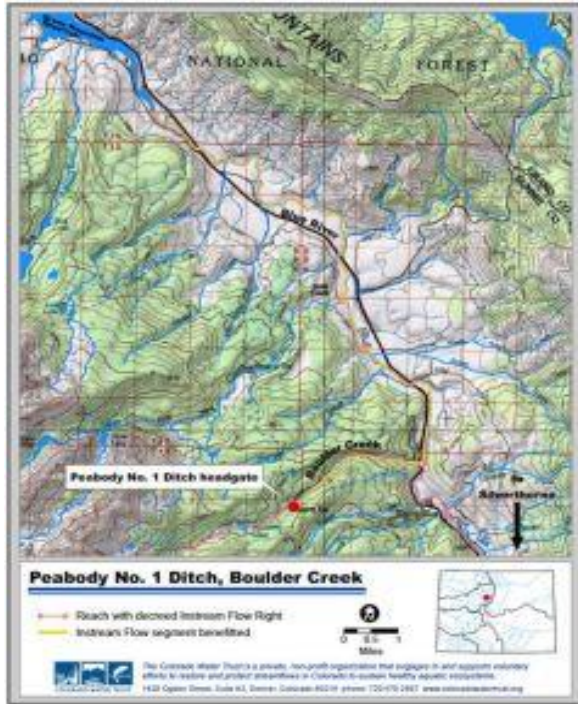
For additional press accounts, see <http://www.coloradowatertrust.org/our-work/projects/mckinley-ditch-little-cimarron-river>.

#### **9. Peabody No. 1 and the Blue River (Mosers) – Permanent Instream Flow Use of Agricultural Water Rights**

This description was provided by the Colorado Water Trust:

*The permanent change of the Peabody #1 Ditch from irrigation to instream flow was the Water Trust's first instream flow transaction. It also featured a remarket of the water rights at the downstream terminus of the instream flow reach for other uses.*

*As Jeannette and Howard Moser began scaling back their ranching operations in the Blue River valley, they sold their upper ranchlands to the U.S. Forest Service for inclusion in the White River National Forest. Wanting to keep the water rights associated with those lands local, they contacted their local water commissioner, Scott Hummer, who introduced them to the Water Trust. The Water Trust purchased the Moser's water rights, two priorities out of the Peabody #1 Ditch, and donated them to the CWCB's Instream Flow Program. The water rights are now decreed for instream flow use from Boulder Creek to the Blue River and down to Green Mountain Reservoir – 14 miles of the local streams the Mosers cared about. The Colorado River District purchased the historical consumptive use of the water at Green Mountain from the Water Trust and has added that water to its water marketing program – now available for other uses and users in the Colorado River basin.*



Beautiful Boulder Creek in Summit County | Scott Hummer

#### 10. Reducing Diversions and Spills in the Highline Canal

The Grand Valley Project, one of the nation's first Reclamation Projects, diverts water from the Colorado River upstream from the City of Grand Junction into the Highline

Canal.<sup>15</sup> The canal runs generally west for 55 miles on the north side of the Grand Valley and provides water to irrigate more than 30,000 acres of land. The project's water rights are relatively senior on the Colorado River and provide a full supply of water for irrigated lands.

Interest in trying to improve late season flows through the 15 Mile Reach of the Colorado River above its junction with the Gunnison to benefit endangered fish prompted examination of ways to better manage the Grand Valley Project's water delivery system.<sup>16</sup> The purpose was to reduce the level of operational spills along the length of the Highline Canal so that Project diversions could be reduced during the late summer and early fall.<sup>17</sup> Improvements had already been made to portions of the Highline Canal and to many of the laterals to reduce salt loadings carried to the river from Project lands.<sup>18</sup> In this phase, Reclamation installed a series of check structures along the canal to better regulate the flows of water in relation to demands.<sup>19</sup> The CWCB also participated in this project by providing funds to establish an endowment fund to pay for maintenance and repairs of the improvements made to the infrastructure improvements. The project enabled reduced diversions of from 30,000 to 45,000 acre-feet per year.<sup>20</sup>

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<sup>15</sup> Bureau of Reclamation, Grand Valley Project, available online at [http://www.usbr.gov/projects/Project.jsp?proj\\_Name=Grand+Valley+Project](http://www.usbr.gov/projects/Project.jsp?proj_Name=Grand+Valley+Project).

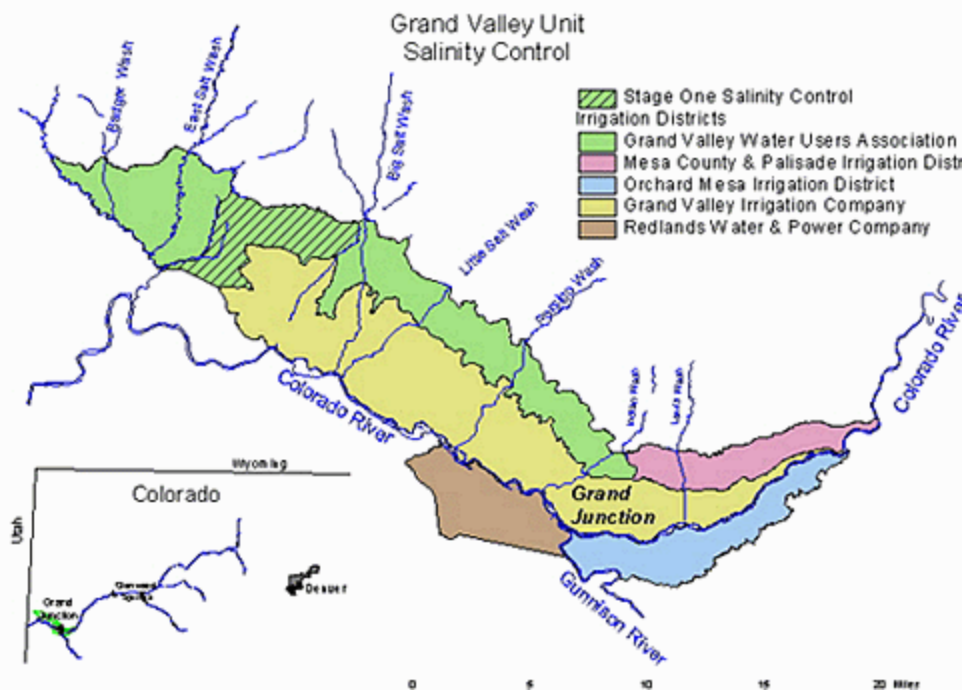
<sup>16</sup> Background is provided in Lawrence J. MacDonnell, FROM RECLAMATION TO SUSTAINABILITY: WATER, AGRICULTURE, AND THE ENVIRONMENT IN THE AMERICAN WEST 127-34 (1999).

<sup>17</sup> Lawrence J. MacDonnell, Managing Reclamation Facilities for Ecosystem Benefits, 67 U. Colo. L. Rev. 197, 245-49 (1996). See also Stuart Styles et al., CASE STUDY: MODERNIZATION OF THE GOVERNMENT HIGHLINE CANAL, ITRC Paper 99-005, <http://www.itrc.org/papers/grandjunction/gj.pdf>.

<sup>18</sup> Ram Dhan Khalsa, Case Study of the Government Highline Canal, at 426.

<sup>19</sup> *Id.* at 427. In addition, spills were captured in Highline Lake and pumped back to canal as needed.

<sup>20</sup> *Id.*



It was not possible under Colorado law to simply convert these savings to an instream flow right without going through a water court change-of-use process that would have required years to complete and would have potentially opened up other issues that might affect the underlying water right.<sup>21</sup> Consequently, an arrangement was made to

<sup>21</sup> As described, the motivation for making the improvements that reduced the need for diversions annually by 30,000 to 45,000 acre-feet was to be able to deliver that water to the 15-Mile Reach of the Colorado River, just above the confluence with the Gunnison River, for the benefit of endangered species of fish. The water historically spilled from the canal had not returned to the river in locations allowing use by other diverters because of the location of the project lands downstream of all other diverters and close to the state line with Utah. Thus there were no return flow dependencies by other water right holders that would inhibit a change of use. Nevertheless the entities involved in the conservation project, including the Grand Valley Water Users Association, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and others were unwilling to go through a water court change-of-use process. Instead the parties negotiated arrangements under which the water could be stored as surplus water in Green Mountain Reservoir and delivered under contract to the cities of Palisade, Grand Junction, and Fruita to support recreation uses of the river adjacent to the cities. Bureau of Reclamation, Colorado-Big Thompson Project, Colorado Municipal Recreation Agreement Among the United States, the Town of Palisade, the City of Grand Junction, and the City of Fruita, April 2, 2015. See also similar arrangements made to support flows of water to the 15-Mile Reach involving the Orchard Mesa Check and the 10825 Project. Description of the Colorado-Big Thompson Project 28-30 (Orchard Mesa Check); Bureau of Reclamation, Environmental Assessment and Finding of No Significant Impact, Colorado Water Users' Commitment to Provide 10,825 Acre-Feet to the 15-Mile Reach of the Upper Colorado River, March 2012. These examples suggest the need for procedures that can facilitate the movement of water conserved through the implementation of beneficial irrigation improvements to other desirable uses so long as other water rights are reasonably protected.



treat these reduced diversions as surplus water in Green Mountain Reservoir and to put in place a delivery contract for this water to Palisade, Grand Junction, and Fruita that allowed protected deliveries of this water through the 15-mile Reach, regarded as essential by the U.S. Fish and Wildlife Service to recover endangered fish.<sup>22</sup>

On the other side of the river, the State, the Colorado River District, the Bureau of Reclamation, and the Orchard Mesa Irrigation District (OMID) are instituting changes that also provide enhanced flows to the 15 Mile Reach. In simple terms, OMID diverts upstream of the 15 Mile Reach to irrigate lands from which the return flows go to the Gunnison River and meet up with the Colorado River downstream of the 15 Mile Reach. By building a reregulating reservoir, and improving the efficiency of the diversions, OMID now diverts significantly less water for irrigation, instead diverting more water at Reclamation's hydroelectric power plant and indirectly leaving more water instream for the 15 Mile Reach.<sup>23</sup>

#### **11. Reducing Selenium Loadings from the Uncompahgre Project**

One of the first five projects initiated under the 1902 Reclamation Act, the Uncompahgre Project moves water from the Gunnison River through a six-mile tunnel into the Uncompahgre Valley to irrigate 76,000 acres of land extending upstream of Montrose to Delta.<sup>24</sup> Return flows from irrigation, especially water percolating into the ground, pick up selenium from the valley's soils, causing concentrations in the lower Uncompahgre River and the Gunnison River below Delta to exceed State water quality standards.<sup>25</sup> "Three parameters were reported to exceed State water quality standards

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<sup>22</sup> As outlined in the Final Programmatic 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, December 1999:

In average and below average runoff years, the majority of the reduced canal spills will contribute to an increased surplus storage condition in Green Mountain Reservoir's Historic User Pool. "Surplus HUP water" is water in excess of the needs of the HUP beneficiaries as defined in paragraph 8 of the Green Mountain Reservoir Operating Policy (Federal Register, Volume 48, Number 247, December 22, 1983, as amended in Federal Register, Volume 52, Number 176, September 11, 1987) and the Stipulation and Agreement of the Orchard Mesa Check Case (Colorado Water Division 5, 91CW247). Surplus HUP water can be released from Green Mountain Reservoir and legally protected to indirectly improve flow conditions in the 15-Mile Reach.

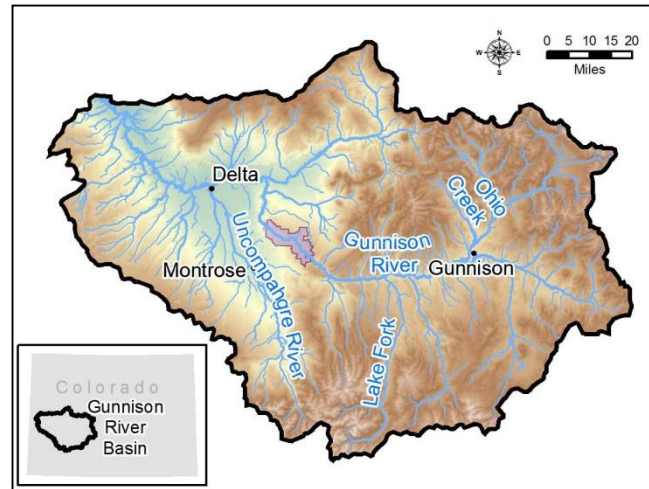
At 10.

<sup>23</sup> Colorado River Recovery Program, FY 2014 Annual Project Report, Orchard Mesa Canal Automation Project, Nov. 18, 2014.

<sup>24</sup> Bureau of Reclamation, Uncompahgre Project, [http://www.usbr.gov/projects/Project.jsp?proj\\_Name=Uncompahgre%20Project](http://www.usbr.gov/projects/Project.jsp?proj_Name=Uncompahgre%20Project).

<sup>25</sup> For background, see materials available at <http://seleniumtaskforce.org/home.html>. "Selenium concentrations are of particular concern to fish and wildlife resources. It is estimated that percolation of water from irrigation and irrigation systems contribute about 90 percent of the ground water that mobilizes selenium in the basin (Reclamation 2006b). It is estimated that 60 percent of the selenium loading results from the Uncompahgre Project; the remainder from private, other federal projects and natural inputs." Bureau of Reclamation, FINAL ENVIRONMENTAL IMPACT STATEMENT ASPINALL UNIT

(for which 85th percentile concentrations exceeded numeric standards) for the Gunnison River: sulfate, total iron, and selenium ....”<sup>26</sup>



In 1998, local, state, and federal interests joined to establish the Gunnison Basin Selenium Task Force.<sup>27</sup> The Task Force joined with the National Irrigation Water Quality Program (NIWQP) to implement a demonstration project that reduced selenium loading by 27% and salinity loading by 11%.<sup>28</sup> The success of that demonstration led to its expansion and to the development of additional projects. In 2009, the U.S. Fish and Wildlife Service issued a programmatic biological opinion under Section 7 of the Endangered Species regarding the effects on protected species in the Gunnison River of proposed reoperation of the Bureau of Reclamation’s Aspinall Project and addressing the effects of water depletions in that basin.<sup>29</sup> It predicated its “no jeopardy” determination upon implementation of a number of conservation actions, including implementation of a Selenium Management Program.<sup>30</sup> A 2011 report provides this summary of accomplishments to that point:

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OPERATIONS ASPINALL UNIT—COLORADO RIVER STORAGE PROJECT GUNNISON RIVER, COLORADO, 3-18—19 (2012).

<sup>26</sup> *Id.* at 3-18.

<sup>27</sup> Identification of elevated selenium levels in tributaries to the Colorado River in the Grand Valley prompted formation of the Grand Valley Selenium Task Force in 2002. These two groups have now joined forces.

<sup>28</sup> Selenium Management Program Workgroup, Selenium Management Program, Program Formulation Document, Gunnison River Basin, Colorado 11 (December 2011).

<sup>29</sup> U.S. Fish and Wildlife Service, Final Gunnison River Basin Programmatic Biological Opinion, 2009.

<sup>30</sup> *Id.* at 15-20.

1995: The “Winter Water Program” eliminated the carriage of water in Uncompahgre Project canals and laterals during the non-irrigation season and thus reduced seepage and subsequent salt and likely selenium loading.

Estimated salt load reduction was 41,330 tons/year.

2000: The Montrose Arroyo Demonstration Project placed 8.5 miles of open laterals into pipe reducing salt and selenium loading and allowing documentation of the effects in a published U.S. Geological Survey (USGS) report. The USGS data collection produced an estimated selenium load reduction of 210 pounds/year and salt load reduction of 2,500 tons/year.

2004 thru early 2011: Following the Montrose Arroyo demonstration project, approximately 47 additional miles of laterals in the Uncompahgre Valley have been placed in pipe or lined to reduce salt and selenium loading and another 4 miles are approved and funded. Estimated salt load reduction is 12,082 tons/year.

1988-2010: Through fiscal year 2010, the NRCS reports implementing 57,588 acres of on-farm irrigation system improvements in the lower Gunnison Basin with an estimated salinity reduction of 105,502 tons/year. An estimated 49,705 acres are improved flood systems, 6,765 acres are sprinkler systems, and 1,067 acres are micro-spray or subsurface drip systems. These numbers do not include work done prior to 1989, and none would include work done by landowners without federal assistance or through other programs or with other non-salinity funds (NRCS 2011).

1988-2010: The BLM implemented Best Management Practices to reduce erosion of saline and selenium-bearing soils.

2010-2011: Approximately 9.8 miles of canal and associated laterals in the North Fork and Smith Fork drainages were piped to reduce salinity loading. Estimated salt load reduction is 4,588 tons/year.

2011: Six additional lower Gunnison Basin projects to pipe irrigation canals and laterals were selected under Reclamation’s 2010 Basinwide Program FOA. Agreement negotiations are underway.<sup>31</sup>

A 2012 USGS report found a reduction of selenium loadings in the Gunnison River of about 28% between 1986 and 2008.<sup>32</sup> The CWCB (through the Species Conservation Trust Fund) funds approximately \$500,000 each year on research, monitoring, and evaluation of selenium impacts, and on reducing selenium loading.

## **12. Salinity Control Projects in the Lower Gunnison Basin**

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<sup>31</sup> *Id.* at 13-14.

<sup>32</sup> The report found a nearly 40% reduction at its measuring station on the Colorado River in that same time period. John W. Mayo and Kenneth J. Leib, Flow-Adjusted Trends in Dissolved Selenium Load and Concentration in the Gunnison and Colorado Rivers near Grand Junction, Colorado, Water Years 1986–2008, Scientific Investigations Report 2012–5088, at 1.

Efforts to reduce salinity loadings to the Colorado River and its tributaries have been ongoing for many years. Work began in the Lower Gunnison Basin in 1986.<sup>33</sup> A 2013 report provides this summary:

There have been significant accomplishments by the Salinity Control Program within the Lower Gunnison Basin since its inception in 1986. An early key accomplishment of the program was the removal of “winter water” deliveries from approximately 552 miles of canals within the Uncompaghe Valley WUA distribution system.<sup>34</sup> Subsequent program accomplishments of the program in the lower Gunnison Basin have included the piping or lining of an additional 117 miles of canal or laterals out of approximately 1,345 miles and improved irrigation methods on approximately 62,306 acres out of 171,000 total irrigable acres.<sup>35</sup>

The report, commissioned by the Bureau of Reclamation to “to identify and prioritize cost effective salinity control opportunities, identify impediments to these opportunities, and to describe how a variety of control measures might be best implemented in a coordinated manner to maximize local and basin-wide benefits in cooperation with other potential funding partners in the Upper Colorado River Basin,” offered these recommendations:

**BASIN COORDINATOR:** Either through State or Federal funding, a full time, locally based Salinity Coordinator is needed to provide the many small companies and private individuals with the support necessary to move forward with the best implementation for the area. This requires identifying an individual who can relate to the irrigation entities and yet have a encompassing view of the programs, rules and regulations which drive the Salinity Control effort

**COMPREHENSIVE PLANNING:** In particular, with the many small ditch and reservoir companies that exist outside of the UVWUA service area, there is obviously a great potential to combine and improve groups of canals and laterals. However, there can be a natural resistance to change which needs the development of a “community vision” to overcome.

**HYDROPOWER INTEGRATION:** With the new legislation and proposed legislation to increase the use of renewable energy, hydropower can be used to assist with project funding. The Colorado Agriculture Department is very interested in assisting in this area.

**IMPROVED IRRIGATION WATER MANAGEMENT SUPPORT:** Much of what can be accomplished can be accomplished with existing systems, operated more efficiently on a continuous basis. We can’t always just go in, make the necessary

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<sup>33</sup> URS, COMPREHENSIVE PLANNING STUDIES FOR SALINITY CONTROL MEASURES IN THE UPPER COLORADO RIVER BASIN, FINAL FINDINGS AND STRATEGIES, LOWER GUNNISON BASIN, COLORADO, DECEMBER 2013 1-6.

<sup>34</sup> This action also was described in the selenium case study, #11.

<sup>35</sup> *Id.* at 1-6.



capital improvements, and leave, hoping that all will be well in the future. We have heard also that the pay scale for good IWM personnel does not really support their long-term retention. A way should be found to maintain (or continue) the federal and national benefits that continuation of effective Irrigation Water Management provides.<sup>36</sup>

Among the many impediments to successful implementation of the program identified in the report was concern about loss of water rights: “There is a real concern by many interviewees that with increased water use efficiency, the participant will lose water rights. This is a particular concern when the capacity of the new water conveyance facility is significantly less than the historical facility on which the water right was based. This concern causes reluctance in participating in the Program.”<sup>37</sup>

### **13. Colorado River System Conservation Program Projects in Colorado**

Concern about growing shortages of water in the Colorado River, especially water held in storage in Lake Powell and Lake Mead, has prompted the development of the Colorado River System Conservation Program. As described in a joint news release in 2014:

The Central Arizona Project, Denver Water, The Metropolitan Water District of Southern California and Southern Nevada Water Authority are partnering with the U.S. Bureau of Reclamation to contribute \$11 million to fund pilot Colorado River water conservation projects. The projects will demonstrate the viability of cooperative, voluntary compensated measures for reducing water demand in a variety of areas, including agricultural, municipal and industrial uses.

Five pilot projects were funded in Colorado for 2015. Each involves reducing the amount of water diverted and consumed to irrigate crops. Work is underway to evaluate the water savings associated with cessation of irrigation or increased efficiency and to determine the effects on the plants. Additional projects have been funded for 2016, some of which involve switching from the irrigation of corn or alfalfa to less water intensive crops. No effort is being made to protect saved water for additional use at this time, but the long-term objective is to be able to shepherd this water to Lake Powell, or allow this water to be stored in other reservoirs in order to be released at a subsequent time.<sup>38</sup>

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<sup>36</sup> *Id.* at ES-3 – 4.

<sup>37</sup> At 4-7.

<sup>38</sup> See Cassidy Woodard, Water Shepherdling (Getches-Wilkinson Center, 2016).

## Appendix B. Related Colorado Water Law

Water rights in Colorado are decreed with a specific priority date, a point of diversion, a maximum rate of diversion, and a purpose and place of use. Irrespective of the decreed diversion rate, an appropriator is only permitted to divert and use the quantity of water reasonably necessary to accomplish the purpose(s) for which the appropriation was made. Thus, if an irrigator reduces the number of acres irrigated he or she can only divert and use the amount of water required to irrigate crops on those acres, presumably less than the irrigator would have diverted and used to irrigate the full number of acres authorized for irrigation in the decree. Similarly, if the irrigator has made improvements to his or her irrigation diversion, delivery, and application systems that therefore require less water to irrigate the same amount of land, he or she should reduce his diversions accordingly.<sup>39</sup> What can the irrigator do with the amount of water no longer diverted?

If the irrigator wishes to use that water to irrigate additional lands not included in his or her existing decree or if another party would like to use that water, the irrigator must go to water court and ask for a change of use of the water right. Court-based changes of use include an examination of the historical uses under the water right and their consistency with the decreed uses, including the point of diversion, the uses made, and the lands irrigated. The applicant must demonstrate that the proposed change—irrigating additional lands or another consumptive use—can be accomplished without enlarging the historical use under the original right and can be implemented without material harm to other appropriators. These proceedings, and especially proving no material injury, can be time-consuming and expensive.<sup>40</sup> Concern about the uncertainties and expense of such change of use proceedings prompted development of creative means of protecting the water no longer needed for diversion through the Grand Valley Highline Canal so that it would flow through the critical 15 mile reach of the Colorado River (Case Study 10).

Alternatively, such savings may potentially be temporarily dedicated to instream flows without having to go through the water court process. For example, a longstanding provision allowing the temporary loan of an irrigation water right for one irrigation season was amended to allow such loans to be made to the Colorado Water Conservation Board to temporarily bolster flows in stream segments already decreed for

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<sup>39</sup> As made clear in a recent report from the Colorado Water Institute, failure to divert the full amount of water authorized under a water right for ten or more years may result in a proceeding to “abandon” that portion of the water right. Reagan Waskom et al., *How Diversion and Beneficial Use of Water Affect the Value and Measure of a Water Right (Is “Use It or Lose It” an Absolute?)*, Colorado Water Institute Special Report 25 (Feb. 2016).

<sup>40</sup> See Britt Banks and Peter Nichols, A Roundtable Discussion of the No Injury Rule of Colorado Water Law, 44 *The Colorado Lawyer* 87 (2015).

an instream flow water right.<sup>41</sup> This authority was used in Case Studies 6 and 7. The General Assembly authorized the formation of water banks in all water divisions for the lease, loan, or exchange of stored water for any use, including for instream flow enhancement.<sup>42</sup> More recently, the General Assembly authorized the Colorado Water Conservation Board to fund up to ten fallowing and leasing pilot projects.<sup>43</sup> The purpose of the program is to “[e]valuate the feasibility of delivering leased water to the temporary municipal, agricultural, environmental, industrial, or recreational users ....”<sup>44</sup> The General Assembly authorized the use of interruptible water supply agreements, enabling the temporary loan of a water right to another user following review and approval by the State Engineer.<sup>45</sup> In addition, the General Assembly made it possible for an appropriator in Water Divisions 4, 5, or 6 to place a portion or all of his water right in an approved water conservation program or in a water bank for up to five years in a ten-year period without penalty for its non- or reduced-use when subsequently determining the right’s historic consumptive use.<sup>46</sup> In addition, the General Assembly modified the statutory definition of abandonment to protect water rights placed in a conservation program, a water bank, a land fallowing program, or temporarily changed to an instream flow.<sup>47</sup> These authorities enabled the transactions described in Case Study 5.

The General Assembly also expanded the scope of the State’s instream flow program to enable the CWCB to acquire water rights or interests in rights, permanently or temporarily, for the purpose of improving stream flows.<sup>48</sup> Thus it is legally possible for an irrigator whose water use system is enhanced using public funding to donate any historically used but no longer needed water to the CWCB, which could temporarily convert that water to an instream flow under its control using one of the administrative processes or permanently convert that water to instream flows by going through a change of use proceeding in Water Court.

Related law in other states is discussed in Appendix C, and the many efforts to legislatively define the status of conserved water in Colorado are listed in Appendix D.

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<sup>41</sup> Colo. Rev. Stat. § 37-83-105 (2). Among a number of limitations applying to such loans is one limiting any such loans to no more than three out of any ten year period.

<sup>42</sup> Colo. Rev. Stat. § 37-80.5-101 et seq. (§ 37-80.5-104.5(1)(a)(II)). For a proposal to expand this legislation to facilitate temporary water transfers, see *An Enhanced Water Bank for Colorado*, Getches-Wilkinson Center Working Paper (2016).

<sup>43</sup> Colo. Rev. Stat. § 37-60-115 (8).

<sup>44</sup> Colo. Rev. Stat. § 37-60-115 (8)(b)(II). The pilots can operate only for up to ten years.

<sup>45</sup> Colo. Rev. Stat. § 37-92-309. Such arrangements may only be used for three in every ten year period, with the potential now to extend the arrangement to a total of thirty years.

<sup>46</sup> Colo. Rev. Stat. § 37-92 305 (3).

<sup>47</sup> Colo. Rev. Stat. § 37-92-103 (2).

<sup>48</sup> Colo. Rev. Stat. § 37-92-102 (3): “The board also may acquire, by grant, purchase, donation, bequest, devise, lease, exchange, or other contractual agreement, from or with any person, including any governmental entity, such water, water rights, or interests in water that are not on the division engineer’s abandonment list in such amount as the board determines is appropriate for stream flows or for natural surface water levels or volumes for natural lakes to preserve or improve the natural environment to a reasonable degree.”

Appendix E discusses the vocabulary concerning categories of water used in the Colorado Water Plan.

## Appendix C. Relevant Laws from Other States

Oregon appears to have the most robust program to improve irrigation water use for other purposes. First enacted in 1987 and revised in 1993, the Oregon statute provides the following definition of conserved water:

- (1) Conservation means the reduction of the amount of water diverted to satisfy an existing beneficial use achieved either by improving the technology or method for diverting, transporting, applying or recovering the water or by implementing other approved conservation measures.
- (2) Conserved water means that amount of water that results from conservation measures, measured as the difference between:
  - (a) The smaller of the amount stated on the water right or the maximum amount of water that can be diverted using the existing facilities; and
  - (b) The amount of water needed after implementation of conservation measures to meet the beneficial use under the water right certificate.<sup>49</sup>

Thus, conserved water is defined in terms of reduction in the diversion of water. Parties intending to take actions that will reduce diversions make application to the Oregon Water Resources Commission.<sup>50</sup> The Commission first determines the amount of this water needed to mitigate effects on other water rights; the remainder is allocated 25% to the state and 75% to the applicant.<sup>51</sup> At the discretion of the Commission, the water allocated to the state can go either to instream flow protection or can be made available for use by other appropriators.<sup>52</sup> The Commission then issues water right certificates with the adjusted uses.<sup>53</sup> These transactions are noticed, and parties may file objections, but they do not go through the formal change of use process.<sup>54</sup> Conserved water retained by the applicant can be used for any purpose, can be disposed of, or can be reserved for future use.<sup>55</sup>

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<sup>49</sup> Or. Rev. Stat. § 537.455.

<sup>50</sup> Or. Rev. Stat. § 537.465.

<sup>51</sup> Or. Rev. Stat. § 537.470(3). The applicant can recommend a higher percent go to the state. Also, if more than 25% of the funds used to conserve water come from public sources, the percentage of conserved water going to the state must at least equal this amount.

<sup>52</sup> *Id.*

<sup>53</sup> Or. Rev. Stat. § 537.470(6). Separate certificates are issued: one to redefine the original right and the second to authorize the additional use of the conserved water. If the state dedicates water to instream flows, a certificate for this use also is issued. At the discretion of the applicant, the priority for the additional use can be either the same as the original priority, or it may be set at one minute later. ORS 537.485(1).

<sup>54</sup> Or. Rev. Stat. § 537.470(1), (4) & (5).

<sup>55</sup> Or. Rev. Stat. § 537.490(1).

The most comprehensive review of this program was produced in 2008.<sup>56</sup> The review found that, between 1993 and 2007, the Commission received 55 applications.<sup>57</sup> As of 2008, 37 of these applications had been successfully completed.<sup>58</sup> Only 1 had been denied and 7 had been withdrawn.<sup>59</sup> According to this study, the average processing time to final order during this period was 13.1 months.<sup>60</sup> All but one of the applications involved irrigation water rights.<sup>61</sup> Two-thirds of the applications involved an intermediary, an outside party interested in use of the conserved water that provides the financing and technical knowledge necessary to implement the conservation actions.<sup>62</sup> Only two applications required a reduction of conserved water to mitigate adverse effects to other water rights.<sup>63</sup>

The State of Washington also specifically recognizes the potential benefits of improved irrigation water uses<sup>64</sup> as well as the concerns about potential adverse alteration of historic return flows.<sup>65</sup> The legislature has established a state program to fund the implementation of agricultural water use enhancement projects.<sup>66</sup> In return for project funding, the State is charged with obtaining public benefits.<sup>67</sup> If these public benefits include a share of the “net water savings,” the State is to deposit this water into the “trust” water right program.<sup>68</sup>

This authority has been used to establish the Irrigation Efficiencies Grant Program, located in the Washington Conservation Commission.<sup>69</sup> The program is specifically targeted at improving stream flows in reaches identified as critical for protected species

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<sup>56</sup> Bruce Aylward, Restoring Water Conservation Savings to Oregon Rivers: A Review of Oregon’s Conserved Water Statute, July 2008 (hereinafter Aylward).

<sup>57</sup> Aylward at 10.

<sup>58</sup> At 11.

<sup>59</sup> At 12.

<sup>60</sup> At 14.

<sup>61</sup> At 15. The predominant conservation actions were to pipe canals and to do on-farm efficiencies.

<sup>62</sup> At 16.

<sup>63</sup> At 17. Nevertheless, the report notes “a fundamental problem with the conserved water statute. Taking water that was seepage and spreading the water to an out-of-stream consumptive use will increase consumptive use under the water right. If there are unmet junior rights downstream then allocating this water to the applicant for consumptive use is likely to injure the junior user (unless the seepage is irretrievably lost to the system) ....”

<sup>64</sup> Wash. Rev. Code § 90.42.010: “The legislature finds that a need exists to develop and test a means to facilitate the voluntary transfer of water and water rights, including conserved water, to provide water for presently unmet needs and emerging needs.”

<sup>65</sup> *Id.*: “Further, the legislature finds that water conservation activities have the potential of affecting the quantity of return flow waters to which existing water right holders have a right to and rely upon. It is the intent of the legislature that persons holding rights to water, including return flows, not be adversely affected in the implementation of the provisions of this chapter.”

<sup>66</sup> Wash. Rev. Code § 90.42.030(1): “...the state may enter into contracts to provide moneys to assist in the financing of water conservation projects.”

<sup>67</sup> *Id.*

<sup>68</sup> Wash. Rev. Code § 90.42.030(2).

<sup>69</sup> <http://scc.wa.gov/irrigation-efficiencies/>.

of fish. Local soil and water conservation districts in areas including these critical reaches are encouraged to work with irrigators to find opportunities for water conservation. The district and the landowner/irrigator submit a proposal to the Commission. The Department of Ecology reviews the plan for water right implications. The Department of Fish and Wildlife assesses the fisheries benefits. Funding is available for up to 85% of the project costs. Since 2001, the program has funded 71 projects at a total cost of about \$14 million.<sup>70</sup> These projects have produced savings of nearly 16,000 acre-feet at a cost of \$891 per acre-foot.<sup>71</sup>

As explained in the Washington program, conserved water can include both gross savings and net savings.<sup>72</sup> Under Washington law, net water savings means "the amount of water that is determined to be conserved and usable within a specified stream reach or reaches for other purposes without impairment or detriment to water rights existing at the time that a water conservation project is undertaken, reducing the ability to deliver water, or reducing the supply of water that otherwise would have been available to other existing water uses."<sup>73</sup> The State developed guidelines to govern the determination of net water savings. The guidelines explain that gross water savings are the reduction in historical diversions while the net savings also account for return flows and any other water needed to satisfy other existing rights.<sup>74</sup>

The State's trust water right program provides a means by which the State can acquire any type of water right, temporarily or permanently, for instream flows, irrigation, municipal, or other beneficial uses.<sup>75</sup> The State Department of Ecology issues a water rights certificate for each new permanent trust water right.<sup>76</sup> For water rights altered by water conservation actions, the Department issues a "superseding" water right certificate that redefines the right as necessary.<sup>77</sup> Such conserved water trust rights are used for instream flow maintenance.<sup>78</sup>

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<sup>70</sup> Spreadsheet provided by Jon Culp, Program Director, Washington Conservation Commission, November 13, 2015.

<sup>71</sup> *Id.*

<sup>72</sup> Compare this approach to the definitions used in the Colorado Water Plan. Appendix E.

<sup>73</sup> Wash. Rev. Code § 90.42.020(3).

<sup>74</sup> Washington Department of Ecology, Guidelines, Trust Water Rights Program (1992) at 9. The guidelines also include the concept of "reasonable efficient practices" and call for a determination of whether historical practices were reasonably efficient. *Id.* at 11.

<sup>75</sup> Wash. Rev. Code § 90.42.040(1).

<sup>76</sup> *Id.* at (2). The Department may also issue a certificate for temporary trust water rights as necessary to provide for changes of use. The water rights retain their priority.

<sup>77</sup> *Id.* Even though the priority of the trust right established by conservation is the same as the original water right, it will be administered as junior to that right.

<sup>78</sup> See <http://scc.wa.gov/irrigation-efficiencies/>. But, according to Kelsey Collins, statewide trust water coordinator for the Washington Department of Ecology, the state only protects the improved flows from the original head gate to the point(s) of return flows. Personal Communication, November 25, 2015.

A recent report examined the laws of 12 western states to evaluate the extent to which they allow the transfer of water used under existing rights to environmental purposes. Among the issues explored in the report was the following:

**Whether the state has a conserved water statute that explicitly allows some portion of water saved by irrigation efficiency improvements to be dedicated to environmental purposes.** Irrigation efficiency projects, such as replacing ditches with pipes, lining ditches, and replacing flood irrigation with sprinklers or drip irrigation, can play an important role in flow restoration. Traditional western water law, however, disincentivizes irrigation efficiency projects. Under black-letter prior appropriation law, if an irrigator can, through improved technology, irrigate the same number of acres with less water, historically they would face a risk of diminishment of their water right. Some states, such as California, Oregon, Montana, Texas, and Washington, have passed “conserved water” statutes that allow water rights holders to dedicate some or all of the water saved through irrigation efficiency or reduced production to environmental uses. In states without such statutes, the fate of conserved water is uncertain, and such water may in fact simply be available for use by other water rights holders. A conserved water statute is therefore an important tool for facilitating irrigation efficiency projects and for environmental water transactions based on improved efficiency.<sup>79</sup>

The report noted: “One of the greatest risks perceived by water rights holders associated with any changes to their water right is that they will unintentionally forfeit or diminish some part of that right as a consequence of a transaction. Irrigators and other water users are more likely to sell, lease, or donate their right if the law spells out clearly in advance what their rights will be after the deal is completed and, if the transaction is temporary, once it expires.”<sup>80</sup>

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<sup>79</sup> Leon F. Szeptycki et al., *Environmental Water Rights Transfers: A Review of State Laws*, August 31, 2015 at 13.

<sup>80</sup> *Id.* at 12.



## Appendix D. Legislative Attempts to Statutorily Recognize Conserved Water



### MEMORANDUM

To: Larry MacDonnell

From: Zach Smith

Date: January 12, 2016

Re: Legislative Attempts at Agricultural Efficiency

This Memorandum briefly outlines the eight Colorado state legislative attempts to create additional water uses out of saved, salvaged, or conserved agricultural water. The Notes section under each bill describes whether the bill focused on diversion or historical consumptive use amounts and to what uses the new water could be allocated. See Table 1 for a more concise outline.

### 1984

**Bill:** Senate Bill 84-161

**Primary Sponsor:** Senator Glass

**Brief Description:** SB 84-161 created a transferable interest in a portion of an existing water right that would be lost to the user by “evaporation, transpiration, seepage, or otherwise and which is conserved or otherwise made available for beneficial use.” That portion of conserved water would be called “salvage water” and would be quantified by calculating the difference between the historical consumptive use and the post-salvage consumptive use. To use the salvaged water for another use or for reuse, the water user would need to file an appropriate application for the new use of the salvaged water, and the new use or reuse could only occur if the jurisdictional body (state engineer, water court, ground water commission) found no injury would occur to other water rights.

**Notes:** SB 84-161 allowed for the transfer or reuse of water that is lost to the user. The bill inconsistent as to whether it refers to consumptive use or diversion amount. The bill placed no restrictions on the new uses beyond the limitations of the injury standard.

**Final Disposition:** Postponed Indefinitely by Senate Agriculture Committee

### 1985

**Bill:** Senate Bill 85-95

**Primary Sponsor:** Senator Glass

**Brief Description:** SB 85-95 allowed for the transfer of saved historical consumptive use from an absolute agricultural water right after the showing of reduced consumptive use and a change of water right proceeding. The bill specifically disallows the transfer of waste.

**Notes:** Transferring saved consumptive use water is occurring today without special legislation. For example, farmers on the Cache La Poudre River received a Substitute Water Supply Plan approval in 2014 to reduce consumptive use through fallowing and subsequently transferred that saved water to downstream industrial uses. The bill placed no restrictions on the new uses beyond the limitations of the injury standard.

**Final Disposition:** Postponed Indefinitely by Senate Agricultural Committee

### **1986**

**Bill:** Senate Bill 86-126

**Primary Sponsor:** Senator Glass

**Brief Description:** SB 86-126 allowed for the transfer of saved historical consumptive use from an absolute agricultural water right after the showing of reduced consumptive use and a change of water right proceeding. The bill specifically disallows the transfer of waste.

**Notes:** SB 86-126 is very similar to Glass's attempt in 1985.

**Final Disposition:** Postponed Indefinitely by Senate Agricultural Committee

### **1991**

**Bill:** House Bill 91-1110

**Primary Sponsor:** Representative Foster

**Brief Description:** HB 91-1110 allowed for the adjudication of a "conservation water right" under existing water court adjudication processes for water no longer needed "for diversion at the applicant's headgate because of modernization, improvement, or change in the applicant's method of operation." The applicant's original decree would be amended and reduced by the amount of the conservation water right.

**Notes:** HB 91-1110 did not distinguish between reduced consumptive use and reduced diversions as making up the quantity of the conservation water right. The bill placed no restrictions on the new uses of the conservation water right beyond the limitations of injury standard.

**Final Disposition:** Passed out of House, Postponed Indefinitely by Senate Agricultural Committee

### **1993**

**Bill:** House Bill 93-1158

**Primary Sponsor:** Representative Foster

**Brief Description:** HB 93-1158 allowed for the additional use of saved water under the original water right's priority under a conservation plan approved by water court. Saved

water would be created by measures that reduce historical diversion of a valid water right, and quantified and approved by the water court under a conservation plan.

**Notes:** HB 93-1158 seems to allow the transfer of savings of both historical diversions and consumptive use. The bill placed no restrictions on the new uses beyond the limitations of the injury standard.

**Final Disposition:** Postponed Indefinitely by House Agricultural Committee

## **2013**

**Bill:** Senate Bill 13-19

**Primary Sponsor:** Senator Schwartz

**Brief Description:** As introduced, SB 13-19 allowed for the transfer of conserved water under the water court process for nonconsumptive uses between the historical point of diversion and historical point of return flow of the original water right. Also, it disallowed water judges from considering years of reduced historical consumptive use when such reductions occurred pursuant to various water conservation plans or transfers to the Colorado Water Conservation Board's Instream Flow Program.

**Notes:** SB 13-19 was crafted to allow quantified reduced use to be protected instream within the water right's diversion reach – from headgate to point of return flow.

**Final Disposition:** An amended version of SB 13-19 was enacted. That version kept the protections for water users in water divisions 4, 5, and 6 who reduce historical consumptive use pursuant to a water conservation program or land-fallowing program, but eliminated the transfer of conserved water.

## **2014**

**Bill:** Senate Bill 14-23

**Primary Sponsor:** Senator Schwartz

**Brief Description:** SB 14-23 allowed the transfer under the water court process of reduced diversions as a result of increased efficiency of irrigation or stock water rights from Water Divisions 4, 5, 6, and 7 into the Colorado Water Conservation Board's ("CWCB's") Instream Flow Program between the historical point of diversion and historical point of return flows.

**Notes:** Senator Schwartz ran SB 14-23 as a more sophisticated version of the portion of SB 13-19 that was removed the year before. Again, the transfer was limited to quantified reduced diversions within the diversion reach of the original water right. Through the amendment process, the transferable amount was limited to the minimum amount necessary to preserve the natural environment to a reasonable decree.

**Final Disposition:** The amended version was passed by the General Assembly and vetoed by Governor.

## **2015**

**Bill:** House Bill 15-1222

**Primary Sponsor:** K.C. Becker

**Brief Description:** HB 15-1222 allowed the CWCB to select up to 12 pilot projects from Water Divisions 4, 5, 6, and 7 through which the CWCB may acquire temporarily nonconsumptive water efficiency savings for instream flow use. Pilot projects must be approved by the CWCB and the State Engineer. Water efficiency savings may only occur through structural improvements that increase the efficiency of water storage, diversion, conveyance, application, or other use practices from decreed irrigation or stock watering water rights. The pilot projects “should operate” for ten years, after which under certain circumstances the project could be renewed for another 15 years. At the end of the first ten-year period, the CWCB and the State Engineering owed the General Assembly a report regarding the projects.

**Notes:** Instream flow use was limited to the minimum amount necessary to preserve the natural environment to a reasonable degree between the historical point of diversion and historical point of return flow, and would have only transferred nonconsumptive savings.

**Final Disposition:** The bill passed through the House and was Postponed Indefinitely by the Senate Finance Committee.

Below is a table summarizing the outline.

**TABLE 1**

<b>Bill</b>	<b>Diversions or HCU</b>	<b>Process</b>	<b>Transferability</b>	<b>Disposition</b>
<b>SB 84-161</b>	Inconsistent	Water Court	Unlimited, except by injury	Postponed Indefinitely (“PI”)
<b>SB 85-95</b>	HCU	Water Court	Unlimited, except by injury	PI
<b>SB 86-126</b>	HCU	Water Court	Unlimited, except by injury	PI
<b>HB 91-1110</b>	Both	Water Court	Unlimited, except by injury	PI
<b>HB 93-1158</b>	Perhaps both	Water Court	Unlimited, except by injury	PI
<b>SB 13-19</b>	Diversions	Water Court	Nonconsumptive uses in diversion reach	Enacted without transfer provision
<b>SB 14-23</b>	Diversions	Water Court	ISF use in diversion reach	Vetoed
<b>HB 15-1222</b>	Nonconsumptive	CWCB Pilot Program with DWR approval	ISF use in diversion reach	PI



## Appendix E. The Problem of Vocabulary

The Water Plan provides an extended discussion of the manner in which water is diverted and used for irrigated agriculture.<sup>81</sup> It explains that water diverted from a stream or withdrawn from an aquifer is carried to its place of use through a conveyance system, most often a dirt-lined ditch, during which a portion of the water is lost through seepage into the ground, through use by vegetation along the ditch, and by evaporation. Most of the seepage returns to the stream and is available for additional use. Water that reaches fields is applied using different systems (flooding, furrow irrigation, sprinkler, drip) to provide amounts needed by the plants for photosynthesis and evapotranspiration. This portion of the water is thus beneficially used. Additional water needed to carry water to irrigated crops either seeps into the ground, evaporates, or moves through surface conveyance systems to other fields or to a stream. Under many early irrigation systems it was common for two units of water to be diverted for every one unit of water consumed by crops. As irrigation systems along individual streams developed over time, uses of water became highly interrelated according to the timing and amount of diversions and the timing and amount of return flows. Improvements in irrigation practices have substantially improved the efficiency with which water is being used so that the same amount of crops can be grown with less water having to be diverted from the stream or withdrawn from an aquifer.

The Colorado Water Plan defines agricultural water conservation as changes to on-farm practices that reduce historic consumptive use,<sup>82</sup> salvaged water as diverted water that is permanently lost to the system without providing a beneficial use,<sup>83</sup> and saved water as intentionally reduced need for water that was historically diverted but not consumed.<sup>84</sup> Using this terminology, conserved water means water made available through reduced beneficial consumptive use while saved water means water left in the stream because of reduced diversions. Thus conserved water would be transferable to another use through a change of use proceeding<sup>85</sup> while saved water has no legal protection at present unless it is donated to the CWCB for instream flow enhancement between the head gate and the point of return to the stream.<sup>86</sup> The Plan notes that the transferability of salvaged water is unclear under Colorado law.<sup>87</sup> As the Plan points out,

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<sup>81</sup> Water Plan at 6-91 to 6-95.

<sup>82</sup> Water Plan at 6-93.

<sup>83</sup> Water Plan at 6-94.

<sup>84</sup> *Id.*

<sup>85</sup> If the new use is permanent, the change would have to go through water court; if temporary, it may be able to use one of administrative processes.

<sup>86</sup> According to the Water Plan, “[s]uch water can be left in the stream, but it may not provide a benefit to environmental or recreational values without a voluntary flow agreement.” Water Plan at 6-95.

<sup>87</sup> “With the exception of phreatophyte removal, which the water court has expressly prohibited as a source of a transferable right, the transfer of salvaged water has not yet been tested in water court or addressed by the legislature.” Water Plan at 6-96.

improvements in on-farm irrigation efficiency can actually increase the amount of water beneficially consumed.<sup>88</sup>

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<sup>88</sup> Water Plan at 6-93. For example, switching from flood or furrow irrigation to sprinklers or drip enables more precise delivery of water in amounts and at times needed by crops, resulting in increased evapotranspirative use of water by the plants and increased plant growth. In addition, a project that enables less diversion may allow a downstream water user to divert water that it would not have seen but for the improved efficiency, thus increasing consumptive use.