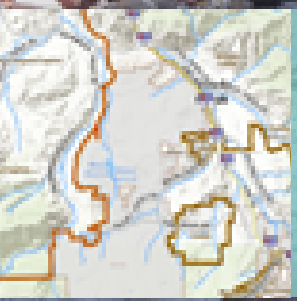


Water User's Guide

for **PROTECTING FLOWS** in **SNOWMASS CREEK**

ACKNOWLEDGEMENTS

PREPARED IN 2016 BY Chelsea Congdon Brundige, on behalf of the Snowmass Capitol Creek Caucus. (http://www.snowcapcaucus.org)

THANKS TO Records-Johnston Foundation, Trout Unlimited Colorado, Colorado Foundation for Water Education, Water Committee of the Caucus.

SPECIAL THANKS TO Lee Rozaklis (Rozaklis and Associates, LLC), Chris Geiger (Balcomb and Green, PC), Sarah Klahn (White and Jankowski, LLP), Brendon Langenhuizen (SGM) for their input and technical review.

COVER PHOTO BY James Brundige

Photo by James Brundige

The Backstory

For more than 30 years, the Snowmass Capitol Creek Caucus (the Caucus) has been committed to protecting healthy instream flows in Snowmass Creek, particularly during low-flow conditions that typically occur from December through March and occasionally in August and September. In 2012, the Caucus commissioned an engineering study, *The Future of Instream Flows in Snowmass Creek* (AMEC Environment and Infrastructure), to evaluate potential impacts to the Creek associated with future growth, climate change and water management practices.

The Caucus produced this booklet to help our neighbors — ranchers and gardeners — understand the importance of adopting water management practices that protect the health of our beautiful Snowmass and Capitol Creeks. Whether you rely on diversions of surface water to irrigate a pasture or fill a pond, or on pumped groundwater to irrigate your yard or garden, the amount and timing of water withdrawals and the efficiency in how water is used can make a big difference to the health of the Creek – especially during droughts or seasonal low flows. This brochure offers a basic overview of flow conditions in Snowmass Creek, and suggestions about what we can do as stewards to protect the Creek. A list of resources available for managing water more efficiently is provided at the end of this booklet.

Table of Contents

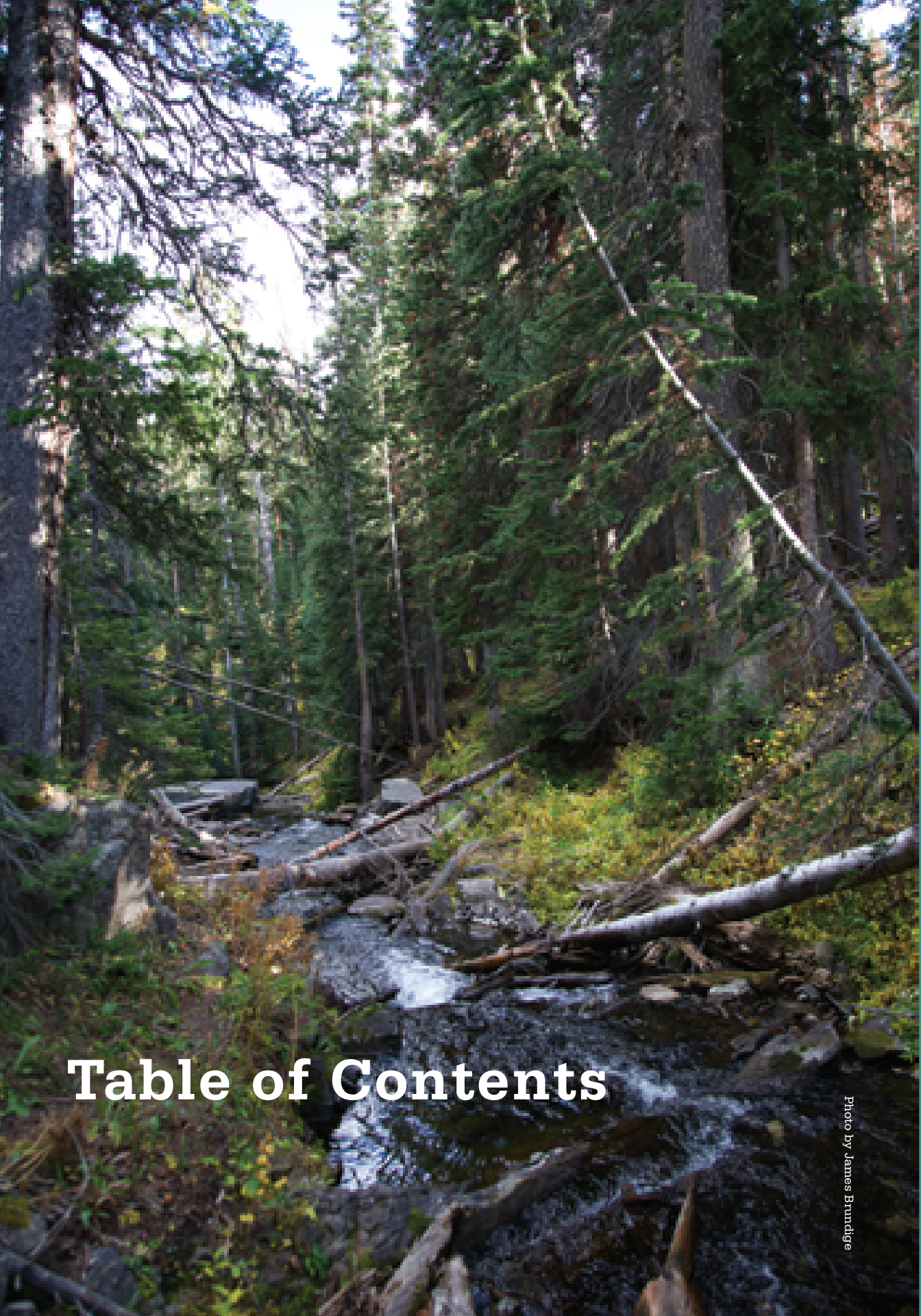


Photo by James Brundige

7 **SECTION 1**

Protecting the Health of Snowmass Creek

Snowmass Creek: A hard working creek

13 **SECTION 2**

Water Rights : A Primer

Perfection, protection, and operation of your water rights

Use, change and abandonment of your water rights

Instream flow water rights

Efficient water use and healthy instream flows

21 **SECTION 3**

What You Can Do To Help Protect a Healthy Creek

Why the Creek needs protecting

Efficiency makes a difference

- o Agricultural irrigation
- o Home and garden irrigation

Things you can do

33 **SECTION 4**

Resources, Partners, Programs

A digital copy of this full report is available for download and sharing at **http://www.snowcapcaucus.org**.

Protecting the Health of Snowmass Creek

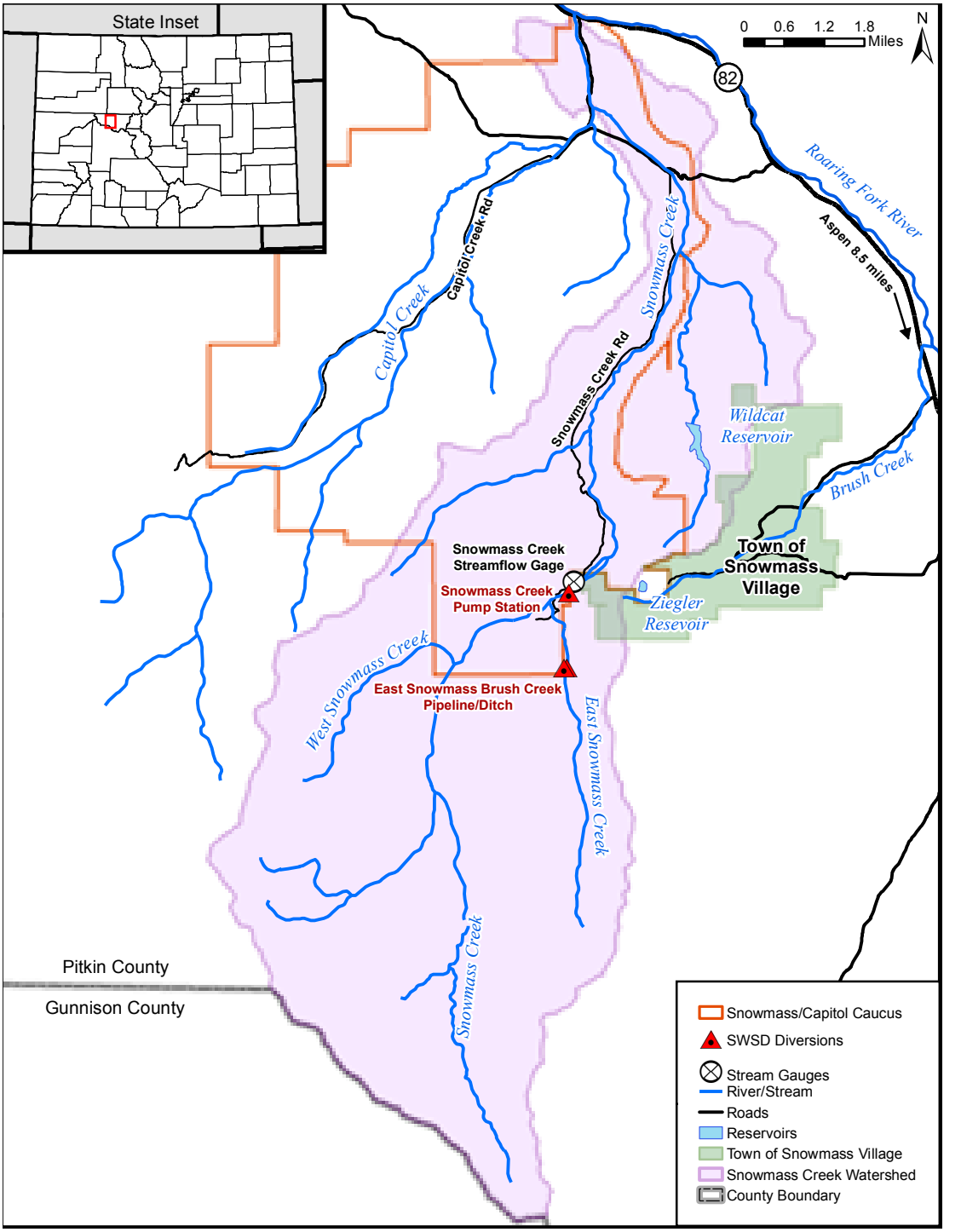
Snowmass Creek: A Hard Working Creek

Snowmass Creek and Capitol Creek together drain a 100-square-mile portion of the Elk Mountains in the Roaring Fork watershed. This sub-watershed contains public land, most of which is designated wilderness, along with rural residential and agricultural land uses. What's more these drainages of Snowmass and Capitol Creek are our home.

The Snowmass Capitol Creek Caucus (the Caucus) is an advisory organization to Pitkin County. We are volunteers committed to preserving the rural character of these unique valleys, protecting their ecosystems, and fostering communication and participation within our community. For more than 30 years, the Caucus has been working to protect healthy instream flows in Snowmass Creek, particularly during low-flow conditions that occur typically from December through March and occasionally in August and September. (See map of the Caucus area on the next page.)

As it drops from Snowmass Lake in the Snowmass/Maroon Bells Wilderness to the valley floor, Snowmass Creek is home to a rich variety of aquatic and riparian ecosystems. The Creek provides food and shelter and a migratory corridor to numerous species of insects, birds and wildlife. Its meandering floodplain supports aesthetic and recreational values in a scenic rural landscape, contributing significantly to the property values along the lower reaches of the Creek.

Snowmass Capitol Creek Caucus



Snowmass Creek, and its tributaries East and West Snowmass Creek, also provide water for irrigation in the Snowmass and Capitol Creek valleys, including Wildcat Ranch, and in the adjacent Brush Creek basin. The Creek is also the source of water for municipal and snowmaking uses by the Snowmass Water and Sanitation District and the Aspen Skiing Company serving Snowmass Village, the Brush Creek basin and the Snowmass Ski Area. Virtually all water demands in the Brush Creek basin are supplied with water diverted from Snowmass Creek.

Stream hydrology and aquatic and riparian ecosystems are complicated, interrelated systems. But the overall health of a stream system is a function of flows. In our region, natural (undisturbed) stream flows progress from the high cold flows of spring runoff to lower and warmer flows during summer and fall. Both are critical to stream health. Peak flows flush out sediment, scour the streambed and rejuvenate aquatic habitat. Base flows provide habitat and sustain fish and aquatic organisms throughout the year. During the winter months, the stream is very shallow, with a covering of ice and/or snow sometimes concealing the very low stream flow beneath.

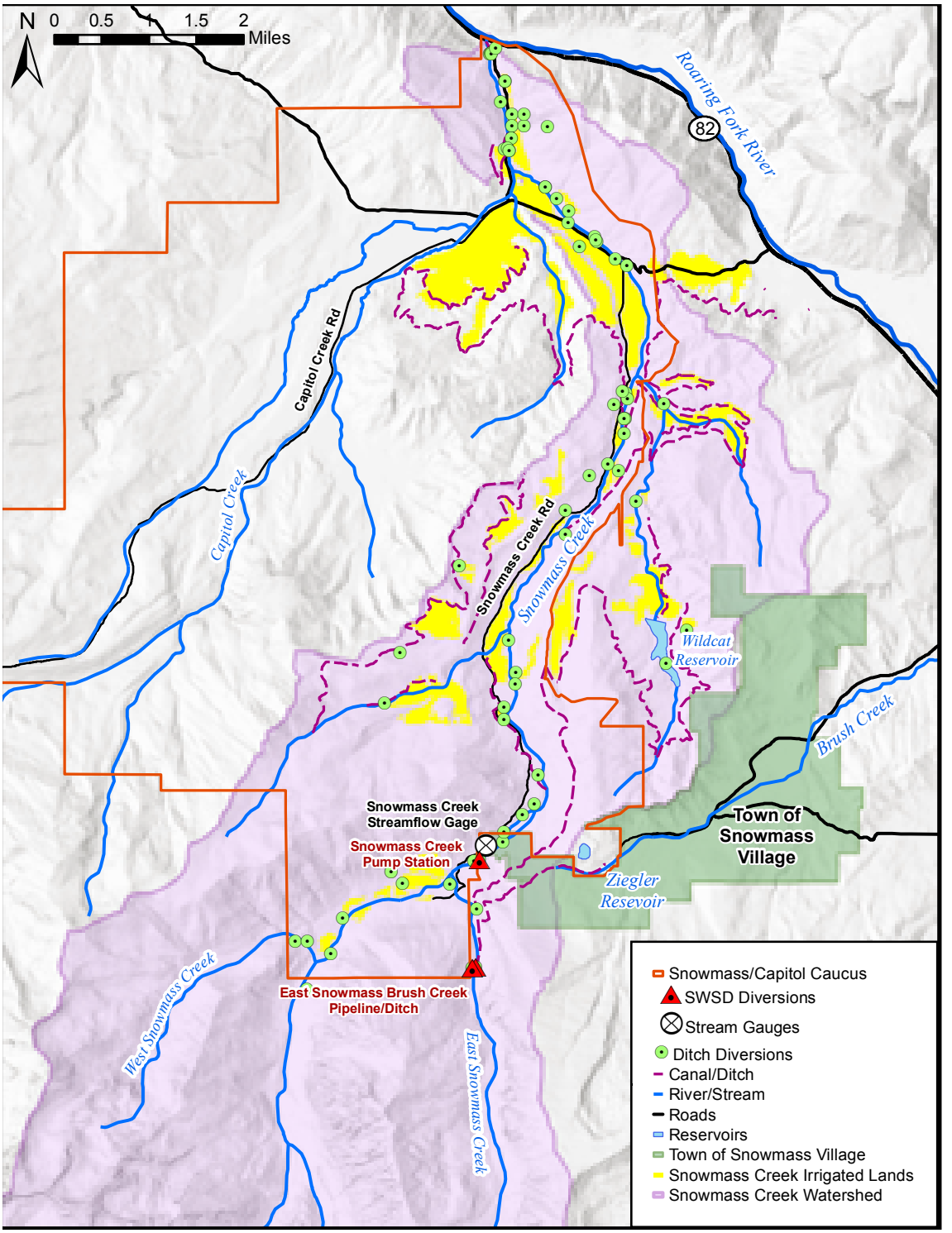
Water diversions from the Creek affect this cycle and the health of the ecosystems that depend on it. During periods of low flows, diversions from the Creek or from the groundwater beneath it have proportionately greater effects on stream flows and water temperatures in the Creek. Low flows and warmer temperatures in the late summer, and low flows combined with ice accumulation in the winter, can jeopardize the survival of trout and the insects and other organisms they depend on. In short, there is a balance between the amount of water the Creek needs and amount and timing of water that can be diverted while maintaining the long-term health of the Creek.

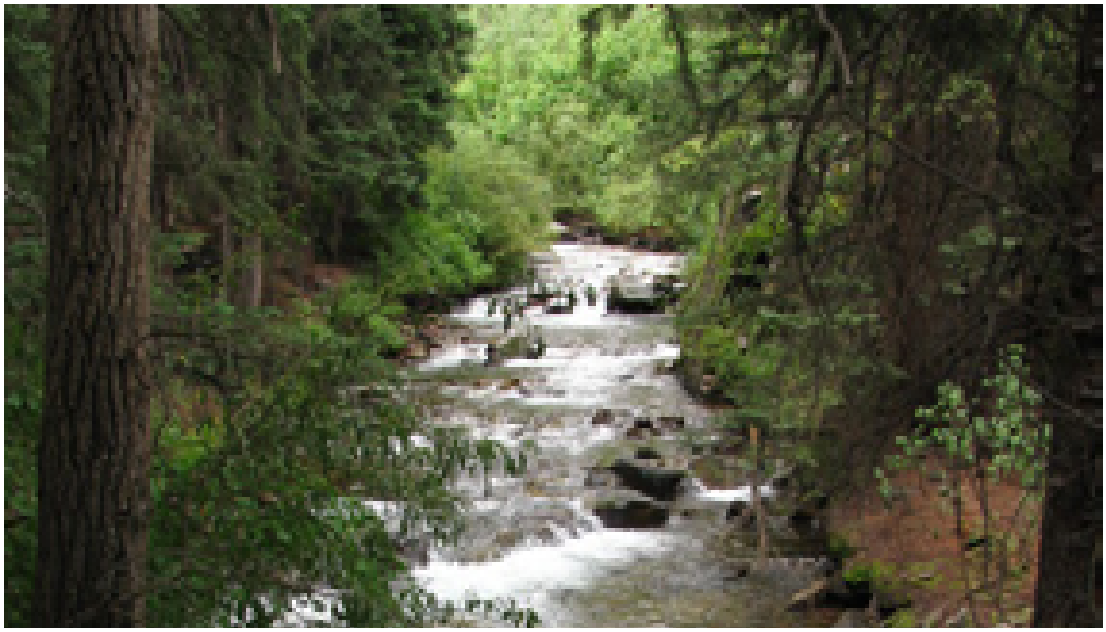
In 1988, after many years of study, the State of Colorado ended a long-running controversy by modifying its instream flow water rights on Snowmass Creek. The goal was to balance the needs of nature with water demands for municipal uses in Snowmass Village and snowmaking at the ski area. (see discussion of water rights in the next section). The Caucus is concerned that these junior instream flow rights are not consistently met under current conditions, and that flow shortages may increase in the future due to increased water demands combined with shifts in stream flow patterns resulting from climate change.

Over the past decade, the Snowmass Water and Sanitation District (the District) has made extensive investments in conserving water. Measures taken by the District directly benefit Snowmass Creek as virtually 100% of the water supplied by the District for homes and hotels, irrigation and snowmaking comes from the Creek. With the recent development of Ziegler Reservoir and ambitious leak detection, water metering and incentive pricing, the District is doing a great deal to ensure that flows in the Creek are protected, particularly during the low-flow winter months.

The biggest diversions from Snowmass Creek occur during the summer and

Agricultural Lands Irrigated from Snowmass Creek





generally occur in two locations. The McKenzie Wildcat Ditch and the East Snowmass Brush Creek Ditch divert water from East Snowmass Creek for irrigation use in the Wildcat Creek and Brush Creek basins. The McKenzie Wildcat Ditch also fills Wildcat Reservoir. Several ditches that divert from lower Snowmass Creek between Elk Creek and Watson Divide — including the Snowmass Divide Ditch, Red Rock Bluff Ditch, Walter Ditch, Snowmass Ditch and Walker Wonder Ditch — supply most of the irrigated lands in the Snowmass Creek valley. Minor irrigation diversions occur at other locations. During a typical irrigation season, more than 15,000 acre-feet of water are diverted from Snowmass Creek, much of it after the runoff season when stream flows are declining. (See figure on facing page of *Agricultural Lands Irrigated by Snowmass Creek*.)

To date, summer season flows generally have been sufficient to supply irrigation needs while maintaining instream flows. However, climate change is expected to increase irrigation demands while simultaneously decreasing stream flows and increasing water temperatures during the summer months. Because instream flow rights are junior to most other uses in our basin, these impacts will affect instream flow rights more acutely than other water rights. Surface flows in Snowmass Creek are connected to the groundwater under the valley floor. As stream levels drop in late summer, the groundwater table drops as well. Residents who rely on wells will find it more expensive to pump the water they need. By equal measure, excessive groundwater pumping will decrease surface water flows. In sum, shortages to the State's instream flow rights are likely to become more frequent and more harmful to stream health without further action on our part.

The following sections of this booklet summarize the principles of Colorado water rights and water management options for protecting flows in the Creek.

Photo by James Brundige

Water Rights: A Primer

This summary of water rights and how they work is offered as an overview. It is wise to consult a professional engineer or water lawyer regarding specific questions about water rights.

All of the water in Colorado—and Pitkin County is no exception - is a public resource, owned by the people of the state. However, individuals or entities (e.g., ditch companies) may acquire the right to use either a rate or volume of surface water and tributary groundwater (groundwater that is connected to surface waters) under the legal framework known as the "prior appropriation doctrine". Water users can secure a water right to divert and use a specified amount of water for a claimed beneficial use at a specific location so long as there is surface water or tributary groundwater available in the system that is not needed by senior water rights.

Perfection, protection, and operation of your water rights

Water rights are perfected merely by appropriating water -- putting a quantity of water to beneficial use. However, in order to obtain a confirmed property right that can be administered by the local water commissioner, water users must obtain a decree from the Water Court. The decree establishes:

- the lawful use or uses to which the rate of flow (or volume) of water may be put,
- the location where those lawful uses may be made, and
- the priority date of the water right.

The streams in Colorado generally, and Pitkin County in particular, are "over-appropriated", meaning there are more decreed rights to use water than can be satisfied by available water supplies. During times of inadequate supply, the earlier court-decreed (senior) rights are allowed to divert water needed to meet their decreed beneficial uses before the later (junior) rights are allowed to divert. Put another way, junior water users may not divert if such diversions would prevent senior water rights from diverting water to meet their decreed beneficial uses. Water Commissioners, who are employed by the Colorado Division of Water Resources, Division Engineer's Office, administer water rights by priority, curtailing junior rights (including undecreed rights) to ensure water supplies are available to seniors. Under this system, water rights with senior priority dates have greater value than those with junior priority dates because they are satisfied first. However, all water rights are potentially valuable because they reflect an enforceable property interest.

Water rights may be for use of surface water or groundwater. Groundwater rights specify the source, location and type of use, and must also be permitted through the State Engineer's office. This includes all domestic and agricultural wells. Because of the connection between groundwater and surface water, groundwater diversions impact available supplies in surface streams. This connection results in severe restrictions on the operation of groundwater rights — *except* for a few types of wells exempted from the prior appropriation system by statute. Effectively, no groundwater may be pumped without a "plan for augmentation" which must be approved by the Water Court.

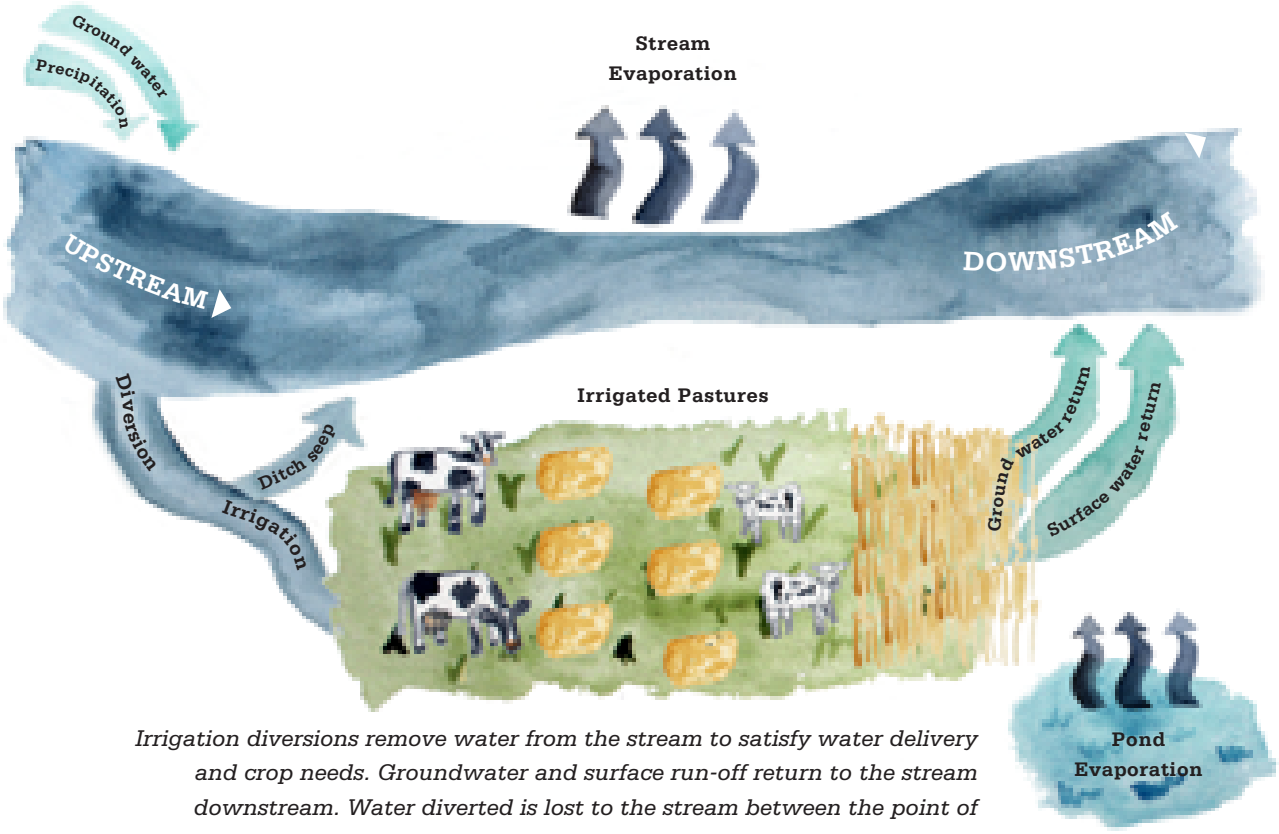
A plan for augmentation allows a junior water right to divert so long as it provides replacement water adequate in time, location and amount to satisfy senior rights. Augmentation supplies are most commonly derived from stored water in a reservoir or by transferring the consumptive use of a senior (commonly irrigation) water right.

Use, change and abandonment of your water rights

Water rights are decreed for particular beneficial uses, such as irrigation, municipal and domestic uses and industrial uses. The volume of water diverted from a stream or aquifer under a water right is comprised of 2 components: *consumptive use water* that is transpired by plants and animals or is evaporated to the atmosphere (collectively referred to as evapotranspiration), and *return flow water* that is diverted but eventually returns to the stream or groundwater system after it has been applied (but not consumed) in a beneficial use. In irrigation, this means that your decreed water right allows you to divert the amount of water that will be consumed by your crop or pastures and the additional amount of water you need to "push" the water to your crop. (see illustration *How the Creek Flows*, page 16.)

Water rights are distinct property interests that may be severed from the land upon which they were originally appropriated. If and when you decide to sell or transfer your water right to another use or place of use, the consumptive use of a water right in a new use or new place of use is limited to the historical consumptive use portion of the water right in its original use and location, as determined by Water Court in a change case. The Court is authorized to decree

How the Creek Flows



Irrigation diversions remove water from the stream to satisfy water delivery and crop needs. Groundwater and surface run-off return to the stream downstream. Water diverted is lost to the stream between the point of diversion and the point of return flows.

changes of use upon appropriate terms and conditions that protect against injury to other water rights.

After an extended period of non-use, water rights can be declared abandoned by the Water Court, but there must be a ***demonstrated intent*** to abandon by the water right owner. A presumption of abandonment is made only after 10 or more years of non-use, and can be rebutted by the water right owner.

A water right owner is not required to divert the water right — or the full amount of the water right — at all times. It does no good to divert the full decreed amount of a water right when that full amount is not needed to meet the decreed beneficial use (e.g., crop irrigation).

First, such actions are not necessary to protect the water right against abandonment; occasional diversion at the fully decreed rate or volume is sufficient to protect against abandonment. (There are numerous decreed water rights in Colorado that have diverted at their fully decreed rate or volume as infrequently as once every 50 years that have never been subject to abandonment.) Second, such excess diversions do not increase the value of the water right or its transferability; the demonstrated historical consumptive use of that water right is an ultimate limit upon what can be changed. Third, excess water diverted from the stream unnecessarily dewaters the portion of the stream between the diversion (upstream) and the point of return flow (downstream), reducing flows that support fish habitat and the stream environment. Fourth, even in the arid West, over-irrigating occurs. Finally, State law prohibits water users from taking from the stream any more water than is needed for beneficial use *at the time of diversion*, despite the amount allowed by decree. To take more than is needed is water waste.

Ponds

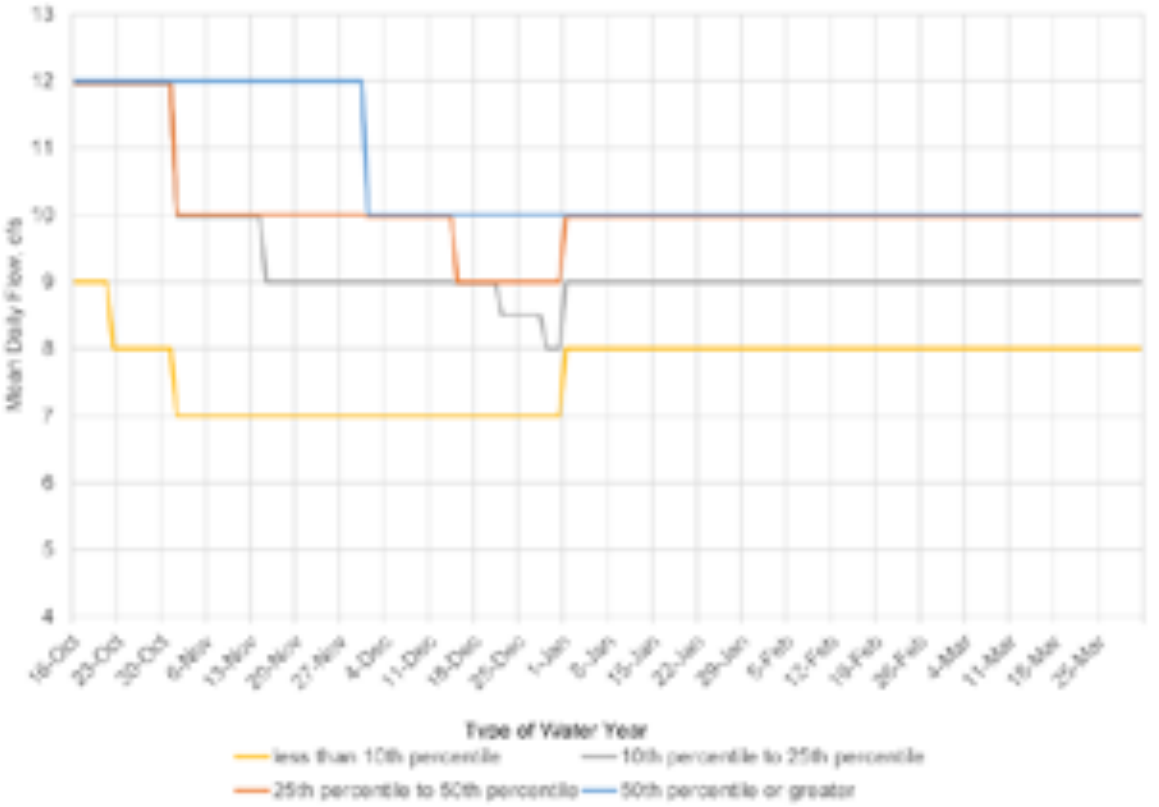
In rural parts of Pitkin County, including the Snowmass and Capitol Creek valleys, homeowners are required to store water in a tank or pond to protect against wildfire emergencies. In recent years, many residents in the Snowmass Creek basin have followed Pitkin County's direction and elected to install ponds, which also have the benefit of adding aesthetic value to the property. The State Engineers' office would like notification of all ponds. To obtain a water right, for any pond construction, homeowners should apply to water court to confirm the date, amount and beneficial use of the water right. Pond owners may also be required to obtain an augmentation plan. If the pond will be maintained full or freshened by continuous flows during a senior call by a downstream water right, the pond owner is responsible for replacing water lost through surface evaporation and passing along the tributary water that accrued to the pond out of priority. If the purpose of the pond is to store water for irrigation, then it is treated as an "irrigation control structure." Typically, water may be stored in such a structure only temporarily. In addition, the County requires an earthmoving permit prior to construction of a pond.

Instream Flow Water Rights

Beginning in 1973, the Colorado Legislature recognized instream flow as a beneficial use of water and empowered the Colorado Water Conservation Board (CWCB) with exclusive authority to appropriate instream flow rights in the minimum amounts necessary to preserve the natural environment to a reasonable degree. The CWCB holds instream flow rights in trust for the public and has two stream flow tools: (1) to appropriate new, junior instream flows; and (2) to acquire, permanently or temporarily, senior water rights and transfer them to instream flow use. Instream flow rights are administered within the priority system like any other water right.

Because instream flow was recognized as a beneficial use only in 1973, appropriated instream flow rights are junior to most other rights on the stream. However, all water rights, including appropriated instream flow water rights, are entitled to maintenance of stream conditions that existed at the time of their appropriation. So, in spite of their junior priority, instream flow rights are often satisfied during times of inadequate supply in locations where downstream senior water rights call water past upstream juniors, thereby maintaining adequate stream flows upstream of the seniors' headgates. Instream flow rights can also protect against future water development

Instream Flow Right for Middle Segment Snowmass Creek October 16 - March 31



courtesy of Rozaklis and Associates LLC

in a basin. To restore stream flows, the CWCB relies on its acquistion authority to acquire, permanetly or temporarily, senior water rights and use them to support or enhance instream flow rights.

In 1976, the CWCB originally appropriated a 12 cubic feet per second (cfs) year-round instream flow right for all of Snowmass Creek. In response to increasing demands for snowmaking water from the Aspen Skiing Company, the CWCB re-examined the basis for its instream flow right, changed the decreed amount of the water right, and split the water right into three water rights for different segments of Snowmass Creek. The Caucus participated in years of litigation, studies and negotiations, resulting in the CWCB establishing an instream flow right for the middle reach of Snowmass Creek of 15 cfs from April 1 through October 15, and one of four alternate 'stair-step' flow regimes from October 16 through March 31 based upon how wet or dry the previous year has been, as shown in the chart opposite.

Efficient water use and healthy instream flows

Water rights are important and valuable property interests and they are transferable. A water right owner can change the type or place of use of the water right, and can sell, lease or donate the water right to someone else, including to the CWCB's instream flow program. Under this voluntary program, water rights holders can be compensated for the water they sell or lease that is dedicated to the stream. Water rights leased to support instream flows are protected against loss of consumptive use credit and against abandonment.

(See box on **Conservation and Improving Instream Flows** on page 26)

Even without permanently or temporarily transferring water through the CWCB, a water right holder can adopt technologies and practices to increase irrigation efficiency and leave water in the stream without jeopardizing their water right. A water right is quantified on the basis of historical consumptive use – the amount of water used by a given crop on a given number of acres over time. A crop's consumptive use will not change substantially with the use of more efficient irrigation practices, and therefore the quantity of the individual's water right also will not change. Under certain circumstances, water saved through efficiency can be left in the stream to enhance flows on a short-term basis during drought and periods of low flows. You can enter into an agreement with neighbors upstream and downstream to let this saved water pass by undiverted. The Caucus, or other organizations described in the Resources section of this booklet, can help you learn how!

Now that you have made it through water rights, the following section describes some water management practices and technologies to increase efficiency, and some of the benefits associated with efficiency and conservation, without jeopardy to water rights.

A digital copy of this full report is available for download and sharing at **http://www.snowcapcaucus.org**.

What You Can do to Help Protect a Healthy Creek

Why the Creek Needs Protecting

Whether the result of drought, surface irrigation diversions or pumping of groundwater that is connected with surface water, low stream flows can be a serious problem for fish and stream health. Low flows reduce oxygen in the water, raise stream temperatures and eliminate fish habitat. Water diversions that pull water from streams during low-flow periods can be especially damaging.

The Caucus is concerned that junior instream flow rights in Snowmass Creek are not consistently met under current circumstances. In the future, periods of inadequate summer season stream flows are expected to occur more frequently due to the combined effects of climate change and continued development in Snowmass Village and the Snowmass Creek valley. Climate change is expected to significantly reduce summer stream flows while also increasing per-acre irrigation demands. At the same time, additional development will increase the demand for water for both irrigation and non-irrigation uses. Under a representative climate change scenario, significant summer season shortages to the instream right are expected in more than 60% of years. (From *The Future of Instream Flows in Snowmass Creek*; see the **Resources and Partners** section of this booklet, page 33.)

Efficiency Makes A Difference

All of us who rely on Snowmass Creek can contribute to protecting healthy flows by committing to increased water use efficiency, especially during times of low flows. Working together, neighbors can ensure that saved water remains in the stream when it is needed most. As used in this handbook, increasing efficiency means reducing diversions, seepage losses and surface runoff while maintaining the same amount of beneficial consumptive use.

Agricultural Irrigation

Typically, opportunities for improving efficiency occur at three stages in the irrigation process: at the headgate or diversion structure; in the method of delivering water from the diversion to the field; and in the method of irrigation. These improvements need not result in any reduction of consumptive water use, but they can significantly reduce the amount of water diverted from the stream. As discussed above, in temporary periods of drought and low flow, water that is saved through efficiency can be left in the stream without jeopardizing water rights.

The Diversion

A surface diversion typically consists of three elements: a diversion structure, a headgate and a flow measurement device. Each element is necessary to effectively and legally divert water and, if designed and operated together properly, can help to protect a healthy creek.

In Colorado, water right owners are encouraged to measure their diversions and report them annually to the State Division of Water Resources (DWR). Reporting diversions to the State is important from the water right owner's perspective because it helps the owner demonstrate continued use of a valuable water right.

The diversion structure is a natural or man-made feature in the stream that directs water to the ditch headgate. The headgate is a flow control structure at the head of the ditch that should regulate the ditch's rate of diversion to meet the ditch's irrigation needs as they vary from day to day, and should also be capable of shutting off diversions when no water is needed or when the ditch's water right is out-of-priority. The headgate can be fitted with a weir or measuring device. Most commonly, the devices used to measure a ditch's diversion are a Parshall flume, a V-notch weir, or a ramp flume. In combination, the diversion structure and the ditch headgate should give the water right owner the ability to divert only the amount of water needed to meet the beneficial uses decreed under the ditch's water right. *It is illegal to divert more water from the stream at any one time than is necessary to accomplish the beneficial use; using more is considered waste.*

Many older diversions in Colorado are inefficient and have limited functionality. Push-up dams that are not equipped with an adjustable headgate, for example, may do a fine job of directing water into the ditch, but they have little or no adjustability. These structures may force the entire flow of a stream into a ditch, even when much less water is needed. The unneeded water is not consumed and will eventually return to the stream.

Headgate with Control Structure

But the stream section between the diversion and the point of return will be depleted. Modern diversion structures equipped with headgate control structures can be set to divert only the amount of water that the crops need. (See pictures on this page)

The Ditch

Most irrigation ditches are open unlined earthen structures that lose significant portions of their diverted water as it seeps into the ground. This water eventually returns to the stream system, but the stream will be depleted between the point of diversion and point of seepage return. Lining a ditch and its laterals with an impervious surface such as felt, plastic, concrete, or clay with PAM will reduce seepage. Alternatively, a ditch can be converted to a pipeline. The water that would otherwise have seeped into the ground instead can be left instream.

The Field

Once you have water at your property or field, there are three basic methods of irrigation – surface, sprinkler, and micro-irrigation (i.e., drip and micro-spray). Surface flood irrigation is generally the least efficient and micro-irrigation is generally the most efficient. Efficiency can be increased by switching to a more efficient method or by improving management of the method currently in use. Several best management practices to boost water efficiency apply to all irrigation methods.

- **First,** it is important to understand plant water requirements and the soil properties that influence irrigation amount and timing. Often water is over applied relative to crop water needs.
- **Second,** leveling a field will increase efficiency by promoting more uniform percolation of irrigation water into the root zone and reducing surface runoff.

Parshall Flume

Flood Irrigation

- **Third,** monitoring soil moisture can help the irrigator take advantage of the soil moisture storage "reservoir" and prevent over-irrigation.

When efficiency is improved through any of these "best management practices" or technologies, the excess water that otherwise would have run off or seeped into the ground instead can be left in the stream.

Flood Irrigation

Surface flood irrigation works best for crops like alfalfa, as well as grains and pastures. Techniques range from "wild flood" irrigation (letting the water run across a field with no controlled application rate or confinement mechanisms), to furrow (a series of small shallow uniformly spaced channels used to guide water), border (confining water between two dikes), and corrugation (small V-shaped furrows used for close-growing crops such as grass).

Wild flooding is the most inefficient method of flood irrigation, where a plastic or canvas dam is typically placed in the ditch to back up the water, allowing it to spill out of the backed-up section of the ditch and run down the field. Each time the dam is moved and reset, it is called a set. A typical length of a set is 12-24 hours. Wild flooding is typically used in situations where the irrigated fields are relatively sloping and irregular, relatively low valued crops are grown and water supplies are perceived as plentiful. Generally, wild flooding results in an application efficiency as low as 15%.

Other variations of flood irrigation employ head gates (slide open gates), siphon tubes (which siphon water over bank of irrigation ditch to transfer water to field), and gated pipes (a series of pipes fastened together with uniformly spaced openings covered with adjustable gates that can be opened to let the desired amount of water out into the field or a furrow). These variations in flood irrigation offer some efficiency improvements; typical efficiencies associated with siphon tubes and gated pipes range from 30-70%.

Siphon Tubes

Sprinkler Irrigation

Sprinklers work well for alfalfa and other medium-deep rooted crops. Options for sprinkler irrigation include a sprinkler gun (a stationary or movable sprinkler mounted on a wheel and fed by a hose); a portable hand line (a hand-moved sprinkler system); and solid set (a stationary system where water supply pipelines are below the surface and sprinkler nozzles are elevated above the surface). For bigger areas, center pivot systems are also an option.

Sprinklers are more expensive than flood irrigation, but if designed, installed and managed properly there is a potential to decrease the amount of water applied while maintaining or increasing crop yields. Typical efficiencies associated with sprinkler irrigation range from 50-80%. However, it is important to manage sprinkler irrigation to limit evaporation. Try irrigating in the morning or evening when temperatures are cool, and double-check automatic controllers to avoid watering during or after rainfall events.

Drip Irrigation

Drip irrigation is best suited for high value crops, garden irrigation or situations where water is limited or expensive (e.g. due to pumping). Drip irrigation systems can be surface or subsurface. Individual water emitters are used to apply water to the soil surface at a low flow rate and pressure. A continuous supply of water (perhaps from a tank, well, or reservoir) is needed for this system during operation. Water must be filtered or screened to protect emitters from clogging. Although the initial cost is higher, typical efficiencies range from 70-95%.

Sprinkler

Conservation for Improving Stream Flows

Saving water through conservation is different than improving efficiency. Conservation means reducing the amount of water consumed in irrigation. Under several State statutory programs, saved consumptive use water can be transferred to instream flows on a short-term basis or permanently. Irrigators who conserve water and dedicate it to instream flows can be compensated. When water is leased instead of sold, the State program protects the water right holder from risk of abandonment or reduction in recorded historic consumptive use. (For more, explore the Colorado Water Conservation Board and Colorado Water Trust in the Section on Resources, Partners, Programs.)

In the Snowmass Creek and Brush Creek basins, irrigation is primarily for pasture/alfalfa or lawns. As such, the opportunities for conservation lie in:

- Deficit irrigation (i.e. irrigate to supply only a portion of the crop water demands)
- Crop changes (i.e. from alfalfa to less water-consuming pasture grass)
- Reduce irrigation season (i.e. stop all irrigation after first cutting)
- Short term fallowing (i.e. stop planting and irrigating a portion or all pasture for a season)
- Replace portions or all of lawns with drought tolerant planting/xeriscaping

Landowners who invest in conservation can dedicate or transfer water to instream flows and realize the following benefits:

- The landowner can receive cash payment for selling or leasing water to the CWCB (see box on page 29).
- In some cases, temporarily fallowing a field can increase its productivity in subsequent years.
- Modern irrigation infrastructure that requires less water is easier to operate and maintain than older systems and can produce a more manageable crop.
- Reducing wastewater run-off through efficiency or conservation can minimize erosion and limit unwanted invasive species.
- Financing for efficiency improvements may be available through the National Resource Conservation Service (NRCS).

Drip Irrigation

Micro-sprinkler (spray) Irrigation

In spray irrigation, small sprinkler-like devices (often called micro-sprinklers) spray water as a mist (or short jets). Micro-sprinklers can be spaced to cover the entire land surface or a portion of the land surface. An above ground spray sprinkler system is less likely to clog than drip and sub-surface drip systems. While these systems can be costly, they are ideal for garden and home irrigation, delivering efficiencies up to 95%.

Home and Garden Irrigation

Landscape irrigation is the largest component of water demand in a home, so choosing water-efficient irrigation systems and practices for lawns and gardens can help reduce direct diversions from the stream or pumping from tributary groundwater. As with irrigated agriculture, efficiency in home irrigation can be achieved through technology improvements and best management practices.

Technology Choices

Residential irrigation systems range from traditional "hose dragging" and hose-end sprinklers, to soaker hoses, drip and micro-sprinkler systems (see above) and automated in-ground sprinkler systems. Depending on your yard and garden, the most efficient irrigation system may be a combination of technologies, like pop-up sprinklers for turf, and drip or soaker hoses for the garden. As with agricultural irrigation systems, the key to increasing efficiency is reducing evaporation and runoff, minimizing over-watering, and improving the uniformity of water application.

Best Management Practices

The amount of water used in lawn and garden irrigation depends a great deal on how and when water is applied. Understanding plant water requirements, watering only as necessary, and applying water as efficiently as possible can realize significant efficiencies.

Many people in Snowmass and Capitol Creek valleys, as well as Brush Creek and Wildcat, may rely on automatic irrigation controls. Often controls are set to satisfy watering needs at the height of summer (July) and the system is left to do the rest. However, these automatic systems typically deliver more water than the landscape needs – up to 50 % more – because they are not adjusted to account for changes in rainfall, temperature and wind. Where possible, it is better to apply water to your garden and yard by hand. For larger areas where automatic sprinkler systems are used, consider adding a rain sensor device that will override the programmed watering schedule and shut off the system during or after significant rainfall.

In our high mountain valleys, evaporation is a significant factor limiting the efficiency of sprinkler systems. With many sprinkler systems, up to 40% of the water will evaporate on a sunny day — before it hits the ground. Real water savings come with simple steps like watering in the early morning or evening instead of mid-day.

Beyond efficient technologies and irrigation scheduling, the choice of low-water-use landscaping is one of the most effective options for saving water. Water-wise landscapes feature native plants to minimize the need for supplemental watering. Xeriscaping, a popular approach to water-wise landscapes, was pioneered in Colorado. Experience with this practice over many years on Colorado's Front Range indicates water savings of 18-63% between April and October.

Whether you irrigate a pasture or a garden, there are a number of technologies and best management practices that can help you use water more efficiently. When you use less

Xeriscaping – no kidding!

CWCB Instream Flow Program

For a water right owner who elects to reduce consumption, Colorado law offers opportunities for transferring water to benefit stream flows without risking abandonment of the water right. The Colorado Water Conservation Board (CWCB) has exclusive authority in the State of Colorado to hold instream flow water rights for the benefit of fish and wildlife habitat.

Through voluntary transactions, the CWCB will purchase, lease or accept a donation of an existing water right currently used for irrigation or some other out-of-stream purpose and convert it to a protected instream flow. Since the inception of this program in the 1970's, the CWCB has acquired rights in many basins, including the Roaring Fork River and Snowmass Creek.

Instream flow water rights transactions can be permanent or temporary. Temporary transactions can be for a specified number of years or for specified months out of the year. For example, an irrigator could make a split-year lease to the CWCB, allowing the irrigator to use water for the first half of the irrigation season and the CWCB to protect it as instream flow during the late irrigation season. Leases can also be set up so that they go into effect in dry years, when fish are most likely to be exposed to low flows.

It's important to note that under instream flow leases, the original water right owner retains ownership of the water right. The period of time that the CWCB uses the water as instream flow does not count towards calculation of historical consumptive use and will not be considered intention to abandon the water right. Though the CWCB uses the water as instream flow for some specified period of time, the water right reverts to the original owner at the end of the lease or when the lease is not active.

water, often more water is available to support healthy instream flows. It is not necessary to divert the full amount of a decreed water right all times to protect the right. The right is largely quantified on the basis of historical consumptive use, and a crop's consumptive use will not change much with the use of more efficient irrigation practices. Therefore the quantity of your water right also will not change. If you want your saved water to remain in the Creek, it is a good idea to make an arrangement with your neighbors upstream and down to make sure the water is not diverted. Even better, you can develop a formal conservation plan with the Colorado River District or other government entities to reduce use without impacting the transferable amount of your and your neighbors' water rights. (See the next section for information on the Colorado River District, page 34).

Things You Can Do

Healthy streams are perhaps the most valuable assets on a ranch, farm or large estate. Not only do streams supply water for crops and livestock, but they also maintain trout populations, recharge groundwater, dissipate the effects of flood flows, filter and entrap sediment and pollutants, and help prevent property loss from erosion. Protecting streams today will provide immediate and long-term enhancement of property values and protection of ecosystems.

It is up to us as irrigators, landowners, pond owners and neighbors to understand how we can be good stewards of Snowmass Creek and protect instream flows. To summarize, here are some simple steps to consider:

- Get to know the other water users who share your ditch, and/or neighbors who divert water upstream or downstream from your diversion. Maybe there will be a way to improve efficiency and conserve water in the stream together.
- Make sure diversions have an adjustable headgate and measuring device in good working order, and divert only the amount of water needed to meet actual irrigation demands on a day-to-day basis.
- Make improvements to unlined ditches to reduce seepage.
- Research alternative technologies to improve irrigation efficiency on a ranch or in the garden that will work for your property and budget.
- On your property, understand plant water requirements and the soil properties that influence irrigation amount and timing; use irrigation scheduling to limit evaporation and unnecessary irrigation during rainfall and wet periods; improve the uniformity of water application through land leveling and sprinkler adjustments.
- Work with neighbors to coordinate and schedule diversions to individual irrigation ditches to minimize the combined effects of simultaneous diversions from the Creek. This practice has historically occurred on an informal basis during periods of unusually low flow and can be very effective in minimizing the combined impact of irrigation diversions.
- Consider practicing deficit irrigation or rotational fallowing to reduce irrigation demand in particularly dry years.
- Research the statutorily-approved programs that encourage efficiency-based conservation for improving stream flows and protect your water rights.
- Brush Creek irrigators could enter into agreements with the Snowmass Water and Sanitation District to reuse the District's treated wastewater as an irrigation supply.
- Irrigators who rely on automated sprinkler systems can install automatic rain sensors to override programmed schedules and time irrigation based on real-time weather data.
- Consider using native plants in landscaping a home garden. "Xeriscaping" and "Wildscaping" were pioneered here in Colorado!

Photo by James Brundige

Snowmass Lake

Photo by James Brundige

A digital copy of this full report is available for download and sharing at **http://www.snowcapcaucus.org**.

Resources, Partners, Programs

These pages offer sources for information on Snowmass Creek instream flows, water law and policy, water education, water management and irrigation efficiency. The list is not exhaustive but provides a good start!

Snowmass Falls

Photo by James Brundige

For a comprehensive analysis of **factors influencing flows in Snowmass Creek**, contact the Caucus for a copy of

The Future of Instream Flows on Snowmass Creek

(September 2012. Prepared for the Snowmass Capitol Creek Caucus by Lee Rozaklis, AMEC Environment and Infrastructure.)

The Colorado Foundation for Water Education

www.yourwatercolorado.org

is a great resource for a summary of all aspects of Colorado water – from water law to water and energy, to water conservation.

The Colorado Water Trust was formed to restore and protect stream flows through water acquisitions, physical solutions and other creative approaches. They work closely with the Colorado Water Conservation Board (CWCB), the only entity in Colorado that can hold water rights for instream flow purposes. All streamflow enhancement projects are voluntary and market-based.
www.coloradowatertrust.org/our-work/how-we-work/

The Colorado River District offers a water rights fact sheet

www.colorado.gov/pacific/sites/default/files/1.10%20Colorado%20Water%20Rights%20Fact%20Sheet.pdf

The District has authority to approve water conservation plans requisite to the protections offered by S.B. 13-019. This bill directs the water court to not consider any decrease in water use as a result of certain water conservation programs, thereby protecting the historical consumptive use calculation should the water right owner ever seek a change of use for the right.

www.coloradoriverdistrict.org/education-resources/water-conservation/

The State of Colorado Water Conservation Board offers a number of voluntary programs for acquiring water rights from willing sellers/lessors to improve instream flows.

www.cwcb.state.co.us/environment/instream-flow-program/Pages/WaterAcquisitions.aspx

Trout Unlimited Colorado staff specialize in working with landowners on stream restoration projects.

TU staff will work with landowners through every step of a project, from evaluating opportunities to securing funding, implementing the project, and performing any necessary post-project monitoring or maintenance.

www.coloradotu.org

The Colorado Water Institute, at Colorado State University

www.cwi.colostate.edu publishes technical papers and other resources relevant to ranch land irrigation, small acreage irrigation, data on irrigation costs, application and relative efficiencies of irrigation technologies. Go to their Agricultural Water Conservation Clearinghouse **www.agwaterconservation.colostate.edu**

For a specific guide on **small acreage irrigation**, see **www.ext.colostate.edu/sam/sam-irr-guide.pdf**

The National Resource Conservation Service (NRCS)

www.nrcs.usda.gov is a federal program that offers extensive support, financial partnerships, field assistance and more to agricultural landowners. They also offer helpful information on options for conserving water in and around the home.

Roaring Fork Conservancy
www.roaringfork.org

is the watershed organization for the Roaring Fork Valley. Their mission is to inspire people to explore, value and protect the watershed. Their extensive knowledge of the watershed, including Snowmass Creek, is reflected in the State of the Roaring Fork Watershed report (November 2008) and the Roaring Fork Watershed Plan (March 2012). RFC offers guidance on water conservation and many other topics related to river health.

For information on **Xeriscaping**, see Xeriscape Colorado's website

www.xeriscape.com

book design by words pictures colours design | printed on FSC-certified, post-consumer recycled paper

Photo by Chelsea Brundige

Snowmass Lake