



Decades Down The Road



An Analysis of Instream Flow Programs in Colorado and the Western United States

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Cimarron River

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Introduction

There are nearly as many names used to describe water designated for use within a stream, lake or river as there are Western states. Some examples include instream flow water right, minimum desirable flow, reservation, bypass flow, transfer, new appropriation, adjudication, permit condition, and reserved water right. Western states not only use different terms for instream flow protection, but many have established different types of programs to achieve this protection. While there are some fundamental similarities among the approaches used across the West, each program also has significant differences.

In the early 1900s (Gillilan and Brown 1997), individual Western states began to acknowledge that water flowing in a stream, over a waterfall, or existing in a lake could be a desirable use of water. Water was being withdrawn from streams, rivers and lakes, or impounded for future use or power generation, in larger and larger quantities in most Western states. A few legislatures and administrators took the initiative to provide a degree of protection for water in lakes or flowing in streams. Oregon's legislature first protected waterfalls on the Columbia River Gorge in 1915, then in 1955 placed a moratorium on new withdrawals from certain streams with important salmon fisheries and scenic beauty. Idaho enacted legislation to protect levels in several scenic lakes in the 1920s (Gillilan and Brown 1997, Shupe and MacDonnell 1993).

The early 1970s saw an emergence of instream flow protection programs throughout the Western United States. It was during this time that Western states began to write comprehensive instream protection into statutes, rules and procedures for stream management. The first states to do this included Colorado and Montana in 1973 and Washington in 1974.

The rise of instream flow programs in the West was not directed by a central authority such as the federal government, nor was it the result of joint meetings and agreements among Western states. Instead, every state created instream flow protections to fit its unique water allocation system. Various federal agencies, especially the U.S. Fish and Wildlife Service (USFWS), commissioned studies highlighting opportunities to protect instream flows across the country. Reports were written in the 1970s and 1980s about institutional methods for reserving instream flows. State water experts also met at various conferences, such as one in Logan, Utah in 1975 and one in Boise, Idaho in 1976 (Gillilan and Brown 1997). Stream and lake protection programs established in the 1980s were certainly guided by existing programs. These opportunities for collaboration notwithstanding, instream flow programs in the Western states developed according to the needs and interests prevalent in each state. In this way, unique programs developed that are encompassed in each state's water rights system.

Figure 1: Terms

Instream flow often refers to the water flows necessary to sustain one or more specified instream use of water. In this way, instream flow is basically synonymous with *streamflow*. The term *instream flow protection* refers to the legal, physical, contractual, and/or administrative methods used to ensure that water remains in streams, natural lake beds, or other areas where water naturally flows or occurs. In this document, **instream flow** refers to that water flowing in a stream reach or natural lake at a given time. *Instream flow protection* encompasses the array of methods employed to protect water in a stream channel or lake bed for a stated purpose (Gillilan and Brown 1997). The term *instream flow program* is used to refer to the institutional entities and body of rules, laws, and statutes that govern instream flow protection.

In Colorado, the legislature recognized the need to correlate the activities of mankind with reasonable preservation of the natural environment and created the State's Stream and Lake Protection Program in 1973. The program has been active in appropriating, acquiring, and protecting water to preserve the water-dependent natural environment for over three decades. The program currently holds 1926 appropriated water rights and 21 acquisitions of existing water rights for streams and lakes. In 2003, Colorado marked the 30th anniversary of its Stream and Lake Protection Program, and staff from this program noted that this anniversary could serve as a point of reflection to analyze what Colorado has done to address instream flow needs, to explore the experiences of neighboring states also noting such anniversaries, and to look forward to developing trends and future needs.

Purpose, Need and Scope

There are significant differences in how Western states approach instream flow protection and the effort to compare and contrast the state's instream flow programs is a difficult task given the unique aspects of each state's program.

A search for "Western state instream flow programs" in any water-related search engine yields pages of books and articles that have been written on this subject. Authors who have contributed to this field of study include law professors, practicing lawyers, economists, planners, biologists, students and others (see References section). Because there are a number of published works written by authors from a range of professional backgrounds, it is worth asking whether another contribution is needed. The answer is yes and the reasons are varied.

Most of the existing literature provides program histories, legislative authorities and case studies. However, nothing found in the existing literature compares states using consistent criteria. Moreover, studies found do not evaluate how successful each state has been in protecting instream flows. It is thus difficult to draw comparisons among states. Perhaps authors have not analyzed all states based on the same criteria due to the significant programmatic differences. Some works focus on state programs but review different criteria for each state. *Instream Flow Protection in the West* (MacDonnell and Rice 1993) has a chapter dedicated to each of 13 states, each written by a different author and covering different information. Other works focus on methods available for instream flow protection. For example, *Instream Flow Protection: Seeking a Balance in Western Water Use* (Gillilan and Brown 1997) is organized largely by the various tools and policies available to states for instream flow protection, highlighting what can and has been done. The most recently written book, *Instream Flows for Riverine Resource Stewardship* (Instream Flow Council 2002), while a thorough and exhaustively researched book, focuses on the biologic and hydrologic issues underpinning instream flow protection, not the political and administrative issues.¹ It also does not provide a state-by-state analysis.

So what is different in this report? Instream flow protection is an emerging concern in the West, and the past several years have seen legislative and institutional changes that are not addressed in these older works. The exceptional drought experienced by most Western states in 2001-2003 has also influenced the way states value instream flow protection.

¹ A new edition, edited by Tom Annear, is now available but was not reviewed for this document.

The fundamental purpose of this report is to characterize programs and accomplishments for each state and to compare Colorado's program and experiences to the achievements and challenges experienced in other Western states. In addition, information from every state is examined to determine the strengths of Colorado's instream flow program and to explore areas where Colorado could improve its program, especially by looking at unique approaches emerging in other states. The analysis thus focuses on Colorado's program and other states in comparison. It is not intended to provide a thorough description and analysis of every individual state, a task that is beyond the scope of this project.

It is important to note that this document focuses on how state statutes establish and govern water rights for instream use. Various administrative mechanisms are applied throughout the Western United States, but these are not always applied in a systematic manner. The exercise of instream flow water rights and their equivalent is difficult to compare state-to-state due to the differences in water right administration systems. Comparing the different alternative mechanisms is beyond the scope of this analysis. Valuable sources on alternative mechanisms include a 2004 article by Trout and Witwer and Gillilan and Brown's 1997 book.

An important actor involved in instream flow protection in the Western United States is clearly the Federal Government, through agencies such as the U.S. Department of the Interior and the U.S. Department of Agriculture. While federal jurisdiction does apply to the management of instream flows in various cases and locations, the focus of this document is on *state-level* measures available and applied for instream flow protection. The intent of this report is to analyze how states have protected instream flows and not to explore the application or intersection with federal management. While this is an important issue, it also is beyond the scope of this document. Although discussion of state-federal interaction is presented in the analysis section, other literature is suggested for a more thorough discussion of this topic.²

Report Outline

This review of state programs and their comparison to Colorado is organized as follows:

- ⇒ The *methodology* is summarized.
- ⇒ A *descriptive analysis* is presented with information about instream flow protection in every state, ranging from how programs are organized to what achievements have been realized.
- ⇒ Once this descriptive foundation is created, a *comprehensive analysis* is presented, looking subjectively at the effectiveness of state programs on the basis of nine characteristics of effective instream flow programs.
- ⇒ The analysis concludes with a *summary* of the comprehensive analysis, and a comparative graphic is generated for all states.
- ⇒ An *emerging issues* section is presented that explores new opportunities in instream flow protection.
- ⇒ *Appendices* contain extensive information for each state in the study.

² See for example Heather Blomfield Lee, *Forcing the Federal Hand: Reserved Water Rights v. States' Rights for Instream Protection*; Wendy Weiss, *The Federal Government's Pursuit of Instream Flow Water Rights*, and Robert V. Trout and James S. Witwer, *Whose Water? Meeting New Federal Water Demands in Prior Appropriation States*.

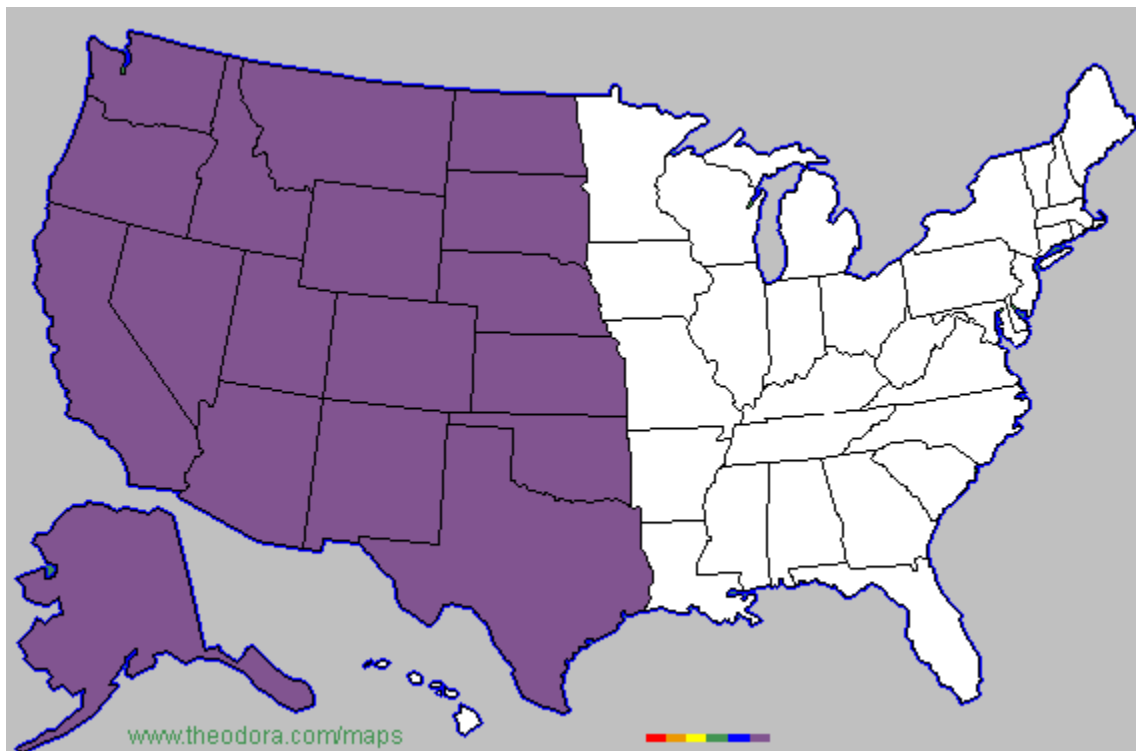
Methodology

The methodology applied to this study can be summarized as follows:

1. Determination of study scope
2. Data compilation through
 - literature review
 - expert interviews
 - state interviews
3. Generation of descriptive tables for every state (Appendix X)
4. Analysis
 - to establish a descriptive understanding of states using consistent criteria
 - to review the effectiveness and achievements of each state's instream flow protection
 - to discuss emerging issues

The scope of this study includes all states west of the 100th Meridian, excluding Hawaii. The states included are: Alaska, Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, Washington, and Wyoming. See Figure 2 below for a map of the study area.

Figure 2: Study Area (base map courtesy of www.theodora.com/maps, used with permission)



A three-pronged approach was utilized to gather information about state programs. A literature search was performed using legal and academic search engines and sources identified by experts. Publications and other literature sources were compiled to create an instream flow library to be housed in the Colorado Water Conservation Board (CWCB)'s Water Resources Information Center (WRIC).

The literature search was followed by a series of individual interviews with instream flow experts (Appendix A). First, national experts in instream flow issues were interviewed. Information gaps were identified and served as a basis for a second set of interviews with experts

from every state. For some states it was necessary to talk with more than one person. In other states, one contact was sufficient.

The literature review and interviews were used to gather specific information based on a list of categories describing instream flow protection. These categories are shown in Figure 3. Tables were created for each category and information entered for every state. All 18 tables are included in Appendix B.

Analysis was begun using these state-by-state tables and comparative

information found in the literature search. The first step was to establish a descriptive understanding of states based on consistent criteria. The criteria that guided the analysis are summarized in Figure 4. Tables were created based on these criteria to highlight a variety of descriptive and comparative issues in a format where states could easily be compared. These tables are found in the Descriptive Analysis subsection.

The second step of the analysis was to examine the achievements and determine the effectiveness of instream flow protection in every state. This analysis was performed using nine characteristics considered to be indicative of effective instream flow management, shown in Figure 5. These characteristics are described in the Analysis section below. Clearly identifying the characteristics used for analysis is intended to make the basis of analysis clear to any reader.

The third and final stage of analysis was completed through identification of areas of concern and growth as identified by the interviews, literature and previous steps of analysis. This is presented as the Emerging Issues section.

Figure 3: State-by-State Categories

- General Water Rights System
- Instream Flow Legal Recognition
- Options Available for Instream Flow Protection
- Entities Authorized to Appropriate Instream Flows
- Entities Authorized to Request/Recommend/Administer Instream Flows
- Processes for Securing Instream Flow Rights or Reservations
- Public Participation
- Protected Beneficial Uses of Instream Flows
- Acquisition Program (or other capacity for transfers or conversion of existing water rights)
- Flow Quantification Methods
- Monitoring and Enforcement
- Record Keeping
- Federal and NGO Involvement
- Statistics
- Other

Figure 4: State-by-State Criteria

- Underlying water right system
- Legal recognition of instream flows
- Explicitly recognized beneficial uses of instream flows
- Type of instream flow water rights
- Who participates in instream flow water rights creation and administration
- Tools available to states for instream flow protection
- Accomplishments
- Timeline

The differences among state instream flow protection approaches make direct numeric comparisons and analysis difficult and it would be misleading to simply present quantitative comparisons of the number of instream flow rights or stream miles protected. However, interesting and insightful observations arise from the analysis of qualitative information. This report includes a combination of both quantitative and qualitative comparisons.

Figure 5: Characteristics of Effective Instream Flow Management

- Existence of legal mechanisms to protect instream flows
- Permanence of the instream flow rights, reservations or permits
- Resources available and dedicated to instream flow activities
- Legally and scientifically defensible quantification methodology
- Protection and enforcement of instream flow rights, reservations or permits
- Partnerships
- Planning/Needs identification
- Evolving and dynamic programs
- “On-the-ground” accomplishments

Analysis

Descriptive Analysis

In order to understand and compare Western state instream flow programs, it is first necessary to establish a baseline of knowledge about these programs. A series of tables is presented in the following section to help establish this understanding. Most tables are presented in two formats. The first table is designed to present information for every state. The second table summarizes the key issues identified in the first, presenting information by subject rather than by state. The tables are designed to describe the following criteria in the following order:

1. Underlying water right system
2. Legal recognition of instream flows
3. Explicitly recognized beneficial uses of instream flows
4. Types of instream flow water rights
5. Who participates in instream flow water rights creation and administration
6. Tools available to states for instream flow protection
7. Accomplishments
8. Timeline of instream flow protection implementation

1. Underlying water right system

Any instream flow program is largely conditioned by the water rights system in which it operates. Most of the Western states use a prior appropriation system. States along the Pacific Coast and the 100th Meridian have either a blend of riparian and prior appropriation systems, or have shifted to a prior appropriation system after starting with a riparian system. States in the intermountain West tend toward a more pure prior appropriation system.³ Colorado is unique

³ The intermountain states include Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming. Shortly after statehood, these states extinguished all common law recognition of riparian rights by adopting a “first in time, first in right” method of appropriation. Many commentators trace the roots of pure prior appropriation back to the 1882 Colorado Supreme Court case, *Coffin v. Left Hand Ditch Co.*, 6 Colo. 443 (1882).

among Western states in having a primarily judicial rather than permit-based administrative system – obtaining an administrable water right in Colorado generally requires water court adjudication (except for well permits), whereas other states mainly issue water right permits first by administrative process. Tables 1 and 2 below summarize these systems.

Table 1: Underlying Water Right Systems in Western States

State	Water Rights System	Court vs. Permit System
Alaska	Prior appropriation	Permit
Arizona	Hybrid: Prior appropriation for surface water and subflow, riparian law for groundwater	Permit
California	Hybrid: Prior appropriation and riparian law	Permit
Colorado	Prior appropriation	Court
Idaho	Prior appropriation	Permit
Kansas	Prior appropriation with vestiges of riparian law	Permit
Montana	Prior appropriation	Permit
Nebraska	Prior appropriation with vestiges of riparian law	Permit
Nevada	Prior appropriation	Permit
New Mexico	Prior appropriation	Permit
North Dakota	Prior appropriation with vestiges of riparian law	Permit
Oklahoma	Prior appropriation with vestiges of riparian law	Permit
Oregon	Prior appropriation with vestiges of riparian law	Permit
South Dakota	Prior appropriation	Permit
Texas	Prior appropriation with vestiges of riparian law	Permit
Utah	Prior appropriation	Permit
Washington	Prior appropriation with vestiges of riparian law	Permit
Wyoming	Prior appropriation	Permit

Table 2: Summary of Underlying Water Rights Systems in Western States

	Prior Appropriation	Hybrid (Prior Appropriation and Riparianism)	Prior Appropriation with Vestiges of Riparianism
Number of States	9	2	7

2. Legal recognition of instream flows

A basic criterion of instream flow programs is whether water can legally be kept in a stream or natural lake. It is interesting first to note the names used to by different states to describe instream flow protection. Alaska and Montana use the term reservation for instream flows. California and Texas do not grant new instream flow water rights but place conditions on other water rights and permits to leave flows in streams for instream purposes (though water rights can be transferred to instream flow purposes). Texas statutes refer to environmental flows. Washington can close basins to future appropriations and can establish instream flows and trust water rights. Idaho uses the term minimum stream flow right. Kansas uses a similar term—minimum desirable streamflow. Nebraska references instream flow appropriations. New Mexico discusses applying water rights to instream uses. Arizona, Colorado, Nevada, Oregon, South Dakota and Utah use the term instream flow water rights. Please note that in this study the terms instream flow or instream flow water right are often used to refer to any of the above terms.

Tables 3 and 4 show that 16 of the states in this study have some form of legal recognition for instream flows. Two states, North Dakota and Oklahoma, have not formally recognized instream use as a legally permissible use of water. South Dakota allows instream flows without expressly recognizing instream flow rights.⁴ New Mexico recognizes instream uses as legally permissible and has issued permits for instream uses, but not yet created rights for instream uses.⁵

Table 3: Legal Recognition of Instream Flows (ISF)

State	ISF Legally Recognized as a Beneficial Use	Special Status Exists for ISF Water Rights
Alaska	Yes	Yes
Arizona	Yes	Yes
California	Yes	Yes
Colorado	Yes	Yes
Idaho	Yes	Yes
Kansas	Yes	Yes
Montana	Yes	Yes
Nebraska	Yes	Yes
Nevada	Yes	No
New Mexico	Yes	No
North Dakota	No	No
Oklahoma	No	No
Oregon	Yes	Yes
South Dakota	Yes	No
Texas ⁶	Yes	Yes
Utah	Yes	Yes
Washington	Yes	Yes
Wyoming	Yes	Yes

Table 4: Summary of Instream Flow Legal Recognition

	No legal recognition	Legally recognized but not a separate water right	Special statutes/status for instream flow water rights
Number of States	3	2	13

⁴ Instream flow rights have been allowed in South Dakota since 1984 when the South Dakota Supreme Court recognized instream uses for fish, wildlife, aesthetics, fish and wildlife habitat, despite there being no enumerated list of beneficial uses in South Dakota’s water code. This court determination came from an interpretation of SDCL § 46-1-6 (3), which defines a “beneficial use” as “any use of water within or outside the state, that is reasonable and useful and beneficial to the appropriator, and at the same time is consistent with the interests of the public of this state in the best utilization of water supplies” (Gillilan and Brown 1997).

⁵ In 1998, the New Mexico Attorney General (AG) released an opinion (N MAG Op. No. 98-01) that for transfers only, the law “permits the State Engineer to afford legal protection to instream flows for recreation, fish or wildlife or ecological purposes.” A 1998 memorandum from the State Engineer Office to the AG similarly concluded that the State Engineer “could act favorably upon an application for an instream use if the applicant can demonstrate that the means exist by which it can be proven that the right has been perfected and that the use is continuous. Emergency and temporary permits have been granted for instream uses to address endangered species issues, but no existing rights have yet been permanently transferred. Regulations regarding the beneficial use of water for instream uses are currently being written by the State Engineer (Lewis 2005, Medley 2005, Sanders 2005).

⁶ In 2001, the Texas Legislature passed Senate Bill 2, establishing the state’s first instream flow program (freshwater flows for estuaries were established in 1975). The state does not grant permits for environmental flows. It instead sets instream flow levels across priority basins. Future permits for water use in these areas are to be conditioned by the amount of water needed instream as determined in the instream flow studies (Austin 2005, NAS 2005).

3. Explicitly recognized beneficial uses of instream flows

Another interesting criterion used to compare instream flow programs is how many legally recognized uses are available for instream flow appropriation. Tables 5 and 6 show the legally recognized beneficial uses for each state. Please note that a particular use may benefit from instream flow protection even though it is not expressly protected by law. For example, fisheries protection may also provide for recreational opportunities. This report does not enumerate all incidental uses, but simply identifies those instream uses expressly protected under statute or case law.

The categories of use presented in Tables 5 and 6 (developed especially from Gillilan and Brown 1997 and Postel and Richter 2003) are intended to show the array of instream flow uses that are of potential benefit across a wide spectrum of needs. It appears from this table that the states with the broadest protection include Alaska, California, Idaho, Kansas, Texas and Oregon, each with six to eight permitted uses. Washington follows with five uses and Colorado, Montana, Nebraska, New Mexico and South Dakota have four. The most restrictive state is Wyoming. Flows for the establishment or maintenance of fisheries are Wyoming's only recognized instream use. A unique feature of Colorado's beneficial uses is highlighted in Figure 6 below.

Figure 6: Recreational Flows in Colorado

In Colorado, recreational flows are managed separately from instream flows. Under C.R.S. § 37-92-103, local governmental entities and water districts can apply for recreational water rights where an in-channel diversion structure is present. The first recreational in-channel diversion (RICD) was filed on the Cache La Poudre River by the City of Fort Collins in 1986 to benefit fish, recreation and wildlife. Diversion dams were built to control the river's flow, but no water was diverted out of the streambed. At the time of filing, the application appeared to be for an instream flow, which can only be held by the Colorado Water Conservation Board (CWCB). The filing was challenged in court and the Colorado Supreme Court found that if water was sufficiently controlled by man-made structures, the water right could be considered as "diverting" water within the streambed for a beneficial use

(<http://www.crwcd.gov/H2O/RICDs.pdf#search='recreational%20flow%20fort%20collins%20colorado'>).

Prompted by this case, the Colorado General Assembly passed Senate Bill 216 in 2001, establishing RICDs as a legal, beneficial use of water and directing the CWCB to establish rules governing this new type of water right. The CWCB is statutorily required to review water rights applications for recreational in-channel diversions ("RICDs") after an applicant submits an RICD application to water court. An RICD is the "minimum stream flow as it is diverted, captured, controlled, and placed to beneficial use between specific points defined by physical control structures pursuant to an application filed by a county, municipality, city and county, water district, water and sanitation district, water conservation district, or water conservancy district for a reasonable recreational experience in and on the water." The CWCB is required to submit its findings and recommendations to water court regarding an applicant's requested RICD water right. Numerous communities in Colorado have filed for RICDs, including Chaffee County, the Upper Gunnison River Water Conservancy District and the cities of Aspen, Longmont, Pueblo, Silverthorne, Steamboat Springs, and Vail. More information on RICDs can be found at the CWCB Web site: http://cwcb.state.co.us/isf/Programs/RICD_main.htm.

Table 5: Beneficial Uses of Instream Flows as Established by Statute or Case Law

State	Fish	Other aquatic organisms	Wildlife	Riparian areas	Recreation	Aesthetics	Environmental protection	Navigation	Channel maintenance	Water quality
Alaska	•		•	•	•			•		•
Arizona	•		•		•					
California	•	•	•	•	•	•		•		•
Colorado	•	•		•			•			
Idaho	•	•	•		•	•		•		•
Kansas	•	•	•		•	•				•
Montana	•		•		•					• ⁷
Nebraska	•		•		•					• ⁸
Nevada	•		•		•					
New Mexico ⁹	○		○		○		○			
North Dakota										
Oklahoma										
Oregon	•		•	•	•	•				•
South Dakota ¹⁰	•		•	•		•				
Texas				•	•	•		•	•	•
Utah	•				•		•			
Washington	•		•		•	•				•
Wyoming	•									

Table 6: Summary of Explicitly Recognized Beneficial Uses of Instream Flows

	Fish	Other aquatic organisms	Wildlife	Riparian areas	Recreation	Aesthetics	Environmental protection	Navigation	Channel maintenance	Water quality
Number of States	14	4	11	6	12	7	2	4	1	9

⁷ Water quality is a recognized beneficial use for leases only, not for reservations, in Montana.

⁸ Beneficial uses for transferred water rights in Nebraska include water quality maintenance and water necessary for compliance with compacts, decrees or other state contracts.

⁹ These protected uses are identified in NMAG Op. No. 98-01 and current policy of the Office of the State Engineer, but they have not been affirmed in court decree, statute or rule.

¹⁰ These uses were explicitly identified in the *Dekay* ruling. To date, the applicability of the *Dekay* ruling has not been challenged as it relates to uses other than fish, wildlife, aesthetics, fish and wildlife habitat.

4. Types of instream flow water rights

Tables 7, 8 and 9 detail how states grant instream flows. Most states allow instream flows to be secured both as new water right appropriations and as transfers of existing rights to instream flow uses. Some states are more restrictive and only allow transfers of existing rights. California, New Mexico, Texas and Utah allow transfers but do not allow new appropriations.

Interestingly, some states require that instream flow water rights be reviewed on a periodic basis. Other traditional water rights, such as those for agricultural or municipal uses, do not carry this same review requirement. Table 7 shows that four states (Alaska, California, Montana, and Nebraska) require periodic review of instream flow water rights. This is not required in other states. This review requirement does not apply to instream flow rights secured through transfer in Montana and Nebraska. Transferred rights are subject to review in California, but it is important to note that review in California applies to all water rights, not only instream flows. The implications of review requirements are discussed in the Comprehensive Analysis section.

Table 7: Types of Instream Flow Water Rights

State	New Appropriation of ISF Water Right Allowed	Transfers or Conversions to ISF Water Rights Allowed	Review Required
Alaska	Yes	Yes ¹¹	Yes, 10 years
Arizona	Yes	Yes	No
California	No	Yes	Yes (frequency unknown)
Colorado	Yes	Yes	No
Idaho	Yes	Yes ¹²	No
Kansas	Yes	Yes ¹³	No
Montana	Yes	Yes	Yes, 10 years
Nebraska	Yes	Yes ¹⁴	Yes, 15 years
Nevada	Yes	Yes	No
New Mexico	No	Yes (see footnote 5)	n/a
North Dakota	No	No	n/a
Oklahoma	No	No	n/a
Oregon	Yes	Yes	No
South Dakota	Yes	Yes	No
Texas	No ¹⁵	Yes	No
Utah	No	Yes	No
Washington	Yes	Yes	No
Wyoming	Yes	Yes	No

¹¹ Current law does not prohibit transfers to instream flow reservations, though none have been completed.

¹² The legal mechanisms for permanent donation to a minimum streamflow have not been developed and no such transactions have taken place. Short-term leases have been authorized through the Idaho Natural Flow Water Bank.

¹³ The State has the authority to purchase water rights in over-appropriated areas and retire those rights to the stream, barring that water from future appropriation for out-of-stream purposes. However, it is not converted into an instream flow right or “minimum desirable streamflow” and this authority has not yet been exercised (Stover 2005).

¹⁴ Nebraska passed new legislation in 2004 (LB 962) allowing water right holders to transfer a water right to instream flow use. The right remains the property of the water right holder, but is leased to the Nebraska Game and Parks Commission or natural resource district (NRD) for up to 30 years at a time, with funding provided potentially by nonprofit organizations, the Commission or the NRDs. To date, no leases have been processed (France 2005).

¹⁵ Texas sets environmental flows across priority basins; however, the state does not grant permits for instream flow use. The levels set will be used to condition what can be diverted out-of-stream under future permits (Austin 2005).

Table 8: Summary of New Appropriations and Transfers

	New Appropriation of ISF Water Rights		Transfers or Conversions to ISF Water Rights	
	Yes	No	Yes	No
Number of States	12	6	16	2

Table 9: Summary of Review Requirements

	Review Required	No Review Required
Number of States	4	11

5. Participation in instream flow water rights creation, administration and ownership

A common topic in the literature and discussion surrounding instream flow water rights is which persons or entities may secure instream flows and by what processes. Tables 10 and 11 list the agencies or entities that can hold an instream flow water right, through new appropriation or transfer of existing rights. Tables 12 and 13 list the agencies and entities that participate in administration, recommendation or review of instream flows, and which agency or agencies grant and administer the instream flows.

Most states require a governmental agency to acquire and hold an instream flow water right. Alaska, Arizona and Nevada are the only states that allow any person, organization or agency to hold an instream flow. These three states and Montana and South Dakota allow federal agencies to hold state instream flow water rights. Nebraska and Oregon allow multiple state agencies to hold an instream flow water right. All other states either do not grant any instream flow water rights or allow only one state agency to hold those rights. In Kansas and Idaho, the legislature must approve instream flow water rights that are then administered by the state's division or department of water resources. See Table 11 for a summary of these findings.

Little difference exists among the Western states on who proposes and reviews instream flow recommendations. In most states, any person can suggest or recommend a stream for protection. Typically though, recommendations come from a state's wildlife agency or, in some instances, from federal agencies. One consistency among all states is that the wildlife agency is authorized to provide comment and input. More discussion of these tables and the implications of these criteria for effective instream flow programs follow in the Comprehensive Analysis section.

Table 10: Participation in Instream Flow Water Rights Appropriations or Transfers

State	Who Can Appropriate ISF Water Rights	Who Can Transfer Existing Water Rights to ISF Use
Alaska	Any local, state or federal government agency and any private person or organization	Not allowed
Arizona	Any person, the state of Arizona or a political subdivisions thereof (including, but not limited, to counties, incorporated cities, towns, and irrigation, power, electrical, agricultural improvement, drainage, and flood control districts)	The state and political subdivisions of the state (private individuals can retain the right but lose the original priority date)
California	Not allowed	Any water right holder can transfer a right to ISF purposes if established criteria are met
Colorado	Colorado Water Conservation Board	Any person, including government entities or organizations, can transfer rights to the CWCB for conversion to ISF
Idaho	Idaho Department of Water Resources (IDWR)	The U.S. Bureau of Reclamation can lease water from Idaho's water bank for use in the Snake River system. ¹⁶
Kansas	Legislature	The state (through the Division of Water Resources)
Montana	Federal and state agencies and any political subdivision of the state	Any public or private entity can lease for ISF purposes
Nebraska	Natural Resource Districts (NRDs) and Nebraska Game and Parks Commission (GPC)	Any water right holder can lease to the GPC Commission or NRDs for up to 30 years at a time
Nevada	Any "person" including individuals, organizations, corporations, government agencies, etc.	Same as appropriations
New Mexico	Not allowed	Same as other water right transfers
North Dakota	Not allowed	Not allowed
Oklahoma	Not allowed	Not allowed
Oregon	Department of Fish and Wildlife, Department of Environmental Quality, State Parks and Recreation Department can apply for new water rights, then held in trust by the Water Resources Department	Any entity can purchase, lease or receive ISF as a gift but converted ISF use must be held in trust by the Water Resources Department
South Dakota	Not explicitly determined. So far, Division of Wildlife, Game, Fish and Parks, private organization and U.S. Fish and Wildlife Service granted permits or transfers of use.	Not explicitly determined. So far, Division of Wildlife, Game, Fish and Parks, private organization and U.S. Fish and Wildlife Service granted permits or transfers of use.
Texas	Not allowed (desired instream flow levels are set through basin studies, see footnote 4)	Any individual or entity with an existing water right can transfer to ISF. Rights can be donated to Texas Water Trust of the Texas Water Development Board in perpetuity or for a given number of years.
Utah	Not allowed	Division of Wildlife Resources (DWR) and Division of Parks and Recreation (DPR)
Washington	Department of Ecology	Individuals can donate rights, which are then held by the Department of Ecology
Wyoming	State of Wyoming (initiated by the Game & Fish Department; Water Development Commission applies to the State Engineer's Office)	Anyone can give as a gift or voluntary transfer to the state (Game & Fish Department acts as petitioner, administered by the State Engineer and the Board of Control)

¹⁶ Idaho's Water Supply Bank is intended to transfer water from willing lessor to willing lessee. The only application for instream use is the U.S. Bureau of Reclamation's ability to use up to 427,000 AF annually in the Snake River system. An additional 60,000 AF annually will be available through the Nez Perce Settlement out of upper Snake River reservoirs (Robertson 2005).

Table 11: Summary of Participation in Appropriations and Transfers

	No one	Legislature	1 State Agency	> 1 State Agency	State & Federal Agencies	Anyone
Appropriations	CA, ND, NM, OK, TX, UT	KS, ID	CO, WA, WY	NE, OR	MT, SD	AK, AZ, NV
Transfers	AK, ID, NM, OK	--	CO, KS, OR, WA	UT, WY	SD, NM	AZ, CA, MT, NE, NV, TX

Table 12: Participation in Instream Flow Water Rights Administration

State	Who Proposes, Reviews, or Provides Other Official Input	Who Authorizes and Administers the ISF Water Right
Alaska	Alaska Department of Fish & Game’s Statewide Aquatic Resources Coordination Unit, Federal Agencies, Private Individuals and Organizations	Division of Mining, Land & Water (Department of Natural Resources)
Arizona	Any entity can propose. Arizona Department of Water Resources (ADWR) reviews applications. Arizona Game and Fish Department is asked to comment as well.	ADWR (<i>note that ADWR does not have enforcement authority. County attorney and sheriff are authorized to enforce surface water rights</i>)
California	Department of Fish and Game (transfers only)	State Water Resources Control Board
Colorado	Division of Wildlife, Division of Parks and Outdoor Recreation, Division of Water Resources, U.S. Department of Agriculture, U.S. Department of the Interior make ISF recommendations to the CWCB. Any entity may recommend streams to the CWCB.	Appropriated, monitored and protected by the Colorado Water Conservation Board (CWCB), Water Court adjudicates all water rights and the Division of Water Resources administers all water rights
Idaho	Anyone may petition IDWR Board, review and comment provided by Departments of Fish and Game, Parks and Recreation, Environmental Quality	Legislature must approve rights either explicitly or by not rejecting them in a given legislative year. Idaho Department of Water Resources (IDWR) and its Board administer ISF rights
Kansas	Kansas Water Office (KWO) currently monitors ¹⁷	Legislature authorizes, Division of Water Resources (DWR) administers flow
Montana	Federal, and state agencies and political subdivisions of the state may reserve ISF	Department of Natural Resources and Conservation (DNRC) processes, issues and administers ISF reservations
Nebraska	Natural Resource Districts (NRDs) and Nebraska Game and Parks Commission (GPC), Department of Natural Resources, Water Division	Department of Natural Resources, Water Division
Nevada	Any entity may appropriate water for instream flow purposes	Division of Water Resources
New Mexico	Unknown (transfers only)	Office of the State Engineer administers water rights
North Dakota	Not applicable	n/a (State Engineer administers other water rights)
Oklahoma	Not applicable	Not applicable (Water Resources Board main agency facilitating Oklahoma water rights)
Oregon	The Department of Fish and Wildlife, the Department of Environmental Quality and the State Parks and Recreation Department provide input.	Water Resources Department

continued

¹⁷ 1980 recommendations were made by DWR, Kansas State Board of Agriculture, KWO, Kansas Department of Health and Environment and Kansas Department of Wildlife and Parks, which met to negotiate minimum desirable streamflow values to recommend to the Legislature.

Table 12: Participation in Instream Flow Water Rights Administration, Continued

State	Who Proposes, Reviews, or Provides Other Official Input	Who Authorizes and Administers the ISF Water Right
South Dakota	Anyone may recommend, Department of Game, Fish and Parks most involved	Water Rights Program of Department of Environment and Natural Resources, Water Management Board
Texas	Texas Parks and Wildlife Department, Texas Water Development Board and the Texas Commission on Environmental Quality (TCEQ) and other stakeholders can make permit recommendations	The TCEQ administers water permits
Utah	Division of Wildlife Resources and Division of Parks and Recreation (transfers only)	State Legislature must approve purchase of water rights for instream flow purpose and State Engineer administers the water rights
Washington	Department of Fisheries and Wildlife, groups associated with the WRIA (water resource inventory area) process	Department of Ecology
Wyoming	State Game and Fish Commission	Wyoming Water Development Commission holds instream flow water right, State Engineer receives and processes applications and administers rights

Table 13: Summary of Participation in Instream Flow Water Rights Administration

	1 State Agency	> 1 State Agency	Any Entity (including Federal)
Recommendations	CA, WY	KS, NE, OR, UT	AK, AZ, CO, ID, MT, NV, SD, TX, WA
Water Right Administration	AK, AZ, CA, MT, NE, NV, OR, TX, WA	CO, ID, KS, SD, UT, WY	--

6. Tools available to states for instream flow protection

Table 14 highlights various methods states use to secure instream flow water rights. A variety of methods are used in different states, ranging from the granting of new instream flow water rights to the conditioning of future out-of-stream appropriations. Some states, such as Colorado, grant water rights for instream uses while other states, such as Kansas, create a reservation of a minimum flow that cannot be removed by additional out-of-stream uses. Note that federal methods for instream flow protection, such as Wild and Scenic River designation and Federally Reserved Water Rights, are not presented in this table (as explained in the Introduction).

Table 14: Tools Available for Instream Flow Protection

State	Tools for Instream Flow Protection
Alaska	<ul style="list-style-type: none"> ▪ Reservation¹⁸ ▪ Department of Natural Resources (DNR) commissioner must review public interest criteria when adjudicating water rights, with the authority to condition permits to protect fish and wildlife
Arizona	<ul style="list-style-type: none"> ▪ General water right appropriations¹⁹
California	<ul style="list-style-type: none"> ▪ California Wild and Scenic Rivers Act ▪ Administrative review of new and existing water permits resulting in protective conditions for ISF ▪ Conversion of existing right to ISF purposes
Colorado	<ul style="list-style-type: none"> ▪ Instream flow water right obtained through new appropriation ▪ Acquisition and conversion of existing rights through grant, purchase, donation, bequest, devise, lease, exchange, or other contractual agreement. ▪ Short-term loan or lease of water right from private individual or water bank to the CWCB
Idaho	<ul style="list-style-type: none"> ▪ Minimum streamflow water right permits ▪ Protected river status, designate stream reach or sub-reach as natural or recreational river ▪ Idaho Water Bank provides for rental of rights for ISF use ▪ Legislative approval required for new ISF rights
Kansas	<ul style="list-style-type: none"> ▪ Minimum desirable streamflow ▪ Kansas Water Assurance Program (indirect)
Montana	<ul style="list-style-type: none"> ▪ Reservations ▪ Water rights leasing programs ▪ Conversion of conserved water to ISF reservations
Nebraska	<ul style="list-style-type: none"> ▪ Instream appropriation ▪ Transfer of existing rights to ISF purposes for up to 30 years at a time
Nevada	<ul style="list-style-type: none"> ▪ General water right appropriations for instream uses
New Mexico	<ul style="list-style-type: none"> ▪ Transfer of an existing surface water right to ISF use is considered permissible ▪ The Strategic Water Reserve, created and funded in 2005, allows for the acquisition of water for endangered species, their habitat, and Interstate Compact obligations
North Dakota	<ul style="list-style-type: none"> ▪ No specified method. Public interest criteria, including fish, wildlife and recreation, may be considered when issuing a permit, which could result in conditions placed to protect these interests
Oklahoma	<ul style="list-style-type: none"> ▪ No specified method, Oklahoma Scenic Rivers Act may indirectly provide protection for ISF
Oregon	<ul style="list-style-type: none"> ▪ Conversion of minimum streamflows (from 1955 legislation) to ISF rights ▪ Application for new ISF rights and conversion of conserved water to ISF rights ▪ Transfer, gift, acquisition
South Dakota	<ul style="list-style-type: none"> ▪ Administrative initiative to grant permits for ISF purpose and one change-of-use request ▪ A judicial determination holds that diversion is not necessary. Recreation and fish and wildlife propagation are considered beneficial uses
Texas ²⁰	<ul style="list-style-type: none"> ▪ Legislation exists to protect freshwater flows in bays and estuaries ▪ Studies are performed for segments or basins. Environmental flow levels condition future permits.
Utah	<ul style="list-style-type: none"> ▪ Permanent or temporary acquisition of ISF rights through donation or by purchase (funds for purchase require legislative authorization) ▪ Utah Code authorizes the State Engineer to reject an application to appropriate water or to change use of a water right if approval would unreasonably affect public recreation or the environment
Washington	<ul style="list-style-type: none"> ▪ Minimum flows set through administrative rule-making procedure²¹ ▪ Trust Water Rights Program allows conserved water to be dedicated to ISF
Wyoming	<ul style="list-style-type: none"> ▪ Appropriation of new water right ▪ Acquisition of a right through voluntary transfer or gift (no purchase)

¹⁸ Recognized by 1980 amendments as “an appropriation of water” AK ST 46-15-145.

¹⁹ AZ Legislature added “wildlife, including fish” to the state’s list of beneficial uses in 1941 and “recreation” in 1962. Furthermore, a diversion is not required to appropriate a water right. (Dishlip 1993)

²⁰ A National Academy of Sciences panel reviewed the process and methods established to set instream flows in Texas. The study is available at http://www.twdb.state.tx.us/instreamflows/pdfs/NAS_Report.pdf.

²¹ Washington water code amended in 1979 to clarify that minimum flows are appropriations.

7. Accomplishments

A critical criterion used to compare state programs is what has been accomplished for instream flow protection through the methods and tools described above. A primary focus of this report originally was to examine how states have achieved goals set for instream flow protection.

Research did not reveal that any particular state program set a quantifiable or qualitative goal when establishing its program. Certain states, such as Texas and Washington, are looking at instream flows across basins through planning processes and may have goals set per basin; however, no state-wide or programmatic goal is clearly set. Despite the lack of stated goals, it is assumed that a fundamental goal of instream flow protection is to provide protection for stream flows through legal measures. To this end, a key measurement of accomplishment is how many instream flow rights (or reservations, or other term, as appropriate) have been created in every state. An even better indicator of instream flow protection than total number of instream flow water rights would be the percentages of flow, stream miles or critical basins protected. A large state may have many rights, but many more unprotected miles, than a smaller state, for example.

Although it seemed feasible to determine total number of rights, as Table 15 shows, not all states can provide this information. Table 15 contains the most accurate information that could be collected and is intended to give a sense of how active state programs have been to date in establishing legally recognized instream flow protection. Because very few states could provide information on total miles or total flow, this information is not shown as percentages of total flow or stream miles. A caution when reviewing this table is that the existence of an instream flow right does not guarantee instream flow protection. A right must be measured, monitored and protected, not just established. This issue will be discussed in the following section.

Table 15: Accomplishments

State	Appropriations		Transfers		# State Employees
	# of Rights	Miles or CFS	# of Rights	Miles or CFS	
Alaska	17 adjudicated (276 pending)	32.8 miles	0	0	4 Full-time equivalent (FTE)
Arizona	93 instream flow rights (some still being perfected)	Not available ²²	Not available	Not available	No FTE (at least 6 part-time)
California	Not applicable	Not applicable	Not available	Not available	6 FTE Equivalent
Colorado	1,926 (including 476 lakes)	8,549 miles	21 (4 are leases)	398 cfs and 8,651 AF	7 FTE
Idaho ²³	85 licensed or permitted (includes 3 lakes)	>672 miles	Not available	Not available	5 FTE
Kansas	33 minimal desirable streamflows set on 23 streams (Stover 2005)	Not available	0	0	No FTE
Montana	434 (Schenk 2005)	2477 miles	Not available	Not available	2 FTE
Nebraska	9 (France 2005)	Not available	0	0	No FTE
Nevada	11 ²⁴	Not available	Not available	Not available	No FTE
New Mexico	0	0	2 - 3 permits, 0 rights	250 miles (approximate)	No FTE
North Dakota	0	0	0	0	No FTE
Oklahoma	0 (Illinois River and several tributaries designated through Scenic Rivers Act)	0	0	0	No FTE
Oregon	1550 (includes lakes) (Rice 2005)	Not available	30 transfers; 15 conserved water; 280 leases	Not available	2 FTE Equivalent
South Dakota	5 (Duvall and Grunlund 2005)	No information	1 (Duvall 2005)	Not available	No FTE
Texas	Not applicable	Not applicable	0	0	9 – 10 FTE
Utah	Not applicable	Not applicable	4	Not available	No FTE
Washington	180 streams conditioned with ISFs, closures in 20 basins (Bolender 2005)	Not available	79 (1 – 20 year leases); 12 (permanent) ²⁵	Over 5300 acre feet	12 FTE
Wyoming	97 (Annear 2005)	417 miles	0	0	2 FTE

²² “Not available” implies that the information could not be gathered for this study, not that the information does not exist. For example, a state may have records of all water rights, with instream flow details, within general files, making it impossible to gather statistics only on instream flow rights in a timely manner.

²³ The Nez Perce Water Rights settlement will be finalized in 2005 and should add 205 water rights in the Snake River Basin with priority dates of April 1, 2005 (Roberston 2005).

²⁴ The figure for Nevada may be higher than 11, but research indicate that records on water rights granted for instream flow purpose are not tallied in an available spreadsheet or database.

²⁵ Figures for Washington transfers are approximate. The Department of Ecology is creating a database to track Trust Water Rights with an expected completion in Fall 2005 (Adelsman 2005).

Table 16: Summary of Accomplishments, Number of Appropriations and Acquisitions

	0	1 – 10	11 – 50	51 – 100	101 – 500	501 – 1000	>1000
# of ISF Rights (appropriations and permanent or long-term transfers)	NM, ND, OK	NE, SD, UT	AK, KS, NV	AZ, ID, WY	MT, WA	--	CO, OR

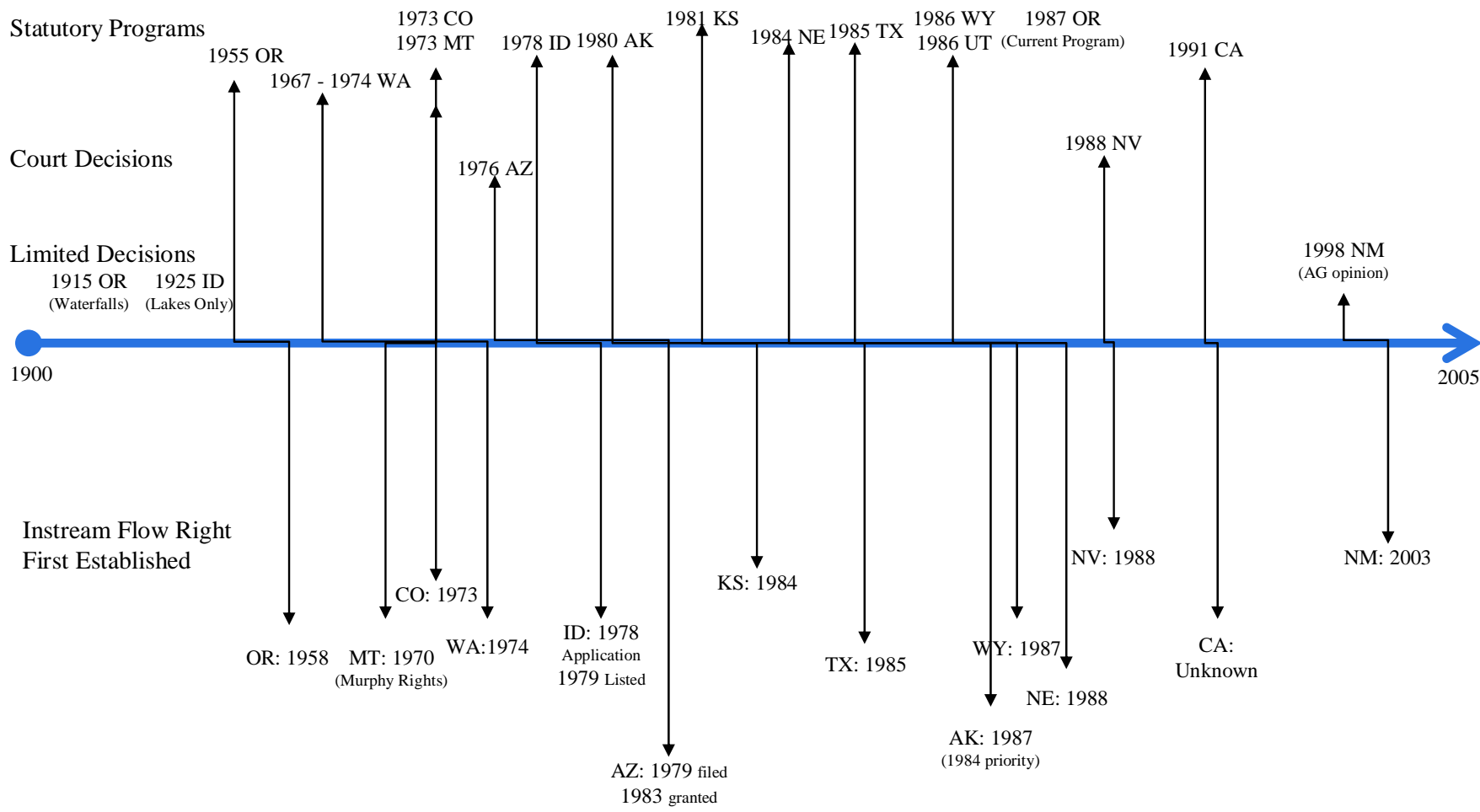
8. Timeline

For an historical perspective, it is useful to see when instream flow programs were established and when a state created its first instream flow. This information is shown in Figure 7 on the following page. Figure 7 shows when a state established instream flow protection across the top of the timeline. This information is divided into three layers. The top layer shows creation of statutory programs, the middle layer shows issuance of court decisions, and limited decisions (by rule or narrow statute) closest to the timeline. Below the timeline are the years when each state established its first instream flow through the authority listed above the line. An arrow connects the creation of the authority with the actual instream flow on the bottom.

Some programs, such as Colorado and Idaho, secured instream flows immediately after the legal basis was established. Nevada's first instream flow right was established subsequent to the court decision that legalized such a right. In other states, such as Arizona and Kansas, it took three years for an instream flow right to be established. Reasons that contributed to timing of applications for instream flow protection can largely be traced to the dedication of resources (fiscal and personnel), political will, anticipated legal complications, and clarity of filing needs and processes.

Gillilan and Brown (1997) trace the first state protection of instream flows to Oregon in 1915 when the state passed measures to protect waterfalls along the Columbia River Gorge. It later moved to protect flows on the Rogue River in 1929. In the 1920s, Idaho added aesthetics, health and recreation to its list of beneficial uses to protect levels in several scenic lakes (Gillilan and Brown 1997). In 1955, the Oregon legislature created an administrative process to establish minimum flows to protect salmon during spawning season. This process created administrative rulings for minimum flows rather than decreed water rights. Oregon's current system of instream flow protection dates to 1987 with the passage of Senate Bill 140, the Instream Water Rights Act. This law recognized instream flow as a beneficial use. It also accorded instream flows water right status, not just administrative protection (Gillilan and Brown 1997, Mattick 1993). Montana took several measures to protect flows in the late 1960s. The state established instream flow water rights on 12 streams (known as Murphy Rights); officially declared that water resources were to be protected for fish, wildlife and public recreational purposes in 1967; and established a process for instream flow protection in 1973. Washington initiated a minimum-flow program in 1967 and strengthened it in 1974. These and other dates are reflected in Figure 7.

Figure 7: Timeline of Creation of Instream Flow Authority (top) and First Instream Flow Right (bottom)



Tables 1 – 16 and the timeline in Figure 7 provide a baseline understanding of how Western states protect instream flows and what has been accomplished to date. Additional information is available on a state-by-state basis in Appendix B.

Comprehensive Analysis

With a clearer understanding of how states have designed and managed instream flow programs, it is possible to undertake an analysis of the characteristics of an effective instream flow program. It is important to clearly identify the characteristics that underlie the determination of an effective instream flow program. These characteristics were derived from the existing literature and through interviews with instream flow experts and government officials.

Fundamentally, an effective instream flow program is one that 1) actively seeks to secure instream flows, 2) manages and defends the instream flows it has acquired, 3) has an active and ongoing dialogue with the public, state and federal agencies and nonprofit organizations, and 4) operates with an open public process. The specific characteristics examined for this analysis are:

- Existence of legal mechanisms to protect instream flows
- Permanence of the instream flow rights, reservations or permits
- Resources available and dedicated to instream flow activities
- Legally and scientifically defensible quantification methodology
- Protection and enforcement of instream flow rights, reservations or permits
- Partnerships
- Planning/Needs identification
- Evolving and dynamic programs
- “On-the-ground” accomplishments

These characteristics are expounded in the following paragraphs.

Existence of Legal Mechanisms to Protect Instream Flows

Any analysis of effective instream flow protection starts with the question of whether such protection can be achieved in a manner consistent with applicable laws. This study considers statutory provisions or court determinations that clearly establish that holding water instream is consistent with state law. It is clear from the previous sections that the majority of Western states (16) do provide some means of instream flow protection. References to governing state statutes can be found in the appendices under the descriptive file for every state.

Two states, North Dakota and Oklahoma, currently have no statutory or judicially determined means to protect instream flows. New Mexico’s Attorney General opined in 1998 that water rights could be transferred to instream flow uses. Since this time, the Office of the State Engineer has not yet received an application to permanently transfer an existing surface water right to an instream use; however, temporary and emergency permits have been granted for fish and wildlife purposes in association with endangered species and interstate compact issues (Medley 2005, Sanders 2005).

Of the 16 states that allow instream flow protection, 14 states have statutes that clearly establish instream flows as a distinct water right (via water right application, reservation, permit, etc.). Distinctive instream flow programs have been established in these states in order to bypass the physical diversion requirement typically needed for demonstrating beneficial use of a traditional water right. Instream flow protection in these states is typically made possible by legislation that categorically excludes certain instream flow uses from the “physical diversion” requirement. The enabling legislation also specifies how such uses are to be achieved. The 14 states that have established statutory protection for instream flows do so through water right (Arizona, Colorado, Nebraska, Nevada, Oregon, South Dakota, Utah and Wyoming), as a designated minimum flow (Idaho, Kansas and Washington) or as a reservation (Alaska and Montana). California and Texas allow for transfers of water to instream flow water rights or as an administrative set-aside from future out-of-stream permits.

Colorado is one of the 14 states that allow instream flow protection through statute. Colorado was one of the first states to legalize instream flow protection and establish a statutorily created instream flow program in 1973. Instream flow rights in Colorado were established that same year. Other early states include Washington and Oregon. Washington created a minimum-flow program in 1967 and strengthened it in 1971. Oregon created a minimum-flow program in 1955 and created its current program through legislation passed in 1987 (Gillilan and Brown 1997). Nevada and New Mexico were the last states to explicitly recognize the legality of instream flow water rights. Nevada courts determined instream uses were beneficial uses in 1988 and the Attorney General released an opinion (1998 NMAG Op. No. 98-01) that the law permits legal protection to instream flows for recreation, fish or wildlife or ecological purposes.

Permanence of Instream Flow Protection

Western states achieve instream flow protection through a variety of tools (Table 14). Different tools provide for protection over different periods of time. Some methods provide temporary protection such as leases or other temporary conveyances that can range from several months to many years. Other methods provide instream flow protection through direct granting of a water right. While there are important roles for temporary conveyances (such as drought response), long-term resource protection requires longer-term, permanent rights and the assurances they bestow. Establishing an instream flow water right can be a slow process; however, once a water right is granted, it is generally considered to be a property right and as such to have greater permanence when legally challenged than a temporary permit or administrative constraint on another water right. It is also more likely to be integrated into the state’s water right system and administered as other rights are administered.

One measure of the permanence of water rights is whether there is a requirement to periodically review the water right. In four states, Alaska, California, Montana and Nebraska, instream flow water rights are subject to periodic administrative review. These reviews are generally set to establish whether the need and purpose for the instream flow are still valid and if there is still sufficient water available to meet that need. In Montana, reviews are required every 10 years for

reservations²⁶ (the 12 Murphy Rights created in the late 1960s are exempted from review), whereas in Alaska, reviews are not mandatory and are held only upon request. To date, no reviews have been conducted in Alaska. In addition to posing a significant demand on state resources, a review requirement makes instream flow water reservations continually vulnerable to revocation. In these states (with the exception of California), other types of water rights are not typically subject to the same level of periodic review.

In Montana, a reservation holder has to file an update or report on use of the reservation to the Department of Natural Resources and Conservation (DNRC) every 10 years. The DNRC can make adjustments in the amount of that reservation if it finds that the reservation is not being put to use. Some reservations held by cities and conservation districts have never been used and may be subject to abandonment through this 10 year review. Those held by the Montana Department of Fish, Wildlife, and Parks (DFWP) were put to use immediately, so it would be difficult to claim that those reservations had not been used. However, the DFWP must file reports to the DNRC to document flow levels, how the reservations are being used and the importance of the reservations. These reports can require a significant investment of time and resources. To date, no reservations for instream flow purposes have been revoked (Schenk 2004).

Nebraska also requires review for permanent rights, and for seven years had an interesting provision in addition to its review policy. A 1997 amendment required the DWR Director to hold a hearing every 15 years from the date of granting an instream flow permit. The Director, under N.R.S. §46-2-112, has discretion to modify or cancel the instream flow right under review (Covell 1998). The hearing requirement was revoked in 2004, leaving the need for review. As of 2005, only one water right had been reviewed under this authority, with no changes made to it (France 2005).

In the 11 other Western states with instream flow protection, no periodic review is required. Instream flows have a similar level of permanence to other privately held water rights. This equal footing helps to establish and maintain protection for the beneficial instream uses claimed.

Resources Available and Dedicated to Instream Flow Protection

Resources are critical to the investigation, establishment and maintenance of instream flow protection. These resources may come in a variety of forms, including staff, funding and technology, and are typically associated with governmental agencies. To accomplish the goals of instream flow protection, a program needs legal, technical, and policy-oriented staff and associated resources to administer its program in accordance with state statutes and rules. In light of the many challenges involved in integrating instream uses with traditional off-stream uses, adequate staffing appears to be particularly advantageous to achieving program goals (Gillilan and Brown, 1997).

Interestingly, few states have staff dedicated specifically to instream flow protection in state water and wildlife agencies. Nine Western states have no staff hired specifically for instream

²⁶ Reservations can be established for both instream and out-of-stream uses in Montana. All reservations require review, not just those established for instream flow purposes. However, out-of-stream uses can eventually be granted water rights, whereas instream uses currently must remain as reservations.

flow issues. Only Alaska, California, Colorado, Idaho, Texas and Washington have four or more full-time staff members who specialize in instream flow issues. Colorado is the only state to have most of these employees concentrated in one agency (seven are at the Colorado Water Conservation Board and one staff member at the Division of Wildlife is dedicated full-time to instream flow issues); in the other states, employees tend to be distributed among different agencies, such as the state's water management agency and the state division of fish and wildlife.

As will be pursued in the 'Partnerships' subsection below, the argument is not that more employees necessarily equate to a better a program, but that in a state that has employees dedicated to instream flow protection, more staff is available to monitor and protect instream flows and to coordinate with public needs.

Some states have shifted staff focus from appropriating or securing new instream flow rights to the transfer of existing rights to instream flow purposes. According to officials in Oregon and Montana, for example, filings for new instream flow rights or reservations have slowed (Rice 2005, Schenk 2005). Oregon has filed over 1,500 new water rights on rivers and lakes in the state. During the years that these filings were taking place, the Water Resources Department (WRD) had multiple staff members dedicated principally to instream flow protection. Currently, at least two staff members are working nearly exclusively on leases and transfers (with other staff involved from other state agencies) (French 2004, Rice 2005). Other staff from the WRD are actively involved in monitoring and protecting existing instream flows, but are not dedicated exclusively to instream flow issues.

Another critical resource question is what technical resources are dedicated to instream flow protection. These resources include the methods used to determine instream flow quantities and those used to track, monitor and enforce protected instream flows. This issue will be discussed in more detail in the following section and under "Protection and Enforcement" but briefly, there are varying levels of technology applied to instream flow management. Colorado has been active in incorporating the use of digital geographic information systems (GIS) to incorporate legal, hydrologic and biologic information on instream flows. This information is available to resource managers to monitor and protect instream flows and to any person interested in accessing information on instream flows. Alaska has a mapping and reporting program that displays maps with the approximate location of water rights and reservations of water in a given area. Tabular reports display general information about the rights or reservations selected on the map. Kansas has real-time gage information available for all its minimum desirable flows as there is a U.S. Geological Survey (USGS) gage at all 33 points. Oregon has instream flow rights on its searchable database, Water Right Information System (WRIS), and is currently migrating information on transfers and leases to this system (Rice 2005). Maps showing instream flows can also be generated. Wyoming is in the process of putting a map on its Web site with links to information on all instream flows in the state. Washington, Wyoming and others have put considerable effort into entering informative materials on its Web site to help interested parties better understand the applications and implications of instream flow protection.²⁷

²⁷ Colorado's database of instream flows can be accessed at <http://cwcb.state.co.us/isf/Database/> and associated documents can be seen at <http://cwcb.viis.state.co.us/cwcbimaging.htm>. Alaska's information is at http://www.dnr.state.ak.us/mlw/mapguide/wr_intro.htm. Oregon's database can be accessed at

Legally and Scientifically Defensible Quantification Methodology

How states determine the appropriate instream flow level needed to protect the target resource or activity is of interest to the effectiveness of an instream flow program. Many methodologies exist to determine instream flow levels and which are the most appropriate is a topic of interest and debate.²⁸

Because this report focuses on issues of policy and administration, methodology as a characteristic of effective instream flow management is included here not to debate the merits of the different available methods, but to identify states that have established a scientific procedure for quantifying flows. Scientifically defensible methodologies are important for several reasons: 1) in most states, a water right must indicate the amount of water needed to accomplish a use without waste, encouraging efficient resource use; 2) to provide reliable information to decision makers balancing the needs for competing uses of water on and off the stream; 3) to demonstrate that the proposed flow level is a repeatable finding that other parties could also determine; and 4) to ensure that the instream flow is defensible in court or in the context of other challenges. It is critical that programs use scientifically established methods to determine flow needs and take steps to evaluate these methods and adopt appropriate tools periodically.

Most states have established that scientifically recognized and accepted methodologies are essential to establishing instream flow quantities. For example, Montana's statutes indicate that instream flow recommendations must be defensible but do not require a particular methodology be used. In practice, wetted perimeter analysis has been and continues to be the standard in Montana (Schenk 2004). The policy of California's Department of Fish and Game is to use the Instream Flow Incremental Method (IFIM), but the best methodology to employ is always determined on a case-by-case basis (Smith 2005). Oregon identifies in its administrative rules that accepted methodologies must be used. Such methodologies include IFIM and the Oregon Method (French 2004). Washington has used IFIM, PHABSIM and other methodologies adapted to local conditions (Beecher 2004). While Montana, Oregon and Washington provided the names of methodologies they often use, they, as with the other Western states, do not require a specific methodology. This may be partly influenced by the variety of climates and geographies within each state, making a uniform methodology difficult to implement.

In Colorado, a scientifically defensible methodology is consistently used to justify an instream flow recommendation. R2CROSS (an instream flow incremental methodology developed in Colorado as a cost-effective, easily interpreted method for determining instream flows) is primarily used, though other methodologies are applied depending upon the individual circumstances of the stream or lake. The intent in Colorado is to clearly outline appropriate methodologies for an appropriation or acquisition early in the process. While issues of instream flow quantification will continue to be debated and new methodologies developed and adopted,

<http://apps.wrd.state.or.us/apps/wr/wrinfo/wrinfo.php>. Wyoming's instream flow information can be found at <http://gf.state.wy.us/fish/watermangtISF/index.asp>.

²⁸ While the determination of instream flow quantities and timing and analysis of biological needs in relation to flow are important topics, they are not fully explored here. Recent books such as the Instream Flow Council book, *Instream Flows for Riverine Resource Stewardship*, and Postel and Richter's book, *Rivers for Life: Managing Water for People and Nature*, examine these issues and provide important insight.

the need for states to remain informed and adaptive in regards to flow-setting strategies is important.

Protection and Enforcement

Water is a scarce resource in the Western United States. Simply creating an instream flow water right or other such protected flow does not ensure that water will be there when needed. “Protection” here refers to the defense of an established instream flow against injury or depletion. “Enforcement” means instream flows are monitored and administrative calls²⁹ are placed as necessary to meet an instream flow right.

A fundamental step in the protection or enforcement of an instream flow water right is knowing what instream flow rights the state holds. It is necessary to know what rights are held as well as the amounts and timing of these rights to be able to protect and enforce them. Greater availability and accessibility of data also provide effective assistance for future planning needs. Interestingly, many states either do not have a tracking system for the instream flow protection measures established (such as California), or do not have this information readily accessible (such as Texas and Washington). Other states (such as Idaho and Colorado) have information easily accessible to the public and agency staff. A more detailed look at this issue will follow in the discussion of “On-the-Ground Accomplishments.”

According to the research performed for this report, at least five states do not regularly protect and enforce instream flow water rights (Alaska, Arizona, Idaho, South Dakota and Wyoming). At least five states have active protection and enforcement programs (Colorado, Kansas, Montana, Oregon and Washington). Several others states (such as Texas and Utah) do not have a formal monitoring program but will pursue enforcement if an instream flow right is not being met. Nevada allows for monitoring and enforcement in a manner similar to that for any other water right.

Some states, such as Idaho and Alaska, rarely monitor flows. Limited funding and resources do not allow for extensive monitoring. In the case of Alaska, existing instream flow reservations are found in areas where water is abundant and water withdrawals are minimal. For these reasons, protection and enforcement may not be currently necessary or be the highest and best use of scarce financial resources. It should be noted, though, that the lack of monitoring to support protection and enforcement also hampers a state’s ability to establish future instream flow quantities because stream flows have not been sufficiently understood to pursue new instream flow water rights (Estes 2004, Gillilan and Brown 1997). In Arizona, an applicant must provide four years of monitoring data to perfect an instream flow water right (this monitoring is not required for other water uses such as agricultural applications). After this four-year period, monitoring is the responsibility of the instream flow water right holder. For protection, until an adjudication court issues decreed water rights and the Department appoints a water superintendent or other such authority, a sheriff or other police officer currently may enforce

²⁹ A “call” is a request by a water right holder, who is not receiving all of the water he or she is entitled to by decree, that upstream junior water right holders shut down or curtail their use until the senior right is satisfied.

surface water rights upon complaint by an affected person. Also, individual water users may initiate judicial proceedings to resolve conflicts (Ronald 2005, Logan 2005).

In those states that do monitor or enforce water rights, a wide variety of approaches are used to conduct these activities. For example, Montana's Department of Fish Wildlife and Parks (DFWP) actively monitors and protects its instream flow reservations, starting with the application. An applicant in Montana must outline a strategy for monitoring instream flows in its request (see Figure 8).

Colorado provides both legal and physical protection for instream flow rights. Because the water courts adjudicate water rights in Colorado, the Colorado Water Conservation Board (CWCB)

provides legal protection by reviewing every water right application filed in the state water court for potential impacts to existing

instream flow water rights. If potential injury is identified, then CWCB staff files a statement of opposition with the water court and seeks protective terms in that decree. This protection through filing of statements of opposition has allowed junior instream flow water rights to gain relevance in Colorado's prior appropriation system. If a transfer of a senior water right to another location or use would detrimentally affect a junior instream flow, the CWCB can file a statement of opposition and request terms and conditions in the transfer or change that protects the instream flow right by ensuring maintenance of stream conditions that existed at the time of the instream flow appropriation.

The CWCB performs monitoring and enforcement and provides physical protection for instream flows largely with the use of gages. If flows fall below the instream right and water is available given the seniority of the right, the CWCB can place a call to meet its flow requirements. One staff member is dedicated to protection and one to monitoring and enforcement. Staff has placed calls to enforce instream flow water rights since the program's inception (Baessler 2005). Legal

Figure 8: Instream Flow Monitoring and Protection in Montana, A Closer Look

Like many state water agencies, Montana's Department of Fish, Wildlife and Parks' (DFWP) monitoring program is dependent on the U.S. Geological Services' (USGS) system of real-time gages. The DFWP only supplements with state gages where USGS coverage is inadequate. Montana's monitoring strategy has proven to be effective. Although the gaging system in Montana doesn't cover every region where an instream reservation is in place, it covers most streams where instream reservations are at issue. Many small streams do not have good gaging information, but virtually all of the main streams and rivers, especially those with junior users who could potentially be called out, are currently monitored. In 2003, Montana staff investigated potential areas where additional monitoring would make a difference in potential calls and found no sites with junior water users that weren't already covered.

As regards protection, the Montana DFWP experienced problems in the past with unpopular calls for water and has since established a statewide system to predict late-summer streamflows and identify streams for potential calls. If reservations are likely to suffer, staff will send a warning letter prior to June 1 to over 500 water users warning about potential calls. As stream levels dip below reserved levels, the DFWP will make these administrative calls. In 2004, DFWP had close to 150 calls and roughly 200 in 2003. Another enforcement model is seen in Montana's Blackfoot River Basin, where there is a cooperative agreement with the local watershed group. There the local users developed a drought contingency plan, designed to "share the pain" of drought (Schenk 2004).

protection is achieved through monthly review of the water court resume³⁰ and requests for stipulations and filings of statements of opposition.

Colorado gages many of those instream flow water rights that are especially vulnerable to out-of-priority depletions. Understanding that it is not possible or financially feasible to place and maintain gages on all its water rights, the state partners with other agencies, primarily the U.S. Geological Survey, but also with municipalities and other groups, to monitor stream levels. Staff of the Colorado Division of Wildlife (DOW) and the Division of Water Resources (DWR) also act as “eyes and ears” on the ground regarding stream conditions. In addition to monitoring instream flow water rights, the CWCB has been active in providing forums for discussions of monitoring needs across the state by participating in and helping host various conferences on this topic. For more information on monitoring in Colorado, see Figure 9.

Figure 9: Technologies Applied in Colorado for Instream Flow Water Right Monitoring

The Colorado Water Conservation Board (CWCB) is among the largest water right holders in Colorado in total number of water rights. This poses monitoring challenges to ensure that flow needs are being met in a manner consistent with the decreed right. The CWCB is working to apply a range of technologies to effectively manage its instream flow and natural lake level water right portfolio. Monitoring currently occurs through:

- “*Eyes and ears*” of people who regularly see the stream and may call the CWCB or water commissioner if the levels appear to be low. These include water commissioners, division engineers, district wildlife managers, members of local Trout Unlimited chapters and others.
- *Staff gages* that are read by various agencies and individuals, including those listed above.
- *Gages linked with satellite monitoring systems*. Currently 457 gages owned and operated by the Division of Water Resources, 294 gages owned and operated by the U.S. Geological Service (USGS) and 19 gages owned and operated by the Northwest Water Conservancy District are tied to satellite systems. This makes information consistently available on a real-time basis (note that these are total satellite gage numbers, not those dedicated to instream flow monitoring).
- *Flow alert system*. Approximately 60 satellite gages are currently connected to an electronic alert system. If a gage measures below or above a certain flow, an alert is sent to the water right holder via both email and cellular phone. Staff at the CWCB can then investigate whether the decrease in flow is due to natural causes or junior depletions to the instream flow water right.

The CWCB is working with the USGS and others to develop new technologies, methods and tools to monitor flows, among these are:

- *Dye dilution tracer methodologies* to monitor late season and winter flow conditions. Gages can freeze and ice in streams can lead to inaccurate data, so alternate methods are needed. In this project, dye is released into a stream and a sensor picks up the dilution amounts downstream, allowing for improved estimation of stream flows. Accurate and consistent estimation of stream flows relies on good vertical and lateral mixing of the tracer
- *Instream Flow Decision Support System*. This system will eventually provide a means to track and model stream flows throughout the state. GIS layers will contain information on amounts and timing of decreed water rights, real-time data on stream flows, and modeling commands to predict what flows should be and compare these to actual flows entering the system. The system will contain a map with alerts that appear when a specified flow has been invaded.

³⁰ The water court resume is a document published monthly by water courts in Colorado. This document provides notice of proposed new water right applications, changes in water rights, exchanges and augmentation plans.

With some of its water rights acquisitions, the donor of the water right and the CWCB have entered into agreements allowing the donor to be the CWCB's agent for monitoring the water right. One example is the Boulder Creek donation. The City of Boulder monitors and reports annually to the CWCB on flows for that instream flow water right. In this way, the CWCB remains active and informed, while allowing local municipalities that are well equipped to monitor flows to do so. Such a relationship allows municipalities such as the City of Boulder to retain a sense of stewardship in the management of this important instream flow through its downtown area.

To some degree, all state programs lack the resources required for complete monitoring and enforcement of all instream flows. However, those programs that have dedicated the most resources to monitoring and enforcement have done well to first prioritize where monitoring most needs to take place (streams where flows may be depleted by junior diverters) and to search for appropriate partners to help accomplish monitoring, such as the USGS or local water managers.

Partnerships

Partnerships are a critical characteristic of efficient management. They allow state agencies to leverage scarce resources by uniting staff and resources with those from other agencies and organizations. Partnerships can apply to new appropriations of instream flow water rights, acquisitions or transfers of existing water rights to instream flow purposes, and to protection and enforcement of established instream flows.

Multiple state agencies actively work together on instream flow appropriations to varying degrees in different states. Typically, a state's department or division of fish and wildlife provides recommendations as a primary source of expertise and information on aquatic species' needs and habitat concerns. Coordination with fish and wildlife agencies is common in at least eleven states (Alaska, Arizona, California, Colorado, Idaho, Montana, Oregon, Texas, Utah, Washington, and Wyoming). In at least eight states (Colorado, Idaho, Montana, Nebraska, Oregon, South Dakota, Texas, and Utah), the state's division or department of parks and recreation is also involved. In three states (Oregon, Texas and Washington), a department or division of environmental quality also participates in recommendations related to water quality.

In addition to sharing responsibilities and expertise among state agencies, instream flow programs have largely benefited from working with groups outside state government. One important player is the federal government. As detailed in several publications, while both federal and state agencies have jurisdiction over various aspects of water issues and needs for which they manage water, it is largely state law that governs water use.³¹ Nonetheless, in special

³¹ A few examples include *California v. United States*, 438 U.S. 645 (1978) (finding that absent any clear congressional directive to the contrary, the federal government must comply with state law when appropriating water). For more detailed analysis of federal instream flow rights and conflicts with state law see Heather Blomfield Lee, *Forcing the Federal Hand: Reserved Water Rights v. States' Rights for Instream Protection*, 41 *Hastings L.J.* 1271 (1990); Wendy Weiss, *The Federal Government's Pursuit of Instream Flow Water Rights*, 1 *U. Denv. Water L. Rev.* 151 (1998) and Robert V. Trout and James S. Witwer, *Whose Water? Meeting New Federal Water Demands in Prior Appropriation States*, 50 *Rocky Mt. Min. L. Inst.* § 22 (2004).

cases federal agencies may have authority to hold water rights by reservation or indirectly manage water through conditions placed on federal storage projects. The federal reserved water rights doctrine recognizes rights to a quantity of water sufficient to fulfill the specific purpose for which the federal government reserved the land; uses of this water may include instream flows.³² Federal agencies have also exercised regulatory authority to limit water uses that would interfere with various objectives under federal environmental or resources management statutes, such as for endangered species (done in accordance with the Endangered Species Act).³³ Often, controversy, extended court cases and associated costs have accompanied the application of federal efforts to manage water flows.

Efforts are being made in various states to incorporate federal agencies into instream flow management in a nonadversarial manner. Federal agencies can apply for state water rights for instream flow purposes in six states, Alaska, Arizona, Montana, Nevada, Texas and South Dakota. In Washington, federal agencies can participate with watershed groups in the Watershed Resources Inventory Area (WRIA) planning efforts to recommend river segments for instream flow protection. In Texas, federal agencies have contributed to studies to determine instream flow needs on a basin or segment basis. Federal agency representatives have also participated in a National Academy of Sciences review of instream flow protection in Texas as mandated by Texas Senate Bill 2 from 2001 (NAS 2005).

In Colorado, state and federal officials are working together to find cooperative means to maintain or enhance instream flows on federal lands. State statute requires that, prior to the initiation of an instream flow appropriation or acquisition, the CWCB “shall request recommendations from the United States Department of Agriculture and the United States Department of the Interior” (C.R.S. § 37-92-102(3)). It is thus written in law that the state must work with federal agencies to determine instream flow needs. While state law prohibits federal agencies from holding instream flow water rights, state-sponsored means are available to federal agencies to establish such rights. One effective approach is through the acquisition program, where agencies, organizations and private individuals can transfer existing rights to the CWCB for instream flow purposes. These transfers can occur in multiple ways, from outright gifts to the CWCB to leases where the original donor retains significant interest in and responsibility for the water right. Through a memorandum of understanding entered into in 2005, the CWCB and the U.S. Forest Service are exploring ways to work cooperatively on instream flow protection. See Figure 10 for further details.

³²The reserved water rights doctrine was formulated by the Supreme Court in relation to Indian reservations, *Winters v. United States*, 207 U.S. 568 (1908). See also *California v. Federal Energy Regulatory Comm’n*, 495 U.S. 490 (1990) (holding that federal law preempts state law when water is appropriated under the authority of the Federal Water Power Act). For a thorough analysis of the federal government’s authority to appropriate flows granted by the 1920 Federal Water Power Act see Michael C. Blumm, *Streamflows after California v. Federal Energy Regulatory Commission*, 21 *Envtl. L.* 113 (1991); Pamela S. Snyder, *California v. FERC: State Designated Instream Flows Fall Prey to FERC Authority under the FPA*, 5 *J. Env’tl. L. & Litig.* 127 (1990). For a detailed analysis of the federal government’s authority to appropriate flows for National Forests see Diane E. McConkey, *Federal Reserved Rights to Instream Flows in the National Forests*, 13 *Va. Env’tl. L.J.* 305 (1994).

³³ See e.g., *Klamath Water Users Protective Ass’n. v. Patterson*, 204 F.3d 1206 (9th Cir. 1999).

Figure 10: Pathfinder Project in Colorado

Providing protection for instream flows on federal lands has been a problematic issue throughout the Western United States for many years, and one not without controversy in Colorado. In May 2000, the Grand Mesa, Uncompahgre, and Gunnison (GMUG) National Forests initiated a process with multiple stakeholders to explore perspectives and options for strategic planning and for providing instream flow protection on streams located on National Forest lands. This process has been termed the Pathfinder Project.

Eleven stakeholder groups representing water users, conservationists, and water regulatory and management agencies met on a regular basis over four years to provide local community perspectives, ideas, and possible ways to manage for instream flows on National Forest lands. The following groups or stakeholders were represented in the Pathfinder Project: Club 20, Trout Unlimited, Grand Mesa and Grand Valley Water Users, San Miguel Watershed Coalition, Overland Reservoir and Ditch Company, State of Colorado Division of Water Resources, High Country Citizens' Alliance, State of Colorado Division of Wildlife, local ranchers, State of Colorado Water Conservation Board and the U.S. Forest Service.

A primary objective of the Pathfinder process was to develop alternatives to the controversial bypass flow requirements that have historically been imposed on special use permits in Colorado. To address this objective, the Pathfinder Steering Committee developed a list of "tools" (strategies or actions) for the Forest Service to use in cooperation with state agencies, water managers, water users, and other interested parties to provide instream flow protection on streams that flow through National Forest lands in Colorado.

The strategy set forth by the Pathfinder Project is one of actions that progress from more cooperative actions to more unilateral ones. A variety of options are outlined that provide for instream flow needs before the Forest Service would move to take unilateral federal action through bypass flow requirements (amount of water required to flow past a dam or diversion to support downstream needs) for special-use permits. The Pathfinder Project strategy views the application of bypass flow requirements as a federal action of "last resort," while recognizing that parties supporting the strategy have not waived their rights and abilities to either use or challenge such action. The first two tiers of action focus on collective and cooperative actions such as: re-operation of diversion or storage facilities, variable water use (drought options), possible acquisition (e.g., donations, purchase, leasing), better monitoring and management of diversions (efficiency), protection under the CWCB Instream Flow Program, limiting diversions to decreed amounts, and conservation. This cooperative approach to instream flow protection demonstrates the opportunities for federal agencies to work with stakeholders and state instream flow programs to achieve federal streamflow protection objectives in a manner consistent with state law. For more information, please see <http://www.gmugpathfinder.org> and [http://cwc.state.co.us/USFS/Pathfinder Project.pdf](http://cwc.state.co.us/USFS/Pathfinder_Project.pdf).

Protection and enforcement are an important area of partnership for the effective management of instream flow programs. In almost every state, the primary agency responsible for managing instream flows is the state's department or division of water management. In Texas and Washington, the primary administrators are housed in the Commission on Environmental Quality and the Department of Ecology, respectively. In Colorado, the primary responsibility to monitor and protect instream flows is held by the Colorado Water Conservation Board. Many states work cooperatively with other agencies and nonprofit organizations to effectively protect state instream flows. Most states rely on the gage system installed and managed by the U.S. Geological Survey to help monitor flows.

Another area of partnerships is between state agencies and nonprofit organizations to facilitate new appropriations of or transfers of existing rights to instream flows. For example, The Nature Conservancy (TNC) has actively worked with various states to provide for instream flows in the manner most appropriate for the particular state. In Arizona, TNC holds 10 instream flow water

rights certificated by the State and one in progress towards certification (in Arizona, once a water permit is perfected, the State issues a certificate of water right) (Logan 2005). In Alaska, TNC is working with state agencies to identify and apply for instream flow reservations. In Colorado, TNC was the first nonprofit organization to participate in the acquisition program, by acquiring and then donating the 1862 priority G. Berkeley Ditch water right in Boulder to the CWCB.

An interesting development in instream flow protection, especially geared toward transfers and acquisitions, is an emerging partnership between state agencies and private water trusts. Water trusts exist in Colorado, Montana, Oregon and Washington. These nonprofit organizations were created to help facilitate the transfer of water rights to instream flow needs where willing sellers or donors can be identified. Of these four states, only Montana allows private individuals as well as organizations to hold instream flow water rights. Nonetheless, Montana's water trust does not accept permanent transfers of water rights – only leased water rights may be banked.

Water trusts can help individuals or organizations participate in instream flow protection by hiring skilled staff and coordinating board members and volunteers to work cooperatively with state agencies. And even in states where private individuals or organizations can hold instream flow rights, doing so is a lengthy process that may be prohibitively expensive or complex. Other benefits being realized through water trusts include 1) ability to raise funds for purchase or to lease water rights for instream flow purposes; 2) skilled marketing that can help generate interest in and understanding of instream flows; 3) individuals who can help negotiate terms and conditions of transfers of water rights to instream flow uses; and 4) minimizing costs and time spent by potential donors of instream flow water rights. By leveraging the resources available to water trusts, states can expand their instream flow programs. More discussion of water trusts is found in the Emerging Issues section.

Planning/Needs Identification

As the Western states experience growth and development, it is important to provide an opportunity for preserving the water-dependent natural environment as water uses are developed for human needs. Careful planning and needs identification are necessary to help achieve this balance and to guide instream flow protection to areas of highest need.

Washington and Texas are pursuing interesting new planning efforts in regards to instream flow protection. In Washington, a watershed planning process was begun in 1998. Planning is occurring in over 60 watershed resource inventory areas (WRIAs). This process includes setting an instream flow by rule – a level that water is not supposed to fall below. Under the WRIA planning process, biological studies of designated watershed areas determine minimum flows needed to protect fish and other resources. In turn, this information goes back to stakeholder groups, which develop instream flow regulations that may be implemented if adopted through the final process. If instream flows are not set through this process by a certain date, the responsibility reverts to the Department of Ecology (this is happening in several WRIAs). Ideally, in Washington, a locally driven process is being used to direct the setting of instream flows throughout the state (Clifford 2004). There have been some problems with this process, primarily the time needed to complete the plans and the lack of available water to meet the rules

that have been set, but it is providing interesting experience in setting plans and goals for instream flow protection.

Texas is moving from setting environmental flows at specific projects (typically following reservoir construction) to planning for entire basins or river segments (Austin 2005, Loft 2004). Senate Bill 2, passed in 2001, initiated an instream flow program by directing the Texas Water Development Board (TWDB), Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD) to “jointly establish and continuously maintain an instream flow data collection and evaluation program.” They were further instructed to conduct studies to determine flow conditions in rivers and streams to maintain a “sound ecological environment” (NAS 2005). These agencies produced two documents in a series titled the *Texas Instream Flow Studies*. The first is the 2002 *Programmatic Work Plan* (PWP) and the second is the 2003 *Technical Overview*. These documents outline Texas’ approach to instream flow protection, describing the process for conducting sub-basin studies. The PWP identified six priority sub-basins for initial work (2003 to 2010) with four backup basins if any of the six cannot be evaluated. The sub-basin studies are to include consideration of hydrology, geology, geomorphology, water quality and connectivity, conducted in an interdisciplinary manner. Spatially, the PWP recognizes that studies will primarily be conducted as a fish and wildlife evaluation of a river segment, sometimes as a more comprehensive evaluation of a sub-basin and rarely as a comprehensive evaluation of an entire basin (PWP 2002, NAS 2005). The PWP is considered a rather ambitious document, but one that outlines a largely sound approach to evaluating instream flow needs across a basin (NAS 2005). Some recommendations provided by the National Academy of Sciences review of the PWP include the need to develop studies that can be consistently applied across the state while being tailored to a particular sub-basin and articulation of clear goals. Another area identified for improvement is to more clearly articulate how stakeholders will be involved in the process and who they will be. Currently, the PWP has identified the need for strong stakeholder involvement from groups such as the federal government, river basin authorities, the academic community, environmental groups, recreational groups and others. Pending legislation may create more changes to instream issues.

Colorado prioritizes potential instream flow appropriations through an annual work plan. The CWCB staff works in conjunction with representatives from the state Division of Wildlife and Division of Parks and Outdoor Recreation, federal agencies from the Departments of the Interior and Agriculture, interested nongovernmental organizations such as Trout Unlimited and The Nature Conservancy, and the public. The recommendations made by these parties are ranked with a set of pre-established criteria based on ecological needs, feasibility of appropriation, and level of support, among other factors. The top candidate streams are then identified in the work plan for the coming year for field study to determine whether to pursue them for appropriations. In 2005, acquisitions (water rights transferred to instream flow uses) will join appropriations in this work plan process. Staff will look more closely at water-short areas of the state where flows for new appropriations have not been historically met (restoration of flows, unappropriated flows, etc.) and will look for solutions by pursuing acquisition with willing entities in these regions. Acquisitions are especially pertinent to water-short areas as they can be used to preserve or improve the natural environment to a reasonable degree (new appropriations can only be applied for preservation, not improvement). Further planning is occurring through the Statewide Water Supply Initiative (SWSI), explained further in the Emerging Issues section.

Evolving and Dynamic Programs

Both the science and the policy supporting instream flow protection are continually evolving. While citizens, legislatures and agencies established foundations for instream flow protection as far back as the early 1970s, effective management requires adoption and changes of law and policy over the years. The evolving and dynamic nature of a program has been evaluated by determining whether new rules and statutes have been created and applied since its creation. Many states have adapted or changed instream flow programs to meet changing needs. Statutes and rules in other states have remained largely as when first introduced, or in some states were never created. This latter category includes Kansas, Nevada, New Mexico³⁴, North Dakota, South Dakota, Utah, and Wyoming.

In other states, laws and rules have been adjusted to address changing needs, lessons learned, and emerging science. States that have been the most active in addressing needs and creating and perfecting new rules and laws include Alaska, Arizona, California, Colorado, Idaho, Montana, Nebraska, Oregon and Washington. For example, Nebraska passed new legislation in 2004 (LB 962) allowing water right holders to transfer a water right to instream flow use. Previously, transfers could not be made to instream flow purposes (France 2005). Montana passed House Bill 308, which removes a sunset provision from the leasing program, making permanent the provisions in the Montana Water Use Act that provide for water leases for instream flow fisheries purposes by private parties (Schenk 2005).

One interesting example of a state addressing the need for clearer rules is Arizona. Given differences between instream flows and offstream uses, government officials and others realized that there were many unanswered questions on the part of potential instream flow applicants. In 1986, the Arizona Department of Water Resources (ADWR) convened an interagency task force consisting of professionals with experience in quantifying instream flow beneficial uses. The stated goal of the Task Force was to “make recommendations to the Department on acceptable methods for determining beneficial use standards.” For this purpose, two subcommittees were established: the Hydrologic Subcommittee and the Biological Subcommittee. The recommendations of the Task Force resulted in the Department’s issuance of a guide to assist applicants to assist potential applicants with meeting statutory requirements for instream flows (Ronald 2005). Currently the Arizona Department of Water Resources (ADWR) provides a document, *Guide to Filing Applications for Instream Flow Water Rights in Arizona*, which outlines procedures on how the ADWR processes instream flow applications (Logan 2005).

Colorado has adjusted and updated its instream flow program since the original legislation was passed in 1973. Some bills removed authorities from the program (such as House Bill 00-1438 in 2000 that removed the ability for the state to convert conditional water rights to instream flows), while others helped to clarify and strengthen the program. For example, Senate Bill 02-156, passed in 2002, gave the state authority to acquire water to preserve and *improve* the natural

³⁴ Late research for this study found that the 2005 New Mexico Legislature passed legislation and provided \$2.8 million to create and fund the “Strategic River Reserve.” This legislation allows the New Mexico Interstate Stream Commission to lease or purchase water rights from willing sellers, obtain rights to store water, and accept donations of water rights to help endangered species and their habitat, and to meet Interstate Compact obligations. No transfers have occurred to date, but regulations for the implementation of the program are currently being developed (Medley 2005).

environment when acquiring water rights, a significant change from the strict preservation language associated now only with new appropriations.³⁵ This is an especially important change for river restoration work in which the existing environment may be seriously damaged but could be improved through stream corridor enhancements and additional flow. Another response to emerging needs is House Bill 03-1320, passed in 2003. This law authorizes water rights owners to loan water to the CWCB for instream flow use for a period not to exceed 120 days, and was originally restricted to use in a basin or county where the governor declares a drought emergency. This law was updated in 2005 with passage of House Bill 05-1039, which removes the requirement of a declaration of drought emergency. This authorization helps to simplify the process for transfers during critically dry periods.

Another interesting factor associated with new legislation and rule or policy setting is that it provides a forum for significant public involvement in the program. In Colorado, as in other states, there are strict guidelines that require public notice and comment at various stages of rulemaking and the making of policy. In this way, the public is continually involved in helping to shape the state's approach to instream flow management.

On-the-Ground Accomplishments

As mentioned previously, the instream flow programs found in Western states utilize a wide variety of mechanisms to achieve established goals. Rather than focus on the actual mechanisms used to achieve these goals, this section attempts to evaluate program effectiveness in terms of what programs have been able to achieve in real terms. Accomplishments are a critical characteristic for this analysis as they demonstrate how effective each program has been in actually achieving resource protection.

Information generated for this study of achievements has focused on the above discussed sections on partnerships, levels of protection and enforcement, and planning/needs identification. Another set of interesting achievements is how many streams have been protected. States break down into several categories on this issue. The first category involves the presence or absence of information on instream flow transactions. Some states have extensive and easily accessible records on instream flow water rights. One of the best among these is Colorado. At a glance, the public can determine how many appropriations and acquisitions (transfers) exist for instream flows and natural lake levels. Using the CWCB Web site, one can find a listing of all these rights and scan detailed information on the name of the rights, the priority date, the location, biological justification, and other forms of data. Any interested person can also access judicial records on the water right through the Water Resources Information Center (WRIC).³⁶ Furthermore, the public will be able to access an interactive geographic information system (GIS) of instream flows created by the CWCB in late 2005.

Like Colorado, Idaho provides easily accessible information on its instream flow Web page. A spreadsheet contains detailed information on the state's minimum flow water rights, such as the

³⁵ Other states that allow for improvement or enhancement, rather than only maintenance of existing flows, include Arizona, California, Kansas, Montana, Nebraska, Oregon, Utah and Washington.

³⁶ Colorado Web sites include: <http://cwcb.state.co.us/isf/Database/> and <http://cwcb.vjis.state.co.us/cwcbimaging.htm>.

location, mileage, requesting entity, priority date and flows. A map shows the location of these flows (though this is not an interactive map as posted on the Web site).³⁷ However, as with many states, good information is available for new appropriations, but limited to no information is available for transfers. Alaska also has a searchable water rights database and map that the public can access.³⁸ It is not clear, however, if instream flows can be individually searched at this site.

At the other extreme, some states interviewed could not provide information regarding the number of instream flow rights processed. Nevada does not appear to have digitized information that can be easily searched to determine how many water rights were established for instream flow protection. California also has limited information on existing instream flow water rights. While many transactions have been processed through the Environmental Water Account, it is difficult to know how many are in effect at any particular time (Hanak 2002). Texas has modified a few water permits based on instream flow needs, and certain flows have been identified for estuary needs (Austin 2005), but no specific list could be found. Montana does have a database where staff can query if a reservation is established on a stream, but not a central Web-based site where this information can be accessed. Staff is working to move this information to the Web (Shenk 2005).

Other states lie between these two extremes. Finding a tally of instream flows in Washington is difficult. The Water Right Tracking System, released in 2005, provides information updated monthly on pending water right and water right change applications.³⁹ This is a useful tool that provides information on applicants, location, type of use and quantity, complete with map links. However, it does not provide a summary of quantity or information about existing instream flows or other water rights. Oregon has interactive maps on its Web site showing where instream flow water rights are located, though codes for instream flows are not easily understood without staff assistance.⁴⁰ The state also lacks easily tabulated information or any indication as to quantity or type of existing water rights. Wyoming posts information about its instream flows on the State Engineer's Web site. This spreadsheet has details on all applications, showing priority date, hearing status, stream segment, whether and when a permit has been issued, location, quantity, and stream length.⁴¹ This information is not yet mapped to show locations.

Recognizing that information availability varies greatly, the following summary shows which states have established the greatest number of instream flows. Although it would be helpful to discuss number of stream miles or volume of water protected, this is not possible given both the lack of available information and the fact that some states operate on a segment basis and some on a point basis, thereby having no stream miles to report.

It is interesting to contrast Tables 16 and 11 (pages 14 and 19 respectively). Contrasting these two tables shows that some of the states with the most permissive legislation (especially regarding who is eligible to appropriate flows and what instream uses are permitted), such as

³⁷ Idaho's minimum stream flow map and database can be accessed from:

http://www.idwr.state.id.us/waterboard/planning/minimum_stream_flow.htm.

³⁸ Alaska's Web site can be accessed at http://www.dnr.state.ak.us/mlw/mapguide/wr_intro.htm.

³⁹ Washington's Web site can be accessed at <http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html>.

⁴⁰ Access Oregon's maps at http://www.wrd.state.or.us/OWRD/MAPS/index.shtml#Interactive_Water_Right_Maps.

⁴¹ Wyoming's instream flow tabulation can be found at <http://seo.state.wy.us/PDF/IFAPSSHweb.pdf>.

Alaska, Arizona and Nevada, have some of the fewest protected rights. States where only one or more state agencies (Colorado and Oregon) may apply for instream flow water rights are the states that have been most active in securing instream flows.

Summary of Analysis

A wide variety of styles and results exists among the Western states across a wide range of issues central to effective management of instream flow protection, from the simple existence of legal mechanisms to protect instream flows to the management style exercised, to the on-the-ground accomplishments. No one state has a clear monopoly on the best program and achievements.

Some states have not participated in instream flow protection to any significant degree. The least active include New Mexico, North Dakota and Oklahoma, an interesting mix of geographic locations and economic backgrounds. These states are surrounded by other states with similar geography, hydrology and economies that have made greater strides toward instream flow protection.

Some states gravitate to a middle ground. These states have the legal ability to protect instream flows and have done so to some extent, but have not taken great strides to move beyond original legislation or goals. Included among these states are Kansas, Nebraska, Nevada, South Dakota, and Utah. While these states can legally protect instream flows, very few rights have been processed, around 62 total. Additionally, these states (with the exception of Nebraska's provisions to allow transfers and simplify the review process) have not updated legislation or rules to expand the protection available through instream flows or to facilitate the process.

Alaska, Idaho, and Wyoming have all pursued more instream flow rights and more actively support instream flow issues than the aforementioned states, but have been hampered in different ways from being active with their programs. Alaska has hundreds of applications in the progress to become instream reservations, but due to limited resources has not yet processed these applications (Estes 2004). It should be noted, though, that Alaska has limited pressures on its water resources, making instream flow filings less critical than in other states with more heavily depleted water resources. Legislation passed in Wyoming is fairly narrow compared to other states (Table 5); however, managers there have made efforts to keep the public well informed and perform as well as possible. The Wyoming Game and Fish Department has posted extensive information about instream flows on their Web site.⁴² The Web site has links to useful technical papers, articles and publications that describe instream flows and their application in Wyoming, such as the difference between instream flows and return flows and the instream flow program's five year plan.

Some states are difficult to classify and compare. In Arizona, instream flows were established as a legally permissible use not through special statute but by court decision that instream uses were beneficial uses and diversion was not necessary. Several statutes have been enacted that expressly address instream flows, but only 93 instream flow water rights have been applied for, mostly by federal agencies, a few nonprofit organizations and several state entities. However, it

⁴² Wyoming's information can be found at <http://gf.state.wy.us/fish/watermangtISF/index.asp>.

can be said that administrative staff has dedicated time and resources to proactively convene a multiparty task force to clarify the application process for instream flow water right applications (Gillilan and Brown 1997, Logan 2005). Given these realities, Arizona appears to rank toward the middle ground.

Texas is difficult to rank. It does not currently have the authority to grant permits for instream flow protection so would appear to fall toward the lower end of the Western states. However, as described under the characteristic of Planning and Needs Identification, Texas has taken a particularly active stance toward setting instream flow levels throughout the state and refining methods to accomplish instream flow protection in an inclusive and participatory manner. Texas is also difficult to classify because it is just now at the end of a significant program review (NAS 2005) and limited information is currently available about on-the-ground instream flow protection. More changes may be made soon to the program if pending legislation passes (which has been adopted by the Senate and is being considered by the House of Representatives) (Austin 2005). This thorough bill is indicative of the level of effort that has been applied to instream flows in Texas. Also difficult to compare to other Western States is the work done to address freshwater inflow needs of bays and estuaries. This program, in place since 1985, has seen the completion of studies of the major estuaries (with flow needs addressed through conditioning of rights, not through instream flow water rights).

California has a complex water right system mixing appropriative and riparian rights with major interbasin transfers. Management of instream flow needs is similarly a complex affair, very different from that of any other state. A primary means of instream flow protection is through administrative and judicial procedures to limit other water uses, but there appears to be no overall summary of how many water bodies are thus protected and how effective protection is. An area of concern with the program is that instream flows are set as points rather than segments. In some areas, such as Mono Lake, this is not critical as there are no diversions downstream of the administrative flows. With rights transferred to instream flow uses, those can be removed after passing the original point of diversion by a downstream user. The Environmental Water Account and other transfer mechanisms, which more closely approximate other states, are relatively new and are not quantified. Section 1707 of the California Water Code (authorizing transfers to instream flow purposes) was not established until 1991. According to some authors (Gillilan and Brown 1997), California is considered a “state to watch.” Although certain aspects of California’s instream flow protection are interesting for study, it is not comparable or easily measured for the purposes of this analysis.

A final batch of states rank toward the top when program effectiveness is evaluated by the factors considered in this analysis. In this category are Colorado, Montana, Washington and Oregon. These states have all processed numerous rights, actively monitor and protect these flows, adequately staff programs, and are on the forefront of new management ideas. All these states have sought to proactively manage instream flows. Interestingly and coincidentally, these are also the states with active, private water trusts.

Montana is included in this category based on the number of transactions, its active monitoring and protection, and ongoing dialog with numerous stakeholders and new approaches to securing instream flows. Although it has only 12 actual instream flow water rights (“Murphy Rights”),

Montana has processed over 400 reservations. Montana's program continues to change and be updated by the Legislature. After some difficult seasons enforcing instream flows, state agencies created a careful system of notification and outreach with potentially affected water right holders. In addition to working actively with water right holders, Montana, like its Pacific Northwest neighbors, works actively with organizations such as the Montana Water Trust and Columbia Basin Water Transactions Program. Montana, like Oregon and Washington, has looked to creative means for finding water, working with agriculturalists and others for transfers and conserved water. Some concerns regarding program effectiveness include: the legal status of reservations in comparison to water rights (instream flows are primarily processed as reservations while other water uses can be granted full water rights); and, associated with the reservation issue, the review requirement, which can be a significant use of state resources and renders instream flow reservations less permanent than water rights. Finally, Montana has indicated that it is working on posting information on reservations to its Web site, but currently this information is not as available as in other states.

Oregon is often referred to as a "program to watch," and has achieved significant protection. Oregon has established a significant number of water rights across stream reaches in comparison to other states. It has also been among the first states to establish instream flow protection and to experiment with tools to transfer water rights to instream flow uses, including the use of split season⁴³ instream leasing. Activity on appropriation of new water rights has recently slowed, with more emphasis placed on acquisition of leases and transfers of existing rights to instream flow purposes. Legal concerns have surfaced, with some of the conserved water transfers injuring senior water rights. An interesting note about Oregon is that it can set its instream flow water rights at desired levels, not flows that are actually available. Flow levels are considered goals, biologically the most desirable level (French 2004, Gillilan and Brown 1997). Oregon appears to be the only state to use this approach. Any reading of Oregon totals should contain the caveat that these are not necessarily the flow levels currently available for instream flow purposes. Oregon, as with many programs, has also been criticized for the complexity of its programs and resulting difficulty in protecting flows, even with short-term leases. It is understood that efforts are being made to address these concerns while maintaining necessary review and analysis.

Washington ranks among the top states for reasons similar to that of Oregon. It has established more water rights than many other states—with conditions set on over 180 streams and closures established in over 20 basins, and was one of the first states to establish instream flows, and has worked with the transfer of existing rights to instream flow uses under voluntary transactions. Washington's program is in a renewed period of activity with its WRIA (Watershed Resource Inventory Area) planning and Trust Water Rights Program. State agencies and partners have been particularly active in establishing plans and goals for instream flow activities. According to management at the Department of Ecology, over 12 people have been dedicated full-time to instream flow issues. It will be valuable to follow the WRIA experience to see if it produces new, enforceable, widely accepted instream flows. It is an interesting effort to combine instream

⁴³ Split seasons is defined in Oregon Administrative Rules, Division 77, as "the exercise of a water right in the same season defined by the water right in the same calendar year for both the existing purpose of the water right and for an instream purpose, provided that water is not used for the existing purpose during the period in which the water is to be protected instream" (OAR §690-077-0010 (29)).

flow protection with other water management concerns. Washington has also been uniquely active in preparing studies and reports on instream flow issues, both for the state and across the Western United States. For example, the Washington Department of Ecology helped prepare an “Analysis of Water Banks in the Western United States.”⁴⁴ The Department of Ecology has also created a useful tool, the Water Right Tracking System, to show the progress of water right applications and permits. They have been working on, and anticipate completion of in Fall 2005, a database to track Trust Water Rights (Adelsman 2005). Their Web site in fact contains much information and many links on current instream flow issues.⁴⁵

Colorado has realized a strong mix of achievements and has adjudicated 1,947 instream flow and natural lake level water rights. While the process to appropriate, acquire and adjudicate these rights is neither simple nor speedy (similar to Oregon), these rights are among the most permanent and secure of any state. Instream flow water rights in Colorado are fully adjudicated property rights rather than being established by administrative measures and yet do not require legislative approval nor periodic review, as required in a few other states. Colorado has also actively sought to update its program through legislation and rule-making. While at times this has limited the scope of the program, in other cases it has led to wider options and improved efficiency. Although Colorado’s statutes are among the most limiting regarding who can appropriate instream flows, and are not the most permissive regarding types of beneficial uses for instream flows, Colorado has still perfected more permanent water rights than any other state; in fact, more than most other states combined. In water-short areas of the State, Colorado has advocated use of the Water Acquisition Program to acquire senior water rights to preserve or improve the natural environment. With the continually expanding use of the Water Acquisition Program and coordination with the Colorado Water Trust and similar organizations, private participation in instream flow protection should continue to grow.

⁴⁴ This report is available at <http://www.ecy.wa.gov/pubs/0411011.pdf>.

⁴⁵ The tracking system is available at <http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html>. The Washington Department of Ecology instream flow Web site is at <http://www.ecy.wa.gov/programs/wr/instream-flows/isfhtm.html>.

Table 17 ranks all 18 states on the basis of four factors, which are a compilation of the nine characteristics of effective instream flow management that guided the comparative analysis.

Table 17: State-by-State Ranking of Instream Flow Protection Effectiveness

	Minimal	Moderate	High
Results⁴⁶	NE SD OK TX NM ND OK	AK AZ CA KS NV ID WY	MT WA CO OR
Maintenance⁴⁷	NM ND SD OK NV	AK AZ ID WY KS TX NE	CO MT OR WA
Process⁴⁸	NM ND OK KS SD	AK AZ ID UT WY CA NE NV MT TX	CO OR WA AK
Groundwork⁴⁹	NM ND OK SD	CA TX UT KS NE AK MT	CO OR WA WY NV AZ ID
	Minimal	Moderate	High

⁴⁶ Results are a function of the on-the-ground accomplishments in the number of instream flow rights.

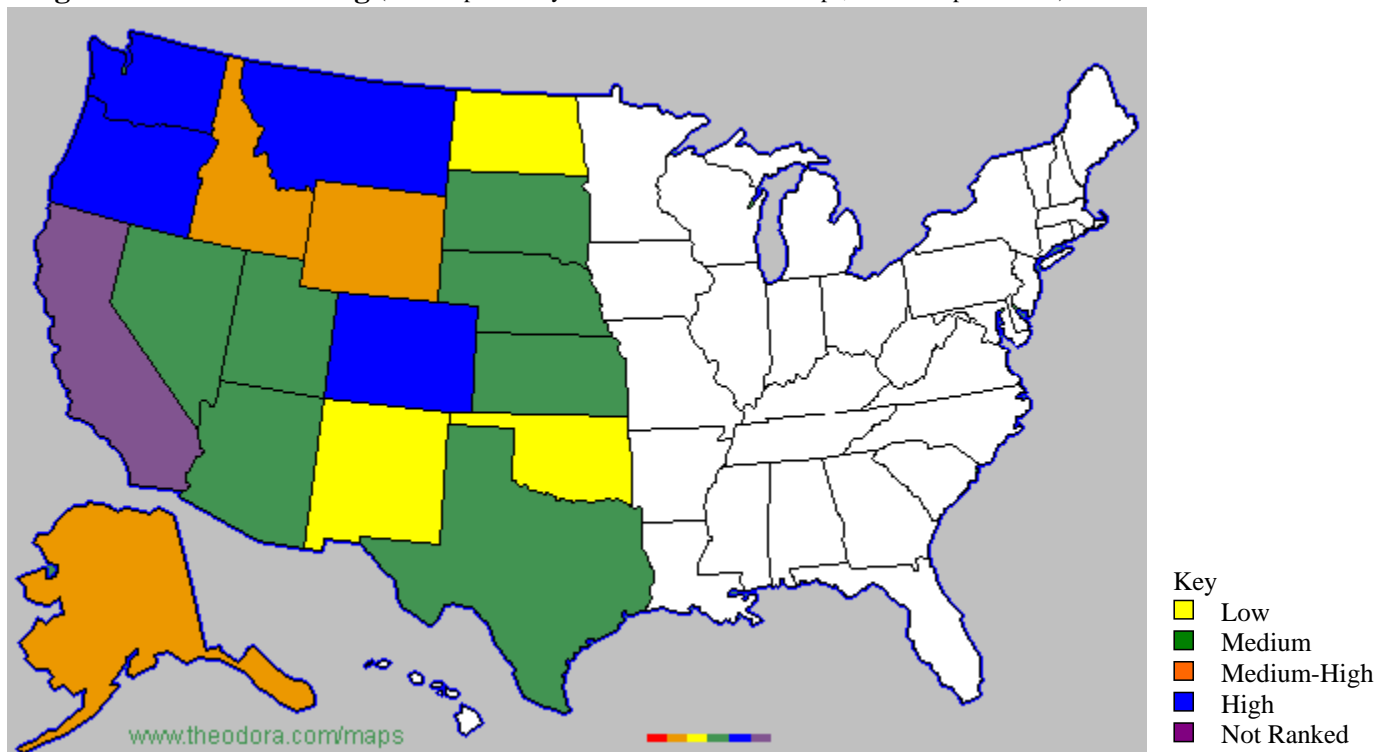
⁴⁷ Maintenance is a function of protection and enforcement, pursuit of useful partnerships, and efforts made to update and improve protection through new statutes, rules or other policy measures.

⁴⁸ Process is a function of how states follow scientific methods for setting flow levels, whether flow levels are set at one base flow or several flow levels, what resources the state dedicates to securing and protecting instream flow rights, and how many agencies and outside organizations and individuals participate. Another factor is what planning process is used to identify and fill instream flow needs.

⁴⁹ Groundwork is a function of legal recognition of instream flow as beneficial use, ability to appropriate new flows, ability to transfer existing water rights or permits to instream flow purposes, and permanency of water rights.

The following map shown in Figure 11 also shows the ranking of these states as developed through this report.

Figure 11: State Ranking (base map courtesy of www.theodora.com/maps, used with permission)



Emerging Issues

While researching and writing this study, issues arose that could not be sufficiently analyzed at this time. These issues include new policies or ideas being considered by resource managers and scientists that are not currently operational. These policies and ideas are interesting to outline for perspective on how to manage and improve instream flow protection. Three categories arose from this study: emerging science, sources of water to meet instream needs, and water trusts and other new partnerships.

Emerging Science

Instream flows are established to meet one or more particular needs that are dependent on the presence of water in a stream, lake or other water body. These needs vary from protection of fisheries to provision of recreational opportunities. A primary purpose of instream flow protection has been protection of fish, other wildlife and habitat associated with riparian areas.

When the majority of instream flow programs were established in the 1970s and 1980s, the focus was on the protection of a “minimum” flow, often granted as a year-round figure. The sciences associated with river management at the time focused on the need for a minimum amount of

water to be left in a stream, particularly the effect this flow had on fish. It was believed that low flows were the primary constraint on the health of aquatic species (Postel and Richter 2003).

Research and practice over the past decades show that low flows do not tell the entire story. According to the scientific community, the health of an aquatic system is keyed to the entire flow regime, with different species of fish, plants and other organisms taking their cues from periods of low flows, peak flows and the naturally occurring flow variation throughout the year. River health is not only tied to annual hydrograph variations, but inter-annual variations as well. Thus, meeting the needs of fish, riverine habitat and other environmental values requires not only management for a given minimum flow, but for a range of flows that mimic the natural flow regime of a stream. This includes needs for low flow periods and peak flows. Since the inception of instream flow programs, biological and hydrologic sciences have evolved to demonstrate the importance of variable flows to stream health and associated biological communities. Additionally, an interdisciplinary approach with experts in hydrology, biology, geomorphology and water quality clearly results in an improved understanding of river needs (Instream Flow Council 2002, NAS 2005, Postel and Richter 2003).

Blending changes in the scientific understanding of riverine systems with instream flow programs is not a simple task. As stated earlier, a characteristic of effective instream flow management is the ability to provide permanent, reliable water rights. Fluctuating flow levels are not easy to incorporate into a prior-appropriation legal system that requires reliability and consistency for efficient and equitable management of all water users. An interesting discussion and synthesis of instream flow science and policy can be found in the recently released review of Texas' instream flow program in Chapter 3 "An Introduction to Instream Flow Science and Programs" (NAS 2005). A key issue pertinent to this report is how to translate advances in science into sound policy.

Some researchers have suggested turning the water rights system "upside down." With "upside-down instream flow water rights," a stream would be managed by looking at how much water could be extracted for irrigation, municipal, hydropower and other traditional needs while still meeting the flow needs of the stream ecosystem. With this approach, flows could be withdrawn or modified only as much as the best available science shows would not be harmful to the river's health. If more was withdrawn, this trade-off would be clearly known. This approach would be most applicable in relatively undeveloped streams where not all the water is already appropriated. In highly developed appropriated streams, upside-down water rights could have the greatest applicability in periods of peak flow (Silk, McDonald, Wigington 2000).

Australia and South Africa currently provide useful insights for incorporating natural flow regimes into river management. As programs were developed in these countries well after those in the United States, it was possible to incorporate newer science into policy. Both countries established what some experts call "holistic" methodologies to determine flow demands. These methodologies look at a wide array of biological factors to determine flow, not just fish or other key species needs. This science is then translated into policy by setting goals for particular rivers and basins; for example, assigning classes to a system from natural to good to fair to poor, each with a different associated flow regime (from natural to highly altered). Rather than setting one or two flow levels for a system, a desired regime is set forth in policy (Postel and Richter 2003)

Of the 16 states that legally permit instream flow protection, several states only allow for instream flow filings that meet the minimum necessary to maintain the natural environment. Among these states are Idaho, Nebraska (though the minimum requirement has not been strictly interpreted), and Wyoming. Colorado only allows for the minimum level for new appropriations, but now allows for flows to preserve or improve the natural environment for water transfers. Utah refers to a “reasonable” flow. Alaska does not require a minimum flow, only that the flow requested must be available for reservation. Oregon and Montana reference a 50% exceedence flow when determining instream flows. Oregon statutes include references to “desirable” levels for recreation, “conservation, maintenance and enhancement of aquatic and fish life, wildlife, and fish and wildlife habitat” and levels “necessary” for pollution abatement (ORS §537.336).

Most if not all states have instream flows that have been set at one minimum flow level throughout the year. Several states, including Arizona, Colorado, Montana, Oregon, Washington, and Wyoming, allow for setting of multiple flow levels, though often split into only two seasons. Colorado is active in prescribing more than one flow level. While it may be possible to create conventional instream flow rights to reflect a natural flow paradigm, this has proven to be a difficult and rarely used policy tool for implementing enhanced scientific understanding of stream systems. New approaches to mimic natural flows in critical streams through instream flow rights and other policy tools are a key area of development for instream flow protection. Fundamentally, to make emerging science relevant to resource management, continued conversation is needed among scientists, policy-makers and water users, fed by experiences in on-the-ground implementation.

Sources of Water to Meet Instream Needs

Water scarcity and competing demands are hardly emerging issues in Western water management. However, recent droughts throughout the Western states and increasing demand from a growing and urbanizing population is putting new and different strains on water distribution, affecting water availability for instream flow protection. To this is added a growing capacity to provide economic valuation to ecosystem services such as those provided by stream systems, and a growing understanding of the role recreation and tourism play in the Western states. Instream flow management will be challenged to balance the continued need for instream and out-of-stream needs.

Most water has already been appropriated in the Western United States. According to a study on water supply recently completed in Colorado, the state faces a municipal and industrial shortage of about 20 percent by the year 2030 (CDM 2004). States will face growing challenges on how to manage water resources to meet competing needs. In addition to growing demand, drought will continue to provide a level of uncertainty as to how much water will be available during dry years compared to a “normal” water year. Where will water come from to meet instream needs?

One potential source of water is that used in ranching and agriculture, an area cities are turning to to purchase or lease water rights. This is also where water trusts, as outlined below, are developing partnerships. Another potential source of water may come as reservoirs are enlarged or new dams are built, in the form of storage rights granted for instream flow releases. Several states have implemented legislation to promote flexibility with regards to short-term leases and

needs during times of drought. Among these states are Colorado (with authority for the CWCB to receive loaned flows established in 2003 House Bill 1320 and 2005 House Bill 1039), Idaho, Montana, Oregon, and Washington (through the Washington Water Exchange).⁵⁰ Oregon has a measure that allows it to suspend the public notice period (only 21 days for short-term leases) in times of drought, though this has not yet been used (Rice 2005). States are also exploring ways to find “surplus” water and make it available for instream flows through conservation. This particular area is one of great controversy and debate. A final means of finding water is to work with water rights holders to transfer retiring rights to instream uses.

In regard to methods to put conserved water into instream flow programs, Montana and Oregon are the states with the most activity. The Oregon Conserved Water Program (ORS 537.455, passed in 1987) amended state water law to allow water users who voluntarily conserve water to retain control over a portion of the saved water. A water user can submit an “Allocation of Conserved Water Proposal” to the Oregon Water Resources Commission. If the proposal is approved and the conservation measures are implemented, the law authorizes the water user to keep up to 75% of the conserved water for additional use, sale, or lease, with a minimum of 25% of conserved water going to the state. The exact percentage depends upon the amount of non-reimbursable state and federal funding. The process is a relatively long one, requiring at a minimum design of a project, public notice and comment, Oregon Water Resources Department (OWRD) review and determination, project approval, and completion and issuance of new certificates (<http://www.owt.org/solutions.html>). To date, approximately 35 projects have been submitted with 15 completed (Rice 2005). Oregon officials identify problems associated with this system such as the difficulty of determining how much water is conserved and whether this water would have resulted in return flows in its prior “unconserved” state. Problems have also been identified with unintended injury to other water right holders as water is dedicated instream or sent to other locations through this program. Determination of consumptive use and resolving injury to other users are complex issues that may discourage conservation efforts. Another issue is that Oregon’s program is entirely voluntary and officials estimate that many conservation projects are happening without entering into the Conserved Water Program, resulting in little gain for instream flow protection.⁵¹

In Montana, the legislature amended the state's water code in 1995 to allow water right holders to donate or lease some or all of their water rights for transfer to instream use. This water code, M.C.A., 85-2-419, allows for water saved through increased water use efficiency to be donated or leased for instream use. According to state officials, this has become a useful tool for establishing instream reservations, opening opportunities that did not exist solely with the retirement of water rights.

In Washington, the Irrigation Efficiency Program is an effort to move conserved water into a state water trust. Currently, the government will provide up to 85% cost share for irrigation improvements and in return requires that a percentage of the water equal to or greater than the cost share be dedicated to the Trust Water program. In this way, conserved water can later be applied to instream or other uses (Lovrich, Siemann et al. 2004). Interestingly, the donor cannot

⁵⁰ Washington’s Water Exchange is at http://www.ecy.wa.gov/programs/wr/drought/2005/drt_wtrxchg.html.

⁵¹ Information on Oregon’s Conserved Water Program can be found at http://oregon.gov/OWRD/mgmt.shtml#Water_Conservation.

specify what the water will be used for and it is open for application to instream, irrigation, municipal and other uses. Again, determination of efficiencies and impacts to other water right holders is a difficult issue.

The Kansas legislature added authority in 1988 for the State to purchase water rights in over-appropriated areas on a cost-share basis. This authority had not been exercised as of 2005. Currently, Kansas is considering legislation to revise this authority and make it more attractive for water users to retire a water right in an over-appropriated basin through its Irrigation Transition Assistance Program. This program would be supported through the Natural Resources Conservation Service (NRCS) and its EQIP program (that provides incentive grants to help implement dryland practices). Kansas is pursuing federal funding for a pilot program to implement this Irrigation Transition Assistance Program. The primary purpose is to stabilize an aquifer, but it could also be used to stabilize stream flows (Stover 2005).

In conjunction with water conservation measures or as separate ways to work with agriculturalists, water trusts (see below) and others are promoting the following tools to help water right holders flexibly manage water rights to increase streamflows. These tools include modified land management (through practices such as switching to dryland crops or rotating crops); installing more efficient irrigation systems; withdrawing water from a different location in the system to help re-water the driest stretches; changing the source of irrigation water from surface water to groundwater or stored water; irrigating during the first half of the season, then leasing or donating the water instream for the second, drier half of the season; or coordinating with neighboring irrigators to take turns leasing or donating water instream. The Oregon Water Trust lists these tools as modified land management, water conservation, split-season leasing, source switching, point of diversion change, and rotational pooling agreements (<http://www.owt.org/solutions.html>).

A question exists as to whether the amount of consumptive water available from conservation projects that will clearly not adversely affect other water right holders is so negligible that the required effort to develop these programs is not a wise use of time and resources. An area that is being explored with potential benefits is working with agriculturalists and ranchers to help direct retired water rights in part to instream flows through voluntary agreements that may be pursued through donation, purchase or lease. States could help to make this possible by providing clear information on how to transfer rights, support for the necessary studies to determine potential impacts to other water right holders, support for the expenses associated with pursuing a change of use, studies and information on the true impacts of moving water from consumptive out-of-stream use to instream flows (to offset concerns from neighbors and other individuals) and the establishment of centers that could help potential donors or sellers meet with interested buyers.

The CWCB has conducted a Statewide Water Supply Assessment (SWSI) to assess Colorado's current and future water needs and develop ways to meet projected demand. Through this process, round table meetings were held in every water basin in Colorado to discuss water needs and issues with local, state and federal agencies, the public, and nonprofit organizations. Several potential water development projects were identified. The meetings resulted in a conclusion that environmental and recreational demands for water are expected to increase with population growth. The CWCB is looking at ways that its instream flow program can address environmental

needs and also provide and maintain regulatory stability in connection with water development projects.

Water Trusts and Other New Partnerships

A recent addition to instream flow protection is the development of private water trusts. Water trusts can generally be defined as nonprofit organizations whose mission is to work cooperatively with water right holders, governmental agencies and other interested parties to restore flows to priority streams. Currently, water trusts exist in four states—Colorado, Montana, Oregon and Washington. The Oregon Water Trust was the first, created in 1993. The Montana Water Trust was established in September 2001, the Washington Water Trust in 1998, and the Colorado Water Trust in 2002. The Columbia Basin Water Transactions Program (CBWTP), started in 2002 (<http://www.cbwtp.org>), acts as a water trust across the Columbia Basin states of Montana, Idaho, Washington and Oregon.

The four water trusts promote an approach that is consistent with the direction instream flow protection is taking within state agencies. Key aspects of the water trust approach include 1) a clearly articulated prioritization process and/or criteria to identify candidate streams; 2) involvement of board members and others from all elements of the water community; and 3) the application of a “market-based” approach to acquiring water rights through lease, purchase or donation only with willing parties.

The four existing water trusts all emphasize use of scientific approaches for identifying candidate streams for instream flow protection. Both the Washington Water Trust (WWT) and the Oregon Water Trust (OWT) prioritize first by basin or watershed. The OWT chooses those that have historically supported significant fisheries and analyzes streamflow and habitat conditions to evaluate potential acquisitions. The OWT “concentrates acquisition efforts on small to medium sized tributaries that provide spawning and rearing for salmonids... where small amounts of water can provide significant ecological benefits.” The WWT “established priority basins by a set of criteria which includes low flow problems due to irrigation diversion, ESA listed fish, and the potential to provide significant benefit.” According to the Montana Water Trust (MWT) Web site, “MWT uses science-based methods to identify those streams where the acquisition of out-of-stream water rights for conversion to instream water rights will provide the greatest potential benefits for fish and water quality.” The Colorado Water Trust (CWT) clearly outlines the criteria and factors it applies to the evaluation of potential acquisitions. For example, the criteria it uses, as listed on its Web site (<http://www.coloradowatertrust.org/guidelines.html>), are as follows:

1. Benefit "water short," ecologically significant, water dependent natural environments (as shown on the CWT-DOW Identified Potential Conservation Interests river basin maps).
2. Complement rather than duplicate or compete with other established conservation programs.
3. Comply with Colorado water law, including water development under interstate compacts and equitable apportionments.
4. Have credible records of actual consumptive use, i.e., no "paper" or conditional rights, or other factors that invite hotly contested change cases.
5. Minimize harm to agricultural productivity.

6. Constitute the minimum interest necessary to accomplish the objective.

An interesting aspect of water trusts is the breadth of interests represented by the boards and outreach efforts. For example, the OWT writes that “Oregon Water Trust’s board of directors is a diverse group. Agricultural, environmental, legal and tribal perspectives are equally represented on the board. Oregon Water Trust’s diverse board membership allows us to openly and effectively address the concerns of rural Oregonians regarding their livelihoods and the conservation of aquatic resources.” The WWT writes “The Water Trust works cooperatively with farmers, ranchers, irrigation districts, tribes, public agencies, land trusts, and other non-governmental organizations to accomplish its stream restoration goals.” In Colorado, the board members of the CWT include water attorneys, ranchers, and representatives of public utilities, environmental organizations, municipal water providers, water conservancy districts and others. Its Web site states, “The Trust works in coordination with the agricultural community and other water users, governmental entities, land trusts, watershed groups and other non-profit conservation organizations.” The need for increased partnerships and representation of a broad spectrum of water users and other interested parties appears to be well established in the formation, board membership and stated intents of these water trusts. The CBWTP has funded over 100 water transactions since 2002, with funding provided largely by the Bonneville Power Administration (providing approximately \$4 million annually for water transactions) (Purkey 2005).

A final key aspect of the water trust approach is the use of market-based approaches to acquire instream flows. All four water trusts clearly indicate a reliance on market-based, voluntary means to secure instream flows. For example, the CWT writes, “the Trust uses market-based mechanisms to acquire rights by purchasing them from willing sellers and by accepting donations.” Water trusts are working within the existing water right system and implementing legislative authorities to transfer existing water rights to instream flow purposes through permanent change of use or short- to long-term leases. In all states but Colorado, the ability to transfer water to instream flow use has only been in existence since the 1990s (Colorado’s original enabling statutes from 1973 made transfers legal). Water trusts are filling an important niche by developing skills in water rights transactions and making this available to the public and governmental agencies. It is possible that they can provide an important extension to state agencies by working with members of the public who may be hesitant to work directly with a governmental agency. They can also, as is the case with the CWT, develop materials and help educate important communities about the intricacies of water rights transactions. The CWT is currently working on materials to help members of land conservation groups better understand how water rights are, and are not, intertwined with conservation easements and other methods employed to preserve open space.

As for accomplishments, these groups are at most 11 years old and, at youngest, three years old. According to its website, the Oregon Water Trust negotiated two water leases for a total of 1.4 cubic feet per second (CFS) in its first year. It currently manages 84 projects⁵² protecting 123.8

⁵² The Oregon Water Trust defines projects as short term if they include paid and donated leases and water use agreements less than or equal to five years long. Long-term projects include permanent acquisitions, conserved water projects, time-limited transfers, and conservation easements.

CFS. The Washington Water Trust shows on its Web site that it has completed 26 transactions⁵³ since its creation in 1998. These include one permanent purchase of a water right, one permanent donation, three 20-year leases, and one split-season lease. The majority are for one- to seven-year leases, some of which have been renewed over multiple years.

Water trusts are certainly not the only nongovernmental entities working with instream flow water rights. Groups such as Trout Unlimited and The Nature Conservancy have been working on these issues for decades. State agencies have and continue to work with these and other groups to help reach different communities and pursue effective instream flow protection. Currently, Trout Unlimited is actively involved through its Western Water Project in policy and on-the-ground instream flow issues. The Nature Conservancy is working with agencies across the Western United States from federal to state agencies. For example, TNC has assisted the State of Alaska in filing over 100 new water rights applications by providing expertise and fiscal resources.

Nonprofit groups in general, and in particular the highly specialized water trusts, can play an important role in meeting instream flow water needs. These groups provide a bridge to the private community that may have concerns about working directly with governmental agencies. As state agencies look for new funding sources, water trusts and other nonprofits can bring experience with fund raising and even eligibility that government agencies may lack to raise money for water rights acquisition, monitoring and protection.

Conclusions

The common belief that instream flow protection in the Western United States is unique to each state was strongly supported by the results of this report. States use different terms and varied statutes, rules and other administrative processes, among many other distinctions. The intent of this report has been to clearly describe how 18 states approach instream flow protection and to apply basic criteria and characteristics to compare what states have achieved toward the end of effective instream flow management.

It is not possible to compare and contrast these unique programs in a purely consistent manner, due to the states' diverse approaches. At the same time, a pattern of successes and constraints has emerged from this report and, as shown in the comparative and summary analysis sections, states do gravitate to different levels of performance. Colorado clearly emerges as a strong program. More instream flow water rights have been established in Colorado than in any other state. These are monitored and protected in an active manner, and the state has dedicated significant resources to this program. Furthermore, Colorado is considering all issues identified in the emerging issues section. The state is working actively with nonprofit organizations to improve its program's effectiveness, multiple flow levels have been prescribed, and new ways to achieve these flows are being pursued through species recovery agreements. One area of improvement in which Colorado could continue to look to its neighbors for assistance is the area of planning and

⁵³ The Washington Water Trust defines transactions to include a lease, purchase and sale, or donation agreement with willing water right holders and temporary or permanent transfer of the water rights to the State Trust Water Rights Program.

identifying priority streams for protection. Washington and Texas are interesting states for further study and to potentially use as models.

Finally, it is important to recognize a common constraint on analysis of instream flow programs. A truly interesting and valuable aspect of analysis of the effectiveness of instream flow protection would be to determine, with commonly accepted evaluation matrices, how this protection has resulted in resource protection. Fundamentally, the purpose of instream flow protection is to achieve the goals set forth in the protected uses as shown in Table 5. If the goal is to provide instream flow for recreation, then how much more valuable is that experience than it would be without the instream flow? If the goal is fishery or riparian habitat preservation or improvement, has the instream flow helped to achieve the stated goal? Are fisheries improving or persevering where they might have failed without the instream flow? No studies surfaced that specifically answer these questions. Although all managers and experts interviewed agreed that this is an important issue, for various reasons such studies are not feasible at this time. A primary reason is that there have been limited situations in which the only flow in a stream is the instream flow, so it is difficult to scientifically determine if an instream flow is sufficient for resource protection when it has nearly always been complemented by other flows, such as a senior call pulling water down a stream. At this time, it is not possible to analyze the impact of instream flow protection on the resource itself. The question of ultimate resource protection, however, is one of interest for future research.

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- <http://www.waterrights.ca.gov/watertransferguide.pdf> Document on Water Transfers in California.
- <http://www.watertransfers.water.ca.gov/faqs/index.cfm> FAQ's related to Water Transfers in California.
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Colorado

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- <http://parks.state.co.us/> Division of Parks and Outdoor Recreation.
- <http://wildlife.state.co.us/> Division of Wildlife.
- <http://water.state.co.us/> Division of Water Resources.
- <http://water.state.co.us/wateradmin/waterright.asp> Obtaining a Water Right, Division of Water Resources.
- http://www.tu.org/conservation/wwwp_co.asp Trout Unlimited Colorado Water Project.
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Idaho

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- <http://www.idwr.state.id.us/waterboard/minimum%20stream%20flow.htm> Idaho's official site for IDWR, minimum stream flow program.
- <http://www.idwr.state.id.us/waterboard> Idaho Division of Water Resources with direct links to information on Idaho's minimum streamflow program.

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- <http://www.kwo.org/index.htm> Kansas Water Office.
- <http://www.kgs.ukans.edu/HighPlains/atlas/atstrm.htm> In-Stream Water Resources and Historic Achievement of Minimum Desirable Streamflows (MDS).
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Montana

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Oregon

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- <http://www.prd.state.or.us/> Parks and Recreation Department.
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South Dakota

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- <http://www.state.sd.us/denr/des/waterrights/summary.htm#Ownership> Summary of South Dakota water laws and rules.
- <http://www.state.sd.us/denr/des/waterrights/wmb.htm> Water Management Board.
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- http://www.tceq.state.tx.us/subject/subject_water.html TCEQ water-related page.
- <http://www.tnrcc.state.tx.us/permitting/waterperm/wrpa/envflow.pdf> Document prepared for Commissioners on how environmental flows are considered in permitting process.
- <http://www.twdb.state.tx.us/instreamflows/pdfs/Enviro%20Flows043004.pdf> Letter describing history and nature of Texas ISF.
- http://www.twdb.state.tx.us/instreamflows/pdfs/Programmatic_Work_Plan.pdf Programmatic Work Plan.
- <http://www.twdb.state.tx.us/instreamflows/pdfs/TechnicalOverview-Draft080803.pdf>, Technical Overview Document.
- <http://www.tpwd.state.tx.us/> Texas Parks and Wildlife.
- http://www.twdb.state.tx.us/instreamflows/pdfs/NAS_Report.pdf National Academy of Sciences Review.

Utah

- <http://www.wildlife.utah.gov/> Division of Wildlife Resources.
- <http://parks.state.ut.us/> Division of Parks and Recreation.
- <http://www.water.utah.gov/> Division of Water Resources.
- <http://www.water.utah.gov/WaterPlan/Default.htm> Water Plan, 2001.
- <http://www.nr.utah.gov/divide/divisions.htm> Utah Department of Natural Resources List of Divisions & Offices.
- <http://www.wildlife.utah.gov/news/02-07/drought.html> Information on ISF and Drought issues.

Washington

- <http://www.ecy.wa.gov/programs/wr/instream-flows/isfhtm.html> Department of Ecology's central page for instream flow.
- <http://www.ecy.wa.gov/programs/wr/instream-flows/wacq.html> Washington Water Acquisition Program.
- <http://wdfw.wa.gov/> Washington Department of Fish and Wildlife.
- <http://www.thewatertrust.org/> Washington Water Trust.
- http://www.cbwtp.org/jsp/cbwtp/library/documents/UW_WSU_water2004.pdf Paper on Washington's Water Acquisition Program.
- <http://www.ecy.wa.gov/programs/wr/rights/tracking-apps.html> Water Rights Tracking System.
- <http://www.ecy.wa.gov/pubs/0411011.pdf> Analysis of Water Banks in the Western United States.
- <http://www.ecy.wa.gov/programs/wr/instream-flows/Images/pdfs/Water%20and%20Trust%20Report.pdf> Analysis of success of the Acquisition Program.

Wyoming

- <http://gf.state.wy.us/index.asp> Wyoming Game and Fish.
- <http://seo.state.wy.us/> Wyoming State Engineer's Office.
- <http://seo.state.wy.us/PDF/IFAPSSHweb.pdf> Table of applications and permitted rights.
- <http://seo.state.wy.us/PDF/b849r.pdf> Overview from 2003 of Wyoming water rights.
- <http://wwdc.state.wy.us/> Wyoming Water Development Commission.
- <http://gf.state.wy.us/fish/watermangtISF/index.asp> Water Management and Instream Flow.