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The Walla Walla Water Management Initiative:

Insights on Design and Implementation from Innovative Water Management Efforts

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Executive Summary

The Water Management Initiative is an emerging effort to create a locally governed water management system in the Walla Walla Basin that will support fish recovery while maintaining the agricultural economy. Because the Water Management Initiative represents a new and untested alternative to current water management, those involved in the effort—irrigators, tribal leaders, municipalities, environmentalists, and others in the Walla Walla Basin, in concert with Washington Department of Ecology and others—asked the William D. Ruckelshaus Center to conduct independent research that would inform their efforts to design an effective and locally appropriate water management system to achieve instream flow targets.

This report responds to that request. It attempts to describe the purposes, goals, and components of the Water Management Initiative as currently conceived by those in the basin and to provide insights and experiences from similar efforts elsewhere. Through extensive research and consultation with a broad range of people familiar with water management, water rights, and other relevant concepts, the Center identified and examined eight innovative environmental management efforts in the United States and internationally that provide insights on specific components of the Water Management Initiative. This report describes those examples and highlights structures, mechanisms and practices that may be relevant to the goals of the Initiative.

The Water Management Initiative is the result of an unprecedented offer by the Director of Washington Department of Ecology, Jay Manning. If water users in the Walla Walla Basin can commit to delivering prescribed flows, Ecology has offered to seek the needed authority to allow water to be managed locally and more flexibly. Ecology has asked the Walla Walla Basin community to develop a proposal that:

- Defines target flows to support fish needs and other instream values. Flows would be scientifically justified to support fish recovery and could be based on precipitation (wet year, medium year, dry year).
- Devises a reliable approach to achieving these flows. This might involve locally governed decisions regarding water management that offers greater flexibility and creates environmental benefit. It would also involve managing conflicts within the basin and monitoring flows to ensure targets are met.

Since any authorities to manage water will be conferred to the basin by the state, the Water Management Initiative will not supersede tribal rights and authorities or federal authorities such as the Endangered Species Act. In addition, Ecology has stated that it does not intend to abdicate its responsibilities and that the Ecology Water Master is expected to continue in the basin. The Initiative is being attempted only in the Walla Walla Basin and water policy changes associated with the Water Management Initiative apply only to the Walla Walla Basin.

Director Manning made this offer because of the significance of water challenges in the Walla Walla Basin and the limited effectiveness of the State's existing options to remedy them. Water in the Walla Walla Basin is overallocated, instream flows are insufficient to support some native aquatic species, and the federal Endangered Species Act threatens to impose severe restrictions on agricultural and other water users. Since junior water right holders typically are not served because allocated water rights exceed divertible supply, any relinquished water would go to the

next junior water user and would not be protected in the river. Furthermore, state water law is often blamed for encouraging excessive use of water rights and hindering conservation efforts. Ecology's offer is an attempt to overcome these challenges, create public benefit, and generate real protected water in the river by creating a cooperative alternative to traditional regulatory water management approaches.

The Water Management Initiative

As described by those in the basin, the purpose of the Water Management Initiative is to significantly contribute to the restoration and protection of streamflows, aquifers and water quality to support recovery of ESA listed species (steelhead and bull trout) while maintaining a thriving agricultural economy. It is also intended to provide a degree of local autonomy and responsibility for water management, giving those with the most at stake greater influence over their own destiny. The Water Management Initiative appears to have three primary goals:

- **Flow**: Achieve instream flow targets and temperature conditions in streams throughout the basin at specified times to support fish recovery. This includes protecting aquifers and the bypassed flows from Oregon as they flow through the Washington portion of the basin.
- **Flexibility**: Allow the basin community to govern water resources locally and provide them with flexibility in how water is withdrawn, conveyed and applied so they can optimize out-of-stream uses and achieve instream flow targets. This might involve altering water laws that inhibit reduced water usage.
- **Reduced regulatory risk**: Reduce uncertainties faced by water users under current federal and state regulations. This might involve suspending state relinquishment laws going forward. At the federal level, this might involve developing a Habitat Conservation Plan (HCP) to address Endangered Species Act requirements.

The Water Management Initiative is premised upon a "performance-based approach" to water management in which water users are given broad latitude within a defined area to meet measurable performance standards or "outcomes" rather than being governed by a traditional system of external rules. This approach is intended to give water users flexibility to design and implement solutions to instream flow problems that are more efficient and environmentally effective than conventional approaches. Many of the proposed water management options are available currently (e.g., conjunctive use of surface and groundwater or changing the point of diversion), but water right holders express a reluctance to consider them due to fear that such activities might lead to relinquishment. The Water Management Initiative is intended to make water management changes for environmental purposes easier to implement going forward and reduce the perceived and actual risks for water right holders.

Insights from the Research

Many of those working on the Water Management Initiative view the concept as an emerging *package* of components that must eventually come together in order for it to be both acceptable and effective. Based on interviews with a range of interests who are involved in or watching the development of the Water Management Initiative, an effective package that could be acceptable to most parties might include the following components:

- Stream flows are sufficient to recover ESA-listed species

- Irrigators are afforded flexibility to alter water management without fear of negative consequences
- The agricultural economy remains viable
- Local government interests are addressed
- The governance, monitoring, and dispute resolution mechanisms are appropriate and credible
- The approach is approved and overseen by relevant state and federal agencies and tribes
- Ecological, economic and social risks are minimized.

The research found no identical precedent operating within the context of western water law for the package of local and flexible water management currently conceived under the Water Management Initiative. However, the research did find examples of innovative environmental and agricultural management efforts from which useful ideas can be gleaned to help shape mechanisms or practices for consideration as part of the Water Management Initiative package. Some key insights from the research and case examples include:

- **Governance mechanisms**: The specific functions of the governance mechanism and its eventual form will depend on what goals, purposes, approaches, and activities are ultimately assigned to the Water Management Initiative. Some of these functions may include making water management decisions, monitoring performance measures and water management activities, enforcing water management decisions, managing projects, and resolving disputes that might arise. The case examples and research suggest that for the governance mechanism to gain credibility and legitimacy, important considerations will include how the governing body is selected (e.g., it might be appointed or otherwise endorsed by locally respected and legitimized bodies); who is involved (e.g., it might be composed of a range of relevant interests or constituency leaders); how decisions are made (e.g., many examples use consensus and base their decisions on accepted science and local knowledge); and how the governance mechanism relates to other entities with authority and influence.
- **Establishing flows and performance measures**: Many irrigators in the Basin say that if water requirements are clearly defined, they can design their water and cropping systems to benefit flows and agricultural needs. Scientific analysis is currently in progress to define streamflow conditions necessary to support recovery of ESA-listed bull trout and summer steelhead. The case examples and research suggest that to maintain trust in the system and to track performance, important considerations for establishing flows include that streamflow targets be based on accepted science, be measurable and be transparently monitored.
- **Market-based incentives**: Agricultural leaders involved in the Water Management Initiative have stated that the approach should employ incentives to achieve water management improvements. The examples demonstrate that market mechanisms such as water banking, transfers of conserved water, tiered pricing, water auctions and effluent permit trading can provide effective incentives for water conservation and water quality improvements. However, the case examples and research also illustrate that market mechanisms can have unintended consequences. For example, selling excess water can lead to increased use, and trading from agriculture to other uses can undermine the agricultural economy. Experience from California suggests that if water trading is

instituted in the Walla Walla Basin, it may be desirable to consider how much water can be traded, whether water can be traded from agriculture to other uses, and whether local zones might be appropriate to limit the geographic impact of water transfers.

- **Equitable distribution of costs and benefits:** Water management changes are likely to impose some costs for those making the changes and some potential impairment to the water availability of others. The case examples and research suggest that support for the Initiative might be enhanced if the costs of water restrictions are shared among groups rather than falling inordinately on some groups more than others (for example, irrigation districts or those on one side of the state line or the other). To mitigate the costs, a potentially helpful approach is to seek an equitable distribution of the *benefits* of water rather than the distribution of the *quantity* of water itself. Distributing water use benefits allows for positive-sum agreements, whereas dividing the water itself only allows for winners and losers.
- **Effective and efficient dispute resolution**: Water management changes are almost certain to result in some impairment of water rights at some time, and thus disputes within the Water Management Initiative are probably inevitable. The case examples and research suggest that an effective, credible and trusted governance structure can help avoid many conflicts. Incorporating a conflict resolution mechanism that builds on the overall credibility and trust of the system is also beneficial. As the case examples illustrate, one key to maintaining legitimacy and credibility is to develop an effective and efficient mechanism for resolving disputes when they do occur. Important components of such a system include 1) a definition of who makes decisions and how they are made (consensus or vote); 2) a specific, efficient, and final process to resolve disputes; and 3) mechanisms that create incentives for all parties to be more flexible and creative in trying to resolve the dispute without resorting to win-lose decisions or outcomes.

Conclusion

Many of the individual components contemplated for the Walla Walla Water Management Initiative have proven to be effective elsewhere. This report provides examples and insights that are intended to inform and possibly guide those in the basin who are working to advance the Initiative. It is hoped that the mechanisms and ideas presented in this report will be of assistance in developing an appropriate package of management and decision-making tools for an effective, balanced and trusted Water Management Initiative.

I. Introduction

On January 25, 2006, the Director of Washington Department of Ecology, Jay Manning, made an unprecedented offer to the Walla Walla community. Speaking to a public meeting of diverse water interests in the Walla Walla Basin, Director Manning said:

> Do you want to push on the edges of the existing law and regulatory system for water? [Or, do you want to do] something far more radical than that, which is, let's forget about the existing system of laws and regulations and let's replace it with an approach that is unique to this basin. And you decide—you come up on a year to year basis based on that year's precipitation. … We're going to maintain this flow in this wet year, we're going to maintain this flow in this medium precipitation year, and this lower flow in a dry year. We're going to maintain that flow for fish, for recreation, for other instream values. And the rest of the water, we're going to manage amongst us users.[1]

In a subsequent presentation[2], Director Manning reiterated his offer (see Figure 1) and clarified that the State has two primary interests: sufficient streamflow and water quality are maintained to support fish; and water management conflicts are managed within the basin. He also offered that the Initiative can operate on a "no foul" basis: if it proves unsuccessful, water users can return to conditions prior to initiation of the Water Management Initiative and parties will not be penalized for non-use of water rights during the trial period.[3] If water users in the basin can commit themselves to these principles and propose a system that is likely to achieve them, then the state is willing to seek the needed authority to allow water to be managed locally. The state will provide support and oversight, most importantly by measuring flow to ensure target flows are met.

Director Manning recognized that some interests outside the basin, especially agricultural, tribal, and environmental interests, might question the offer or have concerns about it. He said he hoped that they would seek to learn about it, understand it, and reserve judgment as it continued to be developed locally. He hoped representatives from those out-of-basin groups would see farmers, tribal leaders, environmentalists, and others in the basin engaged in designing the effort and say, "Well, I guess they know their basin better than we do."

Director Manning made this offer because of the significance of water challenges in the Walla Walla Basin and the limited effectiveness of the State's existing options to remedy them. Water in the Walla Walla Basin is overallocated, instream flows are insufficient to support some native aquatic species, and the federal Endangered Species Act (ESA) threatens to impose severe restrictions on agricultural and other water users.[4] Since junior water right holders typically are

[1] From public remarks made January 25, 2006 in Walla Walla. Transcribed from "*A Helluva Vision*" video produced by Judith Johnson and Kevin Scribner. See Appendix B for a partial transcript from the video. The video is available at: http://134.39.200.64/proftech/helluvavision.wmv.

[2] October 18, 2006, from public remarks by Jay Manning at the Community Action & Innovation for Watershed Sustainability Conference held in Walla Walla.

[3] Some irrigators have noted that physical water management changes made through the Initiative (e.g., changes in points of diversion, new wells, piping, and other physical changes) could be costly to implement and would remain in place even if the Initiative proved unsuccessful. Some changes, however, would involve flexible management of water that do not require significant infrastructure investments.

[4] Flow and habitat issues in the basin were so significant that in 1998 the national environmental advocacy group American Rivers listed the Walla Walla River as the eighteenth most endangered river in the United States.

not served because allocated water rights exceed divertible supply, any relinquished water would be diverted by the next junior water user and would not be protected in the river. Furthermore, state water law is often blamed for encouraging excessive use of water rights and hindering conservation efforts. Director Manning's offer is an attempt to create public benefit and generate real protected water in the river by creating a cooperative alternative to traditional regulatory water management approaches.

Figure 1

Director Manning's Offer to the Walla Walla Basin Community

If water users can commit to delivering target flows, the state will seek the needed authority to allow water to be managed locally. Director Manning has asked the Walla Walla Basin community to develop a proposal that addresses the following features:

- Define target flows based on precipitation (wet year, medium year, dry year). Target flows should support fish needs and other instream values.
- Devise an approach to achieve these flows. This might involve locally governed decisions regarding water management changes to create environmental benefit.
- Gain commitment from water users in the basin.
- Manage conflicts in the basin.

If agreement can be reached, the state would provide support and oversight, and would help measure flows to ensure target flows are met.

What has emerged from Director Manning's offer is the "Water Management Initiative." The Walla Walla Water Management Initiative is an evolving effort to find more effective ways to achieve sufficient streamflows to support fish while also providing water users with enhanced regulatory certainty and a more stable operating environment. At this stage, it might still be called a conversation about an idea, and about how to turn that idea into reality. It is an active conversation among a representative set of interests in the basin—farmers, irrigation districts, environmentalists, municipal leaders, tribal leaders, business leaders, and others—as well as among state agencies and a variety of out-of-basin interests. Although a core set of individuals have been active in these early conversations thus far, plans are underway to engage others—both in-basin and out-of-basin—in a broader discussion.

The approach to the Water Management Initiative has been variously described as "flow from flexibility," "flexibility for fish flow," and "performance-based water management." Each of these terms reflect the offer made by Director Manning. The premise is that if water users are given flexibility in how they use and manage water resources within the Walla Walla Basin—both on-farm and across users—they will themselves find creative, locally appropriate, and effective ways to meet performance standards for instream flow. A further goal of the Water Management Initiative is to demonstrate that this approach can be effective over the long term to address Endangered Species Act requirements, such that a Habitat Conservation Plan (HCP) can be approved by the federal government and water users will be less at risk of severe water restrictions that might otherwise be applied through the ESA.

As currently conceived, the purpose of the Water Management Initiative is to significantly contribute to the restoration and protection of streamflows, aquifers and water quality to support recovery of ESA listed species (steelhead and bull trout) while maintaining a thriving agricultural economy. Through the use of performance-based management measures, the Initiative is intended to emphasize flexibility, efficiency, innovative solutions, and measurable results, with the ultimate goal to maintain sufficient water in rivers and streams for fish.

At this time, Director Manning's offer is specific to the Walla Walla Basin. Although the Initiative may lead to statutory changes that allow flexible and locally governed water management, any changes in policy related to the Initiative are not expected to affect water management policies and authorities elsewhere in the state.

A. Purpose of the Report

The Walla Walla Watershed Alliance and Washington Department of Ecology jointly sponsored this research to inform the efforts of those designing the Water Management Initiative. Its purpose is to document efforts outside the Walla Walla Basin to achieve goals similar to the Water Management Initiative and to describe potentially useful lessons from those efforts.

The research examined water management efforts in Washington, Oregon, California, Nevada, Montana, Colorado, Australia, and South Africa. It sought examples, lessons, and insights regarding a variety of components related to the Water Management Initiative, including governance, water management tools, setting flows, establishing performance measures, monitoring and adaptive management, integrating science and local irrigation knowledge, and resolving disputes.

The report provides an overview of the Water Management Initiative, including the goals, purposes, and key components of the Initiative as currently conceived. It then provides insights and lessons from this research that appear relevant to the goals and purposes of the Water Management Initiative. These insights derive from water management literature and a set of case examples contained in the final section, in which innovative water management efforts with goals similar to the Water Management Initiative are described and lessons are drawn.

The case examples presented in this report illustrate a variety of approaches to achieving the goals and purposes of the Water Management Initiative. These approaches are described so that those designing the Water Management Initiative can evaluate them for possible adaptation. Some of these approaches are already available or operational in Washington, and the case examples describe ways that they could be altered to fit local conditions or remove barriers to their use. The case examples are not intended as detailed explanations of how each approach functions, but rather offer a menu of options that might be relevant and appropriate to the local context. Some approaches will appear more appropriate than others to those in the Basin who must design, operate, and live by the mechanisms of the Initiative. Before adopting any approaches from the case examples, further investigation will likely be merited.

To conduct this study, Ruckelshaus Center staff examined relevant literature, reports and web content, and consulted with a broad range of people familiar with water management, water rights, and other relevant concepts. Consultations began with a sample of Walla Walla Basin community members to identify the range of hopes and concerns related to the Water Management Initiative. This helped focus the research to address the issues and interests of those working on the Initiative. Consultations were then held with policy makers, project managers, scientists, legal scholars, water rights specialists, farmers, environmentalists, tribal staff, and others familiar with water management in the United States and internationally. As relevant efforts were identified, case examples were developed based on interviews and written materials. Through more than 60 interviews and other research, information was compiled on examples of projects with goals similar to the Water Management Initiative as well as water law, governance mechanisms, transboundary water management, and other aspects of the Initiative.

The report contains no recommendations. The intent of the William D. Ruckelshaus Center in preparing this report is to provide independent and impartial analysis related to the goals of the Water Management Initiative. It is the prerogative of those in the Walla Walla Basin, in concert with state policy makers in Oregon and Washington and other interested parties, to develop the Water Management Initiative in accordance with the specific needs and circumstances currently active in the Basin. The Water Management Initiative is an evolving concept, and this report is intended to provide a resource to those who are working to develop it.

B. The Walla Walla Basin[5]

The Walla Walla River Basin encompasses 1,758 square miles located in Walla Walla and Columbia counties in southeast Washington and Umatilla, Union, and Wallowa counties in northeast Oregon (see map, Figure 2). Most of the basin (73 percent) is in Washington, and the remainder is in Oregon. The basin contains three primary river systems which all originate in the Blue Mountains of the Umatilla National Forest. The Walla Walla River starts in Oregon and flows north and west into Washington. Mill Creek, which is a major drinking water source, winds between the Oregon-Washington Border and then travels northwest into Washington where it flows through the City of Walla Walla and joins the Walla Walla River. The Touchet River originates in the northeast quadrant of the basin and flows west and south until it joins the Walla Walla River, which then empties into the Columbia River. Melting snow provides much of the annual runoff to the streams and rivers in the basin.

Precipitation in the basin varies widely and correlates with elevation. At the headwaters in the Blue Mountains (approximately 6,500 foot elevation), precipitation is more than 40 inches annually. The amount of precipitation decreases with elevation to its lowest amount in the lowlands around the mouth of the Walla Walla River, where precipitation is less than 10 inches annually.

Groundwater is also an important water resource in the basin. A deep basalt aquifer underlies the entire basin and is part of the layered Columbia Basalt. It is primarily charged by runoff from the Blue Mountains and has an estimated storage capacity of 4 million acre-feet. A shallower gravel aquifer is located approximately 200 feet above the basalt aquifer under approximately 120,000 acres of the Walla Walla/Milton-Freewater area. The gravel aquifer is recharged from surface streams, precipitation, and the basalt aquifer. Both aquifers provide water for irrigation and other purposes.

Agricultural production is the dominant land use in the basin (58 percent) and the area is one of the most productive agricultural regions in the world. The area's economy is predominantly reliant upon agriculture, which varies from dryland wheat farming to irrigated orchards, and more recently to wine grapes. In addition to agriculture, forest land uses (25 percent), range land uses (17 percent) and urban land uses are also influential. Approximately 90 percent of the basin is privately owned, with nine percent managed by federal or state agencies.

The Confederated Tribes of the Umatilla Indian Reservation also owns approximately 8,700 acres within the Walla Walla Basin. Under the Treaty of 1855, the Tribe ceded more than 6

[5] Information and text for this section derive from the following sources: Curtis, Donald R. Walla Walla River Watershed Study Reconnaissance Report. United States Army Corps of Engineers. October 30, 1997; Walla Walla Subbasin Plan. Prepared for Northwest Power and Conservation Council. Submitted by Walla Walla County (on behalf of the Walla Walla Watershed Planning Unit) and the Walla Walla Basin Watershed Council. May 28, 2004; and the Walla Walla Watershed Planning Website: http://www.wallawallawatershed.org/

million acres of land to the federal government while reserving the right of tribal members to hunt and fish in all usual and accustomed places, including the right to harvest salmon in the Walla Walla Basin. The Tribe's 8,700 acre property is known as the Rainwater Wildlife Refuge, which was purchased in 1998 and is part of the historical territory of the Walla Walla, Cayuse, and Umatilla Indian Tribes. Indeed, the name "Walla Walla" is derived from a Cayuse word meaning "many small waters."

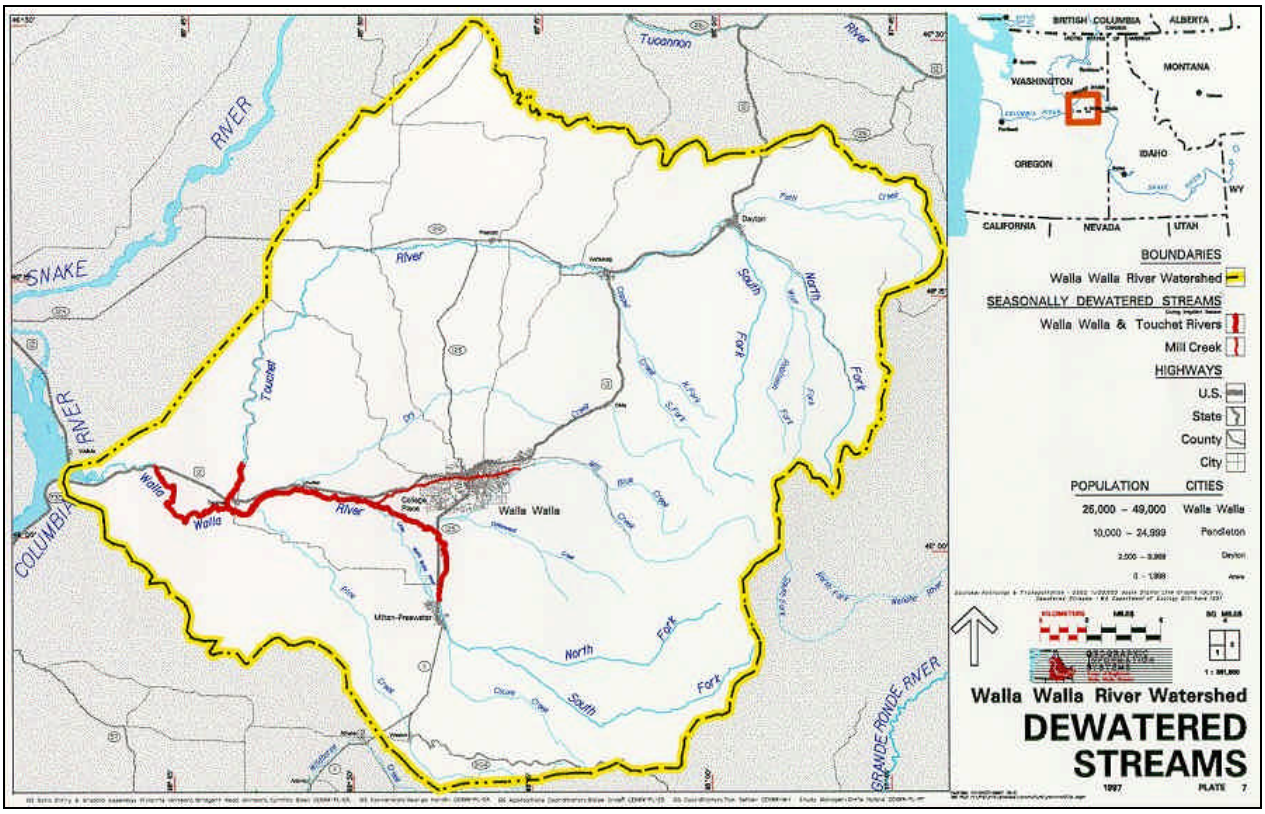

Figure 2. Map of the Walla Walla Basin highlighting stream segments that have historically been dewatered during the summer irrigation season. (Source: Curtis, 1997.)

C. Water and Fish in the Basin

The basin has limited water resources and most of the summer flows in the Walla Walla have been diverted for irrigation. This has resulted in reduced flow in the basin during peak irrigation season (generally late June through October, although many farms irrigate from late January through early December as well). The basin is over-appropriated, meaning that more water has been legally allocated than is naturally available, and it is also one of sixteen in Washington State that are deemed "fish critical," meaning that there is a shortage of water for fish.[6]

Since the late 1880s when diversions began until just recently in 2001, a 50-mile stretch of the Walla Walla River from Milton-Freewater to nearly the Columbia River was typically dewatered during summer months, meaning that it experienced no or minimal water during the peak irrigation season (see map, Figure 2). Because of dewatering, some reaches of this portion of the river were severely limited in their ability to support aquatic life during the summer and fall months. Recent water management changes have led to year-round stream flows, though portions

[6] *Extinction Is Not an Option: Washington's Statewide Strategy to Recover Salmon*. Governor's Salmon Recovery Office. Olympia, WA, 1999.

of the Walla Walla River mainstem continue to experience extremely low flows during some periods.

The Walla Walla River historically supported significant runs of spring Chinook salmon and summer steelhead, as well as bull trout and rainbow trout. Fall Chinook, chum, and Coho salmon are believed to have been present in the Walla Walla River in smaller numbers. Anadromous fish have spawned and reared throughout the middle and upper reaches of the Walla Walla River and its tributaries. However, stream flow reductions from irrigation diversions have had significant effects on aquatic habitat in the basin, including reduced water depth, elevated temperature, and increased concentration of pollutants and nutrients. A combination of dewatering and lack of fish passage likely led to the demise of the basin's salmon run sometime between 1915 and 1925. The last reported wild salmon run of any size was recorded in 1925.[7]

There are currently more than 30 species of fish inhabiting the Walla Walla Basin, seventeen of which are native. The only naturally occurring populations of anadromous fish currently present in the basin are summer steelhead. Pacific lamprey, a federally listed species of concern and vulnerable listed species in Oregon, may also exist. Summer steelhead are federally listed as threatened, a candidate for listing in Washington State, and listed as vulnerable in Oregon. Native spring Chinook, which were last documented in the Walla Walla Basin in the 1950s, are now extinct. However, stray spring Chinook have recently been collected in the Washington and Oregon reaches of the Walla Walla Basin. Non-anadromous salmonids and lamprey endemic to the Walla Walla Basin include interior redband trout, bull trout, and mountain whitefish, and the western brook lamprey.[8] In 2000, the Confederated Tribes of the Umatilla Indian Reservation began reintroduction of spring Chinook in the Walla Walla basin.

Water management in the basin has come under increasing scrutiny by state and federal agencies due to limited water resources and impacts to fish species of concern. In 1977, Ecology adopted the Water Resources Program Rule for the Walla Walla River Basin, seasonally closing most streams and rivers and limiting future water withdrawals. Due to potential impairment of existing water rights, no new surface or ground water rights have been issued in the basin since 1996.

On June 10, 1998 the United States Fish & Wildlife Service listed the Bull Trout (*Salvelinus confluentus*) as threatened under the Endangered Species Act (ESA), and on March 25, 1999 the National Marine Fisheries Service (now known as NOAA Fisheries) listed the Middle Columbia River Summer Steelhead (*Oncorhynchus mykiss*) as threatened under the ESA.

The ESA listings were followed in January 2000 by a US Fish & Wildlife Service letter serving notice of potential violations of the ESA due to irrigation district water delivery operations.[9] In

[7] Information and text for this paragraph was drawn from Curtis, Donald R. Walla Walla River Watershed Study Reconnaissance Report. United States Army Corps of Engineers. October 30, 1997.

[8] Text for this paragraph drawn from: Walla Walla County. Walla Walla Subbasin Plan. May 2004 Version. P*repared for* Northwest Power and Conservation Council. *Submitted by* Walla Walla County (on behalf of the Walla Walla Watershed Planning Unit) And the Walla Walla Basin Watershed Council. May 28, 2004.

[9] The letter called on the Districts to take immediate action to address existing water management practices which, according to US Fish & Wildlife Service (USFWS), were adversely impacting federally protected fish species, including bull trout. The letter made clear that USFWS believed the Districts' activities had "dewatered" the Walla Walla River in 1998 and 1999, and that the dewatering likely resulted in "take" of the bull trout. It also stated that if USFWS were able to establish that "take" in fact occurred in 1998 and 1999, the ESA allows USFWS to assess civil penalties of up to $25,000 per violation (i.e., $25,000 per fish). (Source: Filippi, David E. "Irrigated Agriculture and the ESA: Setting New Precedent in the Walla Walla Basin." Oregon Insider, Issue 255 Sept. 1, 2000. http://www.stoel.com/showarticle.aspx?Show=908)

June 2000, three irrigation districts – Hudson Bay District Improvement Company, Walla Walla River Irrigation District, and Gardena Farms Irrigation District #13 – entered into a Settlement Agreement with US Fish & Wildlife Service to address potential civil liability for the take of listed Bull Trout resulting from the legal diversion of irrigation water in 1998 and 1999 from the Walla Walla River.[10]

The settlement agreement led to a range of changes. More than 85 Oregon irrigators adopted more efficient irrigation technologies, the two Oregon irrigation districts piped more than ten miles of delivery canals, many irrigators experienced reductions in water allocation, and others had to drill new wells or rely more on supplemental groundwater rights. Water saved from the conservation activities is in the process of being legally transferred as saved water back into the stream as an instream water right through Oregon's Conserved Water Program. In the first year of the effort (2000), Oregon irrigators bypassed 13 cubic feet per second (cfs); in the second year they bypassed 18 cfs, and during the 2002-2006 growing seasons they bypassed 27 cfs up until June 30th, then 25 cfs the rest of the year. In Washington, during the first year of the agreement, Gardena Farms Irrigation District #13 bypassed 10 cfs below the Burlington Dam; in the second year 14 cfs, and 18 cfs during the 2002 – 2006; in 2003 – 2006, 19 cfs was bypassed prior to July 1 of each year. A portion of this water has been transferred to the Washington trust water program on a temporary basis as an instream water right.[11] This water is protected through much of the river, but loses its protection at locations where it can be diverted by irrigators with senior water rights.

D. Water Resource Trends in the Walla Walla Basin

Changing water resource patterns appear to be compounding the challenge of improving instream flows in the Walla Walla Basin. Some link the observed changes to increased temperatures and climate change. Regardless of the cause, the Walla Walla Basin has experienced some of the most dramatic water resource changes of any watershed in the Columbia basin.[12] The Walla Walla Basin has the lowest mean elevation in the Columbia basin, and this appears to contribute to the increased impact relative to other basins. On at least two parameters, the adjacent Umatilla Basin, which has the second lowest mean elevation, has experienced the second most dramatic changes.

According to an unpublished analysis of data conducted by the Columbia River Inter-Tribal Fish Commission, the timing of the freshet (i.e., spring snow-melt sequence) has moved 16.6 days earlier over the last 100 years in the Walla Walla Basin.[13] In addition, the spring-summer

[10] Beginning in 2000, the Final Amended Civil Penalty Settlement Agreement (FACPSA) between the USFWS and the local irrigation districts required minimum instream flows to be maintained below Nursery Bridge Dam and Burlingame Dam. The FACPSA identified that the minimum instream flow requirements for the summer of 2002 and each summer thereafter to ensure 19 cfs below Burlingame Dam and 27 cfs below Nursery Bridge Dam until June 30 of each year, returning to 18 cfs below Burlingame Dam and 25 cfs below Nursery Bridge Dam on July 1 for the remainder of each year. (Source: Bronson, James, Bill Duke, "Walla Walla River Fish Passage Operations Program", 2004-2005 Annual Report, Project No. 200003300, 36 electronic pages, (BPA Report DOE/BP-00012779-4)).

[11] 14 cfs of the 19 cfs bypassed prior to July 1 has been temporarily protected through the Washington trust water program; and 13 cfs of the 18 cfs bypassed has also been temporarily protected. (Source: Brian Wolcott, via Stuart Durfee. Email communication 1/31/07).

[12] Kyle Dittmer, Hydrologist & Meteorologist with the Columbia River Inter-Tribal Fish Commission. Personal communication.

[13] Kyle Dittmer, Hydrologist & Meteorologist with the Columbia River Inter-Tribal Fish Commission. Information presented at Northwest Tribal Water Rights Conference, University of Oregon School of Law, Eugene, Oregon. October 26 - 27, 2006. Additional information provided by email and personal communication.

volume of runoff has declined by 26%. In the Umatilla Basin, the timing of the freshet has moved 16.1 days, and the spring-summer volume has declined 25%. Across all the Columbia sub-basins, the flow shift ranged from 3% to 26%, placing the Walla Walla and Umatilla Basins at the extreme end in terms of observed water resource changes. A separate analysis, using a modified-adjusted streamflow data set from Bonneville Power Administration, shows a spring-summer flow for the Columbia at Bonneville declining by 10%, over the years 1928-1999, which corroborates the results of the sub-basin analysis.[14]

The data demonstrate that water in Walla Walla Basin streams is flowing in increasingly larger volumes during the autumn-winter months, and is less available in spring and summer. The increasing temperature trends are projected to accelerate these effects, so that precipitation is likely to fall increasingly as rain rather than snow, and is likely to fall increasingly in the autumn-winter rather than the spring-summer. Low rainfall (i.e., droughts) are likely to increase in frequency, length, and severity. Taken together, these trends and projections suggest that water management during the peak demand times for agriculture and fish may become increasingly challenging over time.

E. Characteristics that Make Walla Walla Appropriate for the Water Management Initiative

Director Manning has offered the Walla Walla Basin community this opportunity to attempt local and flexible management of water because the basin's unique history and characteristics suggest it may be ready, willing and able to attempt it.

These characteristics include a demonstrated commitment to restoring flows and a willingness to work with agencies and others. When irrigation districts received notice from US Fish & Wildlife Service demanding immediate water management changes to protect fish, the districts chose to negotiate and cooperate rather than fight. They worked with statewide environmental groups[15] to devise an acceptable interim plan to return flows to the dewatered sections of river. Two years later, under the umbrella of the newly formed, bi-state Walla Walla Watershed Alliance, community leaders formalized a concept known as the Walla Walla Way, which is rooted in a trusting belief that cooperation gets things done. To formalize this cooperative approach, Alliance members committed themselves to the Walla Walla Promise:[16]

> On this day, March 8, 2002, the undersigned pledge to work together, within the forum of the Walla Walla Watershed Alliance, to restore and maintain the ecological, cultural, and economic health of the Walla Walla Basin. We make this commitment on behalf of the future for the next seven generations and beyond.
>
> A promise made is a promise kept.
>
> --Walla Walla Watershed Alliance

[14] Analysis also conducted by Kyle Dittmer, using the datasource: *2000 Level Modified Streamflow, 1928-1999*; Bonneville Power Administration. May 2004.

[15] The environmental groups included American Rivers, WaterWatch of Oregon, Center for Environmental Law and Policy, Friends of the Earth, Institute for Fisheries Resources, Pacific Coast Federation of Fisherman's Associations, Trout Unlimited, Washington Environmental Council, and EarthJustice.

[16] Source: Walla Walla Watershed Alliance website: http://www.wwwalliance.org/alliance.tpl?dsp=1

A major milestone toward this goal occurred in early Spring of 2000, when irrigators reached out to the Confederated Tribes of the Umatilla Indian Reservation and pledged to "help bring back their fish." This prompted a partnership with the Tribal Council to "keep farmers farming." This cooperative approach contributed to Ecology's willingness to attempt the Water Management Initiative in the Walla Walla Basin.

In addition to the community's cooperative approach and commitment to restoring flows, the basin also exhibits other positive qualities that contribute to Ecology's willingness to attempt this Initiative:

- The basin has accomplished or is engaged in a broad range of planning, study, and other activities to address water, habitat, salmon recovery, land use, and other issues (see Figure 3). According to Ecology, these plans exhibit objectives that are integrated, balanced and realistic. Completed plans are being implemented, demonstrating a willingness to "walk the talk."
- A broadly representative group of community interests in the basin are working together collaboratively to address major water and habitat issues. These parties have provided leadership and built positive and trusting relationships over the years that allow them to address challenging issues and seek win-win outcomes. These parties have organized themselves and demonstrated the ability to gain consensus, manage conflict, implement projects, and deliver results.

Figure 3

Water and Fish-related Plans, Studies and Activities in the Walla Walla Basin (A Partial List)

Plans

- Snake River Salmon Recovery Plan
- Walla Walla Watershed Plan
- NW Power Planning Council Sub-Basin Plan
- Bi-State Habitat Conservation Planning
- Strategic Action Plan for Walla Walla Basin Watershed Council
- Comprehensive Irrigation District Management Plans (CIDMP)
- Walla Walla County and City Growth Management / Comprehensive Plan (including Critical Areas Ordinance)
- City of Walla Walla Strategic Issues Paper (addressing water supply)
- Proposed Instream flow rule

Studies

- Flow Restoration Feasibility Study (US Army Corps of Engineers/ Confederated Tribes of the Umatilla Indian Reservation)
- Bull Trout and Steelhead Lifecycle model
- Surface-ground water interaction assessment and modeling
- Shallow aquifer recharge Projects
- Water rights mapping
- Mainstem Integration strategy

Activities

- Conservation and efficiencies
- Aquifer storage and recovery
- Shallow Aquifer Recharge
- Acquisition of water rights from willing water right holders
- WMI Monitoring Project (under development)
- Habitat restoration projects

- The range of interests in the basin appear to share a vision for the future of the basin that commits themselves to restoring streamflows for fish and incorporates environmental, economic, and social dimensions. Community leaders acknowledge that water is over-allocated and thus they are not seeking a significant amount water for growth as many other overallocated basins continue to do.[17] Rather, they are seeking ways to maintain a

[17] Additional housing and development continues to be proposed, however. A prime example is the proposed 358-acre Pennbrook-Illahee development, a planned 300+ unit housing project and resort east of Walla Walla. One of the primary concerns is sufficiency of water in the deep basalt aquifer and whether the additional demand would

reasonable standard of living and quality of life while reducing water usage and providing flows for fish.

- Science[18] is being developed in the basin through a cooperative approach that appears acceptable to the range of stakeholders and has so far avoided controversy and competing analyses (see a partial list of studies in Figure 3).
- Parties in the basin have demonstrated a willingness to work cooperatively and in partnership with Ecology. As the parties have become more trusting of each other, productive relationships have developed that provide confidence that the agency and community leaders will negotiate in good faith and follow through on agreements.[19]

Ecology also recognizes that the Water Management Initiative is an approach that is complicated, challenging, and risky for all involved. There are many hurdles yet to surmount and it remains to be seen if those in the basin can successfully design and implement the Initiative. If the Water Management Initiative is successful, it is likely that other basins will request similar opportunities to manage water through a more flexible and locally governed mechanism. However, at this time, it appears that no other basin exhibits the complete set of characteristics found in the Walla Walla Basin. Thus, it is unclear whether this effort can be replicated elsewhere in Washington State.

adversely affect ongoing aquifer storage and recovery in city wells. Source: Walla Walla Union-Bulletin. "2006: What a year it was" Dec 30, 2006. ttp://www.union-bulletin.com/articles/2006/12/31/local_news/local1.txt.

[18] Two significant hydrological and biological analyses that are currently in progress are 1) a surface/groundwater monitoring project that will model how water flows through the shallow aquifer and will establish a system of gauges to measure the effects of water management changes (a similar project for the deep basalt aquifer is also planned); and 2) a biological lifecycle model of ESA-listed bull trout and summer steelhead to help define the quantity, location, and timing of flows necessary to support fish recovery. The combination of these two studies, in conjunction with other activities, is intended to help identify and prioritize potential water management changes.

[19] This point is highlighted in a recent study by Washington State University: Lovrich, Nicholas P., Michael J. Gaffney, Dayna R. Matthews, R. Michael Bireley, Bruce J. Bjork, and Edward P. Weber. Public Perceptions of Endangered Species Protection: A Comparative Study of Collaborative Approaches to ESA Compliance and Salmon Recovery in the Methow Valley and Walla Walla River Basin of Washington State. Division of Governmental Studies and Services. Washington State University. January 2003.

II. The Water Management Initiative

The Water Management Initiative is an emerging concept that is being actively considered by a broad cross section of community members throughout the basin. While there are many ongoing or recently completed science-based studies, plans, and activities dedicated to returning flows to the river (see Figure 3), the Water Management Initiative appears to be an integrating concept that can contribute to the effectiveness of these other activities while also providing an opportunity for those in the basin to assume greater autonomy and responsibility for their future.

As currently conceived by those in the basin, the Water Management Initiative appears to have three primary goals:

- **Flow**: Achieve instream flow targets and temperature conditions in streams throughout the basin at specified times to support fish recovery. This includes protecting aquifers and the bypassed flows from Oregon as they flow through the Washington portion of the basin.
- **Flexibility**: Allow the basin community to govern water resources locally and provide them with flexibility in how water is withdrawn, conveyed and applied so they can optimize out-of-stream uses and achieve instream flow targets. This might involve altering water laws that inhibit reduced water usage.
- **Reduced regulatory risk**: Reduce uncertainties faced by water users under current federal and state regulations. At the state level, this might involve suspending relinquishment laws going forward. At the federal level, this might involve developing a Habitat Conservation Plan (HCP) to address Endangered Species Act requirements.[20]

The Water Management Initiative is premised upon a "performance-based approach" to water management. Performance-based water management provides water users with broad latitude within a defined area to meet measurable performance standards or "outcomes" rather than being governed by a traditional system of external rules. The approach emphasizes flexibility, efficiency, innovative solutions, and measurable results. It gives water users freedom to design and implement solutions that are more efficient and environmentally effective than conventional approaches.[21]

The purpose of the Water Management Initiative is to significantly contribute to the restoration and protection of streamflows, aquifers and water quality to support recovery of ESA listed species (steelhead and bull trout) while maintaining a thriving agricultural economy.[22] It also provides a degree of local autonomy and responsibility for water management, giving those with the most at stake greater influence over their own destiny. The Water Management Initiative offers an opportunity to integrate environmental and land use plans and scientific analyses and it

[20] The Water Management Initiative will not supersede the Endangered Species Act or tribal authorities, but it could contribute to aspects of a Habitat Conservation Plan and to the achievement of tribal interests with regard to streamflow and fisheries.
[21] Walla Walla Watershed Alliance. Walla Walla Water Management Initiative. Working Draft, June 15, 2006.
[22] Some have suggested that the purpose should be to support all indigenous fish runs in the basin (for example the re-introduced spring Chinook salmon), or to support viable commercial, recreational, cultural, and subsistence fisheries, or that the purpose should be to re-establish a biologically functioning river system. Currently, the focus appears to be on recovering ESA-listed species.

provides a forum where all the many interests can come together to implement a coordinated approach through the strong community relationships that have been built over the years.

Although the Water Management Initiative is still evolving, it should be noted that any authorities will be conferred to it by the state, and thus the Water Management Initiative will not supersede federal and tribal authorities. In addition, Ecology has stated that it does not intend to abdicate its responsibilities (for example, the Ecology Water Master is expected to continue working in the basin).

If the Water Management Initiative is successful, it offers the potential to relieve some of the regulatory burden from the state and shift it to a cooperative partnership model in which water is jointly managed by Ecology and the basin community themselves. This will require local responsibility to fulfill some of the obligations now managed by the state.

A. Activities Under Consideration to Enhance Streamflow

Washington Water Law contains many provisions intended to protect water right holders that have unintentionally created disincentives for agriculturalists to reduce water consumption. Chief among these is the "use it or lose it" provision,[23] (also known as a determination of the water right's extent and validity[24]). Most water right holders believe that under the law they must put their full allotment of water to beneficial use at least once every five years or the water right is relinquished.[25] Anecdotal evidence[26] suggests that this situation encourages water users to use more water than they might otherwise need (and therefore withdraw water unnecessarily from the stream) in order to protect their water right.[27]

[23] Washington's water law includes the principle that a water right is confirmed and maintained through beneficial use. A water right may be wholly or partially lost through extended periods of voluntary non-use. The return of unused water to the state is called *relinquishment.* The purpose of relinquishment is to ensure that Washington's limited water resources are put to maximum beneficial use for all of Washington's citizens. RCW 90.14.180 reads in part: "Any person hereafter entitled to divert or withdraw waters of the state through an appropriation... who abandons or voluntarily fails, without sufficient cause, to beneficially use all or any part of said right for a period of five successive years shall relinquish such right or portion thereof, and such right shall revert back to the state..." (Source: Washington Department of Ecology. Focus on Water Right Relinquishment from Ecology's Water Resources Program. Document 98-1812-WR. Revised June 2006.)

[24] Legally, Ecology can make a "tentative determination of extent and validity." Ultimately, Superior Courts have the exclusive authority to determine the actual extent and validity of a water right through adjudications.

[25] In fact, the Washington Trust Water Rights Program allows water right holders to temporarily or permanently place their excess water rights in Washington State's Trust Water Program. The priority date is retained, and under a temporary placement, the water rights can be returned at a specified time in the future. For those with perfected water rights, the Trust Water Program provides an alternative to using water simply to maintain the water right. However, application to the Trust Water Program currently requires a determination of water use because the program can only accept certified "wet" water (as opposed to paper water rights). For those whose water rights are not "certain", the determination creates the potential for discovery of a lapse of beneficial use and possible relinquishment.

[26] Dick DuCharme. From public remarks made on October 18, 2006 at the Community Action & Innovation for Watershed Sustainability Conference held in Walla Walla.

[27] "Beneficial use" involves the application of a reasonable quantity of water to a non-wasteful use. Applying water quantities beyond what is needed for a particular crop is considered wasteful and does not qualify as a beneficial use.

Fear of a water right extent and validity determination also creates a barrier for water right holders to interact with Ecology (for example, to request a change in the point of diversion to benefit streamflow, to transfer water to trust or to a water bank, or to install a water meter). Many fear that the review process required to make water management changes will reveal that all or part of the water right has not been beneficially used without sufficient cause. If this is the case, the right or portion of it would be relinquished and Ecology would be compelled to initiate the relinquishment process.[28]

Figure 4

Proposed Activities to Enhance Streamflow

- Use groundwater and surface water conjunctively
- Suspend assessments of beneficial use when making environment-related water use changes (e.g., Change point of diversion, place saved water into trust)
- Trade/sell water rights (water markets and water banking)
- Spread water allotment across fields to optimize crop yield
- Recharge groundwater
- Pulse flows
- Coordinate temporary water reductions (water sharing)
- Improve Irrigation efficiencies
- Acquire water rights
- Develop new water sources (e.g., storage, Columbia River diversion)

As part of the Water Management Initiative, agricultural water users are proposing an alternative to the existing state regulatory structures. Under the proposed Water Management Initiative, water management decisions would be governed locally and would accommodate greater flexibility in how water is used, diverted, conveyed and traded so that instream flow performance measures are met, potential reductions in access to water are managed equitably, disputes are resolved within the basin, and farmers are able to remain economically viable. Local governance would also mean locally-led enforcement and accountability, while still having the support of the Ecology Water Master in the basin. This approach is intended to help water users achieve streamflow targets while, to the extent possible, maintaining the economic benefits they derive from their current use of water.

Under this approach, farmers might flexibly draw from surface water during high flow periods and from groundwater during low flow periods or when fish need the water. They might reduce consumption and change the point of diversion to enhance streamflow without fear of future relinquishment. They might engage in water trades with fewer transactions costs that would provide water to those who need it and allow a financial return from investments made toward water conservation.[29] And they might spread their water allotment over their land more easily to maximize productivity under reduced or annually changing water availability conditions.

In addition, other approaches are being considered to more wisely manage the range of water sources and uses and enhance streamflow at critical times, including groundwater recharge, pulsing flows,[30] water sharing,[31] seeking new water sources (through storage or diversion from

[28] The Washington Department of Fish and Wildlife's Cooperative Compliance program is a tangible example of this fear being realized. In 2000-01, the Department offered incentives to farmers who voluntarily participated in a fish screening program. In some cases, the point of diversion was changed, and this triggered a water right change by Ecology, which requires a determination of the extent and validity of the right and impairment analysis. As a result, some water rights were found to be relinquished.

[29] Water trading between irrigators is unlikely, by itself, to yield increased streamflow, though water banking does have the potential to contribute to instream flow.

[30] Pulsing flows means that irrigators limit or stop pumping for a short period of time to create an increased pulse of streamflow that is designed to encourage fish migration.

the Columbia River) and water acquisition (including seasonal or partial water leases on a temporary or permanent basis). Figure 4 lists many of the proposed water management options, some of which are already being implemented.[32] Each of these activities has the potential to increase streamflow in the rivers while helping agriculture remain viable.

B. Key Components of the Water Management Initiative Package

Many of those working on the Water Management Initiative view the concept as an emerging *package* of components that must eventually come together in order for it to be both acceptable and effective. Individual components such as flow or flexibility or regulatory protection are insufficient by themselves to gain the needed acceptance from the range of interested stakeholders in and out of the basin whose support will be necessary. For example, agriculturalists are unlikely to cooperate in generating flow unless the regulatory risks associated with water management changes are reduced (e.g., suspending the threat of an extent and validity determination when changing the point of diversion for environmental benefit). And Ecology is unlikely to support flexible water management and local governance unless these approaches can dependably deliver target flows. The effectiveness of the Initiative in achieving its goals of flow, flexibility, and reduced regulatory risk is also likely to be enhanced through a balanced and comprehensive package of components that addresses the interests of all stakeholders. Thus, for the Water Management Initiative to be implemented, the package of components will have to be designed so that all the interested stakeholders can support it (or, in some cases, not oppose it).

Figure 5

Key Components of the Water Management Initiative

- Stream flows are sufficient to recover ESA-listed species.
- Irrigators are afforded flexibility to alter water management without fear of negative consequences
- The agricultural economy remains viable
- Local government interests are addressed
- The governance, monitoring, and dispute resolution mechanisms are appropriate and credible
- The approach is approved and overseen by relevant state and federal agencies and Tribes
- Ecological, economic and social risks are minimized

Because the Water Management Initiative is a new approach, some of its components may take longer to develop and implement than others. Thus, while building the Initiative, not all the components of the package may be present initially, and some components may be tested prior to establishing the entire package. However, commitment to the entire package will likely be necessary to gain sufficient support from the range of interests needed to implement the Water Management Initiative.

There are many entities with interests in the Water Management Initiative, and these entities will be watching to ensure that the package contains components that either enhance their interests or reduce the risks they perceive in the Initiative. These interests include those in the Walla Walla Basin (water users, municipalities, the Confederated Tribes of the Umatilla Indian Reservation, and others who are interested in basin-

[31] Water sharing means that water users coordinate bypassing water so that each farmer gets some water while target streamflows are maintained.

[32] Some of the activities that have been implemented or are under development include: Groundwater recharge (City of Walla Walla and Gardena Farms Irrigation District #13); pulsing flows (Washington Water Trust; Tri-State Steelheaders); irrigation efficiencies (Conservation Districts); water right acquisition (Washington Water Trust and Ecology); new water sources (a Columbia River diversion is under consideration; a feasibility study for mainstem Walla Walla River flow enhancement is now being conducted by the Confederated Tribes of the Umatilla Indian Reservation and US Army Corps of Engineers).

level agriculture, economic health, environmental health, and fish recovery), those outside the basin who have interests in water policy (especially state-wide and national environmental, agriculture, irrigation, and business organizations), and government entities operating at a basin, regional, statewide, or national level (e.g., county and state agencies in Washington and Oregon, federal agencies such as US Fish & Wildlife Service, US Army Corps of Engineers, and NOAA Fisheries and tribal governments[33]). Depending on what form the Initiative takes, support from state and federal legislators may also be necessary.

Based on discussions with stakeholders inside and outside the basin, as well as on internal documents related to the Water Management Initiative and other materials, a package of key components is emerging that would likely satisfy the interests and concerns of the wide range of interested and affected parties. Most of these are currently under consideration or already under development. This list is intended to bring the potential package together for consideration by those developing or interested in the Water Management Initiative. A subsequent section will draw from research and case examples to illustrate how these components might be implemented. The apparent key components of a Water Management Initiative package are listed in Figure 5 and described below.

1. Stream flows are sufficient to recover ESA-listed species.

The primary purpose of altering water management in the basin is to provide the necessary quality and quantity of instream flow and habitat to support bull trout and steelhead lifecycle functions while these species are present in the basin.[34] Because these species spend some part of their lifecycle outside the basin, actions in the basin cannot, by themselves, guarantee species recovery. However, the ESA requires that habitat conditions (i.e., streamflow) in the basin be sufficient to support the listed species when they are present. Scientists are currently attempting to define the necessary habitat conditions and especially the necessary streamflow conditions such as quantity, quality, timing, and other elements.[35]

Ecology and the basin community recognize that flexible water management as envisioned under the Water Management Initiative is unlikely, by itself, to deliver sufficient flow to satisfy fish needs. Therefore, additional water sources are also being sought to help achieve this long-term goal. However, the Water Management Initiative is expected to contribute a significant portion of flows, especially in the short-term, until new sources of flow can be developed.[36]

Once the performance targets are defined and agreed upon, the success of the Water Management Initiative will be determined by whether it can consistently deliver and protect these flows during the specified times and in the specified areas. This includes protecting flows

[33] Other tribes in addition to the Confederated Tribes of the Umatilla Indian Reservation may have an interest in the Water Management Initiative. The right of the Tribes is to those fish that pass through their usual and accustomed fishing grounds and stations. If fish from the Walla Walla Basin are caught, or could be caught if productive, by other tribes, then those tribes would warrant consultation.

[34] As noted previously, some have suggested augmented purposes, such as supporting other fish species (e.g., spring Chinook); sustaining commercial, recreational, ceremonial, and subsistence fisheries; or re-establishing a biologically functioning river system. At this stage, the focus appears to be on recovering ESA-listed species.

[35] The lifecycle model for bull trout and summer steelhead is being developed in conjunction with the Habitat Conservation Planning process currently on-going in the basin.

[36] For example, new sources of water are being sought through the feasibility study for mainstem Walla Walla River flow enhancement now being conducted by the Confederated Tribes of the Umatilla Indian Reservation and US Army Corps of Engineers. The Water Management Initiative can help prepare the basin to maximize the utility of these increased flows that may be available once new sources are developed.

bypassed in Oregon and Washington from being diverted as they travel through the mainstem Walla Walla River in Washington. It also includes protecting aquifers and coordinating groundwater extraction and management (including statutorily exempt wells) between the two states.

Many believe that flexible water management can deliver target flows. However, the test is likely to come in very dry years, when base flow conditions may be insufficient to satisfy instream targets and out-of-stream demands. Fortunately, many approaches to increase streamflow are active in the basin, including irrigation efficiencies, water acquisition, shallow aquifer recharge, the Water Management Initiative, and others. Still, since the Water Management Initiative approach is unproven, some observers have suggested that the risks associated with potentially not meeting flow targets should be protected against. The Habitat Conservation Plan, which is currently under development, requires an implementable strategy for maintaining streamflow during dry conditions. Many observers have suggested that a similar implementable contingency plan to provide minimum instream flows when target flows cannot be met through proposed Water Management Initiative approaches will also be necessary.

2. Irrigators are afforded flexibility to alter water management to benefit fish and farming without fear of negative consequences

Under the Water Management Initiative, local governance of water management is intended to yield increased flow for fish. The premise undergirding this approach is that agricultural water users have an intimate knowledge of their land, crops, and irrigation systems, and that they are best able to identify opportunities to improve streamflows in ways that minimize harm to their agricultural business. The premise further suggests that if scientists and policymakers identify the quantity, quality, timing, and other necessary parameters of streamflow, and agricultural water users are given flexibility in how they achieve those parameters, agriculturalists can optimize the water system and create positive outcomes for both fish and farming. Once the streamflow parameters are agreed upon, agriculturalists can key their cropping and irrigation systems to the specific lifecycle needs of fish. In this way, farmers can produce, and fish can reproduce, creating a win-win where the fish lifecycle systems and the irrigation systems complement each other rather than compete.

Currently, many agriculturalists identify restrictive water policy and fear of a water right extent and validity determination as the primary barriers to making changes necessary to improve streamflow. Credible mechanisms to protect farmers who participate in the Water Management Initiative will need to be developed to reduce the fear of negative consequences resulting from altering water management to benefit fish and the environment.

3. The agricultural economy remains viable

Most agriculturalists have experienced increased input costs (especially fuel and fertilizer), shrinking margins on production, and increased market competition for crops. With the water restrictions imposed due to the recent US Fish & Wildlife Service settlement agreement under the ESA, some farmers have also had to expend resources to seek new sources of water, while others say they have experienced reduced water availability which hampers their ability to maximize crop yields. The agricultural economy is constantly changing, and farmers must respond to market conditions to remain viable. Some crops require more water than others, and

some are more compatible with the needs of fish than others.[37] Many farmers hope that flexible water management will yield a win-win outcome, meaning that more water will be seasonally available in the streams for fish, and farmers will be able to optimize ground water and surface water applications to maximize crop yields on their land. Many farmers also recognize that water management changes may require some cost, some adjustment, and some agreement among themselves in how they operate (especially between junior and senior water right holders). Many farmers have said they want a system designed to incentivize the changes and behaviors that will support fish recovery. However, farmers seem most concerned that they not slide any further backward in terms of viability of agricultural production. At a minimum, they do not want the Water Management Initiative to further inhibit their ability to make a living.

4. Local government interests are addressed

Municipalities in the basin are responsible for a broad range of issues concerning human activity, economic prosperity, and ecological health. Within the realm of water, they are responsible for drinking water supply, stormwater, wastewater, and numerous other water-related issues. Municipalities appear to have at least three key areas of interest that might overlap with the Water Management Initiative. One is water quality and future TMDL standards[38] that will affect streams, stormwater, and drinking water supplies. The second is land use planning and growth management, since these can affect water management and endangered species recovery. There may be opportunities to integrate water resource management and watershed planning with development planning and permitting.[39] The third area of interest is how Ecology's offer to allow local governance and flexible water management will affect regulatory relationships with other state agencies such as Washington Department of Fish and Wildlife and Department of Health. Incorporating these municipal issues has the potential to increase the complexity and blunt the focus of the Water Management Initiative. However, since municipalities in the basin have significant influence over water resources, integrating and coordinating water management with municipalities could enhance the range of options to improve streamflow. If done carefully, incorporating their interests could lead to positive impact on a broader range of water related issues.[40]

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[37] For example, growing alfalfa seed requires less water than growing alfalfa and requires it at times that do not compete with streamflow requirements for fish. Wine grapes require about 50% less water than alfalfa. However, many agriculturalists are reluctant to shift fully to these crops to reduce their water requirements. In Washington, the reluctance is due in part to the requirement that water rights are validated before they are placed in the trust water program. In Oregon, some farmers have said their reluctance to lease or transfer water to instream uses is partly because it would require removing from production the portion of land associated with those water rights.

[38] Total Maximum Daily Load. In Washington, it is also known as the Water Quality Improvement Project. This process was established by Section 303(d) of the Federal Clean Water Act (CWA), which requires states to identify sources of pollution in waters that fail to meet state water quality standards, and to develop Water Quality Improvement Reports to address those pollutants. TMDLs establish limits on pollutants that can be discharged to the waterbody and still allow state standards to be met. In the Walla Walla Basin, three rivers have been listed because they do not meet water quality standards: The Walla Walla River (Temperature, Fecal coliform, pH, PCBs, Several chlorinated pesticides); Touchet River (Fecal coliform, Temperature); and Mill Creek (pH, Temperature). Rules for these pollutants in each river are currently being developed. For more information, see Ecology's TMDL website: http://www.ecy.wa.gov/programs/wq/tmdl/index.html. Oregon Department of Environmental Quality has completed an EPA-approved Temperature TMDL for the Oregon portion of the Walla Walla River and its tributaries.

[39] See, for example, Arnold, Craig Anthony. *Wet Growth: Should Water Law Control Land Use?* Environmental Law Institute, Washington D.C. 2005.

[40] For example, a significant portion of household and municipal water use is applied to lawns and landscaping. The estimated efficiency for landscape irrigation can range widely but is approximately 50 percent. Some who work on these issues suggest that significant water savings can be achieved through available technologies to improve efficiency of landscape irrigation. (Sources: David F. Zoldoske, Director, Center for Irrigation Technology (CIT),

5. The governance, monitoring, and dispute resolution mechanisms are appropriate and credible

The design of a governance mechanism will be a critical component of the Water Management Initiative. The governance mechanism will most likely provide the visible center of the Initiative that parties will look to for leadership and will hold accountable for results. The role of the governance mechanism will likely be to implement the vision of the Water Management Initiative, manage its various components, and coordinate between all the relevant parties. It may take the form of a broadly representative steering committee or some other form that would be responsible for implementing the functions of the Initiative.

The specific functions of the governance mechanism and its eventual form will depend on what goals, purposes, approaches, and activities are ultimately assigned to the Water Management Initiative. Some of the governance functions may include making water management decisions, communicating with water users and the public, monitoring performance measures and water management activities, enforcing water management decisions, planning, receiving technical and other information, representing participants in policy and legal forums, managing contracts, projects, and financial resources, and resolving disputes that might arise. Some functions may be appropriately managed by others and simply coordinated through an appropriate mechanism, while others may be a central responsibility of the governance mechanisms itself.

The governance mechanism will likely rely on and build upon the effective social norms and civic engagement that already exist in the basin, as well as cross-communication and cooperation between agricultural water users, municipal water managers, scientists, tribes, fish managers, and others. Many of these interests will likely participate in some aspect of the governance mechanism. Governance may be organized into progressively encompassing levels (e.g., irrigators, water users within Washington State, and the entire trans-boundary basin).

Effective governance will require a structure or mechanism that can flexibly adapt to new conditions resulting from public input, changing basin priorities, new information and technologies or additional participants. To gain the needed legitimacy and credibility, the governance mechanism may benefit from being partially integrated with local government and provided with some legal status, recognition and/or authority.

A number of elements will contribute to the credibility and appropriateness of the governance mechanism. Some of these include:

- **Decisions are based on accepted science and local knowledge:** To make the water management changes necessary to recover target fish species, sciences such as biology, hydrology, and geology will have to operate side by side with the local knowledge of agriculturalists, irrigators, municipal water managers, and others. To be credible and accepted, streamflow parameters will have to be based on accepted science and transparently derived. Likewise, decisions regarding water management changes at the farm and basin level should also be based on accepted knowledge and transparently derived. The credibility of the Water Management Initiative will be affected by how observers perceive the legitimacy of the decisions that are made.

California State University, Fresno. Vickie V. Driver, Principal Water Resources Specialist, San Diego County Water Authority, email communication 1/8/2007. Marsha Prillwitz, Project Manager, California Urban Water Conservation Council, email communication, 1/9/2007.)

- **Goals are measurable and monitoring is transparent:** To track performance relative to instream flow and other goals, clear and broadly agreed streamflow and other performance measures will be necessary at specific points along the mainstem Walla Walla River as well as at key points in tributaries. These performance measures will need to be tracked through an efficient and trustworthy monitoring system. The Initiative's credibility and the public's awareness would be enhanced if monitoring data and analysis were publicly available for all to see (e.g., on the internet). Assessment of the Initiative's progress toward achieving performance goals will help document effectiveness of water management changes, inform efforts to improve provision of streamflow, habitat and other parameters, and provide essential information to make additional changes if necessary. The data will also help the Water Management Initiative document successes and provide a set of facts with which to publicize the efforts among those whose support is needed (Walla Walla community, outside observers, Ecology, state legislatures, and others). Public accountability and transparency would help demonstrate the effectiveness of the Initiative's efforts and potentially add an additional layer of community/peer pressure to help achieve the performance measures.

- **Adaptive management is built in to the system to accommodate new information and changing conditions**: Precipitation and base water flows are variable across years. Rising global (and regional) temperatures suggest that base flow conditions are likely to become more challenging for agriculture and fish in the future. In addition, new information regarding fish requirements, water conservation technologies, agricultural markets, and other factors will likely become available in the future. Mechanisms to incorporate changing climate conditions and new information will be essential to ensure that sufficient habitat conditions are maintained to recover target fish species. Since the primary purpose of the Water Management Initiative is to provide the habitat conditions (i.e., flow conditions) necessary to recover target species, monitoring and assessing whether these goals are being met through the established performance measures, and altering them if they are insufficient or excessive, will be essential to demonstrating that the Water Management Initiative is achieving its goals.

- **Expertise and resources are sufficient to implement the Initiative:** Water related planning in the basin has benefited from significant volunteer input over the years. Some are concerned that the complexity and volume of work involved in implementing the Water Management Initiative exceeds the human and financial resources currently engaged in it. Managing the various functions of the Water Management Initiative will likely require the expertise of biologists, hydrologists, hydro geologists, project managers, and others. These functions might be fulfilled through partnerships with existing entities, consultants, direct hires, or other means. However, it is unlikely that these functions can be carried out adequately over the long run without enhancing the financial resources and human capacities currently engaged in the Initiative.

- **Water is managed across the entire basin:** Currently, water laws, policies, and management approaches differ in Washington and Oregon, and this creates an artificial barrier to comprehensive and consistent water management in the Walla Walla Basin. Since the basin is located in both Oregon and Washington, water management could potentially be improved by devising a mechanism that facilitates integrated and/or coordinated approaches across the two states.

- **Water resources are equitably managed among water users within the water rights seniority system:** Water management decisions have the potential to impair access to

water by others, and these impairments will need to be addressed and potentially mitigated to maintain support for the Water Management Initiative. In addition, since water resources in the basin are over-allocated and natural supplies will vary across years, it is likely that some dry years will require more extensive sacrifices than others. If some individuals or some groups experience an inordinate cost relative to others, this will undermine legitimacy and support for the Water Management Initiative. It may be beneficial to consider ways that all parties—irrigation districts, ditch companies, individual irrigators, municipalities, senior and junior water right holders, domestic users, tribes, exempt well owners, and others—can contribute to the effort of maintaining flows and helping fish complete their lifecycle under various climatic and streamflow conditions.

- **Conflict resolution mechanisms are efficient and effective:** Disagreements can be expected as part of the operation of the Water Management Initiative because water is scarce, it is essential for survival, and many depend on it for their livelihood. Director Manning has stated that one of the Washington State's requirements for the Water Management Initiative is that disputes are handled within the basin and that participants demonstrate their willingness to accept the outcomes of local decisions and the potential impairments resulting from water management changes. While the state will continue to protect against impairment when necessary, the ability of the Initiative to resolve disputes within the Basin will be an important measure of its effectiveness. Some water quantity impairments may be inevitable, but there may be ways to compensate or mitigate for the benefits that the lost water afforded. When disputes arise, a clear, efficient and accepted mechanism for addressing disputes will aid in their resolution.

6. The approach is approved and overseen by relevant state and federal agencies and Tribes

The Water Management Initiative is a partnership between the Walla Walla Basin community and the Washington Department of Ecology and the Confederated Tribes of the Umatilla Indian Reservation, which has co-management authority for Usual and Accustomed fishing areas in the Walla Walla Basin.[41] Although the Water Management Initiative envisions that water resources would be managed locally, water is a public resource and remains a responsibility of the state. Because the basin supports ESA listed fish, federal agencies also have a significant interest in the performance outcomes of the Initiative. In addition, agencies and tribes with responsibilities for water management, endangered species protection and co-management of aquatic resources will continue their role in protecting these interests on behalf of the public. Participation and oversight by relevant state and federal agencies and Tribes can provide legitimacy and credibility to the Water Management Initiative.

7. Ecological, economic and social risks are minimized

The Water Management Initiative is intended to advance the goals of increased flow and local autonomy. However, implementing this approach has inherent ecological, economic and social risks. At a minimum, implementation of the Initiative should not erode the progress that has been made in terms of habitat and streamflow improvements, relations between parties, and the economic viability of the agricultural sector. Opinions differ on whether to initially implement

[41] As noted previously, other tribes in addition to the Confederated Tribes of the Umatilla Indian Reservation may have a stake in the governance of the Initiative. The right of the Tribes is to those fish that pass through their usual and accustomed fishing grounds and stations. If fish from the Walla Walla Basin are caught, or could be caught if productive, by other tribes, then those tribes would warrant a role.

the Initiative on a basin-scale, test it first in a limited geographic area with a set of willing participants, test some components first (such as local decisions regarding changes in points of diversion), or some combination of these. However, consideration for how to develop and implement the Initiative in ways that reduce the ecological, economic and social risks will be important during the early years of the effort.

III. Insights for the Walla Walla Basin

The purpose of this report is to document efforts outside the Walla Walla Basin that have attempted to achieve goals similar to the Water Management Initiative and to describe potentially useful lessons from those efforts. The goals, purposes and approaches of the Water Management Initiative are described in the preceding section (Section II). Later in this document, a set of case examples are presented that offer experiences and insights into ways to achieve these goals. The present section is designed to bring those lessons together and summarize their relevance to the Water Management Initiative.

Findings from this research suggest that no other effort has combined the goals, purposes, and approaches that are under consideration as part of the Water Management Initiative. Consequently, it appears safe to assert that the Water Management Initiative is unique and unprecedented in its potential to chart a new approach to water management.

Although there is no direct precedent or model from which to design the Water Management Initiative, there are many examples of efforts that seek to alter water management for environmental purposes and may inform the efforts of those working to design the Initiative. Some are voluntary efforts, others are Congressionally authorized. Some are intended to prevent the listing of species under the Endangered Species Act, while others provide incidental take authorization under the ESA. Some involve irrigation districts only, while others involve federal, tribal, state, business, and other parties. Some provide insights into governance, while others provide examples of setting performance targets, incorporating science and local knowledge, or establishing a dispute resolution mechanism.

Each of the cases provides insights, lessons, and examples of important components of the Water Management Initiative. The following sections draw insights from the case examples and research as they relate to some of the primary components of the Water Management Initiative package:

- Governance of the Water Management Initiative
- Establishing flows and performance measures
- Market-based incentives for water improvements
- Integrating science and irrigation knowledge
- Equitable distribution of costs and benefits, and
- Resolving disputes

No other package implemented elsewhere combines the full range of approaches and activities contemplated by the Water Management Initiative. However, as this section will demonstrate, there are many options and approaches to achieve the Initiative's goals. Many of these are already available in Washington, but are not yet designed to maximize their effectiveness among water users. The following treatment offers insights on a breadth of these options, but does not provide a comprehensive description of each one. Further consideration will be required by those in the basin to narrow these options and identify those that are appropriate for the particular local circumstances. Once greater clarity emerges regarding the specific approach of the Water

Management Initiative, further investigation may be useful to identify more detailed design considerations beyond the scope of this research.

A. Governance Options for the Water Management Initiative

As noted in the preceding section describing the key components of the Water Management Initiative, a credible and appropriate governance mechanism will be an essential component of the Initiative. The governance mechanism will be the visible center of the Initiative and will be responsible for achieving results. One of the functions of the governance mechanism will likely be to coordinate or integrate the water management activities of the various parties in the basin.

The basin features a complex array of parties with water management interests, authorities, and knowledge, including irrigation districts, ditch companies, individual irrigators, tribes, municipalities, environmentalists, and others. Some of these are divided by city, county, and state jurisdictions. To knit together these various entities, some in the basin currently envision three levels of organization to support coordination and governance of the Water Management Initiative:

- **Level 1: Agricultural water users on the Washington side of the basin**: This level seeks to connect or coordinate among the various categories of agricultural water users, such as irrigation districts, ditch companies, individual irrigators, and senior and junior water right holders. Options include incorporating individual irrigators into existing irrigation districts, combining irrigation districts, and creating a board of joint control to link irrigation districts while maintaining their independence.
- **Level 2: Washington-side basin water users**: This level seeks to coordinate water management among all basin water users within Washington state, including agricultural water users (Level 1), municipalities, and self-supplied water users. A water authority is one common mechanism to create a coordinated water management system between irrigation districts, municipalities, and others.
- **Level 3: Bi-state water management**: This level seeks to facilitate coordinated basin-wide water management involving water users in both Oregon and Washington. A transboundary water compact offers a mechanism to achieve this goal.

Each of these levels increases the number and variety of participants and adds to the complexity of the effort. Each level may have its own governance mechanism, and the governance of the Water Management Initiative may evolve as each successive level becomes operational. Indeed, there may be multiple governance mechanisms (e.g., for irrigators, Washington-side basin water users, and states and the tribes) that are ultimately joined or coordinated through the Water Management Initiative.

Before describing governance approaches from the case examples, there are a number of important considerations that might influence the selection of the structure and the process of designing the governance mechanism. While not comprehensive, these include the following:

- **Consider the functions of the governance mechanism and match the form of governance to them**: The governance mechanism will be most effective if it is tailored to the specific purposes and functions it is expected to carry out (Figure 6). However, until the functions are defined and the existing entities and management options are mapped, it will be difficult to determine the most appropriate approach to governing the Water Management Initiative. An effective approach to designing a governance mechanism is to

start with identifying the functions that are needed to achieve the goals and purposes of the Water Management Initiative, and then designing the governance mechanism to achieve them—in other words, form follows function. There may be some functions that are already being managed by others, and thus coordination may be appropriate. There may be some functions that others could perform if given the inspiration, resources, or capacity. There may be an existing entity that could take on the entire effort or there may be a set of existing entities that could be joined or enlarged to accomplish some or all of the functions. Finally, there may be some functions or some dimensions of the Water Management Initiative that would be most effectively and efficiently achieved through a completely new entity.

Figure 6

Possible Functions of WMI Governance

- Make water management decisions
- Monitor and assess performance measures
- Coordinate among parties (e.g. irrigation districts, municipalities, tribes, individual irrigators, and others)
- Receive technical and other information
- Communicate with water users and the public
- Develop policies and represent the interests of WMI participants at the state level
- Manage water trading and banking
- Cooperate with federal, tribal, and state oversight entities
- Enforce water management decisions
- Manage contracts, projects, and financial resources (bonding)
- Resolve disputes

- **Adaptable governance structures tend to be most effective**: As water users are organized into progressively comprehensive groupings (e.g., irrigators, Washington-side basin water users, and finally the entire transboundary basin), the purposes and functions of governance may change and new parties may be incorporated. In addition, as the Water Management Initiative is implemented, there will be some inevitable trial and error and alterations to the governance mechanism may become desirable. A governance structure that can accommodate new information and learning, changing conditions and priorities, and additional participants will tend to be most durable and effective. The mechanism's ability to address the interests of non-participants will also add to its credibility and legitimacy (for example, addressing potential impairment to those outside the Initiative).

- **Additional governance considerations:** As the governance function is designed, there are a number of dimensions to consider. In addition to those that are addressed elsewhere, these include how representatives are selected (the group can gain credibility and legitimacy if they are appointed or otherwise endorsed by locally respected and legitimized bodies such as a county council, the governor, or other authorized entity), the blend of representation (the group will gain legitimacy if it is composed of an appropriate balance of relevant interests or constituency leaders); how it operates (transparency or other tools and methods); and how the governance mechanism relates to other entities with authority and influence (for example, through ex officio membership or by other means).

- **Tribal involvement may be helpful to protect trans-boundary instream flow:** Legal scholars familiar with water law and tribal law have suggested that an assertion of tribal interest in by-passed stream flow from Oregon to Washington may be an effective approach to facilitating transboundary protection. The potential for this is illustrated by the Truckee River case example. One of the key motivations for developing the Truckee

River Operating Agreement was the opposition of the Pyramid Lake Paiute Indian Tribe to the previous water allocation mechanism negotiated by California and Nevada. The tribe opposed it on the grounds that it would discriminate against their water rights and would cause further decline and ultimate destruction of Pyramid Lake. Because of Tribal opposition, Congress never ratified the agreement, though the states continued to operate under it. The Tribe's continuing opposition led to the 1990 Truckee-Carson-Pyramid Lake Water Rights Settlement Act, which was ratified by Congress and has led to a more equitable allocation of water and protection of Pyramid Lake and its ESA-listed species.

- **Inter-state compact may be difficult to achieve in the short-term**: Previous analysis and recent discussions have suggested that a bi-state compact to achieve transboundary water management (Level 3) may be complex and challenging to accomplish and thus should be considered a long-term strategy rather than a short-term option.[42] Since one of the primary motivations for an inter-state agreement is to protect conserved water from Oregon as it flows through Washington, some have suggested seeking simpler administrative methods that can be achieved at the executive branch level.[43, 44] At this stage in the development of the Water Management Initiative, Level 1 and Level 2 organization and governance might be considered near-term goals that will establish a foundation for the longer-term goal of a trans-boundary water sharing agreement.

Various arrangements are available to achieve the three levels of organization and governance (i.e., irrigation districts, Washington water users, and the entire transboundary basin). Some of the more relevant mechanisms from the case examples are described below.

1. Board of Joint Control for Irrigation Districts

To integrate the operations of existing irrigation districts in the Walla Walla Basin while maintaining their independence and autonomy, the Board of Joint Control appears to be an effective example. This mechanism could help achieve the goals of Level 1 organization to link existing irrigation districts.

The Roza-Sunnyside Board of Joint Control (RSBOJC) in the Yakima River Basin is the only example in Washington State of a Board of Joint Control. Formed in 1996, the RSBOJC was created to support proactive local management of water resources, water conservation and water quality concerns shared by the two irrigation districts. RSBOJC works to identify areas where the two irrigation districts can collaborate to address shared interests or implement projects that

[42] See, for example, Walla Walla Watershed Alliance. Walla Walla River Mainstem Integration Strategy for Instream Flow Protection, March 9, 2005.

[43] For example, the 1967 Interlocal Cooperation Act (39.34 RCW) allows any agency, political subdivision, or unit of local government, including special purpose or local service districts, any state or federal agency, political subdivisions of other states, and any recognized Indian tribe to engage in joint activities as long as each entity has the authority to do that activity itself. Specific statutes authorize cooperation between governments for specific purposes. One relevant example is RCW 35.92.014, which authorizes a city to cooperate with a municipality of a bordering state for the supply of water. For additional information, see: Sullivan, Paul, and Byron Katsuyama. Interlocal Agreements - Doing It Jointly. Municipal Research and Services Center of Washington. Undated web posting: http://www.mrsc.org/Publications/mrnews/articles/interlocal6-00.aspx).

[44] An alternative starting point might be the Memorandum of Agreement (MOA) between Oregon and Washington that was developed to implement stipulations entered into in the U.S. Supreme Court case State of Washington v. State of Oregon, 297 U.S. 517 (1936). In stipulation II. (3), it was agreed that Mud Creek, East and Middle Branch Mud Creek, Pine Creek, Schwartz Spring Branch, Dry Creek, and all tributaries thereto were to be managed according to the decrees of the two states in the same manner as if the state line did not exist. The MOA lays out how the states administer the stipulation when senior rights in Washington have insufficient water to fill their right(s).

benefit from increased economies of scale. The mechanism allows the two irrigation districts to combine resources where appropriate, feasible, and to the advantage of both, while maintaining their separate respective authorities and responsibilities. The mechanism also maintains existing priority dates for water rights and coordinates between junior and senior water right holders. Through this arrangement, the districts have increased operational efficiencies due to pooled equipment utilization, coordinated planning efforts, joint administration and shared resources.

Collaboration is formalized through a Working Group that meets every few months, where landowners, irrigators and government agencies assist in developing policy decisions and determining the direction of the organization. The collaboration has led to adoption of more efficient irrigation systems and the development of policies and guidelines that have improved water quality 50-97 percent. In addition, the RSBOJC employs Water Quality Specialists and has established an on-site, state-certified laboratory to assist in data collection and analysis of water quality.

Similar opportunities for operational efficiencies and improved environmental and agricultural outcomes seem possible in the Walla Walla Basin. The current situation is different in the Walla Walla Basin and therefore a number of steps would likely be required to create a similar arrangement (for example, a variety of agreements might be needed between irrigation districts, ditch companies, and individual irrigators). However, linking the irrigation districts and creating more comprehensive management of their water resources might aid the efforts of the Water Management Initiative to improve water management in ways that increase flows and minimize harm to irrigators.

2. Water Authority

Water Authorities are found throughout the United States and can provide water management services to a variety of agricultural, municipal, industrial and other users. This mechanism may be appropriate to connect agricultural, municipal, and other water users and entities within the Washington side of the basin (i.e., Level 2 organization).

An example from the cases is the San Luis & Delta-Mendota Water Authority in California's Central Valley. This Water Authority governs agricultural water management across multiple irrigation districts and county jurisdictions. The Authority has been effective because it established a coordinated, multi-pronged response to significant reductions in water allocation. Through market mechanisms and other means, the Authority established an operating environment that supports and rewards water improvements by farmers, including tiered pricing, water trading, and tradable effluent loads. Results include the use of advanced water conservation technology, price signals that encourage water conservation, and market mechanisms that provide financial remuneration through trading to those who use less water than their allotment. The system has led to a shift in attitudes toward support for conservation and to agricultural operations that are more efficient and profitable.

A water authority within the Walla Walla Basin has the potential to achieve similar outcomes. With sufficient authorization to establish market mechanisms and implement other activities, it could establish an operating environment that supports and rewards water conservation beyond what is currently possible.

3. Inter-state Water Compact and Transboundary Considerations

Bi-state water management (i.e., Level 3 organization) could be facilitated by an inter-state water compact. These compacts typically have the status of a contract or treaty among sovereign entities (states, tribes, and the federal government) and most require Congressional assent.

According to recent research,[45] a significant challenge limiting effective transboundary water management is the prevailing tendency for governments at all levels to prefer to maintain authority over the people and resources within their political boundaries. Transboundary agreements also typically require a significant investment of time and resources to negotiate. Thus, a strong desire for improved water management is required for a sovereign government to enter into a compact or relinquish some control of water resources. Sovereign governments have varying willingness to cede water management control, and consequently inter-state water compacts tend to range in scope as described below based on the degree of control sovereign governments are willing to relinquish:[46]

- **Coordination and cooperation in the management of shared water resources**: This provides a mechanism to exchange data and other information pertinent to independent water planning and development by respective parties. In this case, parties are not prepared to relinquish their sovereign rights and duties over the waters within their boundaries, but acknowledge that effective management of those resources cannot be accomplished without significant cooperation and coordination.[47] Since significant cooperation and information sharing already exists between Oregon and Washington and the tribes, this type of arrangement may not significantly advance the goals of the Water Management Initiative.
- **Limited purpose agreement for the shared use of water resources**: This is designed for those situations in which the parties wish to maintain control of most aspects of their internal water development but recognize the need to resolve existing or potential conflicts or establish direct coordination or management over a specific water project, source, or management function. This approach is oriented towards purposes that are limited in scope and narrowly drawn. Sovereign entities may concede limited authority over internal water resources as are necessary to achieve certain limited purposes or specific goals ranging from simple allocation of water released from a single reservoir, to prioritization of needs during droughts, to management of water quality issues. This type of arrangement could address the specific goal of protecting Oregon's bypassed water as it flows through Washington.
- **Comprehensive water management agreement**: This approach is based on the concept that the most efficient and effective allocation of shared water resources can be achieved

[45] Information and text drawn from: Draper, Stephen, editor. Sharing Water in Times of Scarcity: State of the Practice: Guidelines and procedures in the development of effective agreements to share water across political boundaries. American Society of Civil Engineers. 2006; *and* Draper, Stephen. Editor. Model Agreements for the Shared Use of Transboundary Water Resources. American Society of Civil Engineers. 2002.

[46] Examples of model transboundary agreements reflecting each of these approaches can be found in Draper, Stephen. Editor. Model Agreements for the Shared Use of Transboundary Water Resources. American Society of Civil Engineers. 2002, and Model Interstate Water Compact from the Utton Transboundary Resources Center, at the University of New Mexico School of Law (http://uttoncenter.unm.edu/about_the_center.html).

[47] This approach conforms to the *United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses*, United Nations Document A/51/869 (1997). The United States voted in favor of this when it received 104-3 vote approval in the General Assembly, but the Convention has not been ratified by the requisite states, including the United States.

only through management on a watershed basis, especially during periods of drought. Such integrated management requires creation of a separate management entity to which the parties cede specified decision-making authority. This type of arrangement would support the goals of comprehensive basin management envisioned by the Water Management Initiative.

The Truckee River Settlement (involving California, Nevada, the Pyramid Lake Paiute Indian Tribe and others) offers an example of a trans-boundary agreement that establishes an inter-state allocation of Truckee River water to address multiple purposes (species recovery, recreation, municipal needs, and agricultural and other economic water uses). Together with the Truckee River Operating Agreement, it provides a flexible way to manage water while still maintaining instream flows to recover ESA-listed species.

Another example of an inter-state compact is the Columbia River Compact.[48] This compact involves the states of Oregon and Washington and provides the forum used to set commercial fishing regulations in the Columbia River. With congressional and statutory authority, the Compact provides that all laws and regulations affecting fishing in the Columbia River over which the states have concurrent jurisdiction shall be made or altered only by mutual consent of both states. In recent years, the Compact has consisted of the Oregon and Washington agency directors, or their delegates, acting on behalf of the Oregon Fish and Wildlife Commission and the Washington Fish and Wildlife Commission. While Indian tribes are not members of the Compact, the Columbia River treaty tribes have authority to regulate treaty Indian fisheries. While not perfectly analogous to the goals of the Water Management Initiative (especially because it excludes the tribes), this agreement has the virtue of involving Oregon and Washington and addressing fish and water issues, and so may be a helpful precedent for beginning the process to establish an inter-state water compact in the Walla Walla Basin.

4. Local governance through community leaders and relationships

Efforts at all three levels of organization and governance under the Water Management Initiative could benefit from the experience of the Big Hole and the Blackfoot basins, where water use reductions are managed by a broadly representative group of community leaders. Although actions are voluntary, they are strongly supported through one-to-one communication and community peer pressure. Because the Walla Walla Basin community is relatively cohesive, has strong leadership, and has developed positive relationships across interest groups (i.e., agriculture, environment, tribes, municipalities, business, and others), the Water Management Initiative has the potential to apply this approach as well.

Through the development of drought plans in the Big Hole and Blackfoot basins, a broadly representative steering committee composed of respected community leaders in agriculture, conservation, tribes, recreation, and others are informally authorized to determine when water use reductions are necessary. If instream flow levels go below three predetermined thresholds, the steering committee initiates public and direct communications to irrigators through emails, newspaper and radio ads, and a phone tree. If the second and third thresholds are crossed, those who are not voluntarily reducing their water diversions receive phone calls and/or personal visits to encourage water use reductions. Because the community is reasonably small and cohesive,

[48] Information and text drawn from Washington Department of Fish and Wildlife's Columbia River Compact website: http://wdfw.wa.gov/fish/crc/crcindex.htm.

this personal approach is very effective. It also creates a sense of shared sacrifice among all parties.[49]

This example highlights the value of a broadly representative group of respected local community leaders lending credibility to the decisions and building on personal relationships to encourage participation for the good of all water users in the basin. The Walla Walla Basin offers a different geography and different context, and thus may be more complex than the Big Hole and the Blackfoot basins.[50] However, this approach is already part of the culture in the Walla Walla Basin (e.g., the Walla Walla Way), and could be built upon and expanded under the Water Management Initiative.

B. Establishing Flows and Performance Measures

The Washington side of the Walla Walla Basin is currently establishing instream flow rules based on recommendations developed through the Watershed Planning process.[51] These flow levels are set for specific gauging stations on rivers in the basin during specific periods of time throughout the year. The flow quantities established under this process represent a water right that must be met before additional consumptive withdrawals can be approved. However, the instream flow rule is not intended to be a target or performance measure for the Water Management Initiative. Ecology and those designing the Water Management Initiative recognize that the Initiative's proposed flexible water management is not, by itself, expected to deliver the quantities of flow currently being established by the instream flow rule. Additional water sources are being considered to help achieve these instream flow levels.[52]

As currently conceived, the Water Management Initiative's stated goals are to achieve streamflow performance targets to help recover ESA-listed species. However, some inside and outside the basin have suggested integrating water management with land management and development, and with other economic, social, and environmental issues. One approach to setting and managing streamflows that addresses these more holistic goals is known as ***Environmental Flows***.[53] An environmental flow is the water regime provided within a river or other aquatic setting to maintain ecosystems and their benefits where there are competing water uses and where flows are regulated. This approach is being increasingly used around the world to establish flows and address multiple interests.

To define environmental flows, all aspects of the river and drainage system must be considered in their context. This means looking at the basin from its headwaters to its mouth and including its wetlands, floodplains and associated groundwater systems. It also means considering

[49] In addition to water use reductions by irrigators, others also participate and share in the sacrifice. For example, fishing is curtailed or stopped during low flow periods, which creates an economic loss for fishing guides and others.

[50] For example, the Washington side of the Walla Walla Basin has more than 3000 surface water rights and more than 4000 groundwater rights, which is significantly more than either the Big Hole or the Blackfoot Basins.

[51] The state defines an "instream flow" as a level of stream flow required in perennial streams to preserve wildlife, fish, scenic, aesthetic, and other environmental and navigational values. The term "instream flow" is also described in state statutes as a base flow, a minimum flow, or a minimum instream flow. (Source: 11-07-06 Preliminary Draft Rule Amendment to Chapter 173-532 WAC Water Resources Program for The Walla Walla River Basin, WRIA 32).

[52] Two examples are the Walla Walla Basin Feasibility Study conducted by the US Army Corps of Engineers and the Confederated Tribes of the Umatilla Indian Reservation; and potential diversion from the Columbia River as part of the Columbia River Water Management Program.

[53] Information and text drawn from: Dyson, M., Bergkamp, G., Scanlon, J. (eds). Flow: The Essentials of Environmental Flows. IUCN, Gland, Switzerland and Cambridge, UK. http://www.iucn.org/themes/wani/flow/

environmental, economic, social and cultural values in relation to the entire system. A wide range of outcomes, from environmental protection to serving the needs of industries and people, are to be considered for the setting of an environmental flow. A fundamental principle is to maintain integrity, natural seasonality and variability of flows, including floods and low flows. One approach to developing environmental flows is to identify the components of a natural flow regime, indexed by magnitude (of both high and low flows), timing (indexed by monthly statistics), frequency (number of events) and duration (indexed by moving average minima and maxima). This approach establishes a set of indicators that are calculated on an annual basis for each year in the hydrological record, thus allowing for inter-annual variability in the indicators.[54] This or other approaches to setting flow targets could be employed in the Walla Walla Basin.[55]

In the cases, the Murray-Darling Basin in Australia offers an example of environmental flows. Flows were oriented to achieve specified environmental outcomes for six significant ecological assets along the river system (five major wetlands and the River Murray channel). Flow objectives included: reinstate ecologically significant elements of the natural flow regime; keep the Murray mouth open to maintain navigation and fish passage and to enhance estuarine conditions; and significantly improve connectivity between and within riverine, wetland, floodplain and estuarine environments. As one example of the results of environmental flow in the Murray-Darling Basin, a one in five year flood event in the Barmah-Millewa Forest has been enhanced through releases from a major storage in the basin. Following the enhanced releases, the great egret bred for the first time since 1979, as did nine species of frog and a variety of native fish.

As the case examples demonstrate, there are a variety of approaches to establishing flows and performance measures. As the Water Management Initiative develops, there may be value in incorporating some of these approaches to address the specific needs of the Water Management Initiative.

A useful early step in establishing flows and performance measures is to define the purpose of the flows and determine the desired future conditions to be achieved through altered water management. The purpose of the flows will influence the quantity, quality, velocity, timing and other water parameters. The desired future conditions, as well as assessment and reporting needs, will influence the choice of performance measures and indicators. To maximize the efficiency and effectiveness of the Initiative's monitoring program, the performance measures and indicators should be chosen to help those implementing the Water Management Initiative determine if those desired future conditions are changing, to what degree, and through what causal functions.

The cases provide examples of four distinct purposes influencing the establishment of flows and performance measures. Each of these cold be incorporated into flow setting and performance measurement for the Water Management Initiative:

[54] This approach is known as the Richter Method for setting flows and employs a hydrological desk-top analysis. See Richter, B.D., Baumgartner, J.V., Powell, J., Braun D.P. 1996. A Method for Assessing Hydrological Alteration within Ecosystems. Conservation Biology 10(4) 1163-1174.

[55] A range of methods have been developed in various countries to define environmental flow requirements. These are broadly grouped into the following categories: look up tables, desktop analysis, functional analysis, and habitat modeling. A variety of approaches for each category is described in Dyson, M., Bergkamp, G., Scanlon, J. (eds). Flow: The Essentials of Environmental Flows. IUCN, Gland, Switzerland and Cambridge, UK. http://www.iucn.org/themes/wani/flow/

- **Specific species**: In the Big Hole Basin in Montana, flow targets are set solely to support the water needs of specific fish species that are candidates for listing under the Endangered Species Act. The Big Hole Basin utilizes three thresholds for flow levels, which trigger increasingly stringent requests for water conservation as flows dip below those thresholds. The current approach to setting flow targets in the Walla Walla Basin appears to focus on setting flows for specific species. A lifecycle model for Bull Trout and Summer Steelhead is being designed to help determine the quantity, quality, location, and timing, and other parameters of flows necessary for recovery of these species.
- **Multi-species and habitat**: The Lower Colorado River Multi-Species Conservation Program provides an example of an effort to recover 26 listed, candidate, or non-listed species. Since many of these species spend some part of their lifecycle outside the Lower Colorado River Basin, the focus of their efforts is on the provision of adequate habitat to support the species while they are present in the basin. Thus, the parties developed a 50-year plan with performance measures related to the quantity, quality, and distribution of habitat created over time. If the targets are met, then the parties have done all they can to recover the species. They have met their obligation under the ESA, and they remain protected by an incidental take permit. However, if the program does not meet the established performance measures, then penalties could be imposed for taking of protected species and the entire agreement might have to be renegotiated. This approach encompasses a broader set of variables, and could be applied in the Walla Walla Basin to provide more comprehensive management of ecological functions than the specific species approach.
- **Multi-purpose (human, economy, environment)**: The Truckee River Operating Agreement and the South Africa approach offer two examples of managing water for the broader purposes of environmental, economic, and human uses. The Truckee agreement establishes flows to recover ESA listed species, as well as to provide for municipal, agricultural, and recreational uses across state boundaries. The Truckee situation is analogous to the Walla Walla Basin in that the majority of water originates in California but much of it is used in Nevada for economic as well as environmental purposes. In South Africa, the state has established reserves of water for human health, environmental functions, and international obligations, and allocates the remainder among economic uses, especially agriculture. This arrangement is analogous to Director Manning's offer to establish flows and then manage the remainder amongst users in the Basin. In both cases, water is managed to address multiple interests. The approach offers a more comprehensive method of accommodating the variety of uses and parties that depend on the resource. This approach also allows water management to be integrated with municipal interests such as drinking water supply and economic development decisions, as is being contemplated in the Walla Walla Basin.

Using performance measures to alter water management and allowing flexibility in how those measures are achieved appears to encourage locally appropriate means to achieve the goals and tends to engender greater support among farmers. One example of this is the Deschutes Ground Water Mitigation Program, where water users must offset withdrawals on a one-to-one volumetric basis in order to gain a groundwater permit. The program suggests that offset credits may be established through instream transfers, aquifer recharge, storage release and conserved water projects. Allowing water users in the Walla Walla Basin to identify appropriate methods to restoring flows may also generate greater support and effectiveness.

There are, however, some challenges to the use of performance-based water management. Two in particular are defining what performance means, and segregating the performance of individual entities from the overall performance of the system. The aim of performance-based water management is to produce flows in a certain range at certain locations during a specific period of time. However, the flow at a given location is typically a function of the actions of several entities, combined with factors outside the control of those entities. It is often possible for one or more actors to make efforts to achieve certain flows, but to have those efforts defeated by external factors (low snowpack, high temperature, losing reaches of the river due to previous drought conditions, etc.). In order to determine whether the water management changes are effective, it is valuable to have a way to determine what flow conditions would have been present without the actions of participants. Similarly, a method for tracking each party's or subgroup's effort separately can help differentiate performance of individual entities from the overall system. This can help identify where practices are effective and where they are not, or where the efforts of some are being undone by the actions or inactions of others.

The Platte River Recovery Implementation Program[56] in Nebraska has addressed some of these challenges through modeling of water management changes and flows. The program provides a basinwide, cooperative approach to improve and maintain habitat for four threatened and endangered species (whooping crane, interior least tern, piping plover, and pallid sturgeon). In the Platte River system, modeling is necessary because parties not in the Program can undermine the efforts of participants, and because normal flow variability in the system can easily mask the efforts of the program participants. Program managers suggest that without modeling, approximately 20 years of empirical observation would be required to reliably demonstrate an increase in flow against the background variation. However, if the Water Management Initiative in the Walla Walla is managing a larger fraction of base flow, determining the effects of water management changes may not be as difficult through empirical means.

C. Market-based Incentives for Water Improvements

Agricultural leaders involved in the Water Management Initiative have stated that the approach should employ incentives to achieve water management improvements.[57] Incentives for water conservation and water quality improvements can come in a variety of forms. Common incentive programs include federal and state loans, grants and technical assistance (e.g., Environmental Quality Incentives Program (EQIP), Conservation Reserve Enhancement Program (CREP), and Conservation Security Program (CSP)). These typically support crop changes, encourage conservation buffers, or provide cost-share opportunities for high efficiency irrigation technologies.

However, another approach to improved water management incentives involves market mechanisms such as water auctions, water banking, trading of conserved water, tiered pricing, and effluent permit trading. The case example of the San Luis & Delta-Mendota Water Authority in California's Central Valley offers an example of effective market mechanisms to encourage and reward conservation. Some or all of these may be appropriate for the Walla Walla Basin. The mechanisms employed there include:

[56] This program is not included in the case studies. For further information, see: http://www.cnppid.com/Platte_River_Program_Status_Feb_2006.htm; and www.platteriver.org/

[57] For example, public comments by Bob Rupar on October 18, 2006 at the Community Action & Innovation for Watershed Sustainability Conference held in Walla Walla.

- **Water trading**: Agricultural water users within the Water Authority are provided an allotment of water that they can use or sell as they choose. For those who have invested in efficient irrigation technologies or crops with low water requirements, they may have an allotment in excess of their irrigation needs. Thus, they can sell a portion of their allotment to others. This tends to reward water conservation investments because farmers reap a financial benefit from their conserved water. Trading within the Water Authority is administratively simple and common (300,000-400,000 acre feet are typically traded internally each year); trading outside the Water Authority is also possible, but requires a state permit. A special environmental water account allows those with an environmental interest (including the state and non-profit organizations) to purchase conserved water to supplement instream flows. While water trading among irrigators would not, by itself, lead to instream flow, water banking and other mechanisms could be included in the Walla Walla Basin that did yield an instream flow benefit.
- **Tiered pricing**: The Water Authority charges its members for provision of water, and the cost per acre foot increases progressively for each additional acre foot purchased. For example: The first acre foot might be charged at $30, the second at $60, and the third at $90. Since the Water Authority must purchase water from elsewhere to meet demand, the increasing price partially reflects the additional cost of providing the water. However, the tiered pricing model also effectively encourages water conservation through tangible and direct price signals.
- **Effluent permit trading:** Water quality is regulated in the area, and the Water Authority has instituted a tradable loads program that creates a market for effluent credits. Effluent permit trading creates an incentive to invest in water quality improvements by providing a market to sell unused permits (thereby reaping some return on the investment), and it also creates a more equitable and efficient system to create cleaner water. In this case, farmers are allocated effluent loads based on historical baselines. If a farmer's effluent load is less than the allotted amount, the farmer can sell the remaining quantity to another farmer who is over the allotted amount. These loads are traded within districts so that total effluent output from a given district remains below the prescribed levels.

In the Central Valley, the result of these market mechanisms is that the farmer can now profit by conserving water and improving water quality. This has helped to shift attitudes toward a conservation ethic and has made farmers more efficient, profitable, and better able to compete in agricultural markets. Under some of the governance mechanisms contemplated within the Water Management Initiative, some or all of these market mechanisms could be equally effective.

1. Cautions regarding water trading[58]

Although water trading has many potential benefits, the design of the system is critical to ensure that its goals are achieved and potential negative implications are reduced, mitigated, or eliminated. The theory behind water trading is that water permits will flow toward their highest valued use. Those that would receive lower value from using the permits (due to higher costs, for

[58] Information and text for this section is drawn from the following sources: Tietenberg, Tom. The Tradable Permits Approach to Protecting the Commons: What Have We Learned? June 2002. Paper presented at the 1st Workshop of the Concerted Action on Tradable Emission Permits (CATEP) organized by the Fondazione Eni Enrico Mattei, Venice, December 3-4, 2001. http://www.feem.it/web/activ/_activ.html ; Getting Paid for Stewardship: An Agricultural Community Water Quality Trading Guide. Conservation Technology Information Center (CTIC) July 2006. www.conservationinformation.org; and Hanak, Ellen. *Who Should Be Allowed to Sell Water in California? Third-Party Issues and the Water Market,*. San Francisco, Calif. : Public Policy Institute of California, 2003.

example), have an incentive to trade them to someone who would value them more. However, water markets and tradable permit systems may not maximize the value of the resource if the market conditions are not right. Circumstances when the conditions may not be right include the possibility for market power (for example if developers are allowed to outcompete agricultural interests for water rights), the presence of high transaction costs (e.g., the need for a permit from Ecology or an extent and validity determination) and insufficient monitoring and enforcement (which might allow cheating).

The experience of water markets in California offers a cautionary tale. Water trading is common in California and allows the historical holders of water rights to transfer water to other users willing to pay for it. Agricultural water districts are the main suppliers, and typical buyers include urban and industrial users, farmers with higher-value crops, and environmental programs to support fish and wildlife habitats. In many areas where environmental mitigation programs have reduced water deliveries, farmers have turned to the market for replacement water. The state has also been a major participant, running drought-year water banks and buying water for environmental programs. Since local governments must demonstrate adequate water supplies for development, municipal agencies are major buyers of long-term and permanent contracts, which account for roughly 20 percent of all sales.

Because most of the water is traded in California by agricultural water right holders, one result has been the fallowing of land in order to sell water, especially to development interests. This has had implications for the agricultural economy. When farmers do not plant, the local economy may lose jobs, tax revenues, and sales of agricultural inputs. As a result, land fallowing has led some communities to pass local ordinances to restrict water transfers or the idling of crop land. A common approach by communities is to limit the quantity or percentage of fallowed land due to water trading in a given area or community. If water trading is instituted in the Walla Walla Basin, it may be desirable to consider how much water can be traded, whether water can be traded from agriculture to other uses, and whether local zones might be appropriate to limit the geographic impact of water transfers (see, for example, the Deschutes Groundwater Mitigation Program case example and its Zone of Impact, which ensures that conservation measures offset additional groundwater withdrawals within a hydrologically connected zone).

Water banks can facilitate water trading and water conservation, but many important design considerations can influence the effectiveness of a water bank. Some of these include the principles or purposes of the water bank, the types of water that can participate in the bank, how price is determined, how environmental objectives are achieved, and who administers and operates the bank. These and other issues are discussed in a recent report analyzing water banks in western states.[59]

D. Integrating Science and Irrigation Knowledge

One of the premises of the Water Management Initiative is that if irrigators are given clear signals about when, where, and how much water fish need, and they are given flexibility to alter water management without fear of negative consequences, they can deliver significantly more water in the stream than is currently available. One key to achieving this is to integrate biological and hydrological sciences with local knowledge irrigators possess about the irrigation systems, diversion options, cropping needs, and other aspects of their agricultural operation.

[59] Clifford, Peggy, Clay Landry, and Andrea Larsen-Hayden. Analysis of Water Banks In the Western States. Prepared by Washington Department of Ecology and WestWater Research. July 2004. Ecology Publication No. 04-11-011.

There are a number of examples throughout the state where science and local knowledge have been integrated to benefit farming and the environment. For example, in the Dungeness Basin in Western Washington, three major water interests (Ecology, the Jamestown S'Klallam Tribe, and the Dungeness Agricultural Water Users Association) entered into agreements to accommodate water needs of both farmers and fish. Through a variety of process over more than a decade, scientific studies had detailed instream flow conditions, fish population changes, salmon instream flow requirements, habitat conditions, agricultural water usage, demographic changes, and more. On the basis of these studies there was general agreement among the leadership of all constituencies regarding the instream flow problem and the specific times that additional flow was necessary. Together, the parties were able to accommodate the interests of both fish and farmers through an agreement in which farmers conserved or sacrificed irrigation water for instream flows during the six week period of peak fish need.

During drought years, Ecology leased water from irrigators and provided compensation through the Water Acquisition Program. This arrangement proved to be especially beneficial for farmers. Dungeness farmers typically grow three crops of alfalfa or hay. Under this arrangement, they would still be able to irrigate the initial two crops, and if rains came during the 6-week period when water is left instream, they might still reap a third harvest. One outcome of the program is that the payments helped reduce the economic fluctuations of farming by providing an income stream to farmers even when drought conditions might impair their ability to successfully grow and harvest crops. Indeed, farmers monitored each other because they felt they were getting a reasonable deal and they did not want others to jeopardize it. Thus, the economics of the program were beneficial to the farmer and to the agricultural community, the benefits led to self-monitoring and self-enforcement, and the overall effect was to substantially enhance the viability of agriculture in the area.[60]

While the specifics of this arrangement may be unique to the Dungeness, it illustrates the potential for integrating local knowledge of agriculture and irrigation with scientific knowledge of fish and flow needs. Many farmers in the Walla Walla Basin have suggested a variety of ways that water management could be altered to improve flows and fish. As the Dungeness example illustrates, through information sharing and creative approaches to managing fish and farming, both can benefit.

The Big Hole and Blackfoot basins also offer an example of the use of science, in this case to help agricultural water users and others predict and adapt to likely water conditions for the coming year. In February, a governing body meets with scientists from USGS and NRCS to assess snow pack levels, forecast climate predictions, and predict streamflow levels for the coming season. This information provides farmers and others with an early warning mechanism to help them plan for the season's likely water conditions. If drought conditions are predicted, farmers might plant only in their most productive fields and not invest inputs on marginal fields that are less likely to yield a harvest under the year's conditions. Others (municipalities, angling guides, residential users) can also prepare and adapt their plans to accommodate the predicted future conditions. Since climate conditions vary in the Walla Walla Basin and Director Manning has suggested that flows might be set for dry, medium and wet years, pre-season forecasting could help farmers and others prepare for the coming year's conditions and avoid unnecessary costs associated with limited water availability.

[60] Source: Lovrich, Nicholas P. and Dan Siemann. Of Water and Trust: A Review of the Washington Water Acquisition Program. WSU-UW Policy Consensus Center. March, 2004. http://ruckelshauscenter.wsu.edu/.

E. Equitable Distribution of Costs and Benefits

Water management changes under the Water Management Initiative are likely to result in some costs for those making the changes and some potential impairment to the water availability of others. For the Water Management Initiative to maintain support and legitimacy within the basin, it will be helpful if the costs are shared across multiple constituencies rather than being borne primarily by a single group such as irrigation districts, junior water right holders, or those on one side of the state line or the other.[61]

As the Water Management Initiative begins to consider water management changes, a potentially helpful approach to sharing or mitigating the costs involved might be to consider an equitable distribution of the *benefits* of water rather than the distribution of the *quantity* of water itself.[62] This concept is subtle yet powerful and is at the root of some of the more effective water management regimes around the world. The idea concerns the distribution of benefits from water use—whether from agriculture, economic development, aesthetics, or the preservation of healthy aquatic ecosystems—not the benefits from water itself. Since water is an input for agriculture rather than an end in itself, there may be creative and effective ways to mitigate for the loss of a specific quantity of water. The shift from consideration of water quantities to distribution of benefits often involves a process of thinking about rights, then needs, then benefits, and then equity. Distributing water use benefits allows for positive-sum agreements, whereas dividing the water itself only allows for winners and losers. This approach also allows the potential to distribute among a "basket of benefits" that might involve non-water-related dimensions such as development, growth management, drinking water protection, and others. This approach could be effective at mitigating impairment between agricultural water users, and could also be applied between agriculture, municipalities, and others.

Examples of equitable approaches to distributing costs and benefits come from the Dungeness Basin in Western Washington and the Big Hole and Blackfoot basins in Montana. Through the development of the Dungeness-Quilcene Water Resources Management Plan,[63] parties established the principle of *shared sacrifice*, in which the tribe, irrigators, and fishing interests agreed to *share the pain and share the gain*. When the weather and other conditions provide abundant flows, ample water is available for all uses; during times of low flows and critical needs for both fish and human uses, all sides agree to restrict uses, and to share water equitably. The intent is to allow both instream and out-of-stream needs to share the pain of water-short years and the gain of abundant years. According to the Management Plan, shared sacrifice means that the irrigation community has agreed to manage and limit the amount of water used during low-flow periods, and the Tribe and fish caucuses have agreed that lower-than-optimum flows for salmonids are tolerable for an interim period while efficiency and conservation measures are implemented.[64]

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[61] As a result of the June 2000 settlement agreement with US Fish & Wildlife Service, the bulk of the costs associated with increasing instream flows are currently being borne by irrigators served by the three irrigation districts in the basin (Hudson Bay District Improvement Company, Walla Walla River Irrigation District, and Gardena Farms Irrigation District #13).

[62] Information and text for this paragraph drawn from: Giordano, Meredith and Aaron T Wolf. Sharing waters: Post-Rio international water management. Natural Resources Forum. Vol. 27 Issue 2 Page 163 May 2003.

[63] Dungeness-Quilcene Water Resources Management Plan. Submitted to the Department of Ecology under the Chelan Agreement. Prepared by the Jamestown S'Klallam Tribe, Coordinating Entity for the Regional Planning Group. June 1994.

[64] These agreements in the Dungeness basin resulted in the 1998 Trust Water Right Memorandum of Understanding (MOU) between the Dungeness Water Users Association and Ecology, in which the irrigators agreed to always leave at least 50% of the total flow from the Dungeness River, regardless of their legal water rights. The MOU

In the Big Hole and Blackfoot Basins, the locally developed, voluntary drought management plan was also designed to share the costs equitably among parties. When instream flow levels cross below agreed thresholds, progressively stringent water use reductions are requested from irrigators. Although the basins have both junior and senior water rights, the senior water right holders participate in the cutbacks with the understanding that some portion of their conserved water is then available for junior water right holders to use. This creates a shared sense of sacrifice in which all irrigators participate and all irrigators are able to continue some level of agricultural activity. In addition to irrigators, anglers and outfitters also participate by progressively reducing their impact on fish. At the first threshold, they are asked to institute conservation measures; at the second threshold, they are asked to limit fishing to morning hours; and at the third threshold, the state closes the river to fishing. Similar progressive restrictions are requested for stock watering, municipal water use, and others.

In the Walla Walla Basin, a variety of constituency groups use and depend on water resources. These groups can be organized by irrigation districts, individual irrigators, municipalities, senior and junior water right holders, domestic users, tribes, exempt well owners, Washington and Oregon State residents, and others. Finding creative and appropriate ways that all parties can contribute to reduced water use, increased streamflow, and fish survival can create a shared sense of participation and commitment, and can reduce detrimental divisions between groups.

F. Resolving Disputes

Water management changes are almost certain to result in some impairment of water rights at some time, and thus disputes within the Water Management Initiative are probably inevitable. Even the best water management systems experience disputes among parties on occasion. One key to maintaining legitimacy and credibility is to develop a clear, effective, and efficient mechanism for resolving disputes when they do occur.

For the Water Management Initiative, Director Manning has stipulated that disputes should be handled inside the basin.[65] The ability of the Initiative to resolve disputes locally will be an important indicator of its success. This will require an effective governance mechanism and equitable decisions. It will also require delicate and creative negotiation and consideration, because community members will be making decisions that affect the well-being of other community members. While water quantity will always be an issue, options to mitigate the negative effects of decisions and consideration of the benefits of water rather than the quantity of water (as described previously) may aid in the resolution of disputes.

The Lower Colorado River Multi-Species Conservation Program offers an example of an effective and efficient dispute resolution mechanism. It is not perfectly analogous to the Water Management Initiative because it involves authorities outside of the basin to resolve conflicts. However, the principles are instructive and it is likely that a similar mechanism could be developed that resolves disputes inside the basin and prevents them from spilling into the courts or elsewhere.

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further stipulated that any saved water would be put in trust and would be distributed two-thirds to instream flow and one-third to future agricultural uses. In addition, the MOU included agreements to pursue funding for habitat and water conservation projects.

[65] As noted previously, the state will continue its responsibility to protect against impairment if disputes cannot be resolved locally. In this way, minority interests will still have protection under the Water Management Initiative.

The Lower Colorado River Multi-Species Conservation Program is managed by a Program Manager with oversight by a Steering Committee. The Steering Committee seeks to make decisions by consensus, which is achieved when it becomes evident through deliberation that every Member, at the very least, does not oppose a decision. However, if consensus cannot be reached and a decision must be made, then the dispute resolution process is initiated.

The first component of the dispute resolution process is to define a "dispute." In the Lower Colorado, they have defined a dispute as occurring where either, (i) any one of the three State Participant Groups, or (ii) an aggregate of at least six votes, oppose a proposed action.[66] When a dispute occurs, the first level involves an informal process in which the disputing parties put in writing the issues in dispute and the relief sought. The Program Manager has 30 days to work with the parties to resolve the dispute. If unsuccessful, a formal process is initiated in which the decision authority is elevated to the Regional Director of Bureau of Reclamation, who works with the parties to seek an equitable solution. The Regional Director also has 30 days to issue a decision. This decision can be appealed only once, and is handled by the still higher authority of the Secretary of the Interior. An appeal requires fifteen dissenting votes (up from 6 for the formal and informal processes) or one state participant group. The Secretary's decision is final. The entire process takes a maximum of 110 days.

The Lower Colorado decision-making and dispute resolution system has a number of virtues that might be applicable to the Water Management Initiative. First, the steering committee operates by consensus to the extent possible, and provides a definition of what consensus means (in this case, the absence of opposition). Second, the by-laws explicitly define a dispute. And third, the system establishes a clear, efficient, and final process to resolve disputes (in this case, providing three opportunities for reconsideration that step from informal, to formal, and finally to appeal; limiting the time between each step in the process; and establishing an end point in the process).

As noted above, since Director Manning has stipulated that disputes be resolved within the basin, the Lower Colorado's approach to engaging progressively higher level officials to make decisions regarding disputes may not be applicable. However, the social norms inherent in the Walla Walla Way, and the types of decisions that are likely to be made, may reduce the need for this feature. Further consideration of this aspect of governance and decision-making among those in the basin will likely reveal an approach that is appropriate and effective for the Walla Walla Water Management Initiative.

[66] Voting members of the Steering Committee are organized into seven "participant groups," which include Federal, each of three states (California, Nevada, Arizona), Native American, conservation, and other interested parties.

IV. Case Examples of Water Management Innovation

This research has found no other example of attempts to implement an effort directly analogous to the Water Management Initiative. However, many efforts contain components or approaches that are similar to those being considered under the Initiative. Thus, the following cases are intended to provide examples of efforts in Washington, the United States, and even internationally that can offer experiences, insights and lessons on specific components of the proposed Water Management Initiative. Although the Water Management Initiative is unique and unprecedented, these case examples demonstrate that the components of the Initiative currently under consideration have been successfully implemented elsewhere. Thus, the truly unique aspect of the Water Management Initiative is in creating the package of features and approaches, and applying them to the specific conditions and needs of the Walla Walla Basin.

The following case examples include a description of the effort and a set of key points that may make the experience relevant to the goals of the Water Management Initiative. The case examples were chosen to address the interests and concerns of those in the Walla Walla Basin who are designing the Water Management Initiative. They were identified through interviews with researchers and practitioners who had broad knowledge of efforts to achieve local governance of water resources or alter water management for environmental purposes. The case examples were developed through review of written materials and interviews with individuals knowledgeable about the efforts.

A. Deschutes Groundwater Mitigation Program, Oregon

The Deschutes Groundwater Mitigation Program provides an example of water use authorizations and offsets through the use of a performance standard and cap on new water development. The program encourages innovative and individually appropriate approaches to instream flow protection, including water conservation, in exchange for new groundwater permits. It also supports water banking and trading.

1. Description

Population in the upper and middle Deschutes watershed has more than doubled over the past 30 years, particularly around the cities of Bend and Redmond, and has fueled increased development. This new development has led to conversions of agricultural and irrigation district lands to at least seventeen 18-hole golf courses and/or destination resorts in Deschutes County alone. This population growth and corresponding development has increased demand on surface and groundwater resources.

Much of the mainstem Deschutes River and the Metolius River are designated State Scenic Waterways and instream water rights are present on the Deschutes River, Metolius River, and Crooked River. Flow levels established for the Scenic Waterway and Instream Water Rights are not always met. In addition, under the Water Resources Commission's water allocation rules, surface water is not available for most of the year due to prior appropriations.

In the 1990s, growth and development in Central Oregon led municipalities, developers and small irrigators to turn to groundwater to supply new water needs. However, due to concerns that ground water withdrawals could impact surface water flows, in 1993, the U.S. Geological Survey (USGS) initiated a comprehensive ground water study in cooperation with the Oregon Water Resources Department (OWRD), local governments, tribes, Bureau of Reclamation and

Environmental Protection Agency. The study confirmed that snowmelt infiltrates into the ground and recharges the underlying aquifers, and that aquifer discharge provides much of the surface water to streams in the Deschutes Basin. Due to the hydrological connection, there is strong potential for groundwater withdrawals to impact surface water flows and cause injury to surface water rights holders, including junior instream rights. Given these facts, without mitigation, new ground water uses in most of the basin are prohibited. Without mitigation, the Department is unable to conclude that a proposed use is in the public interest and is required to deny new and pending ground water applications in the portion of the basin known as the Deschutes Ground Water Study Area.

To address the competing demands for instream flow and water to support agriculture, residential development and other human activities, and provide a framework under which the Oregon Water Resources Department could approve new ground water uses, the state developed the Deschutes Groundwater Mitigation Program in 2002 (OAR 690-505 and OAR 690-521). The program includes mitigation rules, a mitigation bank, and mitigation credit rules. The program is intended to allow for ground water development while mitigating for the effects of groundwater withdrawals on surface water flows in the Study Area.

The program contains two performance standards. The first is a performance standard that must be met for the state to issue new groundwater permits: scenic waterway flows and instream water right flows in the Deschutes Basin must continue to be met on at least an equivalent or more frequent basis as compared to long-term representative base period flows established by the Department. If this standard is met, the Department may continue to issue new ground water permits up to a limit of 200 cfs.

The second performance standard relates to mitigation: in order to consumptively use a gallon of groundwater, a gallon of water must be protected instream that can be used as mitigation (this is a simplified description). This approach offsets withdrawals on a long-term volumetric basis, and this has generated considerable creativity in the service of streamflow restoration. Groundwater permit applicants must acquire groundwater mitigation credits in order to receive a groundwater permit. These credits mitigate for the applicants' annualized consumptive water use, which varies with the type of use. The program suggests that credits may be established through a variety of projects that include instream transfers, aquifer recharge, storage releases and conserved water projects. More creative approaches that were considered but not included were Juniper tree removal (Juniper draw considerable water) and native grassland restoration. In addition, state-chartered groundwater mitigation banks may use temporary instream protections (instream leases or time-limited instream transfers) to establish temporary credits subject to holding an equal amount of credits in reserve (OAR 690-521). Applicants may acquire permanent credits from individuals or they may purchase temporary credits through a mitigation bank. There are two mitigation banks currently operating in the Deschutes Basin. The Deschutes Water Exchange Mitigation Bank (a subprogram of the Deschutes River Conservancy) is the only bank operating with temporary mitigation credits. Three years into the program only instream leases and transfers have been used to create mitigation credits.

The Groundwater Mitigation Rules established for the Deschutes Basin do not require drop-for-drop mitigation of groundwater withdrawals on a specific temporal and spatial schedule. Instead, they allow groundwater applicants to mitigate for the effects of their groundwater withdrawals under an annual volumetric, zone-based framework. OWRD has delineated zones of impact (ZOI) where groundwater withdrawals will theoretically affect specific reaches in the basin.

OWRD will determine which ZOI a ground water applicant must provide mitigation. For example, a groundwater applicant that is determined by OWRD to have an impact on surface water flows in the Whychus Creek ZOI may obtain credits established through an instream lease in Whychus Creek.[67] The applicant may withdraw water year-round, but the instream lease may only be effective during the irrigation season.

Any mitigation project must result in a quantity of water that can be protected legally instream. Groundwater users, to date, have used instream leases and permanent transfers to protect water instream and provide mitigation. Mitigation is typically accomplished by taking an existing consumptive surface water right and protecting it instream. The consumptive portion of that right may be used to mitigate for the consumptive portion of a new ground water use. While this does not reduce overall withdrawals, it is intended to keep consumptive use on the same existing level. For example, transferring one acre of irrigation to instream use will allow for the irrigation of a new acre from ground water.

Concerns regarding timing of the impact from groundwater pumping and other issues led to a lawsuit against the administrative rules by a number of protestants, including WaterWatch of Oregon. The suit was decided in favor of the protestants in early 2005 and the program was held to be invalid. Subsequently HB 3494 was passed by the Oregon Legislature and validated the program. The new law confirmed the Legislature's intent that the program rules govern the program and the allocation of new groundwater permits in the Deschutes Ground Water Study Area.[68]

The Department has a monitoring plan in place intended to evaluate whether the performance standard continues to be met. The Department is required to annually evaluate and report on implementation of the mitigation rules. This annual evaluation is done in coordination with the Oregon Department of Fish and Wildlife, Department of Environmental Quality, Division of State Lands and Oregon Department of Parks and Recreation, and includes consideration of new ground water appropriations, streamflow monitoring, and mitigation activity. Prior to January, 2008, the Department will also complete a five year evaluation of the program which will look at the effectiveness of the projects providing mitigation, the allocation cap (the 200 cfs limit), and what, if any, changes are needed.

2. Possible Relevance to Water Management Initiative Goals

The Deschutes Groundwater Management Program may be relevant to the goals of the Water Management Initiative in the following ways:

- The program provides an example of how to establish a streamflow performance standard that contains a community incentive for achieving it. In this case, the performance standard for instream flows must continue to be met for the state to issue new groundwater permits. This performance standard is defined as: scenic waterway flows and instream water right flows in the Deschutes Basin must continue to be met on at least

[67] Not all applications for ground water use in the Whychus area will have an impact on surface water flows in that zone. Whether a use will have a localized impact (such as in the Whychus Zone of Impact) or a more regionalized impact depends on a number of factors such as well location, depth, ground water flow direction, hydraulic head, etc. A well that is physically located in the Whychus ZOI may actually have an impact on flows at the confluence between the Metolius, Crooked and Deschutes. In this example, the Department would require mitigation within the General (regional) ZOI rather than a local ZOI.

[68] As written, the bill that allowed the rules to stand sunsets in 2014.

an equivalent or more frequent basis as compared to long-term representative base period flows established by the Department.

- The program provides an example of a flexible framework under which new ground water uses may be approved and that allows water users to find an approach that is appropriate for their situation. Water users are able develop new groundwater resources if they can provide mitigation by protecting water instream within a prescribed zone of impact. By providing mitigation that matches the consumptive portion of the proposed ground water use in order to gain a new groundwater permit, the program prevents an increase in total water consumption while providing an opportunity for new water development and encouraging creative and locally appropriate approaches to water consumption.
- The program establishes a credits system to quantify the amounts of water made available for mitigation purposes. One acre-foot of water available for mitigation is equivalent to one mitigation credit. This is water that has been legally protected instream by completing a mitigation project. These credits can be placed in a groundwater mitigation bank, or held by others, and made available for purchase by ground water users needing to mitigate for their use or by others wanting to hold mitigation credits.
- The program provides an example of how to protect surface water flows, including scenic water way flows and instream water rights, while still allowing new water development. The program establishes a cap on new groundwater permits (200 cfs) but allows new groundwater permits if an equal amount of mitigation water is legally protected instream. This creates the opportunity for development of new groundwater resources but caps the total amount withdrawn until impacts can be determined through monitoring.
- The program provides an example of a monitoring and evaluation program that is done in coordination with scientists at multiple state agencies. The joint monitoring and evaluation program provides expertise, oversight and legitimacy to the process and results.

3. References

Information and text for this case study were drawn from interviews and from the following sources:

- Deschutes River Conservancy. Deschutes Groundwater Mitigation Program: A Brief Introduction. Not dated. http://www.deschutesrc.org/What_We_Do/Water_Banking/Mitigation_Bank/default.aspx
- http://pnwho.forestry.oregonstate.edu/site/index.php

B. Roza – Sunnyside Board of Joint Control, Washington

Roza-Sunnyside Board of Joint Control provides an example of a governance mechanism to link irrigation districts that allows for coordinated activities and economies of scale, while also maintaining the independence and water rights of the individual irrigation districts. Through their coordinated and proactive efforts, significant water quality improvements have been achieved.

1. Description

The Yakima Basin in south-central Washington is one of the most intensively irrigated and agriculturally diverse areas in the United States. Until recently, during a normal irrigation season

at least 300 tons of sediment contaminated with pesticides and other pollutants entered the lower Yakima River from irrigated farmland, interfering with fish and their habitat. In 1996 the lower Yakima River was placed on Washington's 303(d) list for impairments from suspended sediment, turbidity, and DDT; and in 1998 the Washington State Department of Ecology (Ecology) established a TMDL. For 2002, the TMDL criterion for turbidity in the mainstem Yakima River was 25 NTU (nephelometric turbidity units) at the mouths of the four major tributaries in the lower Yakima. Prior to the development of the TMDL, turbidity levels commonly reached 300 NTU or higher.

Droughts in 1992-1994 coupled with the TMDL and other issues spurred interest in alternative solutions to water quality problems in the Roza and Sunnyside Irrigation Districts. Landowners and farmers approached both of these Irrigation Districts to suggest a joint committee to address similar concerns across the region in a more effective way. These growers advised that being proactive and self regulating could assist in improving water flow and quality, as well as supporting the endangered species regulations. ESA regulations applied because an increased water flow was necessary for salmon recovery and protection.

Largely due to the efforts of the landowners and enabling policy changes at the state level, the Roza-Sunnyside Board of Joint Control (RSBOJC) was created in 1996 with the goal to create a collaborative governance group to jointly manage water resources and to promote conservation during drought conditions. The RSBOJC is composed of the five Roza Irrigation District Directors, five Sunnyside Valley Irrigation District Directors, and two members from other entities in the Sunnyside Division. The RSBOJC's mission is to "implement a program to enhance water supplies by supporting storage development, improving water quality, and increasing management efficiency".

RSBOJC is an umbrella entity created to plan, implement and administer joint projects and/or programs of the Roza Irrigation District and the Sunnyside Division Board of Control. RSBOJC works to identify areas where the two Irrigation Districts can collaborate in order to address a joint concern, or develop a project which would benefit from a larger economy of scale. The Board of Joint Control mechanism provides a structure for the two entities to combine resources where it is appropriate, feasible, and to the advantage of both, while maintaining their separate respective authorities and responsibilities

The two irrigation districts remain separate and distinct entities, including maintaining their specific water rights and priority dates. However, the Board of Joint Control allows Roza Irrigation District and the Sunnyside Division to work together in ways that they have not been able to before--without changing the structure of either entity. One of the primary benefits has been operational efficiencies between the two irrigation districts such as pooled equipment utilization, coordinated participation in Yakima Basin planning, administration of joint drains, and shared employees. It also facilitates shared information such as joint water conservation planning, a coordinated approach to water management, and coordinated outreach and communication to internal and external audiences. Combined, the RSBOJC represents the third largest irrigation entity in the state.

To address the TMDL and other regulations, the two districts adopted a comprehensive Water Quality Policy, with support and input from local farmers and other landowners, that set specific on-farm turbidity targets. If on-farm targets are not met, the landowner is responsible for taking corrective action by submitting both a short-term and a long-term Water Quality Plan for how

the targets will be achieved. If the landowner continues to be in violation of the water quality policies, the Board can reduce water delivery services to the farm until the plan has been implemented and subsequent monitoring indicates compliance. Over 200 plans have been filed with the irrigation districts.

The Board worked closely with many farmers who voluntarily converted over 20,000 acres from water-intensive and erosive rill and furrow irrigation methods to sprinkler or drip systems to reduce erosion. Each year one lateral irrigation ditch is converted from open ditch to pipe, which reduces evaporation and, in many cases, delivers pressurized water to farms, making it easier for growers to utilize drip and sprinkler systems. Other best management practices implemented to control erosion include the construction of settling ponds, filter strips, and the use of polyacrylamide—a substance that binds to soil while allowing water infiltration.

The Board established an extensive monitoring system that has provided a consistent stream of data and they operate a water quality laboratory that is certified by the Washington Department of Ecology. It also obtained significant funds from Ecology plus several million dollars of its own funds to offer in low interest loans to growers to convert from rill or furrow irrigation to sprinkler or drip systems.

Although support for this approach is now widespread among Roza and Sunnyside irrigators, it was not always this way. When the RSBOJC began its Water Quality Program it held many meetings with groups of landowners within the two divisions. The approach initially met a significant degree of resistance. However, it was the position of the Board that they wanted to police themselves rather than operate under an external enforcement agency. So, they decided to continue with the program to address the Water Quality issues. By the end of their first year of water quality monitoring the landowners began to see that water quality could be improved by better irrigation practices on the farm to help clean up the return flows that were returning to the river.

Effectiveness monitoring conducted by Ecology in 2003 shows that three of the four major agricultural drains met the TMDL criteria for turbidity. While the fourth drain did not meet the criteria, it did show a sediment load reduction of approximately 80 percent. Progress was also observed in the mainstem Yakima River, with reductions of total suspended sediment loadings between 50 and 70 percent in 2003 (as compared to 1995).

Success of the Joint Board is attributed to its strong leadership and to the support it receives from local landowners in both districts. Collaboration is formalized through a Working Group that meets every few months, where landowners, irrigators and government agencies assist in developing policy decisions and determining the direction of the organization. The collaborative relationship between the parties has led to adoption of more efficient irrigation systems that are more effective during drought conditions. It has also led to the development of policies and guidelines around water quality that are beneficial to the farmer and to water quality goals. Together the Board has established a means of gathering and analysis of field data, through implementing an extensive monitoring system and a water quality laboratory. Identified areas in need of assistance are more able to receive government aid due to the detailed analysis to support suggested resolutions. Government funds assist the RSBOJC to support local growers in implementing these more efficient and effective irrigation systems and other applicable best practices.

2. Possible Relevance to Water Management Initiative Goals

The Roza-Sunnyside Board of Joint Control may be relevant to the goals of the Water Management Initiative in the following ways:

- The RSBOJC provides an example of an organizational structure and governance mechanism to link multiple irrigation districts in a basin. This is similar to the Level 1 organization discussed in the governance section, in which agricultural water users in the Walla Walla Basin might seek to connect or coordinate certain aspects of their operations. The structure allows individual entities to retain their identity, autonomy, and water rights, while providing for voluntary cooperation when mutually beneficial.
- The RSBOJC provides an example of the benefits to irrigators that could be derived from linking or coordinating their operations through such a mechanism. These include operational efficiencies, shared resources, coordinated planning, and greater influence.
- The RSBOJC provides an example of what can be accomplished when irrigators organize themselves and take proactive steps to address issues. In this case, significant resources became available to address water quality problems, and the changes benefited farmers as well as water quality.
- The RSBOJC provides an example of self-enforcement among irrigators rather than operating under an external enforcement agency.

3. Resources

Information and text for this case study were drawn from the following sources:

- Roza Irrigation District Website - http://www.roza.org/rsbojc.htm
- Sunnyside Valley Irrigation District Website -http://www.svid.org/rsbojc.htm
- National Association of Conservation District: Conservation Districts Working With TMDLs: http://www.nacdnet.org/govtaff/tmdl/CSLowerYakima.htm
- EPA Success Stories – Washington Lower Yakima River: Changes in Irrigation Practices Reduce Turbidity: http://www.epa.gov/nps/Success319/state/wa_yakima.htm

C. Lower Colorado River Multi-Species Conservation Program

The Lower Colorado River Multi-Species Conservation Program provides an example of a multi-state and multi-party basin-wide environmental management program, in this case to restore habitat for multiple ESA and other species. The program features performance measures, an adaptive management program supported by a long-term monitoring and research program, and an efficient dispute resolution system.

1. Description

The Lower Colorado River is one of the few perennial water supplies for some of the hottest and most arid areas of the United States. It provides water to over 30 million people and to nearly two million acres of farmland in Arizona, California, and Nevada, and to hydroelectric plants that generate about 13 billion kilowatt-hours of electricity annually. Because the river is so vital to the economies of all the states in its drainage, the Colorado River has become one of the most regulated and managed rivers in the United States.

The Lower Colorado River Basin extends from below Lee's Ferry at the upper end of the Grand Canyon to the Southerly International Boundary. Modern use of Lower Colorado River water for irrigation began in the late 1800s when water was diverted for use in California. Competition for Colorado River water supplies has increased steadily in response to population growth. Following construction of upstream dams, there was a long period during which virtually no water reached the Colorado River delta near the US Mexico Border. Competition for the supplies of the Colorado River has resulted in decades of political and legal confrontation and compromise. Even after Congress and the U.S. Supreme Court agreed to the apportionment of the river, this competition continued, primarily due to the use of unused allocations.

In 1994, the U.S. Fish and Wildlife Service (USFWS) designated critical habitat for the four endangered "big river" fishes within the Colorado River Basin (bonytail chub, razorback sucker, humpback chub, and Colorado River squawfish). Entities using the Lower Colorado River feared the impact of water and development restrictions from the ESA. Since water allocation in the Lower Colorado River is fully or oversubscribed, they feared conservation measures arising from Endangered Species Act compliance would prove to be onerous if handled by each separate party. In order to gain some influence over measures that individual affected parties might have to take to be in compliance with the ESA, the parties agreed to cooperate and devise a plan that would satisfy ESA requirements.

As a result, the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) was established in 1994-95 to create a coordinated, comprehensive, long-term multi-agency effort to conserve and work towards the recovery of endangered species and maintain wildlife habitat on the lower Colorado River. Implementation of the program began in April 2005 with the signing of a Record of Decision by the Secretary of the Department of the Interior. The implementation activities are based on adaptive management principles, which allow program conservation measures to be adjusted over time based on monitoring and research. This program is unique in that it provides coverage to both Federal and non-Federal entities under ESA Section 7 (through a Biological Opinion) and Section 10 (through a Habitat Conservation Plan).

The LCR MSCP's purposes are to protect the lower Colorado River environment while ensuring the certainty of existing and future river water and power operations; address the needs of threatened and endangered wildlife under the Endangered Species Act, and reduce the likelihood of listing of additional species on the lower Colorado River.

Through the program, $626 million is being used to create and maintain habitat along the lower Colorado River. The Federal government is providing half of this funding, and the state and local program partners are providing the other half. The negotiated agreement establishes performance measures for a 50 year effort to create 8,100 acres of new or restored habitat to benefit six endangered species and 20 additional species. A variety of other activities are part of the program to ensure a viable population of endangered fish in the Lower Colorado River. An extensive science, monitoring, and adaptive management program is being implemented to ensure maximum benefit to the species. The Bureau of Reclamation, in consultation and partnership with a Steering Committee made up of representatives from the 56 participating entities, is the primary implementing agency for this activity.

One of the key challenges was determining how to measure performance and what to count as success. Since the goal of the LCR MSCP is to promote the recovery of listed and other species, some participants argued that species population measures should be the performance target.

However, others argued that many factors influence the population dynamics of the species (some were migratory, spending a portion of their lifecycle outside the Lower Colorado area) and the parties did not have influence over all the factors. The parties, which included resource agencies from three states and the Fish and Wildlife Service, agreed that the performance measures should target those factors over which the parties had influence, which was primarily habitat.

The LCR MSCP developed a habitat based plan, which identified necessary habitat to offset current and future impacts on habitat from covered activities, as well as additional habitat to assist in recovery of the listed species. They determined to measure success by the quality and quantity of habitat created and protected. If the targets are met, then the parties have met their obligation under the ESA, and they remain protected by an incidental take permit under ESA section 7 or 10. However, if they do not meet their targets for habitat creation and protection, then the parties would have to re-consult under the ESA. The assurance of regulatory certainty has propelled the parties to participate fully in the program.

The parties used jointly-hired consultants to analyze existing data and draw conclusions (no new research was conducted since a significant body of data already existed). In addition, every party had their own scientists analyzing the decisions. What made this approach successful was not just the technical expertise of the consultants, but also their strong leadership and collaborative approach to managing the scientific process.

As part of the scientific analysis, the biologists identified high value conservation opportunity areas where restoration would do the most good for the most species. They and others then incorporated local government input on what would be possible given political considerations. Equity issues were also addressed, so that no party was unduly burdened and so states could be responsible for areas under their jurisdiction. As a first principle, the parties agreed to take no water or land by condemnation. All restoration would be accomplished through transactions with willing sellers and willing buyers. Marsh and wetland constitute key habitat types for the target species. High potential restoration areas are identified, often on public land, and the habitat is reconstructed, often by reducing its elevation to connect with the water table so that marsh or wetland can regenerate.

Monitoring and adaptive management is a significant part of the agreement. Every activity includes long-term considerations for data gathering to help provide information for future analysis and actions through the adaptive management program. Interdisciplinary teams develop research questions and analyze results to ensure that the project's work is achieving its goals.

The program is managed by a Program Manager with oversight by a Steering Committee. The Steering Committee is an association of water users, resource agencies, power users, and others participating in the implementation of a Multi-Species Conservation Plan for the Lower Colorado River. Voting members of the Steering Committee are organized into seven "participant groups," which include a federal group, each of three states (California, Nevada, Arizona), Native American group, conservation group, and other interested parties.

The Steering Committee seeks to make decisions by consensus. According to the By-Laws, Consensus is reached when it becomes evident through deliberation that every Member, at the very least, does not oppose a decision.

However, if disputes occur, the By-Laws provide an efficient and effective dispute resolution mechanism that allows a final decision to be made in a reasonable amount of time. The first step in the dispute resolution mechanism is to define a dispute. In this case, a dispute occurs where either, (i) any one of the three State Participant Groups, or (ii) an aggregate of at least six (6) votes, oppose a proposed action. When a dispute occurs, the first level involves an informal process in which the disputing parties put in writing the issues in dispute and the relief sought. The Program Manager has 30 days to work with the parties to resolve the dispute. If unsuccessful, a formal process is initiated, and the Regional Director of Bureau of Reclamation has 30 days to issue a decision. This decision can be appealed only once, and is handled by the Secretary of the Interior. An appeal requires fifteen dissenting votes (up from 6 for the formal and informal processes) or one state participant group. The Secretary's decision is final. The entire process takes a maximum of 110 days. When a dispute exists among members of the Federal Participant Group, those parties must meet themselves to resolve it.

The Program is a component of Bureau of Reclamation which is managing the entire implementation process, including monitoring and adaptive management. The states and other parties are partners in the program. However, states and other parties are not obligated to make policy changes or take other actions. Their primary role is to contribute specified funds for the program's operation and engage in a process to determine which projects need to be done. Everything is transparent. Annual reporting shows progress toward compliance.

Thus far, the program is reportedly meeting its interim targets. No challenges to the program or the agreement have been made. It is, however, too early to determine if the habitat restoration efforts are leading to species recovery.

2. Possible Relevance to Water Management Initiative Goals

The Lower Colorado River Multi-Species Conservation Program may be relevant to the goals of the Water Management Initiative in the following ways:

- The Program provides an example of a multi-state and multi-party basin-wide environmental management program known as the Multi-species Conservation Program. This program, in concert with the 56 participating entities, conducts habitat conservation activities, monitoring, research and adaptive management, financial management, public outreach, and reporting. A Bureau of Reclamation staff consisting of a restoration group, research and monitoring group, and fisheries augmentation group conducts the program. A large portion of the program is managed by contracts issued by those groups.
- The program provides an example of a decision-making structure that organizes parties into constituency groups yet allows them to assert individual preferences. In this case, parties participate within one of seven groups. Individual parties can assert their interests and can vote counter to the prevailing preferences of their group, but the structure is designed so that decisions are equitable and a small number of parties cannot veto the decisions of a significant majority of interests, while still protecting the interests of sovereign entities.
- The Program provides an example of a performance-based approach to achieving an incidental take authorization under Sections 7 and 10 of the Endangered Species Act. The program establishes performance measures in terms of the quantity, quality, and distribution of habitat created. If the performance measures are met, then it is understood that the parties are meeting their obligations under Endangered Species Act and they are protected from regulatory restrictions that might otherwise be imposed under the ESA. If

the program does not meet the established performance measures, then the parties are in violation of their permits issued under Sections 7 and 10 the ESA, and re-consultation would have to occur.

- The Program provides an example of a comprehensive, science-driven adaptive management program. Each action taken through the Program is implemented with careful planning and monitoring, and thorough evaluation. An interdisciplinary team of scientists coordinates the work. Results are carefully evaluated and incorporated into the adaptive management plan.
- The program provides an example of an effective and efficient dispute resolution structure that establishes three increasingly formal levels of review and provides a final decision is a reasonable amount of time. While it has not been necessary to test this structure to date, all parties have agreed to abide by it.

3. References

Information and text for this case study were drawn from interviews and from the following sources:

- By-laws of the Steering Committee. Lower Colorado River Multi-Species Conservation Program. Voted and passed on June 22, 2005.
- The Lower Colorado River Basin: Challenges of Transboundary Ecosystem Management by Kara Gillon, Defenders of Wildlife. http://www.irc-online.org/us-mex/borderlines/2000/bl68/bl68rivbasin.html
- United States Bureau of Reclamation Lower Colorado Region website: Lower Colorado River Multi-Species Conservation Program. http://www.usbr.gov/lc/lcrmscp/
- Arizona Department of Water Resources website: http://www.water.az.gov/dwr/Content/Find_by_Program/Colorado_River_Management/default.htm
- The Lower Colorado River Multi-Species Conservation Program By: Michael D. White, Ph.D. Ogden Environmental and Energy Services Co., Inc.
- U.S. Fish and Wildlife Service. Biological and Conference Opinion for The Lower Colorado River Multi-Species Conservation Program. March 4, 2005
- US Department of the Interior. Record of Decision: Lower Colorado Multi-Species Conservation Plan. April 2005.
- Bureau of Reclamation. Lower Colorado River Multi-Species Conservation Program Final Implementation Report, Fiscal Year 2007 Work Plan, and Budget Fiscal Year 2005 Accomplishment Report. Lower Colorado River Multi-Species Conservation Program Office, Bureau of Reclamation, Lower Colorado Region, Boulder City, Nevada. August 16, 2006. http://www.usbr.gov/lc/lcrmscp.
- Final Programmatic Environmental Impact Statement/Environmental Impact Report, Volume I. US Department of the Interior, Bureau of Reclamation and US Fish & Wildlife Service, the Metropolitan Water District of Southern California. December 17, 2004

D. Truckee River Settlement, California and Nevada

The Truckee River settlement represents a new generation of transboundary water agreements that establishes flexible water use options for multiple purposes, including recovery of ESA-

listed species, improved water quality, municipal drought protection, and recreation. It is a multi-party agreement between federal, state, and tribal governments and a water authority that incorporates water banking (credit water) and addresses tribal interests and a permanent allocation of water between two states.

1. Description

The Truckee River Basin is a transboundary watershed located in California and Nevada. Most of the runoff in the basin originates in California's Sierra Nevada and is stored in a variety of lakes and dammed reservoirs there. The reservoirs regulate much of the flow in the Truckee River and are operated to maintain prescribed streamflows in the Truckee River for hydropower generation, municipal and industrial use, agricultural water rights, and flow. Most of the river's consumptive use occurs in Nevada. The Truckee River empties into Pyramid Lake, and both are home to the ESA-listed cui-ui and Lahontan cutthroat trout. Conflict over the river's water has been ongoing since 1870 when a dam was built near the outlet of Lake Tahoe in California to facilitate transporting logs through down-river floatation into Nevada. Since then, numerous court cases addressing water rights, ESA species, and other issues have involved the states of California and Nevada, Bureau of Reclamation, the Pyramid Lake Paiute Indian Tribe, ditch companies, and many others.

In 1968, the California-Nevada Interstate Compact Commission approved a provisional Interstate Compact for allocation of the waters of the Lake Tahoe, Truckee, and Carson basins. The intent of the agreement was to allocate the waters of the Truckee, Carson, and Walker Rivers to California and Nevada. The Pyramid Lake Paiute Indian Tribe opposed the Compact on the grounds that it would discriminate against their water rights and would cause further decline and ultimate destruction of Pyramid Lake, which had declined by as much as 80 feet. The Compact was ratified by California and Nevada in 1970 and 1971, respectively, but never ratified by Congress. Even without such approval, the States generally agreed to honor the Compact's allocations.

In 1990, Congress ratified the Truckee-Carson-Pyramid Lake Water Rights Settlement Act (Public Law 101-618). The settlement establishes an interstate allocation of Truckee River water and creates the framework for a multi-party agreement to allow water users to increase the operational flexibility and efficiency of their water rights while providing for environmental concerns. This is achieved by allowing users to store water in reservoirs and trade it amongst uses rather than sending it downstream when it is not needed. The specific procedures for implementing the allocation and providing for storage and trade are contained in the 2003 Draft Truckee River Operating Agreement, which represents 13 years of negotiations by sovereign entities (federal government, California, Nevada and the Pyramid Lake Paiute Indian Tribe) and others. The Agreement is now moving through the administrative process and a Final Environmental Impact Statement is expected soon. A key factor in its progress thus far has been the support of a prominent U.S. Senator (Harry Reid) who shepherded the process and legislation over the years.

The agreement is intended to implement all of the court rulings regulating use of Truckee River water. The goals of the Agreement are to (1) Enhance conditions for threatened and endangered fishes throughout the Truckee River basin; (2) increase municipal and industrial drought protection in the Reno metropolitan area; (3) improve river water quality downstream; and (4) enhance stream flows and recreational opportunities in the Truckee River basin. At the time the agreement takes effect, a permanent allocation between California and Nevada of water in the

Lake Tahoe, Truckee River and Carson River basins will also take effect. The allocation of those waters has been a long-standing issue between the two States.

The primary innovation of the Agreement is to create flexible use of water and water rights through a mechanism called Credit Water. Credit Water allows water users to store water in the reservoir that would otherwise have been released to serve a downstream water right and to trade between categories of use (i.e., between agriculture, municipal, industrial, and environmental uses). Many categories of Credit Waters can be stored and managed for the purposes of maintaining a drought supply, conserving Pyramid Lake fishes, enhancing river quality and flow, and increasing reservoir recreation opportunities. Parties must pay to store the water (if they do not own the reservoir where the water is stored) and then can withdraw it at their discretion. This creates the ability to store wet water and to trade and exchange paper water. Once accumulated, Credit Water would be retained in storage or exchanged among the reservoirs until needed to satisfy its beneficial use. Transfers are done in accordance with state law. This creates a more efficient water management system.

Separate from these agreements, the US Fish & Wildlife Service has, until recently, managed flows on the Truckee River in part to maximize reproduction of ESA-listed species. Thus, natural occurrences of extreme high, scouring flows or extreme low, drought condition flows were not part of the managed flow regime. While this was successful in supporting species reproduction, it eliminated the process of natural selection that typically occurs in nature. Biologists are now trying to mimic natural flows in the Truckee River, including extreme high and low flows.

2. Possible Relevance to Water Management Initiative Goals

The Truckee River settlement may be relevant to the goals of the Water Management Initiative in the following ways:

- The settlement is an example of a multi-party agreement between the federal government, two state governments, a tribal government, and a water authority that allocates water and governs water management. In addition to establishing a permanent water allocation between California and Nevada, it also addresses tribal interests in water and fish management.
- The settlement establishes flows to address both environmental and human/economic values. Flows are managed to recover ESA listed fish, as well as to provide for municipal, agricultural, and recreational uses.
- The settlement allows for the flexible exercise use of water through the establishment of a Credit Water mechanism that allows unused water rights to be stored in reservoirs and traded among agricultural, municipal, environmental and other uses.

3. References

Information and text for this case study were drawn from interviews and from the following sources:

- Truckee River Operating Agreement Revised Draft Environmental Impact Statement/Environmental Impact Report, 2004.
- Federal Register: April 15, 2004 (Volume 69, Number 73)][Notices][Page 20025-20027] Truckee River Operating Agreement, California and Nevada. Agency: U.S. Department of the Interior. Action: Notice of intent to prepare a revised draft environmental impact statement/environmental impact report.

- United States Bureau of Reclamation Truckee River Operating Agreement website: http://www.usbr.gov/mp/troa/

E. San Luis & Delta-Mendota Water Authority, California

The San Luis & Delta-Mendota Water Authority (SL&DMWA) is an example of a regional water authority that has instituted innovative market mechanisms to encourage conservation among agricultural water users. The Authority and it's member districts have helped farmers become more efficient and more profitable under a 30 percent reduction in water allocation.

1. Description

In the early 1990s, agricultural water users and municipalities served by the Bureau of Reclamation's Central Valley Project (CVP) in California experienced severe permanent reductions in water supply coupled with increased water quality requirements. Endangered Species Act listings and other federal statutes reduced water availability by about 30% of their previous allocation.

To address the concerns of the region,, the San Luis & Delta-Mendota Water Authority was established in January of 1992 and now supports the water needs of 32 member water agencies in the Central Valley. It was initially established to operate and maintain certain United States Bureau of Reclamation Central Valley Project facilities, and do so at an optimum level and at a lower cost. The Authority has evolved to support water imports and exports, water supply management, water quality, water development, conservation, distribution, drainage, contractual rights, surface and groundwater management, and any other common interest of the member agencies. It also represents its members' interests with legislative, executive and judicial bodies.

The Authority and it's members have instituted a variety of programs and mechanisms to help farmers adjust to reduced water availability. They applied the usual approaches of grants, low interest loans, incentive programs, and technical assistance to support investments in high-efficiency water conservation technologies that helped farmers maximize yield with available water. In addition, the Authority and it's members have instituted a variety of market mechanisms to incentivize and reward conservation and farmers have the flexibility to use or sell their water to maximize their return. Since those who operate within the Authority are given flexibility in how they use their water allocation, each farmer can choose to irrigate some or all of their land, or they may opt to sell some or all of their water allocation. Investments in reduced water usage can also reap a financial return.

The first market mechanism is tiered pricing. Typically, the Water Authority member districts must rely on purchased water from elsewhere to provide sufficient supplies, and this typically costs more than their CVP contract allocations. For the farmer, tiered pricing might look like the following: $30 for the first acre/foot; $60 for the second acre/foot; $90 for the third acre/foot, and so on. Tiered pricing for water encourages reduced water use and reflects the increased cost to purchase the additional water.

A second market mechanism is the water market. Water transfers are common, especially within local districts, and administratively simple. Within the Water Authority, 300,000-400,000 acre feet are typically traded internally during the year. Water purchases can also be made from outside of the districts, but additional administrative requirements apply. In addition to farmer to farmer transfers, the public (including the state, non-profit organizations, and others) can purchase water for environmental purposes such as instream flow. A special statewide

environmental water account was established for this purpose. Water markets provide an opportunity to reap a return on water conservation investments, because the farmer can sell the saved water. For those with environmental interests, the water market provides an opportunity to supplement instream flow and, because water demand is reduced, prevent the construction of new dams and reservoirs.

A third market mechanism is tradable effluent permits. Water quality is regulated in the area, and the Water Authority has instituted a tradable loads program that is analogous to the water market. In this case, districts are allocated effluent loads based on historical baselines. If a district's effluent load is under the allotted amount by a certain amount, the district can sell the remaining amount to another district that is over the allotted amount. These loads are traded within the region so that total effluent output from a given district remains below the prescribed levels. By investing in water quality improvements and having a market to sell the unused allotment of effluent load, it creates a more equitable and efficient system to create cleaner water and it also helps pay for the water quality investments.

At the farm level, farmers have invested in drip irrigation and other high-tech irrigation technologies. Farmers have found unexpected benefits from these systems. For example, they are now injecting fertilizers into the drip irrigation system, which reduces costs and is more efficient. While these improvements typically cost $800-$1000 per acre, they have led to reduced costs, more efficient operations, and higher yields.

Some farms were unable to survive under the reduced water conditions, and others took decades to accept the new realities and adapt to the new practices. However, farmers now find that they can spread water thinner, farm more acres more efficiently, and are better able to compete in the marketplace. While the initial reduction in water allocation created contentiousness, hardship and loss of some farms, those that have adapted to the new approach seem to be faring well. The incentives and market-based approaches have generated a conservation ethic. Farmers find that they can profit by conserving water, and this has shifted people's thinking to support the efforts.

2. Possible Relevance to Water Management Initiative Goals

The San Luis & Delta-Mendota Water Authority may be relevant to the goals of the Water Management Initiative in the following ways:

- The SL&DMWA provides an example of how a water authority can govern agricultural water management across multiple irrigation districts and county jurisdictions. Through market mechanisms and other means, the water authority establishes an operating environment that supports and rewards water conservation by farmers.
- The Authority provides an example of a coordinated, multi-pronged response to significant water use reductions by agriculture. It facilitates grants, loans and technical assistance through federal and state agencies, and it establishes market mechanisms to incentivize conservation
- The Authority provides an example of how market mechanisms and price signals can encourage conservation. Through the use of tiered pricing, water trading, and tradable effluent loads, farmers are encouraged and rewarded for investing in efficient irrigation technologies, reducing water consumption, and implementing water quality improvement practices. The result has shifted attitudes and reinforced conservation values.

- The Authority provides an example of how advanced water conservation technology and market mechanisms not only reduce water consumption but also help to make agricultural operations more efficient and profitable.

3. References

Information and text for this case study were drawn from interviews and from the following sources:

- San Luis & Delta-Mendota Water Authority website: http://www.sldmwa.org/

F. Big Hole and Blackfoot Basins, Montana

Both the Big Hole Watershed and the Blackfoot Basin represent locally governed, voluntary approaches to water management that use climate and streamflow monitoring and three instream flow performance tiers that trigger increasingly stringent water management activities as instream flow levels decrease across scientifically specified thresholds.

1. Description: Big Hole River Drought Management Plan

Montana's Big Hole River winds through the mountain ranges and sagebrush prairie south of Butte. The river runs over 150 miles and its lower stretch is classified as a Blue Ribbon fishery. The river is refuge for the last wild population of fluvial (river dwelling) Arctic grayling, a fish species now limited to the Big Hole River in the Lower 48. Although the Big Hole watershed encompasses nearly 1.8 million acres, only about 2,000 people live in the area, many of them making their living by ranching and hay farming. Tourism, recreation and outfitting are also major economic activities in the watershed.

The Arctic Grayling is a candidate species for listing under the Endangered Species Act. The fish's survival is threatened by low stream flows and lethal water temperatures caused primarily by irrigation diversions, especially in the upstream tributaries. In one stretch where the minimum flow for survival is 20 CFS, the stream had been measured at only 1.9 cfs during the driest summer months when both agriculture and fish require the water most. Agricultural diversions are the main reasons for low flow, which are primarily used for grass hay, pasture grass and stock watering.

After serious droughts in 1988 and 1994, an ESA listing for the Arctic Grayling became more likely. The river, famous among fly fisherman, was also being considered by the state's Department of Natural Resources and Conservation under a statute that called for identifying "chronically de-watered" rivers in the state. The potential requirements and restrictions associated with these classifications both angered and galvanized local residents. Ranchers, worried about how they would share water among themselves, let alone leave enough in the river for the fish, formed the Big Hole Watershed Committee in 1995 with the assistance of the Governor and the Montana Consensus Council. The Committee provides a consensus-driven forum for discussion among the diverse stakeholders, including ranchers, conservationists, sportsmen, outfitters, utilities, and local, state and federal government agency representatives. Participants include local ranchers, Beaverhead County Commission, Beaverhead Conservation District, Butte-Silver Bow Public Works Department, Big Hole River Foundation, Montana Outfitters & Guides Association, and Trout Unlimited. The group receives significant technical assistance from state and federal biologists (e.g., Montana Fish, Wildlife & Parks (FWP) and United States Fish & Wildlife Service) and state hydrologists from the Montana Department of Natural Resources and Conservation (DNRC).

Water users did not want to sell their water rights, but they all agreed that a dewatered river was unacceptable. After much discussion, this diverse and representative group of community leaders developed a common vision around the idea that the land is more valuable with the river, water, and habitat. They worked with agencies and scientists to develop a "Drought Plan" that made sense to those involved. Once they had a plan that was scientifically sound and acceptable to all the parties involved, the group then had to seek support for it among their neighbors—mostly agricultural water users. The plan is evaluated each year and changes are adopted based on new knowledge and data. Changes to the plan emulate the multistakeholder/multidisciplinary consensus process established by the Big Hole Watershed Committee.

The Drought Plan divides the river into three distinct reaches for managing low flow, and each reach has flow and temperature triggers that govern recreational use and triggers voluntary irrigation limits and mandatory fishing closures. Voluntary irrigation reductions have been implemented every year since the plan was adopted in 1999. Although the river often does not meet its instream flow goal during one week each year, the plan has been successful in maintaining higher flow during drought years than was experienced during 1988 and 1994.

The drought plan involves early warning monitoring by USGS and NRCS on snow pack levels and projected stream flows so that irrigators can prepare accordingly. As drier summer months arrive, streamflow is carefully monitored and if flow levels dip below established triggers, a series of public information activities and requests for water reductions are set in motion.

An example of the 3-tiered triggers comes from the Middle river segment, which is monitored at the USGS Mudd Creek Gage. Scientists have determined that 60 cfs is the minimum survival flow for the Arctic Grayling in this reach of the river.

100 cfs — When flows decrease to 100 cfs or temperatures exceed 70°F for over 8 hours per day for three consecutive days. DNRC and FWP officials will meet with the Big Hole Watershed Committee to present data; formulate options including voluntary reduction of irrigation, stock water diversions, municipal water use, angling, and encourage the use of stock watering wells; and prepare to take action. A phone tree is initiated to advise water users, outfitters, and anglers of low water conditions and encourage conservation measures.

80 cfs — When flows decrease to 80 cfs or temperatures exceed 70°F for over 8 hours per day for three consecutive days. Notice to outfitters and anglers requesting fishing be voluntarily limited to morning hours. Well use will be encouraged for stock watering.[69] A phone tree will advise water users and outfitters of low water conditions and encourage conservation measures. The media will be contacted and news articles released to inform public of low flow conditions.

60 cfs — When flows decrease to 60 cfs or temperatures exceed 70 F for over 8 hours per day for three consecutive days. FWP will close the river to fishing and not conduct electrofishing surveys. Voluntary reduction of irrigation and water use is initiated. A phone tree and media releases inform water users, outfitters, anglers, and publics of the continued decline of instream flows and encourages water conservation. The river remains closed until flows exceed 80 cfs for seven consecutive days and

[69] This is an example of conjunctive use of groundwater and surface water sources to benefit instream flow. When streamflow levels get low, irrigators are asked to shut off diversions that are used only for watering livestock. That water is then left instream to benefit stream flows.

temperatures do not exceed 70 F for more than 8 hours per day for three consecutive days.

The system appears to function because 1) ranchers fear the potential restrictions of the ESA and are willing to voluntarily reduce water usage to avoid the listing; 2) the system was designed by ranchers and informed by science, so it addresses the concerns of key interests; 3) it is built on a philosophy of shared sacrifice among all parties (ranchers, fishermen, municipalities, etc.), so each group or interest is being asked to share the burden; 4) it involves many personal interactions, including phone trees to inform ranchers of changes in conditions; and 5) because the community of water users is relatively small and interconnected, peer pressure is very strong and encourages farmers to participate and help avoid an ESA listing. In addition, during dry periods, the Big Hole Watershed Committee informs concerned interests with weekly flow updates via email, regular postal mail, a posting on the website, and postings at local post offices and businesses throughout the watershed so that streamflow information is available to everyone.

Although most participate in voluntary cutbacks, some water users, especially some junior water rights holders, continue to divert. This causes frustration among those who voluntarily reduce their water usage, but it is recognized that a voluntary system has to allow for people to opt out. Members of the Watershed Committee continue to seek ways of encouraging participation by those who have not yet voluntarily cut back.

In addition to the Drought Management Plan, the committee has focused on improving fish habitat so that the impacts of drought will be reduced. They have initiated projects to improve riparian and instream habitat through creation of deeper pools, narrower and deeper channels, and willow plantings for shade to provide cooler water. Through these and other measures, it is believed that a healthy fishery can be maintained even with reduced instream flow. They are also helping ranchers improve infrastructure by replacing leaky headgates and other technologies to gain efficiency and instream flow.

To provide incentives for habitat improvements, the Committee established the framework for a Candidate Conservation Agreement with Assurances between the U.S. Fish and Wildlife Service and landowners. Under Section 10(a)(1)(A) of the Endangered Species Act, landowners who voluntarily agree to manage their lands or waters to remove threats to the Arctic Grayling will receive assurances against additional regulatory requirements should the species be subsequently listed under the ESA. To qualify, site-specific plans are developed with each landowner by an interdisciplinary technical team made up of state and federal agency staff that implement conservation measures to 1) Improve streamflows 2) Improve and protect the function of riparian habitats 3) Identify and reduce or eliminate entrainment threats for grayling and 4) Remove barriers to grayling migration.

As part of their attempts to reduce the impacts of drought, the Watershed Committee invited Trout Unlimited and the Montana Department of Natural Resources and Conservation to conduct hydrologic studies of basin. The studies identified a critical 8 mile stretch of river that was easily dewatered because it was a losing reach due to glacial moraine geomorphology. This stretch required special consideration. Through a change in the point of diversion and installation of Center pivot irrigation, the flow went from 4 cfs to 15 cfs. Trout Unlimited leased the saved water, and pulsing flows were instituted among a set of irrigators over a course of three weeks that were most critical for fish.

It is too early to say if all these efforts have had a positive effect on the grayling. Because there are so few grayling left in the river, it is difficult for biologists to make a statistical analysis. However, those involved in the effort are optimistic that positive trends in spawning success and survival rates will begin to emerge based on the recently completed and on-going habitat projects.

2. Description: Blackfoot Drought Response Plan

Water users in the Blackfoot Basin[70] have also instituted a three-tiered drought management plan with triggers that encourage voluntary water conservation. In this case, the Blackfoot River has state established instream flow water rights (known as "Murphy Rights") effective from 1971[71]. During low flow periods, the Montana Fish, Wildlife and Parks (FWP) can make a "call for water" against those with water rights junior to the Murphy Rights. In the past, FWP calls in the Blackfoot had been issued with some discretion and not uniformly. The rights were relatively new, had not proceeded through the statewide water right adjudication process, and some juniors in the watershed had firmly stated they wouldn't comply with a call anyway. Questions existed as to whether the state water agency would assist in any kind of FWP non-compliance enforcement action, and there was talk in the basin of challenging the legitimacy of the instream rights in court if a call were made. Such a challenge could have statewide implications. There were also concerns about how far "up" the Blackfoot River the Murphy call for instream flows could extend. Furthermore, a hydrological analysis revealed that even calling all the water rights junior to the Murphy Rights would not generate sufficient flows. In the year 2000, a drought brought all these issues to the forefront.

With the threat of a potential lawsuit against FWP for non-enforcement of the Murphy Right looming, stakeholders recognized they needed to take a different approach. With the help of the Blackfoot Challenge, Trout Unlimited, agencies and landowners, the community developed the Blackfoot Drought Response Plan to address future drought situations. The plan is designed to minimize the adverse impacts on fisheries resources and to aid in the equitable distribution and shared sacrifice of water resources during low flow summers. This plan is only instituted under drought conditions which are determined by stream flows and water temperatures. Snow pack, precipitation, the water table, and soil moisture are monitored throughout the year and are used as predictive indicators of drought conditions. Since 2000, the area has experienced six years of drought conditions.

The plan is modeled after the Big Hole Drought Plan, in which snow pack, precipitation, and stream flow forecasts are monitored monthly with regular communications to water users. If conditions are trending towards drought, water users are notified as early as possible so that appropriate management adjustments can be made. When late summer flows in the lower Blackfoot River fall below predetermined thresholds (700, 600, and 450 cfs), successive levels of phone calls, mailings, personal visits, and public outreach and education activities are initiated to encourage voluntary water use reductions. At 700 cfs, water right holders including irrigators, golf courses, and public agencies are asked to implement their individual drought management plans. At 600 cfs, requests are made to outfitters and the angling public to alter angling practices in an effort to reduce stress to fish during these low flow periods. The 450 cfs trigger has not

[70] Sources: Blackfoot Drought Response Plan. November 19, 2001. Blackfoot Challenge Long-Term Water Conservation Strategy. May 9, 2003. Blackfoot Challenge website: www.blackfootchallenge.org.

[71] Note that the Big Hole also has state-based instream water rights (called "reservations" in this case), but there are so few junior, and so many senior, water users there that the right does not currently play much of a role in water management.

been used since the inception of the Blackfoot Drought Response but requires full compliance with the Murphy Right and closure of the river and core bull trout tributaries to fishing. In addition to stream flows, water temperatures can trigger additional voluntary actions or fishing closures. Water temperatures are closely monitored as stream flows decline. In recent years, efforts have expanded to include homeowners and local businesses in the Drought Response through increased education of water conservation activities and benefits.

The Blackfoot Drought Response Plan is based on meaningful participation by water users junior and senior to the Murphy rights who voluntarily agree to reduce their collective water use during drought conditions in order to maintain critical in-stream flows. The concept is to secure voluntary reductions in water usage and create a "water bank account." During periods of drought, water rights holders junior to the FWP "Murphy" right who reduce their water consumption will be able to match their contribution with those provided by senior water users who have also placed their water savings in the water bank. Through basin pooling of water reductions and various water conservation methods, they attempt to achieve their end goal of maintaining critical in-stream flows.

The Drought Response Committee, a mix of agency, conservation group and private volunteers, work with water users to identify suitable voluntary actions to conserve water for users and to minimize adverse impacts on fisheries resources during the low flows. Options include pooling water rights and using them in rotation; dropping out marginal areas from irrigation; converting stock watering sources from surface water diversions to groundwater pumps; reducing the number of water rotations or shutting down ditches; or partnering with other water users by stream reach or river mile to come up with a plan for reduced water use. From a fisheries perspective, many stream reaches with low flow conditions often overlap with other “habitat” problems such as riparian degradation and impaired water quality. In addition poorly designed irrigation diversions and fish losses to irrigation ditches are common problems exacerbated by drought. The sum of these problems requires a holistic approach to correcting stream problems beyond just water conservation. In response to this broad array of fisheries issues, the drought plan itself falls under the umbrella of a larger, more coordinated stream restoration program that began in 1990. Under this “long-term” restoration program, grazing changes, irrigation ditch lining, flood to sprinkler conversions, installation of fish screens and fish ladders at diversions and many instream flow enhancement projects are continuously being developed in an attempt to address a broad array of human-induced factors that limit fisheries.

During drought periods, FWP has agreed not to initiate the in-stream flow senior Murphy right call on any water user junior to the Murphy right who meaningfully participates in this Drought Response effort, provided there is enough senior water contributed to the "bank" to at least make up for any continued junior use of water. Upon recommendation of the Committee, when in-stream flows drop below the Murphy right level at the USGS Gauge above Bonner, Montana, the FWP may send a "call" to water right holders junior to the Murphy right who are not participating in the Drought Response Plan. If they agree to participate in the Plan, and there is sufficient donated senior water to cover their use, the call can be rescinded. There have been no court challenges to the legitimacy of the instream rights and the rights are being incorporated into the adjudication.

The Drought Response Committee maintains an internal Roster of Participants and catalogues internal information on each voluntary participant that includes the current owner's name, address, phone number, water right claim number, flow rate, priority date, water source, a

description of the method by which the water will be conserved in the drought year, and the estimated amount of water to be conserved. Collection of this information helps them track the amount of in-stream flows maintained during years the plan is implemented and serves as an indicator of the success of the Plan.

The cornerstone of the emergency plan is voluntary, self-defined, water conservation. Participants decide how to reduce their specific water consumption. No mandatory actions are dictated by this plan, except for any calls for junior water triggered by Committee recommendations. The Drought Response Committee realizes that everyone's use and reliance on his or her water use is different so no one solution will work for everyone.

In the hopes of preventing the need to implement the drought response plan in the future, the group has also established a long-term water conservation strategy, whose goal is to achieve water conservation while accommodating the needs of all legitimate water users in the Blackfoot basin. The long-term strategy includes water banking, habitat restoration, leasing water rights and converting water rights to instream flow rights, conveyance and irrigation system efficiencies, domestic and homeowners association savings, landscape and xeriscape measures, measuring and monitoring water usage, and community education and outreach.

3. Possible Relevance to Water Management Initiative Goals

The Big Hole and Blackfoot drought management plans may be relevant to the goals of the Water Management Initiative in the following ways:

- The approach provides an example of a locally designed and locally governed water management system. The system was designed by community leaders from a broad set of interests and was tailored to the specific needs and situations of their basins.
- The approach provides an example of the power of personal relationships and community peer pressure to encourage participation in water use reductions. When water cutbacks are needed, requests are made through phone calls and personal visits when necessary, in addition to emails and media announcements. Personal requests come from familiar and respected people. A desire to maintain cohesion in the community encourages participation in voluntary water cutbacks and other actions. The approach relies on a sense of community, respect and trust among all parties.
- The approach provides examples of equitable distribution of costs associated with low flows. Each operates under the principle of shared sacrifice, in which no group bears the burden alone and all groups participate in some way. As flows cross below each threshold, irrigation, stock water diversions, municipal water use, angling, and other activities all curtail activities that could harm the target species. In addition, senior water right holders reduce consumption so that junior water right holders can continue to irrigate some portion of their land.
- The approach provides an example of allowing farmers and other water users flexibility to determine ways to keep water in streams or reduce harm to target species that are appropriate for their situation. By doing so, individuals can creatively minimize the hardship while still delivering benefit to the stream or species.
- The approach provides an example of an early warning mechanism to inform water users of probable climate conditions and water availability during the growing season. The forecasting is done in February, and this allows water users to proactively plan and prepare for conditions in the coming year.

- The approach provides an example of performance measurement for instream flow. The drought plans established clear indicators and target flow levels for specific times at specific locations. If flow levels cross below a tiered set of thresholds, water users are asked to invoke progressive stringent restrictions on activities that influence stream flow or target species survival.
- The Big Hole Basin provides an example of a package of specialized responses to address specific conditions. A critical 8-mile stretch of river was easily dewatered due to its underlying glacial moraine. A package of responses that included a change in the point of diversion, irrigation efficiencies, and pulsing flows returned critical water to that stretch of river.
- Both basins provide examples of improving river habitat to address the full range of issues associated with fish survival, which are often compounded by the impacts of drought. By improving habitat "quality" and converting to fish-friendly irrigation structures, it is hoped that fish populations are better able to withstand and recover from drought.
- Both basins provide examples of learning by doing. Not all of their efforts were met with immediate acceptance or immediate success. They experienced many bumps along the way and had to adjust their approach based on new data, information, and reactions from water users.

4. References

Information and text for this case study were drawn from interviews and from the following sources:

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G. South Africa National Water Act

South Africa provides an example of a water management system that creates a reserve of water for people and the environment (a kind of performance threshold) and then allocates the remaining water resources to other beneficial uses. It also creates a watershed level governance

mechanism, establishes a comprehensive monitoring program that includes socioeconomic data, and provides a funding mechanism to support the full costs of providing access to water.

1. Description

In 1998, the government of South Africa established the National Water Act to provide for a more equitable and efficient distribution of water than had been present under apartheid. The Act establishes mechanisms to manage water resources using a holistic, ecologically based approach, taking into account the entire water cycle. South Africa's new water policy sets aside water for three purposes: human health, ecological health, and international obligations. The rest is allocated among agricultural, industrial and other users. The goal of the policy is summed up in the motto "Some for all, forever."

South Africa's new water policy sets out a number of far reaching goals:

- Ensure access of all South Africans to enough water to meet their basic human needs and recognize aquatic ecosystems as having a legitimate right to their own water. Water for minimum human and ecological needs constitutes an untouchable "Reserve."
- Price water and effluent to reflect its full costs
- Establish water management and user agencies at the regional level, within hydrological areas known as catchments.
- Impose water-use charges for discharging pollution directly into the resource.

The "Reserve" is a significant and innovative component of the Act. The Reserve consists of two parts: the "basic human needs reserve" (providing all people with sufficient quantity and quality of water for living and daily tasks) and the "ecological reserve" (the minimum quantity and quality of water necessary for ecosystem health). Establishing the minimum water quantities and qualities of the reserve requires extensive study in each "significant water resource" (i.e., watershed basins, which in South Africa are called quaternary level catchments).

The Act specifies that the requirements of the Reserve must be met before water can be allocated to other uses. Where the water is already allocated to other users, requirements of the Reserve may be met progressively over time. Allocation of water in excess of the reserve is to be prioritized to the most beneficial use of water, which could result in the reallocation of water between inefficient and unproductive users and sectors to more productive ones. The policy attempts to give effect to the goal of "beneficial use in the public interest" and preaches the slogan "more crop / rands / jobs per drop" of water used.

To administer the new approach, the Act calls for the delegation of water resources management to the lowest possible level. The government is establishing Catchment Management Agencies (CMA) in each of the country's 19 major catchments as well as supporting localized voluntary water user associations (these incorporate previous irrigation boards into more transparent and accountable user groups). The CMAs will ultimately be responsible for water use allocation in catchments although the methodologies for water use allocation are still being developed. As of November 2005, one CMA had been established and seven were close to establishment.

The new policy also places a high priority on monitoring. The government is developing a National Monitoring System that is intended to facilitate the monitoring of water resources and water resources management processes, so as to provide information to water users, water

management institutions, and the public. This information is critical not only for the effective and efficient management of water resources, but also to demonstrate the outcomes of the new management approach. This is particularly important given the sensitivities about the water reallocation process, and because the ultimate success of the process will largely be determined by the extent of willing participation by all existing and potential future water users. Part of the monitoring criteria includes measuring the impact on people, which this has led to inclusion of socioeconomic data into the national monitoring system.

Significant financing for management of water resources will derive from license fees for water use. The policy states the intention to charge "users the full financial costs of providing access to water." Charges are meant to improve the financial sustainability of water supply services, and they are also deemed necessary to encourage prudent exploitation of the resource. The Act requires that revenues generated through water use charges will feed directly into water service provision and management. These funds are intended to boost the financial viability of the water supply system and contribute significantly to institutional capacity building as well as community education initiatives for water conservation or stakeholder support.

2. Possible Relevance to Water Management Initiative Goals

The South Africa National Water Act may be relevant to the goals of the Water Management Initiative in the following ways:

- The National Water Act establishes an untouchable reserve of water for ecological needs (as well as human needs and international obligations). Water quantities beyond the reserve are allocated for economic purposes such as agriculture. This reserve is analogous to Director Manning's offer to establish flows and then manage the remainder among users.
- The Act provides an example of local governance and decision making. Although water is a national resource held in custodianship by the state, responsibility for management of water resources is delegated to watershed level entities known as Catchment Management Agencies. These agencies are responsible for water use allocation within the catchments. This is analogous to the basin level governance and water management decision-making envisioned by the Water Management Initiative.
- The Act establishes a comprehensive monitoring system that is intended to facilitate the assessment of water resources and water resources management processes. The monitoring program helps determine the ecological water reserve and incorporates socioeconomic parameters to help assess the impact of water management changes on people.
- The Act establishes financing mechanisms to support the full financial costs of providing access to water. Users are charged license fees for water use and revenues generated through water use charges feed directly into water service provision and management. Charges are intended to provide for the financial sustainability of water supply services, and also to encourage prudent exploitation of the resource. The funds contribute to institutional capacity building as well as community education initiatives for water conservation and stakeholder support.

3. References

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H. Murray Darling Basin, Australia

The Murray-Darling Basin provides an example of establishing a broadly representative and agreed upon vision for the basin, establishing environmental flows and a cap on water diversions, a strong water market, and effective community engagement.

1. Description

The Murray–Darling Basin drains Australia's two longest rivers—the Murray (2,530 km) and Darling (2,740 km). The Basin spans five jurisdictions, is over 1 million square kilometers in area (covering about 14% of the country), and is home to two million people. It is also one of Australia's most productive agricultural regions, with over 70% of the country's irrigated agriculture occurring within the Basin. The Basin supports half the nation's cropland, half the sheep flock and a quarter of the cattle herd. The City of Adelaide, with a population of over one million, relies on the River Murray for up to 90% of its water supply in drought years. The Basin contains significant wetlands, ten of which have been recognized internationally through Ramsar listing. It contains many other areas of natural and cultural significance which are often important elements in local tourism.

Most of the Basin is located in semi-arid regions where water is a scarce resource and human competition for it has been steadily increasing. Almost half of the Basin's surface water management areas have been developed beyond 100% of sustainable water yield and a further third have exceeded 70% of sustainable yield. Diversions account for about half of the annual runoff in the basin, while flows to the sea from the mouth of the River Murray are 27% of natural (pre development) flows. Sixteen of the river's 35 native fish species are listed as threatened and native fish populations are currently 10% of their original numbers. Flows had become so low that the Murray mouth was closing. Water rights had been formalized so that each riparian has an entitlement specified in terms of volume and security. However, while highly secure (senior) rights are met in almost every year, less secure (junior) rights may only be met in one out of every four years.

To address the increasing competition for scarce water resources, the deteriorating health of the river systems, and increasing dryland salinity, the Government and community members determined they needed a more holistic approach to water management. The Ministerial Council and individual governments jointly adopted an integrated catchment management approach called the Living Murray Initiative, which aims to "create a healthy working river that assures us of continued prosperity, clean water and a flourishing environment". The Murray Darling Basin Commission was established in 1992 to govern this effort, containing members from each government who represent water, land and environmental resource management.

The key components of this initiative are establishing a broadly representative and agreed upon vision for the effort, establishing environmental flows and a cap on water diversions, a strong water market, and effective community engagement.

Through an involved community participation process, the Murray Darling Basin Commission developed and adopted a vision for “a healthy River Murray system, sustaining communities and preserving unique values.” The vision contained specific objectives for:

- River health: e.g. Protect and restore key habitats and river systems; prevent extinction of native species; reinstate ecologically significant elements of the natural flow regime; keep the Murray mouth open to maintain navigation and fish passage
- water quality: e.g., improve water quality to a level that sustains ecological processes; Manage salinity to minimize impacts on ecological processes; Manage nutrient levels to reduce the occurrence of blue-green algal blooms; Minimize the impact of potential pollutants
- Human dimensions: e.g., Implement an adaptive approach to the management of the River monitoring ecological outcomes and reviewing operations in the light of new information; Gather, evaluate and disseminate the community's living, scientific and intuitive knowledge to optimize environmental flow strategies; Ensure participation of the entire community by recognizing the cultural and historical relationship to the river, its landscape and its people and acknowledging the past to effect the future; Recognize the importance of a healthy River Murray to the economic, social and cultural prosperity of communities along the length of the River

The vision and objectives served to provide direction to an expert panel of scientists from across Australia known as the Expert Reference Panel, established to advise how much water is required for a healthy River Murray. Several scenarios were presented depending upon what values were being managed for and the results of subsequent research. Based upon this advice, in April 2002 the Council decided to engage the entire community in an 18 month long consultation process addressing three different scenarios for achieving additional flows in the River Murray. The three scenarios revolve around how much water to return to the river annually, 350 giga liters (GL), 750 GL or 1,500 GL. These were not options but a reference point for a consideration of the costs, benefits and issues involved.

As a result, the Initiative will initially focus on achieving specified environmental outcomes for six significant ecological assets along the river system. Five of these areas are Ramsar-listed wetlands and the sixth is the River Murray channel itself. This will require effective management of an average of 500 gigaliters of water per year, to be recovered over five years through a combination of water use efficiency gains, infrastructure improvement, and possibly the direct

purchase of water. An important component will be a comprehensive community engagement and communications strategy that will inform, involve and seek community input to the nature and elements of the effort.

Another significant element of the Initiative is the cap on water diversions introduced in 1997. The cap was is intended to limit the amount of water that can be diverted for consumptive uses and to encourage the more efficient use of existing diversions. At the request of the Council, all jurisdictions voluntarily agreed to cap their diversions from the Basin. This came as a result of the growing recognition that further growth in water diversions would hasten the decline in river health, as well as adversely affect water quality and reduce the reliability of the water supply for existing water users.

Under the cap, the amount of water that States would be entitled to divert from regulated streams in any year would be quantified using analytical models that incorporate weather conditions and which take into account a variety of infrastructure, operating rules, entitlements, demand and operating efficiency considerations. The Precautionary Principle is applied through the establishment of an allocation to be held in reserve to minimize the risk of over allocation for consumptive use.

Annual water diversion targets are set for each valley throughout the Basin. The actual rate of diversion for a valley per annum is then compared to the annual water diversion target for that year, taking into account climate variables. If the diversion exceeds an agreed trigger, an Independent Audit Group is required to conduct a special audit of the valley. If the Audit determines that a valley has breached the Cap, the state must report to the Murray- Darling Basin Ministerial Council on the actions it intends to take in that valley to bring the diversions back in line with the Cap.

While this cap limits further increases in water diversions, it has not prevented development in the Basin. New developments can occur provided their water requirements are met by using current allocations more efficiently or by purchasing water from existing developments. Indeed, many irrigators have purchased water for new developments.

The benefits that have been achieved by the Cap so far include stabilizing access rights to existing users; a greater emphasis on achieving water use efficiencies as a means to obtain water for further development; a better framework for trading in water entitlements both within states and between individuals in different states; less deterioration in water quality; less deterioration in the health of natural ecosystems; and activation of water trading.

The basin hosts an active water market. The objective of water trading is to maximize the beneficial use of water accessible by license holders by facilitating its reallocation to higher-value uses providing greater returns to water entitlement holders and the wider community. The aim is to achieve this without any significant impacts on the environment and other values; other water right holders; and inter-government agreements such as the Murray-Darling Basin Cap. The system includes safeguards to ensure that trades do not negatively affect flows and water quality, and it provides conversion factors to account for water losses between buyer and seller.

One of the goals for the Murray-Darling Basin is to establish an Environmental Flow Regime. The Cap is simply a means to that end, with the overall objective of creating a healthy system only being possible through identifying environmental water requirements and flow regimes and

by establishing a supporting management and institutional framework. An environmental flows framework has been developed that requires all jurisdictions to give priority to formally determining allocations or entitlements to water, including for the environment as a legitimate user of water; For stressed, or over allocated rivers, to provide a better balance in water resource use including appropriate allocations to the environment in order to restore/enhance the health of river systems; and before undertaking significant new irrigation or dam construction, to ensure that the environmental requirements of the river system are first met.

Through community engagement and participation, the Council defined an 'environmental flow' as “any river flow pattern provided with the intention of maintaining or improving river health” and further describes it to include making best use of water currently available to the environment; saving water lost in channels and other distribution systems and redirecting it to the environment; and reducing the amount of water removed from the river for human use. The Council further developed environmental flow objectives that include: Reinstate ecologically significant elements of the natural flow regime; Keep the Murray mouth open to maintain navigation and fish passage and to enhance estuarine conditions; and Significantly improve connectivity between and within riverine, wetland, floodplain and estuarine environments. As one example of the results of environmental flow, a 1 in 5 year flood event in the Barmah-Millewa Forest is enhanced through releases from a major storage in the basin. Following the enhanced releases, the great egret bred for the first time since 1979, nine species of frog bred, as did native fish.

The water management approach in the Murray-Darling Basin features a number of elements that contribute to its effectiveness and could be appropriate for the Walla Walla Basin. These include a flexible, integrated approach to balancing ecological, social and economic objectives and providing for the needs of both the environment and consumptive users (e.g. irrigators); the detailed community consultation that has informed all stages of the program’s development and implementation; a phased approach in which they learn by doing; a significant shift in emphasis from seeing environmental flows as being about the delivery of specified volumes of water to being more about achieving specific, agreed environmental outcomes; and the importance of a strong underpinning governance framework to provide the basis for decision-making and cooperative action.

As a result, the Murray-Darling Basin Initiative has achieved a number of valuable outcomes, including reduced river salinity; stabilization of water extractions through the Cap on water diversions; allocation of water for high environmental value ecosystems and deliberate operation of the river to achieve environmental flows; increased knowledge and awareness of declining resource condition and of management practices needed to address the causes; and increased understanding by Basin communities of the geography of the Basin and their place within it.

2. Possible Relevance to Water Management Initiative Goals

The Murray-Darling Basin example may be relevant to the goals of the Water Management Initiative in the following ways:

- The Murray-Darling Basin provides an example of a holistic integrated water management approach that addresses water, land, and environmental resource management, as well as economic and community interests.
- The Murray-Darling Basin provides an example of a concerted public engagement process to educate and gain input on water issues and community preferences. The

Council conducted an 18 month long consultation process that provided the community an opportunity to consider the costs, benefits, and issues involved in various flow levels.

- The Murray-Darling Basin provides an example of creating a publicly embraced vision for the basin that integrates ecological and human dimensions. The vision includes specific objectives for river health, water quality, and human interests.
- The Murray-Darling Basin provides an example of establishing an environmental flow regime that is defined as "any river flow pattern provided with the intention of maintaining or improving river health." Clear principles and objectives help guide the setting of flows, which are geared more toward achieving specific, agreed environmental outcomes than about the delivery of specified volumes of water.
- The Murray-Darling Basin provides an example of establishing clear goals and objectives for water management. In this case, the effort focuses on achieving specified environmental outcomes for six significant ecological assets along the river system (five Ramsar-listed wetlands and the River Murray channel itself).
- The Murray-Darling Basin provides an example of establishing a voluntary cap on water diversions by government entities. The cap was limits the amount of water diverted for consumptive uses and encourages more efficient use of existing diversions. Diversions for each state are quantified annually based on weather conditions and other considerations. The cap limits additional water diversions, but allows new developments to occur provided their water requirements are met by using current allocations more efficiently or by purchasing water from existing developments. The cap stabilizes access rights to water, encourages water use efficiencies, and creates a framework for water trading.
- The Murray-Darling Basin provides an example of the use of an independent science panel known as the Expert Reference Panel. This interdisciplinary set of experts helped advise on how ecological water needs and helped identify tradeoffs of various flow levels.

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Information and text for this case study were drawn from interviews and from the following sources:

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V. Conclusion

This report represents an early step in the process of conceptualizing, designing, and implementing the Water Management Initiative. It draws from the input of those in the basin and is intended to clarify and elaborate the purposes, goals, and challenges of the Water Management Initiative. As the report demonstrates, while the package of components contemplated under the Water Management Initiative is unique and unprecedented, the elements are well tested elsewhere and can be effective.

The report does not make recommendations on how to design or implement the Water Management Initiative. Instead, it provides a menu of options and insights that are intended to inform and possibly guide those in the basin who are working to advance the Initiative. Director Manning has asked that the Walla Walla community develop a proposal describing what the Water Management Initiative would look like and how it would operate. If this report accurately describes a shared vision of the purposes, goals, and components of the Water Management Initiative, then the next step may be to move from the conceptual phase to the design phase of this effort. It is hoped this report will serve as a platform to help those in the basin begin to choose among the many options available and narrow the concept to a specific proposal that can be considered by the broader Walla Walla Basin community and ultimately implemented.

VI. Appendices

A. Abbreviations

BPA	Bonneville Power Administration
cfs	Cubic feet per second
CREP	Conservation Reserve Enhancement Program
CSP	Conservation Security Program
DNRC	Montana Department of Natural Resources and Conservation
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
FACPSA	Final Amended Civil Penalty Settlement Agreement
FWP	Montana Fish, Wildlife & Parks
GL	giga liters
HB	House Bill
HCP	Habitat Conservation Plan
LCR MSCP	Lower Colorado River Multi-Species Conservation Program
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NRCS	Natural Resources Conservation Service
OAR	Oregon Administrative Rules
OWRD	Oregon Water Resources Department
RSBOJC	The Roza-Sunnyside Board of Joint Control
SL&DMWA	San Luis & Delta-Mendota Water Authority
TMDL	Total Maximum Daily Load
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WMI	Water Management Initiative
ZOI	Zone of Impact

B. Excerpts from "A Helluva Vision" Video

On January 25, 2006, Jay Manning, Director of Washington Department of Ecology, met with a diverse set of water interests in the Walla Walla Basin and discussed the Water Management Initiative. A video titled "A Helluva Vision" documented the meeting and other water-related activities in the basin. The video was produced by Judith Johnson, Kooskooskie Common Program Coordinator and Kevin Scribner, Walla Walla Watershed Alliance. It is available at: http://134.39.200.64/proftech/helluvavision.wmv.

Excerpts from "*A Helluva Vision*:"

Jay Manning (Director, Washington Department of Ecology): In my experience, when environmentalists, tribes, municipal water folks, and agriculturalists sit at a table together at a Congressional hearing or a legislative hearing and say, we all want to do this, we support this storage facility, we support this conservation investment, we support this pilot policy change, everybody sits up and takes notice… It starts with having a group like this who can talk to each other. You'd be surprised at how rare this is. This might be the only place in the state where the opposite ends of the water spectrum talk to each other.

Rick George (Director of Natural Resources, Confederated Tribes of the Umatilla Indian Reservation): When we look at the vision that the people here have for this basin, and you just look at it in a short-term and a long-term perspective, the short-term objectives are pretty tough and we haven't been able to get there yet. One of those is to protect the flows that come from Oregon into Washington so that they reach the mouth of the River. And then the longer term vision—this tribe has a multi-million dollar commitment with the Corps of Engineers to come up with a project like we did in the Umatilla that can serve as the long-term water development and water allocation fix for this basin in its entirety. I don't know that we can get where we want to get—short-term or long-term—without breaking out of the envelope.

Jay Manning: How radical do you want to get? Do you want to push on the edges of the existing law and regulatory system for water and do things like develop an aggressive acquisition program and fund it? What I put on the table when I was here in the summer was something far more radical than that, which is, let's forget about the existing system of laws and regulations and lets replace it with an approach that is unique to this basin. And you decide—you come up on a year to year basis based on that year's precipitation—wet year, this is the flow were going to achieve in the river. We're going to maintain this flow in this wet year, we're going to maintain this flow in this medium precipitation year, and this lower flow in a dry year. We're going to maintain that flow for fish, for recreation, for other instream values. And the rest of the water, we're going to manage amongst us users.

Kathryn Brigham (Secretary, Board of Trustees, Confederated Tribes of the Umatilla Indian Reservation): You're putting us in charge of our destiny. I think that is great. I mean, that's something that we, as a Tribe, we've been fighting for for years. That is, get us at the table and let us do our planning for the future. And we know that partnerships are necessary because we are no longer here by ourselves anymore.

Dick DuCharme: I don't think anybody has a problem about the goal. I think everybody is pretty much united on the goal. Tribes want to make sure that there is more water in the river, and they want to make sure that if we get additional water it stays there.

Chris Figgins (Leonetti Cellars): I was guardedly optimistic and loved some of the things we're hearing. Things like net environmental benefit and rewarding conservation. These are things that as a water user, we've been pushing for.

Kathryn Brigham: And listen to each other in a respectful way. And know that a dispute process is going to be important, because we are not always going to agree. But its best to look at the things that we can agree upon, where we go from there, and establish a dispute process. I think that's great.

Jay Manning: I think that if the people out there who care about water, if they saw some pilot— First of all, I'm suggesting a trial. Lets try it for 5 years and see how it works. Now these outside stakeholders, There's going to be some outside agricultural interests who are going to say "What in the world are they doing?" And there are going to be some tribes and environmental groups who are going to look at this and say "What in the world is going on here?" I think if those outside agricultural interests see that farmers in the basin are part of this and the other tribes see the Umatillas are part of this, that's going to give them comfort that, "Well, I guess they know their basin better than we do." I'm hoping they'll want to know about, they'll want to understand it, but I hope they don't stick their nose it and say "I don't like it." And it is a 5 year pilot. Its an experiment. Its not quite so scary to people thinking, "Oh my God," we're setting a precedent for all time and this can never be changed.

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