# AN ABSTRACT OF THE THESIS OF

Owen McMurtrey for the degree of Master of Science in Water Resources Policy and Management presented on June 6, 2018.

Title: Anadromous Salmonid Restoration in the Lower Crooked River: Can Collaboration and Legislation Coexist?.

Abstract approved:

_____

Edward P. Weber

In watersheds across the American Pacific Northwest, changes in the cultural and regulatory landscape have increased pressure to restore and protect populations of anadromous fish. But restoration of anadromous fish populations constitutes a 'wicked problem', relentless in character, affecting diverse stakeholder groups, and defying 'once and for all' solutions (Weber & Khademian, 2008). Existing top-down institutions and adversarial processes appear to be poorly matched to resolve 'wicked problems.' In the Lower Crooked River watershed in Central Oregon, the management of the Bureau of Reclamation's Crooked River Project is the preeminent factor influencing stream flow conditions for anadromous fish. Given the abundant opportunities for the use of litigation in systems with federal storage projects, and that legislation is typically required to make significant changes to the operation of federal storage projects, can collaboration offer a path to success, even when used alongside legislation? This research investigates the specific dynamics of the Lower Crooked River effort using a qualitative case study methodology. Semi-structured interviews

with stakeholders in the Lower Crooked River effort suggest that although a collaborative approach has been useful in resolving fish passage and habitat restoration challenges, implementation of a suite of solutions embedded in the Crooked River Collaborative Water Security and Jobs Act of 2014 has been less successful. Following the model of collaborative governance developed by Ansell and Gash (2008), I attribute the challenges of implementation in the Crooked River case to the incongruence between the structure of collaborative process and the structure of legislative solutions. Delays in the legislative process and uncertainty surrounding the implementation of the legislation reduced the opportunity to develop elements of the collaborative process—trust, commitment, intermediate outcomes, face-to-face dialogue, and development of shared understanding and vision—that are important to achieving a successful outcome.

# Anadromous Salmonid Restoration in the Lower Crooked River: Can Collaboration and Legislation Coexist?

by
Owen McMurtrey

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Presented June 6, 2018
Commencement June 2018

Master of Science thesis of Owen McMurtrey presented on June 6, 2018

APPROVED:

Major Professor, representing Water Resources Policy and Managment

Director of the Water Resources Graduate Program

Dean of the Graduate School

I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

Owen McMurtrey, Author

# ACKNOWLEDGEMENTS

The author expresses sincere appreciation for all those who made this thesis possible through their support, hard work, self-sacrifice, and patience. I owe gratitude to the individuals and organizations who have supported research in the Deschutes Basin through the Gail Louise Achterman Scholarship and to the Oregon State University Graduate School for its support through the Provost's Distinguished Fellowship.

I am grateful to Dr. Ryan Contreras for serving on my committee as my graduate council representative on short notice. I must thank Annie Ingersoll of the Water Resources, who has put forth a heroic effort to ensure that this project was in good standing with the Graduate School and proceeded on time. I want to acknowledge Colleen Barr for her consistent support and Ingria Jones for her help navigating this process. I also want to thank my coworkers at GSI Water Solutions for their assistance and sympathy. And, I want to thank my parents, for their understanding of my lack of communication over the past few years.

I must thank Dr. Bruce Aylward, both for his guidance as a professor and his timely assistance in seeing this thesis through to completion.

I owe an enormous debt of gratitude to Dr. Mary Santelmann, whose assistance, advice, and patient support from the time I applied to the Water Resources program have made possible my education, my career, and my life in Corvallis. Without Mary's encouragement, and her foresight in bringing me in to help with this year's water resources journal club, I would not have been able to find the inspiration to complete this thesis.

To my advisor, Ed Weber, I am thankful for the time and effort that you have put in to help me to understand and frame the Crooked River problem. Your tireless efforts to edit and comment on drafts of my work have helped me through difficult times when hope was scarce. Your significant efforts during my time in this program, and particularly over the last several months, will forever be appreciated

TABLE OF CONTENTS Page

Chapter 1: Introduction ..... 1

1.1 Study Context: The Pelton-Round Butte FERC Relicensing ..... 4

1.2 Study Context: the Deschutes Special Investment Partnership (SIP) ..... 6

Chapter 2: Literature Review ..... 10

2.1: Governing the Commons ..... 10

2.2 Collaborative Governance in Theory and Practice ..... 13

2.3 Whychus Creek ..... 18

2.4 The Crooked River ..... 20

Chapter 3: Research Context ..... 23

3.1 Hydrogeologic Context of the Upper Deschutes Basin ..... 23

3.2 Deschutes Basin Mitigation Program ..... 25

3.3 The Crooked River Watershed ..... 27

3.4 Crooked River Streamflow ..... 30

3.5 Whychus Creek Watershed ..... 33

3.6 Whychus Creek Streamflow ..... 34

Chapter 4: Methodology ..... 38

4.1 The Case Study Approach ..... 38

4.2 Semi-structured Interviews ..... 39

4.3. Coding and Analysis ..... 39

4.4 Limitations ..... 40

Chapter 5: Discussion ..... 42

5.1. Stakeholder Incentives ..... 42

5.1.1 Irrigation incentives ..... 43

TABLE OF CONTENTS (Continued) Page

5.1.2 Municipal Incentives ..... 47
5.1.3 Instream, Fish, and Wildlife Incentives ..... 49
5.2 Venue Shopping ..... 51
5.3 Collaboration despite legislation? ..... 53
5.3.1 Success: fish passage efforts of the CRWC ..... 54
5.3.2 Remaining obstacles: passage and implementation of the Crooked River Act ..... 63
5.4 Summary of Results and Discussion ..... 73
Chapter 6: Conclusion ..... 77
Bibliography: ..... 81
Appendix A: Deschutes SIP Project List ..... 87
Appendix B: Interview Guide ..... 90
Appendix C: Interview Coding Guide ..... 93
Appendix D: Matrix of Crooked River Strategic Issue ..... 95

# LIST OF FIGURES

Figure Page

3.2.1. Deschutes Basin Hydrogeology…….24

3.3.1. Crooked River Watershed……..29

3.4.1. Streamflow of Crooked River below site of Bowman Dam, 1942-1959……...30

3.4.2. Streamflow of Crooked River below Bowman Dam, 1964-1993……..31

3.4.3. Streamflow of Crooked River near Terrebonne, 1994-2014…….32

3.6.1. Streamflow of Whychus Creek below TSID Diversion, 1968-1997…….35

3.6.2. Streamflow of Whychus Creek below Sisters, 2001-2002……36

# LIST OF TABLES

Table Page

1.4.1. Comparison of Hierarchical and Collaborative Governance Types……..13

3.6.1. Whychus Creek Instream Flow Frequency……37

5.3.2.1. Whychus Creek Instream Flow Frequency…….72

## Chapter 1: Introduction

The restoration of anadromous fish populations has become a focus of natural resource managers and environmental advocates in the Pacific Northwest. Restoration efforts are supported by federal legislation like the Endangered Species Act (ESA), Clean Water Act (CWA), National Environmental Policy Act (NEPA), and through the Federal Energy Regulatory Commission (FERC) licensing process for certain hydropower facilities. The availability of these avenues for fish restoration often results in settlements or "consultations" that take the form of broad scale restoration plans (e.g., Habitat Conservation Plans under the ESA). This process allows stakeholders to negotiate for changes in flow management regimes and investment in fish passage and riparian habitat restoration efforts in a supportive setting. However, this complex of federal laws offers many different avenues toward fish restoration, with complex interactions between state and federal laws and a general lack of coordination among multiple agencies. An array of "fish restoration" rules make the on-the-ground task of restoration more difficult because stakeholders must meet myriad demands and mandates in order to move forward.

This top-down, rules-based complexity also contributes to significant time delays in restoration efforts, which often leads to litigation from environmental advocates seeking to overcome delays and force agencies to implement solutions to the long-standing problems of anadromous fish passage, restoration of streamflows suitable for anadromous fish survival, modification and/or removal of barriers to fish passage, and expenditure of funds for riparian habitat restoration. However, litigious approaches also have limited potential for success because court-based solutions are generally poor substitutes for the effective resolution of complex public problems (Weber, 1998). They can also effectively defer management of the resource to existing

bureaucratic hierarchies at both the state and federal level, thus enhancing the 'top-down' character of solutions.

Existing top-down institutions and adversarial processes thus appear to be poorly matched to resolve 'wicked problems' (Weber, Lach, & Steele, 2017). Wicked problems are complex, affect diverse stakeholder groups, and are relentless in character, defying 'once and for all' solutions (Weber & Khademian, 2008). The corollary problem is that the dissatisfaction of those who bear the costs of regulatory and enforcement actions in such cases can then undermine the capacity of state agencies to effectively carry out their missions (Schukman, 2001).

In recent years, however, the complexity of restoring anadromous fish populations in Western watersheds, and the general lack of restoration success (Lackey, 2017), has led scholars and practitioners alike to gravitate toward different problem solving mechanisms, or institutions, particularly collaborative governance (Ansell & Gash, 2008). In the natural resources policy sphere, the success of collaborative approaches has led federal and state agencies to "[tie] collaborative governance to ecosystem management policy as a means of eliminating the dissatisfaction and inefficiencies created by the adversarial model" (Schukman, 2001, 353). In Western U.S. watersheds where there are active efforts to restore anadromous fish species, including ESA-listed species, does collaboration offer a path forward for restoring anadromous fish populations while also improving the condition of other stakeholders who depend on water supplies?

The collaborative governance literature offers general guidance that suggests collaboration would provide a successful path forward for restoring anadromous fish populations, especially given the wicked nature of anadromous fish restoration problems.

However, the collaborative governance literature acknowledges that each watershed is unique, and, unless empirically tested, the prospects for successful collaboration are unclear within any given watershed (Weber, 2003; Weber, 2009). Case studies from the literature offer success stories, but also document impatience due to slow progress in achieving tangible results, sometimes leading to the failure of collaborative programs (see, e.g., Coglianese, 1999; Matthews & Missingham, 2009).

The Deschutes Basin in Central Oregon provides an opportunity to compare two subbasins, Whychus Creek and the Crooked River. These sub-basins share a broad set of overlapping conditions, and have enjoyed varying degrees of success in achieving the goals of fish restoration projects. This thesis focuses on the Crooked River watershed in the Deschutes Basin of Central Oregon. Compared to the Whychus Creek watershed, a well-studied example of successful (though ongoing) collaborative restoration effort, the restoration effort in the Crooked has produced mixed success to date. Although some anadromous fish passage programs in the Crooked have enjoyed success and clearly have collaborative traits, interested stakeholders in the Crooked have struggled to implement a suite of solutions that adequately address the ecological needs of anadromous fish populations. Prineville Reservoir, a Bureau of Reclamation (Reclamation) storage facility that forms the upper boundary of the lower Crooked River, is a key element of the solution, and the Crooked case offers important lessons for collaborative efforts in systems with federal storage projects.

### *1.1 Study Context: The Pelton-Round Butte FERC Relicensing*

The Upper Deschutes is a semi-arid watershed draining the Western slope of the Cascade Mountains to the West and Ochoco Mountains to the East. Three major drainages, the mainstem Deschutes River, the Metolius River, and the Crooked River meet at Lake Billy Chinook, a reservoir created by the construction of Round Butte Dam in 1965. The construction of the dam cut-off upstream and downstream fish passage for anadromous steelhead trout (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), and sockeye salmon (*Oncorhynchus nerka*). There were limited efforts to provide upstream and downstream fish passage prior to the initiation of the FERC relicensing process for the Pelton-Round Butte Hydroelectric project, which resulted in a 2005 settlement agreement between the two project licensees, the Confederated Tribes of the Warm Springs (CTWS) and Portland General Electric (PGE). The Settlement Agreement states ambitiously that the licensees will "establish self-sustaining harvestable anadromous fish runs of Chinook, steelhead and sockeye above the Project." (PGE and CTWS 2004, Appendix D 1(a), 158)

The Upper Deschutes sub-population of steelhead are part of the ESA-listed Middle Columbia River population. Reintroduction of steelhead above the dam thus puts water users and dam owners at risk of litigation under the ESA should their operations result in any of the myriad actions that potentially constitute an accidental take of reintroduced steelhead.[1] Fish passage concerns were of low priority at the time of the construction of Round Butte Dam, and the dam

[1] Through consultation with U.S. Fish and Wildlife, individuals and organizations can enter into a habitat conservation plan. The Deschutes Basin Board of Control (DBBC), which includes irrigation districts with diversions in the Upper Deschutes, Tumalo Creek, Whychus Creek, and the Crooked River have been developing a plan along with the City of Prineville since the mid-2000s, which is in the final stages of development. The plan is expected to require DBBC members and the City of Prineville to take myriad actions to improve conditions for multiple ESA listed species over long periods of time.

ensured that anadromous fish would remain absent from the Upper Deschutes. With established upstream and downstream fish passage at Round Butte Dam, there is an incentive, in the form of reduced liability to ESA enforcement actions, to remove, retrofit, or replace dams and diversion structures in the Upper Deschutes to allow listed fish to reach upstream spawning areas. Upper Deschutes water users earned a temporary reprieve with the NOAA's designation of the Upper Deschutes population of steelhead as 10(j), 'Experimental', at the request of stakeholders throughout the basin. But the designation expires in 2025, so the clock is still ticking on restoring conditions appropriate for anadromous fish survival throughout the Upper Deschutes.

Cultural shifts have also been an important factor in adapting operations to improve conditions for anadromous fish. In the Upper Deschutes, irrigation dependent farming was the cornerstone of the economy through the late 20th century. In 1959, revenues from crop sales for Deschutes, Crook, and Jefferson counties were nearly $159 million (2007 dollars), while the population was just under 40,000 (Kimball & Castle, 1963; Forstall 1996). Beginning in the 1970s, the basin's scenic and recreation opportunities—including angling of resident and hatchery fish—attracted an influx of people from outside the region. In addition to increased demand for potable water supply to support continued population and economic growth, the influx of people brought fundamental changes to the region's economy and culture. By 2007, revenues from crop sales had dropped to $107.5 million, while the population had grown to over 208,000 (NASS 2007, Proehl 2008). Mirroring this demographic and economic shift, public preference began to favor the rehabilitation of dewatered streams to promote aesthetic, recreation, and wildlife values.

Amos (2013) describes how the unique authority granted to the FERC under the Federal Power Act (FPA) to consult with other federal and state agencies to impose conditions on FERC licenses sets the stage for implementation of broad-scale restoration plans. In the Upper Deschutes case, the FERC relicensing of the Pelton-Round Butte project was clearly an important factor in spurring action on anadromous fish restoration. But FERC relicensing processes can ultimately only *provide support for* restoration activities, and mandating the transfer of privately held upstream water rights, riparian land, and private dams is beyond the reach of the FERC relicensing process. Furthermore, due to the unstructured, cross-cutting, and relentless nature of the wicked problem of fish restoration (Weber & Khademian, 2008), it's not clear that a top-down effort would be well-suited to resolve the problem in the Upper Deschutes.

### *1.2 Study Context: the Deschutes Special Investment Partnership (SIP)*

The commitment of PGE and CTWS to reintroduce anadromous Chinook and steelhead above Pelton-Round Butte Dam as part of the FERC relicensing of the facility is a powerful incentive for restoration in both Whychus Creek and the Crooked River. In combination with the prevailing hydrologic and socioeconomic factors in the region, these two case studies provide an opportunity to compare collaborative efforts that emerged from the same narrative and incentives at the same time, with overlapping groups of stakeholders. Additionally, major restoration plans for both Whychus Creek and the Crooked River were laid out as part of the funding proposal for the Deschutes Special Investment Partnership (SIP). The Deschutes SIP is an Oregon Watershed Enhancement Board (OWEB)-funded project umbrella that encompasses both the eastside and the westside of the Deschutes Basin. The investment partnership provides grant funding to four

partners to the SIP: the Deschutes River Conservancy, the Deschutes Basin Land Trust, the Upper Deschutes Watershed Council, and the Crooked River Watershed Council. The SIP has two foci: Whychus Creek and the Lower Crooked River (including McKay Creek, a tributary to the lower Crooked River).

The partners to the SIP recognized that a more integrated approach was needed to address the cross-cutting problem of fish restoration in the Upper Deschutes Basin. In both the Whychus Creek and Crooked River subbasins, the restoration of anadromous fish required the partners to the SIP to address the problems of private dams and irrigation diversions, dewatered stream reaches, and degraded riparian habitat. In addition to leveraging the unique problem-solving capacity of all four SIP partners, the SIP's reliance on voluntary cooperation with stakeholders, (1) expanded the collaborative network to include public and private stakeholders with unique knowledge and expertise, including local landowners, the Oregon Water Resources Department (OWRD), Three Sisters Irrigation District (TSID) on Whychus Creek and Ochoco Irrigation District (OID) in the Crooked River basin, and (2) provided a forum for ongoing dialogue to incorporate new, shared knowledge into the problem solving framework for each subbasin. The SIP partnerships have now been active for over nine years. Restoration efforts are ongoing, and fish passage efforts at Round Butte Dam is still a work in progress, but gains have been made toward achieving the goals outlined by the SIP (see Appendix A for SIP project list).

Weber (2017) describes the Whychus Creek effort as a successful example of collaboration "in which TSID and the Deschutes Partnership came together to create an integrated hydro-irrigation-restoration system able to provide successful responses for all the major components of the wicked problem" (p. 105). Given the shared context of many aspects of

the Whychus Creek and Crooked River cases—the Pelton-Round Butte FERC relicensing, the structure of the SIP created to address the different elements of the problem—should collaboration be expected to provide a path toward success in the Crooked River? Collaborative governance scholarship supports the contention that collaborative governance is generally well suited to resolving problems like anadromous fish restoration in the Crooked River. However, the success of collaborative governance is dependent on contextual factors, many of which emerge while collaborative efforts are in process. In Whychus Creek, for example, entrepreneurial leadership was a key element of successful collaboration, but incentives to participate were high and there were no alternative venues available to resolve the problem (Weber, 2017). What factors in the Crooked River basin are salient to collaborative efforts there?

The elements of the Crooked River effort outlined in the Deschutes SIP identify one of the key factors in that effort, one that differentiates the Crooked River from Whychus Creek: the presence of a large, federally-owned reservoir. As collaborative approaches have grown in popularity, efforts to resolve wicked water resource problems are appearing in larger, more complex, and more engineered hydrologic systems that include reservoirs owned and managed by Reclamation and the United States Army Corps of Engineers (the Corps). Recent efforts in the Klamath and Yakima basins, where flow regimes are driven by management of storage projects, have stumbled after failing to attract the federal support, including funding, needed to implement far-reaching collaborative visions developed over years of negotiation (see, e.g., McCool, 2018; Yoder et al., 2017).

Two key challenges in basins with federally-owned reservoirs are navigating the intersection between state and federal agencies' jurisdiction over water resources and developing

shared knowledge about how large dams and reservoirs can impose limitations on and create opportunities for creative water management solutions. As collaboration becomes increasingly favored for addressing anadromous fish restoration while reducing the liability of state and federal agencies and legislators to public dissatisfaction, understanding how stakeholders have navigated the problem in the Crooked River will provide important insights for other efforts currently underway throughout the Pacific Northwest. This thesis describes the specific dynamics of the Crooked River case using data collected from semi-structured interviews with stakeholders in the Crooked River restoration effort and streamflow data collected by state and federal agencies.

## Chapter 2: Literature Review

As discussed in Chapter 1, the collaborative governance literature provides general support for the hypothesis that collaboration would provide a successful path forward for anadromous fish restoration in the Crooked River effort. But because each case is unique, understanding *how* collaboration can provide support for anadromous fish restoration efforts is a pre-requisite to asking the right questions about the specific dynamics of the Crooked River effort. Weber (2017) provides a detailed description of the Whychus Creek effort, a valuable counterpoint to the Crooked River.

### *2.1: Governing the Commons*

Elinor Ostrom's *Beyond Markets and States:Polycentric Governance of Complex Economic Systems* (2010) begins with a review of the evolution of scholarly efforts to understand the governance of common-pool resources. Ostrom identifies two approaches vying for ideological dominance in the debate over the governance and management of common pool resources: the market and the state. Ostrom refutes this dichotomous view of governance solutions to common-pool resource problems, explaining that "[t]he humans we study have complex motivational structures and establish diverse private-for-profit, governmental, and community institutional arrangements that operate at multiple scales to generate productive and innovative as well as destructive and perverse outcomes" (Ostrom, 2010, p. 641). Of her research, Ostrom writes,

> I struggled to find rules that worked across ecological, social, and economic environments, but the specific rules associated with success or failure varied extensively across sites. Finally, I had to give up the idea that specific rules might be associated with successful cases.

> Moving up a level in generality, I tried to understand the broader institutional regularities among the systems that were sustained over a long period of time and were absent in the failed systems…My effort was to identify a set of core underlying lessons that characterized the long sustained regimes as contrasted to the cases of failure. (652-653)

Ostrom found that the principles underlying "community institutional arrangements," an innovative approach distinct from markets and top-down management, are the elements predictive of 'better' management of common-pool resources, using a measure that combined both avoidance of resource exhaustion and persistence of the governance structure over time.

In the context of anadromous fish restoration, Ostrom's community institutional arrangements stands in contrast to the top-down approach, embodied in the ESA's "strictly science" mandate, which encourages technocrats to apply closed decision-making processes to complex public policy problems (Doremus, 1997). Before the revelation of Ostrom's Institution Analysis and Development framework, Rittel and Webber's "Dillemmas in a General Theory of Planning" (1973) critiqued the top-down approach to public policy, arguing that it developed to deal with "tame" problems. Tame problems are resolved efficiently by a rational approach that assumes "that efficient and effective achievement of objectives can follow from adequate information, carefully specified goals and targets, and choice of appropriate methods" (Head & Alford 2015, p. 712). The "solution" to wicked problems cannot be administered through identification of specific variables confounding the resolution of the problem. Rather, "approaches…should be based on a model of planning as an argumentative process in the course of which an image of the problem and of the solution emerges gradually among the participants" (Rittel & Webber, 1973, p. 162).

Although much of the scholarship on wicked problems has focused on the context of natural resource management, the wicked problem diagnosis has been assigned to a broad spectrum of public policy quandaries, including urban and regional planning (e.g., Innes & Booher, 1999), international development (Easterly, 2007), and software development (DeGrace & Stahl, 1990). Head and Alford (2015) explain that "Modern society is now seen as pluralistic rather than homogenous, and not amenable to top-down general solutions" (p. 713).

Rittel and Webber's (1973) criticisms of the top-down model have been accompanied by calls for a more collaborative, participatory approach. Weber and Khademian (2008) identify three characteristics of wicked problems and discuss why more collaborative, participatory approaches are well-suited for resolving and/or coping with them as best as possible. Wicked problems are:

- Cross-cutting – Interdependent stakeholders hold diverse perspectives, and solutions involve trade-offs that bring competing values to the fore.
- Unstructured – The link between cause and effect can be difficult to identify, and there is high demand for information to craft solutions. In the absence of good information and a strong understanding of cause and effect, there is disagreement over what actions will lead to a resolution of the problem.
- Relentless – Resolution is a moving target that evolves along with the understanding of the problem.

### *2.2 Collaborative Governance in Theory and Practice*

There is a pragmatic element to why natural resource policy stakeholders from across the spectrum are choosing collaboration, whether they are ranchers, farmers, fishermen, loggers, environmentalists, recreationists, government regulators or others. There is a general expectation that the collaborative approach can address or at least minimize the problems associated with existing, top-down, hierarchical governance systems. The attraction is that collaboration promises to deliver improved governance performance, especially over the long term. Table 1.4.1 (Weber et al., 2017) describes differences between the traditional hierarchical model and collaborative governance model.

**Table 1.4.1:** Comparing Hierarchical (Top-down) and Collaborative Governance Types (without modification from Weber et al., 2017)

| COMPONENT | Traditional Hierarchical Model | Collaborative Governance |
|---|---|---|
| **General Style** | Adversarial, zero sum (win – lose) | Cooperative, mutual gain |
| **Policy Focus** | Narrow – single policy area (e.g., water, air, forestry) | Broad - Environment, economy and community |
| **Types of Boundaries** | Traditional legal-jurisdictional, both policy and political | Ecological (e.g., watershed) and social, boundary spanning across traditional jurisdictions |
| **Public Engagement/ Participation** | Limited and directed, controlled by government officials; less dialogue than "one way listening" exercises by government officials | Robust public participation; more co-decision making; back-and-forth dialogue in deliberative forums is key |
| **Decision Style/ Rules** | Experts in charge; agencies make decisions after consultation with public and NGOs | Government experts are among many stakeholders integrally involved in decision process; consensus/near consensus is decision rule |
| **Problem Solving and Management Approach** | Fragmented, separated bureaucratic problem solving and management silos | Systems (integrated, holistic, cross-cutting) problem solving and management approach |
| **Rules vs. Results** | Agency focus primarily on rules and proxies versus on-the-ground results | Explicit focus on results |
| **Temporal Problem Solving Approach** | Short-term problem solving focus; legal compliance key | Building relationships and developing long-term problem solving capacity; legal compliance still important |
| **Role of Science** | Scientific expertise is authoritative and dominant | Scientific expertise critical, but practice-based & cultural expertise also needed for long-term solutions |

As part of this difference in governance models, the tendency of watersheds to transcend neatly drawn administrative boundaries has convinced a growing number of stakeholders to select collaborative governance as the participatory model of choice for addressing the wicked problem of water management in the West (Sabatier et al., 2005). What does the theory and practice of collaborative governance have to offer for wicked problem settings like the Crooked River?

Lessons from theory and practice suggest that collaborative governance increases the likelihood of creative, 'win-win-win' solutions not achievable through hierarchies (Ansell and Gash 2008). This is attributed to the ability of collaboratives to:

- convene organizations with diverse knowledge and expertise to treat the full complexity of the problem,
- promote the development of shared knowledge to improve understanding of the physical and legal system, and
- foster constructive communication and trust-building among stakeholders to facilitate the "continuous transfer, receipt, and integration of knowledge for long-term problem solving capacity (Weber & Khademian, 2008, p. 334)."

But even if collaboratives are better suited to addressing the challenges of wicked problems than top-down approaches, the very nature of wicked problems suggest that there is no silver bullet. Whether collaboratives achieve success depends on a host of factors, including the incentive to choose collaboration in lieu of potentially available alternative policymaking and problem solving venues and antecedent conditions within a watershed community that influence collaborative problem solving capacity (Weber, 2009).

Collaboration is often identified as a means of avoiding potentially costly and protracted litigation (Weber, 1998; Williamson 1981; Feiock 2007). But collaboration also requires substantial investments of time and social capital on the part of stakeholders. Because collaboration requires the investment of all stakeholders, it is best suited to circumstances in which an ongoing stalemate creates relatively equal costs for all stakeholders (Weber, 1998). In the absence of such conditions, it is beneficial for stakeholders to utilize alternative means of resolving conflicts. Although these approaches can be protracted and costly, Ansell and Gash (2008) point out that,

> Incentives to participate are low when stakeholders can achieve their goals unilaterally or through alternative means…Stakeholders who view themselves as having strong allies in the courts or in legislatures, for example, will often prefer these alternative venues. Venue shopping can easily undercut collaborative processes. (p. 552)

The courts and accompanying top-down solutions—via litigation under the ESA and other applicable federal laws—are often the alternative venue of choice. On the other hand, courts can also increase the incentive to collaborate by upholding or invalidating requests for emergency action under the ESA, spurring stakeholders to come to the table (see, e.g., Reilly, 2001).

Venue shopping interacts with another condition that factors in the success of collaboratives: power and resource imbalances. Echeverria (2000) concludes, among other reasons, that a collaborative water planning program in the Platte River basin "is fundamentally flawed because it is too heavily weighted in favor of parochial economic interests" (p. 560). Ansell and Gash (2008) note that environmental groups are often skeptical of collaboration on the grounds that it is advantageous to industry groups. While collaborative efforts can support trust-building, stakeholders must view collaborative enterprises as legitimate to justify the

investment of time and resources to collaboration over an alternate venue, especially if they're already comfortable with litigation.

The investment of time and resources to collaborative efforts also raises equity concerns. Amy (1983) argues that collaboratives can empower entrenched interests with the capacity to influence such processes. Larson and Lach (2010) found that a local watershed council in Portland, Oregon "reproduce[d] existing power structures in the community" (p. 407) through the overrepresentation of educated newcomers with pro-environment views as compared to long-term residents most affected by watershed issues. Similarly, local environmental interests may lack the capacity to participate effectively in collaborative arrangements, allowing national groups to represent the interests of the environment in collaborative decision-making. The concerns of local and national groups may differ, resulting in the marginalization of local interests. Ansell and Gash (2008) derive three principals of collaborative governance related to venue shopping and power and resource imbalances:

> (1) If there are significant power/resource imbalances between stakeholders, such that important stakeholders cannot participate in a meaningful way, then effective collaborative governance requires a commitment to a positive strategy of empowerment and representation of weaker or disadvantaged stakeholders. (p. 551-552)
>
> (2) If alternative venues exist where stakeholders can pursue their goals unilaterally, then collaborative governance will only work if stakeholders perceive themselves to be highly interdependent. (p. 553)
>
> (3) If interdependence is conditional upon the collaborative forum being an exclusive venue, then sponsors must be willing to do the advance work of getting alternative forums (courts, legislators, and executives) to respect and honor the outcomes of collaborative processes (p. 553)

If incentives to collaborate are strong, and power and resource imbalances are properly addressed, are there characteristics of the community of stakeholders that make wicked problems better suited to resolution through collaboration? Particularly in regard to watershed governance, local stakeholders must provide the social capital and leadership to initiate and sustain the collaborative effort. Among the important considerations for collaborative capacity is the history of interactions and social capital amongst stakeholders. While Weber (2003) found that a "hurting stalemate" could provide sufficient incentive for antagonistic stakeholders to reconcile their differences, Ansell and Gash (2008) note that a prehistory of conflict often comes with low levels of trust between key stakeholder groups. Ansell and Gash (2008) conclude that:

> (4) If there is a prehistory of antagonism among stakeholders, then collaborative governance is unlikely to succeed unless (a) there is a high degree of interdependence among the stakeholders or (b) positive steps are taken to remediate the low levels of trust and social capital among the stakeholders. (p. 553-554)

Another key ingredient of social capital is the presence of entrepreneurial leadership. In Whychus Creek, Weber (2017) points to entrepreneurial leaders within each of the key stakeholder groups as an important factor in the successful restoration effort in the Whychus Creek drainage. Leaders emphasized the interdependency of stakeholders, and the likelihood that collaboration would lead to benefits for all parties. But of equal importance was the way leadership within the key stakeholder groups fostered trust-building by building a reputation for honesty and good faith negotiation. Ansell and Gash (2008) describe "facilitative leadership" in similar terms, stating that "Leadership is crucial for setting and maintaining clear ground rules, building trust, facilitating dialogue, and exploring mutual gains" (554). In addition to the benefits of trust building and exploring mutual gains, Ansell and Gash emphasize the importance of

leadership for empowering stakeholders by protecting the integrity of the collaborative process and ensuring that all stakeholders are involved, particularly when power imbalances or a pre-history of conflict can undermine collaborative efforts.

### *2.3 Whychus Creek*

As described above, Weber (2017) contributes to an understanding of the importance of entrepenuerial leadership to the progression of collaborative arrangements *in general*. But the interest of the Whychus Creek system is magnified for this research on the Crooked River system due to the overlapping conditions of the two systems as tributaries to the Deschutes River above the Pelton-Round Butte project, and as components of the 2008 Deschutes SIP. Weber (2017) documents several other factors that were of key importance for the transition of the Whychus Creek system from a traditional gravity-fed irrigation system to "an integrated hydro-irrigation-restoration system able to provide successful responses for all the major components of the wicked problem" (p. 105). While the flow regime and hydrology of the Crooked River system differs from the Whychus Creek system, the similar outlines of partnership structure evidenced by the Deschutes SIP indicate similar strategies for achieving restoration success.

One of the pragmatic benefits of collaboration is the opportunities that it provides for developing mutually beneficial strategies for achieving restoration goals. In the case of Whychus Creek, piping of the existing open-channel irrigation system offered the opportunity to: (1) improve instream flows by protecting water instream through Oregon's conserved water statute (ORS 537.470), which allows water saved through channel piping to be protected with a priority equal to that of the original water right authorizing diversion; (2) screen irrigation diversions to improve conditions for fish passage and survival; (3) provide pressurized water to TSID

irrigators, eliminating the need for expensive pumps and power for sprinkler irrigation; (4) reduce TSID's liability to regulation under the ESA with the eventual expiration of the 10(j) designation for anadromous steelhead returned to the Upper Deschutes; and, (5) allow for the development of in-conduit hydropower production to bolster district revenues to service debts incurred to acquire capital to fund the district's share of the piping plan.

In contrast to adversarial modes of governance, collaboration is not a "winner-take-all" approach to mediating stakeholder interests. "In order to be considered successful…collaborative partnerships must produce mutual gain, or win-win-win, outcomes…(Weber, 2017, p. 108)." The benefits that TSID realized through the Whychus Creek effort would not have been attainable without the capital support and technical expertise provided by the partners to the Deschutes SIP. At the same time, due to the 10(j) designation for steelhead, there was little opportunity to litigate for improvements to streamflows, fish passage conditions, and riparian habitat, and courts are reticent to use federal law to upend state authority over water resource management anyway (see, e.g., MacDougal, 2017).

But the outcomes of the Whychus Creek arrangement go beyond immediate pragmatic benefits. Outcomes of the collaborative process include increased trust, development of a shared understanding of the system, and other secondary benefits (see, e.g., Rogers & Weber, 2010). As noted by Weber (2017), collaborative capacity builders within the Deschutes Partnership (SIP) and TSID were crucial to the realization of these kinds of outcomes. But Ansell and Gash (2008), point out that "Collaborative governance strategies are particularly suited for situations that require ongoing cooperation" (p. 560). The solution in Whychus Creek, which revolved around piping TSID's 60 miles of canals, was necessarily—like all large-scale canal-piping projects—

implemented in phases. In order to leverage the capital required for successive phases of the project, stakeholders were continually engaged in "face-to-face dialogue" (Ansell & Gash, 2008). Furthermore, Ansell and Gash (2008) argue, collaboration is more likely to ensue when the possible purposes and advantages of collaboration are relatively concrete and when 'small wins' from collaboration are possible (561)." Again, the piping project at the core of the Whychus Creek effort necessitates a phased implementation that produces "small wins" that aren't just tangible benefits, but outcomes that support collaborative capacity in the same way as entrepeneurial leadership.

### *2.4 The Crooked River*

Ansell and Gash (2008), in the final claim derived from their definitive review of the theory and practice of collaborative governance, issue an ominous warning, that,

> (10) If prior antagonism is high and a long-term commitment to trust building is necessary, then intermediate outcomes that produce small wins are particularly crucial. If, under these circumstances, stakeholders or policy makers cannot anticipate these small wins, then they probably should not embark on a collaborative path. (p. 561)

The Crooked River effort bears many of the hallmarks of collaboration: the Crooked River Act itself is an innovative solution that emerged from the distillation of the unique technical knowledge of varied stakeholders and navigation of competing interests and values. It is designed to produce a win-win-win solution for instream flows, the City of Prineville, and, to a lesser extent, irrigation interests. Although the Crooked River streamflow restoration challenge is different than that of Whychus Creek, the problem still has all of the elements of a wicked problem.

In the Crooked River case, and in other cases where there is a need—real and perceived—to rely at least in part on federal legislation to put restoration efforts into action, the intial effort can produce innovative designs and solutions that address the cross-cutting nature of wicked problems. But in contrast to the phased piping plan in Whychus Creek, the Crooked River effort revolves around federal legislation that took over six years to become law even after the basic components of the Act were outlined in the Deschutes SIP in 2008. The capacity to deal with the unstructured and relentless nature of wicked problems that comes from face-to-face dialogue, and small wins may be absent when delays in passing federal legislation create discontinuity in the collaborative process and stakeholders are deprived of the opportunity to reap the secondary benefits of collaboration that arise from ongoing cooperation. That issue is exacerbated if stakeholders choose to 'put all of their eggs in one basket,' making many of the elements of the restoration effort dependent upon the passage of the legislative package (see, e.g., Yoder et al., 2017; McCool, 2018). Particularly in the current political climate, delays in the passage of these legislative packages that will hamper collaborative efforts are to be expected.

In this respect, the Crooked River case represents a 'tough' case for collaboration. Stakeholders will have to overcome the interruption of the collaborative process between crafting a win-win-win solution and implementation of the most important parts of the strategic restoration plan. But as evidenced by the inclusion of the Crooked River in the Deschutes SIP, and the approach championed in the Klamath and Yakima efforts (McCool, 2018; Yoder et al., 2017), collaboration has been encouraged even in systems with federal reservoirs. Due to the abundance of systems where federal and state management of water resources intersect, stakeholders, practitioners, agencies, and legislators must figure out how to support collaborative

processes, even when legislation is a necessary element of the proposed solution. By examining how stakeholders used the Crooked River Act, the difficulties they encountered, and the achievements they've made in the effort outlined in the Deschutes SIP, the Crooked River effort offers valuable information for practitioners undertaking collaborative efforts in systems driven by management of federal storage projects.

## Chapter 3: Research Context

This chapter provides background on the hydrogeologic context of the Crooked River and Whychus Creek basins. It is necessary to understand the unique hydrogeologic context of the Upper Deschutes Basin to understand the relationship between flow regimes in the Crooked River and Whychus Creek and flow restoration efforts.

### *3.1 Hydrogeologic Context of the Upper Deschutes Basin*

The definitive study of the hydrogeolic system of the Upper Deschutes Basin is described in Gannet, Lite, Morgan, and Collins (2001), the result of a cooperative study including the U.S. Geological Survey (USGS), OWRD, the U.S. Environmental Protection Agency (EPA), the Cities of Bend, Redmond, and Sisters, and Deschutes and Jefferson counties. The brief discussion in this thesis cannot do justice to the complexity of the hydrogeologic system in the Upper Deschutes Basin, but even a rudimentary discussion provides an important foundation to understanding the collaborative setting in the Crooked River and Whychus Creek subbasins.

Relatively young, permeable volcanic deposits of the Deschutes formation dominate the subsurface geology of the western and southern portions of the Deschutes Basin. Much of the precipitation that falls in the Upper Deschutes Basin falls in the highly permeable Cascades to the west, making this the principal area of groundwater recharge. Groundwater flow is generally to the east and north until flows reach the John Day formation, which is older, more weathered, and contains more clay, rendering it relatively less permeable to subsurface flow. When groundwater flow reaches the John Day Formation, it is forced upward, discharging in the lower

reaches of Whychus Creek, the Metolius River, the Deschutes River, and the Crooked River. Figure 3.2.1 shows a conceptual figure from Gannet et al. (2001).

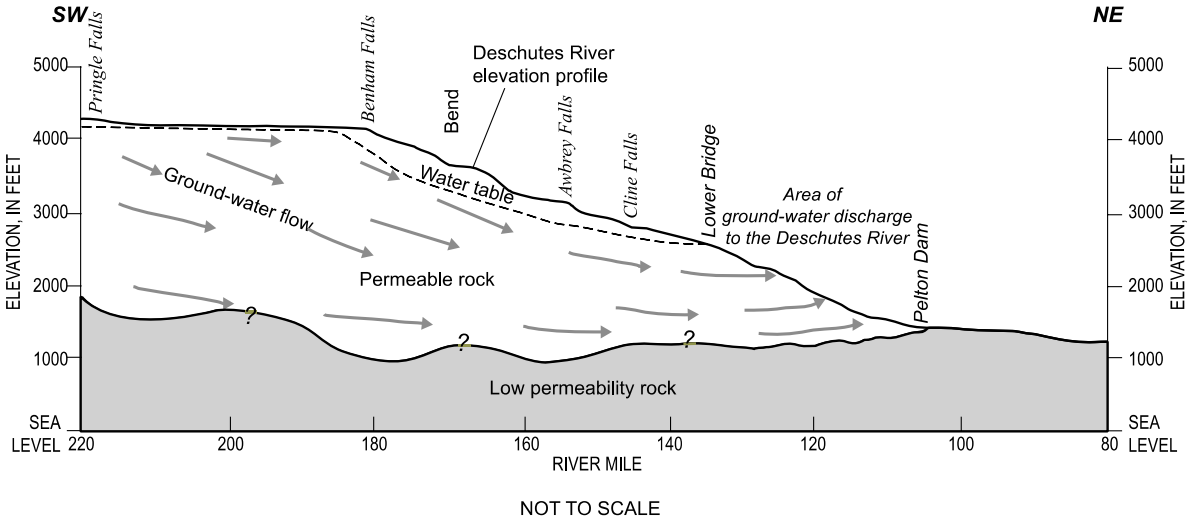


**Figure 18.** Effect of geology on ground-water discharge along the Deschutes River, Oregon, upstream of Pelton Dam.

**Figure 3.2.1.** Effect of geology on ground-water discharge along the Deschutes River, Oregon, upstream of Pelton dam (Gannet et al. 2001).

In general, this subsurface geology results in high transmission losses in unlined canals and increased deep percolation on farms in the south and west of the Upper Deschutes Basin. In the Crooked River subbasin, to the east and north, the substrate is less porous, and transmission and on-farm losses show up in shallow alluvial aquifers, a locally important source of groundwater supply, but one with hydraulic conductivity that pales in comparison to Deschutes Formation aquifers to the west (Gannet et al., 2001). Although opportunities to reduce transmission loss in order to improve instream flows are less favorable in the Crooked River basin, the large groundwater discharge in the lower reaches of the Crooked River focuses stream flow improvement efforts on the upper reaches, between irrigation diversions and groundwater discharge areas.

Likewise, groundwater diversions from basalt aquifers in all parts of the Upper Deschutes Basin are understood to reduce groundwater discharge in lower stream reaches. This ultimately reduces inflows to Lake Billy Chinook, linking pumping of the basalt aquifer across the Upper Deschutes Basin to streamflows in the Lower Deschutes River. The findings of Gannet et al. (2001) were a major factor leading to the creation of the Deschutes Basin Mitigation Program, which is discussed in greater detail in section 3.2.

### *3.2 Deschutes Basin Mitigation Program*

As discussed above, the research of Gannet et al. (2001) established a link between groundwater development in the Upper Deschutes Basin and Lower Deschutes River flows. The significance of this finding for groundwater use in the Upper Deschutes Basin is a result of the designation of the Deschutes River—from the headwaters at Little Lava Lake to its confluence with the Columbia River—as a scenic waterway under Oregon Revised Statutes (ORS) 390.826(5). ORS 390.835 regulates the highest and best use of waters within scenic waterways, but only regulates groundwater withdrawals, "upon a finding by the Water Resources Director based on a preponderance of evidence that the use of ground water will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife." The findings of Gannet et al. (2001), in combination with the scenic waterway designation of the Deschutes River, were sufficient to disallow further groundwater withdrawals in the Upper Deschutes Basin, including water right applications for the use of groundwater for municipal purposes in the Cities of Bend, Redmond, Sisters, and Prineville.

The Deschutes Basin Mitigation Program, described in Oregon Administrative Rules (OAR) chapter 690, division 505 (690-505) was devised to allow issuance of additional groundwater rights if the impacts to the scenic waterway (i.e. to Deschutes River flow) were offset by an equivalent reduction of groundwater or surface water rights. This allows, among other possibilities, for the creation of instream water rights through "the allocation of conserved water provided under ORS 537.455 to 537.500 and OAR 690, division 18, where the applicant's portion of the conserved water is allocated and legally protected for instream use," or through "a secondary permit to use stored water from an existing reservoir obtained pursuant to ORS 537.130 to 537.211 and OAR 690, division 310, provided the secondary permit is for instream use through a secondary permit to use stored water from an existing reservoir obtained pursuant to ORS 537.130 to 537.211." That is, new groundwater rights can be obtained by protecting creating instream water rights as a result of improvements in irrigation efficiency, including piping and lining leaky canals, or through releasing water stored in a reservoir for instream use, among other possibilities. Furthermore, such projects can generate "mitigation credits," which can be sold or held for future use.

These provisions tie groundwater development for municipal growth to protection of instream flow in the Upper Deschutes Basin, including in Whychus Creek (the City of Sisters) and the Crooked River (the City of Prineville). Due to the nature of the Deschutes aquifer, in theory, this eliminates the impact of additional groundwater development in the Upper Deschutes Basin on the flow of the Lower Deschutes River, while also increasing flows in dewatered reaches of Upper Deschutes waterways by providing an incentive to increase flows during low-flow periods. More importantly, the mitigation program created a mechanism to allow water

service providers to continue development of water resources for municipal growth through involvement in water conservation and management efforts aimed at improving instream flows.

### *3.3 The Crooked River Watershed*

The Crooked River watershed drains the eastern side of the Deschutes Basin, with headwaters in the Ochoco Mountains to the north and east and Paulina Peak and Hampton Buttes to the south. The first known diversions in the Upper Deschutes Basin began in the South Fork Crooked River in 1866 (NPCC, 2005). By the early 1900s, irrigation diversions and local beaver extirpation had reduced summer flows in the lower Crooked River considerably. Around 1910, the construction of the Cove Power Plant near the mouth of the river blocked upstream passage of spring Chinook salmon except during high flows (Nielsen-Pincus, 2008).

Additional hydropower and diversion dams were constructed in the ensuing decades, including the Ochoco Project. Local farmers organized into the Ochoco Irrigation District and secured a local bond measure to facilitate the project, which provides 16,000 acre-feet of storage for supplemental irrigation 8,500 acres (Linenberger, 2001). In 1956, Congress authorized the construction of the Prineville (now Arthur R. Bowman) dam to provide supplemental water for irrigation, flood control for the lower Prineville Valley, including the City of Prineville, and public recreation. The dam was completed in 1961 and the associated reservoir has storage capacity of approximately 155,000 acre-feet.

Since the completion of Round Butte Dam in 1965, the Crooked River meets the Deschutes River and Metolius River at Lake Billy Chinook. These features, Lake Billy Chinook and Bowman Dam, define the downstream and upstream extents of the Lower Crooked River,

the area of interest for this research. The two largest tributaries of the Lower Crooked River, Ochoco Creek and McKay Creek, are also included within the area of interest, shown in Figure 3.3.1.


**Figure 3.3.1:** Aerial photo of Crooked River watershed. Gages referenced in Section 3.4 are shown on the map.

### *3.4 Crooked River Streamflow*

Since the completion of Bowman Dam in1964, the flow regime of the Lower Crooked River is driven entirely by the cycle of storage and releases from Prineville Reservoir. Figure 3.4.1 shows 80 percent exceedance flows[2] at USGS gage 14080500, just below the current location of Bowman Dam from 1942 to 1959, before construction of the dam began (see Figure 3.3.1 for Lower Crooked River gage locations). Compared to the target flow of 80 cfs maintained throughout the Lower Crooked River, which is identified in the Deschutes Subbasin Plan (NPCC 2005), flows typically met or exceeded the 80 cfs flow target during winter and through the end of the end of the spring melt near the end of May, but dropped to near zero during summer.

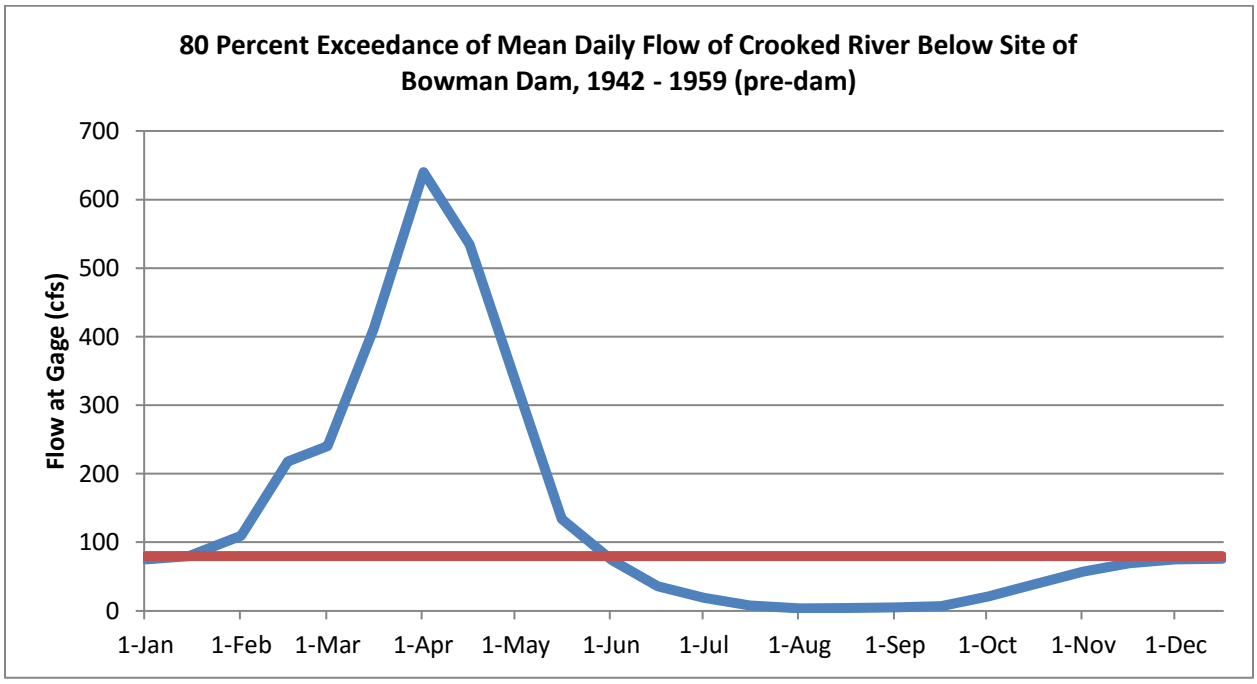


**Figure 3.4.1:** 80 percent exceedance of mean daily flow of Crooked River below present-day site of Bowman Dam (USGS Gage 14080500), 1942-1959. The red line represents the 80 cfs target flow established by The Crooked River Act. The blue line represents the 80 percent exceedance fof mean daily flow at the gage.

[2] The 80 percent exceedance flow is the flow that is exceeded 80 percent of the time. In shorthand, this is the flow that is present in the stream in 4 out of 5 years. The flows shown in this section are the 80 percent exceedance of mean daily flows, so they do not capture intraday fluctuations in flows.

Figure 3.4.2 shows readings at the same gage from 1964-1993, a thirty year period of record beginning after the dam was completed. The 80 cfs target flow is exceeded for a much greater portion of the year, including through the warm summer months. This has created a successful Redband fishery in the tailrace between the dam and downstream irrigation diversions. But the target is not met during winter, when water is being stored for summer irrigation releases. During cold weather, this increases the risk of freezing and fish die-offs in the tailrace.

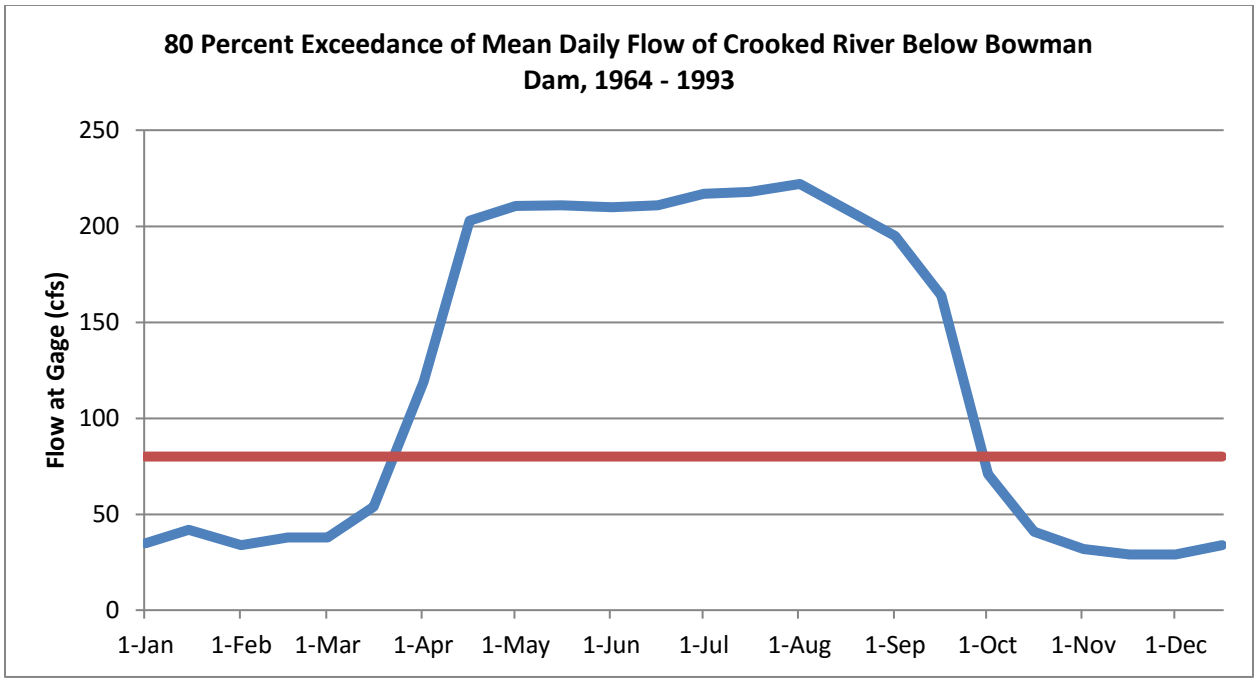


**Figure 3.4.2:** 80 percent exceedance of mean daily flow of Crooked River below Bowman Dam (USGS Gage 14080500), 1964-1993. The red line represents the 80 cfs target flow established by The Crooked River Act. The blue line represents the 80 percent exceedance fof mean daily flow at the gage.

Further downstream where the Crooked River begins to incise a deep canyon, below the irrigation diversions of the Prineville Valley, the flow pattern is inverted. Figure 3.4.3 shows flows at Gage 14087300 near Smith Rock from 1994-2014.[3] Here, flows drop well below the 80

[3] The gage was installed on October 1, 1993 and the Crooked River legislation was signed into law on December 18, 2014

cfs flow target from May through September, increasing stream temperatures for migrating and spawning salmonids.

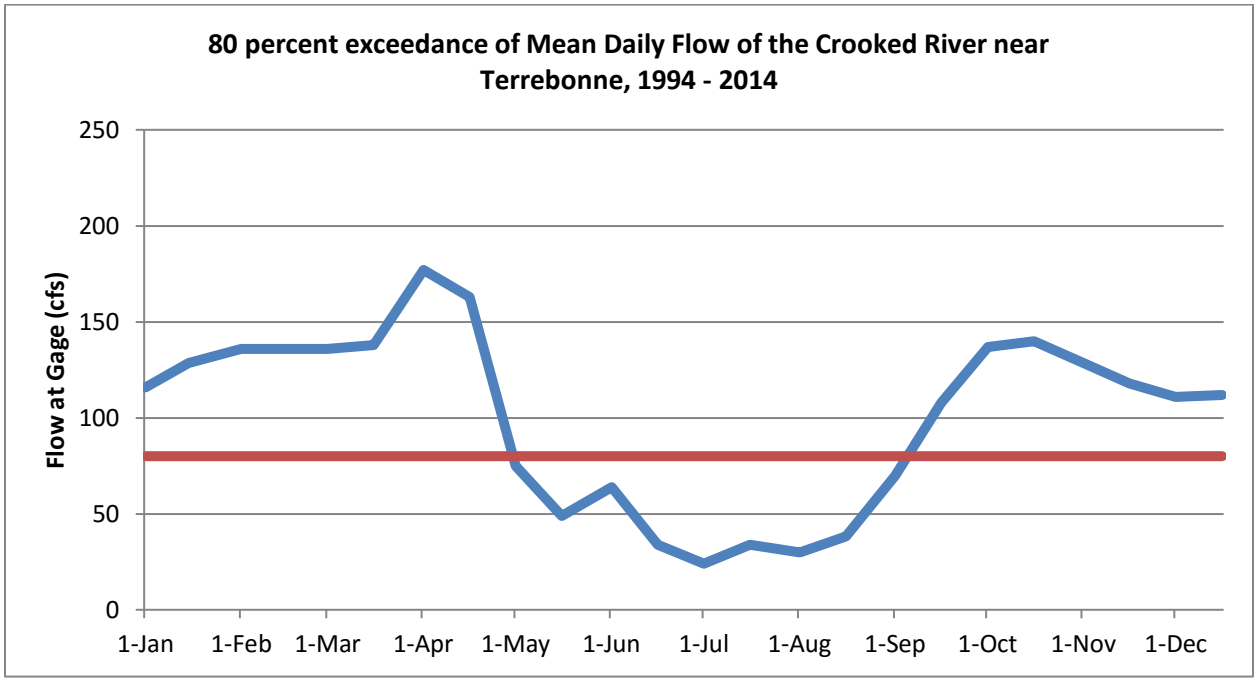


**Figure 3.4.3:** 80 percent exceedance of mean daily flow of Crooked River near Terrebonne (USGS Gage 14087300), 1994-2014. The red line represents the 80 cfs target flow established by The Crooked River Act. The blue line represents the 80 percent exceedance fof mean daily flow at the gage.

Cold groundwater discharges beginning below Osborne Canyon maintain streamflows that rarely dip below 90 cfs. At Opal Springs, flows are steady between 1100 and 1500 cfs year-round due to massive groundwater discharges at the contact between the Deschutes formation and the John Day formation.

These data demonstrate the flow problem in the lower Crooked River: if excess reservoir storage is used to augment flows in order to maintain a flow of 80 cfs to the greatest degree possible, reservoir inflows must be passed during winter and additional water must be released during summer to elevate streamflows below irrigation diversions. So even as the odds of filling the reservoir decrease, there is greater demand on reservoir releases in the summer and early fall.

### *3.5 Whychus Creek Watershed*

The Whychus Creek watershed drains the western slope of the Three Sisters, the third, fourth, and fifth highest peaks in Oregon, all of which rise to over 10,000 feet; and Broken Top, at 9,177 feet. The peaks contain eighteen named glaciers between them, and are considered active volcanoes, with the most recent eruption of South Sister having ended just 2,000 years ago. Due to the porous basalt geology, springs contribute flow throughout the watershed, especially in the lower reaches of the Whychus Creek canyon.

Diversion of water from Whychus Creek began in 1871. By 1916, with the organization of Squaw Creek Irrigation District (now Three Sisters Irrigation District), water was conveyed through a system of canals hand-cut through the porous basalt substrate to irrigate as many as 8,000 acres in the basin. Due to accommodating federal land disbursement policies and to heavy snowpacks in the late 1800s, additional acreage and improvements were made to expand irrigation to additional lands in the Whychus Creek basin (Stuemke, 2009). As a result, the stream was overappropriated and typically ran dry below the cluster of irrigation diversions above the City of Sisters.

Low summer flows in Whychus Creek are contrasted with periodic floods. After heavy winter floods in 1964, the Corps straightened, deepened and channelized a number of streams in the Deschutes subbasin, including Whychus Creek. The Corps' efforts affected 18 stream miles on Whychus Creek, including Camp Polk Meadows downstream of the City of Sisters (Winch, 2006). The natural braiding that occurred in the meadow had provided nursery habitat for steelhead and Chinook salmon.

### *3.6 Whychus Creek Streamflow*

In constrast to the Crooked River, Whychus Creek flows reflect seasonal variability in streamflow and utilization patterns, as there is no major storage project to moderate seasonal flows. Because Whychus Creek drains higher elevations, snowmelt supports higher flows later into the year, but the moderating effect is as variable as the snowpack. As described in section 3.5, heavy snowpacks during the 1890s were a factor in the increased exploitation of Whychus Creek flows for irrigation, and 'junior' water rights are typically regulated during late summer as flows decrease.

For many years, the concentration of irrigation diversions above the City of Sisters regularly dewatered Whychus Creek during summer. Prior to 2000, the only gage on Whychus Creek was above the Three Sisters Irrigation District (TSID) diversion (14075000). But the TSID canal was also gaged (14076000), so an estimate of the flow below the TSID and other senior diversions can be obtained by subtracting the flow of the canal from the flow measured at the gage on Whychus Creek above the diversion.[4] Figure 3.6.1 shows the estimated mean daily flow of Whychus Creek below the TSID diversion at the 80 percent exceedance from 1968 to 1997, the thirty year period prior to the first purchase and subsequent transfer of water rights on Whychus Creek to instream use under ORS 547.348(1), which allows for the creation of instream water rights. Prior to the intiation of water right transactions to improve streamflows in Whychus Creek, the full flow of Whychus Creek was regularly diverted during summer. In May, 2000, a gage was installed at Sisters to enable OWRD to enforce instream flow rights created

[4] These flow estimates are presented to approximate seasonal flow patterns, and the uncertainty associated with this method precludes the use of estimated flows for quantitative analysis. Furthermore, because there are water users downstream with priority dates senior to some TSID water rights, there would have been at least minimal streamflow in Whychus Creek, depending on the status of water right regulation actions on any given date.

through permanent instream water right transfers and temporary instream leases of TSID and other out-of-stream water rights. Figure 3.6.2 shows flows at the Sisters gage in 2001 and 2002, which shows the same pattern as the flow below TSID: the stream is nearly completely dewatered for much of the irrigation season.

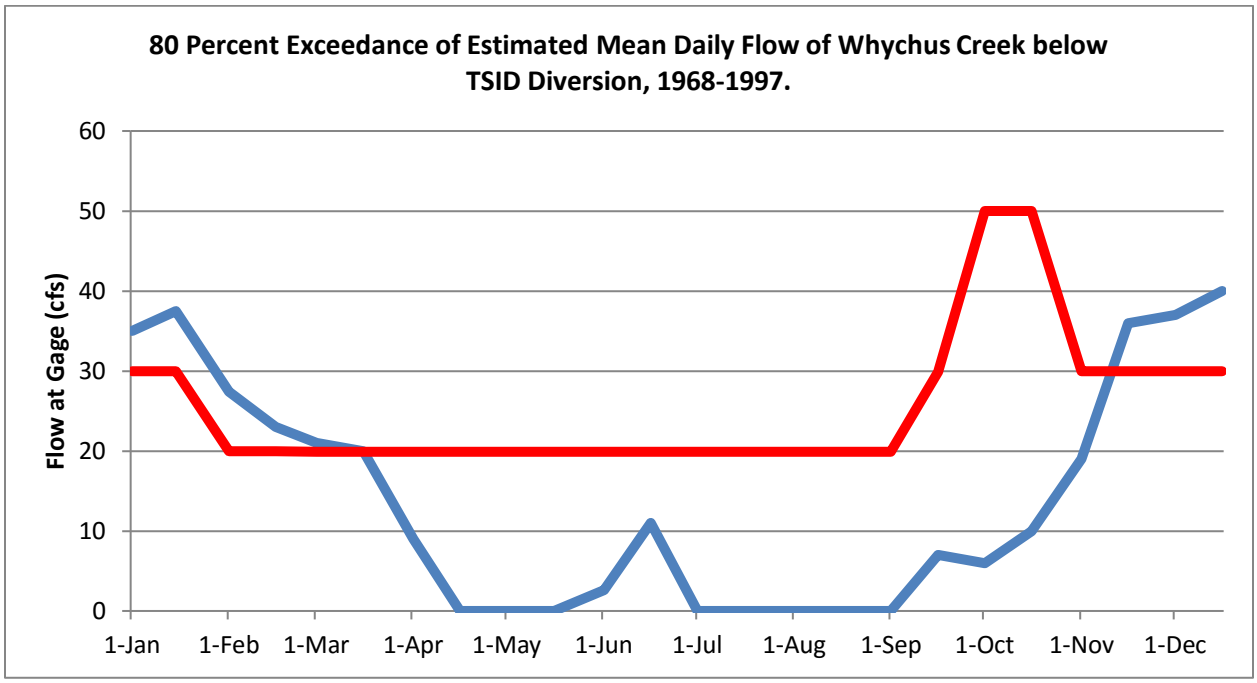


**Figure 3.6.1:** 80 percent exceedance of estimated mean daily flow below the TSID diversion, 1968-1997. The flow below the TSID diversion was calculated by subtracting TSID diversions (Gage 14076000) from the flow of Whychus Creek above the TSID diversion (Gage 14075000). The red line represents the state instream water right (certificate 73223), used as a proxy for the target flow. The blue line represents the 80 percent exceedance fof mean daily flow at the gage.

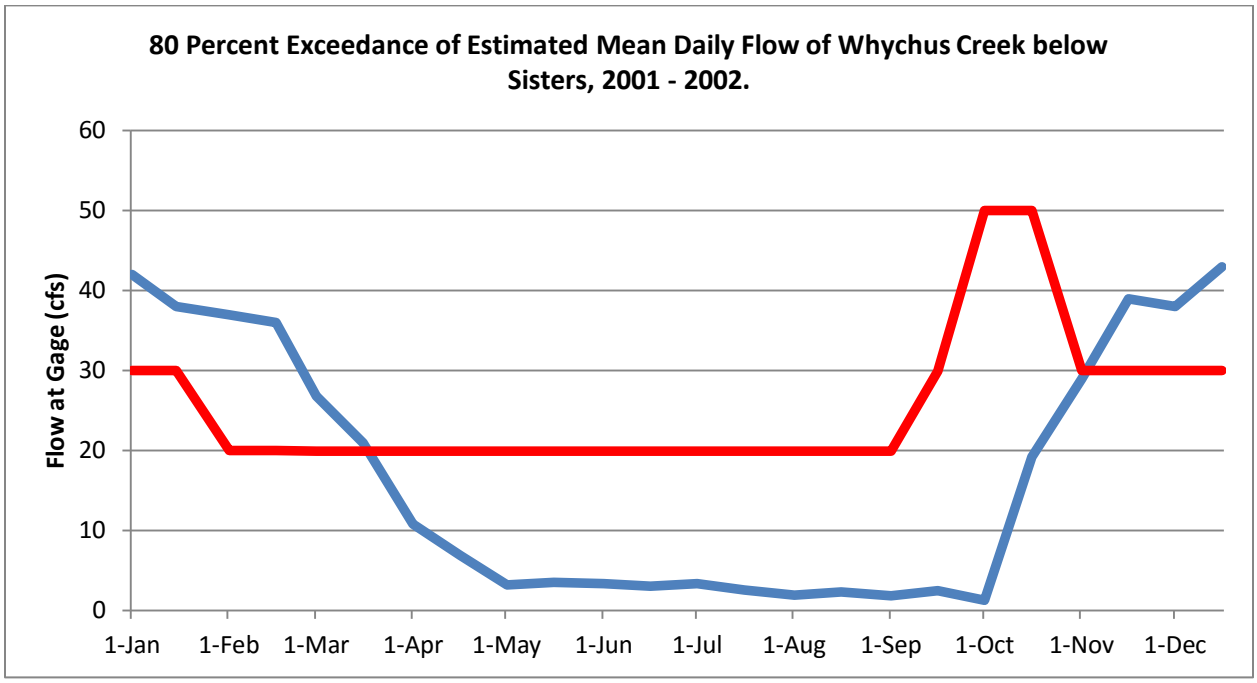


**Figure 3.6.2:** 80 percent exceedance of mean daily flow of Whychus Creek below Sisters (Gage 14076050), 2001-2002. The red line represents the state instream water right (certificate 73223), used as a proxy for the target flow. The blue line represents the 80 percent exceedance fof mean daily flow at the gage.

As flow restoration efforts have progressed—primarily piping of canals to eliminate leaks and create instream water rights from conserved water, and providing financial and technical assistance to exchange surface water irrigation rights for groundwater—Whychus Creek flows have gradually increased. Table 3.6.1 shows the frequency with which instream flow targets were met on Whychus Creek 2001-2017. The figure shows Whychus' Creek's improvement from a stream that was nearly completely dewatered during the summer months, to one with significant flows through the end of the irrigation season.

**Table 3.6.1:** Frequency with which mean daily flow of Whychus Creek at Sisters (gage 14076050) meets or exceeds state instream water right (certificate 73223), 2001-2017.

| Year | April | | May | | June | | July | | August | | September | | October | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001 | 53% | 7% | 7% | 19% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 25% |
| 2002 | 47% | 53% | 0% | 38% | 100% | 100% | 33% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2003 | 67% | 13% | 7% | 31% | 73% | 27% | 13% | 0% | 0% | 0% | 0% | 0% | 0% | 19% |
| 2004 | 7% | 0% | 40% | 81% | 100% | 100% | 53% | 0% | 0% | 31% | 0% | 0% | 0% | 44% |
| 2005 | 33% | 7% | 100% | 100% | 20% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2006 | 80% | 53% | 60% | 100% | 100% | 100% | 100% | 100% | 20% | 0% | 0% | 0% | 0% | 19% |
| 2007 | 100% | 27% | 40% | 56% | 80% | 27% | 13% | 6% | 0% | 0% | 0% | 0% | 0% | 88% |
| 2008 | 100% | 7% | 13% | 100% | 100% | 100% | 100% | 100% | 100% | 50% | 0% | 0% | 0% | 94% |
| 2009 | 100% | 53% | 87% | 100% | 100% | 100% | 100% | 31% | 13% | 6% | 13% | 0% | 7% | 94% |
| 2010 | 100% | 80% | 87% | 81% | 100% | 100% | 100% | 100% | 100% | 81% | 20% | 13% | 0% | 63% |
| 2011 | 100% | 100% | 87% | 56% | 87% | 100% | 100% | 100% | 100% | 100% | 100% | 7% | 27% | 38% |
| 2012 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 88% | 73% | 13% | 7% | 69% |
| 2013 | 100% | 100% | 100% | 94% | 100% | 100% | 100% | 81% | 100% | 100% | 100% | 27% | 13% | 0% |
| 2014 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 13% | 0% | 44% |
| 2015 | 100% | 100% | 93% | 100% | 100% | 100% | 100% | 88% | 60% | 31% | 7% | 0% | 0% | 0% |
| 2016 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 87% | 69% | 20% | 0% | 20% | 94% |
| 2017 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 93% | 88% | 93% | 7% | 0% | 50% |

# Chapter 4: Methodology

## *4.1 The Case Study Approach*

Schramm (1971) identifies that "the essence of a case study, the central tendency among all types of case study, is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result (p. 6)." Yin (2003) couches the case study approach in constructivism. At the heart of Rittel and Webber's (1973) argument that wicked problems cannot be solved through rational-technical interventions is the recognition that such problems are pluralistic in nature. The individual realities of stakeholders in collaborative efforts inform the decisions made as part of those efforts. Semi-structured interviews allow participants to tell their stories and describe their views of reality (Baxter and Jack, 2008).

This approach offers several advantages for an investigation of collaborative restoration efforts. The case study approach allows the researcher to "focus on a single, theoretically useful case" (Eisenhardt, 1989, pg. 533). The Crooked River case, due to its association with the Whychus Creek case, and the unique qualities of the hydrologic setting, including the presence of a federally-managed reservoir, offers value for scholars and practitioners of collaborative governance. Case studies "facilitate exploration of a phenomenon within its context using a variety of data sources (Baxter and Jack 2008, 544)." This study relies primarily on semi-structured interviews with stakeholders, supplemented with information from primary documents and quantitative stream flow data. While case studies "benefit from the prior development of theoretical propositions to guide data collection and analysis" (Yin, 2003, p. 13), interviews were used to both understand the how and the why of events and interactions in the Crooked River case, as well as to understand the context for those events.

### *4.2 Semi-structured Interviews*

A total of six semi-structured interviews were conducted with participants in the Crooked River collaborative restoration effort between August 2016 and April 2017. Interviewees were identified using snowball sampling, with two interviewees specifically identified as informants. Interviews were conducted in-person or by phone. Interviews lasted between 25 minutes and 1 hour and 40 minutes, with an average of 50 minutes. Interviewees were informed about the purpose of the research, consented to be audio recorded, and were offered the opportunity to review any direct quotes the researcher intended to include in the research.

Prior to the interview, I informed respondents that I am employed by GSI Water Solutions, Incorporated as a water rights and water resources consultant and that I have professional relationships with organizations in the Crooked River Basin, specifically, and within the Upper Deschutes Basin more broadly.

A guide was used to highlight important topics of discussion, and additional prompts and follow-up questions were used to explore topics of interest (Appendix B)

### *4.3. Coding and Analysis*

Five interviews were transcribed in full. Due to a technical error, only a partial transcript could be obtained for one interview, with additional supplemental information added based on hand-written notes taken during the interview. Following transcription, interviews were coded according to a guide (Appendix C), which generally follows themes pertinent to the Crooked River case identified in the literature in Chapter 2.

### *4.4 Limitations*

There are three primary limitations to this study. First, all qualitative research, and perhaps case studies in particular, are affected to varying degrees by the subjectivity of the interviewer. While the questions included in the interview guide did not constrain the interest of the questions to matters directly related to the implementation of elements identified in the Deschutes SIP and the Crooked River legislation, I found my focus drawn toward these elements as early as the mid-way point of my first interview. Indeed, the focus of follow-up prompts and questions, in this case focused on a subset of the Crooked River effort, is itself a reflection of the subjective bias of the researcher. But this bias may also extend to the manner in which results are reported and discussed. In this way, some degree of subjectivity is inherent to qualitative research. This bias is limited, to the extent possible, by the focus of the qualitative component of this research on explaining events and perspectives in the Crooked River, and by use of primary documents and quantitative stream flow data to support conclusions.

Second, semi-structured interviews were conducted with a relatively small sample of interviewees. Many researchers argue that this does not have a direct bearing on the quality of the data collected through semi-structured interviews, nor on the potential to reach saturation (see, e.g., Baker and Edwards, 2012). Furthermore, the same themes and topics emerged in the course of each of the interviews, even as responses to differing lines of questions—those included in the interview guide and those that arose spontaneously—indicating that saturation was achieved.

Third, the interviews were conducted as the Crooked River legislation was being implemented. The salience of certain details of respondent's stories and experiences, and their

overall perception of the agreeableness and success of the effort, may be as seasonally variable as the flow of the Crooked River—quite literally, as the transition from drought recovery during the summer of 2016 to one of the best low elevation snowpack years on record during the winter of 2017 improved water supply prospects that are important to the interests of a broad swath of stakeholders in the Crooked River restoration effort. This limitation reflects the realities of conducting research on natural systems, particularly water in the West.

# Chapter 5: Discussion

## *5.1. Stakeholder Incentives*

In its present form, the Crooked River effort outlined in the Deschutes SIP now involves two distinct foci: (1) Efforts to improve fish passage, spearheaded by the CRWC and involving local land owners, dam owners, and water users; and (2), efforts to improve stream flow and water security through the implementation of the Crooked River Act. In order to understand why stakeholders in the Lower Crooked River restoration effort chose to use legislation to address certain elements of the Deschutes SIP (Appendix A), and the effects of those choices on the progress of the restoration effort in the Lower Crooked River, it is important to understand what stakeholders hoped to gain through the collaborative effort. As discussed in Chapter 2, the incentives of the Crooked River restoration effort exist at two spatial scales, the Upper Deschutes Basin as a whole, driven by the FERC relicensing of the Pelton-Round Butte Hydroelectric Project, and at the scale of the Crooked River, driven by the efforts outlined in the Deschutes SIP.

The FERC relicensing of the Pelton-Round Butte Hydroelectric project resulted in a settlement agreement requiring that the licensees "establish self-sustaining harvestable anadromous fish runs of Chinook, steelhead and sockeye above the Project." (PGE and CTWS 2004, Appendix D 1(a), 158)[5] Subsequently, NOAA designated the Upper Deschutes population

[5] The author is not certain whether the language of the Settlement Agreement is or should be interpreted to require the establishment of "self-sustaining harvestable anadromous fish runs of [anadromous salmonids]" or if it merely requires ongoing efforts to establish same. For the purposes of this thesis, it is irrelevant. In practical terms, there is a significant effort at the lower end of the Upper Deschutes system that causes anadromous salmonids to be present throughout the Upper Deschutes, along with financial support for projects to improve conditions in the Upper Deschutes.

of steelhead as 10(j), 'Experimental,' which remains in effect until 2025, granting a reprieve from liability for accidental take to Upper Deschutes water users.[6] Interviewee 2 explained that, "We know with the reintroduction of steelhead into the system, we know that…we need to break the nexus between the irrigation water and the live waters—the creeks and the rivers."

Through the FERC relicensing and the 10(j), irrigators throughout the basin, including in the Crooked River, understood that they needed to improve conditions for listed fish. However, those incentives do not prescribe a specific governance model for restoration efforts. In each sub-basin of the Upper Deschutes River, the mechanisms for restoration have varied. As described in Chapter 1, the collaborative approach has produced success in Whychus Creek. In the main stem Deschutes, where restoration needs are more complex, a number of overlapping efforts centered on a Habitat Conservation Plan (HCP) and associated consultation with U.S. Fish and Wildlife are in progress. Although the Crooked River effort is tied to the Whychus Creek effort via the Deschutes SIP, many of the components of the SIP were wrapped into legislation modifying the congressional authorization for Bowman Dam and the associated Prineville Reservoir.

### *5.1.1 Irrigation incentives*

Apart from reducing irrigators' liability to accidental take, what did irrigators hope to gain from the Crooked River effort that made legislation attractive? Interviewee 5 explained that, "…the legislation was driven by…the local community, but also Ochoco Irrigation District, because we wanted to protect local ag and what we had, while creating opportunities for flexibility in the

[6] It should be noted that the 10j designation does not apply to any other listed species in the Upper Deschutes Basin. A group of irrigators with storage facilities in the Little Deschutes and upper main stem Deschutes Rivers were sued over take of the threatened Central Oregon spotted frog in 2016.

system for environmental flows." At the time of the legislation, Prineville Reservoir was not fully allocated, meaning that of the total storage space available, approximately 155,000 acre-feet, some 68,000 acre-feet were available for irrigation (Crooked River Act 2014), leaving 87,000 acre-feet to be reallocated for flow augmentation, municipal supply, and/or expansion of the reclamation project. Because the authorizing legislation only classifies the reservoir for flood control and irrigation, under the prevailing management paradigm, irrigators enjoyed better certainty of fill. Irrigators were concerned that legislation, litigation, or administrative action could jeopardize the security of their water supply, and with it the livelihoods of farmers (Interviewees 2, 5).

> So if the irrigation district had 45 percent of the water in the reservoir, if it was 100,000 acre-feet and it filled 100 percent, they got 45,000 acre-feet. If it filled half full, then they only got 22,500 acre-feet…So, if we wanted to put a new use up there, and let's say that new use was fish and wildlife and they got half of it and they use all that water every year, instead of filling 9 out of 10 years, now the probability is that you're only going to fill 6 out of 10 years. Well a banker is going to say, I need my money whether you've got water or not. So, what the district said was, just give us the first [68,000] acre-feet. Just take that first [68,000] acre-feet, take care of the contract holders that are there today, and the rest of it you can have. (Interviewee 2)

In order to secure first fill priority, OID agreed to support restoration efforts on McKay Creek, an important tributary for steelhead spawning, by expanding OID's distribution system to serve lands irrigated by live flow from McKay Creek. This expanded the reach of the legislation to irrigation interests that weren't on project lands. For water users on McKay Creek, the voluntary 'water rights switch' would increase the length of the irrigation season in exchange for joining the irrigation district and paying district dues.

> I think there were probably initially some mixed feelings about that, because obviously if they come into the district, they're going to have district fees. They're going to have district dues, those types of things…Whereas, prior to that,

> or as it even exists today, they have natural flow rights on the McKay Creek, and so, the water doesn't cost them any money. Of course, McKay Creek, on a typical year, around the first of July, they're done irrigating, so they're looking at one, two crops, at best.
>
> So, I think that that's a big thing, you know, when you go to somebody, firstly what's not costing them anything and then you say, oh by the way, here's an account fee, here's a $50/acre fee for your water. And so, I think that's, the difficulty was—some of them, I think, got it right away. I think it's like, you know, we're going to get three good cuttings of hay. (Interviewee 5).

From the perspective of OID, the McKay Creek water rights switch was essential to moving the legislation forward, and represents a financial cost, but it also had the benefit of addressing a long-standing problem of disappearing irrigated lands due to urbanization around the City of Prineville, even if the district gave up other opportunities to expand in order to address McKay Creek (Interviewees 2, 5).

> So we said, "Ok. You give us first fill and we'll do the McKay Creek project." Now, many will say that's 600 acres of ground, so the districts going to get rich off that. We'll let's face it, 600 times 50, what's that, 30 thousand bucks? There's like 60 or 70 thousand dollars worth of electricity to put that water up there every year…We were looking for certainty of our water supply out of Bowman Dam, which we got. (Interviewee 2)
>
> …At the end of the day there really isn't a whole lot of it in for the district other than…we're doing something for the environment, we're trying to make some improvement. This is an effort by the district. We're willing to take on this obligation to the district. That obligates us to deliver the water, to have new employees to manage it. (Interviewee 5)
>
> And, I think the other thing is, we gave up, as urbanization happens in the City, since specifically in the early 2000s, especially when things were booming, we've had to look for areas, potentially that we could land. Like today there's around 2000 acres [of irrigation water rights] within the UGB, that gets built-out or [becomes] subdivisions. That's 2000 acres that has to go somewhere, or at least a good portion of it. And McKay Creek was one of those areas that we were definitely looking at expansion. As the opportunity arose, we'd just keep moving the boundary up. Now, by allocating that water, bringing that whole area into the district, we really…forewent that opportunity.

> …In the collaborative part of the process of legislation…it was important. It was important to the Tribes. It was important to many of the folks that really wanted to see steelhead reintroduction succeed. And they really liked McKay Creek for that project. (Interviewee 5).

Furthermore, the problems posed by the expansion to McKay Creek include the engineering challenge of conveying the water to the new lands. In a reflection of the relentlessness of wicked problems (Weber and Khademian 2008), improving instream flows on McKay Creek will require the district to develop the knowledge and tools to manage the increased diversion of stored water on their main canal (Interviewee 5).

> We've got to really make sure we actually get that water through our system. Are the canals large enough? We know we're going to have to add, not only a McKay Creek pump, but most all of our Crooked River water is pumped so we have to go back to our main plant to upsize that. We've got to go to add a re-lift pump. We've got to upsize that. We've got to look at our canal structure. Some of that's most likely going to have to be enlarged. (Interviewee 5)

From OID's perspective, the obstacles to ensuring first fill could not be overcome without legislation. Interviewee 5 attributed this to the difficulty of expanding irrigation releases from Prineville Reservoir and expanding the irrigation district boundary.

> So say, legislation didn't happen, trying to get that 2700 acre-feet of water for McKay Creek would have been—you know it had just been difficult. It would have been very difficult to get that water out of that reservoir. There had been long, withstanding requests from the Bureau for water rights for irrigated agriculture. I mean, so long, that, you know, people were selling property, passing away, that type of thing. So, I think…in order to do that, it actually would have been a longer, drawn out process.
>
> As a matter of fact, I don't think we would be there today. I don't think that with that legislation opening that door, specifically, bringing those lands into the district, specifically setting aside water for the McKay Creek project, I still don't think we would be there today without the legislation. There wouldn't be that set-aside of water.
>
> The other thing is, you know, just trying to bring those lands into inclusion in the boundary—because, again—it was done by Congress. You know, Congress

> authorized those lands to come in within the district boundary. You know, there would have been a whole new set of challenges with trying to do that administratively. Could it have been done administratively? The answer is yes. But, the process is extensive and long. And, there's no guarantees in that. (Interviewee 5).

*5.1.2 Municipal Incentives*

For the City of Prineville, the Crooked River Act presented an opportunity to gain indirect access to water stored in Prineville Reservoir in order to address long-term water supply needs for its burgeoning technological services sector. The Crooked River Act allocated 5,100 acre-feet for releases "to mitigate the City's groundwater pumping" (Crooked River Water Security and Jobs Act, 2014). As discussed in Chapter 3, the research of Gannet et al. (2001) established a link between groundwater development in the Upper Deschutes Basin and Lower Deschutes River flows, leading to the closure of the Upper Deschutes Basin to further groundwater development—including for the City of Prineville's municipal water supply—to prevent negative impacts to stream flow in the Lower Deschutes. The Deschutes Basin Mitigation Program, described in Oregon Administrative Rules (OAR) chapter 690, division 505 (690-505) was devised to allow issuance of additional groundwater rights if the impacts to the scenic waterway (i.e. to Deschutes River flow) were offset by an equivalent reduction of groundwater or surface water rights. The program allows, among other possibilities, for the creation of instream water rights through "a secondary permit to use stored water from an existing reservoir obtained pursuant to ORS 537.130 to 537.211 and OAR 690, division 310, provided the secondary permit is for instream use through a secondary permit to use stored water from an existing reservoir obtained pursuant to ORS 537.130 to 537.211." That is, one way for the City

of Prineville (City) to obtain new groundwater rights is through the release of water from Prineville Reservoir for instream use.

Similar to OID's interest, the City's interest was in securing its long-term water supply. "The City went into it so they could create more certainty for their municipal water supply—mitigate for the wells" (Interviewee 2). The City's need for secure water supply is the result of a well-documented transition from a "mill town" to a hub for tech industry datacenters (Schneider 2018). Facebook and Apple operate "hyperscale" datacenters in the City of Prineville, and require large amounts of water for cooling. The scale and timeline of tech industry investment in Prineville requires the City to have long-term water supplies secure against drought and shifts in the regulatory landscape.

But datacenters also consume large amounts of power. The City, Bonneville Power Authority and Pacific Power became aware that there was less capacity to deliver power to Central Oregon than anticipated (Rogoway, 2017). It's unclear whether this is attributable to unexpectedly large power demands or underestimating the transmission capacity in the region. The Crooked River Act also addresses what Oregon senators Jeff Merkley and Ron Wyden, cosponsors of the bill, characterized as a "historic mistake" (Merkley, 2013) by moving the wild and scenic boundary from the foot of Bowman Dam to a location one-quarter mile downstream to allow for hydropower development at Bowman Dam. Interviewee 2 indicated that this was a major motivation for both the City and Pacific General Electric (PGE) to support the legislation.

Although there are alternative legal avenues available to obtain mitigation under the Deschutes Basin Mitigation Program (e.g., purchase and instream transfer of reliable surface water rights), Prineville—and other water suppliers within the Deschutes Basin—viewed these

options as uncertain, politically unpopular,[7] and the legislation as the most efficient way to secure its future water supply. More importantly, the modification of the Wild and Scenic boundary on the Crooked River could only be addressed through federal legislation. Thus, the motivation was strong to use legislation to address multiple water and power supply challenges.

### *5.1.3 Instream, Fish, and Wildlife Incentives*

In contrast to the components of the legislation that address McKay Creek, hydropower potential at Bowman Dam, and release of stored water for flow augmentation and the City of Prineville's water supply, fish passage projects were not addressed through the legislation, but through the work of the Crooked River Watershed Council (CRWC). The stream flow and McKay Creek restoration components of the SIP were tied to the legislation. To the extent that flow restoration represents a partnership between instream and irrigation interests, the incentive for instream interests to use legislation to accomplish their goals mirrors that of irrigation interests. That is, OID was skeptical that the reservoir reallocation and irrigation district boundary expansion to provide water to McKay Creek water users would be possible without legislation. In interviews, instream interests did not express an opinion on the likelihood of using other approaches to implement the stream flow and McKay Creek restoration components of the SIP. But it stands to reason that the same concerns that the district expressed over the difficulty of reallocating stored water in Prineville Reservoir and expanding OID's boundary without legislation would apply equally to both irrigation and instream interests.

---

[7] These options would require the City to "dry-up" farmland in order to obtain new water supplies.

Interviewee 3 noted that, prior to the construction of the reservoir, there was little or no summer flow in the Crooked River at the present location of Bowman Dam. By moderating summer and winter flows, the construction of the reservoir addressed a stream flow problem that was already present. Using the reservoir to improve stream flows isn't restoration, per se, but making the system more accommodating to steelhead. It is not surprising that the reservoir, with its unallocated storage, should be the focal point for increasing summer flows below the reservoir.

Interviewee 6 expressed concerns about the legislation as it pertained to stream flow restoration:

> [The legislation] was a multi-year process that had many, many, many draft forms. And I would say, throughout the process ODFW had some reservations about some of the elements that were included in the legislation. And now, it is now law, and we're committed to trying to make the best of it, but we still have concerns. (Interviewee 6)

ODFW's concern related to the way the legislation addressed—or did not address—dry-year stream flow.

> …The devil's in the details, and I'll just explicitly state that our general concern is that I see the legislation as doing some good things and affording some opportunity that would benefit fish during average and good water years. But in dry years, in drought years, there's some real problems with it, in that it guarantees all the water for the consumptive interests and none for the river. (Interviewee 6)

But, ODFW acknowledged that the legislation had general support within the environmental NGO community, and that this provided the support that legislators needed to get the Crooked River Act passed.

> I would agree that it wasn't just WaterWatch, American Rivers, and Trout Unlimited that collectively, kind of, represented the NGO community. And with their support of the legislation it provided a lot of, momentum to make it easier

> for it to push through, because you had support from both the environmental conservation community as well as the irrigation, consumptive water users. So, for the layman and the political interests this appeared to be a win-win thing and it was pretty low hanging fruit. (Interviewee 6)

ODFW's concerns about the legislation foreshadowed future obstacles to implementation. The criticism levied against the legislation is limited to the way the legislation failed to address the stream flow component of the Crooked River restoration effort during dry years. That "layman and political interests," in particular do not understand this detail is an identification of the complexity of the challenge that arises from increased conditions of scarcity that bring competing stakeholder values to the fore. However, the legislation attempts to address this element in section 6 of the Crooked River Act, which requires the Bureau of Reclamation to participate in dry-year planning management meetings with "[State], [Tribal], municipal, agricultural, conservation, and recreation interests." The dry-year management plan would "recommend strategies, measures, and actions that the irrigation districts and other Bureau of Reclamation contract holders voluntarily agree to implement." In this way, the Crooked River Act acknowledges that even with the passage of the legislation, there will still be more work needed in the Crooked, and section 6 constitutes a mandate for ongoing collaboration to resolve those problems through voluntary measures.

### *5.2 Venue Shopping*

The use of legislation to address components of the Crooked River restoration appears on its face to constitute 'venue shopping,' as described in Ansell and Gash (2008). But Ansell and Gash describe specific motivations for seeking out alternative venues that do not align with the those of stakeholders in the Crooked River effort. As discussed in Chapter 1, Ansell and Gash

(2008) propose two contingencies pertaining to venue shopping for their model of collaborative governance:

> (2) If alternative venues exist where stakeholders can pursue their goals unilaterally, then collaborative governance will only work if stakeholders perceive themselves to be highly interdependent.
>
> (3) If interdependence is conditional upon the collaborative forum being an exclusive venue, then sponsors must be willing to do the advance work of getting alternative forums (courts, legislators, and executives) to respect and honor the outcomes of collaborative processes. (553)

In the Crooked River restoration effort, legislation was anything but unilateral. Furthermore, passage of the legislation was dependent upon the support of all stakeholders. The rhetoric surrounding the legislation—from both legislators and stakeholders—reflects this. Interviewee 2 described the process of coming to consensus on the legislation—albeit with some frustration:

> So, what the district said was, just give us the first, well it turns out to be [68,000] acre-feet. Just take that first [68,000] acre-feet, take care of the contract holders that are there today, and the rest of it you can have. But, this group over here called WaterWatch was able to take all of the rest of the good—there was fifty people at the table, and there was WaterWatch. And yet, WaterWatch held it up for seven years…
>
> In order for the environmentalists to jump on board and give us first fill, we had to give them some kind of carrot, because they had to get something because they were so adamantly opposed to our first fill…
>
> So we said, "Ok. You give us first fill and we'll do the McKay Creek project." (Interviewee 2).

A press release from Jeff Merkley trumpets endorsements from WaterWatch, The Confederated Tribes of the Warm Springs, American Rivers, Trout Unlimited, and the Association of Northwest Steelheaders, as well as irrigation and municipal interests (Merkley 2013). Furthermore, the dry year management plan included in the legislation was an effort to

address the uncertainty of how to resolve the issues the legislation was not designed to address, reflecting the wicked nature of the Crooked River flow problem.

> Interviewer: And was the dry-year management plan—so you mentioned it was related to the legislation—is there a mandate in the legislation for it? Or is this something you're doing as a follow-up and it's voluntary.
>
> Interviewee 5: No, it was mandated in the legislation, but I would say it was collaborative as it was put in the legislation, because, again, I think those were some of the things as we were putting the legislation together, you know, some of the questions were, what if? And we said, well, as part of the legislation let's be committed to sitting down at the table and working together and trying to come up with a dry-year management plan that is voluntary, but it also looks at real solutions. (Interviewee 5)

The legislation in the Crooked River meets both of the contingencies identified in Ansell and Gash (2008) in that it was not a unilateral effort and the legislation recognized the exclusivity of the collaborative forum going forward by mandating that a federal agency (Reclamation) participate in the creation of a voluntary dry year management plan with stakeholders to the legislation.

### *5.3 Collaboration despite legislation?*

If the Crooked River case does not quite fit the description for venue shopping, and the legislation mandates continued collaboration to address elements that stakeholders acknowledge cannot be addressed effectively through legislation, how is it functioning as a collaborative effort? That is, if the Crooked River effort doesn't fit the Ansell and Gash model for venue shopping, are there elements of the Crooked River effort's process and design that do fit the Ansell and Gash model for collaboration?

With regard to the collaborative process, Ansell and Gash write that,

> …in our reading of the literature, we were struck at the way in which the collaborative process is cyclical rather than linear. Collaboration often seemed to depend on achieving a virtuous cycle between communication, trust, commitment, understanding, and outcomes (Huxham 2003; Imperial 2005). This cyclical—or if you prefer, *iterative*—process is important across all the stages of collaboration. (557-558)

The importance of *iteration* to the collaborative process is evident in Rittel and Webber's (1973) articulation of the definition of wicked problems, and in Weber and Khademian's (2008) identification of the knowledge challenges in wicked problem settings, both discussed in Chapter 2. Ansell and Gash (2008) identify five elements of the collaborative process that are critical to the success of collaborative efforts: face-to-face dialogue, trust building, commitment to the process, shared understanding (part of a larger "collaborative learning" process), and intermediate outcomes. In respect to these elements, stakeholder interviews and stakeholder actions in the aftermath of the passage of the Crooked River Act indicate a mix of success and remaining obstacles.

### *5.3.1 Success: fish passage efforts of the CRWC*

One area of success is the effort to address fish passage in the Lower Crooked River and its tributaries. All interviewees identified removal and modification of fish passage barriers as among the chief accomplishments of the Crooked River restoration effort to-date. Under the Deschutes SIP, the Crooked River Watershed Council (CRWC) is the major partner addressing fish passage challenges on the main stem Crooked River and McKay Creek. In interviews, the CRWC was singled out as good at building trust (Interviewee 3), great at partnering with landowners (Interviewee 4), and a "great partner [to municipal and agricultural stakeholders]"

(Interviewee 2). Interviewee 5 expressed that the CRWC was "quietly doing it right behind the scenes."

Interviewee 1 attributes the success of the CRWC's efforts to clarifying the goals of the watershed council, building trusting relationships with landowners, and forging partnerships to develop creative solutions. Soon after the development of the Deschutes SIP, the CRWC aligned restoration goals in the Lower Crooked River with the implementation of the Middle Columbia Steelhead Recovery Plan (Middle Columbia Plan). The Middle Columbia Plan encompasses mirroring state and federal plans for Steelhead Recovery and identifies habitat and fish passage considerations throughout the Lower Crooked River.

> …it identifies all the limiting habitat factors that need to be addressed to set recovery up in a positive way, a positive trend line. So for example, Opal Springs is identified as a fish passage barrier that needs to be addressed. Same with Rice-Baldwin, same with Stearns, all the barriers are addressed and even tagged by river mile. So it's a really nice guide for people like us, who are practitioners. Can you imagine if we had to spend all of our time figuring out what the priorities should be? And arguing about those, you know what I mean? So, what I've always done…is say, let's just embrace and let's not second-guess. Let's not second-guess where we should call our priorities, let's just adopt their plan and let's try to implement that plan. And it's turned out to be a really good decision because when we apply for grants, when we've identified why we're proposing this particular activity and the activities identified in that plan, the priorities are really clear. So it's become a real nice way to get our grant applications approved with that plan. (Interviewee 1)

The impetus for adopting the Middle Columbia Plan was an effort to focus on anadromous fish. This approach stands in contrast to active restoration efforts in the other branches of the Upper Deschutes Basin, where resident fish, particularly Redband trout, a relative of the steelhead prized by sport fishermen, remain a focus of some of the CRWC's partners, including the DRC, Trout Unlimited and ODFW, the last of which is charged with managing both resident and anadromous fishery resources.

> …we know our work is going to be best evaluated and measured for success if we can get steelhead in the system. We know other species will kind of come around. That's actually been our target. Not the same everywhere in the basin. Some of our partners are taking a watershed view of the fishery sources, and their equally excited about getting more Redband in the river which is—that's just not our philosophy and not our driver. We figure we've got lots of Redband in the Deschutes Basin. We are not short on Redband. So the idea that you would spend millions and millions of dollars to produce, you know, ten percent more Redband in a system that's already chock full of Redband, that really doesn't make a lot of sense to us. But spending money to bring in steelhead that aren't there now? That makes a lot of sense. (Interviewee 1)

As the CRWC has strategically focused on implementing fish passage and habitat projects, they've built trust with landowners[8] by working to ensure that fish passage solutions meet their needs, recognizing that landowners' needs may go beyond the focus of the project, but remain crucial to implementation.

> …I think you've got to be really sensitive to the landowner's needs. And I think sometimes our partners tend to overlook that part, or they don't spend enough time and attention on that piece. I mean you can imagine, we're talking about human relations, here, when it comes down to it. And if you're a producer and there's a conservation issue on your land, and I can fix it, but I can really only give you a solution that's going to cut your hay production in half, you're not going to be that interested in that. If they come at you with a solution that says, hey, I can solve your conservation problem with other people's money, and I can fix your head gate so you've got better operations for your ditch, now all of a sudden you're interested in that.
>
> …You've got to be reasonable on where you draw your lines, but usually, you can find—if you work at it—you can find something where the landowner wants to do this. It's been bugging him for a long time, you can fold that into your project if it makes sense to do it. (Interviewee 1)

The CRWC is also careful when working with landowners to maintain the boundary between the CRWC's voluntary work and enforcing compliance.

---

[8] The CRWC's work is with landowners, structure owners, and water users. In most cases, the landowner is also the structure owner and a water user, but this is not always the case. For the sake of brevity, the term landowner is used throughout this chapter to describe all categories of individuals and entities with whom the CRWC works.

> We rely on others to use the hammer because we are not enforcement. We don't have enforcement authority. And we know, intuitively, if nothing else, that if we go to you and we say, hey, we have this great project. If you volunteer we can give you money, and by the way, if you don't, we're going to come at you with an enforcement action. Well, guess how long that conversation lasts. Pretty quick.
>
> …We would lose our credibility. You can imagine they would clam up…They wouldn't want to share information because they would fear that anything they said would be turned against them.

Among the issues that the CRWC encountered is the funding structure for modification of fish passage barriers, which makes it difficult to obtain funding for maintenance work as compared to construction or major modifications to provide passage. The recognition that some of the projects the CRWC completed early in the Crooked River restoration effort may not be suitable for the needs of the landowner over the long-term has pushed the CRWC to broaden its partnership network and embrace creative solutions. The CRWC's partners include the Crook County Soil and Water Conservation District, the NRCS, and the Deschutes Land Trust, who provide assistance for CRWC projects for fish passage design, habitat restoration, land restoration, fallowing, and invasive species control. The CRWC even found an unexpected partner in the Crook County Roads Department, who had the unique capacity to provide materials and equipment to address an emergent problem with one of the CRWC's early fish passage projects.

> …Crooked River Central [diversion dam] is a great example, a $1.4 million dollar project that we put in with federal and state money. Now the district has a $1.4 million dollar very sophisticated project out there that they've got to do the O&M on, and they are not in a position to do that for that kind of sophisticated structure, frankly. Not at this time.
>
> In the case of Crooked River Central, as soon as the project was built, PGE, I think somewhat unwittingly, and unknowingly—I don't think it was intentional at all—but they tethered a fish trap [and] it had the negative effect of creating an eddy on that side of the river. And the eddy started to erode behind the fish ladder, the concrete. (Interviewee 1)

The OWEB grants the CRWC typically uses to fund its fish passage work are not available for maintenance or repairs, but the CRWC was able to obtain help from the Crook County Roads Department, who repaired the dam using their materials and equipment in exchange for assistance from the CRWC with permitting future projects, an area of expertise for the CRWC due to the myriad permitting requirements involved in removing and modifying diversion structures. Despite their success in addressing the problem by reaching beyond their existing network of partners, the experience pushed the CRWC to embrace designs with lower long-term maintenance requirements in their future projects.

> So [now] we kind of like bypass channels, you can probably tell there's a theme there in the Lower Crooked and one of the reasons we like them is they're low maintenance…the reason we like low-tech, long-term low cost projects is because we know they're sustainable for the landowners. (Interviewee 1)

The progression of the CRWC's activities and achievements in the Lower Crooked River reflects the description of collaborative efforts in the Ansell and Gash (2008) model described above (face-to-face dialogue, trust building, commitment to the process, shared understanding, and intermediate outcomes).

Like many watershed councils in Oregon, the CRWC board is made up of local stakeholders, including irrigation, municipal, and environmental interests. The CRWC board includes members with ties to Ochoco Irrigation District, upland (above Bowman Dam) irrigators, the City of Prineville, and Portland General Electric, many of whom were involved in drafting the Crooked River Act. The CRWC's adoption of the Middle Columbia Plan as a guide for restoration efforts is an example of stakeholders coming to a common problem definition and clarifying goals in response to that problem. Ansell and Gash (2008) explain that "At some point

in the collaborative process, stakeholders must develop a shared understanding of what they can collectively achieve together" (560). Shared understanding encompasses agreement on the definition of the problem *and* knowledge salient to addressing the problem (Bentrup, 2001; North, 2000; Pahl-Wostl and Hare, 2004; Ansell and Gash, 2008). This part of the collaborative process is also characterized as part of the larger "collaborative learning" process, which Ansell and Gash describe as an iterative process to refine the problem definition and relevant knowledge throughout the collaborative effort (Ansell and Gash, 2008; Daniels and Walker, 2001). In the case of the CRWC, clarifying the problem definition in terms of *anadromous* fish populations, and identifying the relevant knowledge as that contained within the Middle Columbia Plan provided an impetus for moving forward. The collaborative learning process involved recognizing the needs of landowners and water users, expanding the collaborative network to include that expertise, and applying it to the CRWC's future projects. In particular, the CRWC's move toward low-tech, low-cost bypass channels was part of a learning process that included stakeholder feedback, observation of the functionality of earlier projects, and communication between the CRWC and its design and engineering partners (Interviewee 1).

The collaborative governance literature indicates that the level of commitment from stakeholders to the collaborative process is a significant factor in explaining the success or failure of collaborative efforts (Alexander, Comfort, and Weiner, 1998; Tett, Crowther, and O'Hara, 2003; Margerum, 2002; Burger et al. 2001, Ansell and Gash, 2008). Ansell and Gash explain that "…commitment to the process means developing a belief that good faith bargaining for mutual gains is the best way to achieve desirable policy outcomes." The CRWC's approach to working with landowners embraces mutual gains for landowners' operations and fish passage,

and the CRWC's adherence to working with landowners in a voluntary context, without threat of enforcement, builds good faith.

In that respect, successful fish passage projects on the Lower Crooked River are not just intermediate outcomes or "small wins," but critical inputs to the ongoing collaborative process. Vangen and Huxham (2003) assert that,

> Undoubtedly, the trust-building loop aligns itself well with a 'small wins' approach within which trust can be built through mutual experience of advantage gained via successful implementation of low-risk initiatives. Trust can be developed over time moving gradually toward initiatives where partners are willing to take greater risks because a high level of trust is present. (16)

In the Lower Crooked River, Opal Springs represents the most significant remaining barrier to fish passage, and its location near the mouth of the Crooked River makes volitional fish passage essential to realizing the benefits of all restoration activities, especially fish passage projects, occurring upstream. In 2013, Opal Springs was elevated to the second highest priority on ODFW's fish passage priority list (Darling, 2013; Loffink, 2013). The structure includes a hydropower facility and was renovated in 1982, at which time it was granted a new, 50-year FERC license. At the time, there was no reason to contemplate large-scale fish passage at Round Butte Dam, so the license didn't require the installation of fish passage facilities.

> Opal…is a whole different beast. Infinitely more complicated. Mostly because it's a FERC-licensed project. So not only does it have a FERC license, but it has a stigma attached to it, too. It's a much taller structure: 25 feet tall. So it's a more imposing barrier, more expensive to deal with.
>
> And I think in the case of Opal, the stigma is, for some people on the project, if these guys are producing hydropower, they should pay for their own ladder. And what we say is—it's in our watershed, so we're a little biased—wait a minute, we don't make any other irrigation districts or any other landowners pay for their stuff. We don't force [Three Sisters Irrigation District], for example, to pay for all their piping. We paid for their piping why wouldn't we do the same for this district? So the politics, in some ways, have been very different and very unique

> around Opal, compared to all the other projects I've been affiliated with in the last five years. And that includes projects in Whychus that [the DRC] might be doing. We bundled all those projects together in the Deschutes Partnership, and for some reason, Opal is this, unique—has to be dealt with completely different from any other project we've ever dealt with (Interviewee 1).

One of the principal challenges of the project is its cost. Much of the effort of the CRWC and the DRC is directed toward fundraising.

> It's an expensive project, probably going to over $9 million dollars in the end, when it's all said and done. And they've asked us, the district, the owners, Deschutes Valley Water, to ask the public to fund about half of the project cost. That seemed pretty reasonable to us because, normally, OWEB requires a minimum of 25 percent from that side. These guys want to put up 50 percent, at least, so already it's better in that way. (Interviewee 1)

> Opal Springs is the last [and] the most important barrier. I think they're almost there, but that's been a big push in many ways, but also in a funding way. (Interviewee 4).

Given the scale of the fundraising effort to develop volitional passage at Opal, the success of previous fish passage projects in the Lower Crooked River is paramount. While it may seem paradoxical that Opal should be among the last fish passage barriers in the system, despite blocking access to 132 miles of habitat—virtually the entire project area—the literature on the importance of small wins in collaborative efforts suggests that addressing other barriers has increased the capacity of the CRWC and its partners to address the more significant challenge at Opal Springs (Vangen and Huxham, 2003; Ansell and Gash, 2008). That the facility's owner, Deschutes Valley Water District (DVWD) was willing to open the FERC license early to address the project is indicative of the significance of earlier successes in the Crooked River effort.

> There's a settlement agreement…and I think the agreement is mostly to avoid a lawsuit…The same agencies, and those NGOs even more particularly, could file a suit that could force them to put a ladder in there under the ESA provisions. The settlement agreement says…let's get together, let's agree to work to get passage now and not wait, and if you guys agree to do that, then we won't sue you, in the

> interim, and we will agree to help you finance it, and help you design and, kind of, make it successful, you know.
>
> So, [it's] a really nice approach, I think it's kind of unique to Oregon, per se, the idea of getting everybody to voluntarily open a FERC license, you know years, a decade or two, before it's due, is pretty unique. If you research that, I'm told that FERC license holders never open their license up. They always wait for the license to just expire, and they deal with all of these environmental issues at that point. (Interviewee 1)

The success of the Crooked River effort in addressing fish passage barriers by coming to a common definition of the problem, pursuit of mutual gains, adherence to the principle of voluntary cooperation, and leveraging small wins to achieve bigger outcomes is reflective of the characteristics of successful collaborative efforts. However, it's important to remember that fish passage is only one part of the Crooked River effort outlined in the Deschutes SIP, and represents an arguably more simple challenge for stakeholders to overcome. Interviewee 6 characterized fish passage projects as "conceptually simple…you come up with the design…and the construction that is needed at a particular site and you just build it."

Interviews with other stakeholders revealed that the fish passage element of the Crooked River effort did encounter and overcome unforeseen challenges and the CRWC changed strategies to increase buy-in from landowners. But ODFW's articulation of the simplicity of fish passage efforts belies a more significant difference between fish passage projects and the drawn-out bargaining process required to draft, pass, and implement the Crooked River Act. With the exception of OID and DVWD (Opal Springs), many of the landowners who have entered into agreements with CRWC to modify or remove fish passage barriers on their property have not been actively involved in the collaborative forum.

> Interviewee 2: …We have to prepare for the listing, so it will require fish screens to be put on several diversions, so that's a cost, not only for OID, but for People's

> Irrigation, Crooked River Central Irrigation, and Lowline Irrigation District, not to mention additional direct diverters out on the Crooked River. So, it creates ESA liabilities for anybody diverting off the Crooked River.
>
> O: And those other districts that you mentioned, Crooked River Central, People's, and Lowline. So I know that [the CRWC] did some work on fish passage for People's and Crooked River Central. Do you know how involved they have been in the broader effort? Has there involvement pretty much limited to their interaction with the Crooked River Watershed Council and modifying those diversions, or are they more involved?
>
> Interviewee 2: <<Shakes head>>
>
> O: It pretty much ends there?
>
> Interviewee 2: Well I hate to throw anybody under the bus, but, yeah. I offered and pleaded with them to join [the legislation]. They did not.

This perspective allows us to conceptualize the broader Crooked River effort outlined in the SIP as two distinct, parallel processes. The CRWC's fish passage efforts, guided by the SIP, have been addressed through an iterative program grounded in the principles of collaboration. The CRWC's work has benefited from the structure that collaborative principles have provided for setting goals and interacting with landowners and water users, which has led to successful implementation. But the reach of that implementation does not address other aspects of the wicked problem of anadromous fish restoration in the Lower Crooked River. Flow restoration on the main stem Crooked River and in the McKay Creek watershed are addressed through the Crooked River Act and the ongoing collaborative effort involving stakeholders to the legislation.

### *5.3.2 Remaining obstacles: passage and implementation of the Crooked River Act*

In contrast to fish passage efforts, flow restoration on the Lower Crooked River and McKay Creek has been stalled by the slow pace of the passage and implementation of the Crooked River

Act. In January 2008, the OWEB board allocated $4 million for the Deschutes Special Investment Partnership (OWEB 2017). The SIP project list (Appendix A) includes the McKay Creek exchange, which would expand the Ochoco Irrigation District boundary and distribution system to provide water for 600 acres with live flow water rights from McKay Creek, in turn protecting those water rights instream to restore flow to benefit steelhead spawning and rearing. Interviewee 4 characterized the McKay Creek project as a "rare win-win-win project." Initially, OID, DRC, and the CRWC were successful at getting landowners on board with the project.

> Most of the landowners we worked with on McKay Creek wanted to do the project, so that wasn't a major barrier…Once we got people in the room and talked about what the project was, we really didn't have challenges to people being on board….we had one big town hall meeting where people were suspicious because we were talking about reintroduction and I think there was a perception of fear. But once we had the real landowners in and we [explained that] you're going to get your water for several more months, this is what it's going to cost you, this is how the projects going to work, we had really strong support. (Interviewee 4)

> I think some of the challenges initially was working with the landowners to see if they were even interested in such a project. And I think there were probably initially some mixed feelings about that, because obviously if they come into the district they're going to have district fees. They're going to have district dues, those types of things—district rules and regulations. Whereas, prior to that, or as it even exists today, they have natural flow rights on the McKay Creek, and so the water doesn't cost them any money, anything like that, so, you know, there's that element. Of course, McKay Creek they're typically—on a typical year, around the first of July, they're done irrigating, so they're looking at one, two crops, at best. (Interviewee 5)

But as described in section 5.1, stakeholders felt that the expansion of the irrigation district and allocation of stored water from Prineville Reservoir, among other elements involved in the Crooked River effort, could only be achieved with federal legislation. The Crooked River Collaborative Water Security and Jobs Act (Crooked River Act) was signed into law by President Barack Obama on December 18th, 2014 (Crooked River Collaborative Water Security

and Jobs Act, 2014), over seven years after negotiations began. Stakeholder interviews indicate that disagreement over how to interpret the legislation caused distrust, delayed implementation, and harmed or jeopardized other elements of the Crooked River restoration effort (Interviewees 1, 2, 3, 4, 5, 6).

In order to understand how and to what extent legislation can be a useful component of a broader collaborative effort, it is necessary to understand, through the lens of a collaborative model, how and why disagreements arose about the interpretation of the Crooked River Act between its drafting and implementation. Answering the question of how and why disagreements arose is not an exercise in reviewing the language of the legislation alongside stakeholder interviews in order to assign blame. Rather, stakeholder interviews provide insight into stakeholder interactions and decisions within the collaborative process. As in the case of the CRWC's successful fish passage efforts, the literature on collaborative governance provides a model for understanding how events, decision, and stakeholder interactions in the Cooked River influenced the capacity for collaborative problem solving there.

When asked about the chief obstacles to getting to success in the Crooked River effort, stakeholders identified:

a. Lack of flow restoration commensurate with habitat restoration in McKay and Ochoco Creeks (Interviewee 6).
b. The politics around the implementation of the Crooked River Act (Interviewee 4).
c. Perception of cultural differences between Bend and Prineville and 'outsider' status of NGOs from Bend (Interviewee 4).

d. Working through extreme differences in a consensus-oriented process (Interviewee 5).
e. One organization is distrustful of others in the collaborative process (Interviewee 3).
f. Lack of accountability or ownership of stakeholders acting outside the collaborative (Interviewee 2).
g. Uncertainty and long process for state and federal permits (Interviewees 1, 2).

Items a, b, d, e, and f were all tied explicitly or implicitly to the passage and/or implementation of the Crooked River Act, which has had wide-ranging consequences for stakeholders. With regard to the McKay Creek water rights switch, the delay in the passage and implementation of the legislation has created complications working with landowners.

> I think if anything's working against [the McKay Creek water rights switch] right at the moment [it] would be time, I think. Now you may get new landowners, and that's a challenge. If you get a landowner in there that doesn't want to do that. So I think that—that could be a challenge. And then just bringing that new landowner up to speed with just what's going on. (Interviewee 5)

Increasing flow in McKay Creek during the spring and early summer months is contingent upon the completion of the McKay Creek water rights switch, but the uncertainty about how the legislation will be implemented has also created delays for flow restoration on the main stem Crooked River below North Unit Irrigation District's (NUID) pumps.

> So this gets [really] complex…There's a conserved water application [and] a management agreement that makes sure that the flows are additive to what would have been there anyway…the way the Crooked River Act is changing this is it's changing the flow regime in the Crooked, and so there's no guarantee that what we've done will be additive to that, yet, because there's uncertainty in how that's going to be managed.
>
> So it will get figured out, but there's too much uncertainty right now for [instream] funders to continue with phases of that project. And North Unit's not willing to make a commitment [for the water] to be additive at this point, because

> there's too much uncertainty [in how the act will be implemented]. (Interviewee 4).

Interviewee 4 is referring to the NUID canal-lining project identified in the Deschutes SIP, which would protect up to 14.5 cfs in the Crooked River below NUID's Crooked River pumping plant. NUID's primary source of water is live flow from the Deschutes River and stored water released from Wickiup Reservoir, both of which are diverted at NUID's diversion dam on the Deschutes River in Bend. But the district uses the Crooked River as a supplemental source of supply. The Crooked River Act was modified before passage in the senate by sponsor Ron Wyden to include a provision that reservoir releases would be managed to "provide instream flows consistent, to the maximum extent practicable, with the recommendations for in-channel strategies" in the 2005 Deschutes Subbasin Plan (govtracker.us). The Deschutes Subbasin Plan's in-channel strategy pertaining to Lower Crooked River flows identifies a minimum instream flow target of 80 cfs from Bowman Dam to Lake Billy Chinook. (NPCC 2005). The direction to maintain 80 cfs from Bowman Dam to Lake Billy Chinook created uncertainty as to the gage that Reclamation would use to maintain the 80 cfs flow target.

As described in Chapter 3, during the summer, flows drop below 80 cfs in the reach downstream of NUID's Crooked River pumping plant (see Figure 3.4.2). A few miles below NUID's pumps, groundwater discharges begin to increase the flow of the Crooked River, focusing concern on the reach just below the Crooked River pumping plant and below diversions near the City of Prineville.

Reclamation considered using the gage near Smith Rock State Park, just below NUID's pumps, to manage releases for flow augmentation. If that were the case, it would introduce the

risk that implementing a conserved water project under ORS 537.465[9] would not result in any additional water being protected instream because if NUID were to divert less water, Reclamation would in-turn release less water from Prineville Reservoir to meet the 80 cfs target flow. As interviewee 4 described, the Pelton Water Fund, OWEB, and National Fish and Wildlife Fund weren't certain they could fund the project without a guarantee that the water would be protected instream.

The uncertainty over the gage that Reclamation would use to assure compliance with the language of the Crooked River Act is attributable to the challenges that are encountered at the intersection of state and federal authority over river management. A similar circumstance created delays in the City of Prineville's pursuit of new groundwater rights to meet municipal demands. The disagreements over the interpretation of the Crooked River Act ultimately led ODFW and WaterWatch to protest a State of Oregon water right transfer application submitted on behalf of the Bureau of Reclamation, which sought to modify Reclamation's State of Oregon storage right for Prineville reservoir to address, under state law, the modifications to the authorizing legislation for Prineville Reservoir enacted by the federal Crooked River Act. (OWRD 2017, Interviewee 2, Appendix D). The application was a necessary prerequisite to obtaining groundwater mitigation credits under the State's Deschutes Groundwater Mitigation Program in order to secure additional water supply for the City of Prineville. Appendix D is a matrix from the DRC's program meeting in February 2016, one month after the transfer application was submitted. It summarizes concerns that the transfer application, as submitted, does not faithfully

[9] A conserved water project allows the applicant to improve conveyance or on-farm irrigation efficiency to create new water rights with the priority date of the original water right authorizing the use of water from the original source in exchange for a share of the water being protected instream.

interpret the legislation. While all of the concerns described in Appendix D are ultimately relevant to the outcome of the transfer and, therefore, the City's ability to obtain mitigation, the complaint that the application changes the character of use to "fish and wildlife" as opposed to "downstream fish and wildlife" is most indicative of the distrust that existed amongst stakeholders. Following the protest, the language of the water right transfer was amended to identify "downstream fish and wildlife" use, specifically, in order to assuage concerns from ODFW and WaterWatch that reservoir managers would seek to subvert the language and intent of the Crooked River Act to keep water for "fish and wildlife" in the reservoir, rather than release it for "downstream fish and wildlife."

For their part, irrigation interests believed that the protest action was initiated to subvert the language and intent of the Crooked River Act by enabling year-to-year carryover of fish and wildlife storage, depriving the district of the first fill security it sought in the legislation.

> We thought that the water put instream permanently for the fish was a good thing for the environmentalists. Moving the wild and scenic boundary so that the hydroelectric facility can be put on Bowman Dam—we thought it was a win for everybody. And, the people that gained the most out of that collaboration [the instream interests], are now bending the rest over a barrel trying to get more. It just doesn't work the way it should work…
>
> …On the legislation—seven years of, quote, collaboration, we finally came to an agreement. It went to congress. They signed it. It went to Obama and he signed it. It came back as law. And now we have the same group—group or groups—that are filing the lawsuit in the collaborative Basin Study Work Group, those same people have come over and now they're gaming the legislation. Ok, that is terrible…
>
> …I don't want this to sound negative. But, I would warn anyone that certain organizations are very sophisticated. And when they put fine print in, it's for a particular reason. Be careful. Be careful. (Interviewee 2)

The disagreement over the interpretation of the legislation within the context of modifying State of Oregon water rights clearly indicates distrust amongst stakeholders. But it also indicates that stakeholders may not have understood one another's interests or agreed about the goals of the legislation even as it was signed into law. Furthermore, the delay in the implementation of the legislation has deprived stakeholders of the opportunity to achieve 'small wins.'

> The other thing I would say—and we haven't had a chance to do this in McKay, and it's been one of the problems—is if you can show on the ground progress, demonstrate something so people see, oh that worked—you know like the fish passage projects, probably, is where that happened—oh that worked and everything's still fine, they're still getting their water, the regulatory risk is reduced. That's great. And I think one of the risks of McKay is we talked for so long, and planned for so long and haven't been able to implement a phase of it that, you know, I think we lost credibility to some extent, with the landowners, although I think most of them understand why that's out of our control. But it's good to show progress on the ground. (Interviewee 4)

With so many elements of the Crooked River and McKay Creek flow restoration component of the Deschutes SIP included in the legislation, stakeholders did not have reason to continue to engage in face-to-face dialogue about the restoration effort for more than two years. In short, all of the elements of the process model outlined in Ansell and Gash (2008) were missing at the crucial moment the legislation was to be implemented.

The effects of using legislation to address flow restoration in the Crooked River are perhaps best understood by way of comparison to Whychus Creek. In the Whychus Creek restoration effort, flow restoration revolved around piping of Three Sisters Irrigation District (TSID) canals and converting non-district irrigation from live flow in Whychus Creek to

groundwater.[10] Due to the scale of the TSID piping effort, a phased approach was required. Table 5.3.2.1 (reproduced from Table 3.6.1) shows the frequency with which instream flow targets have been met in Whychus Creek during the irrigation season from 2001 through 2017. The table shows Whychus' Creek's steady improvement from a stream that's nearly completely dewatered during the summer months, to one with significant flows through the end of the irrigation season.

The phased approach utilized in Whychus Creek required ongoing communication amongst stakeholders, affording the opportunity to build trust through face-to-face dialogue and 'small wins.' Weber (2017) describes how the restoration effort met the needs of the irrigation district to develop an alternative source of revenue in the form of in-conduit hydropower, and how leadership emerged in the course of negotiations to move the effort forward. In the Crooked River, the discontinuity caused by negotiation over the legislation, followed by a hiatus while the legislation was approved, deprived stakeholders of the opportunity for ongoing face-to-face dialogue and small wins, even if stakeholders hadn't come to consensus on the goals of the Crooked River effort and what they could achieve collectively (Ansell and Gash 2008).

[10] Due to the availability of groundwater resources in the Lower Crooked River compared to the Whychus Creek subbasin (Gannet et al. 2001), the latter may not have been an option, but the conversion of live flow water users in McKay Creek to stored water from Prineville Reservoir represents an analogous effort.

**Table 5.3.2.1:** Frequency with which mean daily flow of Whychus Creek at Sisters (gage 14076050) meets or exceeds state instream water right (certificate 73223), 2001-2017.

| Year | April | | May | | June | | July | | August | | September | | October | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2001 | 53% | 7% | 7% | 19% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 25% |
| 2002 | 47% | 53% | 0% | 38% | 100% | 100% | 33% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2003 | 67% | 13% | 7% | 31% | 73% | 27% | 13% | 0% | 0% | 0% | 0% | 0% | 0% | 19% |
| 2004 | 7% | 0% | 40% | 81% | 100% | 100% | 53% | 0% | 0% | 31% | 0% | 0% | 0% | 44% |
| 2005 | 33% | 7% | 100% | 100% | 20% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| 2006 | 80% | 53% | 60% | 100% | 100% | 100% | 100% | 100% | 20% | 0% | 0% | 0% | 0% | 19% |
| 2007 | 100% | 27% | 40% | 56% | 80% | 27% | 13% | 6% | 0% | 0% | 0% | 0% | 0% | 88% |
| 2008 | 100% | 7% | 13% | 100% | 100% | 100% | 100% | 100% | 100% | 50% | 0% | 0% | 0% | 94% |
| 2009 | 100% | 53% | 87% | 100% | 100% | 100% | 100% | 31% | 13% | 6% | 13% | 0% | 7% | 94% |
| 2010 | 100% | 80% | 87% | 81% | 100% | 100% | 100% | 100% | 100% | 81% | 20% | 13% | 0% | 63% |
| 2011 | 100% | 100% | 87% | 56% | 87% | 100% | 100% | 100% | 100% | 100% | 100% | 7% | 27% | 38% |
| 2012 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 88% | 73% | 13% | 7% | 69% |
| 2013 | 100% | 100% | 100% | 94% | 100% | 100% | 100% | 81% | 100% | 100% | 100% | 27% | 13% | 0% |
| 2014 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 13% | 0% | 44% |
| 2015 | 100% | 100% | 93% | 100% | 100% | 100% | 100% | 88% | 60% | 31% | 7% | 0% | 0% | 0% |
| 2016 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 87% | 69% | 20% | 0% | 20% | 94% |
| 2017 | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 93% | 88% | 93% | 7% | 0% | 50% |

In the Crooked River, the discontinuity in the collaborative process led to circumstances in which stakeholders did not have adequate capacity to address the rapidly changing problem setting. Although the legislation was intended to limit the frequency with which flows dropped below 80 cfs in any reach of the Crooked River, the flows below the reservoir in the winter of 2015 through 2016 dropped below 40 cfs, resulting in the largest decline in Redband observed over the past 20 years (Porter and Hodgson, 2016).

> …post-legislation [Reclamation was], during the summer months, releasing their normal or their contracted amount of irrigation water and, I guess [they] interpreted the language in the legislation to read that they had an obligation to release an additional 80 cfs of water for fish during those summer months. And in a normal to good water year, that would have been an appropriate thing to do, but that was coming off of the drought year where we had to not have a lot of storage in the reservoir and so the combination of releasing the contracted water for irrigation and the fish water during the summer months basically left very little

> water in the reservoir during the winter months. And so, during the winter of '15 – '16, because there wasn't much water left in the reservoir, releases were down to 35 cfs. And that low flow coupled with some early cold temperatures we had in December that winter, killed off lots of fish. (Interviewee 6)

### *5.4 Summary of Results and Discussion*

The dynamics of the Crooked River case seem to suggest that legislation and collaboration cannot coexist without greater commitment to maintaining the collaborative process throughout the drafting, passage, and implementation of legislation. To the extent that stakeholders believed that legislation was necessary to address all of the elements of the Crooked River effort, and given that the collaborative process lapsed as the legislation awaited its day in Congress, the Crooked River case could be taken as an indication that collaborative processes are not well-suited to systems in which flow management is driven by federal reservoirs.

However, as discussed in Chapter 1, the wicked problem setting of the Crooked River indicates that top-down solutions would be similarly ineffective at addressing the needs of stakeholders in the Crooked River. And interviewees made clear that legislation not only presented an opportunity to ease the difficulty of achieving the interests of stakeholders, but was necessary to address certain elements of the Crooked River effort. Furthermore, some stakeholders are optimistic that the legislation, including the McKay Creek project, will be implemented, flow restoration benefits realized, and that collaboration will provide benefits moving forward.

> Oh, well the Crooked River Act—I feel like it will be resolved because it has to be, I mean—it's just a matter of time and at what cost to people's relationships it gets figured out…
>
> …So I would say, be strategic. Still have a strategy. Work with other partners to create that strategy and develop it. And then build the relationships. And as part of that, sit down with people, listen, be creative. The more you can find common

> ground and keep it out of, quite honestly, the hands of lawyers, lobbyists, and such like that—the more you keep it local and authentic—I think the greater chance of finding creative solutions that work for everybody. (Interviewee 4).

> … you've got to be at the table… you know, I think you've got to be involved in the process. And, I think you have to be willing to listen to each other, and, again, you know, educate others on what you know, and about your process and bringing that with you. But I think, you also have to be willing to listen and to learn. You know, I mean, I've learned things about fisheries that maybe I didn't know before, or timing, or, you know, just different things like that that you just learn along the way. And I think that you realize that people have their passions, you know? I mean, people are passionate about farming. People are passionate about fishing. And people are passionate about recreation. People are passionate about family farms. I mean it's—I think everybody, when I look around the table and I look at people, you know, I don't know that anyone there has all the answers and all that type of thing, so I think it's just being there and trying to work things through. (Interviewee 5)

At the same time, while optimistic about collaboration, stakeholders believe that the consensus-driven orientation of collaboration may cede too much power to stakeholders who prefer the venue of litigation.

> Well, I do say collaboration is the only way to go, but the collaboration—um—model that we're using is broken. There's way too much weight given to way too few of people. (Interviewee 2)

> I would say in the collaborative effort there are more extreme views that, I don't know [if] makes success something that's achievable. You know, trying to keep the district whole, those types of things. I hope that doesn't sound too confrontational, but it is—you know the reality of it is that there are those out there that still think that we're not close to where we need to be. (Interviewee 5)

That multiple stakeholders expressed concern that one or two organizations and/or agencies were the cause of the breakdown in the collaborative effort suggests that even if collaboration is possible in systems with federal reservoirs, the increased exposure to litigation and other adversarial processes that accompanies the federal reservoir broadens the scope of the stakeholders involved. Such organizations may not show interest in systems such as Whychus

Creek, where TSID and small irrigators make up the population of water users and there is no federal reservoir to provide a nexus for litigious, adversarial approaches.

Another potential confounding variable in the Crooked River case, especially as compared to cases like Whychus Creek, is the culture of the Crooked River basin and the perception of NGOs from Bend and Deschutes County as "outsiders" (Interviewee 4). This dynamic was also revealed in the CRWC's discussion of the Opal Springs project, in which there was a perception of inequity between how stakeholders treated water users in the Whychus Creek and Crooked River basins, specifically in regard to the amount of funding provided in exchange for voluntary cooperation. Interviewee 1 discussed the history and socioeconomic conditions of the Crooked River basin as a potential challenge to embracing change in the same way as other basins.

> …On the whole Lower Crooked is, there's a real strong, cultural identity out here, in Crook County. This is a working watershed, it has been forever, ever since European men got here, kind of thing, right? And, there's a lot of pride in that independence and that kind of pioneering spirit that goes back to when Oregon was first settled. A lot of older families in this area can actually trace their roots back several generations to when they came over with the first settlers and that kind of stuff. So—and I'm not saying this is unique to Crook County, because I think there are other places in Oregon that have similar kind of histories, cultural histories, but in Crook County, I mean, agriculture is king, man. There aren't any other economies out here yet. Now, ten, twenty, thirty years from now, if the economy changes and diversifies—I'm just going to use this as an example, but, let's say we become a little bit more like Sisters or Bend, where our economy is largely propped up by visitors, you know, there's a larger proportion of visitor dollars coming in. I think that could relieve some of the constant pressure on the ag resource. Because this is very much a natural resource based economy out here. And it probably will be for a little longer. (Interviewee 1)

Finally, it's important to remember that the Crooked River case, like Whychus Creek and the Deschutes River, is a work in progress—an effort that has been underway for less than twenty years. This research represents a snapshot of the Crooked River effort soon after the

passage of the Crooked River Act and following one of the most extreme drought years in recent memory. In time, the challenges of implementing federal legislation may appear as a hiccup in an otherwise successful effort. Still, with the benefit of stakeholder interviews and an understanding of the dynamics of collaborative processes, the Crooked River case offers insights about how practitioners can approach the use of collaboration and legislation as parallel, interwoven processes, rather than independent pursuits.

## Chapter 6: Conclusion

As in many watersheds in the American West, the changing regulatory landscape for restoration of anadromous fish populations has put pressure on stakeholders in the Lower Crooked River watershed to navigate a path toward water security for irrigation, municipal, and instream interests. Faced with these kinds of wicked problems, fraught with unpredictable interactions and a complex regulatory landscape involving numerous state and federal agencies, stakeholders throughout the West have increasingly chosen to collaborate in hopes of developing more creative, effective, equitable, and expeditious solutions to the problem of anadromous fish restoration (Ansell and Gash, 2008, Schukman, 2001; Weber, 2009; Weber, 2017; Weber, Lach, and Steel, 2017). But in the Crooked River effort, the extent to which the management of the federally-owned Bowman Dam and Prineville Reservoir influences the flow regime of the Lower Crooked River poses an obstacle to the use of collaboration driven by local stakeholders—especially given the reticence of federal agencies to embrace sweeping changes to reservoir management without congressional direction (Amos, 2013). But these circumstances are ubiquitous in river basins of the American West, where the reach of Reclamation and the Corps extends to virtually every canyon and valley with sufficient flow to support large storage projects (and many that aren't) (Reisner, 1993). Understanding the specific dynamics of the Crooked River case is crucial to implementing collaborative water management solutions throughout the American West. What does the Crooked River case have to offer for watersheds struggling to address the same kinds of challenges while avoiding costly adversarial processes?

This research indicates that the choice to use legislation as part of a larger collaborative effort provided benefits that could not have been attained through litigation or unilateral pursuit

of legislation. Fish passage efforts guided by the collaborative model were successful, and stakeholders are confident that streamflow restoration efforts will eventually produce many of the benefits stakeholders anticipated when they agreed to the legislation. Particularly on McKay Creek, where federal storage will be substituted for natural flows to improve conditions for spawning steelhead, the benefits of the legislation have exceeded what can be achieved through adversarial approaches.

But the key elements of collaborative process identified by Ansell and Gash (2008), trust, commitment, intermediate outcomes, face-to-face dialogue, and development of shared understanding and vision, are missing from the collaborative process in the Lower Crooked River. This has resulted in delays and missed opportunities to move the collaborative effort forward to address unresolved challenges, including:

- flow and habitat restoration on McKay Creek and Ochoco Creek,
- riparian restoration of the main stem Crooked River below Prineville,
- best management practices for Prineville Reservoir,
- and development of a dry-year water management plan.

The elements of successful collaborative processes identified by Ansell and Gash (2008) are a necessary prerequisite for stakeholder driven efforts to develop the collaborative capacity to address these challenges (Weber and Khademian, 2008). The results of this research clearly indicate that collaborative capacity in the Crooked River effort is not sufficient to address these challenges at the present time. Furthermore, the results indicate that the absence of an ongoing collaborative process throughought passage and implementation of the Crooked River Act is the primary cause in the lapsed development of collaborative capacity in the Crooked River effort.

Can stakeholders overcome the discontinuity inherent in the legislative process to develop the capacity needed to implement a collaborative vision?

This is the most important lesson that the Crooked River offers for scholars, stakeholders, and pracitioners enaged in efforts restoration efforts in watersheds and river basins where water management is driven by federally-owned reservoirs. Collaborative processes must be maintained even as widely-supported and nominally collaborative legislative "solutions" progress. Particularly for stakeholders involved only in aspects of the restoration effort that are tied to the fate of the legislation, looking beyond the passage of legislation toward implementation is key. Anticipating the work that is to follow the passage of legislation by engaging in smaller efforts (e.g., pilot projects) would provide stakeholders with an ongoing forum to engage in face-to-face dialogue, develop shared understanding and a vision for success, and celebrate small wins within the broader collaborative effort that are occurring apart from the legislation.

Of course, this is easier said than done. In the absence of legislation, who will provide the funding for this ongoing forum? And what if discussion regarding the implementation of legislation reveals differences in interpretation that jeopardize its passage? Most of all, what impetus will stakeholders perceive to continue to engage in the significant effort of collaboration if the terms of participation and potential to produce meaningful outcomes are unclear? There are no easy answers. In the framework of the Ansell and Gash model, the work of maintaining active collaboration in the face of low incentives for participation simply shifts the problem from one of addressing challenges in the collaborative process to one of poor antecedent conditions. In this respect, the results of this research indicate that cases like the Lower Crooked River effort are

likely to remain ‘tough’ cases for practioners. Furthermore, these cases will benefit from additional scholarship to answer the question of how to build and maintain collaborative capacity when collaboration is used as a parallel process to legislation.

**Bibliography:**

Alexander, J. A., Comfort, M. E., & Weiner, B. J. (1998). Governance in Public-Private Community Health Partnerships: A Survey of the Community Care Network SM Demonstration Sites. Nonprofit management and leadership, 8(4), 311-332.

Amos, A. L. (2013). Dam Removal and Hydropower Production in the United States-Ushering in a New Era. *J. Envtl. L. & Litig.*, *29*, 1.

Amy, D. J. (1983). The politics of environmental mediation. *Ecology Law Quarterly*, 1-19.

Ansell, C., & Gash, A. (2008). Collaborative governance in theory and practice. *Journal of public administration research and theory*, *18*(4), 543-571.

Baker, S. E., Edwards, R., & Doidge, M. (2012). How many qualitative interviews is enough?: Expert voices and early career reflections on sampling and cases in qualitative research.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. The qualitative report, 13(4), 544-559.

Bentrup, G. (2001). Evaluation of a collaborative model: a case study analysis of watershed planning in theIntermountain West. Environmental management, 27(5), 739-748.

Burger, J., Gochfeld, M., Powers, C. W., Waishwell, L., Warren, C., & Goldstein, B. D. (2001). Science, policy, stakeholders, and fish consumption advisories: developing a fish fact sheet for the Savannah River. Environmental Management, 27(4), 501-514.

Castle, E. N., & Kimball, N. D. (1963). Secondary benefits and irrigation project planning.

Coglianese, C. (1999). The limits of consensus: the environmental protection system in transition: toward a more desirable future. *Environment: Science and Policy for Sustainable Development*, *41*(3), 28-33.

Crooked River Water Security and Jobs Act. (2014) S. 1771, 113th Cong. (2014) (enacted).

Daniels, S. E., & Walker, G. B. (2001). Working through environmental conflict: The collaborative learning approach.

Darling, D. J. (2013, May 10). State sets fish ladders at Opal Springs as top priority. The Bulletin. Retrieved February 1, 2018, from http://www.bendbulletin.com/exports/newsletters/main/3141728-151/state-sets-fish-ladders-at-opal-springs-as

DeGrace, P. & Stahl, L.G.. (1990). *Wicked problems, righteous solutions*. Yourdon Press.

Doremus, H. (1997). Listing decisions under the Endangered Species Act: why better science isn't always better policy. *Wash. ulq*, *75*, 1029.

Easterly, W. (2007). The ideology of development. *Foreign Policy*, (161), 31.

Echeverria, John D. 2000. "No success like failure: The Platte River collaborative watershed planning process." *Wm. & Mary Envtl. L. & Pol'y Rev.* 25: 559.

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of management review, 14(4), 532-550.

Feiock, R. C. (2007). Rational choice and regional governance. *Journal of Urban Affairs*, *29*(1), 47-63.

Forstall, R. L. (1996). *Population of States and Counties of the United States: 1790 to 1990 from the Twenty-one Decennial Censuses*. National Technical Information Services (NTIS).

Gannet, M. W., Lite, K. E., Morgan, D. S., & Collins, C. A. (2001). Ground-water hydrology of the upper Deschutes Basin, Oregon: US Geological Survey Water-Resources Investigations Report 00-4162, 78 pp. *US Geological Survey, Portlant, OR.*

Head, B. W., & Alford, J. (2015). Wicked problems: Implications for public policy and management. *Administration & Society*, *47*(6), 711-739.

Innes, J. E., & Booher, D. E. (1999). Consensus building and complex adaptive systems: A framework for evaluating collaborative planning. *Journal of the American planning association*, *65*(4), 412-423.

Lackey, R. T. (2017). Science and salmon recovery. *ln: New Strategies*, 69-94.

Larson, K. L., & Lach, D. (2010). Equity in urban water governance through participatory, place-based approaches. *Natural Resources Journal*, 407-430.

Linenberger, T.R. (2001). *The Crooked River Project.* U.S. Bureau of Reclamation.

Loffink, K. 2013. Fish Passage Priority List, Oregon Department of Fish and Wildlife. 22p, Salem, OR.

MacDougal, D. (2017, September 18). Nothing Great Comes Easily: The Successful Struggle to Secure the City of Bend's New Water Supply Project. Retrieved May 9, 2018, from https://www.martenlaw.com/newsletter/20170918-bends-new-water-supply-project

Margerum, R. D. (2002). Collaborative planning: Building consensus and building a distinct model for practice. Journal of planning education and research, 21(3), 237-253.

Matthews, N., & Missingham, B. (2009). Social accountability and community forest management: the failure of collaborative governance in the Wombat Forest. *Development in Practice*, *19*(8), 1052-1063.

McCloskey, M. (1999). Problems with using collaboration to shape environmental public policy. *Val. UL Rev.*, *34*, 423.

Mccool, D. (2018). Integrated Water Resources Management and Collaboration: The Failure of the Klamath River Agreements. *Journal of Policy History*, *30*(1), 83-104.

Merkley, Jeff. (2013). Senators Merkley and Wyden Introduce Crooked River Collaborative Water Security Act of 2013 [Press release]. Retrieved April 1, 2018, from https://www.merkley.senate.gov/news/press-releases/senators-merkley-and-wyden-introduce-crooked-river-collaborative-water-security-act-of-2013

NASS, USDA. (2007). Census of agriculture. *US Department of Agriculture, National Agricultural Statistics Service, Washington, DC*.

Nielsen-Pincus, M. (ed.) (2008). Lower Crooked River Watershed Assessment. Crooked River Watershed Council. Prineville, OR. February, 2008. 227p.

North, P. (2000). Is there space for organisation from below within the UK government's action zones? A test of'collaborative planning'. Urban Studies, 37(8), 1261-1278.

Northwest Power and Conservation Council (NPCC) (2005). Deschutes subbasin plan. *Prepared for the Northwest Power Planning Council*.

Ostrom, E. (2010). Beyond markets and states: polycentric governance of complex economic systems. *American economic review*, *100*(3), 641-672.

Oregon Water Resources Department (2017). Final Order Incorporating Settlement Agreement Approving a Change in Character of Use in the Matter of Transfer Application T-12239, Crook County. Special Order Volume 103, 732-738.

Pahl-Wostl, C., & Hare, M. (2004). Processes of social learning in integrated resources management. Journal of Community & Applied Social Psychology, 14(3), 193-206.

Palmer, J. "Deschutes subbasin plan." *Prepared for the Northwest Power Planning Council* (2004).

Porter, T., & Hodgson, B. (2016). Effects of a modified flow regime on the fish populations of the Crooked River below Bowman Dam. Retrieved May 14, 2018, from https://www.dfw.state.or.us/fish/local_fisheries/deschutes/docs/Crooked_River_Summary_Report_2016_FINAL_REPORT.PDF

Portland General Electric Company and Confederated Tribes of the Warm Springs Reservation of Oregon. 2004. *Settlement Agreement Concerning the Relicensing of the Pelton Round Butte Hydroelectric Project; FERC Project No. 2030;* Appendix D: Fish Passage Plan. 1(a), 158

Proehl, R., & Crain, J. (2010). 2009 Oregon Population Report.

Reilly, T. (2001). Collaboration in action: An uncertain process. *Administration in Social Work*, *25*(1), 53-74.

Reisner, M. (1993). Cadillac desert: The American West and its disappearing water. Penguin.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, *4*(2), 155-169.

Rogoway, M. (2017, January 26). Prineville is running out of electricity, jeopardizing new manufacturing jobs. Retrieved April 18, 2018, from http://www.oregonlive.com/silicon-forest/index.ssf/2017/01/prineville_is_running_out_of_e.html

Sabatier, P. A., Focht, W., Lubell, M., Trachtenberg, Z., Vedlitz, A., & Matlock, M. (2005). *Swimming upstream: Collaborative approaches to watershed management*. MIT press.

Schuckman, M. (2001). Making the hard choices: a collaborative governance model for the biodiversity context. *Wash. ULQ*, *79*, 343.

Schramm, W. (1971). Notes on Case Studies of Instructional Media Projects.

Stuemke, S. E. (n.d.). Three Sisters Irrigation District Main Canal Pipeline and Watson Reservoir Hydroelectric Power Project: Phase I Field Survey and Section 106 Evaluation, Deschutes County, Oregon (pp. 1-9, Rep. No. SES 2009-004).

Tett, L., Crowther, J., & O'Hara, P. (2003). Collaborative partnerships in community education. Journal of Education Policy, 18(1), 37-51.

Vangen, S., & Huxham, C. (2003). Nurturing collaborative relations: Building trust in interorganizational collaboration. The Journal of Applied Behavioral Science, 39(1), 5-31.

Weber, E. P. (1998). *Pluralism by the rules: Conflict and cooperation in environmental regulation*. Georgetown University Press.

Weber, E. P. (2003). *Bringing society back in: Grassroots ecosystem management, accountability, and sustainable communities*. MIT Press.

Weber, E. P. (2009). Explaining institutional change in tough cases of collaboration:"ideas" in the Blackfoot Watershed. *Public administration review*, *69*(2), 314-327.

Weber, E. P. (2017). Integrated Hydro-Irrigation-Restoration Systems: Resolving a Wicked Problem in the Whychus Creek Watershed (Oregon, USA). *Journal of Sustainable Development*, *10*(2), 104.

Weber, E. P., & Khademian, A. M. (2008). Wicked problems, knowledge challenges, and collaborative capacity builders in network settings. *Public administration review*, *68*(2), 334-349.

Weber, E. P., Lach, D., & Steel, B. S. (2017). *New Strategies for Wicked Problems: Science and Solutions in the 21st Century*. Oregon State University Press.

Winch, M. (2006). *Biography of a place : passages through a central Oregon meadow*. Bend, Or. Seattle: Deschutes County Historical Society Distributed by the University of Washington Press.

Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American journal of sociology*, *87*(3), 548-577.

Yin, R. (2003). K.(2003). Case study research: Design and methods. Sage Publications, Inc, 5, 11.

Yakima Basin Integrated Plan. *JAWRA Journal of the American Water Resources Association*, *53*(2), 456-477.

Yoder, J., Adam, J., Brady, M., Cook, J., Katz, S., Johnston, S., ... & Yang, Q. (2017). Benefit-Cost Analysis of Integrated Water Resource Management: Accounting for Interdependence in the Yakima Basin Integrated Plan. JAWRA Journal of the American Water Resources Association, 53(2), 456-477.

# Appendices

# Appendix A: Deschutes SIP Project List

# Deschutes Special Investment Partnership Immediate Priorities

| Name / Location | Lead Organization | Summary | Key Partners | Relevance to Criteria |
|---|---|---|---|---|
| **Whychus Creek & Lake Creek** | | | | |
| ***Habitat Restoration*** | | | | |
| Camp Polk Stream Restoration | UDWC | The project includes 1.7 miles of stream channel restoration at the Camp Polk Meadow Preserve to benefit spawning and rearing for resident and anadromous fish. It includes >200,000 native plants, >30 acres wetlands created, and an increase of 0.5 miles of channel length. | DBLT, DRC, USFS, ODFW, USFWS, Wolftree, TNC, OSU, U of O | The project is 'ready to go', with strong partnerships, excellent match funding and high ecological significance. This is currently the flagship habitat restoration project for the watershed. |
| Rimrock Ranch Stream Restoration | UDWC | The project will focus on 2 miles of stream channel restoration to improve spawning and rearing habitat for resident and anadromous fish. It will include >100,000 native plants, 25 acres wetlands created and 0.25 mile of new channel created. | DBLT, DRC, USFS, BLM, ODFW, USFWS, Wolftree, TNC, OSU | The project is currently in design, with completion expected Spring 2008 and implementation to begin in early 2009. It has strong partnerships, good match funding, and high ecological significance. |
| City of Sisters Stream Restoration | UDWC | The project will restore ~1.0 mile of stream channel to improve spawning and rearing habitat for resident and anadromous fish within the City of Sisters UGB. The project will result in Whychus Creek being restored throughout the urban area, resulting in sigfinficant benefits to steelhead, redband trout, riparian condition and water quality. | City of Sisters, Landowners, ODFW | The project focuses on one of the critical issues in Sisters - i.e., the urban impacts to the stream. A comprehensive restoration design will catalyze many key projects, with strong public involvement, excellent match funding and important ecological benefits. |
| Public Land Riparian (near Sisters) | UDWC | The project includes restoration of at least 6 sites (near TSID diversion, Sokol Property, Rd 1605) along Whychus Creek near Sisters. Restoration involves student-run planting and riparian area protection. | USFS, Wolftree, Oregon Trout | Projects are 'ready to go' with students, teachers, Forest Service and other partners standing by. Each project results in incrementally improved riparian habitat upstream of Sisters. |
| SF Lake Creek Culvert Removal | UDWC | The project focuses on removal of a culvert and obliteration of road to enhance migration and spawning in Lake Creek for chinook, sockeye, bull trout and redband trout. Culvert removal eliminates a significant erosion hazard and creates improved floodplain access for Lake Creek. | DBLT, USFS | The project helps restore an important reach of Lake Creek to benefit resident and anadromous fish. There are excellent partnerships in place and the project represents a 'win-win' for those involved. |
| ***Fish Passage / Screening*** | | | | |
| Private diversions / passage | UDWC | The project involves developing and implementation fish passage solutions for 6 private diversions on Whychus Creek and Lake Creek. | OWRD, DRC, ODFW, NOAA, USFWS, Landowners | There is already excellent match funding, strong partnerships and a real need to address these problems. Screening and passage are critical to making the reintroduction efforts successful. |
| TSID Diversion | UDWC | The project includes comprehensive fish passage, screening and channel restoration for the TSID diversion. This diversion is currently on ODFW's 'Top 10' list of diversions in the state to be retrofitted. Improvements will open more than 15 miles of habitat. | TSID, USFS, ODFW, USFWS, NOAA | The project addresses the largest diversion in the watershed. Match funding is in place, there are strong partnerships and the team is ready to start the project. |
| ***Flow Restoration*** | | | | |
| McKenzie Conservation | DRC | This canal piping project will permanently restore and legally protect 2.4 cfs instream to be held in trust by the State of Oregon. | TSID, OWRD, Landowners | All of the instream flow restoration projects provide critically needed permanent flow restoration. They have strong leverage, excellent partnerships and a track record of success. |
| Whychus Transfers | DRC | The project will permanently acquire and legally protect 64 acres of water rights, resulting in 2 cfs permanently instream to be held in trust by the State of Oregon. | TSID, City of Sisters, Landowners, OWRD | [see comments above] |
| TSID Main Canal | DRC | The project includes piping the main canal to restore 6 cfs permanently instream to be held in trust by the State of Oregon. | TSID, USFS, OWRD, Landowners | [see comments above] |
| ***Land Conservation*** | | | | |
| Whychus Creek Acquisition #1 | DBLT | The project will protect 0.75 miles of priority floodplain and provide an opportunity for comprehensive restoration by the UDWC. | UDWC | The site has high ecological significance/potential and is adjacent to another protected reach. |
| Whychus Creek Acquisition #2 | DBLT | The project will protect 1.75 miles of quality stream habitat (both sides of creek) and outstanding uplands. Public access will be included. | TPL, BLM | This project will protect almost 2 miles of stream (both sides) and provide public access to the creek. There is excellent match funding and strong partnerships. |
| Spring Creek Conservation Easement | DBLT | The project protects critical spring chinook spawning area in Metolius subbasin. | UDWC, ODFW | Studies show lower Lake Creek contains the most productive spring chinook rearing habitat in the Metolius subbasin. This project will protect an undeveloped property with significant stream frontage. |
| Lake Creek Conservation Easement | DBLT | Protects .5 miles of undeveloped stream habitat on Lake Creek, provides for UDWC enhancement | UDWC | This project will protect nearly all the undeveloped acreage on Spring Creek, an important spring chinook stream. |

| Name / Location | Lead Organization | Summary | Key Partners | Relevance to Criteria |
|---|---|---|---|---|
| **Lower Crooked River & McKay Creek** | | | | |
| ***Habitat Restoration*** | | | | |
| Lower Crooked River - City of Prineville Restoration | CRWC | This project will improve habitat on 3 miles of the Lower Crooked River through the City of Prineville Urban Growth Boundary. The project will involve removing or lowering levees, constructing off-channel habitat for fish rearing and flood refugia, bank stabilization to reduce erosion, and riparian afforestation. | Crook County Parks and Recreation District, City of Prineville, Mayberry Development, USFWS | This is a high profile project with strong partnerships, good ecological benefits and excellent leverage. |
| Middle McKay (McKay Creek Bridge to Allen Creek) | CRWC | This project will restore floodplain connectivity and instream habitat structure, and conduct riparian afforestation between the McKay Creek Road Bridge and Allen Creek. The project will provide rearing and spawning habitat for anadromous and resident fish in a reach of permanently restored streamflow. The project will also overlap with a conservation easement being pursued by the Deschutes Basin Land Trust. | Landowners (Santucci, Dill, Seamus, Parga), DRC, USFWS, DBLT | There is strong synergy between this project and others (flow restoration, land conservation). It has high ecological significance and great leverage. |
| Lower Crooked River - Prineville Valley Restoration | CRWC | This project will promote strategic reach level restoration for the approximately 16 mile reach (including Butler Ranch, Alves Ranch, Estridge Ranch, and Tognoli Ranch) between the City of Prineville urban growth boundary and the Lone Pine Bridge. A design must first be completed by the SIP partnership. | 12 private landowners, NRCS, ODFW, USFWS | This is a critical step toward large scale restoration on the Crooked River. Given the scope of the restoration need, this design phase is a wise investment. There are excellent partnerships and good leverage. |
| ***Fish Passage / Screening*** | | | | |
| Opal Springs Passage and Screening | CRWC | The Opal Springs Dam is a 25 foot fish passage barrier at river mile 1 on the Crooked River. The barrier blocks upstream migration to the 132 miles of upstream habitat on the Crooked River. Designs for a fish ladder to provide passage over the dam have already been completed, and studies of the effects on downstream passage have shown downstream passage mortality to be minimal. | Deschutes Valley Water District, USFWS, ODFW, CTWS, BOR, SWCD | The project provides critically important passage into the Crooked River. It is fundamental to successful reintroduction and well supported by local partners. |
| NUID Pump Screening | CRWC | This project will reconfigure NUID's Crooked River Pump Station to minimize entrapment or injury to fish and to allow NUID to return up to 75 cfs in-stream to a critical low water reach. The project will facilitate anadromous migration from the lower canyons of the Crooked River to spawning habitat upstream. | North Unit Irrigation District, Pelton Fund, ODFW | The project provides important protecting for migrating fish low in the Crooked River system. There are excellent partnerships, existing match, and the project is "ready to go". |
| Crooked River Central Irrigation District Passage | CRWC | This project will replace the existing dam with an inflatable Obermeyer weir and a pool and chute fishway. The project will provide permanent up and downstream passage for migrating anadromous and resident fish, opening approximately 43 miles of habitat. | Crooked River Central Irrigation Owners, Pelton Fund, ODFW, BOR, USFWS, PGE | The project protects fish while retaining irrigation capacity - there is strong ecological significance as the project will open passage to McKay Creek, Ochoco Creek, and the Bowman Tailrace of the Crooked River. There is good leverage and excellent partnerships in place. |
| People's Irrigation District Passage | CRWC | This project will construct a natural fishway over the 7 foot concrete dam and install fish screens. The project will provide permanent up and downstream fish passage for migrating anadromous and resident fish, and reduce entrainment in the People's canal. The project will open approximately 7 miles of habitat. | People's Irrigation District Owners, Pelton Fund, NRCS, USFWS, ODFW | The project protects fish while retaining irrigation capacity - the natural fishway design will improve existing rearing habitat while simultaneously providing passage. There is strong ecological significance, good leverage, and excellent partnerships in place. |
| Stearns Dam Removal Project | CRWC | This project will provide passage into the Bowman Tailrace fishery - a fishery renowned for its excellent habitat and productivity. The project make the existing 5 foot structure passable to up and downstream migrating fish, opening approximatley 13 miles of habitat. | Owners, BLM, Pelton Fund, ODFW | The project will play an important part of successful steelhead reintroduction in the lower Crooked River. Match funding is in place, NEPA is close to completion, and the partnership is ready to move forward. |
| McKay Private Diversions & Passage Projects | CRWC | Four diversion structures on McKay Creek are no longer used or will no longer be needed after the DRC completes the McKay Creek Water Rights Switch Project. This project will work with four landowners to either remove the diversions entirely or construct a series of engineered pools to proved passage over the diversion. | Landowners, DRC, USFWS | The projects are an important part of steelhead reintroduction on McKay Creek. They have excellent leverage and strong partnerships. |
| ***Flow Restoration*** | | | | |
| McKay Creek Exchange | DRC | The project will use an innovated exchange of water rights to permanently restore and legally protect up to 7 cfs instream in McKay Creek | Ochoco Irrigation District, Landowners, CRWC, OWRD, NRCS, DBLT | The project addresses flow restoration, one of the most important issues in McKay Creek. It is innovative, ecologically important and well supported. |
| NUID Canal Lining | DRC | This irrigation conservation project will annually restore and legally protect up to 14.5 cfs instream in the Crooked River. | North Unit Irrigation District, Pelton Fund, OWRD | The project will result in a significant instream flow benefit. There are excellent partners, leverage and ecological benefits. |
| ***Land Conservation*** | | | | |
| McKay Creek Conservation Easement #1 | DBLT | This permanent conservation easement will protect 1.5 miles of priority McKay habitat and provide opportunities for habitat restoration by the CRWC. | CRWC, DRC | McKay Creek, the top priority stream for steelhead reintroduction, is threatened by rapid development. This project will reverse the parcelization trend by combining two large properties into one ownership. Strong partnership component. |
| McKay Creek Conservation Easement #2 | DBLT | This permanent conservation easement will protect 1.5 miles of priority McKay habitat and provide opportunities for habitat restoration by the CRWC. | CRWC, DRC | Protects a key reach of McKay Creek from possible destination resort development. Strong potential for restoring instream flow as part of the project. |

# Appendix B: Interview Guide

## Interview Questions for Crooked River Restoration Effort

- What is the role of the org name here in Crooked River Restoration efforts?
- What is your organization's relationship to the other groups working on the Crooked River Restoration effort?
- How well are the Crooked River restoration effort(s) working to date?
    - What are the chief accomplishments?
    - Why is it working well? (Or why is it *not* working well?)
    - What kinds of things still need to be done to get the Crooked River restoration project to its intended goal of restoration?
        - What are the prospects for getting to success here?
        - What are the chief obstacles?
- Getting the Mackay Creek landowners and water users involved in the overall restoration efforts appears to be critical to long-term success given the Creek's role in sustaining Steelhead stocks:
    - What were the primary challenges to getting people on board with restoration?
    - What were the two or three things/ideas most important to resolving the restoration puzzle on Mackay Creek?
- **What we the incentives for you/your organization to participate in the [McKay Creek water rights exchange, Ochoco Irrigation District Expansion, watershed restoration, riparian easement acquisition]**

- Are there downsides or risks (e.g., water reliability issues, presence of listed species) for anyone in the current negotiated agreements on Crooked River and Mackay Creek restoration?
- Now that you have experience working through a collective restoration effort in a western watershed, what are the main pieces of advice you would offer to others facing a similar situation?
    - If they haven't mentioned this already] Are there specific reforms of legislation, regulations, or water law that would help these kinds of restoration efforts?
- Is there anything you think I missed or anything else you think I should know about the Crooked River restoration efforts?

# Appendix C: Interview Coding Guide

| | Element | Code | Description |
|---|---|---|---|
| Background Information | Stakeholder Interests | Environment | Response identifies needs of stakeholders, including incentives to participate in Crooked River restoration effort. |
| | | Agriculture | |
| | | Municipal | |
| | Chief Accomplishments | Fish Passage | Response identifies areas of success in Crooked River restoration effort, responses categorized following Deschutes SIP structure. |
| | | Flow Restoration | |
| | | Habitat Restoration | |
| | | Land Conservation | |
| | Challenges | Fish Passage | Response identifies areas where additional work is needed in the Crooked River restoration effort, responses categorized following Deschutes SIP structure. |
| | | Flow Restoration | |
| | | Habitat Restoration | |
| | | Land Conservation | |
| | McKay Creek | Challenges | Response identifies challenges to getting people on board with McKay Creek restoration effort. |
| | | Ideas | Response identifies things/ideas important to getting people on board with McKay Creek restoration effort. |
| | | | |
| Themes | Trust-building | Trust | Response indiciates trust amongst stakeholders |
| | | Distrust | Response indicates distrust amongst stakeholders |
| | Intermediate Outcomes/Dialogue | Small Win | Response identifies intermediate outcomes achieved during the course of the restoration effort. |
| | | Discontinuity | Response indicates that there was discontinuity that hindered progress toward achieving intermediate outcomes. Also includes discontinuity in face-to-face dialogue. |
| | Forum Inclusivity | External | Response indicates that stakeholders operating outside of forum are creating obstacles to achieving project goals. |
| | Forum Exclusivity | Alternative Venue | Response indicates that stakeholders sought out an alternative venue to achieve one or more project goals. |
| | Commitment to Process | Process | Response indicates recognition of interdependence, openness to mutual gains, and/or that collaboration is preffered approach to achieving restoration goals. |
| | Shared Understanding | Shared understand of problem | Response indicates a shared understanding of the problem. |
| | Collaborative learning | Collaborative learning | Response indicates collaborative learning. |

## Appendix D: Matrix of Crooked River Strategic Issue

**ATTACHMENT 4**

**Table 1. Issues related to the Bureau of Reclamation's application to change the use of storage in Prineville Reservoir.**

| | What is the issue? | Does the issue related directly or indirectly to the DRC's mission? | What are the potential outcomes of this issue? | Who is involved? What other parties have a stake in the issue? |
|---|---|---|---|---|
| **Status of water for McKay Creek Switch** | The Act allocates not more than 2,740 acre-feet of first fill water to supply the lands associated with the McKay Switch (Sec 6.a.2). Stakeholders disagree over whether, prior to the McKay Switch, this water should be stored as first fill water and be unavailable for fish and wildlife releases or whether it will remain part of the second-fill unallocated storage and be available for fish and wildlife releases. | This issue relates directly to the DRC's mission. An additional 2,740 acre-feet instream may improve conditions in the Crooked River. | Reclamation's current application does not change the type of use of the 2,740 acre-feet of McKay water from irrigation to fish and wildlife and irrigation, eliminating the possibility of releasing this water for fish and wildlife prior to the McKay Creek Switch.<br><br>Ochoco Irrigation District has indicated that it prefers not to move forward with the McKay Switch until the issues related to the implementation of the Act, particularly those related to Reclamation's application, have been resolved. The district has expressed a desire for DRC to support its interests related to these issues. | Ochoco Irrigation District relies on water stored in Prineville Reservoir. Releasing the 2,740 acre-feet of McKay water for fish and wildlife may decrease the amount of water carried over and allocate to the district at the beginning of the storage season. |
| **Character of use of unallocated storage** | Implementing the Act requires the Bureau of Reclamation to obtain a primary right to store water in Prineville Reservoir for the uses designated in the Act. The agency has several options for specifying the character of use of storage, and these options provide varying levels of certainty to instream, municipal, and agricultural interests. | This issue relates indirectly to the DRC's mission. It provides more or less certainty to instream users. | Reclamation's application changes the character of use of the remaining unallocated storage (barring the McKay water, see above) to irrigation and fish and wildlife. This change indirectly relates to the DRC's mission. It provides certainty to agricultural and mitigation users and does not provide that certainty to instream users. | WaterWatch has indicated a preference for either full flexibility (all new water is designated for all uses) or full certainty (new water is only designated for the specific outlined in the Act).<br><br>DRC staff have no knowledge of other parties' positions on this language. |
| **Character of use of City of Prineville mitigation water.** | The Act allocates not more than 5,100 acre-feet of water to the City of Prineville for mitigation (Sec. 6a4), and it requires the release 5,100 acre-feet to serve as mitigation annually (Sec. 4.b.1).<br><br>Implementing the Act first requires the Bureau of Reclamation to obtain a primary right to store 5,100 acre-feet of water in Prineville Reservoir for mitigation. The agency could apply for a fish and wildlife, mitigation, or mitigation and fish and wildlife use. These uses may align more or less closely with the Act and may offer different levels of protection instream | This issue relates directly to the DRC's mission. The character of use of this water right may affect its subsequent protectability instream. | Reclamation's current application changes the character of use of 5,100 acre-feet of stored water to fish and wildlife for the City of Prineville. Technically, the character of use of this stored water may need to be mitigation for it to be subsequently used for mitigation.<br><br>Under Reclamation's current application, the portion of the water not needed for mitigation will be released for fish and wildlife. This split does not align with the language in the Act (Sec 4.b.1), and it will likely increase lead to challenges in the state's administrative process. Depending on the level of protection of water released for fish and wildlife, downstream users may be able to divert this water. | Pending a final agreement on accounting for stored water released instream, water released for fish and wildlife rather than mitigation could be available to both contract (such as Ochoco and North Unit Irrigation Districts) and non-contract holders. DRC staff have no knowledge of their position on this language. |
| **Filling order** | The Act requires Reclamation to release 5,100 acre-feet annually to serve as mitigation for the City of Prineville (Sec 4.b.1). Reclamation's application specifies that first-fill accounts will fill proportionally. Following this approach, 5,100 acre-feet will not be available to release from the City of Prineville's account unless the reservoir fills enough to satisfy all of the first-fill accounts. | This issue relates directly to the DRC's mission. Water released for mitigation restores stream flows in the Crooked River. | A shortfall in the 5,100 acre-feet due to the filling order specified in Reclamation's application will limit the amount of water released instream. Preventing this shortfall and aligning with the language in the Act will require filling the City of Prineville's account prior to filling the other contract holder's accounts. This change may decrease filling reliability for the other contract holders as compared to the approach applied for by Reclamation. | WaterWatch has an interest in this issue as it could lead to less than 5,100 acre-feet released from this account if the account does not fill..<br><br>City of Prineville, Ochoco Irrigation District, North Unit Irrigation district, and other first-fill contract holders have an interest in this issue. |
| **Downstream fish and wildlife** | The Act specifies that Reclamation release water from Prineville Reservoir for downstream fish and wildlife. Reclamation's application changes the character of use of unallocated storage to include "fish and wildlife" rather than "downstream fish and wildlife." | This issue relates directly to the DRC's mission. The designation of downstream fish and wildlife as a character provides additional security to instream interests. | As applied for, "fish and wildlife" could refer to fish and wildlife in Prineville Reservoir rather than in the Crooked River. Although this outcome is unlikely, the lack of specificity in the application has created conflict among stakeholders and uncertainty among instream interests. | As a party to the legislation, WaterWatch has an interest in securing water for future instream use.<br><br>Crook County and the City of Prineville have an interest in maintaining recreation in Prineville Reservoir. DRC staff have no knowledge of their position on this language. |

**Table 2. Issues not related to the Bureau of Reclamation's application to change the use of storage in Prineville Reservoir.**

| | What is the issue? | Does the issue related directly or indirectly to the DRC's mission? | What are the potential outcomes of this issue? | Who is involved? What other parties have a stake in the issue? |
|---|---|---|---|---|
| **Protection of fish and wildlife releases** | The Act requires Reclamation to release water to "provide instream flows consistent, to the maximum extent practicable, with the recommendations for in-channel strategies in the plan prepared by the Northwest Power and Conservation Council entitled 'Deschutes Subbasin Plan' and dated March 24, 2005, for flow between Bowman Dam and Lake Billy Chinook" (Sec 7.a.1) Stakeholders disagree over the intent and interpretation of that language. | This issue relates directly to the DRC's mission. Lack of clarity on the protectability and instream reach of fish and wildlife releases has eliminated Oregon Watershed Enhancement Board funding for the West F project and halted progress on the North Unit Water Supply Program. | Currently, Reclamation plans to manage releases and accounting to ensure that sufficient water is present at the reservoir outlet, at the gauge at the Highway 126 bridge, and potentially the gauge at Smith Rock State Park. It does not plan to apply for a water right to protect the released water instream between Bowman Dam and Lake Billy Chinook.<br><br>Not protecting this water instream from Bowman Dam to Lake Billy Chinook will potentially increase the amount of water available for downstream users to divert (as compared to the alternative). Depending on the reach selected, It may limit opportunities to invest in the North Unit Water Supply Program as funders have indicated that they'd prefer not to invest in water that has already been allocated to fish and wildlife.<br><br>Protecting this water instream from Bowman Dam to Lake Billy Chinook would potentially decrease the amount of water available for downstream users to divert and increase certainty of stream flows (as compared to the alternative). | As a party to the legislation, WaterWatch has an interest in securing water for future instream use.<br><br>North Unit Irrigation District has an interest in the amount of water available to pump from the Crooked River.<br><br>Pelton Water Fund, Oregon Watershed Enhancement Board, and National Fish and Wildlife Foundation have stake in this issue as they've invested in stream flow restoration in the Crooked River. |
| **Endangered Species Act Sec. 7 liability** | The Act specifies that shall release uncontracted water to comply with any Endangered Species Act requirements (Sec 7.a.3). It also states that nothing in the Act "alters any responsibilities under Oregon State law or federal law, including section 7 of the Endangered Species Act" (Sec 8.2). Stakeholder disagree over whether the contracted storage would be subject to Endangered Species Act requirements | This issue relates indirectly to the DRC's mission. While the organization's mission focuses on stream flow, its approach focuses on collaborative approaches rather than litigation or regulatory approaches. | Disagreements over this issue foster distrust between stakeholders and limit the DRC's potential for success in the Crooked River. An agreement on this issue will either increase or decrease liability for contract holders in Prineville Reservoir. | WaterWatch has an interest in this issue.<br><br>Ochoco Irrigation District, the City of Prineville, and other contract holders have an interest in this issue. |