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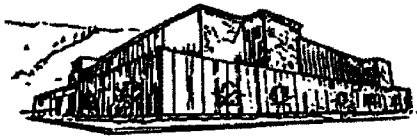
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The Fryingpan Arkansas Project: A Political, Economic and Environmental History

by

Brian D. Petersen

B.A. University of Colorado, Boulder, 1999

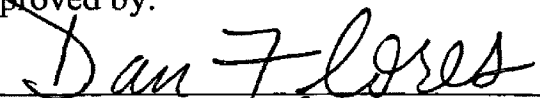
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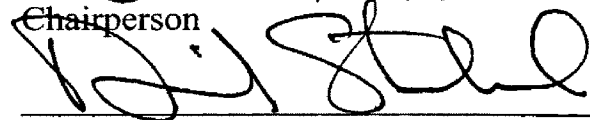
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The Fryingpan-Arkansas Project: A Political, Economic and Environmental History

Chairperson: Dan Flores



The Fryingpan-Arkansas Project (FAP) collects water from Colorado's West Slope and transports it through the Rocky Mountains, via tunnel, to Colorado's East Slope to meet the demands of farmers, industries and cities along the Arkansas River. Transmountain water projects are found predominantly in Colorado. As such, they have not been thoroughly addressed in the water historiography. This study examines the political, economic, and environmental impacts of this unique project.

Politically, the history of the FAP is unique because of the rift that occurred within Colorado itself. Citizens in Colorado's Western Slope feared that the removal of water from their region would negatively impact their economic potential. Other concerns on the national level included the national surplus of agricultural products, concern over who would pay for the project, and the impact it would have on the environment. Congress approved the FAP in response to fears over a long-standing drought, in order to support defense industries located in the Arkansas Valley, and after feuding communities within Colorado overcame a number of differences, including the construction of a large reservoir for Western Slope use.

The costs of the FAP were to be borne by irrigators, municipalities and industries, proportionately. But who has actually paid for the costs of the Project up to this point and who has received the water? It has become clear in the years following the FAP's construction that the project's costs and benefits are unequally distributed. The FAP's operating principles guarantee cities and industries a minimum amount of FAP water. However, up until the last couple of years, agricultural interests along the Arkansas Valley in Eastern Colorado have received most of it. Yet citizens in Colorado Springs and other cities continue to pay the bulk of the FAP's costs. American taxpayers, at large, provide additional subsidies to cover these costs.

Finally, what has become of the rivers, riparian habitat and wildlife impacted by the FAP? I conclude that the project amplifies salinity, temperature and water-flow problems in the Colorado and Arkansas River basins, which, in turn, negatively impact agricultural users, fish and the habitats alongside FAP rivers and facilities.

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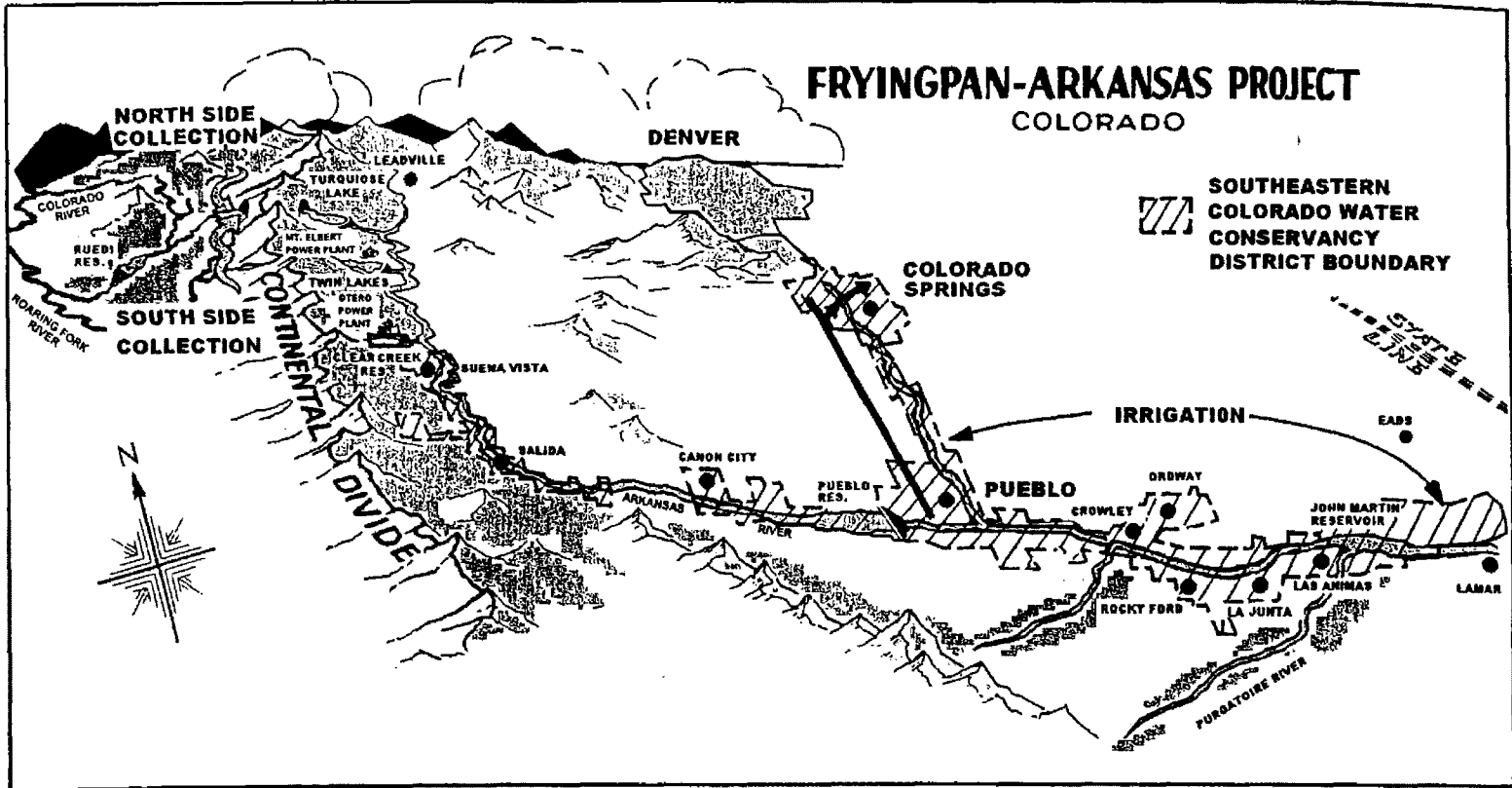
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Introduction

A raindrop falls from the skies above central Colorado and joins a trickle of water running down the west face of Hagerman Pass on the Continental Divide. This trickle meanders around gray, lichen coated boulders and beads over a bed of quartz-speckled granite. It joins other small trickles to form larger rivulets that sink ever lower in elevation before combining with other rivulets large enough to form a stream. Water soon pours into this stream from every direction. The stream becomes a river—the Fryingpan River. But the molecules of that first raindrop do not enjoy the same journey they may have prior to the 1960s, when they would have continued down the Fryingpan River to the Roaring Fork River and, eventually, to the Colorado River in its journey through Utah, Arizona and California. This raindrop will, instead, travel underneath the Continental Divide, and pass through at least five reservoirs and dams and one hydroelectric power-plant as it joins the eastward flowing Arkansas River, which proceeds through Kansas, Oklahoma and Arkansas, before finally giving itself to the Mississippi and the Gulf of Mexico.

Various raindrops from a single storm may travel the combined 27.2 miles of tunnels that catch rainwater and snowmelt from Colorado’s Western Slope and sweep it under the Continental Divide through the 5.4-mile Charles H. Boustead Tunnel to the Eastern Slope. This “transmountain” water diversion is part of the Bureau of Reclamation’s complex Fryingpan-Arkansas Project (FAP). It has the potential to bring over 69,000 acre-feet of water every year to meet the demands of irrigators, industries and cities.¹

¹ The term “transmountain” generally refers to the transfer of water across the Continental Divide. Another term, more commonly used, is “inter-basin,” which refers to long-distance transfers of water, not

The Fryingpan-Arkansas Project's Boustead Tunnel is one of thirty-seven such transmountain diversion structures in Colorado. It is the state's second largest, smaller only than the primary diversion tunnel of the Colorado-Big Thompson Project, an elaborate reclamation project that brings more than 230,000 acre- feet of water to various cities, including Denver, and to irrigators in the northeast section of the state.

Transmountain diversions provide much-needed water to eastern Colorado, which holds more than 90% of the state's population, but receives less than 20% of the state's precipitation.²

I grew up in Colorado Springs, along Colorado's Eastern Slope—or the “Front Range.” It is one of the municipalities that benefits from the Fryingpan-Arkansas Project. Since Colorado Springs borders the farming communities of Eastern Colorado, I often heard about the hardships faced by small farmers in this portion of the state but only vaguely connected it with the flow of water out of the mountains, onto the plains and across farmers' fields.

I also grew up near the headwaters region of the Arkansas River. My family owned a small half-acre of land in a subdivision near these headwaters which we would visit often to sit on lawn chairs, roast hotdogs and dream of someday building a log cabin. I would watch the Arkansas wind down the valley each time we drove to and from that plot of land and I would ache to raft down it or fly-fish in it during the summers. My

necessarily from one side of the Continental Divide to the other. Department of the Interior, Bureau of Reclamation, *Final Environmental Statement: Fryingpan-Arkansas Project, Colorado* (Denver, 1975), ii; Senate Subcommittee on Irrigation and Reclamation, *Hearing Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs on S. 284: A Bill to Authorize the Construction, Operation, and Maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado*, 87th Cong., 2d sess., 1962, 6.

² Ellen Wohl, *Virtual Rivers: Lessons from the Mountain Rivers of the Colorado Front Range* (New Haven: Yale University Press, 2001), 111-3; Daniel Tyler, *The Last Water Hole In the West: The Colorado-Big Thompson Project and the Northern Colorado Water Conservancy District* (Niwot, CO: University Press of Colorado, 1992), 3.

family and I frequently fished in and played in many the state's rivers and reservoirs, among them, Turquoise Reservoir, Twin Lakes and Pueblo Reservoir—all reservoirs created by or changed significantly by the Fryingpan-Arkansas Project. I was connected to this River and this Project in countless ways. However, at the time, I did not understand its importance to millions of Coloradoans; nor did I understand that the Arkansas was a river touched not only by the hands of God and nature but also very significantly by the hands of men and women.

Statement of the Problem

Conflicts over water rights in the American West are as heated today as ever before. A prolonged drought in this region over the last six years has drawn national attention. Proposals for water transfers, dam and reservoir enlargements, and new development projects spring up in the news constantly.

The reservoirs in the Fryingpan-Arkansas Project have a total storage capacity of 748,581 acre-feet. An acre-foot of water is the volume of water that will cover an area of one acre to a depth of one foot. The project has eighteen diversion structures and ten tunnels; it utilizes approximately 38,000 acres of land to house its facilities and to serve project-related purposes. The FAP built four new reservoirs, including Ruedi, Forebay, Clear Creek, and Pueblo; it expanded two others, Twin Lakes and Turquoise. It also includes the Mt. Elbert Pumped Storage Powerplant, located on the north shore of Twin Lakes Reservoir, which is capable of producing 200,000 kilowatts of electrical power.³

The FAP is unique compared to many other development projects in the West because of its transmountain water diversion feature. To Eastern Slope Coloradoans like

³ Bureau of Reclamation, *Final EIS*, ii, II-8.

myself, this type of diversion makes sense—water should be used by those who have a need. We have that need. But transmountain diversions do not come without costs. The approval, construction and operation of the Fryingpan-Arkansas Project created political, economic and environmental consequences that have not been thoroughly examined. In this thesis I will examine these three aspects of the Fryingpan-Arkansas Project. In Chapter One, I examine the political battle over the FAP. In Chapter Two, I discuss the economic costs and benefits of the FAP. Finally, in Chapter Three, I analyze the impact the FAP had and is having on the rivers and habitats surrounding the project's rivers and facilities. As I proceed, I will answer several important questions.

Politically, the FAP exacerbated tensions between needy, fast-developing Eastern Slope residents and the water-blessed, rural Western Slope residents who felt—and still feel—that they are being robbed of their natural resources and economic potential. Disputes between states over water resources are a common feature in the history of numerous reclamation projects, but the FAP is unique because of this intra-state rift. Why was the Fryingpan-Arkansas Project so controversial within Colorado? More broadly speaking, what kind of opposition did the Project attract from Americans nationwide? Finally, what is the broader historical context in which the debate occurred?

Economically speaking, the FAP cost an enormous amount of money, and its costs were to be borne by irrigators, municipalities and industries, proportionately. But who has actually paid for the costs of the Project up to this point and who has received the water? Has the average American taxpayer—as historians Donald Worster and Marc Reisner assert has been the case in similar projects across the West—been suckered into paying for this large and expensive project that subsidizes large agribusinesses and leaves

them holding few, if any, benefits? Which interests benefited from the FAP and which ones suffered?

Finally, altered by such an incredible web of collection stations, tunnels, dams, reservoirs, and pumps, what has become of the rivers whose waters have been augmented or diminished? What about the habitats around the rivers, reservoirs and tunnels? How have fish and wildlife been impacted? What is the potential harm or benefit in the coming years to the environment as a result of the FAP?

In Chapter One, I argue that many of the known costs and benefits of the FAP were understood and accepted by a majority of Coloradoans by the time of authorization. The nation, at large, remained skeptical about the project, and the debate brought to public attention many of the costs associated with reclamation in the West, including agricultural surpluses, vague and complicated repayment contracts, and environmental consequences. In examining the debate, it is possible to see the emergence of the modern environmental movement and its struggle to move away from its focus on preserving National Parks and towards a focus on general environmental concerns. Congress debated the FAP for nine years—1953-1962—and it was only through adept political maneuvering and compromises that Congressmen J. Edgar Chenoweth and Wayne Aspinall finally obtained approval for the project. As for the East/West Slope water allocation debate, although the two sides compromised over the authorization of the FAP, they remained and continue to remain bitterly divided over the future of transmountain diversions in the state.

Chapter Two is an economic analysis of the costs and benefits of the Fryingpan-Arkansas Project. At the time of passage, the FAP was touted as a different kind of

reclamation project. Cities and industries were guaranteed at least fifty-one percent of the water made available by FAP facilities. Agricultural users could use the remainder of the water to mitigate crop losses during dry years. Repayment would be borne proportionately by the entities using the water and federal subsidies would remain minimal. The Fryingpan-Arkansas Project's actual costs, repayment, and distribution of benefits, however, did not match up with the project planners' expectations. Up until the last couple of years, agricultural users received the majority of the benefits of the FAP, while subsidies borne by Colorado residents and the U.S. population at large paid for the construction and maintenance of the Project's facilities. Furthermore, the amount of water delivered by FAP facilities has been disappointing, and so has the electricity that the FAP's hydroelectric features were supposed to provide.

Finally, in Chapter Three, I argue that the FAP has had negative consequences—both anticipated and unanticipated—to the environment. The FAP has exacerbated salinity problems in the Colorado and Arkansas River basins, to the detriment of farmers, fish and other aquatic organisms, and the wildlife and habitats surrounding FAP rivers and facilities. The FAP has also dramatically changed water flows and water temperatures, to the detriment of these same entities. Improved management of FAP facilities and river flows since 1990 have alleviated some of these environment concerns. However, on the whole, the FAP has proven to be substantially destructive on its surrounding environment.

My aim in this thesis is not to develop a broader interpretation of water development in the West. Rather, my goal is to analyze the importance of the Fryingpan-Arkansas Project and to measure its costs and benefits to the citizens of Colorado and the

United States as a whole. Droughts have plagued the West in the last couple of years, while populations in the region have increased dramatically. By understanding the costs and benefits of this and other past projects, we will be better prepared to determine the potential for similar projects in the future.

Review of the Literature

From the very beginning, two books have shaped the direction of this thesis: Donald Worster's *Rivers of Empire: Water Aridity, and the Growth of the American West* and Donald Pisani's *To Reclaim A Divided West*. As the project proceeded, a number of other texts stood out as particularly relevant to the analysis of the Fryingpan-Arkansas Project. They include: Marc Reisner's *Cadillac Desert*, Daniel Tyler's *The Last Water Hole In the West: The Colorado-Big Thompson Project and the Northern Colorado Water Conservancy District*, Charles Howe and K. William Easter's *Interbasin Transfers of Water: Economic Issues and Impacts*, and Ellen Wohl's *Virtual Rivers: Lessons from the Mountain Rivers of the Colorado Front Range*.

Donald Worster argues that irrigation and water development in the West undermined American democracy. In *Rivers of Empire*, published in 1985, Worster builds on the work of German scholar Karl Wittfogel, who maintained that, historically, large-scale irrigation societies always became hierarchical and autocratic. During the initial stages of irrigation development, managerial elites emerged, who recognized the potential wealth of irrigation and monopolized the society's technical knowledge. These

elites created “corvées,” or “hydraulic armies,” to build and maintain their irrigation systems.⁴

The American West, Worster continues, emerged as a new kind of hydraulic society, and he divides its development into three stages: incipience, florescence and empire. The incipient stage consisted of individual and local irrigation efforts during the initial settlement stages of the West. The passage of the 1902 National Reclamation Act marked the beginning of “fluorescence,” when the federal government monopolized capital and engineering expertise necessary for major irrigation projects. Corporate entities during this period became the prime benefactors of government-subsidized water and grew wealthy even as class-structures grew more stratified. Finally, after 1940, the American West—and more specifically, California, one of the great agricultural centers of the world thanks to irrigation—became the seat of an American empire. The U.S. Government and private wealth created a powerful alliance, determined in its quest for complete domination of the nation’s rivers, and utilizing migrant agricultural wage-laborers as its corvée.⁵

Donald Pisani, in *To Reclaim a Divided West*, refutes Worster’s concept of a Western “empire.” He maintains that the federal government adopted a fragmented water policy that reacted specifically to each distinct regional economy, culture, institutional network and environment in the United States. The failure of the Reclamation Act of 1902—a uniform national policy designed to encompass and reconcile competing regional and state interests—proved the extent to which those interests were, themselves,

⁴ Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985) 6-7, 14-5, 20, 23, 27, 38, 41.

⁵ *Ibid.*, 51-2, 64, 171, 193, 217 284.

inherently fragmented.⁶ Pisani's stance on the degree to which water development impacted individual democracy is more difficult to distinguish. Although each community wrangled with others for government resources, the federal government did its best to accommodate each one individually. If water projects undermined liberty and democratic ideals, the government did not act toward that end purposefully.

Donald Pisani continues his examination of water policy with *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935*. Many historians, he argues—no doubt addressing Worster—incorrectly view federal reclamation as a feature of modern America: “It makes more sense to see the Reclamation Act of 1902 and the events that followed as evidence of the persistence of ‘frontier America’ and traditional nineteenth-century values.” It reflected the nineteenth-century laissez-faire ideal of individual autonomy rather than the modern “ethic of a rationalized, planned economy.” Pisani maintains that water interests in this era continued to be “fragmented” as interest groups, politicians and the Interior Department fought for control of the Reclamation Bureau's direction.⁷

My own interpretation of the Fryingpan-Arkansas Project leans heavily towards Pisani's interpretation of water development in the West. Coloradoans understood many of the costs and benefits of the FAP, and believed that the benefits outweighed the costs. The Bureau of Reclamation appears to be a party willing to play along with whatever project Coloradoans would give them. It appears as a pawn, fragmented in its policies,

⁶ Donald J. Pisani, *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New Mexico Press, 1992), xiii-xvii.

⁷ Donald J. Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002), xi-xvii.

and torn between communities, interest groups, politicians and the Department of the Interior. It is not, as Worster suggests, an agency of empire.⁸

Mark Reisner's 1986 book, *Cadillac Desert*, on the other hand, leans toward Donald Worster's interpretation. Reclamation in the American West, he argues, benefited a handful—more often agribusinesses than not—while millions of taxpayers continue to pay the bill. Dams and water projects throughout the West wreaked havoc on the environment and local cultures. The Bureau of Reclamation and Army Corps of Engineers rarely justified the expense of projects in light of their dismal returns, and often these two agencies created projects just to compete with each other, or simply to justify their continued existence and keep their engineers busy. Power and money play a dominant role in Reisner's interpretation of Western water development and, he warns, past excesses threaten the prosperity of the region in the future.⁹ Reisner's account is both comprehensive and terrifically engaging. It proved invaluable in providing a broader picture of water development in the West and a detailed analysis of how reclamation projects in the West were funded.

Also influential to this thesis was Daniel Tyler's *The Last Water Hole In the West: The Colorado-Big Thompson Project and the Northern Colorado Water Conservancy District*. In this book, Tyler examines the political history behind Colorado's largest transmountain water project, the Colorado-Big Thompson Project. He explores the pressures placed on the Northern Colorado Conservancy District—the entity responsible for repayment and management of the Project—by federal legislation, water developers and environmentalists, and discusses the changes that resulted. The water

⁸ Tyler, *Last Water Hole*, 1-5.

⁹ Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water, Revised and Updated* (New York: Penguin Books, 1993).

community's often "unreasonable and stubborn" adherence to the doctrine of prior appropriation, he argues, clashed with environmentalists' "tendencies to neglect the social and economic value of water storage and the importance of private property right to those possessing legitimate water decrees." Compromise and negotiation resulted in slow but gradual progress. However, transmountain water diversions, he continues, threaten West Slope development opportunities, raise environmental concerns—particularly with regard to river salinity—and create political and legal difficulties with lower basin states and Mexico. These conclusions proved invaluable in helping me shape my own conclusions on the Fryingpan-Arkansas Project.

Charles Howe and K. William Easter, in *Interbasin Transfers of Water: Economic Issues and Impacts*, published in 1971, account for many of the costs left out of cost-benefit ratios during the early years of funding reclamation projects in the West. Their work, since being published, has been referenced in nearly every analysis of reclamation, and it proved no less valuable in my economic analysis of the FAP.

Finally, Ellen Wohl's *Virtual Rivers: Lessons from the Mountain Rivers of the Colorado Front Range*, proved an excellent study of the environmental impact of dams and other human-induced changes on several Colorado rivers. While it did not directly analyze the impact of the FAP on the Arkansas and Colorado Rivers, it proved a valuable model by which to proceed with my own discussion.

A Note on the Primary Sources

In addition to these secondary sources, numerous primary sources proved valuable for this thesis. I used the papers of J. Edgar Chenoweth and Wayne Aspinall

extensively, especially when considering Congress's approval of the FAP in Chapter One. Stories from the *Colorado Springs Gazette*, *Pueblo Chieftain*, *Denver Post*, and other Colorado newspapers provided much in the way of background information and insight into Coloradoans' support or opposition to the FAP. I interviewed numerous officials from Colorado Springs Utilities, the Southeastern Colorado Water Conservancy District, the U.S. Geological Survey and the Bureau of Reclamation. Their knowledge and openness added considerable depth to this thesis. DuVoid Burris's interviews with J. Edgar Chenoweth and numerous other influential supporters of the FAP, recorded in *Fourteen Statements: History of the Fryingpan-Arkansas Project and Southeastern Colorado Water Conservancy District*, also proved its usefulness on numerous occasions. Finally, I read countless government documents during my research, including the Bureau of Reclamation's *Final Environmental Impact Statement*, and reports on everything from archeological investigations to the FAP's impact on fish in the Colorado and Arkansas river basins.

The Fryingpan-Arkansas Project has left quite an impression on Colorado's community since the early 1950s. During my research I have discussed the project with Coloradoans in archives, libraries, university hallways, coffee shops and countless other locations. During these discussions I was always struck by the fact that everybody regarded the FAP as an important issue of our present, and not just an interesting feature of our past. That the FAP continues to be a relevant and salient issue in our present has bolstered my belief that this study is an important one. Recent proposals to expand FAP facilities provide further proof that the issue is not dead, but very much alive.

Chapter One

The Politics of Passage

Congressman J. Edgar Chenowith of Colorado fought ten long years for the Fryingpan-Arkansas Project before seeing it approved by the House of Representatives in 1962. Chenowith first introduced the FAP in 1953, in a form very different from the one Congress finally approved. The project's proponents included cities, developers, industries and, of course, agricultural interests. States in the lower Colorado River basin such as California and Arizona criticized the project during this entire period, but the greatest opposition came from within Colorado itself. West Slope residents—those residing west of the Continental Divide—viewed the transmountain diversion as a threat to their resources and to their potential for growth and economic expansion. Enough opposition parties worked out their differences by 1962 to allow the passage of the FAP, but a handful of minority parties continued in their efforts to undermine passage of the bill until the very end.

Chenowith introduced the Fryingpan Arkansas Project at a time when Congress, interest groups, and average Americans increasingly questioned the practical uses and costs of reclamation projects. It was during these years that the leaders of the modern day environmental movement began to speak out on reclamation issues with increasing frequency and tenacity. The Sierra Club, the Isaac Walton League, and the Wilderness Society, as well as numerous other outdoor enthusiasts, voiced their opinions with increasing urgency in such resource development debates as this one. However, Cold War concerns also plagued the minds of the country's leaders, and Congressmen worried about meeting the needs of thirsty steel and energy industries. Also, a severe drought

desiccated the West in the mid-1950s, reminding everyone of the horrible conditions of the Dustbowl and convincing Congressmen and Coloradoans that every last drop of water should be developed no matter what the cost.

It is within this context that the political battle over the Fryingpan-Arkansas Project occurred. By battle, I mean the struggle between local interests and between national interests. The citizens of Colorado helped shape the FAP from the very beginning. Eastern farmers lobbied to obtain supplemental water for their crops, while municipalities agonized over meeting the needs of their booming populations. Meanwhile, the residents of towns like Aspen fought to retain control over their local resources and citizens of Grand Junction and Glenwood Springs wondered why they should have to pay for projects that used “their” water but benefited parties hundreds of miles away. The FAP impacted local communities and the environment considerably—as subsequent chapters will show—enough to restrict or prohibit the passage of similar projects in the future.

Background: The Reclamation Act of 1902

In 1911 William E. Smythe wrote:

To proceed in the making of your farm, in the development of a great region, in the formation of institutions, by knowledge rather than by chance, is a profoundly religious thing. Irrigation, for example, is a religious right. Such a prayer for rain is intelligent, scientific, worthy of man’s divinity. And it is answered. To put knowledge in place of superstition is the first step which men take in entering into partnership with God.

For Smythe, one of the most outspoken devotees to the cause of federally managed reclamation, the Reclamation Act of 1902 was “the most shining guidepost thus far erected by the genius of our statesmanship.” But Smythe believed that reclamation meant

more than just the fulfillment of the nation's religious obligation. He believed that irrigation would give average Americans the land and autonomy God intended. A dyed in the wool Progressive reformer, Smythe was convinced that the Reclamation Act as a tool for social development and means for promoting democratic values.¹

The Reclamation Act of 1902 states that funds from the sale of lands in Western states are to be placed in a "reclamation fund" to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands." The Act limited the size of reclaimed plots to 160-acres, allowed owners ten years to repay construction costs, and required that owners be a "bona fide resident on such land."²

Certainly many Americans shared in Smythe's idealistic vision. But others had more practical concerns. Donald Pisani argues that the Reclamation Act was a response to a number of historical factors: the depressions of 1893, American nationalism, fear of the influence of millions of new immigrants of "questionable" character, questions over the legitimacy and benefits of imperialism (after the Spanish-American War), rapid population growth and urbanization, anxiety over the future of the rural United States, the increasing power of industry and labor, fear of monopoly, the growing strength of the Western states in Congress, the desire of railroads to sell accumulated lands, and the rise of two influential politicians: Francis G. Newlands and Theodore Roosevelt.³

The Reclamation Act arose as a response to the failures of private companies and individual states to achieve their irrigation goals. However, Pisani notes that the Act had

¹ William Smythe, *The Conquest of Arid America* (New York: The MacMillan Company, 1911), xii,xxi, 43, 330.

² Public Law 161, 57th Cong., 1st sess. (17 June, 1902).

³ Donald J. Pisani, *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New Mexico Press, 1992), 273, 291, 298.

many problems of its own and calls it “one of the most anomalous laws ever passed by Congress.” It

...promised to unify the West, but it also reflected many political and economic divisions within the region. It held out the hope of centralizing control over land and water, but it perpetuated nineteenth century concepts of limited government. It embodied twentieth-century ideals of rational planning, efficiency, and government by experts, but it also constituted a bundle of compromises that inevitably undermined those ideals.⁴

Concerns that plagued the passage of the Act from the beginning included its constitutionality, the potential for reclamation expenditures to greatly exceed budgets, the diverse nature and inadequacy of state water laws, the potential for interstate conflicts and agricultural surpluses of certain staple crops. But lobbyists, including Smythe, Newlands and Roosevelt, persuaded Congressmen to overlook these concerns. Congressmen also overlooked the disasters of previous land-grant policies, according to Pisani. The federal government intervened repeatedly in the past to bail out failed farmers. The Reclamation Act in its turn gave no clear instructions on how the government should deal with defaulting irrigators. Nor did it provide for any kind of uniform policy throughout the West. Most Westerners, Pisani observes, “saw it mainly as a benefits program, a way to stimulate local economic development.” Each state grabbed whatever it could as often as it could. The wording of the 1902 Act “institutionalized” fragmentation across the West, and denied the federal government the ability to regulate reclamation. Some local communities benefited from the projects created by the Act, but continuous friction between federal and local interests destroyed the Progressive Era’s drive toward rational planning and efficiency in the arena of water

⁴ Pisani, *To Reclaim*, 273.

development.⁵

Donald Worster is much more critical about the outcome of the Reclamation Act. He argues that the passage of the 1902 Act created three unanticipated consequences: “Those who would reap the benefits were a much smaller number than anyone had supposed; they had to be organized into tight hierarchical and corporate entities which violated traditional rural culture; and the bureaucracy administering the program had to become adept at social as well as environmental engineering.” The Reclamation Service—or, Reclamation Bureau, after 1907—quickly monopolized engineering expertise, creating “a position of technical hegemony in western water development.” This pattern of technical monopolization fit the pattern created by so many previous irrigation societies and the result would be the same: the undermining of democratic values, the proliferation of social injustice, a widening between rich and poor, and the destruction of the environment. After WWII the Bureau partnered more aggressively with wealthy elites out West to exploit nearly every river in the West for their own financial gain.⁶

But Pisani criticizes Donald Worster’s interpretation as a simplified and presentistic “morality play.” Pulling no punches, Pisani writes:

With few exceptions, [Worster’s] “players” are one-dimensional: fools, innocents, and victims pitted against self-serving technocrats, politicians, and predatory capitalists. Occasionally a hero, such as Powell, struts across the stage, but believable men—let alone good ones—are hard to find. However satisfying this view is to many modern readers who are disenchanted with American society, it ignores the context of reclamation: local political and economic conditions, the legal structure, the depression of 1893, the Populist movement, and many other forces that impeded planning and coordinated action.⁷

⁵ Ibid., 317, 322-5, 333-6.

⁶ Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985), 11, 14, 64, 170-1.

⁷ Pisani, *To Reclaim*, 332.

Although Pisani and Worster may disagree about the inevitable results of the Reclamation Act, both agree it failed to achieve the results its original planners intended.

Between 1902 and 1962, when the Fryingpan-Arkansas Project finally passed through Congress, the Reclamation Act underwent numerous changes. The 1902 Act required irrigators who benefited from reclamation projects to repay their share of facility costs within ten years of their completion. Congress extended these payment obligations in 1914, 1926 and again in 1939. Under the Reclamation Project Act of 1939 irrigators had 50 years to pay their share of reclamation costs. In 1924 the Fact Finders Act authorized the Bureau of Reclamation to base repayment obligations on ability to pay—a concept it turned to time and time again during and after the 1930s. Lawrence MacDonnell, a professor from the Natural Resources Law Center at the University of Colorado School of Law writes:

Conceived initially as a means of facilitating the supply of irrigation water, the purposes of the reclamation program have been greatly expanded over the years. The federal interest in receiving reimbursement for the cost of these facilities has been outweighed by the politically stronger interest in subsidizing the settlement and development of the West.⁸

The Reclamation Act changed in other important ways. Most significantly, reclamation projects became multipurpose facilities. In addition to providing irrigation benefits, they might provide hydroelectric, fish and wildlife, navigation and flood control benefits, and supply municipalities and industries with needed water. The 1928 Boulder Canyon Project Act became the first multipurpose Bureau of Reclamation project and the 1939 Reclamation Project Act directed the Secretary of the Interior to consider the

⁸ Lawrence MacDonnell, Richard W. Wahl, and Bruce C. Driver, "Facilitating Voluntary Transfers of Bureau of Reclamation-Supplied Water, Volume I" (Boulder, CO: Natural Resources Law Center, 1991), 9, 11.

multipurpose potential of all new projects.⁹

History of Water Law and Development in Colorado

Colorado's documented water history dates back to the years prior to its acquisition by the United States in the Treaty of Guadalupe Hidalgo in 1848. Hispanic farmers had long irrigated their lands in Southwestern Colorado at the headwaters of the Rio Grande before this Treaty. But the Colorado Gold Rush of the 1850s exerted new pressures on water resources. Fighting occurred among miners and among farmers, as well as between the two groups. Irrigators built the first two registered ditches along the Arkansas Valley in 1860. In 1861 farmers built the Arkansas Valley Ditch, a cooperative effort downstream from Pueblo that transported Arkansas River water eleven miles and helped to irrigate 4,000 acres. By 1884 irrigators had built 191 ditches in this valley. Importantly, a full 93 percent of all irrigated lands lay on the East Slope; only seven percent lay on the West Slope. Already by 1890, however, the Arkansas River was over-appropriated.¹⁰

Water hungry Coloradoans quickly realized that the riparian system of water rights adhered to throughout the rest of the nation would not adequately meet their needs. Under the riparian system, the owner of a property bordering or surrounding a body of water maintains certain rights, including, the right to flow, access, fish, prevent erosion, and the right to reasonable use as long as other users remain uninjured. Such a property owner generally retains these rights whether they use them or not. Under such a system,

⁹ Ibid., 9; also see the 1946 Fish and Wildlife Coordination Act.

¹⁰ E.S. Nettleton, *Report of the State Engineer to the Governor of Colorado, 1883-1884* (Denver, CO: Collier and Cleaveland Lith. Co., 1885), 19; Donald Barnard Cole, "Transmountain Water Diversions in Colorado," *The Colorado Magazine* 25, no. 2, (March 1948): 54, 58, 61; Ralph Taylor, "Arkansas Valley Water Problems 100 years Old," *Pueblo Star-Journal and Sunday Chieftain*, 2 January 1955.

upstream mining and agriculture interests adjacent to rivers claimed water rights early in the territory's settlement. Because water is scarcer in the West than in the East where this system prevailed, these interests restricted further settlement downstream of these areas.¹¹

Coloradoans, instead, adopted the doctrine of prior appropriation—also known as the “Colorado Doctrine.” Under this system, senior users maintain priority rights to water over junior users—first in time, first in right. In the event of a water shortage, the senior rights holder receives his full allowance of water before the junior holder can squeeze out a single drop. Water users under this doctrine do not own the water, but the right to use that water. These rights can be bought, sold, and taxed as real property. To establish a right, users must make an attempt to physically divert and/or use the water, and this water must be put to “beneficial use.” An action such as staking a head gate or surveying a diversion ditch marks the date of appropriation. In the 1876 Colorado Constitution, the state officially endorsed this doctrine. The Constitution states:

The right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied. Priority of appropriation shall give the better right as between those using the water for the same purpose; but when the waters of any natural stream are not sufficient for the service of all those desiring the use of the same, those using the water for domestic purposes shall have the preference over those claiming for any other purpose, and those using the water for agricultural purposes shall have preference over those using the same for manufacturing purposes.

Furthermore:

The water of every natural stream, not heretofore appropriated, within the state of Colorado, is hereby declared to be the property of the public, and the same is dedicated to the use of the people of the state, subject to appropriation as

¹¹ Joseph L. Sax, *Water Law: Cases and Commentary*, Preliminary Ed. (Boulder, CO: Pruett Press, Inc., 1965), 7-9; Herbert C. Young, *Understanding Water Rights and Conflicts*, 2d. ed. (Denver: Burg Young Publishing, LLC, 2003), 71-3.

hereinafter provided.

Under this phrasing, the state may authorize the transport of water anywhere in Colorado as long as it is economically feasible and does not interfere with the rights held by senior users.¹²

In 1882 the Colorado Supreme Court affirmed the legal precedent for inter-basin—including transmountain—water diversions and storage projects in *Coffin v. Left Hand Ditch Company* when it ruled that neither riparian nor watershed location mattered under the prior appropriation doctrine. Then, the 1922 Colorado River Compact apportioned the water in the Colorado River equally to the upper and lower basin states. Each state increased water development efforts in order to secure appropriation rights. Support grew for transmountain water diversions in Colorado that would bring needed water eastward where the majority of the state’s population lived.

Small transmountain water diversions sprang up intermittently between 1890 and 1930 along the South Platte, Arkansas, Gunnison and Rio Grande Rivers. The primary purpose of such diversions was to provide East Slope residents with West Slope water. In the 1930s, Colorado constructed three larger transmountain diversions, including the Twin Lakes, Moffat and Jones Pass Tunnels, which transported a total of 66,000 acre-feet. Then, in 1940 the first phase of construction began on the Colorado-Big Thompson Project. Currently, thirty-seven transmountain diversions exist in Colorado.¹³

The Fryingpan-Arkansas Project is built upon this foundation of Colorado water law and precedent. It is also a classic example of a Bureau of Reclamation multipurpose

¹²Colo Const, Art XVI, § 5-6; See *Bountiful City v. Deluca* and *Hammond v. Rose* for legal precedents to the prior appropriation doctrine; Dale A. Oesterle, and Richard B. Collins, *The Colorado State Constitution: A Reference Guide* (London: Greenwood Press, 2002), 338-42; Young, *Understanding*, 71-3.
¹³ M.C. Hinderlider, *Thirty-first Biennial Report of the State Engineer to the Governor of Colorado, 1941-2* (Denver: Bradford-Robinson Printing Co., 1943), 18-20; Cole, “Transmountain,”: 54, 58, 61.

project. Features include storage reservoirs for irrigation, municipal and industrial use, hydroelectric facilities, and flood control, recreation and fish and wildlife facilities. Opponents of the project often called it the “Rube Goldberg of the Rockies.”¹⁴

The Battle Over the Fryingpan-Arkansas Project

The Fryingpan-Arkansas Project was initially only one component of the more ambitious Gunnison-Arkansas Project. The Gunnison-Arkansas Project (GAP), actively pursued by East Slope water developers and Arkansas Valley farmers during the 1930s and 1940s, would have diverted 800,000 acre-feet of water from the Gunnison River and the Colorado River Basin to the Arkansas River Basin on the East Slope each year. Anxious Arkansas Valley farmers suffering through the drought-ridden 1930s believed that the GAP would guarantee consistent irrigation flows and allow them to expand their enterprises. Meanwhile, the populations of Front Range cities such as Pueblo and Colorado Springs exploded, as did the number of water-reliant industries in the area like Colorado Fuel and Iron (CF&I), one of the nation’s largest steel producers. All of these parties shared the concern that any shortage of water would limit their growth, so they supported the GAP wholeheartedly.¹⁵

But 800,000 acre-feet was, and remains, a substantial amount of water. As lower-basin appropriators and parties to the compact, Californians were horrified by the idea of losing that much of water; in fact they opposed nearly every project to come out of Upper Colorado Basin states for fear of losing a single drop of water. Although Colorado was

¹⁴ “Two Californians Boost Pan-Ark,” *The Denver Post*, 13 June, 1962.

¹⁵ James Earl Sherow, *Watering the Valley: Development Along the High Plains Arkansas River, 1870-1950* (Lawrence, KS: University Press of Kansas, 1990), 37, 49, 53, 59; Stephen C. Sturgeon, *The Politics of Western Water: The Congressional Career of Wayne Aspinall* (Tucson, AZ: The University of Arizona Press, 2002), 54-5.

granted its share of Colorado River water under the Colorado River Compact and the Upper Colorado River Compact, whatever water the state failed to use continued on to California where city planners and irrigators were more than happy to use it.

Congressman Chenowith remembers: “There was no possibility of authorizing a project which called for a diversion of that much water and I think that was recognized by even the most ardent supporters of the transmountain diversion proposal.” Even after Colorado officially pulled its support for Gunnison-Arkansas Project to pursue the more modest Fryingpan-Arkansas Project as an independent project, California Representatives balked that Colorado still had the Gunnison-Arkansas Project on its mind, and was trying to implement it, piecemeal.¹⁶ Coloradoans worked hard to assure lower Colorado Basin states that the FAP was, indeed, an independent project that removed significantly less water, and eventually they succeeded. The final 1962 bill includes the clause:

[Any] modifications or additions as may be required in connection therewith shall not, however, extend to or contemplate the so-called Gunnison-Arkansas Project; and nothing in this Act shall constitute a commitment, real or implied, to exportations of water from the Colorado River system in Colorado beyond those required for projects heretofore or herein authorized.¹⁷

The Fryingpan-Arkansas Project would remove an estimated 69,000 acre-feet of water from the Fryingpan and Roaring Fork River systems annually, compared to the colossal 800,000 acre-feet anticipated by the Gunnison-Arkansas Project. The bill

¹⁶ Harold Christy, interview by DuVoid Burris, 27 December 1972, in *Fourteen Statements: History of the Fryingpan-Arkansas Project and Southeastern Colorado Water Conservancy District* (Pueblo, CO: Southeastern Colorado Water Conservancy District, 1975), 50-1; J. Edgar Chenowith interview by DuVoid Burris, 9 May 1973, in *Fourteen Statements: History of the Fryingpan-Arkansas Project and Southeastern Colorado Water Conservancy District* (Pueblo, CO: Southeastern Colorado Water Conservancy District, 1975), 19; Sturgeon, *Politics*, 55.

¹⁷ Senate Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, *A Bill to Authorize the Construction, Operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado: Hearings on S. 964*, 83d Cong., 1st sess., 15-6 June 1953, 39; Senate Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, *A Bill to Authorize the Construction, Operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado: Hearings on S. 284*, 87th Cong., 2d sess., 28 June 1962, 1-2, 71.

authorizing the project specified that no more than 120,000 acre-feet could be removed from the system each year and no more than about 2.3 million acre-feet in any period of thirty-four consecutive years. Furthermore, FAP lobbyists countered that the project, unlike the original GAP, would provide only supplemental water to farmers with existing water rights, and would open no new lands for cultivation, a clause that must have irritated some agricultural interests who had hoped to increase the size of their irrigated holdings.¹⁸ Chenoweth later admitted that he considered the small size of the diversion one of the project's weaknesses. "But," he continued, "we had to take what we could get."¹⁹

Opponents of the FAP had other concerns. One such concern was the persistence of nationwide agricultural surpluses. Why, some Congressmen asked, should the nation finance a project that would bring additional agricultural goods into an already flooded market? Opponents brought up the issue often in the newspapers and in Congressional debates. But proponents of the project argued it was a non-issue. Surplus feed grains were the primary surplus crop nationwide, but Arkansas Valley farmers primarily produced sugar beets, vegetable crops and grains and grasses for cattle and livestock feed—none of which were surplus crops. Furthermore, unlike the Gunnison-Arkansas Project, the Fryingpan-Arkansas Project opened no new lands for cultivation. It provided surplus water to irrigators with already existing rights.²⁰ Other issues that arose during the nine years of Congressional debate included the cost of the project, its impact on fish and wildlife, and fears of land speculation and monopoly. Many congressmen from

¹⁸ Colorado, *Operating Principles: Fryingpan Arkansas Project* (1958), 3.

¹⁹ Chenoweth, interview, 17-8.

²⁰ "Why Congress Should Vote the Pan-Ark" *The Denver Post*, 2 July 1962; Department of the Interior, Bureau of Reclamation, *Economic Changes In the Arkansas Valley In Colorado During the 1950s* (Denver, 1961), 7.

states across the nation shared these concerns.

However, the greatest opposition to the FAP came from residents living in western Colorado. Frank Milenski, an Arkansas Valley farmer, member of the Colorado State Water Conservation Board, and member of the Southeastern Colorado Water Conservancy District's board of directors for thirty-one years concluded:

While the federal government was funding major reservoir projects for the lower basin states of the Colorado River, little funding came through to help Colorado develop reservoirs for western slope water. As a result, canal companies and cities on the eastern slope have tried to get western slope water in any way they could, and in the process have thoroughly alienated residents on that side of the state.... I really think they would rather see the water run down the Colorado River and into California than see it being used in eastern Colorado.

As mentioned earlier, Colorado's prior-appropriation water-rights system permits interbasin water transfers on the condition that the water is put to beneficial use and does not remove water already allocated to senior-rights holders. Back in the 1930s Western Slope residents rebelled against the huge removal of water proposed under the Colorado-Big Thompson Project. To alleviate their concerns, planners built a "compensatory reservoir" on the West Slope to serve the region's interests and guarantee minimum river-flows throughout the year. In 1943 the State strengthened the precedent for this type of compensation by amending the original Water Conservancy District Act. Subsequent transmountain diversion projects would have to be designed, constructed and operated so that Western Slope uses of the watershed were not impaired-- the construction of compensatory storage reservoirs became implied.²¹

²¹ Frank Milenski, *Water: The Answer to a Desert's Prayer*, ed. Beatrice Spade (Boone, CO: Trails Publishing Co., 1990), 27; See *Coffin v. Left Hand Ditch Co.* (1882); Daniel Tyler, *The Last Water Hole In the West: The Colorado-Big Thompson Project and the Northern Colorado Water Conservancy District* (Niwot, CO: University Press of Colorado, 1992), 3; J. Gordon Milliken, "Water Management Issues in the Denver, Colorado, Urban Area," in *Water and Arid Lands of the Western United States*, ed. Mohamed T. El-Ashry and Diana C. Gibbons (Cambridge: Cambridge University Press, 1988), 342; James Lochhead, *Transmountain Diversions in Colorado* (Boulder, CO: Natural Resources Law Center, 1987) 5-7.

In 1953, designers of the Fryingpan-Arkansas Project proposed a compensatory reservoir on the Roaring Fork River just above the town of Aspen, in Pitkin County, Colorado. The reservoir would be a small one, with the capacity to hold 28,000 acre-feet of water, but the FAP's designers argued that this amount guaranteed adequate water flows downriver. West Slope water brokers and residents disagreed. Many could not see what benefit such a small compensatory reservoir could provide for their cities and industries. Furthermore, Pitkin County residents became livid about the prospect of having a reservoir of any size constructed in their midst.

Western Slope residents had other concerns about the project. In 1953, the first year Chenoweth introduced the FAP in Congress, a coalition from Pitkin County that included residents, officials, commissioners, business leaders members of other prominent organizations wrote a scathing critique of the FAP. Its author, L. D. Chalfant, condemned the cost estimates of the project, writing that they were "understated." The construction of the FAP would require huge subsidies to be paid by Americans living inside and outside the region. Chalfant argued that huge subsidies would be forced on the taxpayers. Chalfant also deduced that the price of water would be held artificially low for irrigators, amounting to even greater publicly-financed subsidies. The FAP, he continued, would undermine Bureau of Reclamation laws designed withhold aid to farms greater than 160 acres: "We would like to draw to the attention of the committee that 921 farms are listed in the 322,000 acres to be irrigated. This works out at 350 acres per farm. Some large land owners will reap the exorbitant profits at the public's expense." He warned that wildlife and fish on the Roaring Fork River would be endangered, cautioned that the removal of Western Slope water would threaten industrial and natural

resource development in the area, and surmised that the government's estimated contribution to the FAP for "flood control" on the Arkansas was excessive: "in a project with a relatively high benefit cost ratio... flood control is bearing more than its proper share of the cost of the project." In conclusion,

The Roaring Fork, the Frying Pan River and their tributaries are not the property of the citizens of Pitkin County nor should they be despoiled for the benefit of a small group in the Arkansas Valley. They are irreplaceable and should be held for the benefit and pleasure of all the people of the nation.... Among those opposed to the project we have firstly all the people of the United States who will be deprived of one of their most beautiful recreation areas; secondly, the taxpayers who will have to foot the bill; and thirdly, the citizens of the Western Slope, who will suffer loss of income and in value of property.... This scheme is for sectional and bureaucratic advancement (Political Pork). It is unsound economically, ill-advised, exorbitant in cost with complete disregard for the taxpayers.²²

The concerns voiced by Pitkin County residents remained by far the loudest in the opposition. However, many other West Slope cities and counties voiced their disapproval. In 1957 the Western Slope County Commissioner's Association officially opposed the bill. This organization included members from twenty-four western Colorado counties, or over one-third of all of Colorado's counties. Among the most pressing concerns voiced by other West Slope interests was the region's potential to develop oil shale, uranium and coal. Development of these resources could not proceed in the future without easy access to substantial amounts of water.²³ Water attorneys from the West Slope cities of Granby and Glenwood Springs lobbied for the addition of an amendment in the 1957 version of the bill authorizing the FAP that would limit transmountain diversions in the state to just 20 % of the annual Upper Colorado basin run-off for a period of twenty-five years. This would, one attorney stated "allow the

²² L.D. Chalfant, "Frying Pan-Arkansas Project-Colorado: Rebuttal Testimony Against the Project," (Aspen, CO: unknown publisher, 1953), Denver Public Library Archives, 2-7.

²³ "Shale Prospects Spur Diversion Opposition" *The Denver Post*, 28 June 1957.

West Slope to catch up with eastern Colorado in the development of water resources to which we're entitled." East Slope advocates of the FAP considered their amendment an attempt to kill the bill.²⁴ Regardless, the bill failed in the House again that year.

One Glenwood Springs group organized in the early 1950s called themselves the "Angrilantes." They remained vehemently opposed the bill from inception to passage.

An April, 1955 newsletter is worth quoting at length. It read:

Taxpayers angry at FOOL DAMS by DAM FOOLS increasing our seven million dollars worth of rotting surplus food now warehoused at a tax cost to us of \$700,000 per day....

We Angrilantes... have blown our stacks. We are mad at the Mad-Hatter promoters, financiers, and starry-eyed reclamationists who want more dams, adding to our mountains of purple-dyed potatoes, our 661 million bushels of mildewing wheat, our over 375 thousand tons of rancid butter, our hundreds of thousands of moldy, stale, spoiled cereals, eggs, and the whole smelly inventory of a colossal, bankrupt, gangrenous grocery store....

Power? But steam is cheaper, good for miners, doesn't rape national monuments, ruin rivers, drown valleys; it is a quicker, better stopgap till the early and inevitable advent of atomic power. And steam can be made invulnerable to atomic attack. Water power is wide open; when bombed becomes a radiation weapon against downstream populations.

You taxpayers in all the 48 states—not just the West—are paying for this unholy mess; so if you're sore at being made a sucker by these double-dam-dealing water fakers, join our posse, load up your pen and send a sizzling postal to your Representative and both Senators, warning them to keep hands off the Frying Pan, the Roaring Fork, Echo Park, etc. "NO MORE DAMS TILL OUR MILDEWED MOUNTAIN OF FOOD SHRINKS TO A MOLEHILL...."²⁵

Such an attack shows both the reasons for West Slope opposition and the emotion behind such opposition.

More common are letters like those from Gordon Graham, from Rifle, Colorado, who wrote on behalf of a local "farmer's union meeting." The union voted unanimously against the FAP, and Mr. Graham pledged to his representative in the House, Wayne

²⁴ "Moratorium Plan Called Bid to Kill Project" *The Denver Post*, 27 June 1957.

²⁵ Angrilantes Newsletter, April 18 April 1955, J. Edgar Chenowith Papers, 75:21, University of Colorado Library (hereafter cited as Chenowith Papers).

Aspinall: “We will be watching your efforts... to fight till Hell freezes over for the water rights for the Western Slope.”²⁶

Oppositional voices were fewer on the Eastern Slope but still present. The psychological impact of the Cold War and the fanatical fear of socialism and communism in the 1950s spilled over into the discussion over reclamation. A Denver civil engineer wrote: “[This project] is simply another step in the Socialism that is creeping over the Nation. I look upon this ‘Creeping Socialism’ as a scourg [sic] that is like a cancer.” One rancher south of Buena Vista, near Twin Lakes Reservoir, who stood to benefit from the project wrote Congressman Chenowith in 1951: “I have no desire to benefit personally at the cost of shoving our country further into socialism. It won’t take many more of these expensive projects... to put honest business [sic] under such a tax burden that government will control all business.”²⁷

Others voiced concerns about the tax burden the project would place on East Slope residents. Gilbert E. Gregg, a business owner from Buena Vista fought the FAP on the grounds that his town would be included in the newly created Southeastern Colorado Water Conservancy District—the organization responsible for repayment of the FAP’s facilities—thus increasing property taxes. Buena Vista, he argued, would receive no benefit from the FAP. Even more disconcerting, Mr. Gregg claimed in a letter to Wayne Aspinall: “Yesterday I was threatened quite severely, not in a physical sense, but in a business way, and given to understand that unless I withdrew my objections to the proposal that a group of men, who conceivably could actually hurt me financially would

²⁶ Letter from Gordon Graham to Wayne Aspinall, 1 March 1957, Wayne N. Aspinall Papers, 20:2, University of Denver Archives (hereafter cited as Aspinall Papers).

²⁷ Letter from O.M. Stevens to Edgar Chenowith and Damian Ducy, 26 July 1951, Chenowith Papers, 74:11; Letter from Parker D. Shepperd to Edgar Chenowith, 16 March 1952, Chenowith Papers, 74:10.

proceed to do everything in their power to accomplish just that.”²⁸

Perhaps more importantly, if not as dramatically, in 1955 the Crowley County Farmers Association, based out of an Eastern Colorado county along the Arkansas, wrote the following letter to John P. Saylor, Congressman from Pennsylvania, and staunch opponent of the FAP:

Our committee are all shareholders in the Twin Lakes Reservoir and Canal Company. We feel that there isn't enough water available to warrant the expenditure of any great sum of money on this type project. Our Company has more water rights and storage capacity at present than can possibly be obtained under the Fryingpan deal. Our entire rights, including storage reservoir, tunnels, etc., can be purchased at a price not to exceed \$30,000,000. We do not believe that there will be enough water available to operate the hydroelectric power proposed on a ten year average. Our irrigation system has run a little over 90,000 acre feet of water. We are confident that the small amount of water that could be obtained and put in the storage reservoir after seepage and evaporation, then divided out to the town and irrigation ditches as proposed, would be scarcely noticeable as far as the farmers are concerned; and further we feel that for the Government and the people of Southeastern Colorado embark upon such a colossal project would not only be the height of stupidity, but could prove to be the ruination of the farmers of the Arkansas Valley.

Furthermore, the letter continued,

We feel that the Fryingpan Project, as talked of, is many times too large for the amount of water that could possibly be had. We also feel that many banks and Life Insurance companies would refuse to make loans on farm properties if our farms were bonded to the extent that it would be necessary to cover the farmers' part of the project.

It is a definite fact that the town and a few farmer stooges are making all of the big noise about the Fryingpan; and further impossible for the people opposing the Fryingpan proposition to get the newspapers to print any information against the proposed project.²⁹

Indeed, the sentiments of the association do not appear in newspaper accounts or Congressional testimony. The influential publisher of the *Pueblo Star-Journal and Pueblo Chieftain*, Frank S. Hoag, Jr., became critical to the lobbying effort in favor of the

²⁸ Letter from Gilbert E. Gregg to Wayne Aspinall, 9 March 1957, Aspinall Papers, 20:2.

²⁹ Letter from The Crowley County Farmers Association to John P. Saylor, 18 July 1955, Chenoweth Papers, 76:12.

FAP for more than ten years. Was Hoag guilty of stifling opposition voices in his newspaper? The answer is not so clear. In his own letter to Congressman Chenowith in 1956, he writes that the Crowley County Farmers group vocalized opposition to the FAP because members thought they could sell their Arkansas Valley water rights for a high price if they made it appear as if the project did not have a chance. He goes on to say:

I am reliably informed that the Crowley County Farmers group... tried to hold two or three meetings earlier in December and that they had so few in attendance they couldn't get any where.... Sollee's position unquestionably is to try to blackmail other water users in the Arkansas Valley, particularly Pueblo, into buying the Twin Lakes water and bailing them out of their dilemma.³⁰

And, indeed, days later, the President of the Twin Lakes Reservoir and Canal Company wrote to Chenowith that the Association did not represent the feelings of the majority of stockholders on the passage of the FAP. "As you know," the President concluded in his letter, "our company has always cooperated in every way possible to obtain favorable consideration of your Bill."³¹

Concerns about the environmental impacts of Western reclamation projects also grew steadily during the 1950s. Opposition by Pitkin County residents over such impacts has been previously noted. The Isaak Walton League of America—with its tagline "Defender of soil, woods, waters and wildlife"—voiced concerns over the FAP in 1953, and members voted in that year to oppose the project. The League's primary concern was the preservation of recreational opportunities. A representative from the League, J.W. Penfold, wrote in a 1954 letter to the House Interior and Insular Affairs Committee:

It would seem...that if the federal government has responsibilities in water development projects—which change the face of the landscape, the regimen of great rivers, the biology and ecological relationships of fish, animal and plant life,

³⁰ Letter from Frank S. Hoag, Jr. to J. Edgar Chenowith, 5 January 1956, Chenowith Papers, 76:12.

³¹ Letter from Herbert Schroeder to J. Edgar Chenowith, 7 January 1956, Chenowith Papers, 76:12.

and it does assume responsibilities for agricultural economics, crop surpluses and community welfare—it can hardly avoid responsibility for the recreational “crops” it proposes to alter, diminish or destroy.

However, Penfold added

I should like to say personally that I have considerable confidence in the federal officials immediately concerned with this project, that they have the desire and willingness to work these things out cooperatively so as to accomplish the maximum in salvaging recreation values.³²

The League eventually endorsed the FAP, satisfied that the project’s designers adequately addressed their concerns about recreation and wildlife.

Historian Stephen C. Sturgeon, in his biography of Wayne Aspinall, notes that other national conservation leaders seemed “more puzzled than provoked” by the FAP. Indeed, letters among members of the Sierra Club indicate a hesitancy to take a position on issues that go beyond “national park and wilderness values.” In a 1953 letter to the Sierra Club Conservation Committee, Richard Leonard, the Committee’s president concluded:

In cases of serious doubt about the true value of a project, where the area is so distant from the personal knowledge of the leadership of the Sierra Club and does not appear to involve at this stage substantial harm to national park and wilderness values, it might be best for the Sierra Club to decline to take part in the controversy.... Opposition on the part of the Sierra Club might be interpreted as ‘habitual’ or chronic opposition of a California group to any use of Colorado River water unless the national status of the club is stressed.

Clearly, Sierra Club members saw the potential for involving the club in a wide range of national environmental issues, but hesitated to do so during this point in history.³³

Members of the Wilderness Society, on the other hand, did not hesitate to voice

³² Letter from J.W. Penfold to Congressman William H. Harrison, 2 April 1954, Aspinall Papers, 49.

³³ Letter from Richard Leonard to the Sierra Club Conservation Committee, 28 September 1953, Fryngpan-Arkansas Transmountain Diversion Project: Envelope of Newspaper Clippings and Open Letters, Water Resources Archive, CA (hereafter cited as Envelope of Clippings and Letters, WRA).

their opposition to the project from the beginning. Bernard Frank, a member of the Council of the Wilderness Society, wrote to Sierra Club leaders:

I believe the time to express interest is now, while the project—and the long-range program of which it is unquestionably a part—is still in the blueprint stage. The fact that present procedures for appraising the pros and cons of large-scale projects are not considered entirely satisfactory, and that thought is now being given to more satisfactory review procedures makes public expressions such as that contemplated by the Sierra Club all the more necessary.... As many of us so well realize, too often the approval of projects on the basis of unrealistic estimates of costs and benefits has resulted in damage to areas which—to groups like us at least—constitute highly important, irreplaceable resources..... The fact that the position of the Sierra Club in opposition to such a project will be supported by that of other groups having national importance should reduce the likelihood of charges that the basis for its opposition lies in the desire of the people of California to ‘monopolize’ flow of the Colorado River.³⁴

But such letters, in the end, did not sway senior members of the Sierra Club. David Brower stayed the Sierra Club’s initial opposition to the project in order to focus the Club’s efforts on thwarting construction of the Echo Park Dam—a controversial project that would have flooded Dinosaur National Monument. Brower feared that the group might undermine its influence on national and regional matters if it appeared to oppose every proposed reclamation project. Mark Harvey, in his study of the Echo Park controversy, *A Symbol of Wilderness*, argues:

With the threat to the park system considered to be the critical issue, it becomes clear why conservation leaders accepted much of what the Bureau of Reclamation sought to undertake along the upper Colorado River. With a few exceptions... they did not challenge the desirability of large dams or hydropower plants, and certainly did not hold the Bureau in the same dark light as a later generation of environmentalists often did. They pressed the Bureau to leave the park system alone and they agreed to support dams and power plants outside of Dinosaur in exchange.

Indeed, the Club’s hesitancy to take an official stand on nationwide resource

³⁴ Letter from Bernard Frank to Richard Leonard, 22 September 1953, Envelope of Clippings and Letters, WRA; see also, letter from Howard Zahniser to Richard Leonard, 25 September 1953, Envelope of Clippings and Letters, WRA (Howard Zahniser was the Executive Secretary of the Wilderness Society at the time and an Honorary Vice-President of the Sierra Club).

development issues would not last very long.³⁵

The previous discussion is indicative of the debate that played out among environmental groups in the 1950s. During the 1960s and 1970s these groups would insert themselves more frequently and more passionately in a wide variety of conservation issues, including reclamation projects. General public concern over conservation also intensified during these decades. Congress reacted by passing such legislation as the National Environmental Protection Act (1969), the Clean Water Act (1972) and the Endangered Species Act (1973). These Acts and similar legislation enabled newly established government agencies like the Environmental Protection Agency to scrutinize the environmental impacts of reclamation projects. Passing large-scale reclamation projects became nearly impossible thereafter.

During the FAP debate, however, environmental concerns remained in this nascent state. West Slope interests concerned themselves more with economic compensation than environmental compensation, and by 1958 disparate interests came to some agreement over one of the most contentious issues plaguing the project: compensatory storage. Parties on the East and West Slopes settled this dispute by agreeing to build the compensatory reservoir along the Fryingpan River further north of Pitkin county. Aspen residents who claimed “not-in-my-backyard” breathed a sigh of relief. Ruedi Reservoir, as the new compensatory reservoir would be called, also had a 100,000 acre-foot capacity—nearly four times the size of the previously proposed Aspen Reservoir. A reservoir this size could easily compensate for the 69,000 acre-feet diverted to the Eastern Slope. An additional 30,000 acre-feet of “bonus water” would be available

³⁵ Sturgeon, *Politics*, 58; Mark W.T. Harvey, *A Symbol of Wilderness: Echo Park and the American Conservation Movement* (Albuquerque: University of New Mexico Press, 1994), 56.

each year to Western Slope interests for whatever means they saw fit. This compromise was critical for the passage of the FAP in Congress. It satisfied the opposition within Colorado enough that lobbyists for the Project now claimed to have statewide support. Out-of-state opponents who claimed that Colorado itself remained divided about the FAP were thus denied this critical piece of ammunition.³⁶

Other non-agricultural interests also played an increased role in shaping the project in the late-1950s. Colorado rewrote the FAP's Operating Principles in 1958, guaranteeing municipal and industrial interests at least fifty-one percent of the project's water. The project's reservoirs, supporters also stressed, provided recreational and tourism benefits to the entire state.³⁷

The FAP's chances also increased in 1958 when Colorado approved the creation of a new taxing district, the Southeastern Colorado Water Conservancy District. Its function was to oversee the development and administration of the project and it served as the taxing entity for repayment of the reimbursable costs of the project.³⁸

Arguably the project's greatest boost in the late 1950s came when Congressman Wayne Aspinall signed onto it. Aspinall firmly believed in the value and merit of reclamation projects, however, the bulk of his constituency lay in the West Slope. He fought hard throughout his career for projects that would benefit this region. Aspinall flip-flopped in his support for the FAP during the 1950s, at times giving it his unvoiced consent, and at other times condemning it as a scheme to steal West Slope water.

³⁶ Senate Subcommittee, 1962, 12; Sturgeon, *Politics*, 61.

³⁷ Colorado, *Operating Principles*, 5.

³⁸ Charles Thomson, interviewed by DuVoid Burris, 4 November 1974, in *Fourteen Statements: History of the Fryingpan-Arkansas Project and Southeastern Colorado Water Conservancy District* (Pueblo, CO: Southeastern Colorado Water Conservancy District, 1975), 155; Colorado, *Operating Principles*, 5; Southeastern Colorado Water Conservancy District, "History and Description of the Fryingpan-Arkansas Project," n.d., <<http://www.secwcd.org/History%20and%20Description.htm>> (7 April, 2004).

Publicly he often warned that the project would remove excessive amounts of water from the Colorado River and he criticized the nearly \$200 million required for the project. His stand on the issue, or lack thereof at times, infuriated the project's supporters. Aspinall's main objection to the FAP, however, was that it might prevent passage of the Colorado River Storage Project, an enormous project that would provide the West Slope with five reclamation projects and three major hydroelectric dams. Aspinall feared that Congress might be reluctant to give Colorado more than one reclamation project during this period. He would not support the FAP at the cost of this important regional project.³⁹

During the late 1950s Aspinall rose through the ranks of his party in Congress to become the chair of the House Interior and Insular Affairs Committee, an important position for deciding reclamation matters. In 1956 Congress finally passed the Colorado River Storage Project. Furthermore, in 1958 East and West Slope interests agreed on Ruedi Reservoir. Aspinall finally felt satisfied that the project protected Western Colorado interests and fully endorsed it; thereafter he called it a "rescue project" for the Arkansas Valley. His position as head of Interior and Insular Affairs committee gave him remarkable bargaining power over other Congressmen who opposed the FAP but feared losing his support for projects in their own states. Even California Representatives gave their reluctant support to the Project.⁴⁰

Much time and effort has been spent so far in this chapter in explaining the opposition to the FAP. But, the fact remains that from 1953 onward, the majority of Coloradoans supported the FAP. The Southwestern Colorado Water Conservation District, the Colorado River Water Conservation District and the Colorado Water

³⁹ Sturgeon, *Politics*, 52, 59-60.

⁴⁰ *Ibid.*, 57-8, 61, 67; "Two Californians Boost Pan-Ark" *The Denver Post*, 13 June 1962; "Unity Within State Greatest Cause of Hope for Fryingpan" *The Pueblo Chieftain*, 10 September 1962.

Conservation Board—all bodies whose primary interests lay in the Colorado River basin—supported the project in 1953 and thereafter. However, they made explicit their reluctance to see any further transmountain diversions constructed between the two Slopes.⁴¹ In 1957, Richard Kitchen, chairman of the Committee for Oil Shale Development—another group invested in the development of the West Slope—urged Congressman Wayne Aspinall not to oppose the FAP, stating that FAP opponents distorted the views of his organization and that, in fact, the Committee had taken no position for or against the project.⁴²

Letters poured into Aspinall's office from organizations, companies and individuals across Colorado. Among the organizations that endorsed the FAP: Democratic State Headquarters; the Salida, Buena Vista and Denver Chambers of Commerce; San Luis Valley Water Conservation District, National Farmers Union, Communication Workers of America, Chaffee County Cattle and Horse Growers Association, Crowley County Beet Growers Association, American Federation of Grain Millers, National Sugar Manufacturing Company, Leadville Buena Vista Lyons Clubs, Colorado Fuel and Iron, Colorado Rural Electric Association, National Rivers and Harbors Congress, National Lamb Feeders Association, the *Denver Post* and the *Pueblo Chieftain*.⁴³

Other supporters included the United Steel Workers of America, the Colorado State Industrial Union Council, Chafee County Farmers Union, Pueblo Board of Realtors, Salida Flying and Civic Club, Southeast Colorado Power Association, La Junta Chamber of Commerce, San Isabel Electric Association, Upper Arkansas Soil Conservation

⁴¹ "Three State Agencies OK Fryingpan" *The Denver Post*, 27 June 1957.

⁴² Letter from Richard S. Kitchen to Wayne Aspinall, 3 June 1957, Aspinall Papers, 20:2.

⁴³ Memorandum, "List of Supporters, n.d., Wayne Aspinall Papers, Box 49.

District, Colorado State Union Council, Pueblo United Labor League, Pueblo Building Trades Council (AFL), Pueblo Trades and Labor Assembly, Pueblo Area Credit Union Chapter, League of Business and Professional Women, Upper Colorado Water Commission, National Wool Growers Association, Colorado Farm Bureau, National Farmers' Union. The Holbrook Lake Sportsmen's Club, based in the eastern Colorado town of Swink, threw their support behind the project in early 1953. And, as mentioned earlier, the Isaak Walton League supported it by 1962. The FAP also had the unanimous endorsement of the Colorado legislature.⁴⁴

The list of supporters continues, but, perhaps, the most important conclusion to make of all of this official public support is that it shows the extent to which Coloradans debated the issue and took a stand on it. The FAP, it may be reasonably argued, passed because it provided for many Colorado interests. Such a conclusion concurs with Donald Pisani's arguments on the "fragmented" nature of water development in the West.

Two other important trends benefitted the FAP's supporters during the 1950s—the Cold War and the mid-1950s drought. Initial Congressional debates over the project in 1953 occurred even as President Eisenhower made the final arrangements for the armistice ending the war in Korea. In 1962, Congressional passage of the FAP came only a year following the disastrous Bay of Pigs incident and just a few months prior to the Cuban Missile Crisis. Security concerns clearly plagued the minds of Congressman who worried about America's safety and ability to defend itself. Congressmen and lobbyists who favored passage of the FAP emphasized the water and electricity benefits

⁴⁴ Earl Law, "Statement In Support of the Frying Pan-Arkansas Project" Chenowith Papers, 74:29; Letter from Wendell Hutchinson to J. Edgar Chenowith, 5 February 1952, Chenowith Papers, 74: 5; Letter from G.E. Kimble to H.H. Christy, 3 July 1953, Chenowith Papers, 25:3; Miscellaneous Memo, n.d., Aspinall Papers, Box 49.

that it could provide defense industries and military installations in the region. Colorado Fuel & Iron, which stood to benefit tremendously from project water was, in 1953, not only Colorado's largest employer, but also the nation's ninth largest producer of steel. The Triplex Corporation and Timken Roller Bearing also did defense work in the region. Numerous military installations called Pueblo and Colorado Springs home, including the Air Force Academy and Camp Carson—later, Fort Carson. The Pueblo Ordnance Depot was the number one supplier of American military forces in the Korean War. Senator Jackson, during the 1953 Senate debates, commented on the energy needs of the region, noting, "I mean it is very essential to the industrial extent of the country which in turn is essential to a sound, strong, and healthy military potential." A nation at war is more willing to justify expensive measures to ensure its safety and defensive potential. Lobbyists played upon Cold War fears to add justification to the project's passage.⁴⁵

Drought also played an important part in influencing passage of the project. In the mid-1950s, especially, 1954-6, drought devastated the Arkansas Valley and many other regions across the West. In fact, dry conditions mirrored those from the disastrous Dustbowl of the 1930s, a period that would not have seemed so distant to farmers and political leaders at this time. A Bureau of Reclamation report written in 1961 played upon drought fears and concluded that had the project been built by the 1950s, it "would have prevented much of the economic losses, instability, and lack of vitality of economic growth that occurred."⁴⁶

In May, 1961 the *Aspen Times* wrote an editorial entitled "We Were Wrong About Fry-Ark." It reads:

⁴⁵ Senate Subcommittee, 1953, 259, 303.

⁴⁶ Department of the Interior, *Economic Changes*, i-7; Ralph Taylor, "Arkansas Valley Water Problems 100 Years Old," *Pueblo Star-Journal and Sunday Chieftain*, 2 January 1955.

Certainly the project was, and still is, expensive. But \$160 million isn't excessive when other reclamation projects are considered not as much as a couple of jet bombers and an atomic warhead.

Certainly, we hated, still hate, to see water from our natural watershed diverted through the mountains to be used for irrigation when we are already paying for agricultural surpluses. But the water is also allocated for drinking purposes, for electricity and for industrial use. We are not paying for the irrigation because the farmers like the other beneficiaries, who get the water must repay the government for what they use. And whether we like it or not, eastern Colorado is still part of our state, spends our tax money, provides tax money for us to spend. Anything that depresses that area ultimately depresses our area, for we are far from being self-sufficient and need the roads, the bridges, the maintenance, the state provides. The industry, the people, now exist on the Eastern Slope. They need the water, much of which runs into the sea every spring. It is selfish and short-sighted to oppose diversion now on the grounds of an illusory population or industrial growth on this slope....

Two years ago the project was altered to meet local demands. The dam and most of the diversions were moved to the Frying Pan at an increase in proposed cost. As a result most Western Slope opposition, much of which was centered in Aspen ceased.

This editorial represents a stunning reversal from the position taken by the newspaper and local residents only a few years before. Still, many Aspen residents continued to oppose the FAP. The *Aspen Times* now regularly attempted to alleviate their concerns. Later that year, an editorial read: "We in Aspen are not living in a vacuum. We enjoy the benefits of many government projects. We are also sensitive to the welfare of the state as a whole. It would be selfish to oppose the Fry-Ark project because it results in more benefits to others than it does to us. But we feel the benefits to us, both direct and indirect, would be considerable."⁴⁷ *The Daily Sentinel*, a paper based out of the western community of Grand Junction, similarly reversed its position, stating that the FAP provides "as much protection to Western Colorado interests as possible, all legal, political, economic, and geographic circumstances considered.... We urge the House to

⁴⁷ "We were Wrong About Fry-Ark," *Aspen Times*, 26 May 1961; "Reclamation, the Fry-Ark and Aspen," *Aspen Times*, 9 June 1961.

vote favorably....”⁴⁸

John Barnard of Granby, a water attorney and long time critic of the FAP reversed his position in 1962, stating: “I predict that on the average more water will be made available for beneficial uses in Western Colorado than in Eastern Colorado, as a result of the construction of [Ruedi Reservoir].... The Fryingpan Arkansas has become acceptable to at least a vast majority of the people of Western Colorado.” Furthermore, “It...seems to me the poorest kind of public relations for various news media to continue to paint a picture which is neither factual nor designed to engender in western Colorado a willingness to go along with the project as now planned.”⁴⁹

Other critics remained steadfast in their opposition to the FAP. Raymond Moley, longtime writer for *Newsweek* on water issues, concluded in 1962:

During the years in which I have studied these river problems I have come to the conviction that in the case of all the states in the entire Colorado Basin, water is too precious a value to be used for irrigation. This is especially true because of the immense growth of the populations all over the Southwest, and also because we already have a heavy burden of agricultural surpluses.⁵⁰

The Angrilantes also kept up the pressure until the end. A 1962 letter addressed to Congressmen and newspapers on behalf of the group called the FAP a “porkbarrel boondoggle” and once again criticized it for its enormous costs, its potential to destroy fishing and the environment, its “stupid” power features and its potential to create increased agricultural surpluses. “We ask you to vote down the Frying Pan-Arkansas because it is backed only by the promoters, the money men, the Reclamationists, and a few short-sighted business men who would risk their long-run tourist business for

⁴⁸ “Fryingpan-Arkansas Project,” *The Daily Sentinel*, 14 June 1962.

⁴⁹ Bert Hanna, “Pan-Ark Plan to Aid Western Slope, Too,” *The Denver Post*, 4 May 1962.

⁵⁰ Raymond Moley, “The Colorado Lifeline,” *Newsweek*, 12 March 1962.

temporary profits during construction.”⁵¹

But the opposition that kept Congress from passing the FAP for nine years could no longer effectively counter the support behind it. Congress finally authorized the Fryingpan-Arkansas Project in 1962. However, passage came down to a voice vote in the House. One Representative tried to get a roll call vote, but could not find the support he needed to carry it through. Congressman Chenoweth recalled that approval for the project would have been very close if it had gone to a roll call vote and many Representatives had confided to him that strong opposition to the project in their home states remained. The Senate quickly authorized the bill, as it had three times previously, and President Kennedy signed it in an elaborate ceremony that featured important lobbyists and Congressman in neckties, clutching cast-iron frying pans.⁵²

Conclusion

Opposition and debate by a wide range of groups played an important role in shaping the FAP. That opponents ultimately failed to undermine the project does not hide the fact that they forced Coloradoans to weigh the benefits and costs for themselves and take a stand. Most Coloradoans felt the benefits outweighed the costs. The debate helped to bring to public attention the problems that plagued many irrigation projects—agricultural surpluses, vague repayment schemes, environmental concerns and others—more dramatically than ever before.

The FAP, then, marked a transition period in America’s reclamation history. The debate surrounding the project’s passage reflected long-standing concerns about natural

⁵¹ Letter from The Angrilantes to United States House of Representatives, 24 April 1962, Aspinall Papers Box 49.

⁵² Chenoweth, interview, 19-20.

resource development, economic opportunities, population growth, and the limits placed on humankind by nature. It also reflected security concerns that arose early on in the Cold-War. But the debate also foreshadowed the emergence of the environmental movement and its role in voicing concerns that helped define the next generation of Americans. Such concerns would limit the potential for similar projects in the future.

Chapter Two

Water and Wealth

“We had hoped to sneak through the conservancy district, your dam, Ladd, without much hoopla. We underestimated the people’s ability to comprehend the complexities and to react against what none of them actually understands, other than instinctively to this day.”

John Nichols, from *The Milagro Beanfield War*

The Bureau of Reclamation and the Army Corps of Engineers have taken a lot of heat over the last couple of decades with regard to their role in “reclaiming” the arid West. Mark Reisner, in his scathing account of Western water development, *Cadillac Desert*, argues that the decisions made by these agencies regarding water development and land settlement over the last one-hundred years proved disastrous. The Bureau of Reclamation and the Army Corps of Engineers, he writes, built dams on nearly every river in the West. They transported water from areas of natural abundance to those of scarcity, and created major cities and farmlands in the most unusual of places: deserts and semi-arid deserts. These projects cost billions of dollars-- which U.S. taxpayers are paying for and will continue to pay for indefinitely-- and provided enormous subsidies of water and electricity to a select few (often wealthy agribusinesses). Projects created to meet the demands of Western populations, Reisner continues, only spurred more people into showing up. Sometimes the Bureau and Corps built dams just to build them, no matter how economically or geographically unfeasible. Often, water projects were pork barrel projects, traded in Congress for political favors and hometown votes.¹

The supporters of the Fryingpan-Arkansas Project spent a great deal of time, energy and money convincing Coloradoans and the rest of the country that this project was different from previous ones. Project water would be used for supplemental

¹ Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Viking Penguin, Inc., 1993).

irrigation only. It would support farmers who had cultivated these lands for decades previously and needed just a few more drops of water each year to mature their crops. The FAP provided water to growing Front Range cities—the operating principles guaranteed cities at least fifty percent of project water each year. Hydroelectric features would bring urgently-needed electricity to communities throughout the state. As if that wasn't enough, the project also provided fish and wildlife and flood-control benefits to local communities, too.

It all sounded very good during Congressional hearings, in small community meetings, and in the newspapers. This project was *different* than the other reclamation projects that cost so much money previously and appeared to provide benefits solely to agribusinesses and land speculators. It was a convincing argument, and as the previous chapter illustrates, an argument that swayed most Coloradoans.

But did the FAP turn out to be different than all of these other projects? Did it prove the exception to the rule? Unfortunately, in many respects, it did not. The Bureau of Reclamation financed the FAP with huge federal subsidies. Although the Operating Principles guarantee municipalities a majority of the imported water, most have lacked both the facilities to transport that water and the demand for that water. Irrigators historically received 77% of the project's water, sold to them by the Bureau of Reclamation at incredibly low prices and subsidized by the federal government and, especially, local communities. The actual operation of the FAP has also been disappointing. For a variety of reasons, including lack of water, lack of demand and inadequate storage capacity, the project has imported only around 70% of the amount of

water it was originally intended to deliver. Hydroelectric facilities, too, proved less vital and less efficient than originally intended.

In short, the FAP did not live up to the expectations of its planners and supporters. Sadly, proclaiming “I told you so” will not turn back the clock or remedy wasted money and resources. However, although it is easy to play off the Fryingpan-Arkansas as a financial debacle, as has been done with reclamation project after reclamation project over the last three decades, this explanation is too simple. In fact, the FAP has contributed substantially to local economies. For example, it created several recreation havens like Lake Pueblo State Park, which makes its claim as the fifth most visited recreational area in Colorado. Furthermore, the FAP still has the potential to create benefits for a broader range of Coloradoans. For example, the City of Colorado Springs and surrounding communities are currently making plans to build an additional water delivery conduit to carry more water to their citizens. They are also lobbying to enlarge the project’s reservoirs and build new ones in hopes of more efficiently utilizing FAP water. As water becomes more and more scarce in the West, much good may still come from the FAP, in economic terms at least.

This chapter will more fully develop all of these findings. It will outline the costs and repayment of the Fryingpan-Arkansas Project, and examine many unanticipated costs and often-overlooked benefits. It will determine who the beneficiaries of the project’s water have been, how this has changed over time, and how it may change in the future. Although this discussion examines the flaws unique to the FAP, its implications have a far broader impact in the current debate over water usage and development. Evaluating

facilities like the FAP is critical as communities out West search with deepening urgency for new sources of water.

Precedents for Federal Subsidies

The Fryingpan-Arkansas Project assumed multiple functions in order to receive approval in Congress. The authorizing bill stated that the FAP was approved

for the purposes of supplying water for irrigation, municipal, domestic, and industrial uses, generating and transmitting hydroelectric power and energy, and controlling floods, and for other useful and beneficial purposes incidental thereto, including recreation and the conservation and development of fish and wildlife.²

The FAP is a classic example of “river-basin planning.” Under such a planning approach, the Bureau of Reclamation or other agency develops a long stretch of river—in this case, the upper-Arkansas—for multiple purposes. The Tennessee Valley Authority was the federal government’s first significant effort at using this approach. The FAP is also an example of a related concept, “river-basin accounting.” Marc Reisner criticizes this approach at length in *Cadillac Desert*. He notes:

With river-basin accounting, one could take all the revenues generated by projects in any river basin--dams, irrigation projects, navigation and recreation features--and toss them into a common “fund.” The hydroelectric dams might contribute ninety-five cents of every dollar accruing to the fund, while the irrigation features might contribute only a nickel (and cost three times as much to build and operate as the dams), but it wouldn’t matter; as long as revenues came in at a pace that would permit the Reclamation Act’s forty-year repayment schedule to be met, the whole package could be considered economically sound.

The Bureau of Reclamation could rake in huge revenues based on the sale of electricity produced by hydroelectric features on dams. The Bureau called these facilities “cash register” dams. By adopting river-basin accounting procedures, Reisner elaborates, the

² Public Law 87-590, 87th Cong., 2d sess. (16 August, 1962).

Bureau of Reclamation could justify building dams across the West that were economically unfeasible otherwise. Such an approach became vital to the very existence of the Bureau of Reclamation: “But even if it subverted logic, economics, and simple common sense, it was essential to the Bureau’s survival as an institution and to the continued expansion of irrigation in the high, arid West.”³

The Colorado River Storage Project (CRSP), passed in 1956, is an excellent example of this approach. CRSP consisted of a series of dams along the upper-Colorado River. The most famous—or infamous, depending on your point of view—dam in this Project was the Glen Canyon Dam. Irrigation and power-production became intimately linked with the CRSP. Eighty-five cents of every dollar spent on irrigation features would be financed by power revenue. These subsidies would amount to nearly two million dollars per farm over the long run, nearly five times their value.⁴

Back in 1954 *Newsweek* writer Raymond Moley criticized another proposed reclamation project, the Upper Colorado River Basin Project, and the “river-basin accounting” approach. Irrigators in this Project, Morley reported, would only end up paying 12%-15% of the irrigation costs. The remainder of these costs would be postponed, interest-free, until such time as hydroelectric costs were paid and power revenues could then be applied to irrigation costs. Morley notes:

Considering the long period of something like fifty years during which the repayment of eighteen percent of the irrigation costs would be postponed (with interest accumulating), the power projects would never be able to pay them off as planned by the [Department of the Interior].... Even if we assume that high power rates could be maintained for seventy-five or one hundred years in order to pay for irrigation costs, any legislative authorization for such a doubtful repayment would in effect constitute an advance obligation to pay for projects of unknown costs and engineering soundness laid out in the master plan. It occurs to

³ Reisner, *Cadillac*, 135-6.

⁴ *Ibid.*, 140-4.

me that this binding of the future to maintain high hydroelectric rates is to assume that there will never be competition with power produced from the vast deposits of coal, gas, and oil shale known to be in the region or from some new form of energy.⁵

In other words, these long-term repayment contracts not only assume a market for expensive hydroelectric power, but also, minimal facility operation and maintenance costs. Such has been the case for reclamation projects throughout the West. Economist Richard Wahl estimated that a mere fourteen percent of construction costs for irrigation facilities in Bureau of Reclamation projects will ever be repaid—with or without the revenue from hydroelectric facilities. Voices similar to Morley's resonated in America during the 1950s, but, as the previous chapter demonstrated, critics Bureau of Reclamation and Army Corps of Engineer projects had not yet coalesced into a formidable resistance.⁶

The revenue-producing potential of hydroelectric power facilities associated with the FAP became a large selling point to Coloradoans and members of Congress. But the project's repayment plan would not exactly mirror that of the CRSP or the Upper Colorado River Basin Project. In fact, the hydroelectric features of the Project would not be nearly as extensive as the project's planners first anticipated. Nor would the revenue produced by these features measure up to expectations.

Paying the Price

During Congressional hearings, the Bureau of Reclamation estimated that the FAP would cost approximately \$170 million to build in 1962 dollars. Upon completion

⁵ Raymond Moley, "Irrigation—Hydropower's Expensive Partner," *Newsweek*, 14 May 1954.

⁶ Sarah Bates, David Getches, Lawrence MacDonnell and Charles Wilkinson, *Searching Out the Headwaters: Change and Rediscovery in Western Water Policy* (Washington D.C.: Island Press, 1993), 133.

in 1982, the Bureau of Reclamation estimated the final price tag at \$485 million. This estimate may be overly optimistic, however. Congressional hearings in 1974 documented the costs of the still-incomplete FAP at approximately \$501 million. Regardless, in 1982 the Bureau of Reclamation finished final construction on the FAP's facilities and gave the Southeastern Colorado Water Conservancy District, the agency responsible for the reimbursable costs of the project (also referred to as the SCWCD, or simply, the District, hereafter), a final bill of just over \$132 million. The Bureau passed along the remaining construction costs to American taxpayers. Of course, Congressmen and Coloradoans understood that the SCWCD would not be held responsible for all of the project's costs, some of which would provide recreation, flood control and other benefits. Also excluded from this figure are the costs of the electricity-producing features of the project. Nevertheless, the difference between the SCWCD's financial liability and the actual costs of the features utilized by the organization is substantial.⁷

In its 1989 Annual Report, the SCWCD boasted about its close relationship with the Bureau of Reclamation, members of Congress and the nation's Presidents. The report goes on to list the subsidies provided to the FAP between the years 1973 and 1989. These totaled nearly \$360 million. Most of these dollars reflect construction costs during these years. However, between 1982 and 1989 the Project still received nearly \$63 million, or nearly \$8 million per year, on average. Yet these funds do not show up on the

⁷ Senate Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, *A Bill to Authorize the Construction, Operation, and maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado: Hearings on S. 284*, 87th Cong., 2d sess., 28 June 1962, 47; Senate Committee on Interior and Insular Affairs, Subcommittee on Water and Power Resources, *Hearing before the subcommittee on water and power resources of the committee on Interior and insular affairs, US Senate on S. 3740*, 93rd Cong., 2d sess., 18 July 1974, 46; Department of the Interior, Bureau of Reclamation, *Contract Amendment Between the United States of America and the Southeastern Colorado Water Conservancy District to Establish the Initial Delivery Date and to Adjust the District's Payments (Contract No. 5-07-70-W0086, Amendment No. 2)* (23 October, 1981) reprinted in Frank Milenski, *In Quest of Water* (Boone, CO: Trails Publishing Co., 1993), 249; SCWCD, *2003 Annual Report* (Pueblo, CO, 2004), 20.

SCWCD's accounting sheets. They are pure subsidies to construction, operation, maintenance and other miscellaneous costs.⁸

As for its \$132 million liability, the SCWCD passes along forty percent of these construction costs to municipal and industrial users, and the remaining sixty percent to irrigators. However, the Bureau charges the SCWCD interest only on the municipal and industrial portion of this cost—3.046 percent per annum on roughly \$57 million—but does not charge any interest on the roughly \$75 million irrigation cost. Had the SCWCD financed the cost of the FAP through private entities, yearly interest costs would have been enormous. Even the interest charged on the municipal and industrial portion of the project—3.046 percent—falls well below marketable interest rates since 1982, the year repayment began. Interest-free and low-interest loans on reclamation projects, subsidized by the federal government, have tapped the average American's wallet for over a century now. Had the federal government loaned the money at marketable interest rates or even used the money to pay off a minute share of the federal deficit, it could have saved the American people millions of dollars. Of course, the FAP never would have been built under such circumstances. Such is the nature of government subsidized reclamation in the West—economically unsound and politically motivated—and the FAP is no different.⁹

Repayment, however, gets even more convoluted. The Bureau applies municipal and industrial revenues directly towards the principle of the loan—towards the \$57 million. The SCWCD estimates that it will pay off these costs—the only costs charged

⁸ SCWCD, *1989 Annual Report* (Pueblo, CO, 1990), 7.

⁹ State of Colorado, *Operating Principles: Fryingpan-Arkansas Project* (1958), 5; Department of the Interior, Bureau of Reclamation, *Supplemental Feasibility Analysis: Fryingpan-Arkansas Project, Colorado* (March 1961), 6.

interest by the Bureau of Reclamation—by 2012. Thereafter, revenues from these sources will be applied exclusively to the costs attributed to irrigation. Cities and industries that use water after 2012, in other words, continue to subsidize irrigation water even after their own liability is paid off.¹⁰

The SECWD takes irrigation revenues, on the other hand, and applies them, first, towards the annual costs of operation, maintenance and repair. After it pays these costs, the District contributes whatever is left to the principle. The District expects to pay off irrigation costs—all interest free—around 2031, fifty years after the start of repayment.¹¹

Finally, there are the power revenues. The Repayment Contract for the FAP states:

In the event payments made by the District pursuant to the provisions of this Article 11 are insufficient to meet the District's obligation to repay the cost of the project works allocated for irrigation... the District shall be entitled to repayment assistance from revenues from the sale of electric power generated by project facilities."¹²

The Bureau of Reclamation anticipates that the costs attributed to hydroelectric facilities will be paid off within forty years of completion—around 2021. Thereafter, power revenues, too, help pay off irrigation costs. Here we see river-basin accounting in action.

But from design to finish, neither the Bureau of Reclamation nor the SCWCD ever anticipated that power revenues would pay for the bulk of the project's construction costs as they had in projects like the Colorado River Storage Project.¹³ Does that mean

¹⁰ Colorado, *Operating Principles*, 5; Department of the Interior, Bureau of Reclamation, *Supplemental Feasibility Analysis*, 6.

¹¹ Colorado, *Operating Principles*, 5; Lawrence J. MacDonnell, Richard W. Wahl and Bruce C. Driver, "Facilitating Voluntary Transfers of Bureau of Reclamation-Supplied Water, Volume I" (Boulder, CO: Natural Resources Law Center, 1991), 5.

¹² Department of Interior, *Contract Amendment*, 252.

¹³ Department of Interior, *Supplemental Feasibility Analysis*, 6.

that revenues from sales of FAP water to cities, industries and farmers pay for most of the SCWCD's financial liability to the Bureau of Reclamation? Unfortunately, it does not.

The SCWCD charged agricultural water users \$8.25 per acre-foot for water in 2003, and municipal users, \$9.00 per acre-foot. The Bureau of Reclamation re-evaluates this rate every four years, and makes changes according to the findings of a Repayment Analysis and Ability to Pay Study—a feature introduced in 1924 with the Fact Finders Act and common to many reclamation projects in the West. Frank Milenski, a member of the Colorado State Water Conservation Board and a member of the SCWCD's board of directors for thirty-one years, estimated the full price of FAP water in 1990 at around \$151 per acre-foot.¹⁴

The difference between \$8 or \$9 per acre-foot charged and \$151 per acre-foot of water cost is tremendous. Where does the SCWCD receive the bulk of its revenue, if not from hydroelectric power? In its 2003 Annual Report, the SCWCD reported that the District paid the Bureau of Reclamation just over \$6 million dollars that year. Only 4% of that \$6 million came from sales of Project water. Nearly 80% of this money came from property taxes. In other words, \$5 million of the \$6 million paid to the Bureau of Reclamation came out of the pockets of the District's residents (See Chart 1). The SCWCD's boundary includes all, or a portion of nine Colorado counties: Chaffee, Fremont, Pueblo, El Paso, Crowley, Otero, Bent, Kiowa and Prowers. All property

¹⁴ In comparison, the typical cost to permanently purchase an acre-foot of water native to the basin is \$2-3 thousand (see Roy Smith and Linda Hill, editors, *Arkansas River Needs Assessment*, A Report prepared by the Cooperative Effort of the USDI Bureau of Land Management, USDI Bureau of Reclamation, USDA Forest Service and the Colorado Department of Natural Resources (July 2000) 3-2); U.S. Department of the Interior, *Contract Amendment*, 252; SCWCD, *2003 Annual Report*, 13; Frank Milenski, *Water: The Answer to a Desert's Prayer*, ed. Beatrice Spade (Boone, CO: Trails Publishing CO., 1990), 141; Lawrence J. MacDonnell, *From Reclamation to Sustainability: Water, Agriculture, and the Environment in the American West* (Niwot, CO: University Press of Colorado, 1999), 65.

Chart 1. Source of Payments to Bureau of Reclamation, 2003
 Total Payments: \$6,241,943

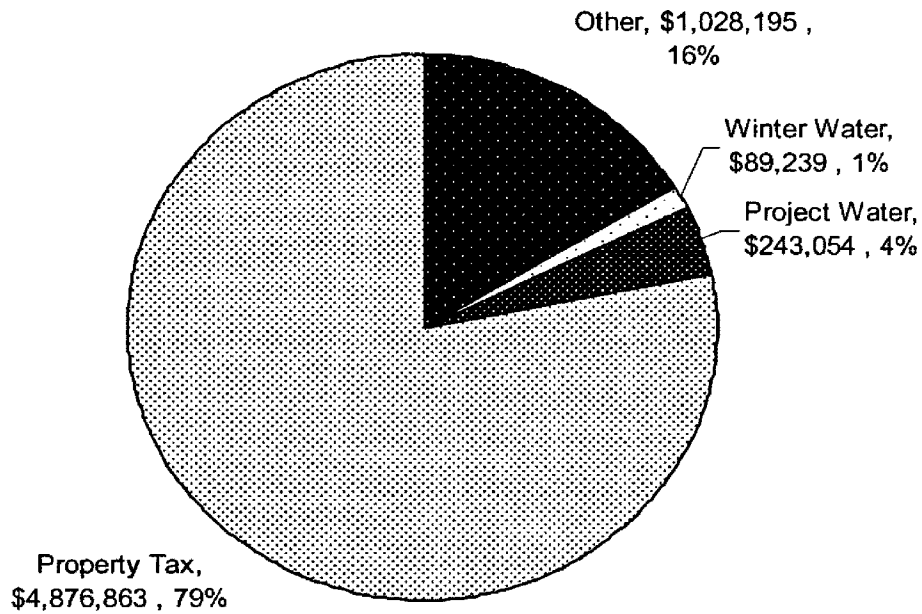
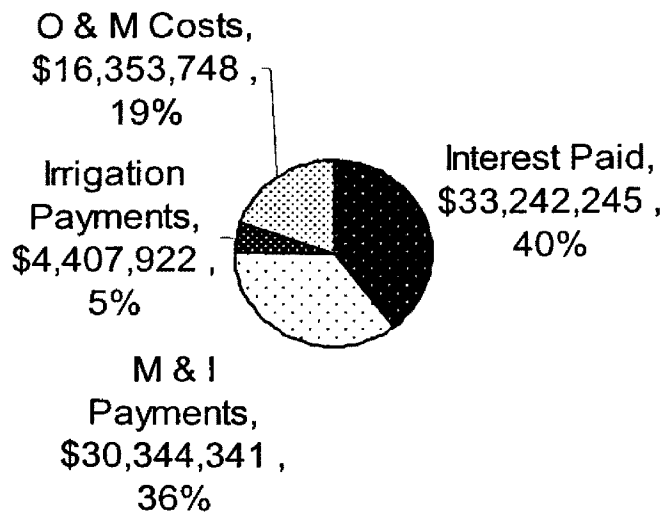


Chart 2. Total Payments to Bureau of Reclamation, 1982-2003
 Total Payments: \$84,293,199



owners within the District's boundaries pay for FAP facilities regardless of the benefits they receive from them.¹⁵

El Paso County, home to Colorado's second largest city, Colorado Springs, pays a particularly heavy burden. Colorado Springs began receiving FAP water in 1985, after the completion of the Fountain Valley Conduit, a pipeline that transports FAP water from the Pueblo Reservoir approximately thirty-five miles north to Colorado Springs.

Although El Paso County citizens receive only about 23% of the FAP's allocation, its citizens pay roughly 74% of the property tax revenues used to repay the federal loan for the Project.¹⁶ The Fryingpan-Arkansas was unique in its day for its guaranteed allocation to municipal entities. It turns out that it is also unique with regard to who pays for irrigation subsidies. Although sales of Project water and, eventually, power revenues, provide some money for repayment, local citizens pay the bulk of the bill.

There are other costs to consider, too. Economic analyses became more sophisticated as the 1960s wore on and, as discussed in the previous chapter, more Americans began to question the economic and environmental viability of such projects. In 1971 economists Charles Howe and K. William Easter published *Interbasin Transfers of Water: Economic Issues and Impacts*, in which they argued that for decades Congress and the Bureau of Reclamation ignored many of the costs associated with interbasin water transfers—a term which includes transmountain water transfers. Economists, they argued, should consider opportunity costs and external costs in addition to the direct costs of construction, operation and maintenance when tabulating the benefit/cost ratio of such projects. Opportunity costs, or the costs of something in terms of an opportunity

¹⁵ SCWCD, *2003 Annual Report*, 20.

¹⁶ Gary Bostrom, interview with author, 18 January 2005; Kristin Bricker, interview with author, 18 January 2005.

foregone, should be measured for potential reservoir and facility sites, and for the water in the area of origin. "Reservoir sites reserved for the public domain," the authors elaborate:

are, in general, assigned no opportunity cost whatsoever and in a few cases positive benefits have been counted for the values of the one time harvesting of timber or taking of minerals prior to inundation, no account being taken of foregone future harvests of these products.¹⁷

External costs, on the other hand, are those costs placed on parties removed from project sites. Farmers outside a reclamation area, for example, may lose income if they are unable to compete with farmers who use subsidized—and, therefore cheaper—reclamation water. A farmer who raises potatoes in Nebraska without irrigation, for example, but who pays federal taxes that support irrigation projects elsewhere, may lose out to a farmer who can produce potatoes in greater quantities and at lower costs using federally-subsidized reclamation water. Howe and Easter also point out that fertile land requiring no irrigation laid unused all across the nation even as the Bureau constructed reclamation projects to open or provide supplemental irrigation on marginal lands in arid climates. Out of 638 million acres of land in the United States considered "best-suited" for agriculture in the mid-1960s, only 200 million acres, or less than a third, were being used for agricultural production. Other types of external costs affect parties who may receive poor-quality water downstream from project facilities or experience other forms of environmental destruction including damage to fisheries, riparian vegetation and other habitats critical to surrounding wildlife. External costs arising from environmental degradation will be explored in more detail in the next chapter.¹⁸

¹⁷ Charles W. Howe and K. William Easter, *Interbasin Transfers of Water: Economic Issues and Impacts* (Baltimore: The Johns Hopkins Press, 1971), 170.

¹⁸ Howe and Easter, *Interbasin Transfers*, 32-3, 55, 106-7, 169-71; Sarah Bates, et al., *Searching*, 140.

It is reasonably safe to conclude that those who benefit most from the water developed by the Fryingpan-Arkansas Project pay little of the project's costs. American taxpayers pay huge subsidies in terms of interest rates and construction costs. Taxpayers within the District are especially hard hit by these subsidies. But who utilizes the project water? Can these huge subsidies be justified in the benefits the project's water provides for millions of Colorado residents?

Who Benefits?

Between the years 1982 and 2003, the SCWCD paid the Bureau of Reclamation approximately \$35 million of its \$132 million liability. The Repayment Contract requires that revenues first be applied to annual operation and maintenance costs, then to interest on the costs allocated to municipalities and industries (at 3.046% per annum), then to the actual principal obligation of the municipal and industrial costs, and, finally, to the principal on the irrigation debt obligation. In this twenty-one year period, the District made payments totaling about \$84 million. An exact breakdown of these payments is shown in Chart 2. Note that only 5 percent of these payments went towards paying off the balance of the FAP's irrigation costs.¹⁹

Yet, between the years 1972 and 2003 the District allocated 77% of project's water to agricultural users and the remaining 23% to municipal and industrial users (See Table 1). Although the Operating Principles guarantee municipalities 51% of the FAP's water, cities between these years never asked for their full allocation of water until 2002—thirty years after the completion of the project's initial facilities. The District allows irrigators

¹⁹ SCWCD, *2003 Annual Report*, 20.

Table 1. Fryingpan-Arkansas Project Water Allocations in Acre-feet, 1972-2003

| Type of Use | 1972-1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 1972-2003 |
|-------------------|-----------|--------|--------|--------|--------|--------|--------|---------|--------|-------|--------|-----------|
| Municipal | 216,341 | 13,810 | 16,417 | 14,518 | 15,729 | 2,342 | 7,568 | 18,007 | 16,429 | 5,602 | 18,016 | 344,779 |
| Irrigation | 567,279 | 37,887 | 59,240 | 77,916 | 60,489 | 89,850 | 21,927 | 158,081 | 60,532 | 5,262 | 17,153 | 1,155,616 |

Table 2. Select Agricultural Data for the Arkansas Valley, 1949 and 1959

| | 1949 | 1959 | % Change |
|-----------------------------------|---------|---------|----------|
| Number of Farms | 5,462 | 3,951 | -28 |
| Average Acres Per Farm | 887 | 1,251 | +46 |
| Irrigated Acres in Farms | 355,279 | 345,269 | -3 |
| Farms Irrigated | 2,993 | 2,927 | -27 |
| % Farms Irrigated | 73 | 74 | +1 |
| Irrigated Acreage Per Farm | 89 | 118 | +33 |

to purchase whatever water the cities do not request. Between these years, then, it appears that the majority of the FAP's benefits went to irrigators in eastern Colorado.²⁰

Part of the reason Colorado Springs has not asked for its full allocation of water is that it lacks the facilities to transport that water. The capacity of the Fountain Valley Conduit is not sufficient to deliver the city's full allocation. Over the last twenty years, the demand has not been such that the Colorado Springs felt compelled to build additional facilities to transport its share of water. That changed, however, in 2002 when Colorado suffered under a severe drought and Front Range cities tried to utilize their fair share of project water. Unfortunately, the SCWCD had little water to give in 2002. In that year the District allocated just over 10,000 acre-feet of water. This sum pales in comparison to the approximately 77,000 acre-feet allocated in 2001, and the 156,000 acre-feet allocated in 2000.²¹

In 2003 Colorado remained thirsty. Cities asked the District for 44,000 acre-feet of water, while agricultural entities requested 109,000 acre-feet. The District had only 37,500 acre-feet to give. Cities received their full 51% allocation (18,016 acre-feet), and irrigators, 49% (17,153 acre-feet--see Table 1). But this amount barely wetted the thirsty throats of these entities. In 2003, the FAP, approved by Congress to provide water in

²⁰ SCWCD, *2003 Annual Report*, 13.

²¹ In 2000 the SCWCD allocated carryover water from previously wet years, which explains why their total allocation for this year was so high. Because Colorado experienced three wet years in a row, 1998, 1999 and 2000, the Bureau found itself holding more water than it knew what to do with. Imports through the Boustead Tunnel were shut off because all of the East Slope reservoirs had reached capacity; Joey Bunch, "Drought Won't Relent Soon, Experts Warn," *The Denver Post*, 5 December 2002; Gail Pitts, "Drought Takes Drastic Toll on Harvest," *The Pueblo Chieftain*, 15 January 2003; "Drought Worst In 277 Years," *The Colorado Springs Gazette*, 23 September 2002; SCWCD, *2003 Annual Report*, 9; SCWCD, *2000 Annual Report* (Pueblo, CO, 2001), 6.

times of scarcity, yielded barely half the amount designers intended—69,000 acre-feet. In 2002, the SCWCD squeezed out a little more than one-seventh of that amount.²²

A long-term look at water imports does not paint a prettier picture. An average of 48,410 acre-feet of water passed through the Boustead tunnel each year during the project's thirty-two year history. This amount is a mere seventy percent of the 69,000 acre-feet planners expected from the project each year.²³ The failure to import the full 69,000 acre-feet is the product of several factors. In dry years, for example, little water is available anywhere in the state. Even if 69,000 acre-feet worth of water could be collected in the FAP's facilities, it could not transport that water to the East Slope because of commitments to maintain minimum flow standards in the Colorado River Basin. These standards guarantee sufficient water to meet allocation and fish and wildlife obligations in that basin.

In years of plenty, on the other hand, the problem has been insufficient water storage on the East Slope. The 1989 water-year provides an excellent example of the inefficiencies which plague the SCWCD's efforts to allocate FAP water. In 1989 the Project made almost 200,000 acre-feet of water available to the District. This large availability of water resulted from above-average precipitation levels over the previous three years. The District purchased only about 108,000 acre-feet. A little more than 8,000 acre-feet of water evaporated.²⁴ Under their contract with the SCWCD cities can store project water behind the Project's dams for an extended period of time. The use of

²² SCWCD, *2003 Annual Report*, 2, 11, 12.

²³ Department of Interior, Bureau of Reclamation, *Annual Operating Plans: Fryingpan-Arkansas Project, Water Years 1989-1990* (Billings, MT: Bureau of Reclamation, 1989), 8; Department of Interior, Bureau of Reclamation, *Annual Operating Plan: Fryingpan Arkansas Project, Water Year 2003 Operations*, published online, <<http://www.usbr.gov/gp/aop/fa/03/03operations.htm>> (9 May 2005).

²⁴ Department of the Interior, *Annual Operating Plans 1989-1990*, 14-6; SCWCD, *1989 Annual Report* (Pueblo, CO, 1990), 16.

storage in this way leaves less room for native water storage. Excess native water is “dumped” down the Arkansas River, unused. In other words, the reservoirs of the FAP are so filled at times with water diverted from the West Slope and saved by the cities for future use that “native” Arkansas River water runs down its natural course, unused. It appears an incredibly inefficient way to utilize Colorado’s water.²⁵

Such has been the case during most of the FAP’s years of operation. The problem has not been lack of water, but an excess of water. The Project has consistently supplied more water than Colorado entities have demanded.²⁶ This of course, will likely change as cities like Colorado Springs grow and build more facilities to transport their share of water.

Unfortunately, optimistic projections for hydroelectric energy did not become a reality either. Originally, plans for hydroelectric development called for the construction of seven power plants, which could produce a combined 505 million kilowatt-hours of electrical energy per year. That would have been enough electricity to serve the entire East Slope—roughly two-thirds of the Colorado’s population in the 1960s.²⁷ The final project included one modest-size power plant, the Mt. Elbert Pumped-Storage Powerplant, adjacent to Twin Lakes. This power plant has a 200,000 megawatt capacity. If operated at its maximum potential, it could produce enough energy to supply approximately 50,000 homes. But the Bureau admits: “Unfortunately, the available water is not adequate to drive these large generators continuously; therefore the units are shut down at the end of the evening power demand peak.” When this happens, the facility

²⁵ Milenski, *Water: The Answer to a Desert’s Prayer*, 141; also see MacDonnell, Wahl and Driver, “Facilitating,” 5.

²⁶ MacDonnell, Wahl and Driver, 5.

²⁷ E.T. Halaas, *The Fryingpan-Arkansas Project: A Summary Statement and Analysis of Project Features, Objectives and Feasibility* (Denver, CO: Colorado Public Expenditure Council, 1955), 3, 9.

literally pumps water back up 445 vertical feet to Forebay Reservoir, where it originally entered the penstocks: “Water can be pumped back into the forebay during times when power demands are low and surplus low-rate power is available from other generating stations. Once the water is returned to the forebay, it can be used again to generate more power during peak demand times.” It is a marvel of hydroelectrical engineering, but not nearly the electricity-producing monster first suggested by the FAP’s early advocates.²⁸

In fact, the Mt. Elbert Powerplant produces, on average, only around 365,000 megawatt hours annually. In 1993, about 971,000 acre-feet of water ran through the Plant’s turbine generators to produce about 355,000-megawatt hours of energy (a below average year). Of that water, only 77,000 acre-feet came from water pumped from the West Slope to Turquoise Reservoir and through the Mt. Elbert Conduit. Water falls downward in elevation from these sources, thereby producing cheap electricity, efficiently. However, the plant pumped an astonishing 902,000 acre-feet of water up the 445 vertical feet to Forebay Reservoir using cheap energy purchased during off-peak hours—usually early in the morning (note that some water is lost, probably due to evaporation and other causes). This same water again descends through the turbine generators during the hours when energy needs peak and power is sold at higher rates. Kerry McCalman, the Bureau of Reclamation’s Regional Power and Maintenance Administrator, estimates that it takes approximately 40% more energy to pump that water uphill than will be received when the water falls back through the turbines. In other words, it is an energy-consumptive operation that makes profit based on buying cheap energy during off-peak hours, and selling more expensive energy (though less) during

²⁸ U.S. Department of the Interior, Bureau of Reclamation, *Fryingpan-Arkansas Project, Colorado* (government document, unknown publishing location, publisher and date), 16; Halaas, *Fryingpan-Arkansas*, 3, 9.

times of peak demand. McCalman admits that the value of the Mt. Elbert Powerplant depends entirely on fluctuations of power rates. In the early 1980s, then again in more recent years, the difference between peak and off-peak electricity rates was minimal. If used during these years, the Powerplant would operate at a loss. Over the last twenty years “it has largely operated in the red,” McCalman concedes.²⁹ In addition, there are always the operation and maintenance costs to pay for on this beast of a powerplant, which run two-and-a-half to three times those of many of the Bureau’s other power generating facilities, and almost seven times those of its best performers.³⁰

The discussion above is important for several reasons. First, it is obvious that the water expected from the West Slope has not matched the designers’ expectations. Second, low demand and inadequate storage created a history of inefficient utilization of water. For most of the Project’s history, demand for the FAP’s water by municipal entities has not even approached the supply. In years of dearth, however, supply was unable to match demand. Perhaps, in this last point, however, we ask too much of the FAP. Water storage can be manipulated, but the ultimate source of water, Mother Nature, remains out of the Bureau of Reclamation’s—or any other earthly entity’s—ability to control. The SCWCD and Front Range cities, as will be seen later in this chapter, have proposed a restructuring of the Project’s facilities to alleviate discrepancies between supply and demand of FAP water.

²⁹ Kerry McCalman, interview with author, 11 May, 2005; Department of Interior, *Annual Operating Plan, 2003*.

³⁰ Department of Interior, *Annual Operating Plan, 2003*.

Other Benefits

Of course, the FAP yielded many economic benefits which are difficult to measure. The project created a significant number of jobs for many local communities during the construction period and continues to do so in its operation and maintenance divisions. Local communities benefit from tourists who use the project's reservoirs. Ruedi Reservoir, a relatively large reservoir for the Western Slope, is situated at an elevation that keeps water temperatures warm enough for waterskiing and swimming during the summer. Many out-of-state visitors utilize the reservoir's facilities and contribute to the economies of local cities like Basalt and Meredith.³¹

The project enlarged Turquoise Reservoir, which stands at the receiving end of the Boustead Tunnel, from a water holding capacity of 17,000 acre-feet, to one able to contain approximately 130,000 acre-feet of water. It enlarged Twin Lakes' capacity from 117,000 acre-feet to 166,000 acre-feet. An estimated 76,000 people recreated on or visited these lakes in 1996. Visitation grows each year.³²

Pueblo Reservoir, the FAP's largest reservoir and recreational draw, attracted more than 100,000 visitors during the first month it opened to the public in 1975. Visitation here, too, grows steadily. In 1996, over 1,543,000 people came to what is now called Lake Pueblo State Park, up over 41% from the number reported in 1990. This State Park is the fifth most visited recreation area in Colorado. In 1996 it brought approximately \$34 million into the regional economy. Turquoise and Twin Lakes

³¹ *Fryingpan-Arkansas Project, Ruedi Reservoir, CO, Round 2 Water Sale Environmental Assessment* (Ft. Collins: Simon, Li and Associates, Inc., 1983), 3.35, 3.43, 3.44.

³² Smith and Hill, *Arkansas River Needs Assessment*, 1-26

brought in around \$600,000 into their regional economies that same year.³³ In economic terms, these reservoirs have made an enormous dent in the region's economy, to the benefit of many who help support the costs of the FAP through property taxes.

Flood control benefits provided by the project should also be considered. The Army Corps of Engineers estimated that in the 1950s damages along the Arkansas River downstream from Pueblo averaged almost one million dollars annually, in 1950s prices. Previous to that, a 1921 flood, the largest on record for Pueblo, caused seventy-eight deaths and property damages exceeding \$19 million. Then, the Bureau of Reclamation built the FAP's reservoirs. The Bureau estimated that Pueblo Reservoir provided over \$11 million worth of flood control benefits between 1975 and 2003. Ruedi Reservoir on the West Slope provided roughly \$8 million in flood control benefits between those years.³⁴

The FAP provides other intangible benefits to Colorado communities, especially in the farming communities downstream of Pueblo Reservoir. Despite the increased availability of subsidized water from the FAP, farmers continue to struggle for survival. Depressed agricultural prices and competition from the larger agribusinesses forced many of the valley's farmers to sell their water rights to Front Range cities like Colorado Springs and Aurora, a rapidly-growing suburb of Denver. Hundreds of these farmers moved or retired, leaving their farms idle and further depressing local economies. The sale of these water rights peaked in the 1970s before the FAP reached its full capacity for

³³ Bob Overton, "Reservoir Attracts Nearly 100,000 In First Month," *The Pueblo Chieftain*, 2 August 1975; Smith and Hill, *Arkansas River Needs Assessment*, 1-26, 6-4; also see Pricewaterhouse Coopers' 2002 *Colorado State Parks' Market Assessment Study*, published online, <<http://www.parks.state.co.us/home/kids/publications/2002%20CO%20State%20Parks%20Market%20Assessment4-15-03%20Screen%20optimized.pdf>> (9 May 2005).

³⁴ Halaas, *Fryingpan-Arkansas Project*, 6; James Earl Sherow, *Watering the Valley: Development Along the High Plains Arkansas River, 1870-1950* (Lawrence, KS: University Press of Kansas, 1990) 10; Department of Interior, *Annual Operating Plan, 2003*.

water storage and benefits. Without the FAP it is likely more of the valley's residents would have hedged their bets and sold off their remaining water rights. The sale of water rights and the exodus of even just a few hundred residents can and has had a devastating effect on the small communities in the Valley. Robert Young, an agricultural economist at Colorado State University looked at the effects of removing water from Crowley County, an Arkansas Valley county with a population of approximately 5,500. He estimated that direct-farming job losses from the transfer of water rights would eventually reach 150 full-time jobs. Another 100 indirectly-linked job losses could accrue. Currently, only 5% of historically irrigated lands remain in irrigation in Crowley County. Economist Charles Howe estimated that in the Arkansas Valley could expect one job loss for every 308 acres removed from irrigated agriculture. Of course, both Young and Howe anticipate higher benefits to Colorado communities that receive the water. However, they emphasize that, in general, benefits accrue in urban markets, while costs accrue in the rural communities. The analyses of Howe and Easter are relevant to this discussion because they show what impact the loss of farms can have on small communities. Without FAP-subsidized water it is highly likely that losses in these small communities would have been much higher.³⁵

So, it appears that the scorecard that reveals costs and benefits is a confusing one.

It is difficult to quantify these costs and benefits, though many have tried. Still, the

³⁵ MacDonnell, *From Reclamation*, 56-7; Robert A. Young and R. Garth Taylor, "Some Measures of the Economic Impacts of a Large-Scale Rural to Urban Water Transfer" (paper presented at Seminar on Water Allocation and Transfer Systems in a Maturing Water Economy, University of New England, Armidale, NSW, Australia, July 1990), paraphrased in MacDonnell, *From Reclamation to Sustainability*; Charles W. Howe, Jeffrey K. Lazo, and Kenneth R. Weber, "The Economic Impacts of Agriculture-to-Urban Water Transfers on the Area of Origin: A Case Study of the Arkansas River Valley in Colorado," *American Journal of Agricultural Economics* (December 1990), 1200-04, paraphrased in MacDonnell, *From Reclamation to Sustainability*; Sarah Bates, et al., *Searching*, 135.

inefficiency and misdistribution of these costs and benefits make projects like the FAP appear to be misguided mistakes. But, the record is not yet complete.

Recent Changes and Future Potential

One successful innovation enacted by the SCWCD, under the guidance of Charles (Tommy) Thomson, who held the position of general manager from 1966 until 1994, was the Winter Water Storage Program. This Program allows Arkansas Valley ditch companies to store the water flowing out of the mountains during the winter months in FAP facilities like Pueblo Reservoir. Winter irrigation did little to build soil moisture levels, but most farmers felt they could use their allocated water to minimal positive effect, or lose it, to no positive effect. The Winter Water Storage Program allows them to divert their stored water during the beginning part of the irrigation season when such water becomes many times more valuable. The Winter Water Storage Program creates revenue for the SCWCD, though not a considerable amount. In 2003, the Program generated approximately \$90 thousand dollars—approximately 1% of the District's payments to the Bureau of Reclamation (See Chart 1). Since 1982 it has helped pay approximately 4% of the SCWCD's debt obligation to the Bureau of Reclamation.³⁶

The City of Colorado Springs has also moved to make more beneficial use of the FAP's existing facilities. Recall that El Paso County residents pay for 74% of the property tax revenues used to repay the federal loan for the FAP and its facilities, despite receiving only about 23% of Project water. In the early 2000s, Colorado Springs forged ahead with plans to construct the Southern Delivery System (SDS). Part of the reason Colorado Springs has not received their allocated share of water has been that the City has not had the facilities to transport that water. The Fountain Valley

³⁶ SCWCD, *1998 Annual Report* (Pueblo, CO, 1999), 15; also see MacDonnell, *From Reclamation*, 44.

pipeline delivers a limited amount to the City and surrounding communities, but its capacity is limited.

Plans for the SDS include two phases. Phase I, scheduled for completion by 2009, includes construction of a 43-mile long, 66-inch diameter raw water pipeline and pump stations, a water treatment plant, and a series of distribution pipelines to transport treated water. The water would be removed from the Arkansas River at Pueblo Reservoir. Phase II calls for the creation of two new storage reservoirs along Arkansas tributary rivers as well as an enlargement of both Pueblo and Turquoise Reservoirs, two of the FAP's largest storage reservoirs. The removal of water would reduce the Arkansas' current flow by approximately 10%. Colorado Springs insists that this removal would not "dry up" the Arkansas through the City of Pueblo—a contentious issue for many Pueblo residents. Furthermore, Colorado Springs boasts that a recently approved "flow management program will provide for more consistent flows in the Arkansas River through Pueblo." The city anticipates completion of the SDS by 2040, the year the Colorado Springs expects population and development growth to exceed the current supply of water. The city estimates that the total cost for the SDS will be roughly \$1 billion.

One setback to this plan, however, may be the ticking clock. By 2040 the FAP's facilities will be over sixty years old. Optimistic projections calculated the lifespan of most Bureau of Reclamation Projects at 100 years. As time progresses operation and maintenance costs will increase, as will the chances for larger—perhaps fatal—mechanical problems.

Conclusion

Ultimately, the Arkansas Valley's farmers who received cheap, subsidized water benefited the most from the FAP. It is a criticism common to reclamation projects throughout the West and it is ably and eloquently expounded by Marc Reisner and historian Donald Worster in *Cadillac Desert* and *Rivers of Empire*, respectively. Both authors point out that large agribusinesses ended up being the primary beneficiaries of Bureau of Reclamation and Army Corps of Engineer projects. In 1960, for example, Californians approved the State Water Project (SWP) at a cost of approximately \$1.75 billion. Los Angeles residents largely footed the bill of this enormous project that pumped water over California's Tehachapi Mountains. The primary benefactors, however, ended up being a handful of agribusinesses. Chevron USA received cheap, subsidized water for 37,793 acres it owned in the SWP service area. Tejon Ranch, owned by the *Los Angeles Times*, irrigated 35,897 acres using SWP water; Getty Oil, 35,384 acres; and McCarthy Joint Venture A, 25,105 acres. Blackwell, Tenneco and Southern Pacific also used SWP water to irrigate large landholdings. SWP beneficiaries brought 250,000 new acres of cotton, olives, pistachios, almonds and wheat into production.³⁷

The farmers in the Arkansas Valley who utilized FAP water, however, were different. The FAP's proponents offered the project as a means of providing supplemental water to small Arkansas Valley farmers. And that is essentially, the way it worked out. In 1949, just four years before Chenoweth introduced the FAP before Congress, 5,462 farms operated in the Arkansas Valley. The average size of each farm was 887 acres. Just ten years later, in 1959, the total number of farms decreased to 3,951, and the average size of each farm increased to 1,251 acres—a 46% increase. (See Table

³⁷ Worster, 290-2.

2) ³⁸ Although the size of farms in the Arkansas Valley has increased, they do not even approach the vast holdings of California's agribusinesses. Furthermore, it is still primarily local Colorado residents who own Arkansas Valley's farms. Nevertheless, it is a departure from the dream that millions of Americans had in mind when they supported the 1902 Reclamation Act. Small 160-acre plots for countless families across the West had not been realized, nor will it ever be realized in future years. By 1962, however, most Americans already understood this failure and tried to make the best out of the tools they had at their disposal.

It is true, then, that in the case of the FAP, farmers benefited from access to heavily-subsidized water. However, these farmers are not the big-business-types that Donald Worster criticizes at length in *Rivers of Empire*. Rather, it appears that the FAP is unique in terms of its costs and benefits, which supports Donald Pisani's description of a "fragmented" West.

Congress and the Bureau of Reclamation accepted a huge portion of the construction cost of the FAP, which means, of course, Americans footed the bill. Local Colorado communities, especially those residing in El Paso County pay a disproportionate share of the FAP's costs even though they receive little water and few monetary benefits. Only recently have communities like the City of Colorado Springs pushed to remedy the discrepancy between supply and demand for FAP water with the introduction of the SDS.

The record of costs and benefits is a mixed one, and, as yet, incomplete. Nevertheless, the FAP clearly failed to live up to the expectations of its designers and

³⁸ Department of the Interior, Bureau of Reclamation, *Economic Changes In the Arkansas Valley In Colorado During the 1950s* (Denver, 1961), 4.

early promoters. The FAP provides further proof that huge interbasin water transfers and dams cost more than they are worth, economically speaking. The final chapter, which discusses the environmental consequences of the FAP, will show that the Project's costs outweighed benefits in environmental terms as well.

Chapter Three

At What Cost to the Environment?

Salt—a “silent killer.” That is how Colorado State University faculty described salt in a 2000 article discussing the impact of high salinity levels in the soils and irrigation water of the Arkansas Valley. “Seventy percent of the irrigated fields in the Arkansas Valley are affected by increased salinity, resulting in an estimated 10-50% yield reduction for alfalfa and corn,” the article states. “Some 25,000 to 30,000 acres of the roughly 250,000 farmable acres in the Arkansas Valley have been lost to agricultural production because of this increased salinity.” Stories about the high concentration of salt in the soils of California’s Imperial Valley have drawn a lot of attention in recent years, but salinity has not been a visible problem in Colorado until recently. What has caused the recent panic over soils in the Arkansas Valley? The answer is, in part, the impact of the Fryingpan-Arkansas Project.¹

Current agricultural practices, in many ways, fail to take into account the interconnectedness of an ecosystem’s components. Clive Ponting points out in his study, *A Green History of the World: The Environment and the Collapse of Great Civilizations*, that:

All the parts of an ecosystem are interconnected through a complex set of self-regulating cycles, feedback loops and linkages between different parts of the food chain. For example, the fertility, stability and texture of a soil depend on an interaction with the other parts of the ecosystem which have produced it. If one part of an ecosystem is removed or disrupted there will be knock-off effects elsewhere in the system.²

¹ Jim Valliant and Robert Ward, “Water Relocation In the Arkansas Valley,” *Agronomy News* 20, no. 6 (November 2000), <<http://www.colostate.edu/Depts/SoilCrop/extension/Newsletters/2000/guAUTUMN00.htm#mapping%20arkansas%20river>>.

² Clive Ponting, *A Green History of the World: The Environment and the Collapse of Great Civilizations* (New York: Penguin Books, 1991), 16.

The Fryingpan-Arkansas Project disrupts the balance of nature in significant ways. First, the FAP increases salinity levels in both the Colorado and Arkansas Rivers. Increased salinity, of course, detrimentally impacts the fish in these waters; however, it also negatively impacts the flora and fauna that depend on the soils on either side of the rivers. The FAP also disrupts water flows and water temperatures in both rivers, further impacting flora and fauna.

Ponting writes:

The most important task in all human history has been to find a way of extracting from the different ecosystems in which people have lived enough resources for maintaining life—food, clothing, shelter, energy and other material goods. Inevitably this has meant intervening in natural ecosystems. The problem for human societies has been to balance their various demands against the ability of the ecosystems to withstand the resulting pressures.³

One means by which Americans attempted to measure and maintain this balance was through legislation like the National Environmental Policy Act.

Congress passed the National Environmental Policy Act (NEPA) in 1969. The purpose of this act was:

To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; and to establish a Council on Environmental Quality.

NEPA requires government agencies to assess the potential environmental impacts of all projects that modify the environment in some way. The sponsoring agency compiles the results of its studies into an Environmental Impact Statement (EIS). This EIS must consider alternative designs and methods that designers might use to reduce or eliminate

³ Ibid., 17.

adverse environmental effects. EIS drafters must distribute copies of a Draft EIS to the public for comment and respond to the comments they receive before submitting the Final EIS.⁴

Whether or not NEPA has lived up to its supporters' expectations is debatable. Regardless, if our attempts to balance the needs of man and nature fail, the outcome might be disastrous. History proves this point. Millennia ago, Sumerians in southern Mesopotamia relied on water storage and irrigation to feed its growing population. Between 3500 BC and 1700 BC Sumerian irrigation practices led to a rise in the level of soil salinity to the point where those soils could no longer grow wheat. For centuries, the power of the Sumerian bureaucracy and army depended on its ability to grow a surplus of wheat and other agricultural products. Clive Ponting points out: "What is remarkable is the way that the political history of Sumer and its city states so closely follows the steady decline of the agricultural base." The conquest by Sargon of Agade, which marked the beginning of the end for the Sumerian civilization was "contemporary with the first serious decline in crop yields following widespread salinization."⁵

A similar process occurred in the Indus Valley around 2300 BC. Irrigation provided an agricultural surplus that sustained the ruling elite, priests and armies. However, it also led to increased salinity levels in the soil and a gradual decrease in agricultural productivity. By 1900 BC, the soil in the Indus Valley could no longer support a sizeable population or army. Shortly thereafter, conquest destroyed the society that thrived there for more than 400 years.⁶

Is America doomed to a similar fate as that which befell the ancient Sumerian and

⁴ Public Law 91-190 (1 January, 1970).

⁵ Ponting, *Green History*, 71-2.

⁶ *Ibid.*, 73-4.

Indus Valley societies? Such a forecast would, of course, be premature. However, population and market pressures have left their mark on the environment in the West. The Fryingpan-Arkansas Project is no small contributor to environmental degradation in the Arkansas and Colorado River basins.

The Fryingpan-Arkansas Project

Although Congress passed the Fryingpan-Arkansas Project well before NEPA became law in 1969, the Bureau of Reclamation had built less than half of the Project's facilities by that year. The Act required the Bureau of Reclamation to write an EIS on the project. Completed in April of 1975, this document assesses the environmental impact of FAP facilities completed up to this date—including Ruedi Reservoir—and the likely impact of the facilities under construction. The impacts reported on the FAP's Environmental Impact Statement include: loss of wildlife habitat, displacement of wildlife, changes in predator-prey relationships, increased erosion, increased hunting and fishing pressures, and other terrestrial and aquatic changes, including increased salinity levels in the Colorado River. Studies published after this Final EIS concur with these findings and document the extent of the damages created by FAP facilities.

In this chapter, I evaluate the impact of the FAP and its facilities on the Arkansas and Colorado Rivers, their tributaries, and surrounding landscapes. The results are disheartening, although probably not unexpected to many who follow water quality and development issues. One of the most pressing issues at present, as mentioned earlier, is the increase in river salinity levels caused by the Fryingpan-Arkansas Project. Salinity is not the only problem created by the Fryingpan-Arkansas Project, however. Management

programs like the Winter Water Storage Program, which allows irrigators to store winter water flows in the project's reservoirs until spring, exacerbate problems for fish in the project's rivers. Past and present management has resulted in both positive and negative impacts to the environment in other ways. The FAP changes water temperatures, reduces spring flooding, and dramatically alters natural river flows. These changes negatively impact flora and fauna in the project's rivers and in the riparian habitat alongside them.

The Arkansas River is one of the most extensively managed rivers in the United States; management is possible, in large part, because of the Fryingpan-Arkansas Project. The Arkansas River is what historian Richard White calls an "organic machine"—it is "an energy system which, although modified by human interventions, maintains its natural, its 'unmade' qualities." The FAP's reservoirs, collection facilities and tunnels are the nuts, bolts and interconnecting parts that, along with the river itself, make up this amazing machine. The agencies with a hand in operating it include: the Southeastern Colorado Water Conservancy District, the Bureau of Land Management, the U.S. Forest Service, the Bureau of Reclamation and the Colorado Department of Natural Resources, to name a few.⁷

In July, 2002, these agencies cooperated to produce the *Arkansas River Water Needs Assessment*, a comprehensive analysis of the upper-Arkansas River's management history, its current legal, ecological and recreation concerns, and, finally, management scenarios that could alter the flow and storage of the Arkansas River in order to maximize the benefits for irrigators, cities, flora and fauna, and recreation users. In this document, Steve Swanson of the BLM emphasizes: "Probably the largest effect of the Fryingpan-

⁷ Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995), ix.

Arkansas Project is the timing of additional flows in the system and not the additional volume.” This comment reveals the dramatic changes that have surfaced across the United States with regard to water development and management.⁸

Micromanagement of the Arkansas River’s flow has come about, in part, from necessity. The public’s attitude towards large development projects has grown more negative as their knowledge of these projects’ economic and environmental consequences has grown. Those who propose legislation for new projects find them nearly, if not completely, impossible to pass. But water is no less valuable today than it was half a century ago. Populations in the West have ballooned. Without new sources of water, community planners and government agencies must manage the water they have with increasing finesse.

Micromanagement of water resources allows managers to maximize benefits to irrigators, urbanites, recreational users and flora and fauna. So far, it has helped stretch the supply of water to users who depend on the Arkansas and Colorado Rivers. However, the environmental consequences have proven severe.

Salinity: “Silent Killer”

Californians and residents of other lower-basin states along the Colorado River who fought passage of the FAP worried about what the removal of water would mean for their own communities. They also worried about how the FAP would impact the quality of the water that would remain in the Colorado River after the FAP began diverting water. The removal of water from the Colorado River, especially at the headwaters,

⁸ Roy Smith and Linda Hill, editors, *Arkansas River Needs Assessment*, a report prepared by the Cooperative Effort of the USDI Bureau of Land Management, USDI Bureau of Reclamation, USDA Forest Service and the Colorado Department of Natural Resources (July 2000), 4-20.

would result in increased levels of salt concentration downstream.

In its 1400-mile journey across the West, the Colorado River accumulates approximately 9 million tons of salt each year. Most of these salts enter the river from natural sources. For example, rivers pick up small particles of calcium and other chemical and mineral deposits as they erode rock and riverbank. Agricultural, municipal and industrial sources, however, have also contributed significantly to the salinity problems plaguing the Colorado River over the last 150 years. Forty-seven percent of Lake Mead's salt concentration, for example, comes from natural sources; 3% comes from water exports; 1% from mining and industry; 12% from reservoir evaporation; and 37% from irrigation.⁹

Salinity levels are determined primarily by two processes. First, "salt loading" occurs when salts are added to the water. One example of salt loading comes from irrigation. An irrigator never uses all of the water diverted from a river. Leftover water returns to the river of origin after passing through the soil. Along the way it picks up additional salts that will increase the total salinity of the river.¹⁰

Another example of salt loading occurs when water is impounded behind dams. For example, the water impounded in large reservoirs created by dams often leach minerals and chemicals from surrounding rocks and sediments. In a 1977 environmental report, L.M. Finnell noted increases in alkalinity, calcium, hardness and pH in Ruedi

⁹ Taylor O. Miller, Gary D. Weatherford, John E. Thorson, *The Salty Colorado* (Washington, D.C.: Conservation Foundation, 1986), xiii, 5.

¹⁰ *Ibid.*, xiii; The water that passes through irrigated fields and returns to a river negatively impacts the river in other ways. Water removed from, and then returned to, the Arkansas River and its tributaries, for example, is generally warmer and carries heavier amounts of fine sediment. Water from these fields also picks up pollutants such as pesticides, mineral nutrients, salts, radio nuclides from fertilizers, wastes from polyethylene tarpaulin and petroleum mulches, the by-products of combustion of fossil fuels, and organic nutrients such as nitrogen from animal manure. All of these factors create further economic externalities for downstream users. See Ellen E. Wohl, *Virtual Rivers: Lessons from the Mountain Rivers of the Colorado Front Range*, (New Haven: Yale University Press, 2001), 124.

Reservoir. Before the creation of this reservoir, Fryingpan River water would have washed quickly through a narrow riverbed, and chemical leaching would have remained minimal. Now, that water stands for extensive periods of time in a large basin containing large deposits of natural gypsum, and its salinity levels have risen significantly. A similar process of salt leaching occurs in all of the reservoirs along the Arkansas River.¹¹

The second process that determines the amount of salt in a body of water, “salt concentration,” occurs when water disappears from a source such as a river or reservoir through evaporation, transpiration or withdraws of less-salty water (from tributaries, for example). Following such processes, the same amount of salt remains but, now, with less water to dilute it. Thus, salt concentration increases.¹²

The Final Environmental Impact Statement for the Fryingpan-Arkansas Project estimated that the annual removal of 70,000 acre-feet of water from the Colorado basin would increase salinity in the Colorado River by 8-12 ppm (2.2-3.3%) at Cameo, CO, 4ppm (0.6 %) at Lees Ferry, AZ and 7ppm (0.8%) at Imperial Dam. These figures may seem low, but they create enormous environmental and economic changes along the Colorado River. The EIS estimated that this small increase in the salinity level would result in a total impact (direct irrigation costs and indirect costs) of \$1.6 million per year (1972 prices) to users in the lower, main-stem of the Colorado River. A 1986 Conservation Foundation study estimated these losses at nearly \$4 million (1984 prices)—all because of what seems a minute increase in the river’s salinity levels.¹³

Small removals of water, here-and-there, however, add up. Total exports of water

¹¹ L. M. Finnell, *Fryingpan-Arkansas Fish Research Investigations: Final Report* (Denver, Colorado Department of Natural Resources, 1977), 18, 53

¹² Miller, *The Salty Colorado*, xiii.

¹³ Department of the Interior, Bureau of Reclamation, *Final Environmental Statement: Fryingpan-Arkansas Project, Colorado* (Denver, 1975), ii, IV-4-6; Miller, *The Salty Colorado*, xiii.

from the Colorado River total more than five million acre-feet annually. Increases in water salinity negatively impact water quality for more than twelve million people and one million acres of irrigated farmland each year; these increases result in an estimated \$91 million worth of damages annually. This figure of annual damages could reach more than \$267 million by 2010.¹⁴

Clearly, water exports have a detrimental effect on users in the Colorado River Basin. On the other hand, it seems logical to assume that the rivers receiving exported water—like the Arkansas—would benefit in terms of water quality. In fact, the benefits are minimal along the Arkansas. The addition of water into the Arkansas River led to increased agricultural pressure, which contributed negatively, overall, to water quality. Salinity levels in the Arkansas rose after irrigators began using imported water. FAP water ran through farmers' fields, picked up salts along the way, and returned to the Arkansas River, "loaded" with those salts.

In fact, the Arkansas River is one of the saltiest rivers in the United States. Farmers irrigate more than 200,000 acres in the Arkansas Valley with water deemed Class C4, the U.S. Salinity Laboratory's highest classification for salinity hazard. Salinity in the Arkansas River is responsible for several million dollars worth of damages annually. Salinity reduces land productivity and can, in particularly extreme concentrations, sterilize the soil, thereby eliminating crop production altogether. Oftentimes, as salt levels in irrigation water increase, farmers begin growing salt-tolerant crops like sugar beets and barley. This has frequently occurred along the Arkansas in Eastern Colorado. The drawback is that these crops are typically less valuable than less

¹⁴ Miller, *The Salty Colorado*, xiii, 5.

salt-tolerant crops.¹⁵

As in the Colorado River, most salts in the Arkansas River come from natural sources. However, 14% of the river's salts come from irrigation salt loading, while 8% come from municipal and industrial water discharge. Although they contribute only a low percentage of the salts present in the Arkansas, municipal and industrial sources may be the most devastating of all because they contribute "highly-soluble" salts—the most damaging type—to the river. Much of the river's salinity comes from salt concentration. Approximately 85% of the total surface water supply of the basin is consumed before reaching the Colorado-Kansas state line. Of this water, 60% is consumed by crop production.¹⁶ Donald Miles, in his study of the Arkansas River's salinity problems, concludes that:

Salinity contributions by irrigation agriculture result from passage of excessive amounts of water through the root zone. This may occur as a result of applying more water than is needed, applying water when it is not needed or nonuniform application of water which results in excessive irrigation of parts of the field while other parts are under-irrigated.... Not only does excessive application of water result in leaching salts, but it also excessively cools the soil, reduces soil aeration, and sometimes creates a high water table.¹⁷

One point from Miles' statement, in particular, deserves attention. Miles points out that much of the salinity problem in the Arkansas may be traced to poor water supply timing. The Southeastern Colorado Water Conservancy District's (SCWCD) Winter Water Storage Program impounds water that would normally flow down the Arkansas

¹⁵ Donald L. Miles, *Salinity In the Arkansas Valley of Colorado*, (Denver, CO, Colorado State University Extension Service, 1977), 1,3, 7; Lawrence MacDonnell reports that "the lower Arkansas River in Colorado is five times more saline than the 'Salty Colorado.' In the Lamar area the salinity concentration measures more than 4,000 parts per million of total dissolved solids most of the time, compared to approximately 850 parts per million of TDS measure in the Colorado River just above the border with Mexico." See Lawrence MacDonnell, *From Reclamation to Sustainability: Water, Agriculture, and the Environment in the American West* (Niwot, CO: University Press of Colorado, 1999).

¹⁶ Miles, *Salinity*, 1.

¹⁷ *Ibid.*, 5.

during winter months. Pueblo Reservoir is the primary storage facility for this program. The District allows irrigators who have winter water rights to save that water behind Pueblo Dam for use in the early spring, when it is more valuable and increases an irrigator's productivity. It benefits both the farmers and the District. But this program creates negative environmental impacts. Water stored in Pueblo reservoir will evaporate at a much greater rate than would occur if left to run its course in the Arkansas. Evaporation increases even more as the weather warms in spring. Water disappears and salt concentration increases.

The FAP's Final EIS concludes that the Winter Water Storage Program could produce changes in water supply timing that would "have a profound effect on river quality down the valley." The Winter Water Storage Program would also, the EIS concludes, create significant "secondary" impacts. One of these impacts would involve the displacement of more than 25,000 ducks directly downstream from the Pueblo Reservoir area due to the reduction in winter riverflow.¹⁸ Similar secondary impacts will be discussed at length later in this chapter.

Impacts on Fish: Salinity, Water Transfer, Flow Management Schedules, and Temperature Changes

The FAP and its facilities influence other local "residents"—fish and other aquatic organisms—that live in these rivers. The Colorado and Arkansas Rivers and their tributaries provide recreation benefits to anglers from local communities and to tourists from around the world. The Fryingpan and Arkansas Rivers enjoy a reputation as two of the most famous trout streams in the Western United States. Fish are a valuable

¹⁸ *Ibid.*, 1; Bureau of Reclamation, *Final EIS*, IV-14, IV-31.

commodity for recreational anglers and local communities.

Fish are also important to the natural balance of the larger ecosystem. They consume and are consumed, thereby providing a link between the various members of their habitat. Maintaining this balance and ensuring survival of each and every one of these ecosystem members has become a priority for wilderness advocates, environmentalists, anglers, and millions of other Americans. Diverse organizations such as the Sierra Club, Colorado Rivers Council, National Wildlife Federation and Trout Unlimited have voiced their concerns on the preservation of these habitats.¹⁹

Chemical changes created as a result of the FAP have negatively impacted fish and their environment. Besides changes in water chemistry, however, one of the most obvious challenges to fish and other aquatic organisms in these rivers is the removal of water. In 1977 L.M. Finnell, of the Colorado Division of Wildlife, noted his concern that the minimum pool prescribed by the FAP's Draft Environmental Statement on Ruedi Reservoir was too low. Kokanee salmon and lake trout, in particular, would be adversely affected by such a low level of water. Since then, the Bureau of Reclamation and the Division of Wildlife have come to some agreement on minimum reservoir and river levels.

The Endangered Species Act has added further fuel to the fire in the debate over minimum pools and minimum river flows in FAP rivers and reservoirs. In 1994 the Department of the Interior designated almost 2,000 miles on the Colorado River as critical habitat for Colorado squawfish, humpback chub, bonytail chub and razorback sucker—all endangered or threatened species.²⁰ Colorado River cutthroat trout are

¹⁹ Finnell, *Fryingpan-Arkansas*, 21; Bureau of Reclamation, *Final EIS*, Volume 2, XI-430.

²⁰ Gregory Silkensen, *Windy Gap: Transmountain Water Diversion and the Environmental Movement*

especially endangered and require substantial amounts of water during the spring spawning season. Spring also happens to be the season when most water diversions from the West to East Slopes occurs.²¹

Starting in 1990, the Bureau of Reclamation and the Fish and Wildlife Service came to an agreement that provided for the release of additional water into the Colorado River in order to aid endangered fish. In 2001 alone, the Bureau released 21,345 acre-feet of water from Ruedi Reservoir. This release of water reduces the amount of water developed for the FAP's beneficiaries and as such, impacts the overall cost-benefit ratio for the project.²²

The FAP has created water flow problems on the other side of the Continental Divide as well. Again, logic would suggest that increasing the amount of water in the Arkansas via FAP collection facilities would positively impact the fishery. However, resource managers now understand that the introduction of FAP water into the Arkansas can both negatively and positively affect the fishery depending upon the rates and timing of the releases.²³

The year 1990 became a pivotal one in the management of the Arkansas River thanks to the FAP. The release of water from Ruedi Reservoir to aid endangered fish was only one small component of the Bureau of Reclamation's new management plan. Prior to 1990 the Bureau of Reclamation released large amounts of water from FAP reservoirs

(Fort Collins, CO: Colorado Water Resources Research Institute, 1994), 107.

²¹ Finnell, *Fryingpan-Arkansas*, 59.

²² Department of the Interior, Bureau of Reclamation, "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2001 Operations" in U.S. Bureau of Reclamation, "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2001 Operations," n.d., <<http://www.usbr.gov/gp/aop/fa/01/01operations.htm#general>> (17 April 2004); Southeastern Colorado Water Conservancy District, "History and Description of the Fryingpan-Arkansas Project," n.d., <<http://www.secwcd.org/History%20and%20Description.htm>> (7 April, 2004); see also Finnell, *Fryingpan-Arkansas*, 59.

²³ Smith and Hill, *Arkansas River Needs Assessment*, 3-57.

along the Arkansas during the months of May and June to meet the demands of irrigators. The Bureau released minimal amounts of water the rest of the year. This flow schedule did considerable damage to the Arkansas River fishery, which requires certain minimum flow levels year round. The new annual flow management program, implemented in 1990, allow the Bureau to maintain flows that support irrigation, wildlife and recreational needs at various times of the year. This flow management program, sponsoring agencies boast, better Mother Nature's own schedule in maximizing benefits to those who rely on the river for sustenance, profit and play.²⁴

The new flow schedule releases more water from upper reservoirs—Twin Lakes, Clear Creek and Turquoise—to Pueblo Reservoir throughout the year. Releases during the late-summer, autumn and winter months (Labor Day to the start of spring runoff—around April 15) better sustain fish populations all year round. Even greater summer releases (typically July 15 to Labor Day) provide increased flows for kayaking, rafting and angling. The Arkansas River between Buena Vista and Pueblo Reservoir is the most extensively used recreation river in Colorado and one of the most used in the nation. Summer releases of water increase the amount of evaporation that occurs (Pueblo Reservoir stores water at a location lower in altitude and higher in temperatures than exists in the upper reservoirs) and may hurt flat-water recreation in the upper reservoirs. However, the agencies that manage the FAP deem these adverse impacts worth the cost, considering benefits received.²⁵

Another ongoing and less-easily repaired problem involves the rerouting of water along the Arkansas. In order to increase water flow to the Mt. Elbert Forebay Reservoir

²⁴ Ibid., 1-11, 1-12.

²⁵ Ibid., 1-11, 1-12, E-1.

for use in generating electricity at the Mt. Elbert Pumped-Storage Powerplant, FAP facilities divert water from Lake Fork and Half Moon Creek—both tributaries of the Arkansas River. The water diverted from these tributaries will, of course, eventually return to the Arkansas River—but at a new point, miles downstream from the previous confluence.²⁶

This re-routing of water creates several environmental problems, particularly for the area's fish populations. First, these transfers reduce the amount of water available for native trout populations between the points of removal and return, thereby reducing their numbers dramatically. Important spawning and nursery grounds for brown trout are also compromised and even lost as a result of this diversion. Second, the upper reaches of the Arkansas River contain large amounts of heavy metals that entered the river as mine drainage from another tributary, California Gulch. Leadville, Colorado, located at the headwaters of the Arkansas River, gained national reputation in the nineteenth century as a silver and gold mining region. More recently it has been home to a molybdenum mine. The lasting legacy from these mining activities, however, is toxic leftover. The area surrounding Leadville receives federal dollars for clean-up as a Superfund site. This toxic mine drainage has historically been diluted by Lake Fork and Half Moon Creek. The removal of water from these two tributaries has resulted in increased heavy metal concentrations. Brown trout populations were either destroyed or significantly decreased along a significant portion of the Arkansas headwaters as a result.²⁷

Yet another factor impacts fish along the FAP's reservoirs and facilities: water temperature changes. Water behind dams warms and evaporates at the surface.

²⁶ Finnell, *Fryingpan-Arkansas*, 63; Thomas P. Nesler, *The Fish Populations and Fishery of the Upper Arkansas River, 1977-1980* (Ft. Collins, Colorado Department of Natural Resources, 1982), 24.

²⁷ Nesler, *Fish Populations*, ii, 1, 23-4.

However, deeper below the surface water temperatures are cooler than average; it is this cooler water that dams release into streams. A 1983 environmental study of the Fryingpan River concluded:

Due to the deep release of water from the reservoir, mean monthly summer temperatures in the river have decreased about 15 degrees Fahrenheit at the dam site and 9 degrees Fahrenheit near Basalt compared to pre-dam records. Low water temperatures in the spring... reduce the survival of rainbow trout eggs in the upper two to three mile section of the river.²⁸

Ellen Wohl's recent studies have shown that temperature changes, along with dam-induced water level fluctuations and changes in oxygen levels to released water profoundly influence the survivability, growth and reproduction of fish.²⁹

Of course there is another side to the debate. The same environmental study that warns about the effects of colder water released from Ruedi Reservoir states that, in general, the Fryingpan River is "good quality habitat for trout" on the fourteen-mile segment of the river from Ruedi Dam to the river's confluence with the Roaring Fork River near Basalt.³⁰ Furthermore, the Bureau of Reclamation claims:

Development of the Ruedi Dam and Reservoir has increased the available fish habitat in the area, and the Fryingpan River immediately downstream from Ruedi is known as a gold medal fishery. Operation of the dam has exposed about six acres of gravel, which now serve as a brown trout spawning ground, immediately downstream from the dam. The gravel areas and regulated stream flow have improved the fishery through increased natural reproduction and increased recreation opportunities in the immediate area.³¹

Such positive impacts on the environment are worthy of noting; they are few in number,

²⁸ Simons, Li, and Associates, Inc., *Fryingpan-Arkansas Project, Ruedi Reservoir, CO, Round 2 Water Sale Environmental Assessment* (Ft. Collins, CO: Simons, Li and Associates, Inc., 1983), 3.13-3.16; see also Finnell, *Fryingpan-Arkansas*, 15, 52.

²⁹ Wohl, *Virtual Rivers*, 120; Sarah Bates, David Getches, Lawrence MacDonnell and Charles Wilkinson, *Searching Out the Headwaters: Change and Rediscovery in Western Water Policy* (Washington, D.C.: Island Press, 1993), 42-4, 140.

³⁰ Simons, Li and Associates, Inc., *Fryingpan-Arkansas*, 3.13.

³¹ U.S. Bureau of Reclamation, "Fryingpan-Arkansas Project," n.d., <<http://www.usbr.gov/dataweb/html/fryark.html>> (7 April 2004).

however.

Dams, in general, create numerous negative consequences on the environment in addition to those already mentioned. High runoff in the spring has a scouring effect upon rivers. The increased flows of water remove sediments and other accumulated matter from river banks. In other words, they clean the riverbed. Reservoirs, however, store excessive spring water behind dams for use during other times of the year and to prevent flooding in developed areas. At Ruedi Reservoir, the removal of this spring-scouring has led to high algal buildup, which in turn, has led to lower productivity in natural food organisms and aquatic invertebrates. Fish populations, of course, also decreased and anglers noted their concerns as early as 1977.³²

The FAP's dams create other stresses on aquatic organisms. For example, many immature lake trout slip through the gates of the Mt. Elbert Conduit at Turquoise Reservoir and end up at Mt. Elbert Forebay. The Mt. Elbert Powerplant's turbines grind many of them up during power generation.³³ More troubling to a local ecosystem is its transformation from a lotic (running-water) habitat to a lacustrine (still-water) habitat. The FAP inundated over twenty miles of Colorado streams, including over eleven miles of fair-to-excellent quality fisheries. Lacustrine habitats provide insufficient spawning areas for native fish and reduce familiar food sources, such as plankton and benthos populations.³⁴

Lacustrine habitats are also more appealing to anglers who come in increased numbers and place higher pressures on the resource. Recreation pressures and habitat changes have placed major stresses on native fish populations. The FAP's Final EIS

³² Finnell, *Fryingpan-Arkansas*, 52-3, 56.

³³ *Ibid.*, 61-2.

³⁴ Bureau of Reclamation, *Final EIS*, IV-34-5.

estimated that the project's reservoirs would require approximately 72.9 tons of hatchery-reared fish for stocking—many of which would have to be lacustrine types, such as lake trout, kokanee salmon and smelt.³⁵

Terrestrial Impacts

The 2000 *Arkansas River Water Needs Assessment* discussed the importance of riparian habitats to the local ecosystem at considerable length. This report states:

Riparian and wetland areas have been well-documented as the most productive and attractive of all wildlife habitats. Riparian communities have an importance to fish, wildlife and recreation which is greatly disproportionate to the acreage of these areas. Although less than 1 percent of the landscape is riparian vegetation, greater than 80 percent of breeding bird species occurs in this vegetation type in the central Rocky Mountains. Riparian areas often provide the key resources that support biological diversity both in the riparian area and nearby uplands.

When disruptions occur to these riparian habitats, like those created by the FAP, reverberations are felt throughout the ecosystem. “Riparian and wetland areas,” the report continues,

are critical for water-dependent terrestrial wildlife species and provide important corridors for movement of wildlife. The linear nature of riparian ecosystems provides distinct corridors important as migration and dispersal routes and as forested connectors between habitats for wildlife such as birds, bats, deer, elk, and small mammals.³⁶

The benefits and costs of the 1990 flow management schedule on riparian vegetation and habitat are difficult to ascertain. Although it would appear that higher year-round flows would positively impact the riparian landscape, water managers concede that positive or negative impacts on various riparian areas change according to a broad spectrum of factors including soil moisture, bank erosion rates, and water table

³⁵ *Ibid.*, IV-34-5.

³⁶ Smith and Hill, *Arkansas River Needs Assessment*, 5-16-17

levels. “An action perceived to enhance vegetation” the *Needs Assessment* warns with regard to manipulating flow patterns, “could erode stream banks and ultimately limit the vegetation extent.”³⁷ It is impossible, in other words, to control the loss or gain to a riparian zone along the river given our current understanding of the ecosystem.

Nevertheless, the *Needs Assessment* points out many ways that the Fryingpan-Arkansas Project impacts the surrounding habitat. The FAP’s reservoirs and other facilities disrupt terrestrial flora and fauna. Grazing and farming lands, as well as wilderness-quality lands, now lie under water or house project buildings, transfer stations, pipelines, canals or any number of other project facilities. New roads—over sixty-two miles worth of them created during construction—disrupt migration patterns, erode soils and create access for hunters and other recreational users who place increased strain on the environment. The disturbed terrain over buried pipelines often requires years of intensive rehabilitation in order to return to productive use. Disturbed soils remain susceptible to invasion from non-native species of flora which can delay the return of native species of plants and animals indefinitely. Meanwhile, the FAP’s Final EIS reported major geological problems at Ruedi Reservoir shortly after its completion:

Slumping and sloughing has developed along the shoreline of Gyp Hill at Ruedi Reservoir. Wave action and annual fluctuation of the water level of Ruedi Reservoir has flushed out the backfill of ancient, filled sinkholes. These solution cavities have since collapsed, giving the area an unaesthetic appearance. The area also presents a safety hazard in its present state and access to the area by general public is discouraged.³⁸

The FAP removed an estimated 17,300 acres of rangeland on both sides of the Continental Divide from use; it has similarly removed nearly 1,000 acres of irrigated croplands. It has permanently removed more than 5,000 acres of habitat for terrestrial,

³⁷ *Ibid.*, 5-23.

³⁸ Bureau of Reclamation, *Final EIS*, VI-6.

subterranean and avian species. The displacement of 25,000 ducks from the Pueblo Reservoir area has been discussed previously.³⁹

Various species of wildlife react differently to disturbances along riparian habitats. Some birds will abandon nesting sites. Changes in the availability of food may weaken other species to the point of extinction. The amount, velocity and quality of water in a river all effect species populations in different ways. Winter water flows are important to Canada geese, for example, because they impact the availability of aquatic vegetation, terrestrial grasses, forbs, grains, stems, leaves, fruits, flowers, and insects. Wood ducks, on the other hand, return every year to the same location and nest in large trees—primarily cottonwoods. Herons and other species of birds, too, rely on large cottonwoods for nesting. Cottonwood growth, however, is dependent on periodic flooding, which has been virtually eliminated as a result of the FAP.⁴⁰

Threatened or endangered species that inhabit the riparian zones along the Arkansas and Colorado Rivers include bald eagles, peregrine falcons and Mexican spotted owls. All may be negatively impacted by changes along these rivers. Other species that could be impacted by significant changes to riparian habitats—particularly human disturbance, changes in water quality and quantity, and changes in riparian vegetation—include American dippers, osprey, bighorn sheep, woodhouse toads, and painted turtles.⁴¹

The exact impact that the FAP has had on riparian habitats is impossible to discern. However, the *Needs Assessment* concludes:

Riparian and wetland resources in the region... have been greatly modified. A

³⁹ Ibid., IV-26, IV-31.

⁴⁰ Smith and Hill, *Arkansas River Needs Assessment*, 5-1, 5-17, 5-18, 5-19, 5-20.

⁴¹ Ibid., 5-1, 5-17, 5-18, 5-19, 5-20.

century of road, railway, and dam construction, irrigation, conversion of land to agriculture, urban development and other modifications have transformed riparian resources.

The FAP is no small contributor to this transformation.

Conclusion

The use of FAP facilities to manage river flows has maximized benefits to irrigators, municipal and industrial entities and recreational users. It has also reduced some of the adverse environmental effects caused by its reservoirs, tunnels and related facilities. Nevertheless, the impact of these facilities on the local environment has been devastating. Changes in chemical composition, water flows and water temperature have negatively impacted both aquatic and terrestrial species of flora and fauna. The inundation of land by reservoirs and the construction of roads, pipelines and other facilities have disturbed wildlife corridors as well as nesting and feeding grounds.

The Bureau of Reclamation spent little time investigating this link between hydrology and ecology—the interconnectedness of a river and its surrounding habitat—when Congress began discussing the FAP in the 1950s and 1960s. But this oversight changed in the late 1960s and early 1970s as Americans became more aware of the environmental problems that came with water development projects and showed an increased willingness to prevent or correct these problems.⁴²

This larger study of the Fryingpan-Arkansas Project has been written, in part, to answer an important question that concerns the American West today: What does the

⁴² For an excellent discussion of the rise of modern environmentalism and the “environmental revolution of the late 1960s and 1970s, see Mark Harvey’s *A Symbol of Wilderness: Echo Park and the American Conservation Movement*, Roderick Nash’s *Wilderness and the American Mind*, and Michael McCloskey’s “Wilderness Movement at the Crossroads, 1945-1970” in the *Pacific Historical Review* (August, 1972 issue).

FAP tell us about our potential to develop similar water development projects in the future? This chapter fills in what has been a missing piece of the puzzle in determining costs and benefits for the FAP. The costs of the FAP on the environmental are substantial enough to ward off consideration of similar projects in the future.

Conclusion

When Congress approved the Fryingpan-Arkansas Project in 1962 Americans did not fully understand all of the costs involved in building and maintaining reclamation projects of its size and complexity. They did, however, understand that certain costs existed and felt that they were acceptable in light of the benefits the project provided for cities, industries and agricultural users. Despite the controversy that erupted over the diversion of water from the Western Slope to the Eastern Slope, the majority of Coloradoans felt that their interests were adequately protected by the finalized project.

A look at the debate over the FAP during the 1950s and early 1960s reveals a remarkable picture of our nation's history. The Cold War dominated American life at the time and Congressmen felt obligated to ensure that military installations like the Pueblo Ordnance Depot, and industries deemed critical to our national defense, like Colorado Fuel and Iron, received the water they needed to operate. A severe drought during the 1950s added to their concerns. Meanwhile, environmental groups such as the Wilderness Society and the Sierra Club began debating whether they should expand their focus beyond National Parks and pristine wilderness areas to advocate for general environmental protections. By the 1960s, the environmental movement would emerge in the form we know it today.

Economically, the Fryingpan-Arkansas Project has been plagued by the same concerns that gave reclamation a bad name elsewhere in the West: federal subsidies, poorly-calculated cost-benefit ratios and unequal distribution of benefits. The Southeastern Colorado Water Conservancy District, the agency responsible for repayment of many of the project's facilities, received a final bill for roughly \$132

million. The project's actual costs, though difficult to estimate, were at least \$485 million. Federal taxpayers made up the difference. Below-market interest rates on the \$132 million debt equate to additional subsidies for the SCWCD at taxpayer expense.

Colorado citizens are hit particularly hard by the costs of the FAP. Property taxes collected from Coloradoans living in the district's boundaries pay for nearly 80% of the project's costs. Yet most of these residents receive few if any of the benefits created by the FAP. Although the FAP's Operating Principles guarantee cities and industries 51% of the water reclaimed by the project, irrigators, up until the last couple of years, received, on average, 77% of the project's water. El Paso County, home to Colorado Springs, receives, on average, only 23% of the FAP's allocation of water; yet its residents contribute roughly 74% of the property tax revenues used by the SCWCD toward its financial obligation.

Part of the reason cities did not receive their full allocation of water in past years was their lack of ability to transport the water. This problem may be remedied in the future if state and federal agencies approve projects like Colorado Springs' proposed Southern Delivery System (SDS). The SDS would construct new reservoirs along the Arkansas, would enlarge the storage capacity of existing FAP facilities at Pueblo, Twin Lakes and Turquoise Reservoirs, and, most importantly, would construct a delivery pipeline between Colorado Springs and the Arkansas River.

For now, irrigators in the Arkansas Valley benefit the most from the existing arrangement. They pay a fraction of the actual costs of the water they receive from the FAP. Still, the FAP cannot meet even their needs every year. In particularly dry years, the supply of water does not come close to meeting the demand. On the other hand, in

wet or normal years of precipitation, large amounts of “native” Arkansas water flushes down the river unused. Moderating these feasts and famines may require enlarging existing reservoirs or building new ones—the approach called for in the SDS. However, the cost of this approach may be considerable, especially to the local environment.

After the passage of the FAP in 1962, a new environmental sensitivity emerged in America’s consciousness. Cold War fears morphed into fears over the survival of endangered fish species and the preservation of riparian habitats. Similarly, recreation, with its emphasis on natural, raw beauty, emerged as a more powerful industry in Colorado than agriculture and steel. Greater concern for the environment surfaced, in part, because new scientific methods allow us to measure environmental changes more accurately than ever before.

Americans in 1962 had little knowledge about the consequences that the FAP would have on the environment. Since that time, however, we have discovered better means by which to measure environmental changes in the rivers and ecosystems caused by the project. Fish and other aquatic organisms have been negatively impacted by the FAP for a variety of reasons. The FAP increased levels of salinity in the water, changed water temperatures in dams and rivers downstream from them, slowed water to a standstill in some areas, and removed it from other locations altogether. These conditions similarly affected terrestrial habitats surrounding the rivers and the flora and fauna that dwell in them. Micromanagement of the Arkansas River by state and federal agencies has alleviated some of these concerns in that basin, but not all of them.

Salinity has emerged as the most pressing environmental issue raised by the FAP. Farmers along the Colorado River and Arkansas River basins have seen their productivity

reduced because of salinity increases in their irrigation water. Ten percent or more of the Arkansas Valley's farmable acres are out of production because of increases in salinity caused, in part, by the Fryingpan-Arkansas Project.

Neither Donald Worster's nor Donald Pisani's interpretation of water history in the West adequately explain the passage of the Fryingpan-Arkansas Project and the distribution of its costs and benefits. However, both historians provide facts and analyses that helped shape the final conclusions presented in this thesis. The government and wealthy elites did not monopolize the process of planning and passing the project, as Worster contends happened elsewhere in the West. Diverse Colorado interests—from the Salida Chamber of Commerce to Pueblo Trades and Labor Assembly—approved of the project, and many of them helped shape the FAP from the very beginning. Most Coloradans viewed water development as a way to maintain economic growth. The Bureau of Reclamation, the federal bureaucracy and the wealthy agricultural “elites” were more than happy to endorse and lead the process. However, the FAP is not their baby alone. The project's history, then, in alignment with Donald Pisani's interpretation, is one important “fragment” of water policy in the West.

On the other hand, Donald Worster's conclusion that an agricultural “elite” received most of the benefits of reclamation in the West—subsidies in the form of cheap water, paid for with federal tax dollars—concur with the findings presented in this thesis. However, the agricultural “elite” in the Arkansas Valley, with average holdings of just over 1,200 acres, do not at all resemble the wealthy “elite” addressed by Worster in *Rivers of Empire*. The holdings of Arkansas Valley farmers are minuscule when compared to those held by giant California agribusinesses like Chevron USA or the Tejon

Ranch—35,000 acres or more. Similarly, Worster's contention that reclamation projects in the West have substantially altered and harmed the environment is supported by documents on the Fryingpan-Arkansas Project. The contributions made by both Worster and Pisani to this examination of the Fryingpan-Arkansas Project are significant. However, the conclusions reached in this thesis are unique and add new depth to the historiography.

This thesis has examined the political, economic and environmental history of the Fryingpan-Arkansas Project. The FAP is an inefficient system, financed by inefficient methods. However, it benefits numerous Coloradoans in numerous ways. Water concerns will only worsen as time goes on. Those involved in planning and approving projects like Colorado Springs' SDS should study the FAP closely before making policy decisions. It is critical that we examine our history of water development in order to make better decisions about future development.

Bibliography

Archival Materials

Aspinall, Wayne. Penrose Library Special Collections, University of Denver. Denver, Colorado.

Chenowith, J. Edgar. Norlin Library Archives, University of Colorado. Boulder, CO.

Western History and Genealogy. Denver Public Library Archives. Denver, CO.

Envelope of Clippings and Letters. Water Resources Archive. Berkeley, CA.

Newspapers and Periodicals

Aspen Times (Aspen, CO)

Colorado Springs Gazette (Colorado Springs, CO)

Daily Sentinel (Grand Junction)

Denver Post (Denver, CO)

Newsweek

Pueblo Chieftain (Pueblo, CO)

Pueblo Star-Journal and Sunday Chieftain (Pueblo, CO)

Steel News (Pueblo, CO)

Dissertations and Theses

Bishop, Mary Beth. *Evolving Western Water Policy*. Master's Thesis, University of Montana-Missoula, 1991.

Brodeur, Brian Robert. *Physical Constraints and Implications for Supplementing Arkansas River Flows for Recreation with the Fryingpan-Arkansas Project*. Master's Thesis, University of Colorado-Boulder, 1988.

Interviews

Bostrom, Gary. Interviewed by Brian Petersen. 18 January 2005.

Bricker, Kristin. Interviewed by Brian Petersen. 18 January 2005.

Edelman, Pat. Interviewed by Brian Petersen. 19 January 2005.

Fourteen Statements: History of the Fryingpan-Arkansas Project and Southeastern Colorado Water Conservancy District. Pueblo, CO: Southeastern Colorado Water Conservancy District, 1975), Interviewed by DuVoid Burris, 27 December 1972.

McCalman, Kerry. Interviewed by Brian Petersen. 11 May 2005.

Miller, Margie. Interviewed by Brian Petersen. 13 January 2005.

Articles

Arkansas River Basin Water Forum: "A River of Dreams and Realities": Proceedings of the 1995 Arkansas River Basin Water Forum, January 17-18, 1995, Pueblo, Colorado. Arkansas River Basin Water Forum (Jan 17-18, 1995). Ft. Collins, CO: 1995.

Cole, Donald Barnard. "Transmountain Water Diversions in Colorado." *The Colorado Magazine* 25, no. 2 (March 1948): 49-65.

Howe, Charles W., Jeffrey K. Lazo, and Kenneth R. Weber. "The Economic Impacts of Agriculture-to-Urban Water Transfers on the Area of Origin: A Case Study of the Arkansas River Valley in Colorado." *Journal of Agricultural Economics* (December 1990): 1200-04.

Lewandowski, Edward R., and Alexander Zlaten. "Foundation Problems of Ruedi Dam and Reservoir." Water Resources Engineering Conference of the American Society of Civil Engineers (Feb 3-7, 1969). New Orleans, LA: 1969.

Milliken, J. Gordon. "Water Management Issues in the Denver, Colorado, Urban Area," in *Water and Arid Lands of the Western United States*. Edited by Mohamed T. El-Ashry and Diana C. Gibbons. Cambridge: Cambridge University Press, 1988: 333-375.

Pisani, Donald J. "Beyond the Hundredth Meridian: Nationalizing the History of Water in the United States." *Environmental History* 5, no. 4 (October 2000): 466-482.

Young, Robert A., and R. Garth Taylor. "Some Measures of the Economic Impacts of a Large-Scale Rural to Urban Water Transfers." Paper Presented at Seminar on Water Allocation and Transfer Systems in a Maturing Water Economy. University of New England, Armidale, NSW, Australia (July 1990). 1990.

Books and Pamphlets

- Arkansas River Basin Water Quality Management Plan: Summary.* Denver: URS/The Ken R. White Company, 1975.
- Bates, Sarah, David Getches, Lawrence MacDonnell and Charles Wilkinson. *Searching Out the Headwaters: Change and Rediscovery in Western Water Policy.* Washington, D.C.: Island Press, 1993.
- Carr, Kathleen Marion, and James D. Crammond, eds. *Water Law: Trends, Policies, and Practice.* Chicago: American Bar Association, 1995.
- Evans, George. *Environmental Concepts for Mt. Elbert Powerplant.* International Conference on Pumped Storage Development and Its Environmental Effects (Sept. 19-24, 1971). Milwaukee, Wisconsin: 1971.
- Fryingpan-Arkansas Project, Ruedi Reservoir, CO, Round 2 Water Sale Environmental Assessment.* Fort Collins, CO: Simon Li and Associates, Inc., 1983.
- Getches, David H. *Water Law in a Nutshell.* Second Edition. St. Paul, MN: West Publishing Co., 1990.
- Halaas, E. T. *The Fryingpan-Arkansas Project: A Summary Statement and Analysis of Project Features, Objectives and Feasibility.* Denver, CO: Colorado Public Expenditure Council, 1955.
- Harvey, Mark W.T. *A Symbol of Wilderness: Echo Park and the American Conservation Movement.* Albuquerque: University of New Mexico Press, 1994.
- High Country News. *Western Water Made Simple.* Washington D.C.: Island Press, 1987.
- Hollon, W. Eugene. *The Great American Desert: Then and Now.* New York: Oxford University Press, 1966.
- Howe, Charles W., and K. William Easter. *Interbasin Transfers of Water: Economic Issues and Impacts.* Baltimore: The Johns Hopkins Press, 1971.
- Hunt, Constance E. *Down By the River: The Impact of Federal Water Projects and Policies on Biological Diversity.* Washington D.C.: Island Press, 1988.
- Ingram, Helen. *Water Politics: Continuity and Change.* Albuquerque: University of New Mexico Press, 1990.
- Lochhead, James. *Transmountain Diversions in Colorado.* Boulder, CO: Natural

Resources Law Center, 1987.

MacDonnell, Lawrence J., Richard W. Wahl and Bruce C. Driver, "Facilitating Voluntary Transfers of Bureau of Reclamation-Supplied Water, Volume I." Boulder, CO: Natural Resources Law Center, 1991.

MacDonnell, Lawrence J. *From Reclamation to Sustainability: Water, Agriculture, and the Environment in the American West*. Niwot, CO: University Press of Colorado, 1999.

Milenski, Frank. *In Quest of Water*. Boone, CO: Trails Publishing Co., 1993.

---. *Water: The Answer to a Desert's Prayer*. Edited by Beatrice Spade. Boone, CO: Trails Publishing Co., 1990.

Miles, Donald L. *Salinity In the Arkansas Valley of Colorado*. Denver: Environmental Protection Agency, 1977.

Miller, Taylor O., Gary D. Weatherford, and John E. Thorson. *The Salty Colorado*. Shawnee Mission, KS: Inter-Collegiate Press, 1986.

Oesterle, Dale A., and Richard B. Collins. *The Colorado State Constitution: A Reference Guide*. London: Greenwood Press, 2002.

Palmer, Tim. *Endangered Rivers and the Conservation Movement*. Berkeley: University of California Press, 1986.

Pisani, Donald J. *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902*. Albuquerque: University of New Mexico Press, 1992.

---. *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935*. Berkeley: University of California Press, 2002.

---. *Water, Land, and Law in the West: The Limits of Public Policy, 1850- 1920*. Lawrence: University Press of Kansas, 1996.

Powell, John Wesley. *Report On the Lands of the Arid Region of the United States, With a More Detailed Account of the Lands of Utah*. Edited by Wallace Stegner. Cambridge, MA: The Belknap Press of Harvard University Press, 1962.

Ponting, Clive. *A Green History of the World: The Environment and the Collapse of Great Civilizations*. New York: Penguin Books, 1991.

Reisner, M. and Bates, S. *Overtapped Oasis: Reform or Revolution for Western Waters*. Washington D.C.: Island Press, 1990.

- Reisner, Marc. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books, 1993.
- Sax, Joseph L. *Water Law: Cases and Commentary*. Boulder, CO: Pruett Press, Inc., 1965
- Sherow, James Earl. *Watering the Valley: Development Along the High Plains Arkansas River, 1870-1950*. Lawrence, KS: University Press of Kansas, 1990.
- Silkensen, Gregory. *Windy Gap: Transmountain Water Diversion and the Environmental Movement*. Fort Collins, CO: Colorado Water Resources Research Institute, 1994).
- Simmons, Virginia McConnell. *The Upper Arkansas: A Mountain River Valley*. Boulder, CO: Pruett Publishing Company, 1990.
- Simons, Li, and Associates, Inc. "Fryingpan-Arkansas Project, Ruedi Reservoir, CO, Round 2 Water Sale Environmental Assessment." Ft. Collins, CO: Simons, Li and Associates, Inc., 1983.
- Smallwood, Jr., J.B., ed. *Water In the West*. Manhattan, KS: Sunflower University Press, 1983.
- Smythe, William E. *The Conquest of Arid America*. New York: The MacMillan Company, 1911.
- Southeastern Colorado Water Conservation District. *Annual Reports*.
- Stegner, Wallace. *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West*. New York: Penguin Books, 1954.
- Sturgeon, Stephen C. *The Politics of Western Water: The Congressional Career of Wayne Aspinall*. Tucson, AZ: The University of Arizona Press, 2002).
- Tyler, Daniel. *The Last Water Hole In the West: The Colorado-Big Thompson Project and the Northern Colorado Water Conservancy District*. Niwot, CO: University Press of Colorado, 1992.
- Webb, Walter Prescott. *The Great Plains*. Boston: Ginn and Company, 1959.
- White, Richard. *The Organic Machine: The Remaking of the Columbia River*. New York: Hill and Wang, 1995.
- Wild, Peter. *The Opal Desert: Explorations of Fantasy and Reality in the American Southwest*. Austin: University of Texas Press, 1999.

- Wilkinson, Charles F. *Crossing the Next Meridian: Land, Water, and the Future and the West*. Washington, D.C.: Island Press, 1992.
- Wohl, Ellen E. *Virtual Rivers: Lessons from the Mountain Rivers of the Colorado Front Range*. New Haven: Yale University Press, 2001.
- Worster, Donald. *A River Running West: The Life of John Wesley Powell*. New York: Oxford University Press, 2001.
- . *Rivers of Empire: Water, Aridity, and the Growth of the American West*. New York: Pantheon Books, 1985.
- Young, Herbert C. *Understanding Water Rights and Conflicts*, 2nd ed. Denver: Burg Young Publishing, LLC, 2003.

Published Government Documents: Colorado

State of Colorado. *Operating Principles: Fryingpan Arkansas Project*. Washington D.C.: USGPO, 1961.

- . Colorado Department of Natural Resources, Division of Wildlife *Fryingpan-Arkansas Fish Research Investigations: Final Report*, by L. M. Finnell. Denver: 1977.
- . *Report of the State Engineer to the Governor of Colorado, 1883-1884*, by E.S. Nettleton. Denver, CO: Collier and Cleaveland Lith. Co., 1885.
- . *Thirty-first Biennial Report of the State Engineer to the Governor of Colorado, 1941-2*, by M.C. Hinderlider. Denver: Bradford-Robinson Printing Co., 1943.

Published Government Documents: United States

- U.S. Congress. Senate Subcommittee on Irrigation and Reclamation. *Hearing Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs on S. 964: A Bill to Authorize the Construction, Operation, and Maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado*. 83rd Cong., 1st sess., 1953.
- . Senate Subcommittee on Irrigation and Reclamation. *Hearing Before the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs on S. 284: A Bill to Authorize the Construction, Operation, and Maintenance by the Secretary of the Interior of the Fryingpan-Arkansas Project, Colorado*. 87th Cong., 2nd sess., 1962.
- . Senate Subcommittee on Water and Power Resources. *Hearing before the*

Subcommittee on Water and Power Resources of the Committee on Interior and Insular Affairs on S. 3740: Cibolo, Texas, and Fryingpan-Arkansas, Colorado, Projects. 93rd Cong., 2nd sess., 1974.

- U.S. Department of Agriculture. Forest Service. Rocky Mt. Region. *Impact Survey Report: Evaluation and Effects of the Fryingpan-Arkansas Project on the Administration, Management and Use of the San Isabel National Forest, Section I, Turquoise Lake.* Denver: 1968.
- U.S. Department of the Interior. Bureau of Reclamation. *Annual Operating Plans: Fryingpan-Arkansas Project, Water Years 1989-1990.* Billings, MT: 1989.
- . Bureau of Reclamation. *Contract Amendment Between the United States of America and the Southeastern Colorado Water Conservancy District to Establish the Initial Delivery Date and to Adjust the District's Payment (Contract No. 5-07-70-W0086, Amendment No. 2).* Denver: 1981.
- . Bureau of Reclamation. *Economic Changes In the Arkansas Valley In Colorado During the 1950s.* Denver: 1961.
- . Bureau of Reclamation. *Effects of Impoundment on Water and Sediment in the Arkansas River at Pueblo Reservoir,* by Scott Herrmann and Kent Mahan. Denver: 1976.
- . Bureau of Reclamation. *Effects of Operating Mt. Elbert Pumped-Storage Powerplant on Twin Lakes, Colorado: 1982 Report of Findings,* by James La Bounty, James Sartoris, and Davine Lieberman. Denver: 1984.
- . Bureau of Reclamation. *Final Environmental Statement: Fryingpan-Arkansas Project, Colorado.* Denver: 1975.
- . Bureau of Reclamation. *Final Environmental Statement: North Side Collection System, Fryingpan-Arkansas Project, Colorado.* Denver: 1973.
- . Bureau of Reclamation. *The Fish Populations and Fishery of the Upper Arkansas River, 1977-1980,* by Thomas P. Nesler. Fort Collins, CO: 1982.
- . Bureau of Reclamation. *Fryingpan River and Ruedi Reservoir Water Quality,* by J. W. Yahnke. Denver: 1982.
- . Bureau of Reclamation. *Gunnison-Arkansas Project Colorado: Project Planning Report No. 7-8a.49-0: Preliminary Draft, Subject to Revision.* Denver: 1947.
- . Bureau of Reclamation. *North Side Collection System, Fryingpan-Arkansas Project, Colorado. Final Environmental Statement.* Denver: 1973.

- . Bureau of Reclamation. *Report on the Arkansas Valley Projects, Colorado*. Denver: 1973.
- . Bureau of Reclamation. *Report on the Upper Arkansas River Basin, Colorado-Kansas: An Appraisal of Existing and Potential Water Resource Developments, Upper Arkansas River Basin*. Denver: 1969.
- . Bureau of Reclamation. *Supplement to Final Environmental Statement, Fryingpan-Arkansas Project, Colorado*. Denver: 1978.
- . Bureau of Reclamation. *Supplemental Feasibility Analysis: Fryingpan-Arkansas Project, Colorado*. Denver: 1961.
- . *Compilation of Water-Quality Data for Pueblo Reservoir and the Upper Arkansas River Basin, Colorado, 1985-87*. Denver: 1991.
- . *Fryingpan-Arkansas Project: Letter from Acting Secretary of the Interior Transmitting Report on the Fryingpan-Arkansas Project, Colorado, Pursuant to Section 9(A) of the Reclamation Project Act of 1939 (53 Stat. 1187)*. Washington D.C.: U.S.G.P.O., 1953.
- . Geological Survey. *Bibliography of Selected Water-Resources Information for the Arkansas River Basin in Colorado Through 1985*. Denver: 1994.
- . Geological Survey. *Selected Hydrologic Data for the Upper Arkansas River Basin, CO 1986-89*. Denver: 1991.
- . National Park Service. *Archeological Salvage for the Fryingpan-Arkansas Project in Lake, Chaffee and Pitkin Counties, Colorado in 1972*, by William G. Buckles. Pueblo, CO: 1973.
- . National Park Service. *Archaeological Survey of the Proposed Mt. Elbert-Malta Transmission Line, Fryingpan-Arkansas Project In Lake County, Colorado*, by William G. Buckles. Pueblo, CO: 1973.
- . A Report Prepared by the Cooperative Effort of the USDI Bureau of Land Management, USDI Bureau of Reclamation, USDA Forest Service and the Colorado Department of Natural Resources. *Arkansas River needs Assessment*, Roy Smith and Linda Hill, eds. Denver: 2000.

Websites

- Pricewaterhouse Coopers. "2002 Colorado State Parks' Market Assessment Study, 2002," n.d. <<http://www.parks.state.co.us/home/kids/publications/2002%20CO%20State%20Parks%20Market%20Assessment4-15-03%20Screen%20>

optimized.pdf (9 May 2005).

Southeastern Colorado Water Conservancy District, "History and Description of the Fryingpan-Arkansas Project," n.d. <<http://www.secwcd.org/History%20and%20Description.htm>> (7 April, 2004).

U.S. Department of the Interior. Bureau of Reclamation. Great Plains Region. "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2001 Operations" in U.S. Bureau of Reclamation, "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2001 Operations," n.d. <<http://www.usbr.gov/gp/aop/fa/01/01operations.htm#general>> (17 April 2004).

U.S. Department of the Interior. Bureau of Reclamation. Great Plains Region. "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2003 Operations" in U.S. Bureau of Reclamation, "Annual Operating Plan, Fryingpan-Arkansas Project, Water Year 2003 Operations," n.d. <<http://www.usbr.gov/gp/aop/fa/03/03operations.htm#general>> (9 May 2005).

Valliant, Jim, and Robert Ward. "Water Relocation In the Arkansas Valley," *Agronomy News* 20, no. 6 (November 2000). <<http://www.colostate.edu/Depts/SoilCrop/extension/Newsletters/2000/guAUTUMN00.htm#mapping%20arkansas%20river>> (22 November 2005).