

**THE ROLE OF CLIMATE IN SHAPING WESTERN WATER INSTITUTIONS, Justice Greg Hobbs,<sup>1</sup> June 11, 2003**

**Water, Climate, and Uncertainty:  
Implications for Western Water Law, Policy, and Management,  
Natural Resources Law Center, University of Colorado**

And turning our stern toward morning,  
our bow toward night,  
we bore southwest out of the world of man;

We made wings of our oars for our fool's flight.  
Five times since we had dipped our bending oars  
Beyond the world, the light beneath the moon

Had waxed and waned, when dead upon our course  
We sighted, dark in space, a peak so tall  
I doubted any man had seen the like.

Canto XXVI, Circle 8, *Bolgia* 8: 115-17, 121-25  
Ulysses' Tale, Dante, *The Inferno* (John Ciardi Translation)

And it may be that moved by that same fear,  
the one peak that still rises on this side  
flowed upward leaving this great cavern here.

Down there, beginning at the further bound  
of Beelzebub's dim tomb, there is a space  
not known by sight, but only by the sound

Of a little stream descending through the hollow  
it has eroded from the massive stone  
in its endlessly entwining lazy flow.

My Guide and I crossed over and began

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<sup>1</sup> Justice Hobbs of the Colorado Supreme Court is the author of the *Citizen's Guide to Colorado Water Law*, Colorado Foundation for Water Education (2003). He is co-convenor of *Dividing the Waters*, an educational project of the western water judges.

to mount that little known and lightless road  
to ascend into the shining world again.

Canto XXXIV, Circle 9, Round 4: 130-38,  
The Ascent From Hell, Dante, The Inferno

## Explorers

Ulysses—traveling West—spotted a peak so tall no man had seen the like. The Poet and his Guide climbed out of hell through a hollow that a little stream—they found only by its sound—had bored, into the lighted upper world.

Westerners, we recognize this immediately: the Ulysses/Dante story is the story of the Great Western Journey. We feel the joy and awe of Zebulon Pike and Major Stephen H. Long (1806 & 1820) in sighting the Great Divide rising out of a scorched and blasted desert plain and ascending up a freshet of mountain water. Traveling with Long, botanist Edwin James observed:

The images of pools of water, which we saw in the deserts of the Platte, appeared to us similar to those mentioned by Elphinstone, likewise to those observed by Nieburgh in Arabia, where *inverted* images were seen.<sup>2</sup>

. . . .

They ascended a primitive mountain which seemed to be of superior elevation, in order to overlook the western ranges, but they here found their horizon bounded by the succeeding mountain, towering majestically above them. To the east, over the tops of a few inferior elevations, lay expanded, like an ocean, the vast interminable prairie, over which we had so long held our monotonous march.<sup>3</sup>

Aridity. That's why the vistas shine so. And why the noses of our best western writers twitch so dryly.

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<sup>2</sup> Maxine Benson, Ed., *From Pittsburgh To The Rocky Mountains, Major Stephen Long's Expedition 1819-1820*, 195 (1988).

<sup>3</sup> *Id.* at 210.

## Writers

**Thomas Hornsby Ferril, “Drouth—1824,” Reprinted in Robert C. Baron, Stephen J. Leonard, and Thomas J. Noel, Thomas Hornsby Ferril and the American West, 16 (1996):**

Hear how the wagons crack  
In the copper drouth of the prairie,  
The pitch that boils from the seams  
Is not yet chilled by the moonrise,  
The great wheels groan like slaves,  
Under the loads they carry,  
The wheels are shrunken and spiked  
With wedges to keep them from breaking.

**J.W. Powell, Report on the Lands of the Arid Region of the United States (1879) (The Harvard Common Press 1983 Facsimile of the 1879 Edition), 5-6. 13-14, 42:**

The Arid Region is somewhat more than four-tenths of the total area of the United States” (excluding Alaska). . . During the fall and winter the streams are small; in late spring and early summer they are very large. A day’s flow at flood time is greater than a month’s flow at low water time. During the first part of the irrigating season less water is needed, but during that same time the supply is greatest. The chief increase will come from the storage of this excess water in the early part of the irrigating season. All the waters of the arid of all the arid lands will eventually be taken from their natural channels, and they can be utilized only to the extent to which they are thus removed, and water rights must of necessity be severed from the natural channels.

**Wallace Stegner, “Living Dry” in Marking The Sparrow’s Fall, The Making of the American West, 226-227 (1998 ed.):**

Adaptation is the covenant that all successful organisms sign with the dry country. . . (W)ater is safety, home, life, *place*. All around those precious watered places, forbidding and unlivable, is only open space, what one must travel through between places of safety.

**David Lavender, *The Southwest*, 20 (1980):**

As a result of these three drying agents—sun, wind, and transpiration—all but the highest mountains suffer from what agronomists call “moisture deficiency.” In many places this deficiency exceeds twenty inches. This means that no matter how excellent the soil or how free of frost the nights, unless irrigation water equal in amount to twenty or more inches of rain is spread at appropriate intervals on the fields, crops cannot be grown.

**Carl Abbot, Stephen J. Leonard, David McComb, *Colorado, A History of the Centennial State*, 173 (3<sup>rd</sup> Ed. 1994):**

(P)eriods of abundant rainfall and drought have occurred in regular cycles on the plains. The years from 1865 to 1872 were dry; those from 1873 to 1885 were wet. Droughts then came in cycles of twenty-one years, with the driest years occurring in 1892, 1912, 1934, and 1953. Total rainfall in the bad years dropped 15 to 25 percent below normal, with most of the reduction during the July and August growing seasons.

**Mary Austin, *The Land of Little Rain*, 1 (1950):**

Not the law, but the land sets the limit. Desert is the name it wears upon the maps. . . Void of life it never is, however dry the air and villainous the soil.

**Norris Hundley, Jr., *Water and the West, The Colorado River Compact and the Politics of Water in the American West*, ix (1975)**

No area of the world is more aware of the current water crisis than western America, a vast arid and semiarid region embracing nearly half the continent of North America. Except for a strip along the north Pacific coast and isolated areas in the high mountains, the West is a region of sparse rainfall and few rivers. The implications of these facts of geography have been enormous. From the time of the first settlers to the present, few westerners have failed to comprehend that control of the West's

water means control of the West itself—its industry; agriculture; population distribution; and, withal, the direction of the future.

We have learned from the relatively new science of paleohydrology not to be so arrogant or dismissive about the origins and reasons for mid-19<sup>th</sup> century western water development. Native Americans were working the waters of the Americas, followed by Hispanic Americans, long before the Oregon Trail opened for the Overlanders a way West from the ocean-like prairie to the waves of mountains blue to the western shores.

### **Native American Water Uses**

William H. Jackson, photographer and artist, accompanied the mapmakers. As a member of Ferdinand V. Hayden's Survey of Colorado in 1874-75, Jackson described the Pueblo ruins of the Puebloans (Anasazi) in the Mesa Verde region.<sup>4</sup> High up on the side of a southeast-facing cliff, he spotted ruins of ancient homes up a series of weathered steps perched—almost impossibly—on sheer vertical space ledges. Opposite one of the rooms was “a large reservoir, or cistern, the upper walls of which came nearly to the top of the window.”<sup>5</sup>

In 1893, the archaeologist G. Nordenskiöld found what he called “conclusive evidence that the cliff-dwellers had to contend with the same dry climate and the same scarcity of water as now obtain in these regions.”<sup>6</sup> He described an ancient reservoir he found on Chapin Mesa enclosed by a circular wall, with a ditch running into it. Nearby were the ruins of a considerable village.<sup>7</sup> Referring to the ruins of ancient irrigation works found in Northern Arizona, Nordenskiöld conjectured, “It is not at all improbable that irrigation by

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<sup>4</sup> W.H. Jackson, “Ancient Ruins in Southwestern Colorado,” Volume 1, Bulletin of the United States Geological and Geographical Survey of the Territories, F.V. Hayden, U.S. Geologist-In-Charge 1874 and 1875, Second Series, No. 1, 17-38.

<sup>5</sup> Id. at 21.

<sup>6</sup> G. Nordenskiöld, *The Cliff Dwellers of the Mesa Verde*, 73 (1893) (Reprinted by Mesa Verde Museum Association, Inc. 1990).

<sup>7</sup> Id. at 74.

artificial means was in use even among the prehistoric inhabitants of the Mesa Verde.”<sup>8</sup>

In 1985, reporting on the University of Colorado’s survey of Mesa Verde National Park, 1971 to 1977, archeologist Jack E. Smith reported the existence of a possible ancient reservoir known as Mummy Lake (Far View Reservoir, probably the reservoir Nordenskiöld had described) on Chapin Mesa and another in Morefield Canyon.<sup>9</sup>

Recent survey, engineering, and archeological work by teams of the Wright Paleohydrological Institute—in cooperation with the National Park Service and the Colorado Historical Society—have confirmed the existence of four ancient Mesa Verde reservoirs.<sup>10</sup> Examination of sedimentation samples, soil and pollen testing, and broken pottery and other cultural artifacts, have produced estimates of the operational life of these reservoirs:

- Morefield Reservoir in Morefield Canyon (AD 750—1100)
- Far View Reservoir (also known as Mummy Lake) on Chapin Mesa (AD 950—1180)
- Sagebrush Reservoir on an unnamed mesa west of Chapin Mesa (AD 950—1100)
- Box Elder Reservoir in Prater Canyon (AD 800—950).<sup>11</sup>

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<sup>8</sup> Id.

<sup>9</sup> Jack E. Smith, *Mesas, Cliffs, and Canyons*, The University of Colorado Survey of Mesa Verde National Park 1971-1977, 15, 21 (1986).

<sup>10</sup> David A. Breternitz, *The 1969 Mummy Lake Excavations Site 5MV833*, Wright Paleohydrological Institute (1999); Jack E. Smith and Ezra Zubrow, *The 1967 Excavations at Morefield Canyon Site 5MV1931*, Wright Paleohydrological Institute, (1993); Wright Water Engineers, *Final Report, Morefield Canyon Reservoir Paleohydrology, Mesa Verde National Park, Site 5MV1931* (1998); Wright Paleohydrological Institute, *Mummy Lake Paleohydrology Study* (2000); Wright Paleohydrological Institute, *Mesa Verde Paleohydrology Sagebrush Reservoir Site 5 MV1936* (2002); Wright Paleohydrological Institute, *Memorandum of May 23, 2003 on Box Elder Reservoir Survey, May 2-4, 2003*.

<sup>11</sup> Ken and Ruth Wright, *Prehistoric Colorado Reservoirs at Mesa Verde National Park*, 1 (May 2003).

Ken and Ruth Wright, with the help of Jack Smith and others for the Wright Paleohydrological Institute, conducted field investigations of the Morefield Reservoir in October 1995, May 1996, and May 1997, excavating an exploratory trench with a permit from the Park Service.

The Morefield reservoir mound is 200 feet in diameter, rises 16 feet above the valley floor, is 21 feet deep, and has a long berm-looking structure extending north from the reservoir up the valley floor to intercept the intermittent stream channel.<sup>12</sup>

The whole thing looks like an inverted frying pan. Sediment samples showed that clay and sand were carried into the reservoir from the stream channel; the clay helped to seal the reservoir from leaking. The Puebloans mucked out the sediment as best they could, throwing the material onto a growing embankment. The mound rose over the centuries from sedimentation, so what probably began as a hole dug into the channel to intercept shallow groundwater became an off-channel reservoir as the intermittent stream routed itself around a rising embankment.

Potsherds in the Morefield Reservoir trench were evidence that the people dipped water out of the reservoir and carried it away in water jars. Deer antlers, sticks, and baskets were used to muck out the reservoir.

To get water into the reservoir required a feeder ditch/canal. There are numerous large stones—the size of a large cowboy hat, and larger—lying at the surface of the dike that extends from the reservoir north. They are aligned and clearly appear to have been placed there, not washed in. This is evidence of the ditch/canal structure cutting northward to intercept the stream channel. 1,400 feet of it!

Apparently, the Puebloans used the four reservoirs for a drinking water supply. At Mesa Verde, they were dry land farmers, growing corn and storing it in nearby granaries they built of rock.<sup>13</sup>

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<sup>12</sup> I had the privilege in May of 2003 to be part of a Wright/National Park Service/Colorado Historical Society survey team for the Box Elder Reservoir in Prater Canyon. Attached is a journal I kept of the May 2-4, 2003, investigations at the Box Elder and Morefield reservoir sites.

<sup>13</sup> There is evidence that Native Americans grew maize in the center of the Colorado Plateau 3000 years ago. R.G. Matson, *The Origins of*

They knew of droughts. They tried to keep up to two years of corn in storage.

There's a great kiva near the Morefield Reservoir. House ruins in the vicinity show a population of nearly 500 people. They must have been proud of their reservoir, and very worried that it took so much work to keep it scooped out and to lengthen the canal. As the berm grew, they had to shift their diversion point again and again to intercept the shifting stream channel. They must have prayed for the rain to come and the water to enter the canal without washing it out.

The Wright Final Report on the Morefield Reservoir Investigation has a chart of tree ring data that show an annual average precipitation of 18 inches per year from 800 to 1100 A.D.—not much different from today in the Mesa Verde region, but there were good wet years and recurring droughts.<sup>14</sup> The Anasazi farmers, like today's, always perched between a sudden flood and enduring scarcity.

## **PUEBLO PEOPLE OF MESA VERDE**

You want to know where water's precious,  
Where every scoop of dirt's a prayer of life;  
And tomorrow's blessing—carried in a pot

Of clay is a source of wonder up a slope  
A thousand years away—perch upon  
A buried kiva's rim and take within the

Arcing southeast sun this light they saw—  
You see—and may you keep this light  
Within and speak it openly;

They worked and loved, like we, this  
Land, this calling, this Mesa Verde.

G. H. 5/2-4/2003

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Southwestern Agriculture, 258 (1991).

<sup>14</sup> Wright Water Engineers, Final Report, Morefield Canyon Reservoir Paleohydrology, at 12.

The Wrights credit the ancestral Puebloans with having good organizational capabilities and considerable skill in mounting large public works with rudimentary tools in a harsh climate:

Long before Columbus sailed for America, the ancestral Puebloans, people that we refer to as the Anasazi, were thriving at Mesa Verde, even though the winters were harsh and water supplies were limited. They had no written language; they did not have bronze, iron, or steel: and they did not use the wheel. As a result, our American history books tend to underrate them in terms of technical capabilities and social organization. However, the Anasazi had rudimentary knowledge of hydrological phenomena, water transport, and storage. To build reservoirs, they also had good organizational capabilities; otherwise, their large public works efforts requiring major and continuous operation and maintenance work would not have been possible. They were able to plan, build, and operate reservoir projects in southwestern Colorado more than one thousand years ago. The evidence that they left behind has provided ample proof of the civil engineering achievements that spanned hundreds of years.<sup>15</sup>

The four Mesa Verde reservoirs were able to capture water only during storm events from runoff in the canyons and on top of the mesas. The two mesa top reservoirs lacked natural drainage basins. Nevertheless, well-traveled paths, the environs of pueblos, and upslope agricultural fields would create runoff from even small rainfalls.<sup>16</sup>

Extended droughts periodically occurred. One of these in the 800s resulted in depopulation for a time,<sup>17</sup> although the “so called

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<sup>15</sup> Ken and Ruth Wright, Prehistoric Colorado Reservoirs at Mesa Verde National Park, 1 (May 2003).

<sup>16</sup> Id. at 3.

<sup>17</sup> A major series of droughts hit the Mesa Verde region in the A.D. 805-825 period, probably terminating the early villages as viable farming communities. Eric Blinman, Adjusting The Pueblo I Chronology: Implications For Culture Change At Dolores And In The Mesa Verde Region At Large,” in Art Hutchinson & Jack E. Smith (Eds.), Proceedings of the Anasazi Symposium 1991, 55, Mesa Verde

Great Drought of 1276-1299” in the region may not have been the reason why the Pueblo people abandoned Mesa Verde by 1300.<sup>18</sup> Why they left is still a mystery the archeologists have not solved. Perhaps, shortages of wood for construction and fuel, depletion of soil nutrients, and the rise of the Pueblo culture in New Mexico and Arizona may have combined with may have attracted them to move to the “big city” to join others already there! For example, groups may have moved to the Hopi villages on their mesas and the Rio Grande Pueblos.

Lt. Joesph C. Ives of the United States Corps of Topographical Engineers encountered the Hopi (called Moqui then) in 1859 during the expedition when he wrecked the steamboat—emblazoned “Explorer” on its wheel house—at Black Rocks, where Boulder Canyon Dam now stands. Proceeding on foot and mule overland, he arrived at the South Rim of the Grand Canyon. Seized up with mental acrophobia at seeing that astounding chasm, Ives uttered one of history’s most ironic false prophecies:

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Museum Association, Inc.

Droughts of 15 or more years’ durations are evident for A.D. 990-1015, 1030-1050, and 1276-1299, from tree ring studies. Mark D. Varien and Richard H. Wilshusen, Seeking the Center Place, Archaeology and Ancient Communities in the Mesa Verde Region, 87 (2002).

<sup>18</sup> A substantial reduction in the population of the area may have occurred between 880 and 940 A.D., with population increases between 950 and 1200 A.D., for a total population of 11, 000 to 14,000 persons, one-sixth of whom mere at Mesa Verde, the rest located on the Great Sage Plan and Dolores areas of Southwestern Colorado; by 1200, total migration occurred, not apparently in response solely to drought as populations had persisted in the area throughout prior droughts. *Id.*, Varien and Wilshusen, at 107, 111, 119-120. See also Carla R. Van West, “Reconstructing Prehistoric Climatic Variability And Agricultural Production In Southwestern Colorado, A.D. 901-1300: A GIS Approach, in Art Hutchinson & Jack E. Smith (Eds.), Proceedings of the Anasazi Symposium 1991, 28-31, Mesa Verde Museum Association, Inc.

The region last explored is, of course, altogether valueless. It can be approached only from the south, and after entering it there is nothing to do but to leave. Ours has been the first, and will doubtless be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado River, along the greater portion of its lonely and majestic way, shall be forever unvisited and undisturbed.<sup>19</sup>

Following the drainage of the Little Colorado River, Ives found the Hopis on their mesas. He described how at several of the villages—by a system of upper and lower reservoirs, intake ditches, and irrigation ditches—the Hopi stored, conveyed, and used drinking, irrigation, and stock water:

The face of the bluff, upon the summit of which the town was perched, was cut up and irregular. We were led through a passage that wound along some low hillocks of sand and rock that extended half-way to the top. Large flocks of sheep were passed; all but one or two were jet black, presenting, when together, a singular appearance. It did not seem possible, while ascending through the sand-hills, that a spring could be found in such a dry looking place, but presently a crowd was seen collected upon a mound before a small plateau, in the centre of which was a circular reservoir, fifty feet in diameter, lined with masonry, and filled with pure cold water. The basin was fed from a pipe connecting with some source of supply upon the summit of the mesa. The Moquis looked amiably on while the mules were quenching their thirst, and then my guide informed me that he would conduct us to a grazing camp. Continuing to ascend we came to another reservoir, smaller but of more elaborate construction and finish. From this, the guide said, they got their drinking water, the other reservoir being intended for animals. Between the two the face of the bluff had been ingeniously converted into terraces. They were faced with neat masonry, and contained gardens, each surrounded with a

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<sup>19</sup> Report Upon The Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers, 110 (1861).

raised edge so as to retain water upon the surface. Pipes from the reservoirs permitted them at any time to be irrigated.

Peach trees were growing upon the terraces and in the hollows below. A long flight of stone steps, with sharp turns that could easily be defended, was built into the face of the precipice, and led from the upper reservoir to the foot of the town.<sup>20</sup>

Ives, an engineer, admired the engineering skill of the Hopi:

The whole reflected great credit upon the Moquis' ingenuity and skill in the department of engineering. The walls of the terraces and reservoirs were of partially dressed stone, well and strongly built, and the irrigating pipes conveniently arranged. The little gardens were neatly laid out.<sup>21</sup>

Ives depended on Native American guides to lead him to other water holes as he trekked back out of what appeared to him as an appalling, exotic, bone-dry, except-for-a-few human-created-garden-spot landscape.<sup>22</sup>

The Spanish explorer Francisco Vasquez de Coronado—looking for mineral treasure his culture coveted—reported that the Native Americans of the Southwest worshipped water:

So far as I can find out, the water is what these Indians worship, because they say that it makes the corn grow and sustains their life, and that the only reason they know is because their ancestors did so.<sup>23</sup>

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<sup>20</sup> Id. at 120 (describing water works at Mooshahneh).

<sup>21</sup> Id. at 124 (describing water works at Oraybe).

<sup>22</sup> Id. at 125-131.

<sup>23</sup> Ira G. Clark, *Water in New Mexico*, 1 (1987) (from George Parker Winship, Ed. and trans., "The Coronado Expedition, 1540-1542, *BAE Ann. Rep.*, 1892-93, part 1, 561, quoting letter of Coronado to Mendoza, 3 Aug. 1540). The Hohokam understood the importance of laying out the canal with good gradient for water flow, and may have plastered the bottom of canals with adobe to prevent leakage. Michael C. Meyer, *Water in the Hispanic Southwest, A Social and Legal History, 1550-1850*, 12 (1984).

The Mayans practiced water religion by means of the “most elaborate water cult,” and common to Native Americans, particularly in the desert southwest, “because of its cardinal role in the daily struggle for survival, water was also afforded a telling reverence in southwestern religion, mythology, and lore.”<sup>24</sup>

In 1697 manuscripts Padre Kino and co-explorer, Captain Juan Mateo Manje reporting seeing ruins of water works built by the Hohokam in the Arizona Salt and Gila river drainages. Archaeological investigations in the 19<sup>th</sup> and 20<sup>th</sup> Centuries revealed an estimated total of 135 to 150 miles of canals in the Salt River Valley alone by 800 A.D. Some of the irrigation works may have existed as early as 300 B.C.<sup>25</sup>

Complicated water systems flourished among Mexico’s high aboriginal cultures:

In Yucatan, Oaxaca, and the Central Valley of Mexico complicated water systems flourished. Sophisticated irrigation agriculture allowed the flood surplus which, in turn, made the development of urban civilization possible. Throughout the constellation of civilizations in central and southern Mexico one could find diversion and check dams, dikes, canals, sluices, aqueducts, deep wells, reservoirs, tanks, and irrigation ditches with technologically advanced head gates and lateral channels.<sup>26</sup>

## Hispanic Water Uses

For nine years, from 1831-1840, Josiah Gregg crossed and re-crossed the plains by means of the Santa Fe Trail. In Commerce of the Prairies he describes the acequia system by which the Hispanic settlers irrigated long narrow parcels abutting the stream from a

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<sup>24</sup> Michael C. Meyer, *Water in the Hispanic Southwest, A Social and Legal History, 1550-1850*, 8-9 (1984). The Hohokam understood the importance of laying out the canal with good gradient for water flow, and may have plastered the bottom of canals with adobe to prevent leakage. *Id.* at 12.

<sup>25</sup> *Id.* at 2-3.

<sup>26</sup> *Id.* at 16-17.

mother ditch feeding smaller laterals to five or six acre fields.<sup>27</sup> Operation and maintenance of the acequias was a community enterprise for the benefit of the community. Three hundred or more acequias were operating in New Mexico by the 1800s.<sup>28</sup>

The Siete Partidas (1265), *Politica Indiana* (1647), *Recopilacion* (1681), and *Novisima Recopilacion* (1805), and specific ordinances and royal decrees were a basic source of Spanish and Colonial law, including the law of water use.<sup>29</sup> The *Plan de Pitic* (1783) set forth a mechanism for the assignment of land and irrigation water rights. A special commissioner in the locality was to divide the water

. . . in such a way that all the land subject to irrigation (that portion previously designated as subject to irrigation) would receive its benefits, especially during the spring and summer, the season most crucial to a successful harvest.<sup>30</sup>

The construction of an irrigation system for the new communities began even before the houses, public buildings, and churches were finished. It was crucial to have the ditches in place before the first sowing. The water official (*alcalde*) assigned and supervised the irrigation schedule of each farmer.<sup>31</sup>

Beneficial use and priority of use, along with cooperation in community, were important principles in the New Mexico water system, which derived from Moorish and Spanish laws and customs. Settlers were to respect the amount of water the Native Americans had long used for drinking water and irrigation.<sup>32</sup> However, conflicts between neighboring landowners and between Native Americans and the Hispanic settlers inevitably occurred because land with a reliable and permanent water source was scarce.<sup>33</sup>

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<sup>27</sup> Josiah Gregg, *Commerce of the Prairies* (1844) (Reprint of 1974, University of Oklahoma Press, Max L. Moorhead, ed., 107-108).

<sup>28</sup> New Mexico State Engineer's Office, *Acequias*, 4 (1997).

<sup>29</sup> Michael C. Meyer, *Water in the Hispanic Southwest, A Social and Legal History, 1550-1850*, 106-111 (1984).

<sup>30</sup> Michael C. Meyer, *Water in the Hispanic Southwest, A Social and Legal History, 1550-1850*, 36-37.

<sup>31</sup> *Id.* at 36.

<sup>32</sup> Ira G. Clark, *Water in New Mexico* at 17.

The New Mexico acequia tradition influenced Colorado in two direct ways. First, the oldest continuous water right in existence today is for the 1852 San Luis People's Ditch diverting from Culebra Creek. It was built to irrigate the fields of Hispanic settlers on the Sangre de Cristo Grant, an 1844 Mexican Land Grant.<sup>34</sup>

Second, when Benjamin Eaton—later, a Colorado Governor—became disillusioned with gold mining as one of the Colorado 1859ers, he learned to work acequia water on the Maxwell Land Grant outside of Cimarron, New Mexico.<sup>35</sup> Returning to homestead in Colorado Territory in 1864, he dug his own irrigation ditch and helped to construct the Union Colony No. 2 Canal in the early 1870s and, later, the Larimer and Weld Canal in Northern Colorado and the High Line Canal in the Denver basin. As a member of the Territorial Legislature, Constitutional Convention, and State Legislature, he worked to shape the prior appropriation provisions of the Colorado Constitution and early statehood water statutes, including the Adjudication Acts of 1879 and 1881.<sup>36</sup>

## **Climate and the Water Laws**

The western movement was more than seeking the material goal of working lush farmlands in Oregon, like Ulysses venturing West:

(I)t was Manifest Destiny made visible in wheel tracks. It was, as Thoreau recognized, a culmination of Occidental man's age-old instinct to follow the setting sun to the blessed isles, to the gardens of the Hesperides.<sup>37</sup>

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<sup>33</sup> Michael C. Meyer, *Water in the Hispanic Southwest, A Social and Legal History*, 47-49.

<sup>34</sup> *Lobato v. Taylor*, No. 00SC527, Slip Op. at 33 n. 9 (Colo. 6/24/2002).

<sup>35</sup> Jane E. Norris & Lee G. Norris, *Written In Water: The Life Of Benjamin Harrison Eaton*, 32, 220-222.

<sup>36</sup> *Id.* at 94, 104, 122, 139, 140, 146, 214.

<sup>37</sup> David Lavender, *Westward Vision, The Story of the Oregon Trail*, 27 (1963).

But the emigrants into the West had to go through the arid lands to get there. U.S. Army Captain Randolph Marcy's 1859 guide to the Overland Trail warns of "long stretches where grass and water are scarce."<sup>38</sup>

Walter Prescott Webb observed that settlers coming into contact with strange and new conditions can become innovators. Sometimes, their way of coping is a radical break from the past:

In the development of institutions there is always a conflict between custom and necessity. Through custom people cling to old traditions and try to perpetuate them by adapting them to new conditions, but necessity argues the case on its merit without much regard for precedent. Out of the conflict comes a compromise in which the old is modified and adapted. Since the frontier was ever in contact with strange and new conditions, the frontiersman became an innovator and therefore sometimes a radical.<sup>39</sup>

Sharp departure from prior customs may result in new laws that institutionalize the change. This happened in the American West, because of climate. Colorado's experience is an excellent example.

The years from 1865 to 1872 were dry.<sup>40</sup> In 1872, the Colorado Territorial Supreme Court issued its first water decision, Yunker v. Nichols.<sup>41</sup> The reality of settling into the arid lands, long known by hard experience to the Native and Hispanic Americans—that water is a scarce and precious community resource needed to grow crops—produced a radical break from the pre-existing English and American common law, which the Territorial Supreme Court encapsulated as the ruling principle of Colorado water law:

(R)ules respecting the tenure of property must yield to the physical laws of nature, whenever such laws exert a controlling

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<sup>38</sup> Randolph B. Marcy, *The Prairie Traveler*, 45 (1859)(Reprint, Applewood Books).

<sup>39</sup> Walter Prescott Webb, *The Great Plains*, 385 (1931).

<sup>40</sup> Carl Abbot, Stephen J. Leonard, David McComb, *Colorado, A History of the Centennial State*, 173 (3<sup>rd</sup> Ed. 1994).

<sup>41</sup> Yunker v. Nichols, 1 Colo. 551, 553 (1872) (opinion of Chief Justice Hallett).

influence . . . In a dry and thirsty land it is necessary to divert the waters of streams from their channels, in order to obtain the fruits of the soil, and this necessity is so universal and imperious that it claims recognition of the law.

The law of water scarcity and need—so the court declared—imposed a servitude across private and public lands for the building of ditches to divert and carry water to its place of beneficial use for irrigation, wherever that might be.<sup>42</sup> The pre-existing English and American common law assigned the right to use the waters of the stream only to those who held land adjoining the stream, limited the amount to de minimus consumption, and required the landowner's consent for any crossing of property or the construction of facilities on the lands of another. Yunker v. Nichols abrogated all three of these pre-existing property right formulations in favor of public water ownership and the establishment of use rights therein by private individuals and public agencies.

Although the court based its decision in part on a statute of the first Territorial Legislature in 1861,<sup>43</sup> it baldly proclaimed that the necessity of water use in the arid climes prevented the Legislature from repealing the fundamental right of the people to access and use the scarce public water supply:

I conceive that, with us, the right of every proprietor to have a way over the lands intervening between his possessions and the neighboring stream for the passage of water for the irrigation of so much of his land as may be actually cultivated, we well sustained by the force of necessity arising from local peculiarities of climate . . . It seems to me, therefore that the right springs out of the necessity, and existed before the statute was enacted, and would still survive though the statute were

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<sup>42</sup> Colorado law initially focused exclusively on irrigation, despite the stereotypical belief that mining produced the water law. Not until 1903 did Colorado adopt an adjudication act that provided for decreeing the priority dates of all beneficial uses, not just irrigation. See Gregory J. Hobbs, Jr., *Colorado's 1969 Adjudication and Administration Act: Settling In*, 3 *Denv. Water L. Rev.* 1, 9 (1999).

<sup>43</sup> *An Act to Protect and Regulate the Irrigation of Lands*, Colo. Territorial Laws, 67-68 (1861).

repealed. If we say that the statute confers the rights, then the statute may take it away, which cannot be admitted.<sup>44</sup>

The 1876 Colorado Constitution ratified the principles of Yunker v. Nichols, establishing prior appropriation for beneficial use as the governing precept for the waters of the natural stream, and providing for a right of private condemnation across the lands of another to build the necessary water works for beneficial use. In 2002, the Colorado Supreme Court, citing the court's 1872 decision, reiterated the Colorado Doctrine as follows:

Advancing the national agenda of settling the public domain required abandonment of the pre-existing common-law rules of property ownership in regard to water and water use rights.<sup>45</sup> Reducing the public land and water to possession and ownership was a preoccupation of territorial and state law from the outset.<sup>46</sup> A new law of custom and usage in regard to water use rights and land ownership rights, the "Colorado Doctrine," arose from "imperative necessity" in the western region. This new doctrine established that: (1) water is a public resource, dedicated to the beneficial use of public agencies and private persons wherever they might make beneficial use of the water under use rights established as prescribed by law; (2) the right of water use includes the right to cross the lands of others to place water into, occupy and convey water through, and

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<sup>44</sup> Yunker v. Nichols, 1 Colo. at 570 (concurring opinion of Justice Wells).

<sup>45</sup> Congress carved the Western states from property of the United States acquired through the 1803 Louisiana Purchase, the 1846 Oregon Compromise, and the 1848 Treaty of Guadalupe Hidalgo. Loren L. Mall, Public Land and Mining Law 7-8 (3d ed. 1981).

<sup>46</sup> For example, Colorado defined "any right to occupy, possess and enjoy any portion of the public domain" as "a chattel real possessing the legal character of real estate." Act of November 7, 1861, § 1, 1861 Colo. Sess. Laws 168, 168; § 36-2-101, 10 C.R.S. (2001). This was a departure from the common-law concept of "naked possession" that the Colorado Supreme Court termed "remarkable." Gillett v. Gaffney, 3 Colo. 351, 358 (1877); see Bd. of County Comm'rs v. Vail Assocs., 19 P.3d 1263, 1269 n. 8 (Colo. 2001).

withdraw water from the natural water bearing formations within the state in the exercise of a water use right; and (3) the natural water bearing formations may be used for the transport and retention of appropriated water. This new common law established a property-rights-based allocation and administration system that promotes multiple use of a finite resource for beneficial purposes.

The water provisions of Colorado's 1876 constitution and 1879 adjudication act of 1879 directly resulted from upstream/downstream junior/senior disputes over water scarcity. The 1870 Union Colony—downstream near the confluence of the Poudre and South Platte Rivers—built and began to operate their irrigation canals only to find in 1874 that diversions by a new ditch upstream near old Fort Collins had reduced the Poudre's flow to a trickle.<sup>47</sup> Clearly, the priority system and its enforcement—prior reliance on turning the water to beneficial use and protecting that use—had to be institutionalized within the three branches of Colorado government for the benefit of the citizens. So the Colorado General Assembly assigned the state's judiciary to decree water rights priorities and the State and Division Engineers and Water Commissioners to enforce them.

The pitch of water scarcity resounds repeatedly along the channel of the water law.

**1882, Coffin v. Left Hand Ditch:**<sup>48</sup>

The climate is dry, and the soil, when moistened only by the usual rainfall, is arid and unproductive; except in a few favored sections, artificial irrigation for agriculture is an absolute necessity. . . We conclude, then, that the common law doctrine giving the riparian owner a right to the flow of water in its natural channel upon and over his lands, even though he makes not beneficial use thereof, is inapplicable to Colorado. Imperative necessity, unknown to the countries which gave it birth, compels the recognition of another doctrine in conflict therewith.

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<sup>47</sup> Robert G. Dunbar, *Forging New Rights in Western Waters*, 88-98 (1983).

<sup>48</sup> Coffin v. Left Hand Ditch Co., 6 Colo. 443, 446-447 (Colo. 1882)(citing Territorial legislative acts, 1861 Colo. Sess. Laws, ch. 4, 68, and 1864 Colo. Sess. Laws, ch. 32, 68).

**1938, People v. Letford:**<sup>49</sup>

It is a matter of common knowledge that due to climatic conditions, except in a few limited areas, agricultural crops cannot be produced in Colorado except by irrigation of the land. Also it was early evident and still is obvious, that the economic and industrial development of an arid state is directly dependent on its water supply.

**1986, County Commissioners v. Denver Water:**<sup>50</sup>

The effects of drought on water supply in Colorado are well known. The impact of drought on municipalities has resulted in lawn watering restriction, moratoriums on service, and other restrictions on use to conserve water. A drought in the 1950's was so severe that the Board retracted use by temporarily creating a "Blue Line" beyond which water service would not be extended, and within which service was not assured.

As a result of the drought crisis of 1976, the board adopted water restrictions and a Tap Allocation Program which established procedures and criteria to allocate new taps among the various entities under contract outside Denver which are served the Board's water system.

Prior appropriation is a doctrine of scarcity that curtails undecreed water uses and decreed surface and tributary groundwater junior water uses, in accordance with decreed priority, when there is insufficient water available to supply all uses.<sup>51</sup> Adjudication of water rights priorities, and engineering studies of diversions and uses in wet, average, and dry times, allows water planners and suppliers to determine whether present and future water demands can be met, and what water rights have a dependable supply to support new uses by acquisition and change of those senior water rights to the new uses through water market transactions.<sup>52</sup> Augmentation and

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<sup>49</sup> People v. Letford, 102 Colo. 284, 295, 79 P.2d 274 (Colo. 1938).

<sup>50</sup> Bd. Of Cty. Com'rs v. Denver Bd. Of Water Com'rs, 718 P.2d 235, 239 (Colo. 1986).

<sup>51</sup> Gregory J. Hobbs, Jr., Priority: "The Most Misunderstood Stick In The Bundle," 32 *Envtl. L.* 37, 48 (2002).

<sup>52</sup> See, generally, Daniel S. Young and Duane D. Helton, P.E., "Developing a Water Supply in Colorado: the Role of an Engineer," 3

substitute supply plans may operate to allow out-of-priority uses to continue if adequate replacement water is made available to the otherwise injured water rights.<sup>53</sup>

### **A Water Law and Institutional Bridge—John Wesley Powell**

In his 1879 Arid Lands Report to Congress John Wesley Powell identified principles of climate, necessity, law, and use remarkably similar to those the Colorado Supreme Court had announced in 1872:

The ancient principles of common law applying to the use of natural streams, so wise and equitable in a humid region, would, if applied to the Arid Region, practically prohibit the growth of its most important industries. . . . If there be any doubt of the ultimate legality of the practices of the people in the arid country relating to water and land rights, all such doubts should be speedily quieted through the enactment of appropriate laws by the national legislature. Perhaps an amplification by the courts of what has been designated as the natural right to the use of water may be made to cover the practices now obtaining; but it hardly seems wise to imperil interests so great by intrusting them to the possibility of some future court made law.<sup>54</sup>

Powell emphasized that priority of utilization, based on seniority of rights, should apply in times of short supply based on the “necessities of the country.”<sup>55</sup> He would limit the water anyone could appropriate to water actually used; his caveat was that water ought to be tied to the land permanently, a position he reasserted when serving as a member of the Public Lands Commission.<sup>56</sup> He foresaw the West’s future in terms of an enduring agrarian democracy, like Jefferson before him. Instead, today’s West is a rapidly urbanizing multi-faceted democracy, but Powell had a major hand in the rise of

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U. Denv. Water L. Rev. 373-390 (2000).

<sup>53</sup> Simpson v. Bijou, No. 02SA377, Slip op. at 19, 24-25 (2003).

<sup>54</sup> J.W. Powell, Report on the Lands of the Arid Region of the United States (1879) (The Harvard Common Press 1983 Facsimile of the 1879 Edition), 42-43.

<sup>55</sup> *Id.* at 43.

<sup>56</sup> Donald Worster, A River Running West, The Life of John Wesley Powell, 378 (2001).

western irrigated agriculture and the institutions that grew up around it. Western agriculture—beyond Powell’s vision—has supported the rise of western urbanization and a water law that provides stability, reliability, and flexibility in the identification, protection, and change of water use rights.<sup>57</sup>

Like the Native Americans, who animated his ethnology work,<sup>58</sup> Powell saw the hand of the Great Spirit in the blessing and the working of water. He revered both the desert and the garden that is the American west. Son of a Methodist minister, his scientifically poetical writing invokes the redeeming power of the water drop:

It may be anticipated that all the lands redeemed by irrigation in the Arid Region will be highly cultivated and abundantly productive, and agriculture will be but slightly subject to the vicissitudes of scant and excessive rainfall.<sup>59</sup>

Climate, flood and drought, the power of divinely-inspired human labor teamed with natural cosmic forces to make a settling place through science, engineering, law, individual and community enterprise, and enlightened public policy—Powell harnessed Stephen

<sup>57</sup> The rise of the cities and of commerce, in addition to agriculture, requires a water law that recognizes security, reliability, and flexibility. Security resides in the system’s ability to identify and obtain protection for the right of water use. Reliability springs from the system’s assurance that the right of water use will continue to be recognized and enforced over time. Flexibility emanates from the fact that the right of water use can be changed, subject to quantification of the appropriation’s historic beneficial consumptive use and prevention of injury to other water rights. Empire Lodge Homeowners’ Ass’n v. Moyer, 39 P.3d 1139, 1147 (2002).

<sup>58</sup> Donald Worster, *A River Running West, The Life of John Wesley Powell*, 371 (2001).

<sup>59</sup> J.W. Powell, *Report on the Lands of the Arid Region* at 10.

Long's desert view and William Gilpin's garden view<sup>60</sup> into a vision of government in service to the cause of western settlement.

Powell saw the necessity of invoking the power of the national government to aid the farmer; otherwise, corporate monopolies—not animated by the public interest—would control the scarce water resource. His vision started with cooperative efforts, like those of the Mormons in Utah and the Union Colony in Colorado, to construct ditches from the streams to the land; inevitably, however, the settlers could not—within the limits of their own labor and finances—construct the reservoirs that would be needed to compensate for nature's yearly watershed rhythm, a flood of water off the mountains from spring snowmelt, then a drought when the heat of mid-summer requires crop water when the stream ebbs low.<sup>61</sup>

Powell became a law and institution builder, serving as Director of the U.S. Geological Survey after the short tenure of fellow western surveyor Clarence King. He advocated the organization of irrigation and land use districts and laws that would institutionalize the ability of western settlers to survive and enjoy living on the land.<sup>62</sup>

A series of alternate droughts and flash floods during the late 1880s and early 1890s prompted western farmers to the belated realization that they could not maintain their farms "unless they stabilized their water supplies by building larger reservoirs and stronger dams and canals than those they had attained so far through

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<sup>60</sup> William Gilpin, Colorado's first Territorial Governor, promoted western settlement during a cycle of wet weather, proclaiming another of the western great false prophecies: "rain follows the plow." Joni Louise Kinsey, Thomas Moran and the Surveying of the American West, 110 (1992). After President Lincoln removed him as Territorial Governor after one year in office, Gilpin became a land development, railroad, irrigation proponent. In numerous speeches and writings that received nationwide attention he argued that "Colorado's dryness was an advantage, for irrigated farming was the most efficient form of agriculture." Thomas L. Karnes, William Gilpin, *Western Nationalist*, 318 (1970).

<sup>61</sup> J.W. Powell, Report on the Lands of the Arid Region at 10 at 11-14, 27.

<sup>62</sup> *Id.* at 40-45; Donald Worster, *A River Running West, The Life of John Wesley Powell*, 479-486 (2001).

private effort.”<sup>63</sup> With Congressional funding, the Geological Survey produced a survey of potential reservoir sites and a short-lived piece of Powell-proposed legislation to withdraw reservoir sites from settlement under the Homestead laws,<sup>64</sup> so they would be available for use as needed in the future.<sup>65</sup>

Powell envisioned segmenting major rivers into a series of “natural districts” or “hydrographic basins” for the resolution of land and water problems; each district would own the water within its boundaries and each landowner in the district would share in the water and water decision making.<sup>66</sup> Although his land reservation proposals caused a Congressional furor and repeal of the reservoir site reservations, his vision of local water districts in charge of water rights and decision making—aided by national legislative and administrative policy—has been followed throughout the West, at least in part, through local district sponsorship and operation of reclamation projects.

## **Climate and Water Institutions**

Water scarcity sparked Powell’s proposals, as they mark the current Western institutional landscape. Drought events of four years or more occurred in large regions of Colorado and the West during the years 1899-1902, 1933-1937, and 1952-1956.<sup>67</sup> Each of these climatologically-caused episodes corresponded to the enactment of major laws creating significant water institutions.

In 1902, Congress enacted the Reclamation Act, creating the U.S. Bureau of Reclamation. Also in 1902, Kansas sued Colorado, commencing the era of interstate water allocation through United States Supreme Court equitable apportionment decrees and interstate water compacts.

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<sup>63</sup> David Lavender, *Colorado River Country*, 173-174 (1982).

<sup>64</sup> William deBuys, Ed., *Seeing Things Whole*, *The Essential John Wesley Powell*, 214-215 (2001).

<sup>65</sup> Donald Worster, *A River Running West* at 356-358; Joni Louise Kinsey, *Thomas Moran and the Surveying of the American West* at 99.

<sup>66</sup> Donald Worster, *A River Running West* at 494-495.

<sup>67</sup> *Colorado Climate*, Colorado State University, “Drought in Colorado,” 15 (Winter 1999/2000).

In 1937, the Colorado General Assembly created the Colorado Water Conservation Board, the Colorado Water Conservation District, and the Water Conservancy Act, under which the Northern Colorado Water Conservancy District became the first of the 51 water conservancy districts existing in Colorado today.

In 1956, Congress enacted the Colorado River Storage Project Act, putting into place a network of Colorado River reservoirs structured to support the operation of the 1922 Colorado River Compact. The 1956 Act became inevitable because the years 1905 to 1929 were the longest recorded wet cycle, resulting in a significant overestimation of Colorado River water available for allocation to the Upper and Lower Basin Colorado River states. The guarantee of a 75,000,000 acre-foot ten-year running average to the Lower Basin left the Upper Basin states in dire need of a large storage system that could withstand at least a severe four year drought.<sup>68</sup>

In turn, reaction to the implementation of the 1956 Act—through the construction of Glen Canyon, Flaming Gorge, Blue Mesa, and Navajo dams—helped to counter-produce the 1964 Wilderness Act, as proposed dams at Echo Park and Marble Canyon dramatized the environmental call for creation of a National Wilderness Preservation System.

## **Reclamation**

Harking to Powell's view of water scarcity and the need for redistribution of the natural hydrographic through reservoirs, the progressive era produced a marriage of the national forest preservation system with the reclamation program of irrigation development. The 1901 Congressional hearings on the Newlands and Shafroth bills sounded loudly with the principle that forest watersheds must be protected in aid of western water development and use. Congressman Newlands of Nevada emphasized that the

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<sup>68</sup> Based on tree ring studies, the long term average flow of the Colorado River Basin is 13.5 Million Acre-Feet, but the Compact negotiators assumed there was at least an average of 16 MAF. "The system of reservoirs now in place in the Colorado Basin is capable of storing approximately four times the average annual flow of the river." Kathleen A. Miller, *Climate Variability, Climate Change, and Western Water*, Report to the Western Water Policy Review Advisory Commission, 34.

capacity of locally built direct flow ditches to provide a stable irrigation supply had reached its limit, and the existing settlers were in need of water storage that they could not finance on their own:

On all those streams lands have been taken up and reclaimed, but the limit of reclamation under the present system has been reached. These rivers discharge immense quantities of water during the early spring and summer months, but become attenuated threads during July, August, and September. The only method of further development of irrigation is by water storage.<sup>69</sup>

The snows on the mountains are in a certain sense storage reservoirs for the water. The snows fall in immense quantities and great banks form in the ravines and the valleys, and as long as they are protected by the trees, the melting is not as rapid in the spring and summer months as it otherwise would be. When these trees are cut down the snow is exposed to the fierce rays of the sun, it melts rapidly, and the water rushes down in the early spring months. The destruction of the forests has limited and cramped many of the existing irrigation systems of the arid regions. Settlements which in former years never suffered from drought are now suffering, not because there is not the same quantity of water in the streams, but because it comes at a time when it is not needed, on account of the melting of the snow hastened by the cutting down of the forests.<sup>70</sup>

Congressman Newlands invoked Powell's earlier admonition that private corporations could not be trusted to act in the public interest:

Private capital will not undertake to build storage works unless there is a speculative profit. Investors wish to get a large area of land out of which they may make this profit by leading

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<sup>69</sup> Hearings Before the Committee on The Public Lands of the House of Representatives, Relating to The Reclamation and Disposal of the Arid Public Lands of the West, January 11 to 30, 1901, 11 (Government Printing Office 1901).

<sup>70</sup> Id. at 31.

irrigation ditches over it, and the general tendency of such a course is to create land monopolies. The object of the people of the United States is to prevent land monopolies and promote settlement.<sup>71</sup>

Pointing to the over-appropriation of the South Platte by the direct flow ditches, Congressman Shafroth of Colorado urged federal funding of reservoirs to allow irrigation of newly developed lands, along with stabilizing the water supply of existing farmers:

Now, the Platte River in Colorado has been appropriated eight times over, and on account of the increase of the population the claims on the waters of the Platte River have increased to eight times beyond what it is possible for the river with its ordinary flow to supply, and there is not a drop of water for any new lands. . . if you construct reservoirs and put them in direct connection with the reclamation of Government lands and designate that the water is to be utilized in that connection, the water turned into the stream from the reservoir can be taken out at a lower point and taken to the land the Government owns.<sup>72</sup>

Shafroth emphasized that the “laws of the irrigation states” recognized conservation of water for the improvement of lands.<sup>73</sup>

The great American forester Gifford Pinchot also testified at these hearings that the forest reserves would support, not impede, present and future water uses:

The successful development of those lands, the continuance of their prosperity, and the extension of this irrigation system over the West depends absolutely on the preservation of these forests.<sup>74</sup>

Colorado was central to the public debate surrounding the creation of the national forests. Colorado Senator Henry Teller, who also served for a time as U.S. Secretary of Interior, contended for the

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<sup>71</sup> *Id.* at 13.

<sup>72</sup> *Id.* at 33.

<sup>73</sup> *Id.*

<sup>74</sup> *Id.* at 65.

conveyance of the public lands to state and local interests and fought federal forest reserves.<sup>75</sup> President Teddy Roosevelt campaigned on the ground in Colorado for the forest reservations, arguing that withdrawal from homesteading and conservation of the forested watersheds was necessary to developing and using water for farms and cities.<sup>76</sup> 14 million acres of forest reserve exist in Colorado today.<sup>77</sup> Roosevelt convinced many Coloradans, despite Teller's adamant states' rights advocacy. Key to the compromise was a provision in the 1897 Forest Organic Act adhering to state water law and allowing rights-of-way for irrigation canals, ditches, flumes, and reservoirs.

The 1902 Reclamation Act wedded the national government's role in water conservation to forest conservation. As a result of this progressive conservation marriage, the Bureau of Reclamation has celebrated its one-hundred year anniversary. It has created more than 600 dams and reservoirs, distributes water to more than 31,000,000 urban and rural residents in the West, including one-fifth of the region's irrigation farmers on land that produces 60% of the nation's vegetables.<sup>78</sup> The Bureau's early, almost exclusive, irrigation focus inevitably shifted as the western United States proceeded into the World War I, Great Depression, World War II, and environmental eras.

In the late 1920s, Southern Californians were as much interested in the power production and flood control benefits of the Boulder Canyon Project as they were in a water supply. Dams as energy producers and cash registers helped the effort of the United

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<sup>75</sup> Duane A. Smith, Henry M. Teller, *Colorado's Grand Old Man*, 229-230 (2002).

<sup>76</sup> G. Michael McCarthy, *Hour of Trial, The Conservation Conflict in Colorado and the West, 1891-1907*, 50-57, 88 (1977).

<sup>77</sup> *Citizen's Guide to Colorado Water Law*, 25 (2003).

<sup>78</sup> Donald J. Pisani, "Federal Reclamation in the Twentieth Century: A Centennial Retrospective," 33, *Symposium on the History of the Bureau of Reclamation*, June 18-19 (2002). Powell had estimated that 30 million acres could be irrigated; the actual productive area today is closer to 10 million. Shelly C. Dudley, "The First Five: A Brief Overview of the First Reclamation Projects Authorized by the Secretary of the Interior March 14, 1903," 30, *Symposium on the History of the Bureau of Reclamation*, June 18-19 (2002).

States to emerge from the Great Depression and produce the power needed to win World War II and supply the growing cities after the war. Today, Bureau dams have a total capability of producing 14.7 million kilowatts of electricity.<sup>79</sup>

The creation of jobs, power, and water for cities often worked at cross-purposes to the Homestead ideal upon which it began, and, despite charges that it has tried to dominate and compete, cooperation with local interests and institutions has been a major tread of its step.<sup>80</sup> Congress interjected the Bureau into a web of pre-existing land and water laws that recognized the values and rights of private entrepreneurs, and expected the Bureau to operate as a business, recapturing investments, yet produce economic and democratic miracles for the disenfranchised urban poor and soldiers returning to civilian life.<sup>81</sup>

Colorado benefited from early reclamation projects and suffered detriment to its interests from others, dramatizing the point that the Bureau was responsive to a national constituency that included competing regional and state interests. Among the first five authorized projects were the Gunnison (Uncompahgre) Project in western Colorado and the Sweetwater (North Platte) Project in Wyoming and Nebraska.<sup>82</sup>

The Uncompahgre Project resulted from the late 1890-early 1900s drought, rescuing and completing a project that local residents had started.<sup>83</sup> The Gunnison Tunnel, diverting Gunnison River water into the Uncompahgre Valley, six miles long with a carriage canal

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<sup>79</sup> Jay Brigham, "From Water to Water and Power: The Changing Charge of the Bureau of Reclamation," 3, Symposium on the History of the Bureau of Reclamation, June 18-19 (2002).

<sup>80</sup> Id., Pisani, 14, 32.

<sup>81</sup> Patricia Nelson Limerick, "One Hundred Years of The Bureau of Reclamation: Looking from the Outside In," 11, 15-16, Symposium on the History of the Bureau of Reclamation, June 18-19 (2002).

<sup>82</sup> The other three of the earliest projects were the Milk River (Montana), Newlands (Truckee, Nevada), and Salt River (Arizona) projects. Shelly C. Dudley, "The First Five: A Brief Overview of the First Reclamation Projects Authorized by the Secretary of the Interior March 14, 1903," Symposium on the History of the Bureau of Reclamation, June 18-19 (2002).

<sup>83</sup> David Lavender, *Colorado River Country*, 175-177 (1982).

another twelve miles long, came on line in 1909. In the ensuing decades, the Bureau built additional diversion dams and either purchased private canals or constructed new ones, totaling approximately 470 miles. By 1913, the Uncompahgre Project canals delivered water to 37,000 acres while the private irrigation structures transmitted water to 13,600 acres. Within the next decade, the irrigated acreage increased to 64,180 acres within the project.<sup>84</sup>

John C. Fremont's 1842 surveying expedition produced a seven-part strip map of an overland, watered route by way of the North Platte through South Pass.<sup>85</sup> The North Platte River from Chimney Rock through Scott's Bluff through Ft. Laramie was a critical portion of the Oregon Trail's opening into the mountain West.<sup>86</sup>

The Bureau's Sweetwater Project benefited these portions of the North Platte valley in Wyoming and Nebraska. It included the construction of Pathfinder Dam, named for Fremont, and the Fort Laramie and Interstate canals, with water deliveries starting in 1909. By the mid-1920s, over two thousand miles of canals and laterals were constructed, bringing water to about 220,000 acres in Wyoming and Nebraska. Guernsey Dam at Goshen Hole, Wyoming, and Lake Alice and Lake Minatare in Nebraska were added. Under the Warren Act, allowing contracting of water with private water users for supplemental water on their lands, irrigated acreage increased another 100,000 acres.<sup>87</sup>

Early reclamation projects resulted in an embargo on Colorado water development of the Rio Grande and North Platte Rivers and contributed palpably to: (1) interstate water litigation in the U.S. Supreme Court, (2) successful negotiation of numerous water compacts, (3) construction of ever-larger waterworks by the Bureau and others, and (4) the essential and enduring role of the states, local water districts, and municipalities. All of these embedded

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<sup>84</sup> Id., Dudley, 12-13.

<sup>85</sup> William E. Hill, *The Oregon Trail, Yesterday and Today*, 29-40 (1994)(containing copies of the Fremont-Preuss maps).

<sup>86</sup> Merrill J. Mattes, *The Great Platte River Road: The Covered Wagon Mainline Via Fort Kearny To Fort Laramie*, 378-521 (1969).

<sup>87</sup> Id., Dudley, 17-18; Alan S. Newell, "Did The Secretary Sell Us 'Blue Sky'? Inclusion of Warren Act Contractors In The North Platte River Project," 2-3, *Symposium on the History of the Bureau of Reclamation*, June 18-19 (2002).

arrangements resulted from adaptation of a changing West to the reality of western aridity.

### **Interstate Disputes and Their Resolution**

In the same year Congress passed the Reclamation Act, Kansas sued Colorado for impeding the flow of the Arkansas River into Kansas; Kansas was a riparian state; Colorado, a prior appropriation state; the United States, the owner of huge federal lands from which and through the vast percentage of western water flowed. In the course of the litigation, which resulted in two opinions,<sup>88</sup> Kansas claimed its law required Colorado to by-pass all water to it; Colorado claimed its law could keep any water from flowing into Kansas; and the United States claimed that all unappropriated western water had been reserved for development and distribution through the 1902 Reclamation Act.

The United States Supreme Court rejected all three theories in favor of case-by-case original jurisdiction for the equitable apportionment of waters between States that share an interstate stream system. The Court held that each state could choose its own water law, could not impose its choice on another state, and the national government's interest in reclamation of arid lands could not supplant state water law selection.<sup>89</sup>

Having failed to establish a reservation of western water for the reclamation program, the United States used its property power over federal lands to embargo permits for crossing of federal lands necessary to build non-federal water projects upstream of Pathfinder Dam in Wyoming and Elephant Butte Reservoir in New Mexico.<sup>90</sup>

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<sup>88</sup> *Kansas v. Colorado*, 185 U.S. 125, 22 S.Ct. 552, 46 L.Ed. 838 (1902); *Kansas v. Colorado*, 206 U.S. 46, 27 S.Ct. 655, 51 L.Ed. 959 (1907).

<sup>89</sup> *Simpson v. Highland Irrigation Company*, 917 P.2d 1242, 1247 (Colo. 1996) (referencing and summarizing the U.S. Supreme Court's 1907 decision). The Supreme Court pointed out that section 8 of the Reclamation Act requires the Secretary to proceed "in conformity" with state laws. 27 S.Ct. at 665.

<sup>90</sup> Daniel Tyler, *Silver Fox of the Rockies*, Delphus E. Carpenter and Western Water Compacts, 8, 119, 154, 169, 314 n.58 (2003); William A. Paddock, *The Rio Grande Compact of 1938*, 5 Univ. of Denv.

This embargo, and the looming loss to Wyoming in an equitable apportionment case,<sup>91</sup> spurred Delph Carpenter of Colorado to formulate the “compact idea” resulting in the era of interstate water compact negotiation and ratification.

Professor Dan Tyler explains that Carpenter’s water compact brainstorm derived from his understanding of drought and “river culture”:

The culture of rivers and streams is dictated by geographical location. Upstream residents tend to manifest an attitude of superiority. Their connection to reliable water is guaranteed, especially during periods of drought. Their major concern comes from the fact that most western states accept the principle of first in time, first in right. Economic development downstream, where warmer temperatures encourage agriculture and population growth, results in a prior use of water and therefore a potential legal claim to that water in times of scarcity. Downstream residents worry excessively about upstream transfers of water out of the river basin and upstream consumption that diminishes downstream flows at critical times.<sup>92</sup>

Experience with interstate water litigation taught Carpenter three great lessons. When the United States Supreme Court exercises its original jurisdiction to resolve an interstate water dispute, (1) the doctrine of equitable apportionment governs, (2) what is an equitable apportionment in one decade may not be so in another, and (3) the upstream state can lose to a downstream state whose development occurs first, if not now then later.

Carpenter had two primary fears, that California would preempt Colorado by its capacity for early development and that the federal government through the Bureau of Reclamation would command all western rivers to the detriment of individual states.

By the time the Supreme Court recognized Wyoming’s interstate Laramie River priority, leaving only 15,500 acre-feet per

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Water L. Rev. 1, 13 (Fall 2001).

<sup>91</sup> Wyoming v. Colorado, 259 U.S. 419 (1922).

<sup>92</sup> Tyler, Silver Fox of the Rockies at 8. I have attached to this paper my review of this Delph Carpenter biography.

year for additional Colorado use,<sup>93</sup> Carpenter had convinced the powerful League of the Southwest to endorse the compact idea for the Colorado River, and Congress had enacted legislation for a seven-state Colorado River Compact Commission, whose Chair became Commerce Secretary Herbert Hoover.

The Colorado River Compact of 1922 institutionalized, as a matter of state and federal law, the allocation of Colorado River water. Because of reliance on the longest wet cycle in recorded history (1905 to 1929),<sup>94</sup> the Upper Basin States of Colorado, New Mexico, Wyoming, and Utah are shorted in dry times by the guarantee of a 75,000,000 ten-year running average of water delivery at Lee Ferry for the Lower Basin States of Arizona, California, and Nevada.<sup>95</sup> This realization led to the alliance Colorado Congressmen Ed Taylor and Wayne Aspinall forged with western state Congressional colleagues to build reclamation projects in the Upper Basin and throughout the West, to assist in the operation of the compacts and assure local water supply for agricultural, municipal, commercial, power production, and recreation.<sup>96</sup>

### **State and Local Water Boards, Districts, Municipalities, Ditch and Reservoir Companies—Their Enduring Role**

The Great Depression drought of the 1930s propelled water development as a major means for rehabilitating America. Colorado's successful effort to forge a permanent water arrangement with the United States through the Great Divide flushed up construction and operation of the Colorado-Big Thompson Project, with water features tapping the headwaters of the Colorado River to benefit water uses on the western and eastern slopes of Colorado.<sup>97</sup>

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<sup>93</sup> Wyoming v. Colorado, 259 U.S. at 496.

<sup>94</sup> Kathleen A. Miller, Climate Variability, Climate Change, and Western Water, Report to the Western Water Policy Review Advisory Commission, 34.

<sup>95</sup> James S. Lochhead, "An Upper Basin Perspective on California's Claims to Water From the Colorado River, Part I: The Law of the River," 4 U. Denv. Water L. Rev. 290 (2001).

<sup>96</sup> Steven C. Schulte, Wayne Aspinall and the Shaping of the American West, 25, 68 (2002).

In 1937, the Colorado General Assembly gave birth to the Colorado Water Conservation Board,<sup>98</sup> the Colorado River Water Conservation District,<sup>99</sup> and the Water Conservancy Act.<sup>100</sup> The Northern Colorado Water Conservancy District became the first of the now-current 51 conservancy districts in Colorado. The Colorado River District was the first of three conservation districts established by General Assembly enactment, the other two being Rio Grande Water Conservation District<sup>101</sup> and Southwestern Water Conservation District.<sup>102</sup>

A primary motivator for the establishment of State and local boards and districts was that the Reclamation Act required the Bureau to contract with local entities to obtain repayment for part of federal water project construction and operation costs. The conservancy districts—empowered by the General Assembly to receive public funds from a property tax mill levy, make assessments, and charge fees for water use—undertook the water project sponsorship and repayment role. Along with the conservancy districts, the conservation districts—assigned with a regional responsibility for water development and basin protection with separate major watersheds within the state—became fixtures for state and national assertion of local water interests.

The Colorado Water Conservation Board, with representatives from all regions of the State appointed by the Governor and confirmed by the Senate, became the coordination and planning reservoir for marshalling Colorado's interest in the development and use of its scarce water resource. The State and Division Engineers continued their historic role of administering the decrees of Colorado courts confirming the priorities of water use rights.<sup>103</sup> The Colorado

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<sup>97</sup> Daniel Tyler, *The Last Water Hole in the West, The Colorado—Big Thompson Project and the Northern Colorado Water Conservancy District*, 19-25 (1992).

<sup>98</sup> § 37-60-101, et. seq. C.R.S. (2002).

<sup>99</sup> § 37-46-101, et. seq. C.R.S. (2002).

<sup>100</sup> § 37-45-101, et. seq. C.R.S. (2002).

<sup>101</sup> § 37-48-101, et. seq. C.R.S. (2002).

<sup>102</sup> § 37-47-101, et. seq. C.R.S. (2002).

<sup>103</sup> § 37-92-101, et. seq. C.R.S. (2002).

Groundwater Commission oversaw the permitting of ground water withdrawals from designated deep groundwater basins.<sup>104</sup>

Across the state, towns and cities, water and sanitation districts, irrigations districts, mutual ditch and reservoir companies, homeowner associations, and individual businesses each have a local constituency and responsibility for water planning and delivery. Although criticized at times for acting for a narrow interest and undemocratically, each of these organizations—with the Governor, the General Assembly, and the courts also performing their assigned role—is peopled by citizens of Colorado who focus on the very important public interest the Native American and Hispanic peoples—and western visionaries like John Wesley Powell—also pursued when they focused on conserving water for community uses. Through these institutions—as the result of pressure and counter-pressure among constituent groups—the water customs and values of the people are shaped and reshaped.<sup>105</sup>

### **The 1956 Colorado River Storage Project Act and Wilderness Preservation, Counter-Twins**

The annual native flow of the Colorado River can vary between 4,400,000 acre-feet in drought times to 21,900,000 acre-feet in wet years.<sup>106</sup> The Colorado River Compact guarantees a delivery of 75,000,000 acre-feet measured at Lee Ferry to the Lower Basin.<sup>107</sup> Only by storing can the Upper Colorado River Basin states “even come close to meeting their allotted annual uses and discharging their Lee Ferry obligations.”<sup>108</sup>

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<sup>104</sup> § 37-90-101, et. seq. C.R.S. (2002).

<sup>105</sup> Citizen’s Guide to Colorado Water Law, Colorado Foundation for Water Education, 19 (2003).

<sup>106</sup> Edward W. Clyde, “Institutional Response to Prolonged Drought,” *New Courses for the Colorado River, Major Issues for the Next Century*, Gary D. Weatherford and F. Lee Brown, Eds., 113 (1986).

<sup>107</sup> Article III(d), Colorado River Compact, section 37-61-101, C.R.S. (2002); Citizen’s Guide to Colorado Water Law, Colorado Foundation for Water Education, 23 (2003).

<sup>108</sup> Edward W. Clyde, “Institutional Response to Prolonged Drought,” *New Courses for the Colorado River, Major Issues for the Next Century*, Gary D. Weatherford and F. Lee Brown, Eds., 113 (1986).

In 1956, Congress enacted the Colorado River Storage Project Act<sup>109</sup> to assist the Upper Basin states in developing their allocation of water, producing hydropower, and ensuring Compact deliveries, among other uses that, as a result of the 1968 Colorado River Basin Act, include fish, wildlife, and recreation.<sup>110</sup> Particularly in times of drought, the Aspinall Unit on the Gunnison River in Colorado—together with Navajo Dam in New Mexico, Glen Canyon Dam in Utah, Fontenelle Dam in Wyoming, and Flaming Gorge Dam in Utah—operate as a “savings account,” so that the citizens of Colorado and the other Upper Basin states can develop and use the water allotted to them by the Compact “without fear of being ‘called out’ at some time by the demands of the Compact.”<sup>111</sup>

The proposal to build a dam on the Green River at Echo Park near the Colorado-Utah border—and another at Marble Canyon just east of the main gorge of the Grand Canyon below Lee Ferry—gave birth to the compromise of constructing Glen Canyon Dam and also helped the 1964 Wilderness Act.<sup>112</sup> to flow forth from Congress and the Grand Canyon and Echo Park dam plans to be junked.<sup>113</sup>

In late 1955 and early 1956, Howard Zahniser of the Wilderness Society worked unceasingly at trying to inset a proviso into the CRSP that would protect the sanctity of the park system from future reclamation projects. Conservationists also insisted upon a second provision protecting Rainbow Bridge National Monument from the huge reservoir that would be created by the proposed Glen Canyon Dam. After another round of negotiations on Capital Hill, Zahniser gained assurance from Upper Basin leaders like Aspinall and William Dawson of Utah that they would support the provisions in return for the cessation

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<sup>109</sup> 43 U.S.C. §§ 620-620o (1994).

<sup>110</sup> Colorado River Basin Act, 43 U.S.C. § 1501(a) (1994); *Cty. Comm’rs v. Crystal Creek Homeowners’ Assn.*, 14 P.3d 325, 333, 339-340 (2000).

<sup>111</sup> *Id.*, 14 P.3d at 334; *Citizen’s Guide to Colorado Water Law*, 20-21 (2003).

<sup>112</sup> Norris Hundley, Jr., *The Great Thirst, Californians and Water, 1770s-1990s*, 307-309 (1992).

<sup>113</sup> Roderick Nash, *Wilderness and the American Mind*, 230-234 (1967).

of conservation-organization opposition to the CRSPO. At long last, the way seemed clear to passage.<sup>114</sup>

Water storage to assist state use of water compact allocations, park protection, and wilderness preservation—these are the three essentials of the CRSP compromise that forged beneficial use and preservation, not just beneficial use, to the maturing western experience. Just as the reclamation movement tapped Native and Hispanic American water use roots, so the wilderness movement tapped a resonant core of awe and respect in Americans. Wilderness has fundamentally shaped our American character. Preservation of its remaining vestige is a great national achievement, the argument for which included the water quality and quantity benefits of preserving natural watersheds.

The movement for preservation started with the great 19<sup>th</sup> century western surveyors themselves—and the artists, photographers, botanists, and geologists who accompanied them—but most importantly the citizens of the United States. The surveys of George Wheeler, Clarence King, Ferdinand Hayden, and John Wesley Powell<sup>115</sup> were intended by Congress to provide the location and resource nexus for settlement of the West. But, the people of the United States through the work of artists, journalists, and popular magazines, such as Harper's Weekly,<sup>116</sup> also saw how vast, beautiful,

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<sup>114</sup> Steven C. Schulte, *Wayne Aspinall and the Shaping of the American West*, 86 (2002).

<sup>115</sup> Robert W. Karrow, Jr., "George M. Wheeler and The Geographical Surveys West Of The 100<sup>th</sup> Meridian 1869-1879," Donna P. Koepp, Ed., *Exploration and Mapping of the American West, Selected Essays* 121-124 (1986).

<sup>116</sup> Harper's Weekly—which modestly called itself "A Journal of Civilization—described Denver as an oasis community created in the desert a little over 25 years after the 1858 gold strike at the junction of Cherry Creek and the South Platte River:

If the city were less substantial in appearance than it is, if it possessed certain glaring peculiarities, it would be much easier to describe it. But it so belies its age, and seems so much older than it really is, that one falls to taking for granted that which should be surprising. Wide, shaded, and attractive-looking

varied, and stupendous is this land carved of sporadic surging rivers and trickling drops, sun, wind, and plenty of parching days.

The paintings of Thomas Moran, the sketches of William Henry Holmes, and the photographs of W.H. Jackson were direct products of the Powell and Hayden surveys, leading the way for the establishment of those jewels of the Park system, including Yellowstone, Grand Canyon, and Mesa Verde National Parks—and with the tremendous added value of John Muir’s hiking, writing, wandering, and advocacy, Yosemite.<sup>117</sup>

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streets, handsome residences surrounded by spacious grounds, noble public buildings, and the many luxuries of city life, tempt one to forget that Denver has gained all these Excellencies in less than twenty-five years. Every tree that one sees has been planted and tended; every attractive feature is the result of good judgment and careful industry. Nature gave Denver the mountains which the city looks out upon; but beyond those hills and the bright sky and the limitless plains, she gave nothing to the place which one has only to see to admire. The site originally was a barren waste, dry and hilly. Never was it green, except perchance in early spring, and not a tree grew, save a few low bushes clinging to the banks of the river. Surrounded on the east, south, and north by the extended prairie lands, fast being converted into productive farms, and having on the west the mountains with their treasures of gold, silver, coal, iron and lead, Denver is the natural concentrator of all the productions of Colorado. From it are sent forth the capital, the machinery, and the thousand and one other necessities of a constantly increasing number of people engaged in developing a new country.

The West, A Collection from Harper’s Magazine at 52-53 (1990).

<sup>117</sup> Thurman Wilkins, Thomas Moran, Artist of the Mountains, 106-135 (2<sup>nd</sup> ed. 1998); Kevin J. Fernlund, William Henry Holmes and the Rediscovery of the American West, 102-122 (2000); Douglas Waitley, William Henry Jackson, Framing the Frontier, 105-141 (1999); W.H. Jackson, John Fielder, Colorado 1870-2000 (2000); Thomas J. Noel and John Fielder, Colorado 1870-2000 Revisited, The History Behind The Images (2001); John Muir, “Our National Parks,” in John Muir, The Eight Wilderness-Discovery Books, 457-605 (1992); Paul D. Sheats, “After Yosemite, John Muir and the Southern

San Francisco tapped Muir's beloved Hetch Hetchy Valley for municipal storage. Muir's reaction to what he viewed as a moral outrage sounds a high and clear tone of the liberty bell that Americans can hear—and appreciate—among all the tones we hear from the lyric and rhythm of Nature and its influence on our national character.

That any one would try to destroy such a place seems incredible; but sad experience shows that there are people good enough and bad enough for anything. The proponents of the dam scheme bring forward a lot of bad arguments to prove that the only righteous thing to do the people's parks is to destroy them bit by bit as they are able. Their argument are curiously like those of the devil, devised for the destruction of the first garden—so much of the very best Eden fruit going to waste; so much of the best Tuolumne water and Tuolumne scenery going to waste. Few of their arguments are even partly true, and all are misleading.

Thus, Hetch Hetchy, they say, is a 'low-lying meadow'. On the contrary, it is a high-lying natural landscape garden.<sup>118</sup>

Twenty-four wilderness areas, over 3 million acres, exist in Colorado today, because Coloradans joined with other citizens of the United States to pass the wilderness acts, starting with the 1964 Act.<sup>119</sup> Congressman Wayne Aspinall, as Chairman of the House Interior Committee—a procurer of water projects for Colorado—played a key if reluctant role. Echo Park dam had been a part of plans for the Colorado River Storage Project and was deleted because of wilderness advocate opposition in favor of preserving Dinosaur National Monument.<sup>120</sup>

Wallace Stegner's Wilderness Letter of December 3, 1960 speaks to the preservation chamber of America's heart, just as John

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Sierra, Sally M. Miller, Ed., John Muir, Life and Work, 245-264 (1993).

<sup>118</sup> John Muir, "The Yosemite," The Eight Wilderness Discovery Books, 715.

<sup>119</sup> 43 U.S.C. 16 U.S.C. §§1131-1136; Sierra Club v. Yeutter, 911 F.2d 1405, 1408, 1419-1421 (10<sup>th</sup> Cir. 1990).

<sup>120</sup> Roderick Nash, Wilderness and the American Mind, 215-219 (1967).

Wesley Powell's water writings address the beneficial use chamber of the same heart:

We need wilderness preserved—as much of it as is still left, and as many kinds—because it was the challenge against which our character as a people was formed. The reminder and the reassurance that it is still there is good for our spiritual health even if we never once in ten years set foot in it. It is good for us when we are young, because of the incomparable sanity it can bring briefly, as vacation and rest, into our insane lives. It is important to us when we are old simply because it is there—important, that is, simply as idea.<sup>121</sup>

The state of the Great Divide—mother of rivers—headwaters of the Platte, Arkansas, Rio Grande, and Colorado Rivers has an enduring legacy of water preservation, conservation, and beneficial use.

### **2000-2003 Drought, Testing the Limits**

In the South Platte, Arkansas, and Colorado River watersheds Colorado has approached the limits of its interstate water allocations. The Colorado Water Conservation Board uses an estimate of 400,000 acre-feet of water available for development under its Colorado River Compact and Upper Colorado River Compact apportionment.<sup>122</sup>

Normally, Colorado rivers generate 16 million acre-feet of water, annual average. In the drought year 2002, they produced approximately 4 million acre-feet. Colorado lived in 2002 on 6 million acre-feet of storage water it released from reservoirs. About 2000 reservoirs exist in Colorado.<sup>123</sup>

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<sup>121</sup> Wallace Stegner, "Wilderness Letter," *Marking the Sparrow's Fall, The Making of the American West*, 112 (1998).

<sup>122</sup> *Citizen's Guide to Colorado Water Law*, 23 (2003).

<sup>123</sup> *Id.* at 20. The reliance of the United States on storage is shown by an illustration that storage capacity increased from less than 50 million acre-feet in 1925 to 450 million acre-feet in 1990. Wayne B. Solley, "Estimates of Water Use in the Western United States, U.S. Geological Survey," *Report to the Western Water Policy Review Advisory Commission*, 2 (1997).

Colorado's current population is over 4.25 million persons. In 1971, agriculture accounted for 92% of the state's consumptive use; today, that consumptive use is 85%. The difference represents market transfers, primarily to domestic and municipal use, which accounts for 10% of Colorado's water consumption.<sup>124</sup>

Together with demand-reducing measures, such as water restrictions and surcharge pricing, reservoirs with adequate storage rights are crucial to the state's ability to endure drought, such as the one Colorado has just experienced. A water right is a right to share in the public's water resource. Conservation is indispensable—in all its forms—to stretch a scare resource. The measure, scope, and limit of a water right is beneficial use. Beneficial use without waste without speculation is the core of our western water law doctrine. In times of scarcity, juniors defer to seniors, and the water market operates to transfer senior priorities to those who want to make a new use or firm up a junior use. Augmentation plans allow out-of-priority diversions to operate if adequate replacement water is supplied to senior water rights that would be injured otherwise.

The Colorado General Assembly has adopted an instream flow law for fish and wildlife protection and a recreational in-channel diversion law for rafting and boating. Surely, these laws are reflections of our maturation as westerns in settling in. They take their place in the priority system, with the opportunity to firm their use, through water market transfer of senior rights and water storage and release, legal mechanisms that have their institutional counterparts: the Water Conservation Board for the instream flow program; cities, conservancy districts, and other local governments, with consultation by the Water Conservation Board, for recreational in-channel diversions.

A true mark of western water being a scare public resource is how long and how often we have institutionalized its conservation and use in legal assignments made to national, state, and local public agencies, from the U.S. Geologic Survey to the Bureau of Reclamation, from the Water Conservation Board to the Upper Gunnison Water Conservancy District, from the City and County of Denver to the Town of San Luis.

The public institutions the legislative bodies at all levels create have the duty, in the public interest, to plan for and secure a firm

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<sup>124</sup> Citizen's Guide to Colorado Water Law at 7.

water supply, responsive to environmental laws as well as all other applicable laws to the best of their ability. Environmental institutions and citizen groups help shape how, when, if, how and why additional water works will be built, but they do not have the public's water supply responsibility and will not be answerable for a lack of planning and failure to undertake the needed actions. Public officials will be held accountable.

As a result of severe drought at the outset of the 21<sup>st</sup> Century, public officials at all levels are engaged in drought planning and response. In 1981, as a result of the 1976-1977 drought and a dry year in 1981, Colorado's Governor initiated the development of a comprehensive drought management plan. "The Colorado plan is effective because it incorporates three primary components: a monitoring system, an impact assessment system, and a response system. The State is currently attempting to give greater emphasis to mitigation in its plan."<sup>125</sup> This effort has redoubled as a result in the most recent drought.

In its 2003 session, the Colorado General Assembly added additional flexibility to Colorado water law, extending administrative authority in the State Engineer for water banking, changes of water rights, substitute supply plans, emergency water plans, loans of water including for instream flow purposes, prohibition of new covenants that restrict the use of drought-tolerant vegetative landscapes, state technical assistance for water usage and billing systems, and water rights for conservation easements, consistent with the laws for water court adjudication of water rights and State Engineer enforcement of them.<sup>126</sup> The General Assembly also provided for financial mitigation

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<sup>125</sup> Donald Wilhite, Director, National Drought Mitigation Center, University of Nebraska, "Improving Drought Management in the West," Report to the Western Water Policy Review Advisory Commission, 17 (June 1997).

<sup>126</sup> S. B. 03-073 (substitute, temporary, and emergency water supply plans); H.B. 03-1001 (prohibiting new restrictive covenants limiting use of drought tolerant vegetation, providing technical assistance for customer water use and billing systems, allowing State Engineer approval of temporary changes of water rights); H.B. 03-1008 (water rights for conservation easements); H.B. 03-1318 (water banks to all seven water divisions); H. B. 03-1320 (loans of water rights for instream flow use in drought emergencies); H. B. 03-1334 (temporary

to counties that suffer tax revenue loss from the removal of agricultural water from their jurisdiction.<sup>127</sup> The Assembly has directed the Water Conservation Board to undertake a statewide assessment of water supply, water demand, and water development strategies; project alternatives are to include social, economic, and environmental impacts and a consensus-building approach.<sup>128</sup> These short term and long term measures have their bud in the most recent drought but their root in the long-ongoing process of adapting to the arid lands. Surely, the arena of reducing water demand and increasing the efficiency of water application and use deserves additional action.

We must not forget the contributions of the professional community, including climate scientists—meteorologists, hydrologists, climatologists, among them—who help us gauge, analyze, and forecast based on past and current data, so we can prepare for what we must do to conserve supply and reduce demand.

Our heritage is the same as all of those who have preceded us here. We must work the water well, and we must also leave it alone to do its shaping.

In one ironic sentence, Bernard DeVoto summed up the problem and experience of the Way West—such as Lewis and Clark realized after they had bushwhacked their way with a lot of supreme effort, and luckily, to the mouth of the Columbia with the help of Native Americans, Sacagawea, the Shoshone, and the Nez Perce:

The point it indicated was clear and precise: the route they had taken west was certainly not the shortest and probably not the best one.<sup>129</sup>

I would add, how else goes the course of western civilization? Weather and water politics, in the wild cycle of their beneficial seasons, will always be with us.

### **GOOD COLORADO HEADWATERS EDUCATION**

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interruptible water supply agreements during time of drought emergency).

<sup>127</sup> S.B. 03-115 (financial mitigation to counties for removal of agricultural water);

<sup>128</sup> S.B. 03-110 (Water Conservation Board funding, section 14).

<sup>129</sup> Bernard DeVoto, *The Course of Empire*, 507 (1952).

Good we don't have to buy the weather,  
Good isn't for sale and just happens whenever.  
Predictions, though good and getting better,  
Are wildly inaccurate when the best worst weather  
Hits so suddenly you can't tell where the pitch  
Comes from.

I prefer weather to politics,  
I mean, at least, when you sear your lips  
Or an will wind spansks your bottom, you can  
Rightly say, "Wait just a minute, it'll change"--  
Colorado axiom--any politics charging straight  
Off the Divide is worth standing to for.

Sure you have to hunker down when thunder  
Booms and lightning catches between a vortex  
Pit-of-gut instinct and a gearing rain that may never  
Touch ground. "Norm" is only a mathematical  
Possibility. Yell, Hail! and run. Your average-  
Staked tent blows down any minute.

Greg Hobbs  
6/7/2003

**Appendix:  
Mesa Verde Journal and  
Delph Carpenter Biography Book Review**

**Mesa Verde Journal/Greg Hobbs**

**Prater Canyon Box Elder Reservoir Survey  
By Wright Paleohydrological Institute  
In Cooperation with the Colorado Historical Society  
And the National Park Service, May 2-4, 2003**

**May 1, 2003**

Bobbie picks Greg up at the new Idaho Springs High School where the Colorado Supreme Court has heard oral argument on two criminal cases in front of students from a number of area high schools.

Greg and Bobbie drive through four major watershed headwaters on their way to Cortez: the Platte, the Arkansas, the Rio Grande, and the Colorado. The route is I-70 to Eisenhower Tunnel (Platte watershed), Eisenhower Tunnel to Leadville (Colorado River watershed into Arkansas River watershed), Leadville to Wolf Creek Pass (Arkansas River and Rio Grande watersheds), and Wolf Creek Pass to Cortez (Colorado River watershed—San Juan, Pine, Piedra, La Plata, and Mancos Rivers sub-watersheds).

Arrival and check into Comfort Inn at 10:00 p.m. We are met by Terri Ohlson.

## **May 2, 2003**

Some engineer has set the clock radio in Greg and Bobbie's room to go off at 5:00 a.m. Promptly at 5:00 a.m. the radio comes on!

Breakfast is at six. The survey team early arrivals arrive for breakfast.

7:00 a.m. the team assembles in the Comfort Inn parking lot. Ken and Ruth Wright welcome all of us. Jack Smith, former Chief Archeologist at Mesa Verde National Park, briefs us on Park etiquette. In short, the etiquette is you may find and pick up artifacts but put them back where you found them. No collecting!!

Ken explains that this is the "intellectual day." The "heavy lifters" come tomorrow.

Doug Ramsey, a soil scientist, and Dick Wiltshire, U.S. Bureau of Reclamation civil/geotechnical engineer, load up a mobile core-drilling rig loaned by the Bureau of Reclamation.

We are off to Mesa Verde—sky high canyon home of the Anasazi. Ruth explains on the way:

The Pueblo I occupation was 750-900; the Pueblo II, 900-1150; and Pueblo III, 1150-1300. The Box Elder Reservoir in Prater Canyon was likely in operation from 750 to 950 A.D., during the Pueblo I period primarily. Its location and existence became known after the year 2000 Bircher fire burned off the piñon, juniper, and sagebrush. A fast and furious wind burned fiercely 27,000 acres.

The Box Elder Reservoir is named for the unusual box elder trees that are in the stream channel near the reservoir. Box Elder is the fourth Mesa Verde reservoir the Wright Paleohydrological Institute has surveyed. Two are mesa top reservoirs: Far View Reservoir (also known as Mummy Lake) on Chapin Mesa (A.D. 950-1180), and Sagebrush Reservoir on an unnamed mesa west of Chapin Mesa (A.D. 950-1100). The third is a canyon-bottom reservoir, Morefield Reservoir in Morefield Canyon (A.D. 750-1100).

We pass through Morefield Canyon and wind over tricky switchbacks into Prater Canyon.

Our first view of Box Elder Reservoir, site 5MV4505, is from high on the Prater Canyon ridge. No doubt about it. There's a big berm on the channel side of a circular-shaped landform. We see burned/ghostly white box elder trees in the channel at the upper end of the reservoir site.

This may be an "intellectual day" for some of us, but Doug Ramsey and Dick Wiltshire get right to work on setting up the drill rig and start drilling and extruding cores—they're at it all day with the help of Ernie Pemberton, formerly head of the Bureau of Reclamation's Sedimentation Branch; John Rold, former Colorado State Geologist; and David Breternitz, retired archeologist.

Bobbie has sharp eyes. She spots a sheer-white small and elegantly shaped arrowhead lying on the south slope of the berm.

We set out with archeologist Jim Kleidon to find P-I and P-II sites in the vicinity of the reservoir. We walk up the west slope of the canyon to the north end of the reservoir site. We find a P-II site (900-1100). Jim explains that the potsherds we see all over the ground are pottery pieces of P-II black and white and corrugated pottery. This is site 5MV3159.

Bobbie finds what we call a "hammer stone." It's made out of igneous rock and has a chipped out portion in the center for tying on a handle. It is broken, split right down the middle from top to bottom. We examine with awe this tool of 1,100 years ago, and put it back in place.

We return to the surface of the reservoir body—now just a large mound because of sedimentation over the centuries. The soil experts are excited. They point to cored material that is clearly the result of sediment transport and compression within the reservoir body. The cores taken so far are down to 11 feet.

Ken signals we are going back over the ridge to Morefield Canyon. Terri Ohlson and Jack Smith have hiked over the ridge between Prater Canyon and Morefield Canyon—to the east—to see how long it takes to walk between the two reservoirs.

Driving up the bottom of Morefield Canyon, we see Terri and Jack walking up the road towards us. They've proved the point. Even though they found, then lost, the ancient Anasazi trail near the top of the ridge, it took only an hour and a quarter to cross over. Forty-five minutes probably would do it for those familiar with the trail—and strong from constantly walking where they needed or wanted to go—a thousand years ago.

We see the Morefield Reservoir mound, site 5MV1931. Ken and Ruth, with the help of Jack Smith, conducted field investigations here in October 1995, May 1996, and May 1997, excavating an exploratory trench with a permit from the Park Service.

The mound is 200 feet in diameter, rises 16 feet above the valley floor, is 21 feet deep, and has a long berm-looking structure extending from it north up the valley floor. The whole thing looks like an inverted frying pan. Soil samples and potsherds showed that clay and sand were carried into the reservoir from the stream channel.

The Anasazi mucked out the sediment as best they could, throwing the material onto a growing embankment. The clay sealed the bottom of the reservoir from leakage. The mound rose over the centuries, so what probably began as a hole dug into the channel to intercept shallow groundwater became an off-channel reservoir as the intermittent streambed routed itself around a rising embankment.

To get water into the reservoir required a feeder ditch/canal. Bobbie and I walk up the elevated berm-like structure from the reservoir north. The stream channel is to our west. We clearly see large numerous stones lying at the surface—the size of a large cowboy hat, and larger. They are aligned and clearly appear to have been placed, not washed in. Here is evidence of the ditch/canal structure cutting northward to intercept the stream channel!

Bobbie and Ken (who has joined us) walk back and forth among the stones, showing me the canal's alignment. 1,400 feet of it!

Ken says there was no irrigation used here. This was a drinking water supply. The Anasazi at Mesa Verde were dry land farmers, using valley bottom alluvial land and terraces to grow their corn, storing it in nearby granaries they built of rock. They knew of droughts. They tried to keep up to two years of corn in storage.

The potsherds in the reservoir trench showed the Anasazi dipped the water out and carried it away in water jars, which sometimes broke in the effort to bring water back to their families. Deer antlers, sticks, and baskets were used to muck out the reservoir.

There's a great kiva near the Morefield Reservoir. House ruins in the vicinity show a population of nearly 500 people. They must have been proud of their reservoir, and very worried that it took so much work to keep it scooped out and to lengthen the canal. As the berm grew, they had to shift their diversion point again and again to intercept the shifting stream channel. They must have prayed for the rain to come and the water to enter the canal without washing it out.

I have with me a copy of the Wright Final Report of the Morefield Reservoir investigation, dated January 1998. It has a chart of tree ring data that show an annual average precipitation of 18 inches per year from 800 to 1100 A.D.—not much different from today in the Mesa Verde region, but there were good wet years and droughts. The Anasazi farmers, like today's, always perched between a sudden flood and enduring scarcity. The reservoir likely operated from 750 to 1100 A.D.

It's getting near to lunch, and we better get back to Prater Canyon!

A tailgate lunch with a famished crew is what we enjoy. The Boise State University history professor from Idaho, Todd Shallat, peppers the sandwiches and canned ice tea with questions: "Did the ducks fly in to sit on the reservoir water and the Anasazi eat them?" Archeologist David Breternitz answers they ate the corn they grew and turkeys they kept. But, what about the ducks? says Todd. (Bobbie and I saw duck-headed petroglyphs on several hikes to Grand Gulch twenty years ago—Todd is onto something).

After lunch, Jim Kleidon leads us down canyon and we climb a southeast-facing slope. The rocks of house structures and the sink spot of kivas are clearly visible. Potsherds dot the landscape. Site 5MV3146. Jim did the post-Bircher fire survey of the ruins, identifying previously hidden additional houses and where they needed to be protected against erosion. Ute Indian teams then came in to place protective checks to divert water away from them. 275 new sites found at Mesa Verde after the fire!

Jim shows us how the houses were aligned west to east with the kivas dug on the south side. The midden—or waste pile—is down slope. These are the archeological treasure houses that reveal the

discarded tools of a people working to survive in a hard but familiar homeplace.

We can see how they perched themselves on the southeast-facing slopes to take advantage of the light and warmth a winter-sinking sun parcels out to those who seek it well.

Jim says the large P-II community here—though smaller than the population of Morefield Canyon—probably was home to 300 people.

We spend hours marveling at the privilege of a dawning understanding. These were smart people who used the native materials—and their craft at making clay and stone tools—to grow and store corn and conserve water to survive and live. Their places of prayer, the kivas, could also have served as winter homes, out of the wind and cold.

We arrive back to the Box Elder core-drilling. Dick Wiltshire and Doug Ramsey have been prodigious workers! The soil samples in long rows are spread out on a white sheet and boxed for later lab analysis of the reservoir profile, as best it can be determined from the cores, to show how deep and for how long this water body served these people.

At 4:00 p.m. we pile our sore feet and wind-chapped faces back into the vehicles and unpile at the Comfort Inn. A short snooze, wake to dinner at the Mexican Fiesta, and retire to a fiery western sky. Day one is done, the intellectual day, bundled up to our persistent memories.

### **May 3, 2003**

Same clock radio goes on at the same time, 5:00 a.m., breakfast at 6:00 a.m., depart at 7:00 a.m. These engineers know how to organize a survey!

The “heavy lifters” are here. They turn out to be young people, strong and confident. They will do the hand augering and handle the precise surveying and global positioning instruments. They include engineers, geologists, biologists, and hydrologists: Jason Alexander, Eric Bikis, Chris Brown, David Foss, Pete Foster, Matt Gavin, Kurt Loptien, and Ryan Unterreiner.

Dr. Mary Gillam, a Quaternary geologist and soils stratification expert, also joins the team.

Ken announces the assignments for this day's work on the Prater Canyon Box Elder Reservoir survey. Peter Monkmeyer, Chairman of the Civil Engineering Department, University of Wisconsin—who was with us yesterday—will team up with Jason to see whether hand augering in the channel bottom will reveal groundwater. The surveyors will determine the channel parameters and locate natural and cultural features, the building blocks of an accurate map. The soils and sedimentation experts will ascertain the depth of the reservoir and the variety of its deposits. The archeologists will confirm the identity of cultural features and artifacts.

Greg will work with Jim Kleidon and Ernie Pemberton to identify the diversion point and canal alignment, if evidence of a canal can be found. Bobbie will accompany Eric Bikis and Jack Smith to fix, by GPS, the location of special cultural artifacts, like those Bobbie found yesterday. Jack will then accompany Jason in the afternoon to the abandoned Prater Brothers' homestead sites up the canyon, to auger for groundwater in the abandoned wells.

Ruth will continue photographing the work of all the teams, and Ken and Terri will continue with overall coordination and logistics. Todd will press his questions. He is editing the Wright report on the four Mesa Verde reservoirs for publication in a professional journal later this year.

We are at full strength and eager to get to work! At Prater Canyon we rivet and disperse to our assignments.

I set out with Jim and Ernie, walking north of the reservoir body. We have the map of the October 2002 field survey of the Wright Paleohydrological Institute, which this day's work will supplement. We check out "Ernie's ditch alignment." Ernie has hypothesized an alignment that takes us on a northern path from the reservoir's body onto an alluvial fan of material washed down from the canyon walls over the centuries.

Will we find cultural evidence similar to that in Morefield Canyon along the trace of an ancient ditch to a diversion point on the stream? Finding evidence will be difficult. It looks like a thousand years of washed-down soil has buried whatever may have been.

Approximately a hundred yards north of the reservoir's upper end, we encounter a gully that cuts the alluvial fan with a slice towards the channel. We see the tops of stones aligned in an up-canyon direction! Jim thinks they may have been placed

there—tentative evidence of ditch reinforcement and demarcation. We walk on.

Thirty feet farther on we see a number of large stones flanking the western slope of the stream channel. Ken and Ruth join us. We show them this stone grouping. Jim lights up. He is finding P-I gray ware shards on the embankment. Large stones apparently arranged for erosion control, and potsherds—this is physical evidence of ditch/embankment armoring. Similar to Morefield Canyon, here in Prater Canyon is proof of an off-channel reservoir and canal—carefully tended water features operating at the same time in two canyons by people who could easily communicate and learn from each other by walking over the ridge.

Jim and I walk straight on. We find more scattered stones, too large to have been washed here, how many more are buried beneath? We reach the channel just below its confluence with a tributary channel running in from the northeast. Here's the likely diversion point into the canal.

We walk west up the main channel among the box elder trees. No more large placed stones on the bank, not a one! Jim and I believe we have confirmed that Ernie's tentative canal alignment is matched with on-the-ground cultural proof. We leave the gradient check to the surveyors (the Morefield canal had a one-percent gradient running from the diversion point to the reservoir).

Now we need to find the habitations of people who could have built and maintained this reservoir and canal. It's got to be a P-I site, as all the sherds Jim found along the ditch alignment were P-1. Nearby is a P-II site on the western canyon slope; there's another P-II site directly across on the eastern slope. Where's the P-I?

We climb up the western canyon wall. Jim is thinking out loud. P-I sites could be buried beneath the P-II structures, including the large down-canyon village we visited yesterday.

We climb to a site that perches way up near the top of the western canyon wall. Jim surveyed this site after the 2000 Bircher fire. Site 5MV3190. It's a glorious spot with a comprehensive view of the reservoir below and a southeast facing down-canyon view. We find many P-I sherds matching the type Jim found along the canal alignment.

We look directly out on the reservoir site below where the drill crew is busy drilling cores and laying out the telling proof of how these people stored their drinking water. I can see the paths those people

walked, carrying their water pots, to fill them when the water was there, returning to their lofty homes in the sun. And how they must have thirsted when the reservoir was near-empty, watching and waiting for the skies to drop the weight of clouds into their storage bowl!

Jim and I see Bobbie walking amongst the ruins down below us. We join her. She's been to a P-II site across the canyon with Jack Smith. They found an axe! Now she is looking for the hammer stone she found the day before. Jim and I recall it being at the P-II site northwest of the reservoir at the edge of the burned-out forest.

Bobbie finds the hammer stone again! The site marker reads 5MV3159. I go get Eric from the reservoir site. He locks in the coordinates with his global positioning unit.

N 37 14.471

W 108 25.214

Elevation 7289—hammer stone.

We go back to the reservoir berm to position in the arrowhead lying where Bobbie found it yesterday, site 5MV4505.

N 37 14.585

W 108 25.228

Elevation 7289—arrowhead.

We go across canyon to the P-II ruins on the east side of the channel downstream from the reservoir where the axe head is lying. Site 5MV3033. We lock it in.

N 37 14.471

W 108 25.214

Elevation 7257—axe.

It's lunchtime at the tailgates!

At lunch, Ken asks Greg and Bobbie if they will accompany Jason up to the Prater Brother homesteads for groundwater testing. The hand auguring in the vicinity of the reservoir, down to 10 feet, has not reached ground water. Will augering at the old well sites up-canyon show and ground water?

Jack Smith had planned to go with Jason, but isn't feeling well. It's a two-mile hike each way.

Jack briefs us before we start off. Brothers Albert and William Prater had adjacent homesteads in the canyon between 1900—before Mesa Verde National Park was created (1906)—to the late 1920s when the Park bought them out. They grazed cattle and

sheep. In 1974, Jack tested the water in the lower Prater well. It was about ten feet from the surface.

We hike up-canyon on an old road that disappears half way up. The canyon is lined on the east side with beautiful rim rock. We spot the first green tree—likely a Douglas fir—we've seen in Prater or Morefield Canyons in two days. The 2000 Bircher fire was devastating.

We pass the lower well. The windmill structure, without its turning wheel, stands forlornly in the middle of a deserted field. We reach the upper Prater homestead site. Two busted windmill wheels lie apart from each other. We see the charred remains of wooden foundations and fence posts. The well has caved in, forming an open pit about four feet deep, so Jason has a good start at the augering. Site 5MV3129, Middle Well.

He reaches a depth from surface of 10 ft.8 inches. We hear a sucking noise as Jason pulls out a core of peat—he's gone through quite a bit of it—but no groundwater, just a heap of moist peat.

The day is growing late, and we need to be back by 4 p.m. to the vehicles, so we don't have time to test in the vicinity of site 5MV2896, Lower Well.

When we return to the reservoir site we learn that the coring work has shown that that the reservoir is 20¼ feet deep—very close to the depth of the Morefield Reservoir.

The wind has been lashing us all afternoon, and we are exhausted. The core drilling team is still at work when we leave with Terri, Jack, and Peter. We join the group for dinner at 7 p.m., but Ken is worried. Jack Smith doesn't show for dinner.

### **May 4, 2003**

We arrive for the wrap-up symposium on Chapin Mesa at the Recreation Hall in the old CCC camp. We learn that Jack slipped and fell last night and is still in the hospital recuperating. To our great relief, apparently he's all right.

The teams report their findings. Archeologist David Breternitz, Professor Emeritus, Archeology Department, University of Colorado, sums up. We have confirmed that Box Elder Reservoir is a P-I site in Prater Canyon, the construction of which commenced somewhat later than the Morefield Reservoir. Both were in operation at the same time, although the Morefield Canyon Reservoir was longer-lived.

Plainly the people in both canyons were in communication and learned from each other. Because the great kiva is in Morefield Canyon—David says the people from Prater Canyon “probably went to church over there.”

Ken thanks all the members of the team for their work and says that a written report of the findings and a map will follow.

We say goodbye to each other, knowing we have shared a great privilege, to see—on their ground—how the organizational skills of these Pueblo people helped them live in a harsh environment they probably loved for its elevated light.

Bobbie and Greg visit the Chapin Mesa Museum and the Far View Reservoir and villages on their way out of the Park.

Like Sagebrush Reservoir, Far View Reservoir is on top of a mesa and was not fed by an intermittent stream channel. Instead, it intercepted rainstorm runoff from compacted soils and perhaps a collection ditch. You can see an inlet structure to the reservoir that likely conveyed water, and a separate set of stairs for the people to dip their water pots.

Driving out of the Park at the top of Prater Canyon, we see a big turkey cross the road right in front of us and head down through the burned-out oak brush. These faithful life-sustaining birds the Anasazi domesticated are still here! We hear this pilgrim sounding off for a good five minutes before disappearing across a high meadow into the skeleton forest beyond.

We wind down out of the Park. Good views of the Mancos River bottom lands below, where farmers are planting this year's crops.

On the way home, we visit the BLM's Anasazi Heritage Center outside of Dolores. We see a photograph of David Breternitz on the wall! We've been in the company of famous archeologists these past two days.

We drive over Lizard Head Pass through Telluride, up and over the Dallas Divide, the glorious San Juan and Uncompahgre Mountains surround us.

It's snowing on Vail Pass. We arrive home Sunday night after 11 p.m. The lights of Denver are a long way from the silent mound of the Box Elder Reservoir. And we are glad, so glad, to have its location and purpose fixed in the context of the long—yet still unfolding—community of Colorado.

## **PUEBLO PEOPLE OF MESA VERDE**

You want to know where water's precious,  
Where every scoop of dirt's a prayer of life;  
And tomorrow's blessing—carried in a pot

Of clay is a source of wonder up a slope  
A thousand years away—perch upon  
A buried kiva's rim and take within the

Arcing southeast sun this light they saw—  
You see—and may you keep this light  
Within and speak it openly;

They worked and loved, like we, this  
Land, this calling, this Mesa Verde.

Greg Hobbs  
5/2-4/2003

### **BOOK REVIEW**

**(University of Denver Water Law Review, Spring 2003)**

**DANIEL TYLER, SILVER FOX OF THE ROCKIES, DELPHUS E. CARPENTER AND WESTERN WATER COMPACTS**, University of Oklahoma Press: Norman (2003); 392 pp.; \$34.95; ISBN 0-8061-3515-8

REVIEWED BY JUSTICE GREGORY J. HOBBS, JR.<sup>130</sup>

Professor Dan Tyler tells a remarkable story of a remarkable man, Delph Carpenter, a small town water lawyer who became a national statesman of rivers.

Architect of the “compact idea” for settling interstate water allocation disputes, Carpenter was born to a nineteenth century pioneering family in Horace Greeley's Union Colony, founded in 1870.

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<sup>130</sup> Greg Hobbs is a Justice of the Colorado Supreme Court. He is the author of the *Citizen's Guide to Colorado Water Law* recently published by the Colorado Foundation for Water Education.

Carpenter grew up working water with his father from the irrigation ditches that tap the Poudre River, which flows east from its source in what is now the Rocky Mountain National Park.

Carpenter's life mirrored the Great Divide he revered. He loved the shining mountains and the Great Plains that take one inevitably to them. He drew from their strength as a husband, father, lawyer, legislator, and craftsman of treaties. When litigating for Colorado against Wyoming in the United States Supreme Court, for example,<sup>131</sup> he climbed to the source of the Laramie River to understand the lay of the land and how the waters flow. He wanted to leave his name on the mountains he had climbed with the district water commissioner:

Carpenter wanted precise information on the Laramie River's origins, but he also enjoyed the adventure of planting the first American flag on these unnamed peaks. Having deposited a record of their ascent in a Prince Albert tobacco can at the summit, Carpenter later asked the U.S. Geological Survey to recognize these mountains henceforth as the Carpenter Peaks.<sup>132</sup>

There are no Carpenter Peaks. But, Carpenter's work is indelible in the day-to-day, year-in-year-out administration of four great rivers from source to mouth—the Platte, the Arkansas, the Rio Grande, and the Colorado. His signature and mark are upon the 1922 Colorado River Compact, the 1922 La Plata River Compact, and the 1923 South Platte River Compact. His groundwork prepared the way for the 1938 Rio Grande River Compact, the 1942 Republican River Compact, the 1948 Arkansas River Compact, and the 1948 Upper Colorado River Compact.

Carpenter was a local northern Colorado ditch company lawyer and one-term state Senator who became the state's equitable apportionment litigator in the United States Supreme Court. His decade-long scorching struggle against Wyoming from 1911 to 1922 converted him from a state-of-origin win-at-all-costs litigator into a patient-and-tireless negotiator of durable interstate agreements. Ironically, Carpenter became a peacemaker because the reality of water scarcity and necessity—upon which the prior appropriation

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<sup>131</sup> Wyoming v. Colorado, 259 U.S. 419 (1922).

<sup>132</sup> Tyler, Silver Fox of the Rockies at 163.

doctrine turns—applies with equal logic to interstate rivers, if litigation in the United States Supreme Court is the only device for resolving water disputes between states.

Colorado had won against downstream Kansas in their 1907 equitable apportionment case, on the basis of Colorado's settled equity in continuing established water uses over prospective Kansas water uses.<sup>133</sup> When Wyoming brought the same argument to bear against Colorado, Carpenter initially resorted to claiming sovereignty over waters originating in the headwaters state. He knew the argument was likely a loser, and—while the Supreme Court was busy taking evidence and briefs, hearing oral argument, ordering further briefs, convening re-argument, and then pondering its decision for years—Carpenter was busy formulating the “compact idea.”

With clarity, scholarship, and a profound understanding of Carpenter's keen passion and intellect, Professor Tyler explains that Carpenter's water compact brainstorm derived from his understanding of “river culture”:

The culture of rivers and streams is dictated by geographical location. Upstream residents tend to manifest an attitude of superiority. Their connection to reliable water is guaranteed, especially during periods of drought. Their major concern comes from the fact that most western states accept the principle of first in time, first in right. Economic development downstream, where warmer temperatures encourage agriculture and population growth, results in a prior use of water and therefore a potential legal claim to that water in times of scarcity. Downstream residents worry excessively about upstream transfers of water out of the river basin and upstream consumption that diminishes downstream flows at critical times.<sup>134</sup>

Experience with interstate water litigation had taught Carpenter three great lessons. When the United States Supreme Court exercises its original jurisdiction to resolve an interstate water dispute,

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<sup>133</sup> *Kansas v. Colorado*, 206 U.S. at 117-18; David W. Robbins and Dennis M. Montgomery, *The Arkansas River Compact*, 5 *Univ. of Denv. Water L. Rev.* 58, 67 (Fall 2001).

<sup>134</sup> Tyler, *Silver Fox of the Rockies* at 8.

(1) the doctrine of equitable apportionment governs, (2) what is an equitable apportionment in one decade may not be so in another, and (3) the upstream state can lose to a downstream state whose development occurs first, if not now then later.

Carpenter had two primary fears, that California would preempt Colorado by its capacity for early development and that the federal government through the Bureau of Reclamation would command all western rivers to the detriment of individual states.

Carpenter's fears were real. In the Kansas/Colorado suit, the Supreme Court—citing section 8 of the 1902 Reclamation Act deferring to state water law—rejected the Government's contention that Congress had reserved all unappropriated western waters for use as the United States saw fit.<sup>135</sup> Yet, the Government proceeded to embargo Colorado from getting federal right-of-way approvals necessary for additional water development of Rio Grande River and Platte River water, in favor of assuring water supply for the federal Elephant Butte Project in New Mexico and the Pathfinder Project in Wyoming.<sup>136</sup>

California's demand for a mainstream Colorado River dam for flood control, power production, and irrigation water was long, loud, and compelling, and its Congressional delegation insistent. In this maelstrom, Carpenter refined and forwarded his principle of interstate comity based on the Constitution's compact clause<sup>137</sup> and federalism guarantees.<sup>138</sup> To Carpenter, "comity" meant that states sharing an interstate stream system would apportion the waters between themselves in perpetuity, respecting each other's legitimate

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<sup>135</sup> *Kansas v. Colorado*, 206 U.S. at 92-93.

<sup>136</sup> Tyler, *Silver Fox of the Rockies* at 8, 119, 154, 169, 314 n.58; William A. Paddock, *The Rio Grande Compact of 1938*, 5 *Univ. of Denv. Water L. Rev.* 1, 13 (Fall 2001).

<sup>137</sup> U.S. Const., Art. I, sec. 10; Art. VI, clause 2.

<sup>138</sup> Carpenter was a "literal, strict constructionist" in his view that the Tenth Amendment to the U.S. Constitution "provided parameters for his recognition of limited state sovereignty and a guarantee of states' rights against illegal federal usurpation. . . . Although an interstate compact would diminish state sovereignty to some extent, it would supersede state laws and assure signatory states the comity necessary to avoid conflict (war) in the Supreme Court." Tyler, *Silver Fox of the Rockies* at 19-20.

present and future needs. Of course, Carpenter knew that Congressional assent was necessary to make the apportionments legally effective and enduring.

By the time the Supreme Court recognized Wyoming's interstate Laramie River priority, leaving only 15,500 acre-feet per year for additional Colorado use,<sup>139</sup> Carpenter had convinced the powerful League of the Southwest to endorse the "compact idea" for the Colorado River, and Congress had enacted legislation for a seven-state Colorado River Compact Commission, whose Chair became Commerce Secretary Herbert Hoover.

Professor Tyler's story of Delph Carpenter is marvelous biography of national significance culminating with particular resonance in the telling of Carpenter's key Colorado River Compact role. Following Professor Donald Pisani's Foreword and Professor Tyler's Introduction, this biography includes chapters devoted to (1) Lineage and Love Letters; (2) Education and the Beginnings of a Career; (3) The Making of an Interstate Stream Commissioner; (4) The Colorado River Compact: Phase I; (5) The Colorado River compact: Phase II; (6) The Struggle for compact Ratification; (7) Last Years as Interstate Streams Commissioner; (8) Vindication; and (9) Carpenter and the Compact Legacy. Extensive notes and a bibliography document Professor Tyler's ten-year successful effort to bring Delph Carpenter to life.

Carpenter was sick at the time of his greatest achievement. Advocacy and negotiation wore him down. He suffered from Parkinson's disease aggravated by stress.

Aided by the first-ever access to Carpenter's personal and professional papers—made available by the Carpenter family—Professor Tyler tells how a stern-minded adversary of the federal government became a close personal friend of the future president and former state opponents in reaching monumental agreements.

These agreements are essential to the needs of a growing and diverse western United States. In the twenty-first century, rapid western urbanization—and the need to protect all creatures that share this harsh and magnificent environment we love and depend on—will test the durability of the river compacts. Because the states and their citizens have placed great reliance on the guarantee that their water

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<sup>139</sup> Wyoming v. Colorado, 259 U.S. at 496.

compact apportionments will be available to them for beneficial use when needed, continued decision-making within the compact framework appears to be a well-counseled choice.

Ultimately, Delph Carpenter learned that there is no substitute for hard work and good will. His love for the land of the Great Divide and his dear wife, Dot, welled up in these verses:

From the blackest clouds come the brightest rains  
The tree that is most exposed to wind and storm is the strongest.  
The best fish come from the purest waters.  
Circumstances must be turned and are not anxious to turn  
themselves.<sup>140</sup>

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<sup>140</sup> Tyler, Silver Fox of the Rockies at 50.