Can Negotiated Agreements Facilitate Market Transfers of Water? Lessons from New Mexico

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Abstract

Recently four large and complex water rights settlement agreements were negotiated in New Mexico. Although targeted primarily to resolving entrenched conflicts associated with the adjudication of water rights and addressing pressing over-allocation problems, the agreements contain a number of provisions to facilitate market transfers of water, especially leasing. In addition to clarifying property rights, the settlements provide mechanisms for expediting short-term leases and allow Indian water to be leased off Indian land. The agreements also address some of the concerns associated with opposition to water marketing by providing protections to certain groups of stakeholders and allowing them to participate in the rule-making process. The settlements demonstrate that negotiated agreements among local parties can make adjustments to existing governance institutions in order to facilitate market transfers of water.

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Outline

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1. Introduction

It is increasingly recognized that new approaches to the governance of water are needed to reconcile entrenched but outdated institutions and management processes with the new realities of scarcity, environmental change, and evolving attitudes toward the environment.[1] This situation is exemplified in the American west, including New Mexico, where expanding populations and economies are confronting dwindling water supplies and increased competition for water. There is increasing pressure to reallocate water from traditional uses, such as irrigated agriculture, to higher-economic-value uses in urban areas or to environmental purposes. The resulting conflicts between urban and rural populations, agriculture and other economic sectors, forces for environmental conservation and forces for development, wealthy and poor, and traditional cultures and suburban sprawl are not easily resolved.

As in many arid regions, water has been a primary issue in New Mexico for centuries.[2] Water is central to the culture of New Mexico's past and present-day Indian communities. When Spanish settlers began moving to the region in the 1600s, the availability of water determined the locations for their settlements, and their first task was always to construct a hand-dug water ditch system, or *acequia*,[3] a thousand of which are still in operation today. In the late 1800s and early 1900s as Anglo[4] settlers moved to the area, regional economies were built on irrigated agriculture. Some of the tension that developed over water allocation among these communities

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[1] See, for example, Western Water Policy Review Advisory Commission, *Water in the West: Challenge for the Next Century*, ed. Denise Fort (Springfield, VA: National Technical Information Service, 1998). Sandra Postel and Brian Richter, *Rivers for Life: Managing Water for People and Nature* (Washington, D.C.: Island Press, 2003). Robert Glennon, *Water Follies: Groundwater Pumping and the Fate of America's Fresh Waters* (Washington, D.C.: Island Press, 2002). Douglas S. Kenney, ed., *In Search of Sustainable Water Management: International Lessons for the American West and Beyond* (Northampton, MA: Edward Elgar Publishing, Inc., 2005).

[2] Ira G. Clark, *Water in New Mexico: A History of Its Management and Use* (Albuquerque: University of New Mexico Press, 1987). pp. 3, 5-6.

[3] The term "a*cequia"* refers both to centuries-old ditch-based irrigation systems and the associated communities stemming from Spanish land grants made in the 1600-1800s. See José A. Rivera, *Acequia Culture: Water, Land, and Community in the Southwest* (Albuquerque: University of New Mexico Press, 1998).

[4] Consistent with common usage in New Mexico, Anglo is used here to mean a white American of non-Hispanic or Mexican descent and is not limited to persons of English descent.

still persists. Current conflicts in New Mexico also include unresolved Indian water rights and their effect on other water rights; concerns about meeting interstate compact deliveries; impairment of water rights by large numbers of domestic wells; federal lawsuits over water required for species habitat under the Endangered Species Act and who must bear the burden of providing it; concerns about the effect on river flows of groundwater pumping by municipalities, and tension between rural and urban interests as pressure increases to transfer water from agriculture to meet the needs of rapidly growing towns and cities.

As in other parts of the western U.S., New Mexico's formal water institutions[5] were motivated by the goals of settling and developing the west. However, for a number of reasons, these institutions are proving to be inadequate for addressing today's realities of increasing water scarcity and entrenched conflict. First, the water rights adjudication process is slow, expensive, and complex, and it has been completed in only a few basins. This situation, combined with hydrologic complexity and the difficulty and expense of metering and monitoring water withdrawals, has resulted in poor enforcement of rights and unsustainable water use in many basins. Second, pressure to reallocate water is increasing. Although New Mexico has a longstanding water market and many water transfers have occurred over the years, transaction costs, lead times, and increasing numbers of protests make the market highly inefficient in some circumstances. Third, much of New Mexico's economy is based on junior water rights, so using priority administration to curtail total water use in the absence of efficient water markets would be economically devastating.

Changing the existing institutions is difficult because departing from the doctrine of prior appropriation or otherwise unilaterally altering property rights to water would require a change to the state's constitution and possibly raise complex and potentially expensive federal takings issues among existing water rights holders.[6] Recently in New Mexico, four large and complex

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[5] The word "institution" is used here to mean the formal and informal rules that societies use to govern themselves. See for example, Douglas C. North, *Institutions, Institutional Change and Economic Performance (Political Economy of Institutions and Decisions)* (Cambridge, UK: Cambridge University Press, 1990).

[6] Changing the constitution is not impossible, of course, but there is a widespread sense in New Mexico's water community that a constitutional amendment moving away from the doctrine of prior appropriation and the associated private property rights to water is unlikely, at least in the foreseeable future, in part because it would be viewed as a taking of private property rights. Per the Fifth Amendment to the U.S. Constitution, taking of private property by the government requires due process of law and just compensation to the owner for the value of the property taken. How this would actually turn out is uncertain. See Joseph L. Sax et al., *Legal Control of Water*

water rights settlement agreements were negotiated to resolve longstanding and entrenched conflicts over water in key basins. In doing so, the settlements make changes to some key water management institutions.[7] Because the settlement agreements are voluntary, they can alter fundamental institutions while remaining within existing legal framework. Although some legislative or congressional action was required for certain provisions in the settlements, wholesale changes to the legal system, such as changing the state constitution, were not required.

Although the four settlements stem from water-rights adjudication lawsuits, they contain a variety of other provisions to address numerous concerns involved in the underlying conflict. This paper is focused primarily on one aspect of the agreements: how they affect the institutions governing market-based transfers of water, particularly leasing.

2. Water Resource Management in New Mexico

This section provides foundation material on water resource management in New Mexico, summarizing water resources and use and the state's water resource management processes, including allocation, water rights, and adjudication of water rights. Some of the difficulties associated with market transfers of water stem from aspects of the management system's structure and implementation (or lack thereof).

2.1 Water Resources and Use

Precipitation in New Mexico averages about 14 inches annually.[8] The state contains parts of five major surface water drainage basins, including the Rio Grande, the Upper Colorado River Basin, the Lower Colorado River Basin, the Arkansas River Basin (which drains into the Mississippi), and the Texas Gulf Basin. New Mexico's major groundwater resources include the Roswell Basin Aquifer; portions of the Rio Grande aquifer system, the Pecos River Basin Alluvial Aquifer, the High Plains Aquifer (also known as the Ogallala), the Colorado Plateau aquifers; and a very small portion of the Basin & Range Aquifer.[9] In addition to these aquifers,

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Resources, Third ed., American Casebook Series (St. Paul, Minnesota: West Group, 2000). pp. 316-333.

[7] E. H. Richards, "Over-Allocation and the Doctrine of Prior Appropriation: Water Rights Settlement Agreements in New Mexico" (Stanford University, 2008).

[8] USGS, "New Mexico Precipitation," in *The National Atlas of the United States of America* (Reston, VA: United States Geological Survery, 2005). See also USDA in cooperation with Oregon State University, "Map of New Mexico Annual Precipitation," (Fort Worth, TX: United States Department of Agriculture - Natural Resources Conservation Service, 1999).

[9] S. G. Robson and E. R. Banta, "Ground Water Atlas Ha 730-C: Arizona, Colorado, New Mexico, Utah," in

smaller amounts of groundwater exist locally in various locations throughout the state. For management purposes, groundwater in the state is sub-divided into basins that generally correspond to surface-water-management sub-basins.

In the year 2000, water withdrawals for the state totaled 3.65 million acre-feet (MAF).[10] Slightly more than half (53%) came from surface water, and slightly less than half came from groundwater (47%).[11] The proportions vary considerably by basin. The San Juan basin in northwestern New Mexico uses primarily surface water, portions of eastern New Mexico use primarily groundwater, and use is more evenly divided between surface and ground water in the rest of the state. Much of the groundwater was mined, meaning it came from aquifers with recharge rates lower than withdrawal rates. Ground water levels in most areas have been declining for several decades, although levels are recovering in some areas where pumping has been reduced.[12]

In 1995, the most recent year for which consumptive use data are available, total consumptive use in the state was about 2.0 MAF/yr.[13] Irrigated agriculture was responsible for about 85% of consumptive use in New Mexico.[14] Domestic uses, including both publicly supplied and self-supplied, consumed 6% of the total. Commercial uses consumed about 3%, with the remaining 6% consumed by power plants, mining, livestock, and industrial uses. These percentages vary considerably by basin, depending on the degree of urbanization and reservoir location.[15] In the most-populated and fastest-growing basin, the Middle Rio Grande, agricultural consumptive use is only about half of total consumption.

Ground Water Atlas of the United States (Denver: USGS, 1995).

[10] Susan S. Hutson et al., "Estimated Use of Water in the United States in 2000, U.S. Geological Survey Circular 1268," (Reston, Virginia: U.S. Department of the Interior, U.S. Geological Survey, 2004).

[11] Ibid.

[12] New Mexico Office of the State Engineer, "2002-2003 Annual Report," (Santa Fe, NM: New Mexico Office of the State Engineer & Interstate Stream Commission, 2003).

[13] USGS, "Estimated Use of Water in the United States in 1995 - Data for Counties and Watersheds," (http://water.usgs.gov/watuse/spread95.html, 1995).

[14] Ibid. Reservoir evaporation is significant (19% of total consumptive use in the state), so these numbers may vary depending on how the evaporative losses are assigned to the various sectors.

[15] Ibid.

2.2 Water Allocation and Management

Water management in New Mexico is guided by principles in the New Mexico Constitution developed in the early 1900's. Generally, a water right is required in order to divert or withdraw water. New Mexico's constitution provides an explicit framework for allocating water rights, recognizing and confirming rights existing at the time of the statehood for "any useful or beneficial purpose" but declaring that water itself belongs to the public, subject to appropriation for beneficial use.[16] The Constitution also includes the doctrine of prior appropriation, which provides that water rights established earlier have precedence over water rights established later. New Mexico law allows – subject to certain restrictions – the market transfer of water through the sale or leasing of water rights. The intent is to provide a mechanism for serving new uses in a fully-appropriated basin and to enable the voluntary reallocation of water from senior rights holders to junior users who are denied water due to priority administration.[17]

The doctrine of prior appropriation applies to both surface and ground water in New Mexico, and they are generally managed conjunctively.[18] In general, Indian water rights are the most senior, followed by acequia communities descended from Spanish land-grants, and then farmers, ranchers, and some mining interests. More-junior rights are generally held by industrial and commercial users, residential users, municipalities, and recreational users.[19]

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[16] The definition of what qualifies as a beneficial use is generally not spelled out in state law in the western U.S. Traditionally accepted applications include irrigation, manufacturing, power production, domestic, and municipal. As times have changed, states have added new uses, such as recreation. See Sax et al., *Legal Control of Water Resources*. pp. 124-128. "Unlike other western states, New Mexico has no statute giving any use more beneficial status over another use." Peter Chestnut, "Water and Growth Issues for Tribes and Pueblos in New Mexico: Legal Considerations," in *Proceedings of the 45th Annual New Mexico Water Conference - Water, Growth and Sustainability: Planning for the 21st Century* (Albuquerque: New Mexico Water Resources Research Institute, 2000).

[17] Priority administration (also referred to as "administering priority" or "calling priority") is the formal process used by the state engineer to curtail water use in a basin. Under priority administration, water to the most-junior rights holders is cut off so that the more-senior rights can be fulfilled. Priority administration has been used only rarely in New Mexico. See page 15 of Alletta Belin, Consuelo Bokum, and Frank Titus, *Taking Charge of Our Water Destiny: A Water Management Policy Guide for New Mexico in the 21st Century* (Albuquerque: 1000 Friends of New Mexico, 2002).

[18] New Mexico was one of the first states to recognize the surface and groundwater interactions and to develop procedures for managing them as one interconnected resource. G. Emlen Hall, *High and Dry: The Texas-New Mexico Struggle for the Pecos River* (Albuquerque: University of New Mexico Press, 2002). pp 112-113.

[19] John D'Antonio, "Active Water Resource Management" (paper presented at the New Mexico Drought Summit, Albuquerque, NM, September 27, 2004). In some cases senior rights have been purchased by some of these otherwise more-junior rights holders.

Notwithstanding these general delineations, adjudication of water rights is largely incomplete, and clarifying water rights on a quantitative and prioritized basis is a complex process still working its way through the courts.[20]

Table 1. New Mexico Interstate Stream Compacts

Compact	Year	States involved (in addition to New Mexico)
Colorado River	1922	Arizona, California, Colorado, Nevada, Utah, Wyoming
La Plata River	1922	Colorado
Rio Grande	1938	Colorado, Texas
Costilla Creek	1944 & 1963	Colorado
Upper Colorado River Basin	1948	Arizona, Colorado, Utah, Wyoming
Pecos River	1948	Texas
Canadian River	1950	Oklahoma, Texas
Animas La Plata Project	1969	Colorado

A central feature – and key constraint – to water management in New Mexico is the need to meet water delivery obligations to other states under the terms of eight interstate stream compacts (Table 1). Failure to comply can and does result in protracted and expensive litigation.[21] A number of international and federal requirements also affect water rights in New Mexico. These requirements include treaties between the U.S. and Mexico apportioning the waters of the Rio Grande and the Colorado River between the two countries, the 1848 Treaty of Guadalupe-Hidalgo, federal reserved rights, and other Indian rights.

The state's water resources are administered and managed by the New Mexico Office of the State Engineer (OSE) and the New Mexico Interstate Stream Commission (ISC). The State Engineer is appointed by and reports to the governor and is responsible for "the supervision, measurement, appropriation, and distribution of all surface and groundwater in New Mexico, including streams and rivers that cross state boundaries."[22] The Interstate Stream Commission has the power to "investigate, protect, conserve, and develop New Mexico's waters including

[20] T. C. Turney, "New Mexico's Water Supply and Active Water Resource Management," (Santa Fe, NM: Office of the State Engineer and the Interstate Stream Commission, State of New Mexico., 2001).

[21] See, for example, *Texas V. New Mexico, 485 U.S. 953*, (1988). See also John D'Antonio, "Findings of Fact," *New Mexico Office of the State Engineer*, January 23, 2006.

[22] NM OSE, "New Mexico Office of the State Engineer," NM Office of the State Engineer (Website), http://www.seo.state.nm.us/index.html.

both interstate and intrastate stream systems"[23] and is responsible for protecting New Mexico's water rights under the eight interstate compacts as well as ensuring that New Mexico meets its compact water delivery requirements. The ISC is also responsible for state water planning. The two offices are closely connected. The State Engineer serves as Secretary of the ISC and oversees the ISC staff. The director of the Interstate Stream Commission serves as the Deputy State Engineer.

In addition to the OSE and ISC, local and regional entities have limited legal authority to regulate or control water within their boundaries. These entities include Indian tribes, acequias,[24] municipalities, water and sanitation districts, mutual domestic water associations, water cooperatives, and conservancy and irrigation districts. For example, municipalities have the authority to impose conservation requirements on their customers.[25] Irrigation and conservancy districts control delivery of water to their constituents. Since 2001 municipalities have had statutory authority to limit the drilling of new domestic wells within their service area, and acequias have had the power to block water transfers out of their associations since 2003.[26]

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[23] NM ISC, "Interstate Stream Commission," NM Office of the State Engineer/NM Interstate Stream Commission (Website), http://www.seo.state.nm.us/isc_index.html.

[24] The Spanish word "*acequia*" comes from an Arabic word meaning "to irrigate." In New Mexico, the word has both a physical and an institutional definition. Physically, an acequia is a ditch, usually an earthen hand-dug channel, that conveys water from a river or stream to agricultural fields and communities. Institutionally, an acequia refers to a public entity that allocates and distributes water to its members, the landowners of the community. Acequias have their origins in both medieval Spain and Pueblo Indian culture. Although modern technology and other institutions have replaced most other subsistence agriculture traditions in the United States, acequias have persisted for more than four centuries as one of the central agricultural institutions in New Mexico. Acequias play a unique role in the state's culture, economy, and water management. Approximately 1000 acequia communities remain in New Mexico, and in many rural areas they continue to be the only form of government below the county level. They generally have the second oldest water rights, after tribal rights. Because most rights are not adjudicated, exact numbers do not exist, but acequias represent much of the irrigated agriculture in certain basins and therefore much of the water. They have the most senior rights that are transferrable (since tribal rights generally cannot be transferred), so they are a target for reallocation in basins with large or growing populations. Having survived threats to their water from mining, rail roads, and the creation of irrigation districts in the past, they are now fighting for survival as rapidly expanding cities compete for their water, either though New Mexico's water market or via lack of enforcement of senior rights. See Rivera, *Acequia Culture*.

[25] "Opportunities for Local Governments and Water Providers in New Mexico to Adopt Ordinances and Regulations to Conserve Water - a Report for the New Mexico Drought Task Force," (Santa Fe: Ordinances and Plans Subgroup of the Drinking Water Group of the New Mexico Drought Task Force, 2004).

[26] .*NMSA 72-5-24.1 Acequias and Community Ditches; Changes in Point of Diversion or Place or Purpose of Use*. See also New Mexico Acequia Association, "Website," http://www.lasacequias.org/.

2.3 Water Rights

A water right is the right to use water from a particular source, either surface water or groundwater. In New Mexico, it is usually characterized by a diversion quantity in acre-feet per year (AF/yr), a consumptive-use quantity in AF/yr, a priority date, a place of use, a purpose of use, and a point of diversion. Sometimes the quantity is expressed in terms of irrigated acres, with the amount of water allowed tied to crop- and/or basin-specific "duties of water." The timing of water use may also be specified (for example, irrigation withdrawals may be restricted to the summer growing season). The diversion and consumptive use amounts may be the same or they may be quite different.

A water right is established when surface or ground water is withdrawn and put to beneficial use, although special circumstances apply to the water rights of Native American tribes and Pueblos.[27] Prior to 1907, nothing else was required to establish a water right, and the priority is the date water was first put to beneficial use.

Since 1907, a permit from the state engineer has been required before withdrawing surface water, with the priority date for these rights being the date the permit is filed. After verifying that the water under the permit is being withdrawn and put to beneficial use, the OSE issues a license for the water right. Since 1931, permits have also been required for ground water in basins that have been "declared" by the state engineer.[28] As populations and ground water withdrawals have increased in the state, the state engineer has declared additional basins, until 2005 when the last remaining portions of the state were declared.[29]

"Pre-basin rights" are surface water rights established prior to 1907 or ground water rights established prior to the associated groundwater basin being declared. Although these rights are generally the most senior, and therefore the most valuable, little or no official documentation exists for many pre-basin rights. In these cases, a (presumed) water right owner may file a "declaration of a water right" with the state engineer's office. A declaration may or

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[27] See Chapter 9 of Sax et al., *Legal Control of Water Resources*.

[28] For a discussion of the New Mexico groundwater statute, see C. Gopalakrishnan, "The Doctrine of Prior Appropriation and Its Impact on Water Development: A Critical Survey," *American Journal of Economics and Sociology* 32, no. 1 (1973). p. 69.

[29] NM OSE, "State Engineer Signs Special Orders Declaring and Extending Underground Water Basins Throughout the State of New Mexico," *Press Release, NM Office of the State Engineer,* September 23, 2005.

may not represent a valid right, but it does provide at least the beginnings of some official documentation. Some rights holders file declarations as a step in the due diligence required prior to selling a water right. Others file declarations in the interest of protecting their rights from encroachment or impairment by others or to stake a claim in an impending adjudication process. Many other rights holders have not filed declarations, relying instead on historical and continued use as evidence of a valid right.

Permitted rights – rights to surface water established after 1907 and groundwater rights established after a basin was declared – are much more clearly documented than pre-basin rights. However, because their priority dates are often much later, permitted rights are not nearly as valuable as pre-basin rights, especially where water is in short supply. The law requires that all water rights ultimately be clarified and documented – adjudicated – through the courts, but this process has not been completed for most water rights in the state (or even started in many basins).

Once the water in a given basin is deemed by the State Engineer to be fully appropriated, the basin is "closed" and no new appropriations are allowed. Anyone needing additional water must then purchase water rights from an existing rights holder, with or without the associated land, and apply for approval of a transfer from the OSE if any change to the place or purpose of use or the point of withdrawal is needed. Virtually all of the water in the state is now considered fully appropriated.

Domestic wells have special status and are considered by many to represent a major loophole in the prior appropriation system as it is now implemented. In 1953 the state legislature passed a law to facilitate access to domestic water and streamline the appropriation process for small amounts of water.[30] The statute requires the state engineer to grant a permit to anyone applying for a domestic well, even in basins that are fully appropriated. As of the year 2000, there were more than 137,000 domestic wells in the state, with developers sometimes pooling domestic well water to serve new subdivisions that otherwise would require an existing water right.[31] Domestic wells may be drilled even on land that has previously had its water rights

[30] *NMSA 72-12-1.1. Underground Waters; Domestic Use; Permit.*

[31] ———, "Map - NM Ground Water Basins & Total Domestic Wells," (Santa Fe: New Mexico Office of the State Engineer, 2000).

severed and sold for some other place of use. The cumulative effect of some of these wells has led to accusations of impairment by senior water rights holders, with a variety of lawsuits working their way through the courts.[32] In one case the constitutionality of the domestic well statute is being challenged.[33] Although legislation has been proposed several times to address the domestic well issue, none has yet been passed.[34]

In New Mexico, a major premise underlying the water management system has been that, in the event of a shortage or other need to reallocate water, entities with a need for more water – either because they have expanded or new needs for water or because their junior rights were curtailed via priority administration – may purchase or lease water rights, with or without the appurtenant land, from existing rights holders at a price mutually acceptable to both. Thus, water may be reallocated via a market structure in a manner that would put it to its highest-economic-value uses.[35] For a market system to function properly, clearly defined, enforced, and secure property rights (adjudicated water rights in this case) are required. To address shortages effectively, it must be possible to transfer water from one use to another within a sufficiently short time frame and without excessive transactions costs. However, in most basins in New Mexico, neither of these conditions has been met.

2.4 Adjudication of Water Rights

Water management in New Mexico is complicated by the state's history, which includes Native American communities dating back 1000 years, Spanish colonial land-grant communities that go back 400 years, a period of Mexican rule, then U.S. territorial status, and finally statehood starting in 1912. The water laws and management practices in use today evolved

[32] *Horace Bounds, Jr. And Jo Bounds, and the San Lorenzo Community Ditch Association vs. The State of New Mexico, Ex. Rel, John D'antonio, New Mexico State Engineer, No. CV-2006-166, State of NM, County of Grant, Sixth Judicial District*, (2008). Staci Matlock, "Court Cases Force Action over Domestic Wells," *The New Mexican*, February 1, 2007. *Lynn Montgomery, Dr. Robert Wessely, and Dr. Catherine Harris, Protestants-Petitioners, V. Lomos Altos, Inc. And Garden Path Associates, Applicants-Respondents, and New Mexico State Engineer, Real Party in Interest. Opinion Number 2007-Nmsc-002*, (2006).

[33] *Bounds vs. New Mexico, No. CV-2006-166, State of NM, County of Grant, Sixth Judicial District.*

[34] Consuelo Bokum, "Judge Rules Domestic Well Statute Unconstitutional/State Engineer Appeals," *New Mexico Water Dialogue Newsletter*, Summer 2008.

[35]Cultural or other non-economic values of water that cannot easily be quantified in terms of a price may not be well-represented in a market.

throughout this history.[36] There are numerous rights that pre-date the permitting process. Many of these rights have been in place for centuries, some before written records or water laws; accordingly, many of the oldest and most valuable water rights in the state are undocumented.[37]

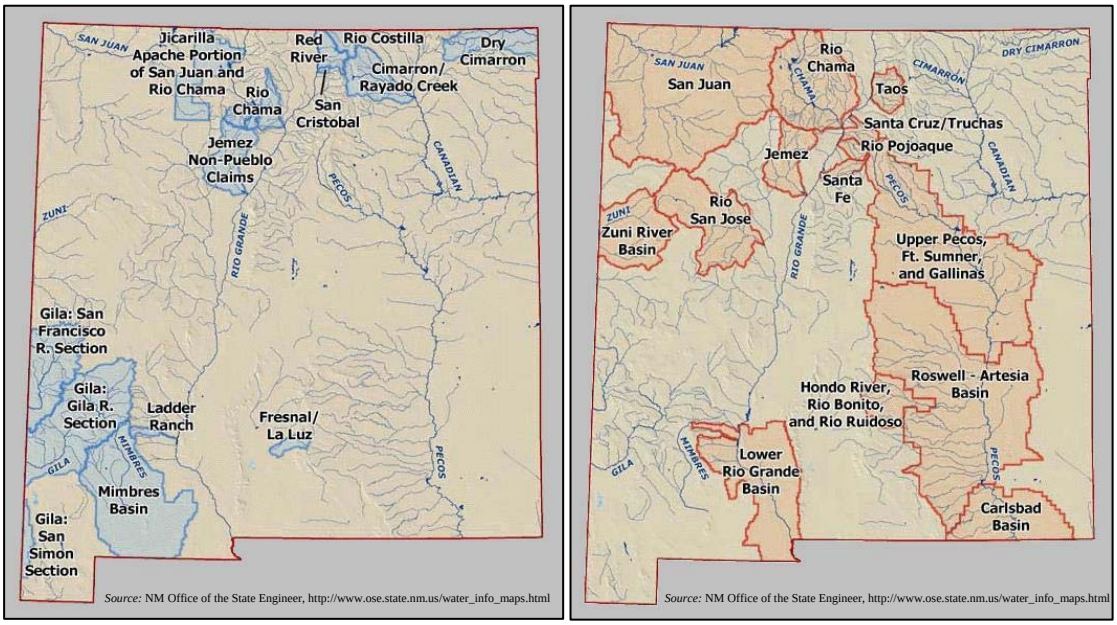

Figure 1. Completed Adjudications (left) and Adjudications in Progress (right).[38]

Adjudication is the legal process for determining officially who owns the rights to divert and consume what water, for what use and at what location, when during the year and at what point of diversion, and with what priority date. New Mexico's complex history and lack of documentation have made it difficult to adjudicate water rights in some basins, and, as shown in Figure 1, adjudication has been completed in only a few basins. Statewide it is less than 20% complete.[39] Although adjudication is being actively pursued in some basins, it is not being pursued in many others. As long as water supplies are adequate and water is not fully-appropriated, having unadjudicated water rights is not a major concern because there is no need

[36] For a complete description and discussion of the evolution and development of water management and law in New Mexico, see Clark, *Water in New Mexico: A History of Its Management and Use.*

[37] New Mexico Office of the State Engineer, "2002-2003 Annual Report."

[38] _____, "Map - Completed Adjudications," (Santa Fe, NM: 2003). New Mexico Office of the State Engineer, "Map - Active Adjudications," (Santa Fe, NM: 2003).

[39] NM OSE, "2006-2007 Annual Report," ed. Karen Stangl (Santa Fe, NM: New Mexico Office of the State Engineer & Interstate Stream Commission, 2008).

to identify and curtail junior users nor is there a pressing need to reallocate water via a market or otherwise. But when there are shortages, having known and quantified water rights is critical to administering the prior appropriation system. And, as mentioned, clearly defined water rights are also essential for a well-functioning water market reallocation system.

Per New Mexico law, an adjudication process begins when the state, federal government or an interested party initiates a lawsuit to ascertain the water rights of a particular stream system and associated ground water basin. Adjudications occur in phases. Typically, the State Engineer first conducts a hydrographic survey for the stream system and/or groundwater basin, identifying all water users and the history of water use. This survey is conducted using historical records and aerial photography. Based on the results for the hydrographic survey, the State Engineer then sends "offers of judgment" (determinations of water rights) to the water users in the stream system via the court. A water user may accept the offer of judgment or challenge it in court. This phase is called the sub-file phase. After individual water rights are determined in the sub-file phase, the adjudication moves to the *inter se* phase where water users may challenge the water rights of other appropriators. After *inter se* challenges are resolved, the adjudication concludes with the issuance of a court decree that documents the water rights in the stream system, including the quantity (diversion and consumptive use), priority, and point of diversion for each rights holder.[40]

The OSE is currently involved in eleven adjudications, some of which are decades old.[41] For example, the ongoing adjudication of the Pecos River stream system began in 1956, eventually involving the interconnected surface- and ground-water rights of three irrigation entities, a federal water storage project, and roughly two thousand individual rights holders. Adjudications of several tributaries to the Upper Rio Grande were started between 1966 and 1983, involving water rights of many of New Mexico's Indian pueblos and tribes, the federal government, municipalities, acequias and community ditches, and thousands of individual defendants.[42] The San Juan stream system has been partially adjudicated through proceedings

[40] New Mexico Office of the State Engineer, "Website - Water Rights Adjudication," NM Office of the State Engineer, http://www.seo.state.nm.us/water-info/legal/adjud-process.html.

[41] NM OSE, "2005-2006 Annual Report," ed. Karen Stangl (Santa Fe, NM: New Mexico Office of the State Engineer & Interstate Stream Commission, 2007). p. 37.

[42] New Mexico Office of the State Engineer, "2002-2003 Annual Report."

initially filed in 1975, but the rights of the Navajo Nation, the United States, and thousands of private claims in that basin remain unresolved.[43] In addition to being exceedingly complex, many of the adjudications involve intense conflicts among the parties.

Water rights on Indian lands and reservations in New Mexico are particularly complex because they may involve as many as three different doctrines: pueblo historic use water rights, federal reserved water rights (also known as Winters Doctrine rights[44]), and/or water rights established under New Mexico state law.[45] Because Indian claims are often quite large and generally senior to other rights in a given basin, there can be considerable uncertainty regarding the viability of other rights in the basin.

While a few adjudications have proceeded through the prescribed adjudication litigation process successfully and with little fanfare, others have been stalled due to conflicts among the affected parties and/or insufficient resources to complete the adjudications. A lack of resources has prevented the OSE from even starting adjudication in many basins. Significantly, adjudication proceedings have not been started in the largest, most populated, and most complex basin in the state, the Middle Rio Grande. This basin includes the largest city in the state, Albuquerque, along with a number of smaller but rapidly growing cities and towns competing for water with six Indian Pueblos and a variety of traditional irrigated agriculture interests.

Fundamentally adjudications are about defining property rights to water: who, how much, where, for what, when, and with what priority. However, even in basins where adjudication has been completed, property rights to water are frequently not entirely clear for a number of reasons:

First, water rights are hydrologically interdependent, in that one person's withdrawals may affect the ability of others to use the resource.

Second, water rights are legally interdependent: seniors are to receive their water first, with juniors allowed to take water only if there is a sufficient supply remaining after the seniors

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[43] Ibid.

[44] Federal reserved rights for Indian tribes are also sometimes referred to as Winters Doctrine rights in recognition of the U.S. Supreme Court decision that established them. *Winters V. United States*, 207 U.S. 564 (1908).

[45] ———, "2002-2003 Annual Report."

have been served. Water rights may be transferred only if the transfer will not impair other users.

Third, a water right does not convey ownership of water per se, but rather conveys ownership of a right to withdraw and/or consume a certain amount of water according to certain restrictions, such as place and purpose of use and point of withdrawal. Approval from the OSE is necessary in order to change any of these parameters. The water right is restricted to uses deemed beneficial by the state, and non-use or misuse of a water right can lead to its forfeiture. In some basins, water rights are specified in terms of how many acres may be irrigated rather than how much water may be diverted or consumed. The amount of water allowed may be dependent on the particular crop or standards set for the basin.

Fourth, New Mexico law requires that water use serve the public welfare, which may add additional restrictions to a water right. The definition of what constitutes public welfare is still evolving and may depend on the particular basin involved.

And finally, the documentation of a water right is much more complex than, say, a share of stock in a publicly traded company or even a real estate title deed. (The latter is associated with something that is physically stationary and can at least be tied to a plat book.) If a water right is sold (as part of a land sale or separately) or otherwise transferred after it has been adjudicated, due diligence is required to ascertain its validity because the current owner will not be the one listed in the adjudication court decree and, if the water right has been transferred, it may no longer be associated with the same location or use. From a practical standpoint, although the OSE is in the process of converting all water rights to electronic format, the file for one water right may involve multiple documents to support its initial validity and to track any subsequent transfers, splits, and/or combination with other water rights.[46]

Adjudication of water rights is a complicated, lengthy, and expensive process. Adjudications are based on a litigated court process in which a plaintiff, usually the State Engineer, files suit against all other water rights claimants in the hydrologic system being adjudicated. Therefore, by their nature, adjudication procedures are adversarial and not

[46] New Mexico has put a significant amount of its hydrological and water rights information into an on-line database in an ongoing process that began in 1998, with the goal of ultimately consolidating New Mexico's 2.5 to 3 million water-rights documents into one location.

conducive to collaboration. The average water rights holder is often shocked and alarmed to receive a notice announcing that he or she is a defendant in a lawsuit being brought by the government.[47] Standard litigated adjudications also have a prescribed set of outcomes, and do not allow for creative solutions to allocating scarce water or resolving conflicts. Most basins in the state remain unadjudicated, and even in basins where adjudication has been completed, the property rights to water are not necessarily straightforward.

Adjudication is about the allocation of water at a given point in time. It specifies, as of the date the court decree is entered, who has the rights to water, including how much, where, and for what purpose. Except when water rights have been transferred prior to an adjudication, the adjudication process does not address or track the reallocation of water.[48] The ability to reallocate water from one user to another, from one place to another, and/or for one purpose to another, is critical to the practical functioning of the prior appropriation system. This is particularly true in fully appropriated basins, where reallocation is virtually the only way to acquire water for new uses. It is also essential in the event that priority must be administered to address a water shortage because junior uses are often the most economically productive.

2.5 Over-Allocation of Water

When more water is allowed to be used than the system can support over time, a state of over-allocation exists. Given that water rights determine who is allowed to use water, over-allocation is defined here as the total rights to water exceeding the renewable supply of water. It is also called over-appropriation and is sometimes described as “paper water” exceeding “wet water.” Over-allocation is closely related to how rigorously the doctrine of prior appropriation is implemented, including the degree to which water rights under that system are monitored and enforced. It is also in many cases closely connected to the use of non-renewable groundwater.

The consequences of over-allocation can be severe. At the most basic level, consuming water at a rate that exceeds the renewable supply means that water shortages will occur more often and with greater severity, with the rate at which this will occur depending on the degree of

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[47] Jerald A. Valentine, "Adjudications: Getting To "Finished"," in *50th Annual New Mexico Water Confererce - New Mexico Water: Past, Present, and Future, or Guns, Lawyers, and Money* (Las Cruces, NM: New Mexico Water Resources Research Institute, 2005).

[48] Thus, over time as rights are transferred, an adjudication decree may become out of date, although it will likely still be useful as a starting point for conducting due diligence to establish the validity of a particular right.

over-allocation. Although surface water is viewed as a renewable supply (the effects of climate change and watershed degradation notwithstanding), many who are dependent on surface water also depend on water storage. If water is over-allocated, reservoir levels will decline. In the case of seasonal storage (e.g., storage of snowmelt for use in the late summer), water supplies may be insufficient to last through the season for which they were intended. In the case of over-year storage, water supplies may be insufficient to provide protection from drought. Upstream over-allocation of surface flows may deprive downstream seniors of water and/or destroy critical aquatic and riparian habitat. Where surface water is hydrologically linked to declining groundwater supplies, rivers and streams can cease to flow. Over-allocation is of particular concern for communities and economies dependent on groundwater sources based on largely prehistoric "fossil water" with little or no recharge.[49] Another consequence of over-allocation is non-compliance with the requirements of interstate compacts and the need to make large adjustments quickly when the compacts are eventually enforced.[50]

Water is over-allocated in many basins in New Mexico, including the basins represented by the four settlement agreements. In one basin, groundwater pumping by junior rights holders resulted in cumulative rates of water consumption that exceeded the sustainable supply in the basin, resulting in New Mexico defaulting on its interstate compact delivery requirements and necessitating large, permanent, reductions in water use in a very short period of time. In the other three settlement basins, large senior Indian rights had gone unused due to lack of resources to develop them. The unused water associated with those rights was appropriated by more-junior users to build growing communities and economies. As the tribes increasingly assert their water rights, the water supplies to communities and economies based on junior rights are subject to curtailment. Many other examples exist, both in the settlement basins and in other basins, where for various reasons water use has exceeded the sustainable supply and resulted in hydrologic imbalances.[51]

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[49] Several communities, including Albuquerque, Gallup, and those in eastern New Mexico dependent on the Ogallala are facing the prospect that their primary water sources are being rapidly depleted.

[50] This was the case in the Lower Pecos, transforming a chronic over-allocation situation into an immediate and expensive crisis. A similar situation may also exist on Rio Grande.

[51] The term "hydrologic balance" is used here to mean ensuring that water withdrawals and consumption do not exceed the renewable supplies.

In a perfectly implemented prior appropriation system, water rights would be established until the system was fully allocated, and then the basin would be closed to new appropriations. Not all rights holders would receive water every year, and new uses of water would require transferring water rights away from existing uses. As long as the prior appropriation system was adhered to, there would be no over-allocation. However, if the prior appropriation system is not perfectly implemented and enforced, the system can become over-allocated.

There are a variety of root causes of over-allocation, including (but not limited to) lack of clarity about who owns what rights and with what priority; the fact that certain rights (Indian and other federal reserved rights, and municipalities) are not subject to abandonment for non-use; hydrologic complexity; reluctance to enforce priority for political or economic reasons, and historical reliance on unsustainable groundwater mining. In addition, new constraints on the system such as new uses of water to protect the environment, reductions in the available supply due to climate change, or increased attention to interstate compact enforcement, along with the high cost of managing and implementing the prior appropriation system, also contribute to the over-allocation of water.

Some of the same root-causes of over-allocation, such as unclear or unenforced property rights, also are barriers to the proper functioning of water markets. Over-allocation also has a direct negative effect on the proper functioning of water markets because when over-allocation is allowed, there is little incentive to purchase or lease water rights. As will be discussed later, addressing over-allocation problems was a key objective of all four of the settlement agreements.

3. Reallocation: Water Markets in New Mexico

One indication that New Mexico has left the era of water allocation and has entered the era of reallocation is that the water rights division of the Office of the State Engineer now spends much more time processing transfer applications than processing applications for new appropriations.[52] Because very little water in the state remains unappropriated, the market transfer of water rights is a key feature in the (re)allocation and management of water in New Mexico. And, the ability to transfer water rights via a market is essential to the practical

[52] The OSE also spends time processing declarations of old water rights.

implementation of the prior appropriation system. However, the water transfer process can be expensive, slow, and sometimes infeasible.

3.1 Terminology

In New Mexico, the term "water market" commonly refers to the buying and selling of a perpetual[53] right to water (sometimes called "paper water"), rather than the sale of a particular volume or flow of "wet" water. These transactions are *permanent* transfers of ownership of water rights, and per New Mexico law they may occur with or without the sale of the associated land.

The terms "water leasing" and "water banking" in New Mexico generally refer to *temporary* transfers of water. These temporary water transfers may specify a volume of water or a flow-rate over time ("wet water"), or they may specify the use of a particular water right for a stated period of time. Water banking and water leasing are frequently treated as synonyms in New Mexico, although water leasing may typically be thought of as a transaction directly between a rights holder and a lessee, while water banking often refers to a more structured system involving a third party, such as an irrigation district, that oversees, facilitates, or manages leasing transactions.

These definitions are not adhered to rigorously, and the two terms, leasing and banking, are often used interchangeably. In addition, the term "water market" is often used more broadly to include banking and leasing as well as permanent changes in ownership of a water right. To date, the permanent transfer of water rights has been much more prevalent in New Mexico than leasing or banking arrangements, although the latter are receiving increasing attention.

As noted previously, a water right is legally defined by its priority, quantity,[54] purpose of use, place of use, and point of diversion (or location of well in the case of groundwater). A "water transfer" is defined as a permanent or temporary change to one or more of the following attributes of a water right: ownership, purpose of use, place of use, and/or point of diversion.[55]

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[53] The right is perpetual as long as, per state statute, it is not abandoned or forfeited due to non-use.

[54] As noted previously, the quantity may be specified as a diversion amount, a consumptive amount, or both. Occasionally the right is specified in terms of irrigated acreage, with basin-specific multipliers for different crops use to derive quantities. There may also be restrictions regarding the timing of the withdrawals.

[55] In addition, the OSE also considers combining or splitting of water rights to be types of transfers. These more administrative transfers are not considered in this analysis, although as mentioned briefly in the section on water

A change in the point of diversion may involve changing where water is diverted from a river or stream or changing the location of a well. It can also involve a change from ground water to surface water or vice versa.[56] No approval is required for a change in ownership, but the OSE must review and approve (or deny) any application to make changes in the other attributes, whether or not a change in ownership is involved.[57] This review process can be quite extensive and time consuming, and it also includes requirements for public notice and opportunities for others to protest the transfer. A water transfer as defined by the OSE is not necessarily a "market" transfer.

3.2 History of Reallocation

New Mexico's market for water rights has long been accepted as routine, with market transactions used to reallocate water from irrigation to municipal use dating back at least to the 1950s.[58] Until fairly recently, most transfers were processed and approved with little fanfare, and only a small percentage were protested.[59] This contrasts with, say, California where, although the water market there has received much more attention in the literature and the news, relatively few agriculture-to-urban market transactions have taken place.[60] Trading of water

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rights adjudication, they do contribute to the complexity of the system.

[56] The OSE generally uses "point of diversion" to designate the location where surface water is withdrawn. It uses "location of well" for to specify the location where ground water is withdrawn. The OSE treats changing the point of diversion (surface water), changing the location of a well (groundwater), changing from surface water to ground water, and changing from ground water to surface water as different types of transfers. For simplicity they are lumped together here under one type of transfer: changing the point of diversion.

[57] NM OSE, "Rules and Regulations Governing the Appropriation and Use of the Surface Waters of New Mexico," (Santa Fe: New Mexico Office of the State Enginner, 2005). NM OSE, "Rules and Regulations Governing the Appropriation and Use of Groundwater in New Mexico," (Santa Fe: New Mexico Office of the State Enginner, 2006).

[58] Based on a review of OSE water transfer data entered into the WATERS database as of February 2006. These data also show a transfer of a water right from irrigation to manufacturing in 1930. Other early transfers are likely, given that data entry into the WATERS database was only about 50% completed at the time of the review, representing fewer than half of the basins. NM OSE, "Waters," New Mexico Office of the State Engineer, http://iwaters.ose.state.nm.us:7001/iWATERS/.

[59] See Chapter 4 of Lawrence J. MacDonnell, "The Water Transfer Process as a Management Option for Meeting Changing Water Demands, Vol. 2," (Boulder, CO: USGS, 1990). Prior to 1990, more than 50% of transfers were processed in three months or less, and more than 75% of transfers were processed in 6 months or less. In 2000, per the state engineer, "we receive a lot of complaints concerning the length of time it takes to process a transfer. The hearing unit now has 185 protested applications ... we have 650 unprotested applications." T. C. Turney, "Water Issues Facing New Mexico," in *Proceedings of the 45th Annual New Mexico Water Conference - Water, Growth and Sustainability: Planning for the 21st Century* (Albuquerque: New Mexico Water Resources Research Institute, 2000).

[60] MacDonnell, "The Water Transfer Process as a Management Option for Meeting Changing Water Demands, Vol.

allotments within irrigation or conservancy districts has also been routine in New Mexico, although transfers from within an irrigation district to an entity outside of or not part of the district may be restricted depending on whether the rights are owned by the district or the individual members and/or on district-specific rules. In 2003 the New Mexico legislature passed legislation allowing municipalities and other qualifying entities to use water from irrigation districts via the creation of Special Water User Associations.[61] There is also an established history of buying and selling water rights among mining and other industrial users of water in New Mexico.

State law also allows for temporary transfers, or leases, of water rights. Generally, leases of up to 10 years are allowed, and up to 40 years for municipalities, universities, and other "40-year planning entities."[62] Except within an irrigation district or acequia where short-term exchanges of water may be handled internally, leasing transactions are handled essentially the same way as permanent transfers, with the same requirements for OSE review and approval.[63] Because these procedures can be time and resource intensive, they can be disproportionately burdensome for short-term arrangements.

To date, water leasing has not played a major role in water allocation and management in New Mexico, although this is starting to change. One example is an agreement signed by the Jicarilla Apache Tribe and the City of Santa Fe in 2005 whereby the Jicarilla Apache will provide 3,000 AF/yr to augment Santa Fe's water rights portfolio.[64] This agreement was made

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2." See also Water Science and Technology Board. National Research Council (NRC), *Water Transfers in the West* (Washington, DC: National Academy Press, 1992). and Brent M. Haddad, *Rivers of Gold: Designing Markets to Allocate Water in California* (Washington, D.C.: Island Press, 2000).

[61] For example, the Elephant Butte Irrigation District (EBID) in the Lower Rio Grande basin now has Special Water User Associations whereby municipal entities, such as the city of Las Cruces, can become fully vested District constituents with the ability to purchase or lease water rights from within the district, with prices negotiated individually between the buyer and seller or lessor and lessee. J. Phillip King, "Active Water Resource Management in the Lower Rio Grande: Adapting to Basin-Specific Requirements," *Proceedings of the 50th Annual New Mexico Water Conference: New Mexico Water: Past, Present, and Future or Guns, Lawyers, and Money* (2005).

[62] As discussed futher below, the settlement agreements have provisions allowing tribal entities to lease water for terms up to 99 years.

[63] See Section 19.26.2.18 in NM OSE, "Rules and Regulations Governing the Appropriation and Use of the Surface Waters of New Mexico."

[64] Ben Neary and Tom Sharpe, "City: 50-Year Jicarilla Lease Vital to Tapping Rio Grande," *The New Mexican*, July 3, 2004. The agreement was finalized in 2005. The initial price was $1.5M/year, or $500/AF. Note that because this is a lease, the $500/AF is effectively the price for a specific volume of water, not the rights to water.

possible by federal legislation associated with a 1992 water rights settlement agreement that allows the Jicarilla Apache to lease water off reservation land. A key feature of this lease is its duration – 50 years – long enough for a municipality to consider the leasing market as a viable source of water. Another key feature is its pricing mechanism: Santa Fe agreed to pay an annual fee of 10% of the current water rights purchase price in the area; this price will change every two years based on the results of a market study.[65] This lease may be a sign of future trends, with other Indian tribes negotiating changes to federal law that allow them to lease their water off tribal lands.

Another example of the increasing role of water leasing is the water bank that the Middle Rio Grande Conservancy District (MRGCD) has set up whereby water rights owners within the district may lease unused water to each other.[66] However, the legality of the MRGCD's water bank has been questioned.[67] The MRGCD claims enough water rights for more than 120,000 acres, but actually irrigates only about 65,000 acres.[68] It has never proven it has put more water than that to beneficial use, filing and receiving repeated one-year extensions from the OSE exempting it from proving beneficial use. In any case, it is now possible for MRGCD farmers to sell their water rights off their land, but continue to irrigate by leasing unused water rights from the MRGCD water bank. This is commonly referred to as "double-dipping."

The OSE is promoting the development of new, streamlined, short-term leasing mechanisms as a tool for coping with drought in some basins with critical water shortage issues.[69] Some have concerns, though, about whether the OSE's proposed short-term leasing programs will skirt the due diligence required to ensure other rights holders and third-party interests are not impaired. In 2002, after several unsuccessful attempts to pass a more

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[65] David Brookshire et al., "Issues and Results from Experimental Water Leasing Markets" (paper presented at the UNM Water Forum, Albuquerque, October 31, 2006). Julie Ann Grimm, "City's Cost for Leasing Water Climbs," *The Santa Fe New Mexican*, January 10 2008.

[66] Subhas Shah, "The Middle Rio Grande Conservancy District: Sustaining the Middle Valley for over 70 Years," in *Proceedings of the 45th Annual New Mexico Water Conference - Water, Growth and Sustainability: Planning for the 21st Century* (Albuquerque: New Mexico Water Resources Research Institute, 2000).

[67] Lisa D. Brown, "The Middle Rio Grande Conservancy District's Protected Water Rights: Legal, Beneficial, or against the Public Interest in New Mexico?," *Natural Resources Journal* 40 (2000).

[68] Inc. S.S. Papadopulos & Associates, *Middle Rio Grande Water Supply Study* (Boulder, CO: Prepared for U. S. Army Corps of Engineers Albuquerque District and the New Mexico Interstate Stream Commission, 2000).

[69] D'Antonio, "Active Water Resource Management".

comprehensive leasing law, the legislature was able to pass a limited law allowing expedited leasing on a stretch of the Pecos River. "The acequia association had argued that the faster transfer of water rights allowed by water banks could harm other water users and the public by undermining the rural lifestyle. The association also was concerned about the effect water banking would have on the historic, cooperative function of acequias, or irrigation systems. The irrigation and conservancy districts had argued that they didn't want the interference and regulatory control from the state engineer that could accompany water banking."[70]

From about 1980 to 2000 the number of water market transactions increased substantially in some basins as cities and developers purchased water rights from farmers to support rapidly increasing urban and suburban populations.[71] In some locations in the state, cities are requiring developers to purchase water rights prior to approving plans for new subdivisions.[72] Even where this requirement does not exist, pressure is increasing for municipalities to address water needs before approving large new subdivisions, and it is no longer automatic for a municipality to provide water rights for new developments.[73] Prices for water rights have also risen dramatically in some basins, with "frenzied activity" reported in some locations.[74] However, the market has slowed in the last few years in some basins, with buyers outnumbering sellers.[75] One view is that sellers are taking a wait-and-see attitude as prices have climbed, resulting in a lack of available rights for sale.[76] Another view is that there are no more large senior water rights

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[70] "Water-Banking Solution Could Foster Smoother Water Sharing," http://www.uswaternews.com/archives/arcconserv/2watban3.html.

[71] This information from various presentations at *New Mexico Water Markets: A Seminar on Buying, Selling, and Leasing Water Rights*, ed. F. Lee Brown and John W. Shomaker (Albuquerque: H2O Economics and John Shomaker & Associates, Inc., 2006).

[72] Examples include Santa Fe and Las Cruces. In a related matter, a dispute about whether the city or the developer was responsible for providing the water rights to a previously approved major new development arose in Albuquerque. Erik Siemers, "Mesa Del Sol Water Plan Could Be Approved Tonight," *Albuquerque Tribune* (2007). In past years, it was assumed that the city would provide water service to new developments, including the water rights.

[73] See for example V.B. Price, "Water Crisis: How Will Albuquerque Satiate Its Continual Thirst for Growth?," *Albuquerque Tribune*, January 6, 2007. In 2006 a dispute about whether the city or the developer was responsible for providing the water rights to a previously approved major new development in Albuquerque. Siemers, "Mesa Del Sol Water Plan Could Be Approved Tonight." In past years, it was assumed that the city would provide water service to new developments, including the water rights.

[74] *New Mexico Water Markets: A Seminar on Buying, Selling, and Leasing Water Rights*.

[75] Ibid.

[76] Ibid.

available in key basins and that, at best, cities will need to pursue multiple small rights to support continued population growth, despite the uncertainty of their availability and validity and the increased transactions costs of doing so.[77] Some cities are turning to leasing, although the fact that a lease has an end-date can be problematic for municipal supplies.[78]

Meanwhile, resistance to water transfers is growing and becoming more organized. The numbers of transfers protested has increased, with several high-profile cases.[79] There are several reasons for this, as discussed further below.

3.3 The Water Transfer Process

Water transfers in New Mexico involve either or both of two primary processes, each of which can be costly and time consuming. Transfers that involve a change in ownership require that a willing buyer and a willing seller find each other, conduct due diligence to establish the validity and transferability of the right, negotiate a price satisfactory to both parties, and execute the transaction. Transfers that involve a change in the place or purpose of use of the water and/or the point of diversion are subject to review and approval by the state engineer to ensure other rights holders are not impaired. Per state law, the OSE must also consider whether the public welfare will be served by the transfer and whether the transfer is contrary to water conservation. Public notices are also required as part of this process. Transfers that involve both a change in ownership and one or more of the other changes (place, purpose, and/or point of diversion) require both processes. Sometimes completing the change in ownership is made contingent receiving approval from the state engineer.

3.3.1 Changes in Ownership

Because there is no central "water rights exchange," it can be time- and resource-consuming for willing buyers and willing sellers to find each other. There are a few private water brokers in the state, and some law firms offer brokering services along with assistance in

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[77] Ibid.

[78] In addition to Santa Fe's lease of water from the Jicarilla Apache Nation mentioned above, Gallup is hoping to lease water from the Navajo Nation.

[79] Kay Matthews and Mark Schiller, "Prehearing Held on Top of the World Water Transfer Protest," *La Jicarita News*, October, 1999. Staci Matlock, "Mysterious Firm's Water Plan Draws Protests - Small Towns in the San Agustin Plains Worry About Impact on Wells," *The New Mexican*, September 5, 2008. *Montgomery V. Lomos Altos and New Mexico State Engineer, 2007-Nmsc-002*. Some of the Pueblos along the Rio Grande are increasingly protesting transfers that move the point of diversion upstream.

the legal process. Real estate agents are becoming increasingly involved, as the value of water rights attached to land deals has increased and become more recognized.[80] Water rights attached to land for sale can sometimes be found via the multiple-listing service used by the real estate sales industry. Cities have staff tasked with locating suitable water rights for sale and following through to purchase them.[81] Developers are being drawn into the market as cities increasingly require new developments to provide their own water rights. Individuals or other entities that have rights for sale may approach any of these people involved in purchasing water rights, but there is no single clearinghouse so it may take some effort to settle on a satisfactory approach. Water rights holders in the state have diverse backgrounds and cultures, and finding someone they trust to handle a water transaction is frequently an issue.[82] Efforts to establish water banks that would serve as a central clearinghouse, at least for leasing transactions, have generally been stymied by political opposition from various factions.[83]

A significant amount of due diligence is usually required to establish the validity of a given water right, particularly in those areas (most of the state) where adjudication is not complete. Historical maps, surveys, crop or other agricultural records, and aerial photos are all used as parts of a portfolio establishing when the water was first put to beneficial use (priority date) and demonstrating that the full water right has been in continual use and has not been abandoned or forfeited. It is in the interest of the seller to provide as much documentation as possible to demonstrate priority date and continuous use in order to attract buyers and obtain the highest possible price. It is in the interest of the buyer to have as complete a package as possible to increase the probability that the right they are purchasing is as claimed by the seller and will be recognized as valid in an eventual adjudication or priority administration of the basin. It is also in the interest of buyers to conduct their own research to ensure that there is no evidence that

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[80] New Mexico Water Markets: A Seminar on Buying, Selling, and Leasing Water Rights.

[81] Norm Gaume, "Meeting Future Municipal, Industrial, and Environmental Needs: Buying, Leasing, or What?" (paper presented at the New Mexico Water Markets: Second Seminar on Buying, Selling, and Leasing Water Rights, Albuquerque, May 14, 2007).

[82] *New Mexico Water Markets: A Seminar on Buying, Selling, and Leasing Water Rights*.

[83] "Water-Banking Solution Could Foster Smoother Water Sharing."

the water right, or portion of the water right, was ever abandoned, forfeited, or severed from the land and sold to someone else previously.[84]

In addition to finding each other and conducting due diligence, the parties must negotiate the terms of the deal, including price. With no central exchange for water rights transactions and no tracking of prices, the prices are negotiated on a case by case basis. Price is dependent on the location of the right, the priority date of the right, and the scarcity of the rights for sale in a given basin or sub-basin, but can vary widely among similar rights. In many cases, closing the deal may be contingent on the OSE approving a change to place of use, purpose of use, or point of diversion. In sum, negotiating the sale of a water right can be costly and time consuming, even when OSE approval is not required.

3.3.2 Changes to Place of Use, Purpose of Use, or Point of Diversion

Whether or not a change in ownership is involved, if the transfer involves a change in the purpose of use, place of use, and/or the point of diversion, it must be reviewed and approved by the OSE. As in the case of a change in ownership, the transaction costs can be substantial and the process can be time consuming.

The process begins with a review of the submitted documentation to ensure the validity of the right to be transferred, with unadjudicated rights likely requiring more scrutiny than adjudicated rights. Inchoate rights, or those rights or portions of rights which have never been demonstrated to have been put to beneficial use, may not be transferred. Only the consumptive amount of a right may be transferred; when the purpose of use is changed, the diversion amounts or return flow credits associated with the right may need to be changed. Although the OSE may accept the documentation submitted as sufficient to allow a transfer of an unadjudicated right, getting the transfer processed and approved does not guarantee that the water right will be found to be valid in a subsequent adjudication.

The OSE must conduct a hydrologic study for each transfer application to ascertain whether other water rights will be impaired by the proposed change.[85] Due to the complexities

[84] Sometimes proof of beneficial use has never been filed or it turns out that not all of the original right has been put to beneficial use. These unused, or inchoate, rights are subject to forfeiture, although enforcement has been lax.

[85] For example, if a water right is being transferred upstream, flows may be diminished for users located between the downstream "move from" point of diversion and the upstream "move to" point of diversion. Another example of possible impairment is when transferring a water right out of a given irrigation system reduces flows to the level

of the hydrologic interactions, the interconnectedness of water rights, and the frequent lack of documentation of existing water rights, this can be a complex process. If the OSE determines that other rights will be impaired, the transfer will be denied unless there are mitigating measures the applicant can take, such as providing additional water to offset the negative effects of the transfer. The OSE will then make these mitigating measures a condition of the transfer.

In addition to ensuring that other water rights will not be impaired, the OSE must ensure that transfers are consistent with the goals of water conservation and the public welfare. The OSE can make serving these goals a condition of a transfer approval. For example, prior to approving an application by the City of Albuquerque to transfer groundwater rights to surface water, the OSE required the City to develop and implement a water conservation program. In some cases the OSE may require increased monitoring of water diversions or consumptive use.[86] Addressing public welfare is more complex because, although the OSE is required by state law to ensure public welfare is not harmed by a transfer, a definition of public welfare has yet to be provided by state law or the courts.[87] Interpretations vary widely across constituencies and regions, and public welfare is proving to be a sticking point in a number of ongoing, protested, transfer applications.

Once the OSE completes the above reviews and there are no unresolved adverse findings, the applicant must publish a notice about the impending transfer once a week for three consecutive weeks in a newspaper, specified by the state engineer, in every county that might be affected by the transfer. The notice is also posted on the state engineer's web site. The notice must specify the location of the point(s) of diversion, the amount and timing of the diversion of water, the place of use, and the purpose for which the water is to be used. The applicant must then also file with the OSE an affidavit of publication. If no protests are filed within 10 days of the final public notice, then the OSE proceeds with processing the transfer request.

If a protest is filed, additional steps are necessary. The OSE will first encourage the parties to negotiate among themselves to resolve the issues, holding a pre-hearing conference if

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where there is not enough carrying capacity to deliver water to other rights holders on the ditch.

[86] NM OSE, "Rules and Regulations Governing the Appropriation and Use of the Surface Waters of New Mexico."

[87] Consuelo Bokum, Vickie Gabin, and Paige Morgan, *Living within Our Means: A Water Management Policy for New Mexico in the 21st Century* (Santa Fe: New Mexico Environmental Law Center, 1995). p. 14

necessary. If the parties do not resolve the issue, depending on the circumstances, the OSE may deny the transfer or may schedule a hearing to allow each side to present their case for a decision by the OSE. The OSE may then deny, approve, or approve with conditions. If the applicant is not satisfied with the OSE decision, whether or not there was a protest, he or she may request that the OSE reconsider the decision and/or pursue an appeal through the courts.

The definition of who has standing to protest a water transfer is fairly broad, including not only individuals and other entities who believe their water rights will be impaired by the transfer, but also, with certain conditions, those who believe that the transfer will be "contrary to the conservation of water" or "detrimental to the public welfare."[88] The state of New Mexico, its agencies, departments, boards, and political subdivisions also have standing to protest water transfers. As discussed further below, increasing numbers of transfers are being protested.

Little information is available regarding transaction costs, but it is clear they can be considerable, especially if legal counsel is required.[89] In addition, a "typical" transfer with no protests takes on the order of six months to go through the OSE approval process; it can be much longer if a protest is involved.[90] When protests are involved, the process can drag on for years.[91] For water purchased as part of long-term supply planning for municipal growth, these lead times may not pose a significant problem, but even six months may be too long for the market to function as a reallocation mechanism for critical near-term shortages.

3.3.3 Lack of Transparency in the Water Market

Despite the fact that water transfers are public records and that public notification is required as part of the transfer process, it is actually quite difficult to discern market transactions from the OSE water rights transfer files. This is because of the complexity of the files and because the sale of the right (with or without the appurtenant land) may occur years prior to

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[88] NM OSE, "Rules and Regulations Governing the Appropriation and Use of the Surface Waters of New Mexico." NM OSE, "Rules and Regulations Governing the Appropriation and Use of Groundwater in New Mexico."

[89] Some early analyses found that transactions costs were relatively low, but that was when the time to process a transfer was significantly less and protests were less common. MacDonnell, "The Water Transfer Process as a Management Option for Meeting Changing Water Demands, Vol. 2." Costs for some routine transfers may still be relatively low, depending on circumstances.

[90] *New Mexico Water Markets: A Seminar on Buying, Selling, and Leasing Water Rights*.

[91] For example, the Top of World Farms transfer has been pending for more than 15 years. Matthews and Schiller, "Prehearing Held on Top of the World Water Transfer Protest."

when the place of use, purpose of use, or point of diversion is transferred. Despite the fact that the OSE continues to add increasing numbers of water rights files to its WATERS electronic database,[92] it is still very difficult to get an accurate assessment of the numbers or types of water market transactions, or related trends. The most comprehensive study of water transfers to date covered the period 1975 through 1987 and examined only changes in place of use, purpose of use, and point of diversion, not change in ownership.[93]

Information about the prices associated with water transfers is also difficult to obtain. New Mexico does not record price information when land is sold, and the OSE has not in the past collected price information when ownership of a water right is transferred. In 2006 the OSE updated its forms to include price, but providing information about prices will continue to be voluntary. Some water brokers, attorneys specializing in water rights, and real estate agents specializing in the sale of land with water rights have a good understanding of price trends in the particular basins where they work, but they generally consider this information to be proprietary. Some price information may technically be in the public domain, such as for transactions involving government agencies, but there is no centralized repository or reporting mechanism for the information.[94]

The lack of transparency in the water market is important for at least two reasons. One is that the efficiency of markets depends on good information. The other is that the lack of transparency can contribute to the over-allocation of water, in particular with respect to double-dipping.

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[92] WATERS stands for the Water Administration Technical Engineering Resource System. It is an electronic database set up by the OSE to allow easier access to water rights files. The system includes a chronology of each individual water right claim in New Mexico, including court orders and decrees, hydrographic survey results, and water right applications pending before the State Engineer. It also contains scanned images of various supporting water rights documents. Information is being input into the system one basin at a time, with approximately half of the basins scheduled to be included by 2009.

[93] MacDonnell, "The Water Transfer Process as a Management Option for Meeting Changing Water Demands, Vol. 2." See also the related report, F. Lee Brown et al., "Transfers of Water Use in New Mexico," (Las Cruces: New Mexico Water Resources Research Institute in cooperation with the Natural Resources Center of the University of New Mexico, WRRI Report No. 267, 1992).

[94] A few publications track water transfer price information in the western U.S., but the information reported is based on news reports or other public disclosures rather than a comprehensive tracking of all market transactions etc.

3.4 Benefits of Water Markets

The considerable benefits of water markets are well-documented and are summarized only briefly here.[95] They provide a means for reallocating water once a basin has become fully appropriated, allowing those who have a higher economic-value use for water, but have insufficient water rights, to purchase water from willing sellers with a lower economic-value use at a price that is agreeable to both. Such transfers are voluntary, not mandated by an external authority. Assuming transaction costs are sufficiently low and negative externalities are minimal or otherwise accounted for in some way, this type of reallocation increases economic efficiency. In addition, using a market to allocate water sets a price for water that more closely reflects its economic value and its scarcity, which tends to curb over-consumption relative to when it is treated as a free or heavily subsidized good. Allowing prices to reflect the full value of the water also can stimulate advances in technology, such as, for example, new water efficiency devices. Economic efficiency may also be improved by replacing the "use it or lose it" requirement with the ability to sell water conserved through water-use efficiency measures.[96] In New Mexico, water markets are consistent with existing laws, allowing for reallocation without requiring a major overhaul of existing water institutions.

Water markets -- either permanent transfers or leasing -- play a critical role in the event priority administration is used to curtail water use. Given that many of the most junior water rights are associated with high-economic-value uses, the ability to reallocate water from lower-economic-value uses quickly and with minimal transaction costs is essential to avoid large economic welfare losses incurred by priority administration. However, although New Mexico has a long history of water market transactions, the transactions costs and time associated with the transfer process have the potential to limit the market's effectiveness in this regard. In addition, opposition to market transfers and some inherent limitations in water markets may also limit the market's effectiveness.

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[95] See for example National Research Council (NRC), *Water Transfers in the West*. T. L. Anderson and P. Snyder, *Water Markets: Priming the Invisible Pump* (Cato Institute, 1997). Bonnie Colby Saliba and David B. Bush, *Water Markets in Theory and Practice*, ed. Charles W. Howe, Studies in Water Policy and Management (Boulder: Westview Press, 1987). Haddad, *Rivers of Gold: Designing Markets to Allocate Water in California*.

[96] Frank A. Ward, Ari M. Michelsen, and Leeann DeMouche, "Barriers to Water Conservation in the Rio Grande Basin," *Journal of the Amercian Water Resources Association* 43, no. 1 (2007).

3.5 Opposition to Water Markets and Transfers

Although there is considerable support for water markets in New Mexico, not everyone favors water transfers and markets. Protests of individual transfers are becoming more common, and recent changes in state law put additional conditions on certain types of transfers.[97] For the market to continue to serve as a reallocation mechanism, the concerns that many have about water markets cannot be taken lightly, both from the perspective of getting individual transfers approved and from the perspective of improving the process. In a number of cases, ignoring concerns about water transfers resulted in successful legal or political action to block specific transfers or resulted in political opposition to the creation of new market mechanisms.

A variety of problems with and associated opposition to water markets are well documented in the literature.[98] In New Mexico, reasons for opposition to the market transfer of water can be grouped under four categories:

(1) concerns about market imperfections and failures, including externalities and difficulties accounting for the values of water attributed to things that are hard to quantify monetarily;

(2) distributional concerns associated with who may profit from the state's water and who may control it;

(3) fairness of the processes involved in water transfers and markets; and

(4) fundamental differences in the ways water is valued socially and culturally.

In some cases, support for or opposition to water markets is conditional; if specific concerns are addressed and incorporated into the market process, those opposed may become supporters.

3.5.1 Market Imperfections

Market transfers of water are often accompanied by notable external (or third-party) effects. First, because water rights are interdependent, a transfer (via a market or otherwise) may affect rights holders who are not parties to the transaction. Although the OSE is required to

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[97] *NMSA 72-5-24.1 Acequias and Community Ditches; Changes in Point of Diversion or Place or Purpose of Use*.

[98] See for example, Sax et al., *Legal Control of Water Resources*. pp. 246-257. National Research Council (NRC), *Water Transfers in the West*. Saliba and Bush, *Water Markets in Theory and Practice*. Haddad, *Rivers of Gold: Designing Markets to Allocate Water in California*.

prevent impairment resulting from water transfers, many rights holders do not feel adequately protected.[99]

Second, many people, not just the rights holders themselves, benefit from particular water rights. When the withdrawal and/or use of water are moved to a new location, those in the original area may be negatively affected.[100] Aside from evaluating whether a water transfer is contrary to public welfare,[101] the OSE review process does not protect those who do not hold a water right from the negative effects of a water transfer. These third-party effects, often difficult to quantify in an economic sense, are a major problem for many. Of particular concern is the decline of local farming communities and economies as land is taken out of production so that water can be transferred elsewhere. Some fear that the unique character of the state and the corresponding tourism component of its economy will be destroyed if too many acequias and other rural farming communities disappear due to water transfers.[102] Loss of recreational opportunities tied to water is another key issue in some areas.

Third, environmental consequences of transfers are also a concern. For example, transferring rights to an upstream location reduces the flow in the stretch of river between the original and new points of diversion, potentially impairing habitat for fish or other species. Fallowing farmland and allowing ditches to dry up can destroy critical wildlife habitat and/or create dust problems. Farmland irrigated with networks of earthen ditches helps compensate for human-made alterations to a river's natural hydrograph, allowing portions of the original floodplain to function as such despite the absence of flood events.[103] Under some circumstances

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[99] The 2003 law giving acequias power to block a transfer is one result of this sentiment.

[100] Perhaps the most well known example of this is the decline of the Owens Valley economy after the water was transferred to Los Angeles. See Chapter 10 in Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin Books, 1986).

[101] As described above, public welfare is as yet largely undefined. It could consider overall public welfare of the state rather than the public welfare of a particular local community. See Sax et al., *Legal Control of Water Resources*. pp.250-253.

[102] Rivera, *Acequia Culture*.

[103] Lisa Robert, "A Killing "Cure"—Agricultural-to-Urban Water Transfers in the Middle Rio Grande Basin," in *Water Resources of the Middle Rio Grande: San Acacia to Elephant Butte*, ed. L. Greer Price, Peggy S. Johnson, and Douglas Bland, *Decision Makers Field Conference* (Socorro, NM: New Mexico Bureau of Geology and Mineral Resources, 2007).

potential exists to violate the Endangered Species Act, thereby blocking some transfers or requiring additional mitigation such as offset water.

Transfers may also have positive externalities, possibly improving habitat in some locations and/or benefiting non-rights-holders in the location receiving the water transfer.

3.5.2 Distributional Concerns

The second major category of concerns about water markets relates to distributional issues. Although the right to withdraw and use water is generally accepted as private property in New Mexico, the state's constitution states that the water itself belongs to the public. Consequently, some believe that rights holders should not be allowed to profit from the sale of a publicly-owned resource, especially when the water rights were established with help of government-subsidized irrigation projects.[104] Related views are that it is acceptable to profit to some degree from the sale of water rights, as long as the profits are not "excessive" and/or that profits are shared with the state on behalf of the public.

Others, who may or may not be bothered by the notion of profiting from the sale or lease of water rights, are not comfortable with the initial distribution of rights. These people feel that the initial "distribution of wealth" via the prior appropriation system was arbitrary and consequently unfair to the current population. Particular concerns have been raised about entities that have large senior water rights, such as irrigation districts and tribes, because water leasing by these groups would give them considerable market and political power in basins where they hold the majority of senior rights.[105]

3.5.3 Fairness of Processes

The third category of concerns about water markets is perceived fairness of the transfer process. This includes issues relating to transparency, who has the power to make and enforce the rules governing market transactions, and inter-basin transfers. There is also concern that wealthy and/or politically connected development interests are too influential in how the rules are made and enforced.

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[104] The Upper Rio Grande Working Group, "Upper Rio Grande Waters: Strategies," in *Proceedings: A Conference on Traditional Water Use* (Santa Fe: University of New Mexico, 1987). Similar concerns exist in the state of Hawaii; see Sax et al., *Legal Control of Water Resources*. pp. 255-256.

[105] See for example Brown, "The Middle Rio Grande Conservancy District's Protected Water Rights: Legal, Beneficial, or against the Public Interest in New Mexico?." Mike Sullivan, "San Juan Deal Drains N.M. Dry," *Albuquerque Journal*, March 25, 2007.

Transparency and who has the ultimate say in whether a transfer is approved are both issues of particular concern to acequias. Because acequias operate communally, transferring individual water rights out of an acequia weakens the overall system. An acequia needs minimum flows in its ditches to operate effectively, and each water rights holder shares in the responsibility of maintaining the irrigation system, both from a labor and a financial perspective. Despite the public notification requirement, lack of transparency in the market transfer process and the short window of time in which a protest must be filed have resulted in transfers occurring without an acequia learning about it until too late to avoid damage to the community system. In some cases, acequia members have sold their water rights with a lease-back arrangement that allows them to continue to irrigate for ten or so years. Because a change in ownership does not require approval by the OSE or public notification, the sale may be kept secret until the buyer applies for OSE approval to change the purpose or place of use and/or the point of diversion. Even then, the acequia must be vigilant enough to spot the public notice; otherwise the transfer may be approved without the acequia's knowledge. Even if the acequia does observe the notice and is able to get a protest filed within the allotted ten days, the transfer applicant (the new owner) may be much more able to afford legal and other assistance in getting the transfer approved.

In response to concerns by the NM Acequia Association, in 2003, the legislature passed a law requiring that acequias meeting certain requirements (e.g., approved bylaws) be notified of applications for transfers out of their territory and giving them veto power over the transfer.[106] While this law alleviates certain concerns relating to water markets, it adds another complexity and constraint to the water market. Meanwhile, the constitutionality of this law is currently being challenged in court in two separate lawsuits.[107]

Another concern about fairness relates to inter-basin transfers. In some basins, there is insufficient agricultural water available for reallocation to urbanizing areas.[108] These urban customers are looking to adjacent basins for water rights to purchase. Some feel it is unfair to

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[106] *NMSA 72-5-24.1 Acequias and Community Ditches; Changes in Point of Diversion or Place or Purpose of Use*. Acequias must have approved bylaws in place to qualify for the protection provided by this law.

[107] Staci Matlock, "Water Rights Cases Test Acequia Powers," *The Santa Fe New Mexican*, September 18 2007.

[108] Lucy Moore, "The Upstream-Downstream Project: Report from the Fourth Workshop," *New Mexico Water Dialogue*, Fall 2007.

allow rapidly growing urban and suburban communities to transfer water from more rural basins because it deprives the rural communities of their own future economic development. The result is that discussions of local prohibitions against inter-basin transfers are becoming more common in some areas of the state.[109]

And finally, there is also a general sense in some quarters that the rules, the rule-making process, and enforcement are skewed in favor of certain moneyed and/or politically powerful entities. The apparent reluctance of some cities to link development with realistically available water supplies is a prime example. Some senior rights holders are concerned about the reliance on relatively junior rights to fuel development. These are rights that allow urban growth to continue, but that would need to be cut off by the OSE if priority administration were necessary. One fear is that, because these junior rights are used for (politically more powerful) municipal purposes, they would not be cut off despite their junior status, diminishing the value of senior rights through impairment. There have also been increasing concerns by senior rights holders about municipalities simply using powers of eminent domain to condemn senior water rights in the event their junior rights are curtailed,[110] although this concern has been at least partially alleviated by state legislation passed in 2009 that provides some protections against condemnation of water rights.

3.5.4 Differences in Social and Cultural Values

The opposition to water markets discussed above is largely about flaws in the process or fairness and other distributional issues that could conceivably be negotiated to solution. However, in some quarters, there is strong opposition to water markets that stems from deeply held social, cultural, and religious views about water. One such view, elaborated in the literature but not detailed here, is that water is a basic human right and should not be treated as a commodity.[111] Another view, widely held by many senior rights holders in parts of New

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[109] See for example Inc. Daniel B. Stephens & Associates, "Taos Regional Water Plan, Vol. 1," in *NM Regional Water Plans,*, ed. NM Interstate Stream Commission (Albuquerque, NM: Prepared for Taos Regional Water Planning Committee, 2007). and Laura Nesbitt, "Estancia Basin May Get Help," *Moutain View Telegraph*, January 24 2008.

[110] "Minutes of the Fourth Meeting of the Water and Natural Resources Committee," (New Mexico Legislature, Elephant Butte, NM, September 21-22, 2006).

[111] For a summary, see M.L. Livingston, "Designing Water Institutions: Market Failures and Institutional Response," *Water Resources Management* 9 (1995).

Mexico, is that water is a community resource and should not be separated from the land.[112] Those who value New Mexico's rural landscapes see water transfers as a proxy for land use changes that spell the end of farming, rural lifestyles, and associated scenic and cultural values. Some Indian tribes, recognizing that water is scarce and having stewarded water carefully through the centuries, have water as the centerpiece of their spiritual and cultural existence. Some tribal members are dismayed when they see this resource used for watering lawns in cities, particularly when the tribes are experiencing water shortages despite their senior rights.[113] Although the law requires that water use must serve the public welfare, this concept remains poorly defined, and differences in interpretation of the meaning of public welfare have provided the basis for protests over specific transfers.[114]

There is also distaste for speculation in some arenas. Many of the original laws requiring that water be put to beneficial use prior to a right becoming established and that it be kept in use to avoid abandonment stem from the belief that speculation and profiteering in water should be avoided.[115] Although there are varying views in the literature on the relative merits of speculation in a water market,[116] the view persists among many in New Mexico that markets allow wealthy water investors with no vested interest in New Mexico per se to profit from speculation at the expense of local residents.

Many of the concerns identified above are not indicative of permanent across-the-board opposition to water markets (support for human rights to water and opposition to separating water from land notwithstanding). In many situations, if the concerns are addressed the opposition will likely diminish. For many people, whether or not a transfer is part of the water market is not the important thing. Rather, what matters is the change in the place or purpose of

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[112] See for example Paula Garcia, "My View: Water-Rights Cases Could Determine Acequia Future," *The New Mexican*, September 22, 2007.

[113] Mary Lance, Tom Zannes, and Dale Kruzic, "Voices of the Jemez River," (New Deal Films, Inc., Corrales, NM, 2005).

[114] See for example Matthews and Schiller, "Prehearing Held on Top of the World Water Transfer Protest."

[115] Sax et al., *Legal Control of Water Resources*. pp. 257-258.

[116] T. L. Anderson, "Market Alternative for Hawaiian Water, The," *Natural Resources Journal* 25 (1985). Terence R. Lee and Andrei S. Jouravlev, *Prices, Property, and Markets in Water Allocation* (Santiago, Chile: United Nations Economic Commission for Latin America and the Caribbean, 1998). Sax et al., *Legal Control of Water Resources*. pp 258-259. S. F. Williams, "The Requirement of Beneficial Use as a Cause of Waste in Water Resource Development," *Natural Resources Journal* 23 (1983).

use and the point of diversion, and the process used to decide these things. From a pragmatic perspective, while market transfers of water are generally accepted in New Mexico, transfers will be slowed or blocked unless the institutions that support market transfers evolve so that the above concerns are addressed in meaningful ways. Recent history has shown that various interest groups will use their political power to limit or place controls on the market, via either rules of operation or additional protests that effectively shut water transfers down.[117]

3.6 Limitations of Water Markets

In addition to the opposition to water transfers noted above, there are some limitations that exist whether or not political forces support the use of markets. One limitation is conveyance. Even if a willing buyer and a willing seller can find each other and agree on a transfer, the transaction is unlikely to take place if there are no reasonable means for moving the water from the original location to the new location. Transporting water over any significant distance outside the natural flow of a stream system can be expensive, especially if there are changes in elevation requiring pumping. Transfers within the same hydrologic system are generally much easier and less expensive than transfers between basins, although the physical and legal structure of the water rights may preclude some transfers within the same hydrologic system.[118] Inter-basin transfers do occur in New Mexico, but to date have mostly involved large bulk transfers with federally subsidized conveyance systems.[119] Even where pre-existing human-made conveyance infrastructure exists to transfer water between basins, access may be subject to the availability of excess carrying capacity and negotiation of user fees or other costs. Conveyance losses can also be a concern, whether due to evaporation or seepage. Thus, water markets are generally restricted geographically. In New Mexico, rather than a single integrated water market, there are actually a number of smaller markets defined by basin boundaries and hydrology.

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[117] See note 83 above. Also see, for example, Haddad, *Rivers of Gold: Designing Markets to Allocate Water in California*.

[118] For an illustration of this point, see Maria R. Saleth, John B. Braden, and J. Wayland Eheart, "Bargaining Rules for a Thin Spot Water Market," *Land Economics* 67, no. 3 (1991).

[119] The San Juan-Chama project, which moves water from the Colorado River Basin to the Rio Grande Basin, is the primary example.

Even within a particular river system where conveyance might not be an issue, water is often managed at a sub-basin level. For example, the Rio Grande basin in New Mexico is divided into Lower, Middle, and Upper sections, with additional further subdivisions reflecting tributaries or groundwater boundaries. Some of these divisions reflect the location of gauges that determine interstate compact compliance; transferring water across these gauges may be restricted. Transferring water across state lines may also be restricted by interstate compacts, although this restriction tends to apply more to surface water than ground water.[120] In addition, some communities are considering local area-of-origin protections that would prohibit transfers out of the sub-basin. Federal law also generally prohibits the use of Indian water off Indian land.

Hydrologic transmissivity may also constrain the ability of water transfers to achieve their desired intent. This is of particular concern when a point of diversion is changed from groundwater to surface water. Depending on the distance between the original well and the surface water in question, as well as the geology, such a transfer may result in an immediate additional depletion of surface water flows because the positive effect of ceased groundwater pumping is not realized until the cone of depression associated with the well recovers, something that may take decades. Similarly, the reverse effect may occur when the point of diversion is transferred from surface water to groundwater. A temporary increase in surface water flows may occur until the new cone of depression reaches the river. In the meantime (a period that may be measured in decades depending on the distance between the well and the river), other surface water users may come to depend on these increased flows.

Another potential limitation of markets for water rights is that many transactions are "one-shot deals." That is, once a municipality acquires a water right, it is unlikely to resell this right in the foreseeable future. This contributes to the thinness of the market and contrasts with, say, the stock market, where the same shares of stock are bought and resold routinely. From a practical view, eventually there may be no more water rights for sale. For example, in basins where roughly 80% or more of the water is currently being used for agriculture and 20% or less is being used for urban uses, urban use could be doubled (to 40% of the total) with agriculture declining by a only a quarter or less (to 60% of the total). However, in basins such as the Middle

[120] Refer to earlier discussion of interstate compacts.

Rio Grande, urban and agriculture uses each consume roughly 50% of the water available.[121] Doubling urban use (from 50% to 100%) to accommodate a doubling of population (consistent with population growth forecasts) would essentially require eliminating irrigated agriculture in the basin – the primary source of water rights available for reallocation. Barring an unforeseen decline in population, it is unlikely that urban areas would ever put their rights back on the market. The water rights market as it currently exists in that hydrologic region would essentially end, except perhaps for inter-basin transfers from areas where conveyance is physically and financially feasible, where area-of-origin restrictions do not apply, and where urban users have not already acquired all the water rights.[122]

Water leasing or banking that involves specific quantities of water rather than the perpetual right to use water may be less likely to be one-shot deals and therefore may alleviate the thinness of the market to some extent.[123] However, municipalities are likely to require long-term leases on the order of 50 years or more, so in areas where urban use is a high percentage of the total, a large fraction of the total available water rights would still be tied up for significant periods of time.

Certain environmental issues may also limit a water market. One is water quality – municipalities require higher quality water than agriculture does, so not all water may be acceptable unless water purification infrastructure were put into place. Under some circumstances the Endangered Species Act could preclude some transfers if the net result is a decline in critical habitat, although the case can also be made that a robust water market could provide a means for supplying water to critical habitat.

From a pragmatic view, the sheer complexity of the water rights system in New Mexico is also a limitation to the market. Even when water rights are reasonably well-defined through the adjudication process, they are still quite complex. The time and expense involved in the

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[121] This information is based on the figure on page 6 of MRGWA, "Middle Rio Grande Water Budget," (Albuquerque: Middle Rio Grande Water Assembly, 1999). It accounts for the water available after evaporation and non-agriculture-related evapotranspiration is considered.

[122] It is conceivable that market-like forces, such as pricing structures, could still be used to reallocate water within an urban area, say, to reduce lawns to allow for more industry. However, it is doubtful this would involve the buying and selling of water rights, but rather adjustments within an agency that owns the rights.

[123] Saleth, Braden, and Eheart, "Bargaining Rules for a Thin Spot Water Market."

analysis of validity, impairment, conservation, and public welfare for each transfer is considerable.

It is unlikely that a major overhaul of the water rights and marketing system could be accomplished without amending the state's constitution. However, the four recent large water-rights settlements in New Mexico offer evidence that voluntary negotiated agreements may be able to, among other things, address concerns about and facilitate market transfers of water. Specifically, the four settlements reduce the transaction costs and time associated with clarifying property rights, reduce the transaction costs and lead-time associated with water leasing, and open up the opportunity for tribes and Pueblos to lease their water off Indian land, all without requiring wholesale changes to the existing legal framework.

4. Water Rights Settlement Agreements in New Mexico

Four large and complex water rights settlement agreements were recently negotiated in New Mexico. All four of these settlements stem from water rights adjudication litigations that are decades old, involve thousands of water rights claimants, and are highly contentious. Three of them are linked to federal efforts to resolve Indian claims, similar to settlements in other states. Significantly, one of the four New Mexico settlement agreements does not involve tribal water claims, demonstrating that negotiated water rights agreements may be useful beyond the established realm of tribal water rights. Although the underlying adjudications are focused on determining property rights to water, the settlements go well beyond the determination of water rights, including among other things, mechanisms to expedite transfers of water, especially via leasing.

This section summarizes the four settlement agreements and their primary provisions.[124] As shorthand, each is designated by its commonly used name, either the name of basin in which it occurs or by the commonly-used name of the adjudication lawsuit with which it is associated. Accordingly, the four settlements are designated as the Lower Pecos, the San Juan-Navajo, the Taos, and the Aamodt.

[124] More extensive descriptions and comparisons of each can be found in

4.1 Overview of the Settlements

The map in Figure 2 shows the location of the basins associated with each of the four settlement agreements. The Lower Pecos, in southeastern New Mexico, includes the Roswell Artesian and Carlsbad sub-basins, which are the primary focus of the settlement.[125] The San Juan basin, in the northwest portion of the state, encompasses a significant portion of the Navajo Nation, whose rights are of primary concern in that settlement. The Taos basin in northern New Mexico includes the Taos Pueblo, as well as the Town of Taos, fifty-five acequias, and other water users. The Nambe-Pojoaque-Tesuque basin (NPT on the map) is the location of the Aamodt adjudication and associated settlement involving the four Pueblos of Nambe, Pojoaque, San Ildefonso, and Tesuque. The map shows the considerable variation in the drainage areas of the basins, although the land area is much less of a factor in the complexity and difficulty of the settlements than the number of water rights claimants and the needs for water relative to the amount of water available.

To provide some perspective, Table 2 lists some general statistics associated with each of the four settlements. Each of them involves water rights adjudication litigation that was filed decades ago, is highly complex, and remains incomplete. All four involve settlement agreements that were signed within a few years of each other, although the length of time to negotiate each settlement varied widely. The basins vary greatly in size, population, and quantity of water involved. There are Native American lands in each of the basins, but only three of the settlements involve tribes. Correspondingly, although all four settlements require significant government funding, funding from federal sources is provided only for the three settlements involving tribes.

[125] The Lower Pecos basin also includes the Hondo and Penasco sub-basins, but they are not directly involved in the settlement agreement.

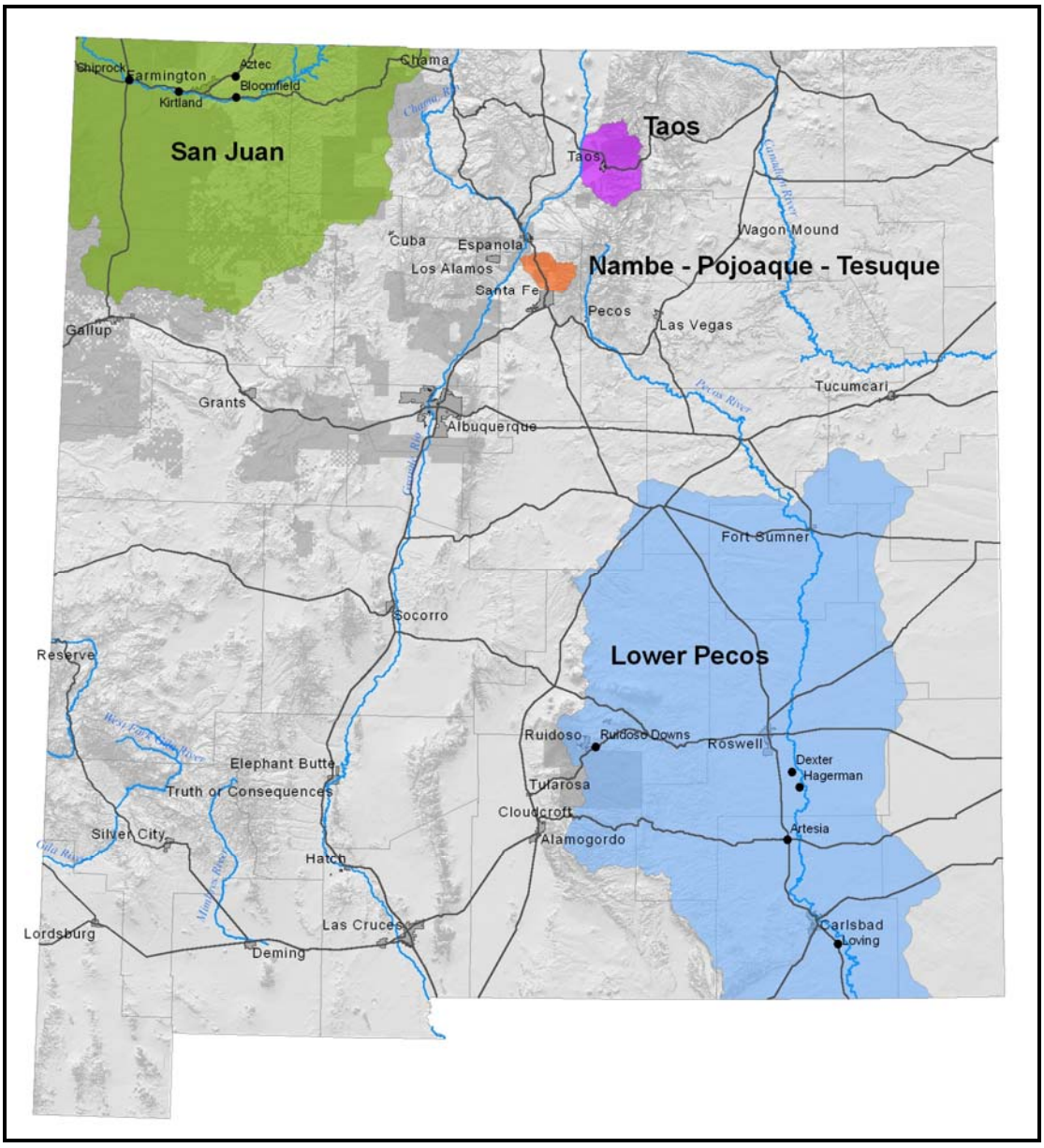

Figure 2. Location of the settlement basins: Lower Pecos, San Juan, Taos, and Nambe-Pojoaque-Tesuque[126]

[126] Map courtesy of Geoff Klise.

Table 2. Basin and Settlement Statistics

	Lower Pecos	San Juan-Navajo	Taos	Aamodt
Year Adjudication Filed	1956	1975	1969	1966
Number of Water Rights Claimants	~2000+	~18,000[127]	~7,000[128]	~3,000+
Year Settlement Signed	2003	2005	2006	2006
Years to Negotiate Settlement	2	9	17	5
Population of Basin (in 2000)	139,000	97,000	16,000	11,000
Area of Basin (square miles)	16,777	9,762	524	200
Available Water in Basin (AF/yr)*	125,000	1,100,000	68,000[129]	7,000[130]
Water Rights Settled (AF/yr)*	56,000	600,000	~65,000	~7,000
Number of Tribes in Basin	1	3	1	4
Number of Tribes Involved in Settlement	0	1	1	4
Federal Funding	0	$820M	$120M	$170M
State Funding	$100M+	$25M	$14M	$50M
Local Government Funding	0	$30M	0	$62M
Total Government Funding	$100M+	$875M	$134M	$282M

**Available Water and Water Rights amounts are based on consumption, not diversion, and are rough estimates meant to allow comparison of the cases.*

A brief description of each settlement agreement is provided below. More comprehensive descriptions are available in Richards (2008).[131]

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[127] Stanley M. Pollack, "Indian Water Rights Settlements: Bringing Certainty to Uncertain Water Resources," *Proceedings of the 50th Annual New Mexico Water Conference: New Mexico Water: Past, Present, and Future or Guns, Lawyers, and Money* (2005). p. 144.

[128] This number of water rights claimants in the Taos adjudication is a rough estimate based on the number of individual irrigators represented by the Taos Valley Acequia Association. Additional claimants include the Pueblo of Taos, the Town of Taos, El Prado Water and Sanitation District, and twelve Mutual Domestic Water Consumers' Associations. Pueblo of Taos and New Mexico Office of the State Engineer, "Taos Pueblo Water Rights Settlement Overview and History (Fact Sheet)," (2006).

[129] Estimates of the average available water and total water rights in the Taos Basin were obtained from Figure ES-9 on page ES-13 of the Taos Regional Water Plan. Daniel B. Stephens & Associates, "Taos Regional Water Plan."

[130] Estimates of the average available water and total water rights in the NPT Basin (Aamodt case) was calculated from Tables 21 and 22 of the Jemez y Sangre Regional Water Plan. Inc. Daniel B. Stephens & Associates, "Jemez Y Sangre Regional Water Plan," in *NM Regional Water Plans*,, ed. NM Interstate Stream Commission (Albuquerque: Prepared for Jemez y Sangre Water Planning Council, 2003).

[131] Chapter 3 of Richards, "Over-Allocation and the Doctrine of Prior Appropriation: Water Rights Settlement

4.1.1 Lower Pecos Settlement Agreement

The New Mexico Office of the State Engineer (NM OSE) termed the Lower Pecos settlement a "landmark compromise of disputed water rights."[132] Signed in March of 2003, it settled a nearly fifty-year-old water rights adjudication dispute involving the Carlsbad Irrigation District, the Pecos Valley Artesian Conservancy District, the Fort Sumner Irrigation District, the federal government, and the state of New Mexico. In addition to defining certain property rights to water, the settlement includes a land and water-rights acquisition and retirement program, provisions for expedited short-term leasing of water, a well field to pump groundwater from the Roswell Aquifer into the Pecos River to ensure that deliveries to Texas are met per a U.S. Supreme Court ruling, and resolution of a longstanding priority call.[133] It also allows for the substitution of shortage-sharing for priority administration in certain circumstances.[134] These features are intended to bring the Pecos River into short-term and long-term hydrologic balance,[135] meet the terms of the Pecos River Compact with Texas, and avoid federal takeover of water management in the basin.

Implementation of the Lower Pecos Settlement is essentially complete. In 2004, the settlement was appealed by some of the senior rights holders in the basin, but it was upheld in 2006.[136] In 2006, in accordance with the settlement agreement, the OSE issued new basin-specific rules for managing water in the Pecos.[137] They incorporate increased monitoring and enforcement, including priority enforcement on a daily basis of direct diversions from the

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Agreements in New Mexico".

[132] NM OSE, "2002-2003 Annual Report," (Santa Fe, NM: New Mexico Office of the State Engineer & Interstate Stream Commission, 2003). pp.51-52.

[133] NM OSE et al., "Settlement Agreement, March 25, 2003 (Lower Pecos River Basin)," (2003).

[134] NM OSE, "Proposed Rules and Regulations Providing for Active Administration of the Waters of the Lower Pecos River Basin Water Master District and Implementation of the Pecos River Settlement Agreement," (Santa Fe: New Mexico Office of the State Engineer, 2006).

[135] The term “hydrologic balance” is used here to mean ensuring that water withdrawals and consumption do not exceed the renewable supplies.

[136] In the Lower Pecos, where the signatories were irrigation districts, some senior rights holders disagreed with the terms and filed an appeal claiming that the settlement violated the doctrine of prior appropriation and other constitutional rules because the settlement used taxpayer money to buy land and water rights instead of enforcing priority. Barry Massey, "Pecos River Water Rights Upheld," *Albuquerque Tribune*, November 17, 2006. The court ruled in favor of allowing the settlement to proceed. See November 16, 2006 New Mexico Court of Appeals ruling re *State of New Mexico Ex Rel. State Engineer V. Lewis, Et Al., Fifth Judicial District*, (1956).

[137] NM OSE, "Proposed Rules and Regulations."

tributaries and better protections for senior rights to both direct flows and released storage water. Appeal provisions are also incorporated. New leasing mechanisms are included that allow junior rights holders whose use is curtailed to acquire water on a short-term basin from seniors more easily, including making arrangements in advance. The new rules also provide for shortage sharing instead of priority enforcement if local water-rights owners agree.[138] The augmentation well field was completed in mid-2008.[139] In 2008 the legislature passed a law allowing the ISC to purchase water rights without the land to reduce the cost of retiring water rights.[140] The ISC has purchased or is in negotiations to purchase essentially all of water rights to be retired as part of the settlement.[141] Although the settlement did not complete the entire adjudication, which continues, it resolved certain contentious and long-litigated portions of the Pecos adjudication and improved the overall "certainty and security" of the water situation in the Lower Pecos.[142] Deliveries to Texas have been met without priority administration.

4.1.2 San Juan-Navajo Water Rights Settlement Agreement

The San Juan-Navajo settlement agreement is intended to resolve the water claims of the Navajo Nation in the San Juan River Basin in northwestern New Mexico. Signed in April 2005 after more than twenty years of litigation to adjudicate the water rights of the Navajo Nation, it provides resources for water development projects for the Nation in exchange for a "release of claims to water that could potentially displace existing non-Navajo water users in the basin and seriously damage the local economy."[143] The Navajo Nation is the senior rights holder and has made claims to essentially all of the water in the basin.[144] The settlement protects other existing

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[138] Shortage sharing, termed "Alternative Administration" in the new Pecos rules, replaces priority administration with a pro rata or other sharing agreement. It results in a reduction of water to all users, rather than some users being denied water altogether while others receive their full allotment.

[139] AP, "Pipeline for Pecos River Settlement Is Complete," *Albuquerque Journal*, June 25, 2008.

[140] "Governor Bill Richardson Signs Pecos River Settlement Water Rights Bill (Press Release)," *State of New Mexico, Governor's Office*, February 27, 2008.

[141] John D'Antonio and Estevan Lopez, "Progress Report to Interim Legislative Committee," (Santa Fe: New Mexico Office of the State Engineer and Interstate Stream Commission, 2007).

[142] NM ISC, "Attorney General Madrid Announces Landmark Water Rights Settlement (Press Release)," NM Interstate Stream Commission.

[143] Quote from website, NM OSE, "New Mexico Office of the State Engineer."

[144] The Navajo Nation's claims exceeded New Mexico's entire allotment under the Upper Colorado River Compact. If the Nation prevailed in court, all water for the Farmington and the San Juan Basin region would be under control of the Navajo Nation. ———, "1998-1999 Annual Report," (Santa Fe, NM: New Mexico Office of the State

uses of water and allows for future growth in the basin within the amount of water from the Upper Colorado Basin apportioned to New Mexico by the Colorado River Compact. Thus, although only Navajo claims are determined through this settlement, the agreement resolves large uncertainties about the other water rights in the basin.

The agreement has four fundamental features: (1) establishing the Navajo Nation's water rights in New Mexico's portion of the San Juan basin, (2) providing resources for large water infrastructure projects, (3) protecting the more-junior (relative to the Indian rights) established uses of water, and (4) changing aspects of how water will be managed, including provisions for a change to federal law, which will allow the Navajo Nation to lease its water for use off Navajo land. The agreement also has a number of smaller provisions.

The agreement settles the Navajo Nation's federal reserved rights to surface water and groundwater in the San Juan Basin in New Mexico.[145] It provides the Navajo Nation with the right to divert a total of 604,660 AF/yr of water and to consume 323,670 AF/yr from the San Juan River.[146] This is the largest single water right in New Mexico. The agreement also establishes the Navajos' right to divert and consume 2,000 AF/yr of groundwater. The priority date for all of these rights is June 1, 1868. The Navajo agreed to settle for a water right that is substantially smaller (on the order of half) than they were originally claiming in exchange for the resources to develop water supply infrastructure, in effect trading "paper water" for "wet water."

The centerpiece of the settlement is the "Navajo-Gallup Water Supply Project" which is intended to provide pipelines and pump stations for thousands of rural dwellers with no current access to water other than hauling it long distances with pickup trucks and barrels, especially on the eastern part of the reservation. The project would also provide a pipeline from the San Juan River to the City of Gallup, 90 miles to the south. Gallup is currently dependent on a rapidly declining groundwater reserve.[147] The project would also pipe water to several small

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Engineer & Interstate Stream Commission, 1999). See also Appendix D of "San Juan Basin Regional Water Plan," ed. NM Interstate Stream Commission (Santa Fe: 2003).

[145] The Navajo Nation is engaged in separate negotiations with Arizona and Utah regarding its rights in the portions of the San Juan Basin in those states.

[146] The 606,000 AF/yr includes 506,000 for the previously authorized NIIP.

[147] See USBR http://www.usbr.gov/uc/envdocs/eis/navgallup/DEIS/index.html

communities, and the agreement also includes funding to renovate two existing Navajo Nation irrigation projects.

The settlement provides a variety of protections for junior water users. One is that the Navajo Nation agreed to limit its agricultural uses and to allow the State Engineer administrative authority over Navajo water. The Navajo also agreed to allow a date of 1955 to be uses for priority administration purposes, rather than 1868, the year when the reservation was established and therefore the priority date of their federal reserved rights. This provision provides considerable protection for many well-established, but junior, non-Indian water uses in the basin as it, in effect, gives rights established prior to 1955 seniority over Navajo rights. Another way that the settlement provides protection to the water rights of non-Indian farmers is by allocating storage rights to the Navajo Nation in Navajo Reservoir. This makes it less likely that the Navajo, as the downstream senior, would need to make a priority call during late-summer low flows because the Navajo may access their stored water instead.[148] Another protection for junior rights is shortage sharing, which distributes the burden of a water shortage across all users on a pro rata basis or by some other arrangement instead of cutting off the most junior uses completely. Shortage sharing is already practiced in the San Juan Basin, both as a permanent management approach and on a voluntary and temporary basis.

The settlement makes a number of changes to the rules that govern how water is managed in the San Juan. In addition to shortage sharing, the settlement adds a variety of water metering, monitoring, and reporting requirements to improve water management and enforcement of water rights. Another very significant change is that the Settlement Act will allow leasing of Navajo water off Navajo land. Given the size of the Navajo Nation's water right, this provision has the potential both to provide a new supply for growing demands for water and to allow the Navajo to reap some immediate economic benefit from their resources without the need for new infrastructure. In addition, the Act provides for a streamlined leasing process, which exempts water leases that meet certain conditions from certain types of oversight by federal government. The Navajo Nation also agreed that it would market water outside of New Mexico only after complying with state law, going through the State Engineer's permitting process, and getting approval from the Interstate Stream Commission.

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[148] Pollack, "Indian Water Rights Settlements."

Although the state and the Navajo Nation have reached an agreement, the adjudication of the Navajo rights cannot be finalized until Congress enacts legislation approving it and providing funds for the associated projects. This legislation is currently in progress; assuming the bill makes its way into law, a court order adjudicating the Navajo water rights will be proposed. There is some lingering discontent with the existing settlement, including some Navajos who believe the tribe has given up too much water and some non-Indian irrigators who think the settlement gives the tribe too much.[149]

4.1.3 Taos Settlement Agreement

The Taos Settlement, announced in March 2006, was the result of seventeen years of negotiations representing most of the water users in the Taos Basin. It settles the rights of the Taos Pueblo and expedites the adjudication of the other non-Indian water rights in the basin. It allows existing uses of water in the basin to continue and provides protection for the Buffalo Pasture, a wetland with great significance to the Taos Pueblo. It also provides funding for a water development fund for the pueblo and a number of smaller water infrastructure projects for non-Indian entities.

Settlement negotiations first began in 1989 when representatives of the Taos Valley Acequia Association (TVAA) approached Taos Pueblo about resolving their differences outside of litigation.[150] The TVAA is comprised of fifty-five acequias, representing more than 7,000 non-Pueblo irrigators in the Taos Basin. The negotiations expanded to include the Town of Taos, the El Prado Water and Sanitation District, and twelve Mutual Domestic Water Consumer Associations (MDWCAs), along with the United States and the State of New Mexico.[151] Together the entities involved in the settlement negotiations represent nearly all of the water-rights owners in the Taos Basin.[152]

Of particular importance to the Pueblo is that a Historically Irrigated Acreage (HIA) value of 5,712.78 acres (and associated water right) is recognized. If the Pueblo were to exercise

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[149] Sullivan, "San Juan Deal Drains N.M. Dry."

[150] NM OSE, "Taos Pueblo Water Rights Settlement Summary of Settlement Provisions," (Taos Pueblo and NM Office of the State Engineer, 2006). John Arnold, "Taos Water Pact Signed," *Albuquerque Journal*, May 31, 2006.

[151] OSE, "Taos Pueblo Water Rights Settlement Summary of Settlement Provisions."

[152] Ibid.

this right in full though, it would displace many other water users in the basin. So, in consideration for other provisions in the settlement, Taos Pueblo agreed to forbear from using the HIA right beyond the amount already in use. Per the agreement, the Pueblo may gradually increase use of the right over time as it buys out and retires other rights to offset the increased use. Funds are included in the settlement for this purpose.

The settlement confirms non-Pueblo rights determined so far by the standard adjudication process and resolves the rights of the twelve MDWCAs. To expedite the adjudication, the parties agreed to waive any objections to the Pueblo's water rights. They also agreed to waive *inter se* challenges and not to challenge existing domestic wells

The settlement also contains a number of protections for non-Pueblo water rights. In addition to forbearance by the Pueblo from fully exercising its HIA rights, the parties agreed to refrain from refrain from priority calls for both surface and groundwater uses. Instead, for surface water, century-old water sharing schemes will be used. Per the settlement, Taos Pueblo's share may increase over time as they purchase and retire rights using their development funds. For groundwater, the parties agreed to no priority enforcement, except for purposes of complying with the Rio Grande Compact; instead the settlement specifies well spacing and diversion limits to minimize interference.

The settlement includes funding for a number of water projects. One, termed the "Mitigation Well System" is intended to offset the surface water depletion effects resulting from future use of water by accessing deep groundwater at various locations and pumping it into key tributaries and acequias. The intent is to shift the burden from the tributaries to the main stem of the Rio Grande, where "offset acquisition and transaction costs are expected to be lower." The goals of the well system are to limit reliance on acquisition and retirement of water rights from acequias, to facilitate the Pueblo's acquisition of water rights by reducing competition for water rights, and to provide "a means for critically needed and sustainable groundwater development in the Taos Valley." The settlement is also dependent on the importation of water from the San Juan-Chama Project, specifically 2,990 AF/yr allocated among the Pueblo, the Town, and EPWSD. The settlement also includes funding for a large ($54M) water infrastructure project for the Pueblo, with the details yet to be determined.

Federal legislation and funding appropriations are currently in progress. Meanwhile, the parties are proceeding with some of the terms of the settlement assuming that they will be able to get the funding eventually.[153]

4.1.4 Aamodt Settlement Agreement

The Aamodt adjudication is widely reported to be the longest-running case in the federal court system.[154] Filed in 1966 and extensively litigated for more than forty years at an estimated cost of $200M,[155] it seeks to define the water rights of four Indian Pueblos and other water users in a small basin, the Nambé-Pojoaque-Tesuque (NPT) Basin, in north-central New Mexico just north of Santa Fe. The Aamodt settlement was signed in 2006 after five years of court-ordered settlement negotiations. The agreement is intended to resolve the water rights claims of the four Pueblos while protecting water rights for other existing uses and help bring the basin into hydrologic balance. It includes transfers of water rights into the basin to help balance supply with demand, and it provides for a regional water supply pipeline intended to reduce the use of domestic wells and deliver imported water to the Pueblos.

The Aamodt Settlement Agreement[156] is extremely complicated. It settles the Pueblos' water rights, creating a complex set of rights allocated to Nambé, Pojoaque, San Ildefonso, and Tesuque. It acknowledges and confirms non-Pueblo surface-water rights, federal agency rights, and certain municipal and county rights previously determined by the adjudication process. It also requires reductions in non-Pueblo domestic wells and domestic-well withdrawals, provides a variety of protections for junior rights, and specifies funding and construction of a regional water system.

The settlement calls for the importation or acquisition and transfer of 4,000 AF/yr, 2,500 AF/yr for the Pueblos and 1,500 AF/yr for other water users, in particular domestic well owners that switch to the regional water supply system. The water for the Pueblos in intended to

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[153] Staci Matlock and Brandon Garcia, "Finding a Balance: Water Rights for Native Americans, Others Uncertain," *The New Mexican*, January 16, 2007.

[154] *New Mexico Ex Rel. State Engineer V. Aamodt, No. 66cv6639 (D.N.M.)*, (1966).

[155] This number was mentioned by several panelists at the 2005 New Mexico Water Dialogue Annual Meeting. John R. Brown, "Statewide Meeting Focuses on Negotiated Settlements," *New Mexico Water Dialogue Newsletter*, Summer 2005.

[156] "Settlement Agreement New Mexico Ex Rel. State Engineer V. Aamodt, No 66cv06639 Mv/Lcs-Ace (D.N.M.) January 19,," (2006).

compensate them for forbearing on priority calls. The other imported or transferred water is intended to help bring the basin into hydrologic balance by reducing the reliance on domestic wells.

The settlement agreement sets forth a number of rules, and guidelines for additional rules, for governing how water will be managed in the basin. It declares that the basin is fully appropriated and prohibits new appropriations, and it sets diversion and consumption limits for irrigated land. It also requires metering and monitoring of both surface water and groundwater withdrawals. It specifies that in the event there is a shortage in supply from the regional water system, the parties will share the shortage on a pro-rata basis. The settlement will permit the Pueblos to lease their water off pueblo land, but restricts use to within the NPT basin.

Another key provision of the settlement is that it resolves the long and contentious *inter se* phase of the adjudication (where rights holders may challenge the validity of other rights). The settlement prohibits any of the signatories from challenging anyone else's water rights. There will likely be some individual water users who decline to sign the settlement and may wish to continue litigation, but the settlement resolves the larger *inter se* concerns. There is an incentive for water users to sign the settlement because those who do not sign will not be afforded the impairment and priority call protections from the Pueblos' senior rights.

Like the San Juan-Navajo and Taos agreements, the Aamodt settlement requires Congressional approval, both to enable settlement with the Pueblos and to provide federal funding. This legislation is currently working its way through the federal system.

4.2 Key Features of the Settlements

Although certain agencies, such as the OSE, were involved in all of the settlements, the four agreements were negotiated largely by local people in different basins with substantially different local characteristics and widely varying amounts of water. The Lower Pecos is dominated by large irrigation districts and interstate compact compliance issues. Water in the San Juan is dominated by federal projects and a large Navajo presence. The Taos Basin has both a Pueblo and a large number of acequias competing with each other and a growing population. The NPT Basin has four Pueblos and is located between the growing City of Santa Fe and Los Alamos National Laboratory, a situation with striking contrasts as well as development

pressures. The language, organization, complexity, and details of each settlement are quite different, but much of the core content is strikingly similar.

All four settlements contain provisions that are well beyond the scope of traditional litigated adjudications. In addition to clarifying property rights to water, all of the agreements provide for the construction of water projects and measures to balance demand with renewable supply. They also include provisions to facilitate the leasing of water, and they place heavy emphasis on avoiding priority administration. Thus, the settlements not only go beyond traditional litigations by "enlarging the pie" to create incentives to settle; they change how water will be managed.

Although the details and circumstances vary, the fundamental motivations underlying each of the settlements are essentially the same. Perhaps as expected in any settlement related to a lawsuit, all of them expressly seek to eliminate uncertainty in outcomes (and avoid the possibility of a negative outcome) inherent in litigation and to save the time and expense associated with continuing to litigate. But, all four of the settlements also seek to resolve uncertainty in the supply of water, bring the associated basins into hydrologic balance, and address the problem that there are more water rights than there is water, all in a manner that does not cause severe disruption to the economy or the society.

4.2.1 Determination of Property Rights

Not surprisingly, given that the settlements stem from water rights adjudications, determining property rights is a key component of each agreement, and all four settlements specify certain water rights. In the case of the San Juan essentially one very large right is defined, that of the Navajo Nation to use water from the San Juan Basin in New Mexico. In contrast, the Taos and Aamodt agreements settle the rights of most of the claimants in the associated adjudications, with a particular focus on the rights of the Pueblos. The Lower Pecos settlement resolves a subset of rights within the basin, primarily the rights of the Carlsbad Irrigation District and by extension its members who own individual rights.

In addition to determining specific property rights to water, all of the settlements provide protections for junior rights by placing limitations on senior rights. These limitations go beyond the "normal" limitations of quantity, priority, place of use, etc. that are associated with traditional litigated adjudications. They include forbearance agreements regarding water use and priority

calls, as well as shortage sharing agreements. The Navajo Nation agreed to a much later priority date for the purposes of water administration. In addition, the Aamodt settlement puts limits on junior rights to reduce impairment of senior rights.

All four of the settlements also involved compromises with regard to particular rights in exchange for greater certainty that "wet water" would actually be available. In the Pecos, Carlsbad Irrigation District will receive a minimum of 50,000 AF/yr of wet water, less than its paper right and far less than its original claim, but more water than it often received. In the San Juan, the Navajo Nation settled for roughly half its original claim in exchange for the ability to make productive use of its water rights. In the Taos and Aamodt settlements, the Pueblos agreed to restrictions on their water rights in exchange for more wet water.

Three of the four settlements expedite the remainder of the adjudication involved by greatly reducing what can be a very contentious process, the *inter se* phase, where claimants can challenge each others rights.[157]

4.2.2 Water Projects

All four settlements include expensive water projects. Although the types of projects vary, they all provide incentives for specific parties to compromise on their water claims, or to trade "paper water" for "wet water." In the case of the Pecos, an augmentation well field provides a technological solution to a hydrology problem (delays in the effect on the river from reductions in groundwater pumping) and assures wet water deliveries to a downstream senior (as well as to Texas). In the San Juan, water infrastructure projects provide much needed resources for the Navajo Nation to develop its water rights. In the Taos Basin, a variety of water projects including, among other things, supply infrastructure and well construction will benefit both Pueblo and non-Pueblo users. In the Aamodt settlement, a regional pipeline provides a means to deliver additional water to the Pueblos as well as a tool to reduce unsustainable groundwater pumping.

4.2.3 Improving Hydrologic Balance

All of the settlements contain provisions to address the fact that more water is being used, or has the potential to be used, than the system can support. Water is over-allocated in all of the

[157] The San Juan agreement does not include this provision because it settles only one water right and therefore does not have other water rights holders as signatories.

basins; that is, there are substantially more water rights (or claims to water rights) than there is water, with large junior uses having become well-established in the economy and society. The settlements balance "paper water" with "wet water" in several ways. The Pecos and Taos settlements provide for the buyout and retirement of water rights, and Aamodt reduces groundwater withdrawals. The Taos and Aamodt settlements also provide for additional water to be imported into the basin. In the San Juan, the settlement was contingent on a determination that there would be sufficient water to supply the Navajo rights as well as the other existing uses.[158]

The four settlements all strengthen and make more explicit the conjunctive management of surface water and groundwater. They also all have provisions for increased enforcement, including requirements for metering, monitoring, and reporting water withdrawals. (The Taos settlement does not contain actual specifications for metering and monitoring, but instead states that such measures will be developed as one of the conditions to the settlement.)

4.2.4 Avoidance of Priority Administration

All of the settlements go to significant lengths to avoid using priority administration as the primary mechanism for addressing water shortages. The settlements provide resources to buy out and retire water rights and to fund water imports. These provisions are as much about avoiding priority administration as they are about achieving hydrologic balance. (The two are related of course: priority administration is also a mechanism for achieving hydrologic balance.)

Other provisions contained in the settlements designed to preclude priority administration include forbearance agreements and shortage sharing. In the Pecos, Taos, and Aamodt agreements, the senior rights holders agree to forbear from making priority calls under some circumstances and/or to forbear from withdrawing water under some circumstances. In the San Juan, the Navajo Nation agreed to use a priority date of 1955 instead 1868 for the purposes of water administration in the basin. This is effectively a forbearance agreement in that the Navajos agree not to call priority on junior rights older than 1955.

Shortage sharing is a component of all four water rights settlement agreements. It is an alternative to priority administration as a mechanism for curtailing total water uses. Instead of

[158] As noted previously, the conclusions of this study were somewhat controversial.

cutting off junior uses completely, shortage sharing reduces water to all users (or some designated subset) according to how much water is available. It may be done on a pro rata basis or by some other arrangement. In the Pecos, shortage sharing will be accomplished through voluntary local arrangements. In the San Juan, the settlement continues prior shortage-sharing arrangements for federally contracted water. In the Aamodt settlement, reductions in allowable withdrawals from domestic wells is a form of shortage sharing, as are some of the limits on priority calls. The Aamodt agreement also calls for sharing in the event of a shortage of pipeline water. The Taos agreement adopts an agreement from 1893 that specifies how shortages will be shared by the Pueblo and an acequia.

4.2.5 Facilitation of Water Leasing

The settlement agreements all have provisions that facilitate the leasing of water rights. In the Pecos, short-term leasing mechanisms were created to allow juniors to lease water from seniors in an expedited fashion. These mechanisms are intended to mitigate the economic harm that would arise if it were necessary to curtail water use by priority administration or by some other means, such as shortage sharing. All three of the settlements involving tribes require federal legislation that will permit the tribes to lease their water rights off tribal lands. The San Juan settlement also expedites the leasing process by exempting leases that meet certain conditions from some of the federal oversight requirements. Water leasing by tribes has already proven to be useful, as evidenced by the Jicarilla Apache's leases with the Public Service Company of New Mexico (PNM) and the City of Santa Fe.

4.2.6 Environmental Issues

With the exception of the Taos settlement, in which restoring the Buffalo Pasture is a key feature for both environmental and cultural reasons, the settlements do not directly address environmental issues. Both the Pecos and San Juan settlements acknowledge the need to maintain compliance with the Endangered Species Act, but they do not address this issue directly. The Taos settlements demonstrates however that it is possible to incorporate environmental issues into water rights settlement agreements.

4.2.7 Government Funding

All of the settlements are heavily dependent on external resources supplied by the federal, state, and/or local governments (the federal funds are linked to the settlement of Indian claims).

The government funds are used for water projects, land and water rights buyouts, and water imports, as well as for other purposes related to the management of water on Indian lands. One view of this funding is that it is necessary in order to "enlarge the pie" or to adjust incentives for the different parties to settle. In all four basins though, the funding goes beyond providing direct compensation to particular parties as it is used to address complex, long-standing, difficult problems that have the potential to negatively affect the basin as a whole, not just particular stakeholders.

4.2.8 Summary

The settlement agreements are extremely complex documents, with a myriad of provisions and details addressing the specific circumstances in each basin and the particular interests of the stakeholders involved. As would be expected under such circumstances, there is variation in the specific provisions contained in each settlement. However, despite the quite large differences in structure, language, and details the settlements address very similar core issues.[159] All four settlements, in one way or another are about:

- Determining property rights to water and the limits to these property rights,
- Achieving hydrologic balance (meaning water withdrawals do not exceed the renewable supply)
- Resolving over-allocation problems (meaning that the rights to water do not on average exceed the quantity of water available, or "paper water" is consistent with the supply of "wet water"),
- Avoiding priority administration as a means for achieving hydrologic balance and/or resolving over-allocation problems, and
- Facilitating the leasing of water.

[159] It is also interesting to note a couple of themes that did not emerge. Addressing environmental issues did not emerge as a theme, as only one settlement explicitly addressed the subject. The settlements also largely do not address water-use efficiency or conservation. Other than detailing limits on how much water can be applied per acre for irrigation use or curtailing per-well domestic use, the settlements do not generally consider improved efficiency or conservation measures as a tool for achieving hydrologic balance, focusing instead on water projects, retiring rights, and/or importing water. Economic efficiency of water use is not addressed explicitly, although water leasing inherently addresses it.

In addition, as mechanisms both to achieve settlement and to resolve chronic problems, all four settlements rely on physical water projects and external government funding.

5. Negotiated Agreements and Market Transfers of Water

Although the primary focus of the settlements was not necessarily to facilitate or hinder water marketing, the settlements influence market transfers of water in several ways. One is that they firm up property rights to water, making market transfers generally more feasible and less costly. They include changes to the rules governing water leasing, allowing water to be leased from tribes and streamlining the process for short-term leases. The agreements also specify certain market-like transfers to be carried out as part of implementing the settlements. Resolving over-allocation problems may also tend to increase market transfers because new users will be required to purchase rights rather than simply contributing to the over-allocation "free for all." The settlements also put restrictions on some transfers, such as limiting transfers to within a particular basin. Some of the provisions not targeted specifically to transfers may have the effect of reducing transfers, such as shortage sharing or other protections for junior rights and the avoidance of priority administration.

The following discussion is focused on a key commonality from the four settlement agreements: the facilitation of water leasing, which has the potential to mitigate the negative economic welfare effects of curtailing high-value junior water rights.

5.1 Tribal Water Leasing

Historically federal law has precluded Native American tribes from leasing water for uses outside of tribal lands. A key part of the three case study settlements that involve tribal water is federal legislation that changes federal law to permit the tribes to lease their water rights off reservation lands for terms up to 99 years. (Similar legislation was also a key part of the earlier Jicarilla Apache settlement.) Some restrictions apply, such as in the Aamodt settlement, where tribal leasing arrangements are limited to water uses within the NPT basin. This change in the rules opens up a potentially large resource to new or displaced junior uses and allows tribes to make near-term high-economic-value use of their water without building infrastructure. Substantial gains from trade are possible, as the size of tribal water rights are often large in comparison to both total water rights in certain basins and to the amounts of water currently

being used by the tribes. The long lease terms allowed make water leasing a potentially viable solution for municipalities.

This change in the rules cannot be accomplished through local negotiation alone. Federal law generally prohibits tribes from leasing (or selling) their water rights for use off Indian land. Thus as part of the settlement process, a change to federal law must be obtained allowing the tribe in question to lease water their water off Indian land. Because the settlements involving tribes generally included federal funding, federal legislation is necessary regardless of the leasing provision. In the case of the San Juan-Navajo settlement, the language in the agreement and associated federal legislation also specified the level of federal oversight to be applied to such leases.

5.2 Streamlined Short-Term Leasing

The settlement agreements also contain provisions that streamline the water leasing process, subject to conditions that varied across the case studies. The implementation rules and regulations[160] for the Lower Pecos settlement provide for junior rights holders to set up "Replacement Plans" to arrange for short-term leased water in advance of a curtailment with expedited review by the OSE. All three of the other settlements, in addition to allowing the tribes to lease water off their land, provide exemptions from federal approval requirements under some circumstances, particularly for short-term leases of less than seven years.

The new leasing mechanisms offer increased flexibility in the reallocation of water. In the event water uses are curtailed, either by priority administration or alternative mechanisms, expedited leasing allows higher-economic-value users to acquire water more quickly and with fewer transaction costs. Expedited leasing may allow economic losses caused by the curtailment of water to be mitigated, or even prevented if leasing arrangements are made prior to the curtailment. There are limitations to the expedited leasing mechanisms however. They are limited to short terms because the streamlined approval process may overlook some impairment issues or third-party effects. Although there may be less local opposition to short-term leases than for permanent rights transfers, if the mechanisms are overused or perceived to be a tool for

[160]NM OSE, "Proposed Rules and Regulations."

subverting the review and protest process required for permanent transfers, opposition is likely to mount.

Increased leasing (relative to sales of perpetual rights) also shifts the nature of the water market from one that deals primarily in perpetual rights to water toward one that prices specific quantities of "wet water" according to current market conditions. This may increase the number of transactions and alleviate problems related to the thinness of the market, although it may raise questions regarding who should be allowed to profit from the long-term control of large water rights.

5.3 Time May Be Critical

Expedited leasing mechanisms are particularly important because in some situations the time it takes to implement a water transfer may be at least as important as the associated transaction costs. Drought response is an example, as is responding to near-term water shortages due to compact enforcement, such as was the case in the Lower Pecos basin. (Time to implement a transfer may be less important for rights purchases for, say, long-term growth planning by municipalities.)

Figure 3 shows the effect on social welfare (or, more specifically, the effect on mitigation of social welfare losses) of the time it takes to implement water market transactions. It demonstrates that even if market transactions had no transaction costs, how quickly they can be implemented has a large effect on the recovery of welfare losses resulting from priority administration of junior high-value uses. Even straightforward transfers with the typical lead time of six months may be too slow to avoid large losses.

The graph plots the total social welfare from the use of water in a hypothetical basin as a function of time. Two cases are considered. The upper black line is the total social welfare under business as usual conditions with no curtailment of water. The lower black line is what the total social welfare would be if water were curtailed and no reallocation occurred. The red line shows how, when at time = 0 a water curtailment occurs,[161] total social welfare drops from the upper curve to the lower curve. Total social welfare then remains at the lower level until reallocation through water market transactions can begin to occur. At that point the total social

[161] This is analogous to the Lower Pecos where New Mexico had to decrease its water use significantly and abruptly due to the Supreme Court decree.

welfare (represented by the red line) starts to recover, moving closer to the upper black line. The cumulative welfare loss over time is represented by the shaded area between the red line and the upper black line.

Several points are worth noting. First, given the existing water market system, the minimum time to implement an ordinary water market transaction with no protests is about 6 months. So, as the graph shows, recovery of welfare losses does not begin before six months; the losses that occurred to this point are not recoverable. Second, the transfers do not happen all at once; rather there is a cumulative effect as increasing numbers of transfers are implemented, bringing the red line closer to the upper black line over time. Third, the red line does not reach the black line for three reasons: One is that even in a perfectly competitive market, there will still be a small welfare loss due to the curtailment of water. Another reason is because of the transactions costs; transaction costs may have a large effect on this increase in social welfare that can be obtained through trade. The third reason is that some water transfers may be infeasible.

As the shaded area in Figure 3 shows, priority administration can result in significant unrecoverable welfare losses even in the presence of water markets. This may be due as much to the time it takes to implement transfers as it is due to transaction costs. Even if all senior users could purchase water with no transactions costs from junior users so that all of the highest-value uses received water and only the lowest-values uses were cut off, the time involved in the transfers could still leave sizable economic welfare losses.

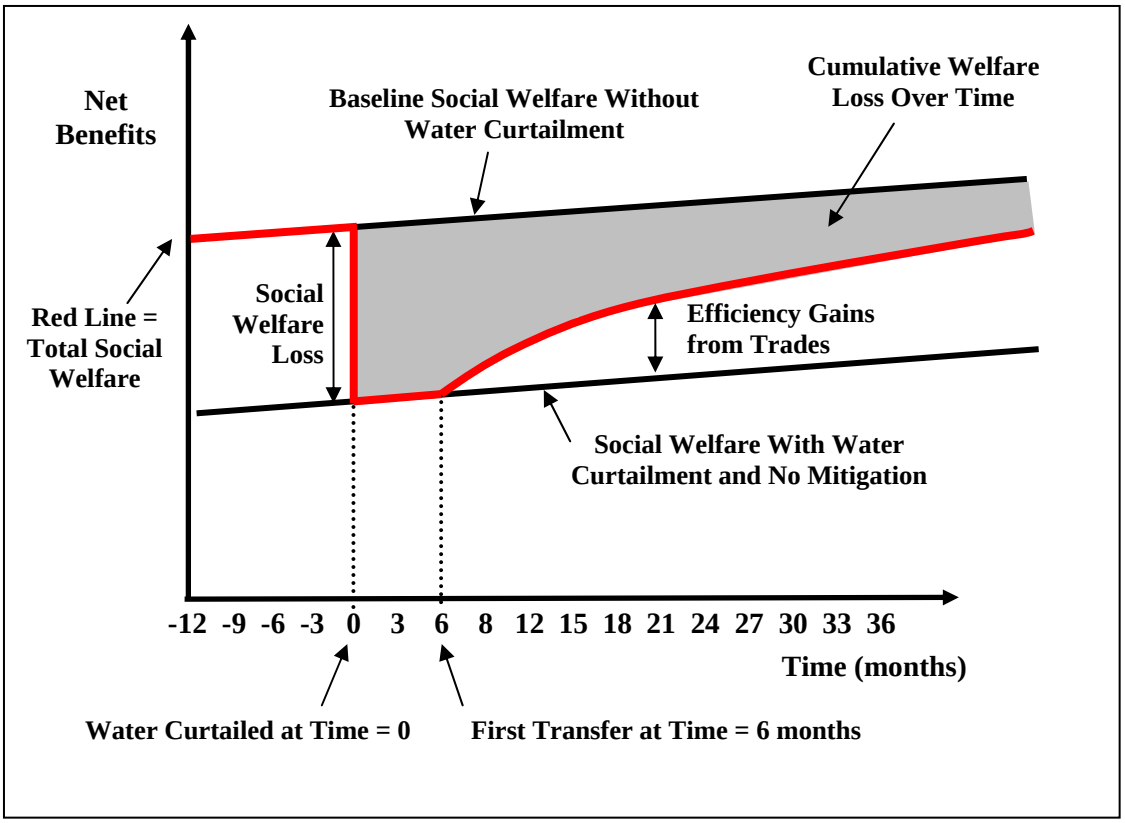

Figure 3. Effect of Time on Welfare Loss Recovery Via Water Transfers

5.4 A Note on Water Buyouts and Transfers

In addition to enhance leasing mechanisms, three of the four settlement agreements contain provisions designed to alleviate over-allocation problems and improve hydrologic balance through the government-funded buyout and retirement of water rights and/or the government-funded purchase and transfer of water rights or federally-contracted water from another basin.[162] These purchases of water rights are being conducted largely via the existing water marketing mechanism in the state. Although ostensibly these buyouts and transfers are one-time occurrences within a given basin, they have at least temporarily driven up prices for in the associated basins.[163] They also reduce the likelihood that priority administration will be

[162] Although the buyouts and purchases do not necessarily represent new rules, they do provide for the reduction or elimination of an old rule (priority administration). Weakening or elimination of a rule is also institutional change. W. R. Scott, *Institutions and Organizations* (Thousand Oaks: Sage Publications, 2001). p. 182.

[163] F. Lee Brown, "Market Prices as Measures of Water Scarcity in New Mexico and the West," in *Beyond the Year of Water: Living within our Water Limitations* (Santa Fe, NM: New Mexico Water Resources Research Institute, 2007). p. 51

needed in the future and set a precedent for the protection of junior rights at government expense, so it is unclear what their long-term effect, if any, will be on water markets in the state.

5.5 Other Related Negotiations

Through its Active Water Resource Management (AWRM) program,[164] the OSE is promoting the creation of locally-developed and negotiated water management rules tailored to specific basins. The AWRM program is intended to provide a mechanism for conjunctively managing both groundwater and surface water in basins designated by the OSE as "critical" due to drought and water shortages. The OSE has designated seven basins (or combinations of sub-basins) as critical, including the San Juan, Gallinas, Pojoaque, Chama, Mimbres, Lower Rio Grande, and the Hondo/Peñasco sub-basins of the Lower Pecos.[165] The adjudication status of these basins varies. Some have active adjudications in progress, while others, such as the Mimbres are fully adjudicated.[166] Adjudication has not been initiated in the Peñasco Basin.[167]

The AWRM program is intended to provide a framework for developing locally-negotiated alternatives to the use of priority administration to resolve over-allocation problems. Through this program, the OSE is promoting local collective action to develop basin-specific rules that include mechanisms similar to some of those contained in the four settlements. In addition to the development of shortage sharing or other alternative administration agreements, other features of AWRM include increasing metering and monitoring of water withdrawals and local development of expedited short-term leasing mechanisms.[168]

The OSE is piloting some of these activities in the Mimbres basin. For example, the OSE field manual for the water master in the Upper Mimbres basin calls for the development of a set of basin-specific rules, based on input from local stakeholders.[169] It also specifies that an annual

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[164] See "Title 19 Natural Resources and Wildlife Chapter 25 Administration and Use of Water - General Provisions Part 13 Active Water Resource Management. (19.25.13.1 NMAC - N)," ed. Office of the State Engineer (2004).

[165] NM OSE, "2006-2007 Annual Report." p. 25.

[166] The San Juan and Pojoaque basins represent two of the case studies in this paper. The Hondo and Peñasco sub-basins of the Lower Pecos were not part of the Lower Pecos settlement.

[167] NM OSE, "2006-2007 Annual Report." p. 76

[168] David Brookshire et al., "Issues in the Development of a Water Leasing Model in the Mimbres Basin, NM," in *SAHRA Sixth Annual Meeting* (Scottsdale, AZ: 2006).

[169] Hiring of a water master and development of the field manual are part of the AWRM program. NM OSE, "Upper Mimbres Water Master District: Water Master Field Manual," (Santa Fe: NM Office of the State Engineer, 2006).

meeting of representatives from the community ditches in the basin be held every April to decide if an alternative administration agreement should be used in lieu of priority administration that year. In addition, the OSE is trying to facilitate the development of a locally designed expedited water leasing market in the Mimbres, starting with the collaborative development of a virtual (computer-based) water leasing market in which decision makers and stakeholders can explore alternative institutional and regulatory frameworks for governing the market as part of the process of designing a market.[170] The virtual market is also intended to provide a means for educating and familiarizing stakeholders with how a market would function, allowing them to try it out in advance of any actual financial or resource investment.

6. Conclusions

The four water rights settlements were negotiated fundamentally to resolve critical over-allocation problems and were not targeted specifically at resolving concerns associated with market transfers of water. Nevertheless, the settlement agreements contain a variety of provisions that enhance the ability to implement market transfers of water, especially leasing. These provisions include streamlining processes and allowing Indian water rights to be leased off Indian land. The settlements also address some of the concerns associated with opposition to water marketing by providing protections to certain groups of stakeholders and allowing them to participate in the rule-making process. The settlements thus demonstrate that negotiated agreements among local parties can make adjustments to existing governance structures in order to facilitate market transfers of water.

6.1 Settlements Allow Collective Action

Ordinarily, many of the rule changes in the settlements would to various degrees require the restructuring of the legal basis for managing water in the state. This is difficult, and unlikely to occur quickly, because the doctrine of prior appropriation is a tenet of the state's constitution. Locally negotiated agreements provide a way for the people affected to work out a mutual solution that is not dictated by prescribed government processes.[171] The collective choices

[170] [need reference; cite Tidwell &Brookshire]

[171] Although, as part of the legislation associated with settlement of Native American rights, exceptions to some laws were created, in particular to federal law that restricted water leasing off tribal lands and to a state law that limits the term of water leases.

represented by the settlements apply only to the parties agreeing to them.[172] They do not alter the rules in other basins (although they may set a precedent or model for other basins to follow). Although the settlements provide alternatives to priority administration, the doctrine of prior appropriation remains the fundamental tenet of New Mexico water law and management. The beneficial use requirement, restrictions against impairing other rights, and the requirement that adjudication of water rights be done through the courts all remain in force. But the legal structure does not prevent people from agreeing among themselves to manage water in a different way, as long as all involved agree voluntarily and third parties are not harmed.

6.2 Settlement Agreements as Institutional Change

Some of the provisions in the settlements represent significant changes in the operational rules governing how water will be administered. The act of negotiating the settlements themselves is also a significant departure from the prescribed and traditional set of operational rules for adjudicating water rights. Because changes in rules are involved, the settlements represent institutional change both in how property rights to water are *determined* and how they are *administered*.

Litigated adjudications are relatively formal, rigid, and adversarial court procedures. In contrast the settlements allowed for new ways of determining water rights, namely collaborative problem solving. Settlement processes are characterized by bargaining and compromise along with consideration of a much broader range of alternative measures than are considered in litigated adjudications. The settlements were more streamlined than the litigation process, eliminating some steps in the adjudication. The changes in rules used to determine rights are informal in that they are not part of new state statutes or written procedures, and the existing formal legal rules remain. However, the settlement process nevertheless provides decidedly alternative paths to determining water rights.

Two changes in the rules governing the administration of water rights are particularly noteworthy. One is the replacement of priority administration with alternative administration schemes, such as shortage sharing and forbearance agreements, in certain situations. These new rules contrast sharply with the doctrine of prior appropriation, which has governed water in most

[172] An exception is that the water rights determined by the settlement agreements, once the court issues the Partial Final Decree and appeals are exhausted, are binding on even those parties who do not sign the settlements.

of the western U.S. for more than a century and is a central tenet of formal water management in New Mexico.[173] The other notable change is the creation of enhanced leasing mechanisms, in particular provisions for short-term water leasing with expedited approval processes and leasing of Indian water off Indian land. Short-term leasing mechanisms with expedited approvals[174] by the State Engineer will enhance the ability of markets to mitigate welfare losses resulting from priority administration. Allowing leasing of Indian water off Indian land has the potential both to provide a new supply for growing demands for water and to allow tribes to reap some immediate economic benefit from their resources.

The remarkably similar provisions of the four settlements, along with some similar provisions in the 1992 Jicarilla Apache agreement, provide evidence that negotiated water rights settlements represent institutional change and are not just anomalies. Together the five completed settlements represent roughly 750,000 AF/yr of consumptive water rights, more than a third of the estimated 2.0 MAF/yr of water consumed in New Mexico.[175] A sixth water rights settlement agreement is in progress in the Jemez River basin. A number of smaller agreements affecting additional water rights have also been negotiated. Other basins, such as the heavily populated Middle Rio Grande, are candidates for future settlement agreements given the extent of over-allocation, degree of complexity in water rights, and the need to meet interstate compact requirements.

Approximately two-dozen Indian water rights settlements have been negotiated in at least ten western states since 1978,[176] and thus the use of settlements to resolve Indian water rights is fairly well established.[177] Three of the four case studies in this research involved Indian claims.

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[173] Although it has not been a central part of "modern" water law in New Mexico, shortage sharing has been an integral part of Native American and acequia community water management practices for centuries. See for example Rivera, *Acequia Culture*.

[174] Note that in order to have expedited leasing, all parties involved must agree to the terms, including those who might be impaired.

[175] The 750,000 AF/yr estimate was obtained by summing the water rights in Table 3-1 and adding the Jicarilla Apache water rights of slightly more than 32,000 AF/yr. The 2.0 MAF/yr estimate is from 1995 USGS data, the most recent year for which consumptive water use is available. USGS, "Estimated Use of Water in the United States in 1995 - Data for Counties and Watersheds."

[176] Bonnie G. Colby, John E. Thorson, and Sarah Britton, *Negotiating Tribal Water Rights: Fulfilling Promises in the Arid West* (Tucson: The University of Arizona Press, 2005). p. xxiii.

[177] Ibid. See also Daniel McCool, *Native Waters: Contemporary Indian Water Settlements and the Second Treaty Era* (Tucson: University of Arizona Press, 2002).

However, two of the three cases involving Indian rights also addressed the water rights of other entities in the basin, and the fourth case (the Lower Pecos) is not related to the settlement of Indian claims, demonstrating that negotiated water rights agreements are not limited to resolving Indian rights. The fact that the settlements go well beyond the determination of property rights inherent in the underlying adjudication procedures provides evidence that negotiated agreements can be used to make needed changes to other water resource management institutions.

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