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GENERAL STREAM ADJUDICATIONS AS A PROPERTY AND REGULATORY MODEL FOR ADDRESSING THE DEPLETION OF THE OGALLALA AQUIFER

*Burke W. Griggs**

I. INTRODUCTION

It is a truth long acknowledged, that a river basin possessed by too many claims, must be in want of an adjudication.[1] The reason is simple: because "you can't administer something you can't define."[2] Over the past five decades, western states have embarked upon numerous general stream adjudications to define and decree every water right on the subject stream, so that state engineers and state courts can protect and administer these rights in times of shortage.[3] But these

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[1] ELWOOD MEAD, IRRIGATION INSTITUTIONS: A DISCUSSION OF THE ECONOMIC AND LEGAL QUESTIONS CREATED BY THE GROWTH OF IRRIGATED AGRICULTURE IN THE WEST 371 (1903) (with apologies to JANE AUSTEN, PRIDE AND PREJUDICE 1 (1966 ed.) (1813)).

[2] Clive Strong, Esq., as quoted in Scott Graf, *Why It Took 27 years and $94 Million to Complete Idaho Water Rights Adjudication*, BOISE STATE PUBLIC RADIO (Aug. 29, 2014), http://boisestatepublicradio.org/post/why-it-took-27-years-and-94-million-complete-idaho-water-rights-adjudication. Mr. Strong represented the State of Idaho in the Snake River Basin Adjudication, which adjudicated 158,591 decreed rights in twenty-seven years—a rate of one claim every ninety minutes, as United States Supreme Court Justice Antonin Scalia pointed out in his remarks on the occasion of the signing of the final decree. Clive Strong, *SRBA Retrospective: A 27-Year Effort,* 57 ADVOCATE (IDAHO) 28 (Nov./Dec., 2014).

[3] For a comprehensive history and analysis of modern general stream adjudications, see generally John E. Thorson et al., *Dividing Western Waters: A Century of Adjudicating Rivers and*

voyages have not been easy. The Gila River adjudication has produced the largest and longest judicial proceeding in the history of Arizona, and among the most complex in American history.[4] Yet as of this writing, it is "a long way from the decree stage."[5] Two of the most ambitious adjudications, the Big Horn Adjudication in Wyoming (initiated in 1977) and the Snake River Basin Adjudication in Idaho (initiated in 1987), concluded in 2014—and these are the fast ones.[6] Together, these two adjudications have resolved nearly half a million dispersed state and federal claims into approximately 150,000 decreed water rights.[7] The Snake River decree runs 275,000 pages and quantifies every right in Idaho's portion of the basin. As a result, the State of Idaho can now proudly claim (through its top water lawyer) that the "foundation for 'effective management' of its water resources has been laid."[8] Because, after all, you can't administer—or manage—what you can't define.

The Snake River Basin and Big Horn adjudications are significant accomplishments. They have required costly, time-consuming, and contentious proceedings. Their very existence and endurance reflect their respective states' political will to achieve durability and clarity in one of the most complex areas of property law. Or so the states hope. But have these adjudications achieved their goals so as to justify the expense of treasure, time, and political capital? Answering that question can be difficult. Supporters of general stream adjudications usually rely upon faith-based arguments that assume their lasting value; they believe that prior appropriation rights can be made "perfectively certain" through the adjudication process.[9] Those who pursue a cost-benefit analysis of an adjudica-

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Streams, 8 U. DENV. WATER L. REV. 355 (Spring 2005) [hereinafter Thorson et al., 2005]; John E. Thorson et al., *Dividing Western Waters: A Century of Adjudicating Rivers and Streams, Part II,* 9 U DENV. WATER L. REV. 299 (Spring, 2006) [hereinafter Thorson et al., 2006]. My debt to these two articles is obvious throughout this article.

[4] Joseph M. Feller, *The Adjudication That Ate Arizona Water Law,* 49 ARIZ. L. REV. 405, 406 (2007).

[5] John Weldon, Esq., Presentation at Big Horn Adjudication Symposium, Riverton, Wyoming (Sept. 11, 2014) (notes on file with author). Mr. Weldon represents the Salt River Project.

[6] For a useful history of the Big Horn Adjudication, see Jason A. Robison, *Wyoming's* Big Horn *General Stream Adjudication*, 15 WYO. L. REV. 243 (2015). The *Big Horn* Adjudication effectively concluded with the issuance of a Final Order by Judge Robert E. Sklar of Wyoming's Fifth Judicial District Court on September 5, 2014. In re the General Adjudication of All Rights to Use Water in the Big Horn River System and All Other Sources, State of Wyoming, Final Order (Sept. 5, 2014), *available at* http://bhrac.washakiecounty.net/DocumentCenter/BHCR/9-29-14a.PDF. Since then, two appeals have been filed with the Wyoming Supreme Court, both of which concern relatively minor matters involving state law-based appropriative water rights addressed in Phase III of the adjudication.

[7] Strong, *supra* note 2, at 28–29.

[8] *Id.* at 29.

[9] Dan Tarlock, *General Stream Adjudications: A Good Public Investment?* 133 J. CONTEMP. WATER RES. & EDUC. 52, 53 (May 2006).

tion soon meet with disappointment, because the costs arrive immediately while the benefits arrive in the future, so any calculation will overstate costs and understate benefits.[10] Detractors of general stream adjudications can easily point to their costs, delays, and disappointments. Beyond the frightful transaction costs, the detractors can always turn to functionalist arguments in general, and to law and economics arguments in particular. These arguments usually rest upon the belief that the law serves mostly to reflect and to reinforce existing distributions of wealth, power, and property rights, including water rights; and they likewise assume that the propertied and the powerful dominate the legal process. Therefore, these arguments conclude, general stream adjudications can do effectively little to correct and to clarify rights to the subject stream and so can hardly be worth the expense, especially given the arcane laws and inefficient procedures which complicate the various property regimes of western water.[11] Professor MacDonnell, an authority on Wyoming water law, has evaluated the Big Horn Adjudication, and his conclusions are decidedly mixed.[12]

This article pursues the question of whether a water rights adjudication can be justified, but in a very different region: the High Plains-Ogallala Aquifer, where an answer is urgently needed. The Ogallala is the largest but most rapidly diminishing source of fresh water in the West. Groundwater pumping, almost entirely for irrigation, has depleted the aquifer by 276 million acre-feet since it began, and pumping over the past decade has only accelerated this depletion, which stands at more than 8.3 million acre-feet annually.[13] If these depletions could open up a hole in the ground, that hole would swallow more than the entire annual flow of the Snake River in a dry year, or almost four years of average Big Horn flows.[14] But such a whole could not be filled. Unlike the Snake and the Big

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[10] *Id.*; Bonny G. Colby, *Assessing the Value of Adjudications in a World of Uncertainty: An Economic Perspective*, 10 U. DENV. WATER L. REV. 327, 332–38 (2007). For a critique of cost-benefit analysis in environmental law that could be extended to natural resources allocations and adjudications, see generally DOUGLAS A. KYSAR, REGULATING FROM NOWHERE: ENVIRONMENTAL LAW AND THE SEARCH FOR OBJECTIVITY (2010).

[11] *See, e.g.*, R. A. POSNER, ECONOMIC ANALYSIS OF THE LAW 271–81 (5th ed. 1998); NATIONAL WATER COMMISSION, WATER POLICIES FOR THE FUTURE (1973); Charles Meyers & R.A. Posner, *Market Transfers of Water Rights: Towards an Improved Market in Water Resources,* Legal Study No. 4, July 1, 1971, (Nat'l Water Comm'n 1973).

[12] Lawrence J. MacDonnell, *Rethinking the Use of General Stream Adjudications,* 15 WYO. L. REV. 347 (2015). Professor MacDonnell is the author of TREATISE ON WYOMING WATER LAW (2014).

[13] LEONARD F. KONIKOW, GROUNDWATER DEPLETION IN THE UNITED STATES (1900–2008), at 4–5, 22 (U.S. Geological Survey 2013). I have converted Konikow's figures from cubic kilometers to acre-feet, the standard volumetric unit for measuring western water. (1 km^2 = 810,713.194 acre-feet.) One acre-foot is 325,850 gallons.

[14] The average annual flow of the Big Horn River in Wyoming (including the Wind and Shoshone rivers) is 2,435,679 acre-feet. Wyoming State Geological Survey, *Major Rivers of Wyoming*, http://www.wsgs.wyo.gov/research/water-resources/Major-Rivers.aspx (last visited July 9, 2015).

Horn, whose river flows and groundwater basins rely upon substantial amounts of annual precipitation (at least by western standards), the Ogallala mostly holds fossil water from the last ice age. And that supply cannot be sustained by recharge from precipitation, because across most of its range, Ogallala recharge is effectively negligible.[15] The obvious hydrological cause of these rapid groundwater depletions is massive over-pumping; the less obvious legal cause is over-appropriation, where the sum of all of the authorized use quantities for Ogallala water rights and permits vastly exceeds the water supplies that the aquifer can sustainably provide. As a result, perfectly legal pumping has overwhelmed the Ogallala as a hydrological system, depleting groundwater baseflows so badly that nearly all of the major perennial streams in Kansas west of the Hundredth Meridian are now either dry or flow only ephemerally.[16] Yet despite this severe and permanent condition, groundwater depletion is a collective action problem, and none of the states overlying the aquifer have ordered permanent reductions in pumping, much less seen fit to commence a general adjudication to address the problem of over-appropriation.[17] In light of the experience of most general stream adjudications farther west, such reticence is understandable. Logically, it seems beyond reproach. If the principal purpose of a general stream adjudication is to

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Snake River flows below Hells Canyon Dam have a minimum flow requirement of 9,200 cfs, or 6,660,800 acre-feet per year, and are usually considerably higher. Idaho Power, *Hells Canyon River Flows*, https://www.idahopower.com/OurEnvironment/WaterInformation/Hellsrivflw/default.cfm (last visited July 9, 2015).

[15] KONIKOW, *supra* note 13, at 22; JAMES A. MILLER AND CYNTHIA L. APPEL, GROUNDWATER ATLAS OF THE UNITED STATES: KANSAS, MISSOURI, AND NEBRASKA, Number HA 730-D (U.S. Geological Survey 1997).

[16] Kansas Geological Survey, *Major Perennial Stream Changes from 1961 to 2009* (2012), http://www.kgs.ku.edu/HighPlains/HPA_Atlas/Aquifer%20Basics/index.html#Perennial%2520Stream%2520Changes%25201961%2520to%25202009.jpg (last visited July 9, 2015). The Hundredth Meridian is the most well-known climatic boundary between the wetter, lower, eastern portion of the Great Plains, and the higher, drier, western portion (usually described as the High Plains), where agriculture generally requires irrigation. It bisects Nebraska about equally, and separates the western third of Kansas from its eastern two-thirds. John Wesley Powell chose this meridian because it roughly corresponded to where annual precipitation fell below twenty inches. JOHN WESLEY POWELL, REPORT ON THE LANDS OF THE ARID REGION OF THE UNITED STATES: WITH A MORE DETAILED ACCOUNT OF THE LANDS OF UTAH 12-13 (W. Stegner ed., 2d ed. 2004) (1879); WALLACE STEGNER, BEYOND THE HUNDREDTH MERIDIAN: JOHN WESLEY POWELL AND THE SECOND OPENING OF THE WEST 217 (1954). Later legislation such as the 1944 Flood Control Act, 33 U.S.C. §§ 701–709, pushed the boundary farther east, by drawing the boundary between western irrigation use and eastern navigation use at the 98th Meridian. In any case, the various formations of the Ogallala Aquifer straddle these cartographic, climatic, and political divides.

[17] This is not to say that western states have not reduced overall groundwater pumping. Through federally subsidized programs such as the Conservation Reserve and Enhancement Program (CREP), the Environmental Quality Incentive Program (EQIP), and similar state and locally funded programs, hundreds of thousands of acres of irrigated land have been temporarily or permanently retired from irrigation across the Great Plains. However, the impetus behind such retirements is principally to protect groundwater pumping at present levels on lands that remain irrigated. *See infra* note 169 and accompanying text.

secure definite and durable water rights which the state can promptly protect by priority administration when water runs short, then such a marathon proceeding could never be justified, since most of the Ogallala is so obviously unsustainable.

If that logical proposition is correct, then the inquiry is over, and this article has little purpose. Fortunately, however, the assumptions supporting this proposition are not valid across the Ogallala. Recall Mr. Strong's canny use of quotation marks: a general stream adjudication should support the "effective management" of scarce water resources.[18] The objectives of a general adjudication and those of "effective management" are interrelated and interdependent. Together, they must account for the hydrological contexts, the historical contexts, the legal regimes, and the major actors, which together impelled the commencement of the particular adjudication. Across the Ogallala states, these contexts, regimes, and actors are substantially different from those of the Rocky Mountain West, and they raise encouraging possibilities for what a general stream/aquifer adjudication might achieve on the Great Plains.

Such an adjudication need not labor under the burden of securing definite *and* durable water rights, because carrying that burden would be hydrologically impossible over the long term and therefore difficult to defend as both a legal end and as a policy goal. Focusing on one of these attributes of an ideally adjudicated Ogallala water right—definite or durable, rather than both—may be sufficient and even preferable in many situations. A properly designed adjudication could thus produce a portfolio of property rights in water that is better suited to the aquifer's hydrological characteristics.

Moreover, such an adjudication need not defer to the abstract dictates of t he prior appropriation doctrine, especially where such deference would aid little in the administration of adjudicated rights and the management of water supplies upon which those rights depend. Otherwise, the doctrine would lose much of the utility which gave it legitimacy in the first place. All Ogallala states apply some version of the doctrine to surface waters, but their legal regimes for groundwater vary considerably. Yet in states which follow different doctrines for surface water and groundwater, as well as in states which enjoy doctrinal consistency for both waters, the administration of water rights and the management of water supplies have both proven to be inconsistent, legally difficult, and administratively cumbersome. Within these diverse legal regimes, a general stream/aquifer adjudication could perform the signal service of integrating the governing doctrines with actual administration and management of water rights. That is, after all, what modern general stream adjudications do: they have always, and necessarily, confronted fundamental disruptions to the prior appropriation system. They arose to address and to resolve the rights held by Native American

[18] Strong, *supra* note 2, at 29. Mr. Strong is too judicious and experienced a lawyer to hazard a definition of "effective management," which is a politicized term.

tribes—huge, abstract, and dominant tribal rights, rights imbued with their own tribal sovereignty, based in federal law, often predating state law water rights, and even dating to time immemorial.[19] If a doctrine committed to temporal priority can acknowledge, address, and resolve immemorial rights, it should be able to do the same with impermanent ones. Furthermore, adjudications have similarly addressed—and decreed—prior appropriation rights whose beneficial uses contradict traditional doctrinal assumptions, such as instream flow rights.[20] Uses of water which courts would have dismissed as non-beneficial or even wasteful a century ago, such as instream flows and *in situ* recreational rights, are embraced as precious and even imperative today.[21] Indeed, the magnitude of these disruptions and others has led prominent water law scholars to question whether the doctrine remains relevant or even operative.[22]

Finally, it is not preordained that an Ogallala adjudication should require the lengthy, arduous, and expensive proceedings which have bedeviled and discredited general stream adjudications farther west. The modern legal and administrative regimes of the Ogallala states are generally well-equipped to assist with a general stream/aquifer adjudication. For example, such an adjudication would most likely not suffer the large burden of administratively unrecognized claims—such as those in the Snake River Basin Adjudication, which incorporated 85,000 decreed claims that previously were not of record with the Idaho Department of Water Resources.[23] And where groundwater depletions and

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[19] *See, e.g.*, United States v. Adair, 478 F. Supp. 336, 350 (D. Or. 1979) (decreeing the priority of tribal water rights necessary to preserve hunting and fishing rights as of "time immemorial"), *aff'd as modified by* United States v. Adair, 723 F.2d 1394, 1410 (9th Cir. 1983).

[20] Robison, *supra* note 6, at 308–18.

[21] *See, e.g.*, GEORGE S. KNAPP ET AL., THE APPROPRIATION OF WATER FOR BENEFICIAL PURPOSES: A REPORT TO THE GOVERNOR ON HISTORIC, PHYSICAL, AND LEGAL ASPECTS OF THE PROBLEM IN KANSAS 52 (1944) (describing water left flowing in the stream as water wasted); less than forty years later, the Kansas statutes described instream flows as sufficiently desirable to require the Chief Engineer to withhold water from appropriation for their support, and to protect such flows according to their statutory date of priority. KAN. STAT. ANN. § 82a-703a (L. 1980, ch. 332, § 2) (2015).

[22] *See, e.g.*, Reed D. Benson, *Alive But Irrelevant: The Prior Appropriation Doctrine in Today's Western Water Law*, 83 U. COLO. L. REV. 675 (2012); for a brief summary of the general positions, see also Christine A. Klein, *Water Bankruptcy,* 97 MINN. L. REV. 560, 566–81 (2012). Justice Gregory J. Hobbs of the Colorado Supreme Court has been among the most knowledgeable and forceful advocates of the doctrine within modern water management. *See, e.g.*, Gregory J. Hobbs, *Priority: The Most Misunderstood Stick in the Bundle,* 32 ENVTL. L. 37 (2002). Justice Hobbs's position tends to assume that the doctrine operates within a system of rolling adjudications, as in Colorado water court; critics of that position tend not to acknowledge that context, or to ignore it. Klein, at 576–81.

[23] Strong, *supra* note 2, at 28. This large disparity is the result of Idaho law, which recognizes both "statutory" water rights that were obtained in compliance with the Idaho permit statute, as well as unadjudicated "constitutional use" water rights that were obtained by the user diverting the water and putting it to beneficial use without administrative approval, as allowed under the

surface water shortages are most pressing above the Ogallala, there are few federal reserved water rights for tribes or for federal land, facts that should greatly reduce the potential for lengthy and contentious negotiations and litigation, as well as the necessity for congressional funding. Across these states, long-established water use records, long-required metering requirements, and widely used groundwater models should together be capable of resolving the most important factual issues regarding past, present, and future water usage and supply. This capability should significantly streamline the adjudicative process, providing solid grounds for stipulation, negotiation, and settlement.

In sum, this article puts forth a hopeful and novel but realistic proposition, one suited to the legal and hydrological realities of the Ogallala. Properly framed by appropriate legislation, a general stream/aquifer adjudication can clarify property rights in Ogallala water, especially by recognizing the undeniable distinctions and boundaries between its different water supplies, and by decreeing rights to them accordingly. It can do so in a manner that enables the holders to protect those rights more effectively than they currently can, and can enable the state to better manage its water supplies and protect the public interest. Finally, it can do so in a reasonably timely manner. Such an adjudication is not only justifiable; it is probably preferable to the current regimes for Great Plains water rights and water resources management.

To serve that argument, this article discusses the potential for, and the potential pitfalls of, a stream/aquifer adjudication, anchored mostly in the respective water codes of Kansas and Nebraska, states which together hold nearly three-quarters of the Ogallala's total water supplies.[24] Part II provides an analytic summary of the traditional causes, goals, and consequences of general stream adjudications. Part III describes the hydrology of the Ogallala and the varied legal history of its attendant water codes, in order to explain how and why the causes, goals, and consequences of an Ogallala stream/aquifer adjudication would differ significantly from those of a typical general stream adjudication—largely because of the hydrological and political dominance of groundwater. Within this groundwater-dominated context, an adjudication must confront the two most pressing problems facing the Ogallala region: the problem of the permanent depletion of the aquifer, and the failure of both regulators and water rights holders across different legal regimes to administer and to protect senior water rights. Part IV sets forth a generalized vision for what such an adjudication must achieve in this context, to confront and to resolve these conjoined problems of permanent depletion and of legal and regulatory failure.

Idaho Constitution. IDAHO CONST. art. XV, § 3; Joyce Livestock Co. v. United States, 156 P.3d 502 (Idaho 2007). Since 1969 however, "constitutional" water rights fall behind statutory rights in administration situations. Nettleton v. Higginson, 558 P.2d 1048 (Idaho 1977) (construing IDAHO CODE ANN. § 42-607).

[24] *See infra* note 175 and accompanying text.

II. THE TRADITIONAL CAUSES, GOALS, AND CONSEQUENCES OF GENERAL STREAM ADJUDICATIONS

A. The Inherent and Historical Causes of General Stream Adjudications

The original cause of general stream adjudications is the over-appropriation that has generally resulted from the operation of the prior appropriation doctrine. That doctrine combines two elements which are in regular tension: that of appropriation, which establishes the right originally, and assumes there is water to obtain; and that of priority, which gives the right value against other rights when water supplies run low. One who diverts water from its source, conveys that water to its place of use, and applies that water to a beneficial use, appropriates that water. The labor and industry of the appropriator, the social utility of the appropriator's water use, and the use of the water combine to produce an appropriation right, which is a use right in the water so appropriated. (It is not a right to the water itself.) This appropriative, predominantly private approach to property rights in water derived from the mining customs of western gold and silver camps during the middle of the nineteenth century, first in the Sierra Nevada during the 1840s, and a decade or so later in the Rockies.[25] Like those mining customs, an appropriation right is based on labor and aligns with Lockean property theory: labor, applied to a natural resource, produces property, which can exist in a situation effectively without government. Individual initiative and industry create the property right and give it legitimacy independent from the State.[26] In that spirit, state constitutions across the West recognize the right to appropriate water, and they do so in non-historical and non-political terms: it is inalienable, and it "shall never be denied."[27]

Priority engages in times of shortage, which are frequent in the arid and drought-prone West. During these times, appropriation rights are entitled to protection not equitably, but according to the temporal priority of the relevant appropriation rights. (That priority is usually established according to when the appropriator first began to labor on his or her industrious diversion.) During

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[25] *See generally* DONALD J. PISANI, TO RECLAIM A DIVIDED WEST: WATER, LAW, AND PUBLIC POLICY, 1848-1902, at 11–68 (1992), and especially the sources upon which Pisani relies (at 340–56); *see also* ROBERT G. DUNBAR, FORGING NEW RIGHTS IN WESTERN WATERS 60–63 (1983). For a sustained argument that the prior appropriation doctrine in Colorado represented a progressivist response to the threat of land and water monopolies, *see* DAVID B. SCHORR, THE COLORADO DOCTRINE: WATER RIGHTS, CORPORATIONS, AND DISTRIBUTIVE JUSTICE ON THE AMERICAN FRONTIER (2012).

[26] JOHN LOCKE, SECOND TREATISE OF GOVERNMENT §§ 26-45 (Peter Laslett, ed., 2000) (ca. 1681).

[27] *E.g.*, COLO. CONST. art 2, § 3, art. 16, § 6 (1876); IDAHO CONST. art. 1, § 1, art. XV, § 3 (1890). These constitutional statements presume that the appropriation is for a beneficial use; and what constitutes a beneficial use has evolved significantly since then. *See supra* note 21 and accompanying text.

the seminal period of western water law, courts first wrestled with the doctrine, recognizing its extralegal pre-existence while refusing to approve it.[28] But in less than twenty years, both state supreme courts and the Supreme Court of the United States conferred legal sanction on it, and in states such as Colorado, they proclaimed it the exclusively operative doctrine. As a consequence, water rights based upon the prior appropriation doctrine generally overcame rights rooted in other doctrines, most importantly the riparian doctrines of English common law; and that doctrinal victory was based on the widespread belief that prior appropriation was well-suited to the water conditions of the West, which are much more arid and much more variable than those in the East.[29]

However, the tension between appropriation and priority encouraged claimants to claim more water than they needed. From the territorial period into the twentieth century, individual irrigators intentionally made excessive water rights claims to protect against potential incursions into their water usage; and many, if not most, appropriators did not know the actual quantities of their diversions or their claims, much less their needs.[30] Irrigators also tended to overstate their water use, misrepresent the acreages irrigated, and inaccurately describe their diversion works, making it difficult to discern whether there was water available to appropriate, and deterring new appropriations of water.[31] As a result of these errors, intentional and otherwise, the sum of water rights claimed from a given stream could frequently exceed the available water supply by as much as an order of magnitude—even among rights with decrees obtained under early adjudication statutes.[32] States were not blind to these garish levels of over-appropriation; indeed, they conducted hundreds of stream adjudications across the West during the twentieth century to correct them.[33] But these early efforts mostly failed in this regard, and so the original problem of over-appropriation under state law has carried on as a distinct problem.[34]

A second cause of general stream adjudications arose from two fundamental challenges to the established order of state law-based water rights under the prior

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[28] *See, e.g.*, Eddy v. Simpson, 3 Cal. 249 (1853).

[29] Irwin v. Phillips, 5 Cal. 140 (1855) (recognizing a prior appropriative right as superior to a junior riparian right); Coffin v. Left Hand Ditch Co., 6 Colo. 443 (1882) (recognizing the prior appropriation doctrine as operative against rival doctrines); Jennison v. Kirk, 98 U.S. 453 (1878). For authoritative surveys of the doctrine, see generally SAMUEL C. WIEL, WATER RIGHTS IN THE WESTERN STATES 46–306 (1905); WELLS A. HUTCHINS, WATER RIGHTS IN THE NINETEEN WESTERN STATES 1.226–649 (1974); *see also* PISANI, *supra* note 25.

[30] MEAD, *supra* note 1, at 145–59 (on the over-appropriation problem in Colorado).

[31] Michael McIntyre, *The Disparity Between State Water Rights Records and Actual Water Use Patterns: "I Wonder Where the Water Went?"*, 5 LAND & WATER L. REV. 22, 26–30 (1970).

[32] MEAD, *supra* note 1, at 145–59.

[33] Thorson et al., 2005, *supra* note 3, at 408–24, 449–50.

[34] Sandra Dunn, *Cooperative Federalism in the Acquisition of Water Rights: A Federal Practitioner's Point of View,* 19 PAC. L.J. 1323, 1323 (1988).

appropriation doctrine. The first of these was the recognition of federal reserved water rights. Starting with *Winters v. United States* in 1908, the Supreme Court and federal courts established a federal common law of Native American reserved water rights, which entitled tribes to very large, senior water rights under federal law, against existing prior appropriation rights held under state law.[35] Under *Winters,* tribes were entitled to a quantity of water necessary for the present and future needs of the tribe—usually for agriculture, by far the largest use—and with a priority date of the treaty establishing the reservation, if not earlier.[36] (The priority date of the tribal right often predates the admission date of the state in which the reservation is located.[37]) In the first several decades after *Winters* was decided, state and federal courts applied its doctrine mostly to protect tribal water rights which were necessary for various tribal irrigation projects.[38] It was not until 1963, when the Supreme Court delivered its decision in *Arizona v. California*, that "the magnitude of the conflict between reserved rights and state appropriative rights became clear."[39] The Court in that case not only reaffirmed *Winters*, but approved the standard of "practicable irrigable acreage" (PIA), which provided a method by which dormant and implied tribal rights could be quantified for use on reservations.[40] *Arizona v. California* and later cases applied the reserved rights doctrine to non-tribal federal lands such as federal recreation

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[35] *See generally* JOHN SHURTS, INDIAN RESERVED WATER RIGHTS: THE *WINTERS* DOCTRINE IN ITS SOCIAL AND LEGAL CONTEXT, 1880S–1930S (2000).

[36] Winters v. United States, 207 U.S. 564 (1908); *see also* United States v. Rio Grande Irrigation Co., 174 U.S. 690, 703 (1899) (asserting in dicta that a state cannot extinguish the right of the United States, as a riparian owner, to the flow of water necessary for the beneficial uses of that federal property). For a memorable jeremiad against the entire notion of federal reserved rights, see Frank Trelease, *Federal Reserved Rights since PLLRC,* 54 DENV. L.J. 473 (1977).

[37] *See, e.g.*, Water Rights Compact Entered Into by the State of Montana, the Crow Tribe, and the United States of America, MONT. CODE. ANN. § 85-20-901 (ratified June 22, 1999), at art. 1 (recognizing a priority date for the Crow Tribe's reserved water right of May 7, 1868, which is the date of the establishment of the Crow Reservation under the (second) Treaty of Fort Laramie of the same date). Montana entered the Union on November 8, 1889. 26 Stat. 1551 (Nov. 8, 1889).

[38] Such a determination of necessity was usually done on a case-by-case basis. *See, e.g.*, Byers v. Wa-wa-ne, 169 P.121, 127–28 (Or. 1917) (distinguishing from *Winters* based on the finding that no irrigation was necessary for successful agriculture on tribal lands); United States *ex rel.* Ray v. Hibner, 27 F.2d 909, 911–12 (D. Idaho 1928) (recognizing *Winters* rights according to tribal needs, as against successors to Indian lands in the adjudication of Toponce Creek); United States v. Powers, 16 F. Supp. 155, 164 (D. Mont. 1936), *decree generally aff'd in* 94 F.2d 783 (9th Cir. 1938), *and* 305 U.S. 527, 533 (1939) (reducing the tribal water duty from 1 miner's inch per acre to ½ miner's inch for tribal irrigation works on the Crow Reservation).

[39] PETER W. SLY, RESERVED WATER RIGHTS SETTLEMENT MANUAL 4 (1988).

[40] Arizona v. California, 373 U.S. 546, 595–601 (1963). Charles J. Meyers, *The Colorado River,* 19 STAN. L. REV. 1, 65–71 (1966). While the PIA method remains the default standard, it has not been treated as the exclusive one for irrigation purposes. *See, e.g.*, *In re* General Adjudication of All Rights to Use Water in the Gila River System and Source, 35 P.3d 68 (Ariz. 2001). For a more recent analysis of the *Winters* doctrine, see Susan Williams, *The* Winters *Doctrine on Water Administration,* 36 ROCKY MTN. MIN. L. INST. 24-1 (1990).

areas, wildlife refuges, and national forests.[41] The recognition of these federal, reserved rights intensified the problem of over-appropriation—especially in the Southwest, where they threatened to displace state law-based appropriative rights and absorb most of the available water supply if the reserved rights doctrine were uniformly applied—while creating substantial uncertainty about the security of state law-based appropriation rights.[42]

The establishment and assertion of reserved rights rendered the earlier generation of stream adjudications into partial proceedings at best. Between the size and priority of tribal rights, and the large amount of federal land in the West, federal reserved rights extended to over fifty-two percent of western land.[43] Federal deference to state water law, born of the western states' "deep-seated hostility to federal dictation of water rights"[44] and stated repeatedly in major federal water legislation during the first half of the twentieth century, became little more than a shibboleth in this context.[45] Given the priority and the size of tribal water claims, addressing those claims with the state has become the imperative first step towards any successful general stream adjudication.[46] Subsequent general stream adjudications have proved up the quantity and the size of these federal claims. For example, approximately 30,000 federal claims were filed in the Snake River Basin Adjudication, by twelve different federal agencies, all of which accounted for roughly twenty-five percent of the total claims in the adjudication.[47]

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[41] *Arizona*, 373 U.S. at 601; Cappaert v. United States, 426 U.S. 128, 141 (1976); United States v. New Mexico, 238 U.S. 696 (1978).

[42] SLY, *supra* note 39, at 5; Thorson et al., 2006, *supra* note 3, at 306–08, 313–17, 331–37. In reserved water rights adjudications on higher and wetter drainages, such as those in the Northern Rocky Mountains, the recognition of federal reserved rights has not intensified the problem of over-appropriation to such an extent, largely because such rights have frequently involved non-consumptive uses in headwater areas, rather than consumptive uses (mostly for irrigation) in downstream areas. For a discussion of such a situation in the Big Horn Adjudication, where the tribes sought large instream flow rights on the Wind River, see Robison, *supra* note 6, at 289–307.

[43] Thorson et al., 2006, *supra* note 3, at 311 (tabulating federal acreage with reserved water rights in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming).

[44] *Arizona*, 373 U.S. at 612 (J. Harlan, dissenting).

[45] Section 8 of the Reclamation Act of 1902, now codified at 43 U.S.C. §§ 372, 383 (2015); 43 U.S.C. § 485h-4 (2015) (identical to Section 8); *see also* 43 U.S.C. § 390b(c) (2015) (Water Supply Act provision incorporating Section 8).

[46] BONNIE G. COLBY, JOHN E. THORSON, & SARAH BRITTON, NEGOTIATING TRIBAL WATER RIGHTS: FULFILLING PROMISES IN THE ARID WEST 57–77 (2005). However, it is worth noting that a central feature of reserved water rights settlements (including state-tribal compacts) can be the protection of (junior) state law-based appropriation rights from administration calls by the (senior) tribal water right; and new development of the (senior) tribal water right (such as a post-settlement reservoir) is, for purposes of exercising the right, often recognized as being junior in priority to those state law-based appropriation rights. *See, e.g.*, Montana-Crow Compact, *supra* note 37, arts. III–IV.

[47] Testimony of David Shaw, chief of the adjudication bureau of the Idaho Department of Water Resources (and the primary witness for the State of Idaho in the Snake River Basin

The second legal challenge to the western states' water rights regimes emerged from the growing importance of public and environmental issues during the last third of the twentieth century. Generally, this emergence substantially reduced the amount of water available for both new and existing appropriations. In California, the courts revived and applied the public trust doctrine to existing prior appropriation rights.[48] As the California Supreme Court held in the *Mono Lake* case,

> the state is not confined by past allocation decisions which may be incorrect in light of current knowledge or inconsistent with current needs. The state accordingly has the power to reconsider all allocation decisions even though those decisions were made after due consideration of their effect on the public trust.[49]

Seeing this opportunity, environmental plaintiffs have sought (so far with little success) to leverage the potential power of the public trust doctrine in general stream adjudications.[50] Courts have also recognized, under the "public interest"

Adjudication), *as cited in* Appellate Brief of Respondent State of Idaho at 6, In Re The General Adjudication of Rights to the Use of Water From the Snake River Basin Water System, (No. 19407), 1991 WL 11242536 (Idaho) (Appellate Brief). These claims incurred filing fees of approximately $10 million, producing a dispute over whether the United States was required to pay those fees pursuant to the McCarran Amendment, 43 U.S.C. § 666; the Supreme Court ruled for the United States, holding that the statute's prohibition on assessing costs against the United States extended to such filing fees. United States v. Idaho, 508 U.S. 1, 8–9 (1993).

[48] The textbook authorities are Illinois Cent. R.R. Co. v. Illinois, 146 U.S. 387 (1892); Joseph L. Sax, *The Public Trust Doctrine in Natural Resource Law: Effective Judicial Intervention*, 68 MICH. L. REV. 471 (1970). For a recent survey of the applicability of the doctrine to western waters, see Robin Kundis Craig, *A Comparative Guide to the Western States' Public Trust Doctrines: Public Values, Private Rights, and the Evolution Toward an Ecological Public Trust*, 37 ECOLOGY L.Q. 53 (2010).

[49] Nat'l Audubon Soc. v. Sup. Ct. of Alpine Cnty., 658 P.2d 419 (1983). For a useful commentary on how the doctrine has actually been applied in California—primarily at the agency level—see Dave Owen, *The Mono Lake Case, the Public Trust Doctrine, and the Administrative State,* 45 U.C. DAVIS L. REV. 1099 (2012). For a rare application of the public trust doctrine to groundwater, see United Plainsmen Ass'n v. North Dakota State Water Conservation Comm., 247 N.W.2d 457 (N.D. 1976).

[50] In Idaho Conservation League, Inc. v. State, 911 P.2d 748 (Idaho 1995), environmental plaintiffs moved to intervene, on the grounds that the public trust doctrine required the Snake River Basin Adjudication court to consider the public trust as an element of each water right subject to the adjudication. The Supreme Court of Idaho was receptive to the concept of the public trust doctrine, pursuant to their earlier ruling in Kootenai Envtl. Alliance, Inc. v. Panhandle Yacht Club, Inc., 671 P.2d 1085, 1094 (Idaho 1983), but affirmed the lower court's denial of that motion, on the grounds that the state's ownership of the water was not a question before the SRBA court, and that the public trust doctrine "is not an element of a water right used to determine the priority of that right in relation to the competing claims of other water right claimants." *Id.*; *see also* Shokal v. Dunn, 707 P.2d 441, 447 n.2 (Idaho, 1985). The Idaho legislature subsequently banned the application of the public trust doctrine to water rights, including adjudications. IDAHO CODE ANN. § 58-1203(2)(b) (2015). The bill banning the application of the doctrine "went through the legislature faster than

standard, the right of state agencies to reject applications to appropriate water if such appropriations would impair water supplies necessary for aquatic habitat, recreation, aesthetic beauty, and water quality, among other considerations.[51] While the public trust doctrine is mostly confined to the administrative law of California, the public interest standard generally applies across western water law; however, it has proven to be a variable and often impotent restraint.[52]

The same could never be said for the Endangered Species Act (ESA).[53] Justly regarded as "the pit bull of environmental law," the ESA limits actions that threaten to modify or destroy critical habitat for threatened or endangered species—and as a result, can effectively govern the use of much of the water supply that sustains that habitat.[54] It arms successful plaintiffs with the powerful and accessible weapon of injunctive relief.[55] On major western drainages such as the Klamath, the Sacramento, and the San Joaquin, actions taken under the ESA have shut the headgates to irrigation projects holding large and senior state law-based appropriation rights in dry years, to protect habitat for salmon, smelt, and other aquatic species.[56] In the Sacramento Bay Delta, actions taken under the ESA to balance the water needs of endangered species and irrigation districts will likely produce the most expensive water engineering projects undertaken since the Central Arizona Project.[57] The power of the ESA to effectively reduce water allocations secured under the prior appropriation doctrine has even motivated states to voluntarily reduce their collective water use, rather than to risk such a powerful remedy.[58]

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a kayaker going through Staircase Rapids on the South Fork of the Payette River at flood stage." James M. Kearney, *Recent Statute Closing the Floodgates? Idaho's Statutory Limitation on the Public Trust Doctrine,* 34 IDAHO L. REV. 91, 93 (1997) (quoting Pete Zimowsky, *Batt Should Shoot This Bill Down,* IDAHO STATESMAN 1C (Mar. 18, 1996)).

[51] *See, e.g.*, *Shokal*, 707 P.2d at 448–49 (construing the meaning of "public interest" under Idaho water statutes).

[52] Michelle Bryan, *Hitching Our Wagon to a Dim Star: Why Outmoded Water Codes and "Public Interest" Review Cannot Protect the Public Trust in Western Water Law,* 32 STAN. ENVTL. L.J. 283 (2013).

[53] 16 U.S.C. §§ 1531 *et seq*. (2015).

[54] *See, e.g.*, Steven P. Quarles, *The Pit Bull Goes to School: The Endangered Species Act at 25: What Works?*, 15 ENVTL. F. 55, 55 (1998) (discussing the origins of the act's reputation).

[55] *See, e.g.*, Tennessee Valley Authority v. Hill, 437 U.S. 153 (1978) (enjoining construction of a federal reservoir pursuant to Section 7 of the Endangered Species Act, 16 U.S.C. § 1536).

[56] HOLLY D. DOREMUS AND A. DAN TARLOCK, WATER WAR IN THE KLAMATH BASIN: MACHO LAW, COMBAT BIOLOGY, AND DIRTY POLITICS (2008); San Luis & Delta-Mendota Water Authority v. Jewell, 747 F.3d 581 (9th Cir. 2014).

[57] BAY DELTA CONSERVATION PLAN, PUBLIC DRAFT 8–61 (November 2013), *available at* http://baydeltaconservationplan.com/Libraries/Dynamic_Document_Library/Public_Draft_BDCP_Chapter_8_-_Implementation_Costs_and_Funding_Sources.sflb.ashx (estimating capital outlays and O&M outlays of approximately $25 billion combined).

[58] Under the Platte River Recovery Implementation Program, the states of Colorado, Wyoming, and Nebraska, together with the United States Department of Interior, cooperatively

The scale of these two legal disruptions—the imposition of federal reserved water rights and the intervention of mostly federal environmental law—have justifiably raised the issue of whether state law-based prior appropriation systems retain their effective legal and doctrinal primacy over western waters.[59] As a matter of both substantive law and its functional effect upon water rights, that remains an open question.[60] Regardless, these disruptions both dramatically increased claims on western waters and reduced the amount of water effectively available to satisfy those claims.

The third general cause of general stream adjudications was a matter of procedural law: the availability and necessity of the modern adjudication procedure itself. In 1952, Congress passed the McCarran Amendment, which waived the sovereign immunity of the United States and provided its consent to be joined in state court for the purpose of conducting general stream adjudications.[61] As a result, state courts obtained jurisdiction to adjudicate all of the different water rights on a particular stream reach—rights obtained under state law, as well as rights impliedly reserved under federal law. Subsequent United States Supreme Court decisions ruled that the McCarran Amendment also applied to state court adjudications of Indian reserved rights held in trust by the United States.[62] As with the recognition of reserved rights under *Winters,* it took time and judicial construction to clarify how the McCarran Amendment would operate in practice: the acceptability of various state court judicial processes, the extent of the waiver of immunity and consent to joinder, and perhaps most importantly, the length of the stream reach that would be sufficient to qualify as a "general stream adjudication" and therefore engage the amendment in the first place.[63]

If federal reserved rights and federal environmental law have shifted much of the effective water law of the American West in favor of federal interests and federal power, the McCarran Amendment has enabled western states to push back somewhat against those interests and that power.[64] While the McCarran

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manage flows in the Platte River Basin to protect endangered species habitat. *See generally* PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM, https://www.platteriverprogram.org (last visited July 9, 2015).

[59] *See* David H. Getches, *The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?*, 20 STAN. ENVTL. L.J. 3 (2001).

[60] *See supra* note 22 and accompanying text.

[61] 43 U.S.C. § 666 (2015). For a summary of the conditions leading to the passage of the McCarran Amendment, *see* Thorson et al., 2005, *supra* note 3, at 442–59.

[62] Colorado River Water Conservation Dist. v. United States, 424 U.S. 800 (1976); Arizona v. San Carlos Apache Tribe, 463 U.S. 545, 559–71 (1983).

[63] Dugan v. Rank, 372 U.S. 609, 618 (1963). For a summary of judicial construction of the McCarran Amendment, see Thorson et al., 2006, *supra* note 3, at 331–37.

[64] *See, e.g.*, *In re* the General Adjudication Of All Rights To Use Water In The Big Horn River System (Big Horn I), 753 P.2d 76 (Wyo. 1988) (determining the scope of tribal rights and rejecting tribal claims for water rights dedicated to fishery, mineral, industrial, wildlife, and aesthetic purposes).

Amendment does not divest federal courts of jurisdiction over reserved rights claims, the federal courts generally abstain in favor of state court proceedings.[65] As a consequence, state courts have become the dominant forums in which the federal doctrine of reserved water rights has evolved. That evolution has not been entirely consistent, as the *Big Horn* Adjudication demonstrates. In *Big Horn I,* the Wyoming Supreme Court declined to extend the reserved rights doctrine to groundwater, even as it endorsed the logic of such an extension; that decision runs counter to the developing majority opinion of state and federal courts.[66] And in *Big Horn III,* the same court prohibited tribes from dedicating a portion of their reserved rights award, which had been quantified under the PIA standard (and which explicitly assumes consumptive use) for instream flow purposes to support a tribal fishery.[67] In both cases, the Wyoming Supreme Court effectively asserted Wyoming state law (and the role of the State Engineer) to determine many of the contours of the tribal reserved water right. Put another way, the *Big Horn* Adjudication began as a case dedicated to quantifying the substantial federal reserved water rights of the Eastern Shoshone and Northern Cheyenne Tribes; but it evolved into a case focused largely on state law-based issues of water rights regulation and administration.[68]

B. The Typical Goals of General Stream Adjudications

General stream adjudications seek to resolve the problems that made them necessary in the first place. First, there is the problem of over-appropriation. Prior appropriation rights have generally come into existence without a prospective

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[65] *See generally* COHEN'S HANDBOOK OF FEDERAL INDIAN LAW § 19.05[1] (Mitchie 2005).

[66] *Big Horn I*, 753 P.2d 76, 99 (Wyo. 1988), *aff'd by an equally divided Court*, Wyoming v. United States, 492 U.S. 406 (1989). Elsewhere across the West, state and federal courts have extended the doctrine to groundwater. *See, e.g.*, *In re* the General Adjudication of All Rights to Use Water in the Gila River System and Source, 989 P.2d 739, 745, 747–48 (Ariz. 1999) (holding that tribal reserved rights expressly extend to groundwater, and politely criticizing the Wyoming Supreme Court for its opposite holding in *Big Horn I)*; Gila River Pima-Maricopa Indian Cmty. v. United States, 695 F.2d 559, 561 (Fed. Cir. 1982) (denying the availability of the Salt River to fulfill tribal rights on the grounds that the Gila River and groundwater were the intended sources for tribal irrigation); Tweedy v. Texas Co., 286 F. Supp. 383, 385 (D. Mont. 1968), and Confederated Salish and Kootenai Tribes v. Stults, 59 P.3d 1093, 1099 (Mont. 2002) (both refusing to exclude groundwater from the reserved rights doctrine); United States v. Washington Dep't of Ecology, 375 F. Supp. 2d 1050, 1058 (W.D. Wash. 2005) (holding that *Winters* rights extend to groundwater on the Lummi Reservation). For a discussion of tribal rights to groundwater generally, see Judith V. Royster, *Indian Tribal Rights to Groundwater,* 15 KAN. J.L. & PUB. POL'Y 489 (2006).

[67] *In re* the General Adjudication Of All Rights To Use Water In The Big Horn River System (Big Horn III), 835 P.2d 273 (Wyo. 1992).

[68] John C. Schumacher, Esq., Big Horn Adjudication: Decades In The Making 9, 15 (Sept. 11, 2014) (unpublished paper presented at Big Horn Adjudication Symposium, Riverton, Wyoming) (on file with author). Mr. Schumacher represented the Eastern Shoshone Tribe in the *Big Horn* Adjudication from 1985 through 2010.

regard for other rights or needs.[69] This is especially the case in states that recognize a constitutional right to appropriate water.[70] The adjudicative process scrutinizes all of these putative water rights; those that survive are placed within the operational and administrative context of all of the other valid rights on the stream system, within that system's water budget. Ideally, the total authorized quantity of the adjudicated rights is equivalent to that budget. To meet that budget, water rights of all priorities can be effectively readjusted. Those with the largest and oldest rights—typically tribal rights, which exist under the *Winters* doctrine and its progeny—dominate the litigation and negotiation of any adjudication which concerns an area with tribal lands.[71] The adjudication may reduce the authorized quantity of senior state law-based appropriation rights, if the record shows that their water demands can be met with less water; such a reduction is justified on the grounds that no appropriator has a right to waste.[72] Reductions in such senior rights can then be assigned to junior rights, softening the blow of the adjudicative

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[69] This was one of Mead's principal laments. The most senior rights on a given western stream, which took most or all of its available water supply, were usually dedicated to direct diversion for irrigation, making it difficult to establish dependable storage rights, since the latter inevitably held junior priorities. As a consequence, in dry periods when stored water was most needed, it was least available. MEAD, *supra* note 1, at 170–71.

[70] Three examples illustrate variations of this problem and how they have been resolved. Colorado recognizes the constitutional right of prior appropriation (COLO. CONST. art XVI, §§ 5, 6) and does not have an administrative permitting system. Through the common law and the decree process, it has produced the following general rule: senior but non-decreed water rights are junior to decreed water rights. In this situation, the date of the relevant adjudication provides the operative date of priority against such non-decreed, albeit historically senior rights. *See, e.g.*, Luis Coppa & Son v. Kuiper, 467 P.2d 273, 276 (Colo. 1970). For Idaho, where the administrative permitting system overlays the multitude of "constitutional" rights, rights obtained through the former take priority over the latter, see *supra* note 23 and accompanying text. The New Mexico Court of Appeals faced a difficult case in which the priority doctrine, established under Article XVI, Section 2 of the New Mexico Constitution, clashed with the state's domestic well statute (N.M. STAT. ANN. 1978 § 72-12-1.1 (2003)), which required the granting of groundwater rights for domestic use upon application to the State Engineer. Plaintiffs, who owned senior water rights, argued that the statute was an impermissible exception to the priority doctrine. The Court of Appeals upheld the statute, largely by distinguishing the "broad priority principle" of the doctrine from the regulatory system of administering water rights according to priority in times of shortage; the statute was thus a permissible exception to, and not a facial violation of, the constitutional doctrine of priority, as long as senior rights were protected from impending impairment by domestic wells permitted pursuant to the statute. Bounds v. State Engineer, 252 P.3d 708, 721 (N.M. Ct. App. 2011), *aff'd in* Bounds v. D'Antonio, 306 P.3d 457 (N.M. 2013).

[71] The Big Horn Adjudication exemplifies this dominance. *See* Robison, *supra* note 6, at 278.

[72] John C. Peck, *Groundwater Management in Kansas: A Brief History and Assessment,* 15 KAN. J.L. & PUB. POL'Y 441, 451–52 (2006) (describing the reduction of senior rights in the Walnut Creek Intensive Groundwater Use Control Area in Kansas).

process. Because junior rights bear the brunt of this corrective blow, those who hold them have little or no incentive to pursue an adjudication.[73]

By confronting the problem of over-appropriation, adjudications also serve as a tool to establish political, jurisdictional, and administrative boundaries. Interstate conflicts over interstate water supplies have produced adjudications of their own, under the original and exclusive jurisdiction of the United States Supreme Court.[74] Litigation and negotiation performed under the Court's supervision have generated the basic rules by which these boundaries between sovereigns, and their respective limits of water usage, have been set.[75] Through a combination of litigation and negotiation, states have adjusted their mechanisms for quantifying and allocating their respective allocations in response to the over-appropriation that has resulted from groundwater pumping.[76] Interstate adjudications have also clarified the respective duties of state engineers and local water districts with respect to the administration of groundwater rights.[77] Tribes,

[73] D.L. Sanders, Esq., Presentation at Big Horn Adjudication Symposium, Riverton, Wyoming (Sept. 11, 2014) (notes on file with author). Mr. Sanders served as Chief Counsel to the New Mexico State Engineer from 2001 until his retirement in 2014.

[74] U.S. CONST. art. III, § 2, cl. 2; 28 U.S.C. § 1251(a) (2015). The Court clearly views these disputes as adjudications, even in the context of interstate compact disputes. *See, e.g.*, Arizona v. California, 373 U.S. 546, 564 (1963) (Court has the "serious responsibility to adjudicate cases where there are actual existing controversies over how interstate streams should be apportioned among states.").

[75] Kansas v. Colorado, 206 U.S. 85 (1907) (asserting the power of the Court to equitably apportion interstate waters); Nebraska v. Wyoming, 359 U.S. 589, 618 (1945) (setting forth the Court's multi-factor analysis for equitable apportionment); Colorado v. New Mexico, 459 U.S. 176, 183 (1982) (restating the modern formulation for equitable apportionment); Arizona v. California, 373 U.S. 546 (1963) (holding that Congress has the power to apportion interstate waters through federal legislation other than an interstate compact); for interstate compact jurisprudence, see generally Douglas A. Grant, *Water Apportionment Compacts Between States, in* WATER AND WATER RIGHTS §§ 46-1 to 46-30 (2010). For a recent interstate compact case which often resembles an adjudication, see Montana v. Wyoming, No. 137, Original, SECOND REPORT OF THE SPECIAL MASTER (LIABILITY ISSUES) 99–220 (Dec. 29, 2014) (detailing specific water rights at issue in Wyoming and Montana that are affected by alleged violations of the Yellowstone River Compact).

[76] Kansas v. Nebraska & Colorado, No. 126 Orig., FINAL SETTLEMENT STIPULATION (Dec. 15, 2002).

[77] Colorado attempted to regulate groundwater pumping in the Arkansas River Basin in the 1960s, but these attempts were stymied by the Colorado Supreme Court. Kansas' lawsuit against Colorado to enforce the Arkansas River Compact eventually forced Colorado either to require curtailment of post-compact groundwater development or to replace the depletions caused by over-pumping. (The fact that the waters of the Arkansas River Basin in Colorado are legally classified as tributary groundwater, and thus within the jurisdiction of the State Engineer, only serves to emphasize this point.) Kansas v. Colorado, No. 105 Orig., FIRST REPORT OF THE SPECIAL MASTER 118–19 (July 1994). *See also, e.g.*, Spear T Ranch v. Knaub, 691 N.W.2d 116 (Neb. 2005) (stating the jurisdictional boundaries between the State of Nebraska's Department of Natural Resources and the state's Natural Resources Districts, and setting forth the appropriate test for equitable treatment between senior surface water rights and junior groundwater permits); Upper Black Squirrel Creek Ground Water Mgmt. Dist. v. Goss, 993 P.2d 1177, 1186 (Colo. 2000) (holding that in in a designated basin, the local groundwater management district, not the State Engineer, has administrative responsibility).

as sovereign entities distinct from the states in which their reservations are located, have also compacted with states to establish their respective supplies.[78]

Most importantly, adjudications provide legal and financial leverage by which those with large but indefinite water rights can obtain wet water. For all of their variations, interstate adjudications, general stream adjudications, and tribal water rights settlements have all served to effectuate previously inchoate water rights. The United States has long been concerned about securing permanent water rights for federal irrigation projects.[79] It has required western states to enter into interstate compacts as a condition for constructing federal irrigation and flood control projects, so that those projects rest upon permanent and concrete allocations of states' respective water supplies.[80] General stream adjudications and tribal water rights settlements secure federal legislation, including appropriations funding, to satisfy tribal water rights entitlements.[81] Typically, that funding supports new or expanded water projects for tribal uses, and the purchase or lease of pre-existing water rights from non-tribal members, which are then transferred to tribal use. Decrees also specify the procedures by which junior water rights will be administered to protect senior tribal rights during times of water shortage.[82]

C. The Consequences of General Stream Adjudications

The general (and idealized) goal of general stream adjudications is a balanced system. The system has a balanced water budget: existing uses and reserved rights do not exceed the available water supply, including storage. To achieve that balance, the overall adjudication process pursues both sides of the water supply ledger. (Ideally, the quantity of tribal water rights and other large reserved rights have been established through a negotiated settlement; litigating these issues, it is generally agreed, is a bad idea.[83]) On the supply side, the parties

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[78] *See supra* note 37 and accompanying text.

[79] The Reclamation Act of 1902 is a prominent example of this concern. Section 8 of the original Reclamation Act expressly defers to state law water rights regimes, but with an important proviso: water rights obtained under state law for Reclamation projects "shall be appurtenant to the land irrigated . . . ." 43 U.S.C. §§ 372, 383 (2015).

[80] President Franklin D. Roosevelt vetoed the penultimate version of the Republican River Compact, on the grounds that it sought to redefine the river as non-navigable, and so it did not "specifically reserve to the United States all of the rights and responsibilities which it now has in the use and control of the waters of the basin." 77th Cong., 2 sess., H. Doc. 690, at 2 (Apr. 2, 1942). The states amended the compact accordingly, recognizing these federal rights, and the compact was approved by Congress and signed into law by President Roosevelt later that year. Republican River Compact, 57 Stat. 86 (May 26, 1943).

[81] *See* COLBY *et al.*, *supra* note 46, Appendix, 171–76 (2005) (listing the principal elements of tribal water rights settlements).

[82] *Id.* at 57–103.

[83] Thorson et al., 2006, *supra* note 3, at 459–60, and the articles cited therein at note 1009.

to adjudications seek to secure funding for increased storage projects, which by making more water available, can mitigate the losses to junior water rights holders. Parties can also seek protections for water made available by rotated fallowing, increases in irrigation efficiency such as center pivot and drip irrigation, and other mechanisms.[84] On the demand side, the adjudication court or officer often reduces wasteful or excessive senior rights, reduces the authorized quantities of junior rights, and strikes unmerited claims to water altogether. As a consequence of this hydrological balancing, many, if not most, of the water rights on the stream system suffer reductions in their authorized quantities of property rights. Without playing down that quantitative loss (which can be largely composed of "paper water" which juniors have not dependably used), junior rights can gain an increase in the quality of their rights. They gain added legal security and certainty of title as decreed rights, and their rights become more enforceable as a result of the decree's administration provisions. Perhaps most importantly, because these rights have been accurately quantified, judicially secured, and made predictably enforceable, they should become more marketable, thereby aiding the reallocation of water supplies from lower-value to higher-value uses. It is difficult to justify adjudications solely on the grounds that they repair the broken mathematics of an over-appropriated system. As a means towards a water market, however, an adjudication can be a crucial step.[85]

Yet for all of this apparent utility, the results of general stream adjudications have been mixed at best, and impressively inefficient. They have taken decades; they have cost hundreds of millions of dollars; and they have been the source of enduring disappointment and frustration, especially among the tribes whose federal reserved rights compelled the adjudications in the first place. A sample of these adjudications across the West provides some humbling numbers. Arizona commenced its Gila River General Stream Adjudication in 1974, in which approximately 82,000 claims were filed; four decades later, it is only one-third complete. In 1978, Arizona commenced its Little Colorado General Stream Adjudication, in which approximately 14,000 claims were filed; it is approximately fifty-five percent complete.[86] Montana initiated its general stream adjudication in

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[84] James P. Merchant, *Making Water Available for Indian Water Rights Settlements*, *in* COLBY *et al., supra* note 46, at 95–103.

[85] *See, e.g.*, ELINOR OSTROM, GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION (1990); WILLIAM BLOMQUIST, DIVIDING THE WATERS: GOVERNING GROUNDWATER IN SOUTHERN CALIFORNIA (1992); Thorson et al., 2006, *supra* note 3, at 457–58. It should be noted that Ostrom and Blomquist generally anchor their findings in California, an outlier legal regime for groundwater. For more skeptical assessments, see Joseph W. Dellapenna, *The Importance of Getting Names Right: The Myth of Markets for Water*, 25 WM. & MARY ENVTL. L. & POL'Y REV. 317 (2000); Amy Sinden, *The Tragedy of the Commons and the Myth of a Private Property Solution*, 78 U. COLO. L. REV. 533 (2007).

[86] Weldon, *supra* note 5; *see generally* The Judicial Branch of Arizona, Maricopa County, *Arizona's General Stream Adjudications*, http://www.superiorcourt.maricopa.gov/SuperiorCourt/GeneralStreamAdjudication/Index.asp (last visited July 9, 2015).

1979; as of 2004, it had invested more than $37.5 million in those proceedings, and still harbors hopes of adjudicating approximately 219,000 water rights by 2028.[87] New Mexico initiated thirteen distinct adjudications between 1956 and 1970, and all of them remain pending; these proceedings are "leviathans," which cost the state $2.8 million annually for staffing.[88] Oregon commenced the Klamath River Basin Adjudication in 1975, and completed just the administrative phase of the adjudication in 2013, having determined the validity of 730 claims to the surface waters of that basin, against 5,600 protests to those claims. The judicial phase of the Klamath adjudication will produce a decree enabling the administration of the decreed rights.[89] The State of Washington initiated the Yakima River Basin (Acquavella) Adjudication in 1977, to adjudicate approximately 3,000 water rights, a relatively small number by the standards of these other adjudications; it finally concluded in 2013.[90] If general stream adjudications are necessary and vital undertakings, their time and expense reveal the political, cultural, historical, technical, and legal difficulties that can bedevil their completion.[91]

III. THE UNUSUAL SITUATIONS OF THE OGALLALA

This brief summary of general stream adjudications should give us pause. On one hand, they are imperative proceedings, to resolve the disruptions caused by the most powerful doctrines in western water law, and they are justified proceedings, at least according to their champions. On the other hand, the inevitable resolution of these disruptions makes them unpopular with the majority of water rights holders—those with junior rights, who have everything to lose. They have also met with disapproval by those with the most senior rights, the tribes.[92] They have required exceedingly lengthy and expensive proceedings, and they have plunged parties and presiding judges alike into existential despair.[93] For better and for

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[87] Tarlock, *supra* note 9, at 52, 53; The Honorable Bruce Loble, Presentation at Big Horn Adjudication Symposium, Riverton, Wyoming (Sept. 11, 2014) (notes on file with author).

[88] Sanders, *supra* note 73.

[89] *See* Findings of Fact and Order of Determination, In the Matter of the Determination of the Relative Rights to the Use of the Waters of Klamath River and its Tributaries (Mar. 7, 2013), *available at* http://www.oregon.gov/owrd/ADJ/docs/7_Findings_of_Fact_and_Order_of_Determination.pdf.

[90] Washington Dep't of Ecology v. Acquavella, 296 P.3d 835 (Wash. 2013); *see* Washington Department of Ecology, *Water Right Adjudications*, http://www.ecy.wa.gov/programs/wr/rights/adjhome.html (last visited July 9, 2015).

[91] Thorson et al., 2006, *supra* note 3, at 483–84.

[92] MacDonnell, *supra* note 12, at 380.

[93] *See, e.g.*, Thorson et al., 2006, *supra* note 3, at 302–03 (quoting Judge Allen Minker, the presiding judge in Arizona's Little Colorado River Adjudication, comparing himself to a French canal-digger); SAMUEL BECKETT, THE UNNAMABLE 179 (English ed. 1958) (" . . . you must go on, I can't go on, I'll go on.").

worse, the prospect of adjudicating rights to the water supplies of the Ogallala states presents a series of situations which are both unusual and importantly different from those of general stream adjudications farther west.

A. The Physical and Legal Situations of the Ogallala Aquifer

The Ogallala Aquifer presents a physical situation that is distinct from most other western water supplies in two important characteristics. The first characteristic concerns hydrology. Most of the stream systems of the West originate in its mountain ranges, such as the Wind River Range or the Bighorn Mountains. These systems receive their water supply from precipitation, predominantly from snowfall that accumulates at higher elevations, is stored there as snowpack and seasonal groundwater, and then releases into tributaries during spring thaws. This water supply varies a great deal from year to year, much more so than in the East.[94] Nonetheless, in wet years and dry years alike, these systems do answer to the annual hydrological cycle.[95] The second characteristic concerns topography. Because western rivers such as the Bighorn cut through mountains, creating canyons and valleys in the process, their water is often located at some distance from arable land.[96] Much of western water law serves these two distinctively western imperatives: the need to accommodate annual climatic variability through the priority system, and the need to protect the investment in diversion works which transport water from their source, often over great distances, to the place of use.[97] The Ogallala, however, presents a fundamentally different situation. Unlike the annual variability and annual replenishment of western surface water supplies, the waters of the Ogallala Formation were deposited in geological time, between the formation of the Rocky Mountains millions of years ago and the retreat of glaciers and streams during the last ice age, tens of thousands of years ago.[98] Topographically, the Ogallala is diffused across much of the Great Plains, providing a readily accessible water supply to those who own or farm land above it—easily arable land, and land blessed with high-quality soils. It provides a large and stable water supply directly beneath rich farm ground; such friendly

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[94] DOUGLAS L. GRANT AND GREGORY S. WEBER, CASES AND MATERIALS ON WATER LAW 3 n.3 (8th ed. 2010).

[95] THOMAS C. WINTER, JUDSON W. HARVEY, O. LEHN FRANKE, & WILLIAM M. ALLEY, GROUNDWATER AND SURFACE WATER: A SINGLE RESOURCE 2–5 (U.S. Geological Survey ed., 1998).

[96] Wyoming v. Colorado, 259 U.S. 419, 456 (1922) (describing the transbasin diversion of flows from the Laramie River-North Platte River system in Wyoming to the Cache la Poudre-South Platte River system in Colorado).

[97] *See supra* note 25 and accompanying text.

[98] Rex C. Buchanan, B. Brownie Wilson, Robert R. Buddemeier, & James J. Butler, Jr., *The High Plains Aquifer,* 18 KANSAS GEOLOGICAL SURVEY, PUBLIC INFORMATION CIRCULAR 1, 1–2 (Jan. 2015).

conditions, so dramatically different than those farther west, would not have produced the prior appropriation doctrine.[99]

Water law across the Great Plains thus developed in fits and starts to accommodate the exceptional conditions of the Ogallala, and to exploit its bountiful water supply.[100] Aside from the South Platte and Arkansas rivers, there was little irrigation development across the lands of the southern Great Plains between the territorial period and the Dust Bowl era.[101] The High Plains river systems could not really support extensive irrigation projects; this was almost exclusively dryland farm country, "next year" country.[102] As groundwater irrigation became more prominent in the 1930s and 1940s, it began to expose doctrinal and jurisdictional problems across the Ogallala. In the "pure" prior appropriation regime of Colorado, the 1943 adjudication statute did not address groundwater, and the Colorado Supreme Court issued a series of decisions between 1951 and 1963 which produced significant confusion about both doctrine and jurisdiction, while attempting to distinguish alluvial groundwater supplies from those of the Ogallala and other non-tributary sources.[103]

Similar problems arose in the water law regimes of Kansas and Nebraska, whose water resources development began in the wet and humid east before moving westward into the dry High Plains. Eastern Kansas originally followed the riparian doctrine, in accordance with its adoption of the English Common Law at statehood, but adopted the prior appropriation doctrine for western Kansas as early as 1866, by statute in 1876, and reaffirming that statute with a notice-posting

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[99] *See, e.g.*, ERASMUS HAWORTH, UNDERGROUND WATERS OF SOUTHWESTERN KANSAS 46–47 (U.S. Dep't of the Interior, U.S. Geological Survey eds., 1897).

[100] This and the following two paragraphs largely rely upon a more detailed commentary in Burke W. Griggs, *Beyond Drought: Water Rights in the Age of Permanent Depletion*, 62 KAN. L. REV. 1263, 1275–96 (2014).

[101] For the Arkansas River, see JAMES EARL SHEROW, WATERING THE VALLEY: DEVELOPMENT ALONG THE HIGH PLAINS ARKANSAS RIVER, 1870–1950 (1991). The Republican River Basin, which occupies a large part of the area between the South Platte River and the Arkansas River basins, had very little surface irrigation, although it did contain some legally important diversion works. *See, e.g.*, Weiland v. Pioneer Irrigation Co., 259 U.S. 498 (1922).

[102] DONALD WORSTER, DUST BOWL: THE SOUTHERN PLAINS IN THE 1930s, at 26 (1979); CRAIG MINER, NEXT YEAR COUNTRY: DUST TO DUST IN WESTERN KANSAS, 1890–1940 (2006).

[103] COLO. REV. STAT. §§ 148-9-1 to -27 (1963) (repealed); Safranek v. Town of Limon, 228 P.2d 975, 977 (Colo. 1951) (all groundwater presumed to be tributary and subject to the prior appropriation doctrine); Whitten v. Coit, 385 P.2d 131, 139 (Colo. 1963) (Colorado Ground Water Law of 1957 did not confer authority upon the state engineer to adjudicate and administer rights to non-tributary groundwater); City of Colorado Springs v. Bender, 366 P.2d 552, 555 (Colo. 1961) (asserting judicial responsibility over tributary groundwater). *See* Justice Gregory J. Hobbs, *Colorado Water Law: An Historical Overview*, 1 U. DENV. WATER L. REV. 1, 20–22 (1997); *see also* Justice Gregory J. Hobbs, *Colorado's 1969 Adjudication and Administration Act: Settling In*, 3 U. DENV. WATER L. REV. 1, 12–14 (1999).

statute in 1886.[104] For the next six decades, Kansas water law was a compound of eastern riparian and western prior appropriation doctrines; by the 1940's, it had become an increasingly unstable one, especially regarding groundwater.[105] Kansas comprehensively rewrote its water code to address these problems in 1945.[106] The 1945 Kansas Water Appropriation Act repudiated riparianism, and extended the prior appropriation doctrine to the entire state and to all of its waters, including groundwater; it granted to the Chief Engineer of the Division of Water Resources (DWR) jurisdiction over all of the waters of Kansas, and established mechanisms for recognizing water rights established before 1945.[107] Kansas did succeed in adjudicating approximately 5,000 of these pre-1945, "vested" rights.[108]

Nebraska water law also developed as a legal hybrid, but unlike Kansas, it has remained one. Nebraska embraced the prior appropriation doctrine for surface waters in 1889, and constitutionalized the doctrine in 1920; but it has never extended that doctrine to groundwater, which remains governed by the doctrine of correlative rights.[109] Jurisdictionally, Nebraska has maintained a similar divide between surface water and groundwater: the state Department of Natural Resources (DNR) regulates the former (under the prior appropriation doctrine) while local Natural Resources Districts (NRDs) regulate the latter (under the correlative rights doctrine.)[110] And while Nebraska did conduct adjudications during the early twentieth century, the existing statutory adjudication process appears to be limited to forfeiture proceedings, and does not contain a method for converting riparian uses into appropriative rights.[111]

B. The Causes of a Potential Aquifer Adjudication

For all of this legal and doctrinal variety, the original cause of the earlier generations of adjudications farther west—that of over-appropriation—

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[104] 1876 Kan. Sess. Laws ch. 58; Clark v. Allaman, 80 P. 571, 572 (Kan. 1905).

[105] State *ex rel.* Peterson Co. v. Board of Agric., 149 P.2d 604, 607–09 (Kan. 1944) (declaring Kansas water law ineffectual regarding groundwater).

[106] *See* KNAPP ET AL., *supra* note 21, *passim*; the committee's draft legislation was almost entirely adopted in the Kansas Water Appropriation Act, 1945 Kan. Sess. Laws ch. 390, § 1 *et seq.,* codified at KAN. STAT. ANN. § 82a-701 *et seq.* (2015).

[107] KAN. STAT. ANN. §§ 82a-702, -706, -716 (2015) (authorizing and setting forth the duties of the Chief Engineer); *Id.* §§ 82a-704a to -704b (providing procedures for determining vested rights).

[108] John C. Peck, *The Kansas Water Appropriation Act: A Fifty-Year Perspective*, 43 KAN. L. REV. 735, 744 (1995). Vested rights remain fraught with potential complications.

[109] 1889 Neb. Sess. Laws 503–04; NEB. CONST. art. XV, § 6 (1920); Osterman v. Cent. Neb. Pub. Power & Irrigation Dist., 268 N.W. 334 (Neb. 1936).

[110] *In re* Metro. Util. Dist. of Omaha, 140 N.W.2d 626, 637 (Neb. 1966); Spear T Ranch v. Knaub, 691 N.W.2d 116 (Neb. 2005).

[111] Thorson et al., 2006, *supra* note 3, at 416–17.

remained, and intensified during the 1960s, ecumenical in its sweep across the Ogallala states. Yet the original over-appropriation of the Ogallala is peculiar and difficult: it is an over-appropriation not in quantity, but in time. Where the over-appropriation endemic to a typical western stream system is a problem in which the authorized quantities of all of the water rights exceed the annual and durable quantity of that stream system, the original over-appropriation of the Ogallala is a problem in which the authorized quantities of all of the groundwater rights then in existence did not, for a time, exceed what the aquifer could provide. At the time those rights were granted, the supply was there, large enough to avoid impairing prior rights; consequently, the law typically required new groundwater rights to be issued, so that water could be put to beneficial use pursuant to the prior appropriation doctrine.[112] Problems that might ensue according to the other half of that doctrine—priority—could be put off for a later time.

That procrastination was intentional and economically rational in the short term, but it produced the second cause of a potential aquifer adjudication: a much higher level of over-appropriation, which resulted from softening the dictates of priority. As the groundwater revolution spread across the Great Plains during the 1950s and 1960s, state legislatures amended their water codes to enable the development of the Ogallala's water supplies, largely by removing legal obstacles that might have frustrated such development.

Kansas led the way, amending its Water Appropriation Act in 1957 by effectively placing the principle of beneficial use above that of priority. It did so by redefining what the Chief Engineer must consider in evaluating whether an application for a new water right might impair a senior right. The original act defined impairment in absolute hydrologic terms, including declines in groundwater levels caused by junior rights.[113] Yet within this context of reviewing new applications for water rights, the 1957 amendments redefined impairment in economic terms, as impairment "beyond a reasonable economic limit." This change thus required the Chief Engineer to approve an application for a junior right, even if that right would interfere hydrologically with senior rights, as long as that interference was not economically unreasonable.[114] This redefinition, combined with the as-yet under-tapped bounties of the aquifer and DWR's lack of concern over long-term water supply availability, produced a level of over-

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[112] *See, e.g.*, KAN. STAT. ANN. § 82a-711 (2015) (1945 Kan. Sess. Laws ch. 390, § 11).

[113] *Id.*

[114] *Id.* § 82a-711(c) (1957 Kan. Sess. Laws ch. 539, § 16). If the applicant makes such a showing, the Chief Engineer is required to approve the application. *Id.* § 82a-711(a). It should be noted, however, that other statutes concerning impairment do not define it in economic terms. *Id.* § 82a-708b(a)(2) (changes in water rights must not impair existing rights); *Id.* § 82a-717a (junior rights cannot impair senior rights). The Kansas Court of Appeals has recently made this distinction clear. *See infra* note 149 and accompanying text.

appropriation across the Kansas portions of the Ogallala that would not have otherwise occurred.[115]

Other Ogallala states made similar compromises. Colorado, which endured substantial litigation in the 1950s and 1960s concerning the protection of rights to the Ogallala,[116] legislatively removed the waters of the Ogallala from the other waters of the state, and placed these waters in the newly created category of "designated groundwater."[117] Like Kansas groundwater rights, designated groundwater wells in Colorado were not entitled to the maintenance of historical water levels; but unlike them, designated groundwater permits did not obtain the status of water rights.[118] Oklahoma repealed the 1949 Oklahoma Ground Water Law and its priority system in 1973, replacing it with a permitting system in which permits were granted according to the proportionate share of the overlying land.[119] Nebraska never embraced the prior appropriation doctrine for groundwater, so it has never needed to commit such compromises.[120]

These two causes—over-appropriation in time, and much greater over-appropriation as a matter of short-term policy—were self-inflicted. In this regard, the states of the Ogallala have much in common with states farther west.

The Ogallala states do not, however, face the challenges of federal reserved water rights, whose coming of age during the 1960s and 1970s compelled so many general stream adjudications. As a general rule, the Ogallala lies beneath very little federal and tribal land, and so is subject to far fewer federal reserved water rights claims. Nearly sixty-two percent of Idaho is federal land, and tribes hold over 642,000 acres of land there; for Wyoming, the numbers are forty-eight percent and over 1.9 million acres respectively. [121] By contrast, less than one percent of Kansas is federal land—the lowest level in the nation—and its four tribes hold a total of 7,200 acres. Nebraska's numbers are similar, at 1.1 percent and 23,800

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[115] *See* Griggs, *supra* note 100, at 1284–86.

[116] *See supra* note 103 and accompanying text.

[117] 1965 Ground Water Management Act, COLO. REV. STAT. §§ 37-90-103(6)(a) (2015).

[118] COLO. REV. STAT. § 37-90-102(1) (2015); *Id.* §§ 37-90-107, -108. The Kansas legislature redefined water rights in 1957 as real property rights—even as it redefined them to guarantee their impermanence. 1957 Kan. Sess. Laws ch. 539, § 1 (current version at KAN. STAT. ANN. § 82a-701(g) (Supp. 2014)). For a discussion, see Griggs, *supra* note 100, at 1284–86, 1310–19.

[119] WELLS A. HUTCHINS, WATER RIGHTS IN THE NINETEEN WESTERN STATES, III, at 436–39 (2004).

[120] *See supra* notes 109–10 and accompanying text. Like other Ogallala states, Nebraska did enact legislation in the 1960s and 1970s conveying regulatory authority over groundwater to local districts. NEB. REV. STAT. §§ 2-3201 *et seq.* (1970).

[121] ROSS W. GORTE, CAROL HARDY VINCENT, LAURA A. HANSON, & MARC R. ROSEBLUM, FEDERAL LAND OWNERSHIP: OVERVIEW AND DATA 3–7 (Congressional Research Service, Feb. 8, 2012); National Research Council of Maine, *Public Land Ownership by State*, http://www.nrcm.org/documents/publiclandownership.pdf (last visited July 9, 2015).

acres respectively.[122] And what federal land does exist across the expanses of the Great Plains are national grasslands managed by the United States Forest Service, lands whose purposes would require little or no reserved water rights. These are, for the most part, the lands most devastated by the Dust Bowl.[123] Had the Arapaho, the Cheyenne, and especially the Comanche Tribes been forced onto reservations corresponding with their historic territories, these states would likely be facing massive tribal water rights settlements over Ogallala supplies.[124]

Similarly, the public trust doctrine, public interest concerns, and environmental law, which together disrupted a century of relatively settled western water law and reduced the amount of water available for diversion across the West, have had comparatively little effect upon groundwater management across the states of the Ogallala. With one prominent exception, the public trust doctrine has obtained almost no judicial traction across the Great Plains.[125] Nor has the public interest standard for evaluating groundwater rights and permits constrained groundwater over-development, since the states' understanding of the public interest supported granting such rights in the first place.[126] As for the ESA,

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[122] *Public Land*, *supra* note 121.

[123] WORSTER, *supra* note 102, at 30.

[124] For example, the traditional range of the Comanche in southwestern Kansas overlies most of what is today Southwest Kansas Groundwater Management District No. 3, the largest such district in the state, as well as the eastern plains of southern Colorado, eastern New Mexico, and the Oklahoma and Texas panhandles. PEKKA HAMALAINEN, THE COMANCHE EMPIRE 176 (2008) (map by Bill Nelson showing the extent of the Comancheria Empire on the eve of the Mexican War).

[125] United Plainsmen Ass'n v. North Dakota State Water Conservation Comm., 247 N.W.2d 457 (N.D. 1976). The Supreme Court of Kansas refused to apply the doctrine in a case involving public stream access for recreational purposes, and expressly distinguished that situation from one involving water rights, whether for consumptive or non-consumptive recreational use. State *ex rel.* Meek v. Hays, 785 P.2d 1356, 1363–65 (Kan. 1990). In *United States v. Burlington N. R.R. Co.*, 710 F. Supp. 1286, 1287 (D. Neb. 1989) the federal district court for the State of Nebraska denied a motion for summary judgment partially by recognizing that the United States, "like the States in their *parens patriae* capacities," could pursue an action to recover for damages to wildlife on federal land in Nebraska. In *Sierra Club v. Block*, 622 F. Supp. 842, 865–66 (D. Colo. 1985), the federal district court for the State of Colorado refused to extend the doctrine to impose duties in addition to those set forth in the Wilderness Act (16 U.S.C. §§ 1131 *et seq.*) to assert and to claim reserved water rights for wilderness areas in Colorado. In *People v. Emmert*, 597 P.2d 1025, 1027 (Colo. 1979) the Colorado Supreme Court refused to impose a public trust theory to resolve the issue of public stream access. In *In Re Title, Ballot, Title, Submission Clause for 2011-2012 No. 3*, 274 P.3d 562 (Colo. 2012) the Colorado Supreme Court allowed a ballot initiative that would adopt the public trust doctrine for Colorado water law to go forward; the initiative later failed. However, Justice Hobbs set forth a comprehensive dissent: dropping this "nuclear bomb on Colorado water rights" violated the single subject requirement under the Colorado Constitution (COLO. CONST. art. 5, § 1(5.5)) because the ballot initiative combined more than one subject—namely, the different evolution of public water ownership and that of public submerged-land ownership regimes in Colorado. *Id.* at 570–76.

[126] *See, e.g.*, KANSAS WATER RESOURCES BOARD, REPORT ON THE LAWS OF KANSAS PERTAINING TO THE BENEFICIAL USE OF WATER 91 (1956).

it has figured prominently in the interstate management of the Platte River Basin, especially in regulating surface diversions; but it has not played much of a role in reducing groundwater pumping more closely connected to such streamflows.[127] Sadly, many of the groundwater-dependent ecosystems of the Great Plains had lost their critical flows before the ESA was in place to protect aquatic habitat.[128] (Because streamflows continue to diminish, however, the ESA promises to remain an important regulatory consequence.) Minimum streamflow requirements based on state law can force the administration of junior groundwater rights during low flow periods, but they typically lack the seniority to reduce depletions caused by senior groundwater rights.[129]

C. Goals of a Potential Ogallala Adjudication

Like its general stream adjudication counterpart, a general stream/aquifer adjudication over the Ogallala would need to resolve the problems which made the proceeding necessary in the first place. There is good news and bad news in this regard.

The good news is twofold. Large reserved water rights claims, whether by tribes or the federal government, do not present the southern Great Plains states with anything remotely like those facing the Rocky Mountain states, whose large tribal claims properly dominate the general stream adjudication process. The same is generally true for environmental claims on the water supply, whether imposed by federal environmental law, or by instream flow rights and requirements.

The bad news concerns the problems of over-appropriation and permanent depletion in a predominantly groundwater context. There is the problem of over-appropriation in time, a serious, but legally innocent problem. There is also the quantitatively greater, and far less innocent, problem of over-appropriation as a matter of policy: by favoring present beneficial use over the long-term security of a water right, this policy substantially weakened the priority system in practice, and produced massive and permanent groundwater depletions. An adjudication of predominantly Ogallala water supplies can correct the distortions in Ogallala water rights that have resulted from that depletion, and it can define those rights accurately; but to do either, it must confront depletion in the first place.

Like a general stream adjudication, a general stream/aquifer adjudication can establish the proper boundaries between sovereigns at the interstate level,

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[127] *See supra* note 58 and accompanying text.

[128] *See supra* note 16 and accompanying text. For groundwater-dependent ecosystems, see Barton H. Thompson, Jr., *Beyond Connections: Pursuing Multidimensional Conjunctive Management,* 47 IDAHO L. REV. 273 (2011).

[129] *See, e.g.*, KAN. STAT. ANN. §§ 82a-703a, -703b, -703c (2015) (establishing minimum desirable streamflows, but with a priority of 1984 or later).

and can resolve competing jurisdictional claims to a common water supply at the intrastate level. In order to accomplish such ends, however, the adjudication must confront how these boundaries and claims have shifted in the wake of the groundwater revolution. The first round of interstate litigation over groundwater presented relatively clean and clear boundaries: lower basin states, harmed by depletions to their water supplies allegedly (if rather obviously) caused by upper basin states' excessive groundwater pumping, sued the upper basin states for violating interstate river compacts.[130] The plaintiff states brought their suits on behalf of all of their citizens and water users, regardless of whether they hold water rights or not, and regardless of the source of water upon which those rights depended.[131] That is because states are sovereigns, and not merely agents or trustees of those who own water rights.[132] The fundamental issue in these disputes was the relationship of groundwater and groundwater conditions to such compacts; and the most important judicial and adjudicative task in these cases lay in determining the extent of that relationship, by integrating groundwater within the total water supply allocated by the river compact at issue.[133]

Yet beneath these deceptively clear legal and political interstate boundaries is an increasingly important, complicated, and troublesome hydrological boundary: that between surface water and groundwater, and the irrigators who depend upon these different (and sometimes hydrologically connected) supplies.[134] For

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[130] Texas v. New Mexico, 462 U.S. 554 (1983) (interstate litigation concerning excessive groundwater pumping in New Mexico's portion of the Pecos River Basin, in violation of the Pecos River Compact); Kansas v. Colorado, 514 U.S. 673 (1995) (interstate litigation concerning excessive groundwater pumping in Colorado's portion of the Arkansas River Basin, in violation of the Arkansas River Compact); Kansas v. Nebraska, 525 U.S. 1101 (1999) (interstate litigation concerning excessive groundwater pumping in Nebraska's portion of the Republican River Basin, in violation of the Republican River Compact). For an excellent and entertaining history of the first case, see G. EMLEN HALL, HIGH AND DRY: THE TEXAS-NEW MEXICO STRUGGLE FOR THE PECOS RIVER (2002).

[131] *See, e.g.*, Wyoming v. Colorado, 286 U.S. 494, 509 (1932) (private owners of water rights are represented by their state under the *parens patriae* doctrine and they are bound by any decree that results).

[132] Kansas v. Colorado, 533 U.S. 1, 7–8 (2001) (citing New Hampshire v. Louisiana, 108 U.S. 76 (1883); North Dakota v. Minnesota, 263 U.S. 365 (1923)).

[133] *See, e.g.*, Kansas v. Colorado, No. 126 Orig., FIRST REPORT OF THE SPECIAL MASTER (SUBJECT: NEBRASKA'S MOTION TO DISMISS), (Jan. 28, 2000). In the wake of the Special Master's finding that the Republican River Compact required accounting for depletions caused by groundwater pumping, the parties negotiated a settlement agreement and adopted a groundwater model that formally incorporates groundwater into the Compact accounting. Kansas v. Colorado, No. 126 Orig., FINAL SETTLEMENT STIPULATION (Dec. 15, 2002), approved by Decree of May 19, 2003, 538 U.S. 720 (2003).

[134] This paragraph relies upon Griggs, *Irrigation Communities, Political Cultures, and the Public in the Age of Depletion*, *in* BRIDGING THE DISTANCE: COMMON ISSUES IN THE RURAL WEST 141–90 (David B. Danbom ed., 2015).

example, Nebraska has chosen to comply with the Republican River Compact by administering senior surface water rights, while allowing pumping from junior groundwater wells to continue.[135] From a political standpoint, this is a rational policy choice in Nebraska, where groundwater pumping dwarfs surface water diversions.[136] It may even be a legal choice, given the doctrinal and jurisdictional boundaries between surface water and groundwater that have long existed within Nebraska.[137] As a consequence of this policy choice, however, conflicts have emerged between surface water and groundwater irrigation interests within Nebraska, largely because the former shoulder a much greater (and, almost certainly, an inequitably large) burden for complying with the compact.[138] So far, surface water irrigation interests have not obtained legal relief from this state policy.[139] Indeed, the intrastate conflict between some surface water and groundwater interests in Nebraska has become so intractable that the former testified in support of Kansas in its recent lawsuit to enforce the compact. They did so because they realized that they would benefit under the Kansas remedy—retiring 312,000 acres of land from groundwater irrigation—whereas they suffered under Nebraska's compliance approach of administering surface rights.[140] This, too, is a rational policy choice. But the fact that the respective rational policy choices of the State and its senior most water rights holders are opposed

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[135] These actions are taken pursuant to Integrated Management Plans, or IMPs. NEB. REV. STAT. §§ 46-714 to -718 (2014); *see, e.g.*, INTEGRATED MANAGEMENT PLAN FOR THE UPPER REPUBLICAN NATURAL RESOURCES DISTRICT (Nov. 1, 2010), *available at* http://dnr.ne.gov/IWM/NRD/UpperRep/URNRD_IMP_0910.pdf; State of Nebraska, Department of Natural Resources, *In the Matter of Water Administration of the Republican River Basin, Order [placing] Compact Call Year in Effect* (Jan. 1, 2014), *available at* http://www.dnr.nebraska.gov/iwm/order-for-republican-river-compact-call-year (administering all surface water rights in the Republican River Basin).

[136] As of 1990, groundwater pumping irrigated fourteen times more land than surface water irrigation in Nebraska. Vincent H. Dreeszen, *Water Availability and Use*, *in* ROBERT D. KUZELKA ET AL., FLAT WATER: A HISTORY OF NEBRASKA AND ITS WATER 84 (1993).

[137] *See supra* notes 109–10 and accompanying text.

[138] The Nebraska Ground Water Management Act requires equitable treatment for surface and groundwater users when Nebraska administers water rights and well permits for the purpose of compact compliance. NEB. REV. STAT. § 46-703(2) (2014). The Nebraska Supreme Court has similarly held that a balancing of equities is an appropriate rule for adjudicating a conflict between a surface water user and a pumper of hydrologically connected groundwater. Spear T Ranch v. Knaub, 691 N.W.2d 116 (Neb. 2005). The Department of the Interior has become officially concerned about Nebraska's approach to compact compliance. Letter from Anne J. Castle, Assistant Secretary for Water and Science, United States Department of Interior, to Brian P. Dunnigan, Director, Nebraska Department of Natural Resources (Sept. 30, 2014) (on file with author).

[139] Frenchman Cambridge Irrigation Dist. v. Nebraska Dept. of Natural Resources, 801 N.W.2d 253 (Neb. 2011).

[140] *Kansas v. Nebraska & Colorado,* No. 126 Orig., Pre-Filed Testimony of Kansas Witness Brad Edgerton (Manager, Frenchman-Cambridge Irrigation District) at 5–22 (July 26, 2012); *Id.,* Pre-Filed Testimony of Kansas Witness Marvin Swanda (Bureau of Reclamation); *Id.,* Pre-Filed Testimony of Kansas Witness Aaron Thompson (Area Manager, Bureau of Reclamation) (July 19, 2012), (all on file with author).

to each other suggests that in some cases at least, hydrological boundaries—and the refusal to coordinate water rights administration across them—have become more determinative than political ones.

D. Consequences of a Potential Ogallala Adjudication

Given these distinctive problems—the hydrological problem of permanent groundwater depletion and the various boundary problems between surface water and groundwater—Great Plains water rights systems appear to have a pressing need for what an adjudication could achieve. The situation is arguably worse there. In many areas above the Ogallala, a hydrological balance between the local water supply and its attendant water rights can be achieved within the prior appropriation system, because there is sufficient groundwater baseflow to sustain those rights, albeit at a reduced level.[141] Yet across those areas where the Ogallala is the sole or predominant source of supply, such a balance will be very difficult to achieve, given the magnitude and the extent of its over-appropriation.[142] In Kansas, the Chief Engineer, whose position claims jurisdiction over all groundwater rights, could administer all junior rights; that appears to be his statutory duty.[143] In Nebraska, the Director of DNR, whose position is generally impotent to regulate groundwater pumping, could ask that the Governor call a committee to do so.[144] These are legally available but unlikely remedies, because they are unpractical and even impracticable from an administrative standpoint, and unpopular and even suicidal from a political one. As if out of respect for the formidability of these obstacles, states have developed administrative procedures that make it more burdensome to reduce groundwater pumping in an Ogallala situation than in an alluvial one.[145]

This distinction between groundwater systems which can be restored to hydrological balance through administration, and those which practically

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[141] For the best example from Kansas, see IN THE MATTER OF THE DESIGNATION OF AN INTENSIVE GROUNDWATER USE CONTROL AREA IN BARTON, RUSH, AND NESS COUNTIES, KANSAS (Jan. 29, 1992), *available at* http://www.ksda.ks.gov/docs/default-source/igucas/wc1992.pdf?sfvrsn=2 (Order of the Chief Engineer, Kansas Division of Water Resources, allocating water in the Walnut Creek Intensive Groundwater Use Area according to a cutoff priority date of Oct. 1, 1965); KAN. STAT. ANN. § 82a-1038(b)(2) (2015) (requiring the Chief Engineer, Division of Water Resources, to follow priority dates of water rights "insofar as may be reasonably done").

[142] A prominent 1973 report estimated that pumping exceeded recharge nationally by a factor of forty-six. NATIONAL WATER COMMISSION, WATER POLICIES FOR THE FUTURE 230 (1973). Across much of western Kansas, the core irrigation regions above the Ogallala are pumping three to four times more than the estimated long-term recharge value. J.A. Schloss, B.B. Wilson, and R.W. Buddenmeier, *Changes in Use Necessary for Sustainability* (Kansas Geological Survey, 2000), http://www.kgs.ku.edu/HighPlains/atlas/atsust.htm (last visited July 9, 2015).

[143] KAN. STAT. ANN. § 82a-706 (2015).

[144] NEB. REV. STAT. § 46-719 (2014).

[145] *See, e.g.*, KAN. ADMIN. REGS. § 5-4-1(a) (2010); NEB. REV. STAT. § 46-719 (2014).

cannot, is an important distinction, because it bears on the practical reality of the property interest in groundwater itself. In a system which can be balanced, an adjudication or other regulatory action would impose reductions in the authorized quantities of all but the senior-most rights. In exchange, however, the rights so reduced in quantity would receive, at least theoretically, some compensation in quality, becoming more durable, enforceable, and marketable.[146] In a groundwater system that is too far out of balance, however, this exchange of quantity for quality will not be generally available. The holders of junior rights in a non-renewable groundwater system have almost nothing to gain by such an adjudication. Because the hydrology and over-appropriation of such a system together create a situation where juniors greatly outnumber seniors, it should come as little surprise that the Ogallala states have not produced any adjudications since the groundwater revolution.

In the shadows of this inaction, various specters haunt these water rights. There is the practical lack of legal repose in the status of these rights across the different legal regimes of the Great Plains states, despite what those regimes have achieved elsewhere regarding groundwater management.[147] There is the threat of takings, which is always a politically powerful threat, regardless of its legal validity.[148] There are excessively complicated and procedurally painful administrative procedures, which seek to square the circle of achieving effective priority administration in a situation beset by basin-wide groundwater level declines.[149] And instead of markets in water rights, there is something like an under-market, where the thing marketed is not a water right, but rather the consent not to use or not to protect one.[150]

Reflecting upon the prospect of an Ogallala adjudication raises thorny issues about the property rights so adjudicated. To appreciate these problems, it helps to recall that water rights are shaped by at least three different forces. First, constitutional provisions, statutes, and the common law together establish the legal definition to the right, and set forth the legal boundaries of its exercise.

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[146] *See supra* note 85 and accompanying text.

[147] For Kansas, see Peck, *supra* note 72.

[148] John C. Peck, *Property Rights in Groundwater—Some Lessons from the Kansas Experience,* 12 KAN. J.L. & PUB. POL'Y 493, 501–05, 509 (2003); Dave Owen, *Taking Groundwater,* 91 WASH. U. L. REV. 253, 253 (2013); Joseph Sax, *The Constitution, Property Rights and the Future of Water Law,* 61 U. COLO. L. REV. 257, 260 n.5 (1990) (citing a letter from Professor MacDonnell which described the commonly held belief in the heightened property rights status of water rights).

[149] *See, e.g.*, KAN. ADMIN. REGS. § 5-4-1a (2015). A senior right holder frustrated with this procedure abandoned it, filed a civil suit against an impairing junior right, and has so far obtained an injunction against the defendant's pumping. *See* Garetson Brothers v. American Warrior, Inc. (Haskell Co., Kansas), (No. 12-CV-9) (2012). The district court's injunction was recently upheld on appeal. *See* Garetson Brothers v. American Warrior, Inc., 347 P.3d 687 (Kan. Ct. App. 2015).

[150] *See* Griggs, *supra* note 100, at 1298–1304.

Second, the state water agency and state courts regulate the right, especially during times of shortage or enhanced water management, according to conditions which the state places upon it. These are conditions which determine what the state can do to the right; they are distinct from what the holder can do with the right, according to its legal definition and its attributes, such as authorized quantity, rate of diversion, place of use, and type of use. Water rights in a prior appropriation legal regime thus combine the elements of exclusion and governance.[151] Yet across the Ogallala especially, the holder of the right shapes it through a third force, that of practice, which is not necessarily coincidental or harmonious with the right's legal definitions or its regulatory obligations, or with its positive and negative liberties. To address these often cross-buffeting forces, state water codes typically contain a few clear rules—priority, beneficial use, abandonment—that are immersed in murky statutory and regulatory exceptions, exceptions often produced by special-interest legislation or regulation.[152] Largely because of the political and administrative benefits of murkiness, an Ogallala adjudication has not been seriously considered, much less done; the clarity which an adjudication can provide is not something which most groundwater right holders find to be desirable. In certain practical respects, the real condition of water rights across the Ogallala may be as confused, misleading, and unsettled today as it was before the development of modern water law codes seventy years ago.[153]

Instead, states across the Great Plains have devised various alternatives to adjudications, employing management actions that do not threaten to permanently reduce or modify the specific legal attributes of water rights. At the precatory level, there are state water plans, which describe the supply gaps caused by increased demand and declining supply, but which avoid legislative recommendations to close them.[154] Basic management actions can include: identifying certain groundwater areas and basins to be managed in a more rigorous and restrictive manner; imposing allocation limits (in states which follow the correlative rights doctrine for groundwater) and metering and reporting requirements; and establishing limits to protect existing rights from impairment by new rights, such as well-spacing limits, depletion formulae, and closing areas to new wells.[155]

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[151] Henry E. Smith, *Governing Water: The Semicommons of Fluid Property Rights*, 50 ARIZ. L. REV. 445, 458 (2008).

[152] The classic articulation of this problem is by Carol A. Rose, *Crystals and Mud in Property Law*, 40 STAN. L. REV. 577 (1988).

[153] *See* Griggs, *supra* note 100, at 1304–08.

[154] COLORADO WATER CONSERVATION BOARD, COLORADO'S WATER PLAN 3–5, 343 (draft of Dec. 10, 2014), *available at* www.coloradowaterplan.com; KANSAS WATER OFFICE, KANSAS WATER PLAN 2014, *available at* http://www.kwo.org/Kansas_Water_Plan/KansasWaterPlan2014.html; KANSAS WATER OFFICE, VISION FOR THE FUTURE OF WATER SUPPLY IN KANSAS 25–32 (Draft II, Nov. 2014), *available at* www.kwo.org.

[155] The rules and regulations, as well as the management plans, of Kansas groundwater management districts and Nebraska natural resources districts reflect this managerial approach.

However laudatory their intent, many of these management actions have served principally to protect the groundwater pumping of existing water rights holders from interference by new users, rather than reducing overall water usage; as a consequence, they have done little to stem the aquifer's depletion.[156] They have not reconciled the doctrine of prior appropriation with the reality of depletion. More aggressive management actions, including voluntary ones, can impose reductions on permissible groundwater withdrawals, but it is unsettled whether and how these reductions permanently change the water rights themselves.[157] That lack of clarity seems especially problematic under Kansas law, which provides explicit definitions and specific attributes for groundwater rights under the prior appropriation system.[158] (Water codes elsewhere in the West require reductions in total groundwater water use in a particular groundwater basin or area, but these statutory regimes have carefully and explicitly avoided defining or redefining the legal contours of the property right in water, largely because of the political obstacles to such a definition, or because of the legal peculiarities of groundwater rights in those states.)[159] In any event, the most powerful management action tool available in Kansas, the Intensive Groundwater Use Control Area (IGUCA), has been used to restore sustainable systems, but it has yet to be deployed anywhere across the Ogallala.[160] A promising innovation in Kansas law, the Local Enhanced Management Area (LEMA), provides for voluntary but legally binding reductions in groundwater pumping; but it has yet to spread beyond one temporary program in northwest Kansas.[161]

IV. ENVISIONING AN OGALLALA STREAM/AQUIFER ADJUDICATION

Let us recapitulate the principal problems at hand, preferably with a strong drink. First, there is the legal problem. Where the dominant source of water is

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See, e.g., KAN. ADMIN. REGS. §§ 5-24-1 *et seq.* (2015), *available at* www.gmd4.org (for Northwest Kansas Groundwater Management District No. 4 (Dec. 8, 2006), Northwest Kansas Groundwater Management District No. 4, Revised Management Program (2012)); INTEGRATED MANAGEMENT PLAN FOR THE UPPER REPUBLICAN, *supra* note 135.

[156] *See* Leland E. Rolfs, *Comparing and Contrasting the Roles of the Division of Water Resources and the Groundwater Management Districts in Groundwater Management and Regulation*, 15 KAN. J.L. & PUB. POL'Y 505 (2006); Michael K. Ramsey, *Kansas Groundwater Management Districts: A Lawyer's Perspective,* 15 KAN. J.L. & PUB. POL'Y 517, 522 (2006).

[157] KAN. STAT. ANN. §§ 82a-1038(b)(3), 82a-1041(f)(3) (2015) (enabling the Chief Engineer to impose reductions in permissible groundwater withdrawals in an Intensive Groundwater Use Control Area and a Local Enhanced Management Area respectively).

[158] *Id.* § 82a-701(g).

[159] *See, e.g.*, California Sustainable Groundwater Management Act, CAL. WATER CODE § 10720 *et seq., esp.* § 10720.5 (West 2015); Groundwater Management Act of 1980, ARIZ. REV. STAT. § 45-401 *et seq.* (2015) (Arizona).

[160] *See* John C. Peck, *Kansas Groundwater Management Districts,* U. KAN. L. REV. 51 (1980); Peck, *supra* note 148.

[161] KAN. STAT. ANN. § 82a-1041 (2014) *amended by* 2015 Kan. Sess. Laws ch. 60; *see* Griggs, *supra* note 100, at 1291–92; *see also infra* note 187.

the non-renewable supply of the Ogallala, the typical groundwater right certifies an impossible fiction: a legally permanent real property right that rests upon an impermanent and rapidly declining water supply.[162]

Next, there are the administrative and regulatory problems: across their different doctrinal and regulatory regimes, the chief water officials of Kansas and Nebraska have not protected prior rights and the water supplies upon which they depend. Faced with the facts of the aquifer's depletion, the Chief Engineer of Kansas DWR has very rarely administered junior groundwater rights to the Ogallala, and he has not initiated any IGUCAs in the Ogallala-supplied areas. The Director of Nebraska DNR has done the Kansas Chief Engineer one better, by administering *senior* surface rights to protect junior groundwater pumpers.[163] In Kansas, there is the decision not to apply or to enforce the priority doctrine. In Nebraska, the doctrine is not protecting senior rights, and is effectively operating backwards.

Fortunately, both officials enjoy that most precious resource amid a scandal—plausible deniability. The Kansas Chief Engineer can claim that he has the power, but not the explicit duty, to protect senior rights on his own initiative.[164] Conversely, the director of the Nebraska DNR can claim that he has the duty (to comply with interstate compact obligations) but lacks the power (to administer groundwater permits), and so he must impose a "first in time, last in right" water rights administration.[165] Both chief officials thus depend, paradoxically, upon impotence. Sadly, that claim is credible. In Kansas, the Chief Engineer must answer to two politically superior forces: the Secretary of Agriculture, a political appointee of the Governor, and to Kansas groundwater management districts (GMDs), which make up in political power what they lack in regulatory power.[166] For the most part, Kansas GMDs have not confronted the problem of the Ogallala's permanent depletion.[167] They have not recommended reduced groundwater pumping to extend the life of the Ogallala, and they have not petitioned the Chief Engineer to initiate an IGUCA. On the contrary, the most powerful of these GMDs, in Southwest Kansas, is advocating for a "Kansas Aqueduct," which would divert water from the Missouri River in northeast Kansas, and pump it over 300 miles and up over 3,000 vertical feet to western Kansas, to maintain

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[162] KAN. STAT. ANN. § 82a-701(g) (2015).

[163] *See supra* note 135 and accompanying text.

[164] KAN. STAT. ANN. §§ 82a-706, 82a-1036 (2015).

[165] *See supra* note 135 and accompanying text.

[166] KAN. STAT. ANN. §§ 74-606b, 82a-1901, 82a-1020 (2015). Likewise, Kansas is the only state that houses its water resources agency within a department of agriculture.

[167] A hopeful but still unique exception is Northwest Kansas GMD No. 4, which initiated the Sheridan-6 Local Enhanced Management Area. *See infra* note 187 and accompanying text.

current levels of water use at enormous and clearly infeasible expense.[168] Nebraska NRDs have achieved similar projects on a smaller scale. Rather than reducing groundwater pumping to address depleted streamflows in the Republican River Basin, NRD's have constructed "augmentation" projects. These projects pump deeper Ogallala groundwater and pipe it into various tributaries of that river, where, by the alchemical forces of Nebraska water law, it becomes surface water, deliverable to Kansas under the Republican River Compact, but unavailable to surface irrigators in Nebraska.[169] As a whole, groundwater interests across the Kansas and Nebraska portions of the Ogallala have mostly avoided reductions to their groundwater pumping, even as that avoidance has undercut the long-term viability of their irrigation enterprises.

Finally, there is a property problem. Holders of senior rights, unprotected by their own chief water officials and their local districts, have been left to their rights. In Kansas however, holders of senior groundwater rights have almost entirely avoided filing impairment claims to shut down junior rights. Between 2006 and 2008, only sixteen such claims were filed statewide—across a universe of approximately 40,000 wells—and most of these claims were brought outside Ogallala areas.[170] Nor have they petitioned the Chief Engineer to initiate proceedings for an IGUCA as is their right.[171] Having mostly avoided these regulatory options, they have also refrained from suing the junior water rights holders who are impairing their rights.[172] In Nebraska, holders of senior surface rights have joined together to sue DNR and the State, to stop the policy of shutting off their rights in favor of groundwater pumping, but they have so far been denied relief.[173] On behalf of irrigators who depend upon Bureau of Reclamation surface water rights in Nebraska, the United States has officially warned the Director of DNR; but no litigation has yet to ensue.[174]

Defective legal description, intentional regulatory inaction, and the failure to protect senior water rights: these describe all too well many of the operative water rights-related situations in Kansas and Nebraska, whose lands and irrigators

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[168] KANSAS WATER OFFICE AND THE U.S. ARMY CORPS OF ENGINEERS, UPDATE OF 1982 SIX STATE HIGH PLAINS AQUIFER STUDY ALTERNATE ROUTE B, esp. ch. 4, 4-29 (2015), *available at* http://www.kwo.org/projects_programs/Aqueduct/Rpt_Aqueduct_Study_Update_012715_kf.pdf.

[169] *See, e.g.*, *Upper Republican Natural Resources District, Nebraska Project Poised to Aid Interstate Water Compact, Protect Producers*, IRRIGATION LEADER, Mar. 1, 2011, at 16–17.

[170] Griggs, *supra* note 100, at 1299 n.212.

[171] KAN. STAT. ANN. § 82a-1036 (2015).

[172] *See supra* note 149 and accompanying text.

[173] *See* Hill v. Nebraska, (Case No. CI 14-68, Furnas County, Nebraska. 2014--), Order Sustaining Defendant's Rule 12(B)(6) Motion to Dismiss (Mar. 24, 2015); Frenchman Cambridge Irrigation Dist. v. Nebraska Dept. of Natural Resources, 801 N.W.2d 253 (Neb. 2011).

[174] *See* Letter of Anne J. Castle, *supra* note 138.

together lie above three-quarters of the water stored in the Ogallala Aquifer.[175] General stream adjudications can provoke literary references to *Bleak House,* the novel by Charles Dickens.[176] But these situations—first in time, last in right; administration by avoidance; augmentation through subtraction—evoke Lewis Carroll's *Alice's Adventures in Wonderland.*

Fixing this topsy-turvy situation requires a candid confrontation with its root causes. A regulatory and enforcement paralysis has beset the over-appropriated groundwater systems of the Great Plains. Legal and regulatory confusions pervade the region and its multiple water boundaries: the hydrological, doctrinal, and jurisdictional boundaries between surface water and groundwater; the boundaries between alluvial or tributary groundwater and fossil or non-tributary groundwater; and the increasingly tense boundaries between state authority and local control. Properly structured, a general stream/aquifer adjudication would confront this paralysis, and resolve these confusions. To that end, the remainder of this article describes, in fairly general terms, how such an admittedly idealized adjudication could do so.[177]

A. The Authorized Forum and its General Procedure

A Great Plains general stream/aquifer adjudication would begin with enabling legislation authorizing the adjudicatory process as simply and as flexibly as possible. The legislation would establish a specialized, state water rights court, part of the greater state court system. A chief water judge would preside over this court, and, if necessary, employ subordinate judges or water masters, similar to the model established in the Montana water court system.[178] Because of the near-total absence of significant federal reserved water rights claims across the Ogallala region, the potential for disputes over the proper forum should be low. State agencies and districts with regulatory or supervisory authority over water rights and water management should be necessary parties. In Kansas, they would

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[175] U.S. Geological Survey, *High Plains Aquifer Water-Level Monitoring Study Characteristics of the High Plains Aquifer*, http://ne.water.usgs.gov/ogw/hpwlms/hpchar.html (last visited July 9, 2015); McGuire, V.L., *Water-level and Storage Changes in the High Plains Aquifer, Predevelopment to 2011 and 2009–11*, at 15 (U.S. Geological Survey Scientific Investigations Report 2012–5291, 2013), http://pubs.usgs.gov/sir/2012/5291/ (last visited July 9, 2015) (quantifying Nebraska's share of the Ogallala at 68.3 percent and Kansas's at 9 percent).

[176] Thorson et al., 2006, *supra* note 3, at 302 (comparing Arizona's Little Colorado River Adjudication to Jarndyce and Jarndyce, the never-ending lawsuit in *Bleak House).*

[177] The following discussion essentially adopts by reference the recommendations contained in Thorson, et al., 2006, *supra* note 3, at 473–81 (setting up successful procedural structures to employ in general stream adjudications).

[178] MONT. CODE ANN. §§ 3-7-201, -301 (2015); MONTANA WATER RIGHT ADJUDICATION RULES 1, 1(b), 3.

be DWR, the Kansas Water Office (where applicable), and the relevant GMD.[179] In Nebraska, they would be DNR and the relevant NRD. The legislation would also require the full participation of state geological surveys and other agencies, whose pre-existing water-related data and analyses would provide a large part of the technical record to which the parties might stipulate, and, depending upon the situation, support a rebuttable presumption of validity. Ideally, federal agencies such as the United States Geological Survey, the National Resources Conservation Service, and the Bureau of Reclamation would participate and contribute in a similar fashion. The enabling legislation should also identify, in some priority order of need, the regions and groundwater basins that most require adjudication, thus relieving the state water rights court of making such a potentially politicized decision.[180] To expedite final judicial review, decisions of the court would be appealable directly to the state supreme court, as water court decisions are in Colorado and Montana.[181]

B. Quantification, Negotiation, and Regulatory Correction

Once established, the state water court would begin its work. The threshold task would be quantitative, to establish the water budget for the subject basin, which would almost always be dominated by groundwater. Measuring the demand side should be a fairly straightforward process, and that process should yield reasonably accurate numbers. First, the relevant state agency (in Kansas, DWR; in Nebraska, the relevant NRD and DNR, acting together) would sum all of the authorized quantities of all water rights and well permits in the relevant basin. That sum would provide the gross, and mostly static, figure for all of the "paper water" in the basin. Next, the same agencies would compute the gross actual water usage in the basin, based on the water use reports of the water rights holders themselves. In Kansas, the holders of all water rights except domestic rights have been required to submit annual water use reports since 1988, and the reporting rate exceeds ninety-nine percent.[182] Similar requirements exist for surface water rights in Nebraska, and metering requirements and pumping

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[179] The Kansas Water Office serves as the intermediary between federal reservoir supplies and state water users, and supervises the state water plan. KAN. STAT. ANN. §§ 74-2608 *et seq.*, 82a-1301 *et seq.* (State Water Plan Storage Act), 82a-901 *et seq.* (State Water Resource Planning Act) (2015). For GMDs, see *id.,* § 82a-1020 *et seq*.

[180] *See, e.g.*, CAL. WATER CODE § 10720.7 (West 2015).

[181] COLO. REV. STAT. § 13-4-102(1)(d) (2015); MONTANA WATER RIGHT ADJUDICATION RULE 25.

[182] KAN. STAT. ANN. § 82a-732 (2015); John C. Peck and Burke W. Griggs, *Groundwater Law and Management: The Asia (IWMI)-Kansas Program,* 41 CREIGHTON L. REV. 315, 332 (2008). DWR performs spot-checks in the field to evaluate the accuracy of water use reports and to test metering systems; while no regulatory system can eliminate the fraudulent reports and meter-tampering, strong civil penalties and water use penalties for these violations can be an effective remedy. In representing DWR, the author can testify to how scofflaw irrigators in both Kansas and Nebraska have developed impressively creative means of under-reporting their water use.

records have quantified groundwater use in some Nebraska NRD's since 1978.[183] The sum of actual water usage in the subject basin, based on the reports and meters of the holders themselves, yields the figure for all of the "wet water" in the basin—or at least a presumptive one, subject to rebuttal where such records and metering may be incorrect or even fraudulent. This "wet water" figure is an altogether more useful figure than that for "paper water"—for the former reveals the quantities actually diverted, pumped, and relied upon over the past three decades, as the aquifer has tilted into its decline phase.[184] In areas where the Ogallala Aquifer is thickest, as in much of Nebraska and in parts of Southwest Kansas, this historical record of water usage will vary mostly according to precipitation: pumping will decrease in wet years and increase in droughts. Elsewhere, where the aquifer is thin and supplies less robust, the use records will likely show a steady decline in pumping. Most of the areas that would be likely subjects of an Ogallala adjudication are either officially or effectively closed to new water rights. Moreover, the modern water codes of Nebraska and Kansas have long provided for the recognition or extinguishment of water rights claims that existed outside their respective administrative systems.[185] As a result, these sums and historical records should provide a sufficiently comprehensive quantification of current water demand in the subject basin. (Domestic water rights across the Great Plains are both small and usually exempt from permitting and reporting requirements; the legislation enabling the adjudication should thus probably exempt them from the adjudication.)

On the other hand, measuring the total water supply for an Ogallala adjudication is a less straightforward task than it first appears. In alluvial groundwater and surface water systems such as that of the Republican River or Arkansas River Basins, comprehensive pumping data and stipulated groundwater models can provide accurate and dependable quantifications of the annual, but variable, water supply, as well as the effects of groundwater pumping upon stream flows.[186] Across much of the Ogallala, however, the water supply is largely non-renewable, non-perpetual, and non-variable on an annual basis. These hydrological and temporal qualities do not correspond well with the assumptions of the typical prior appropriation right, whose authorized quantity is typically granted on an annual basis, and whose priority largely determines how much of that quantity can be used in a drought year, when supplies run short. So, while the total saturated thickness of the subject aquifer area, its total (and essentially captive) water supply, and annual changes in these totals can all be accurately

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[183] *See e.g.*, INTEGRATED MANAGEMENT PLAN FOR THE UPPER REPUBLICAN, *supra* note 135, at 2.

[184] For a graphic illustration of this difference, see the online maps from *Changes in Use Necessary for Sustainability*, *supra* note 142 (maps showing the percent reduction in authorized use needed versus percent reduction in reported use needed).

[185] NEB. REV. STAT. §§ 46-226 *et seq.* (2014); KAN. STAT. ANN. §§ 82a-704a to -704c (2015).

[186] *See supra* note 133 and accompanying text.

measured, these figures serve only as a starting point for an Ogallala-specific adjudication. They must be translated and reduced to utility, by employing assumptions about the operation of the groundwater rights: their pumping amounts (on an annual basis, based on the present or the recent past), their pumping rates, the irrigation efficiencies of their delivery works, and so on. Applied to these totals, they yield the number that water users and analysts most want to know: the estimated usable remaining life of the aquifer, based on current levels of over-appropriation. The Kansas Geological Survey has performed this type of hydrological analysis and groundwater modeling, which have served as the basis for state regulatory action, local regulation, and water planning.[187] An adjudication could similarly leverage such data, analyses, and modeling, and the enabling legislation for the adjudication should clearly enable the water court to require it as a matter of course.[188]

The task of quantifying the subject water supply and comparing it with the total water rights demand for the adjudication should not be too contentious. The difference between these two totals—over-appropriation based on current rights and usage—should be clear, and probably staggering.[189] As described above, the typical responses and established response mechanisms for closing this gap between paper water and wet water have not done so. Straight priority administration of water rights would certainly close the gap, but such a hyper-rational approach is neither likely nor realistic; conversely, avoidance of administration and enforcement mechanisms has been the customary rule, but that custom has only widened the gap further over time.[190] Once the water court has established this number, it should remain subject to revision by retained jurisdiction, as in the Colorado water court system.[191]

Having quantified and defined the over-appropriation gap, the water rights court, in tandem with the parties to the adjudication, would then have to address it. But the court should not force the issue. At this point in the process, the adjudication should provide a substantial time period for the state water agencies, groundwater districts, and water rights holders themselves to conduct negotiations to accomplish whatever accord they can in resolving the over-appropriation

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[187] KANSAS DEPARTMENT OF AGRICULTURE, DIVISION OF WATER RESOURCES, ORDER OF DESIGNATION APPROVING THE SHERIDAN 6 LOCAL ENHANCED MANAGEMENT AREA WITHIN GROUNDWATER MANAGEMENT DISTRICT NO. 4, at 12–13 (Apr. 17, 2013), *available at* http://dwr.kda.ks.gov/LEMAs/SD6/LEMA.SD6.OrderOfDesignation.20130417.pdf.

[188] In Kansas, courts resolving disputes between water rights owners can require the Chief Engineer to serve as a factfinder, and to submit a report accordingly. KAN. STAT. ANN. § 82a-725 (2015).

[189] *See supra* note 142 and accompanying text.

[190] *See* Griggs, *supra* note 100, at 1305–08.

[191] *See* Michelle Bryan, *At the End of the Day: Are the West's General Stream Adjudications Relevant to Modern Water Rights Administration?*, 15 WYO. L. REV. 461, 475 (2015).

gap. Montana's rules for settlement conferences and mediation provide a good procedural template for such an Ogallala adjudication.[192]

Substantively, two analogies for negotiation and settlement beckon. The first is that of "water bankruptcy," which Christine Klein has recently described.[193] The demands upon the hydrological system vastly exceed what the water supply can possibly provide. Both the regulators and the regulated are responsible for these water debts: the state has granted far too many rights, creating the over-appropriation gap, an overall water debt which is collectively "owned" by all of the water rights holders who have depleted the aquifer's supply in the subject basin. In both bankruptcy law and western water law, the priority doctrine establishes a clear procedure for paying debts and making sacrifices; but when that procedure has become unworkable because of lack of resources, a reallocation of assets and debts becomes imperative. Such a reallocation usually follows some middle path—in the water rights context, a compromise between senior and junior water rights—established most productively by negotiation. Such a reallocation, however, may well produce substantial litigation as a consequence, especially where the negotiations collectively compromise the priority doctrine. Just as debtors and creditors can sue to block bankruptcy settlements, both senior and junior water rights holders could do the same to a water rights settlement that reduces (and even eliminates) the hydrological debt of over-appropriation.

The second analogy is that of federal reserved water rights, a useful, if rough and negative one. As with federal reserved rights, the over-appropriation gap is the most important number in the adjudication. Like a reserved water rights award, it establishes the largest allocation of water in the adjudication— a massive and permanent number, establishing the amount of water that holders of state water law rights have been able to use in the past, but now cannot use.[194] Unlike a reserved right, however, that number does not merely represent water that is now off-limits; it represents water that is gone, an allocation to the past. Like state agencies and holders of state water rights negotiating with tribes and the United States over a federal reserved right, they can, however, find some mutually acceptable responses to the gap (which is a state law water supply shortage), by negotiation, compromise, conveyance, and contract. As with reserved water rights settlements, the most popular and politically acceptable negotiated response would be financial. The State, in partnership with the federal treasury,

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[192] MONT. CODE ANN. § 85-5-110 (2015); MONTANA WATER RIGHT ADJUDICATION RULES 16–17.

[193] Klein, *supra* note 22, at 560–624.

[194] The Big Horn Adjudication quantified the tribes' reserved right award at approximately 500,000 acre-feet per year. *In re* the General Adjudication Of All Rights To Use Water In The Big Horn River System (Big Horn I), 753 P.2d 76, 103, 106–07 (Wyo. 1988) (awarding the Tribes 209,732 acre-feet under the PIA standard and 290,490 acre-feet for lands which had been historically irrigated).

could substantially increase its retirement of irrigated land through programs such as CREP and EQIP.[195] Federal enthusiasm for such a remedy might be low, and justifiably so. For compared to a typical reserved water rights settlement, which uses federal dollars to ensure the security and to enable the exercise of a federal and tribal water right, a federal buy-out of state law water rights would serve a purpose analogous to that of the federal Troubled Asset Relief Program in securities.[196] Yet to the extent that targeted reductions in irrigated acreage could reduce the risk of listings under the ESA, or protect and restore habitat necessary for species already listed, the Ogallala states would probably serve as willing partners.[197]

In any case, the negotiation phase of a stream/aquifer adjudication will be critical. Junior rights holders and holders of crippled wells could sell out to seniors and to those with better supplies, presumably at a discount; likewise, juniors could buy out seniors, probably at some premium. Holders of water rights whose supply is least secure would eagerly seek state and federal retirement offers. Because of the potential regulatory costs and burdens of the ESA, and because of the value of threatened and endangered species themselves, those with water rights whose retirement or reduction could benefit such species and ecosystems could command higher prices from the federal government and from conservation groups. For the same reason, owners of irrigated land might be willing to retire some or all of their water rights, perhaps even at a discount, if retirement could help them avoid the consequences of an ESA listing. As advocates of water markets point out, the varieties of what can be negotiated are extensive.[198] Voluntary negotiation could potentially produce a significant reduction in total water rights demand. Given their own substantial technical and financial resources, groundwater districts could assist these negotiations. The water court would review negotiated transfers of water rights as part of the adjudication, in tandem with the state water agency.[199]

Voluntary negotiation can only go so far, especially with a largely non-renewable water supply such as a typical Ogallala sub-basin. To close the over-appropriation gap further, legislation concurrent with the adjudication should require the state water agency to propose rules which set significantly lower levels of maximum necessary irrigation for the basins that will be adjudicated. This reduced maximum could then be subject to general challenges through administrative hearings, and by particular, site-specific challenges through the adjudication process. In either case, the water agency and the water court judge would determine the general and

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[195] *See supra* note 17 and accompanying text.

[196] *See* Emergency Economic Stabilization Act of Oct. 3, 2008, Pub L. No. 110-343, 122 Stat. 3765 (codified in scattered sections of 5, 12, 31 U.S.C.). For a summary of Troubled Asset Relief Program implementation, see Erik D. Klingenberg, *Summary and Analysis of the Troubled Asset Relief Program*, 62 CONSUMER FIN. L.Q. REP. 26 (2008).

[197] *See supra* notes 127, 128 and accompanying text.

[198] *See supra* note 85 and accompanying text.

[199] *E.g.*, KAN. STAT. ANN. § 82a-708b (2015).

specific standards, subject to appeal. (Ideally, these determinations would be made early, so that water rights holders who engage in negotiation with one another will be able to account for them.) Advancements in crop science, farming practices, and irrigation technology have enabled irrigators to produce much higher yields with the same water supply; but because current levels of irrigation are obviously unsustainable and therefore hostile to the permanence of a real property water right, it seems difficult to defend those levels on reasonableness grounds. It is an uncontroversial tenet of western water law that the holder of a water right cannot obtain a protectable property interest in the unreasonable use of water. While the determination of such reasonableness is case-specific, it depends on statewide considerations, most importantly the "ever increasing need for the conservation of water . . . ."[200] Irrigators in Kansas have already demonstrated that they can exploit advancements in agriculture to produce lower but still profitable yields with significantly less water.[201] For the same reasons, concurrent legislation should require a more stringent definition of water waste. For determinations of both reasonableness and waste, the legislature as well as the water agency will need to make certain policy decisions about permissible withdrawal levels. In sub-basins whose annual recharge is very low, these decisions may contemplate the gradual exhaustion of the local aquifer supply, or they may set a hard limit on its depletion.[202] The phased-in reductions of water usage established in the 1980 Arizona Groundwater Management Act provide a useful template for addressing issues of reasonable use and waste within a depleting groundwater system.[203]

Assuming that legislation and the adjudication together achieved such redefinitions of reasonableness and waste, it is a virtual certainty that irrigators would challenge them. They would do so both facially and as applied to their particular water rights, as reductions in the authorized quantity of their water usage that constitute uncompensated takings of property. Politically, this would be a strong argument: a reduction in wet water applied to the farm strikes many as a physical taking, and legislators listen to irrigators and other stakeholders, not law professors.[204] Yet such a reduction should properly fall under the category of regulatory takings jurisprudence. A water right is a use right, and water yet unused belongs to the people of the state, subject to state regulation.[205] Consequently, if the

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[200] City of Barstow v. Mojave Water Agency, 5 P.3d 853, 864 (Cal. 2000); *accord,* KAN. STAT. ANN. § 82a-707(e) (2015) (forbidding appropriations in excess of the needs of the appropriator).

[201] The irrigators in the Sheridan-6 LEMA voluntarily agreed to reduce their water use by twenty percent over a five-year period. *See* ORDER OF DESIGNATION, *supra* note 187, at 22–23.

[202] *See infra* notes 211–16 and accompanying text.

[203] ARIZ. REV. STAT. §§ 45-563 to 45-568 (2015) (establishing five successively more stringent five-year periods of water management, including definitions of water duty, in Active Management Areas).

[204] *See* Sax, *supra* note 148.

[205] KAN. STAT. ANN. § 82a-701(g) (2015); State *ex rel.* Emery v. Knapp, 207 P.2d 440, 447 (Kan. 1949).

state were to reduce that maximum to a level still enabling productive irrigation, such a reduction, properly established and implemented, should withstand a regulatory takings challenge.[206] This seems especially true within the context of the non-renewable supplies of the Ogallala, where reductions would extend the useable lifetime of the water supply further into the future. If water becomes more valuable as it becomes scarcer, the higher value of that future water use should compensate, and even over-compensate, for reductions in present levels of use.

By the end of this quantification and reallocation stage, the water court and the parties to the adjudication will have accomplished several important things. They will have established the initial over-appropriation gap. With security afforded by affirmative legislation, they will have determined reduced, yet reasonable, maximum levels of irrigation and a more stringent definition of waste. The holders of water rights in the subject basin will have negotiated private reallocations among themselves, and they will have negotiated both partial and total retirements of their rights with third parties, whether private conservation groups or governmental agencies. All of these accomplishments will probably be challenged at the administrative and judicial levels; but if the enabling legislation for the adjudication is sufficiently strong and clear, this stage of the process should survive judicial review mostly intact.[207] On its own, this stage can significantly reduce the over-appropriation gap.

C. Boundaries and Definitions

The quantification and reallocation stage of the adjudication is a necessary stage, but it is not sufficient on its own. Even the most capable parties, experts, judges, and lawyers, the most committed negotiators, the soundest water use regulations, and the most generous buy-outs can only go so far against their common opponent in a non-renewable groundwater system: nothingness itself, in the form of permanent groundwater depletions. Unlike creditors in a bankruptcy proceeding or tribes in a reserved water rights negotiation, permanent depletion is not willing to negotiate. Despite the best efforts to reform and ameliorate the governing regimes for Ogallala groundwater, the subject basin will almost certainly remain substantially over-appropriated.

Beyond that point, the dominant issues revolve around time, and how to make sense of it in property law. Geologically, all hydrological systems are connected, and so no aquifers are completely cut off from surface water systems; the migration of groundwater from distant uplands or deep aquifers to streams and to rivers is only a matter of time—geological time. Yet in less than two

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[206] Peck, *supra* note 148, at 501–03; Owen, *supra* note 148, *passim*.

[207] *See, e.g.*, *Knapp*, 207 P.2d at 447; Williams v. City of Wichita, 374 P.2d 578 (Kan. 1962); F. Arthur Stone & Sons v. Gibson, 630 P.2d 1164 (Kan. 1981) (upholding the Kansas Water Appropriation Act as constitutional under the police power of the State to regulate water use).

generations, Ogallala irrigators have depleted many of these systems past their breaking point, depleting baseflows beneath where they can replenish stream and river systems.[208] Caught between these two mutually antagonistic calendars is the law. Western water law generally presumes that the water rights that depend upon these hydrological systems are permanent. That presumption has stubbornly survived even as depletion has belied it, and so its survival has been marked by ever-increasing contortions to straddle the distance between legalistic notions of permanence and geologic facts of depletion.

Any Ogallala adjudication must be part of a larger deliberative process of ending these distortions and adapting the governing water law to the realities of permanent depletion. That adaptation will largely consist of recognizing boundaries, a process which will require a water management compromise among hydrology, current levels of groundwater pumping, and reliance upon existing rights and law. What is the boundary between tributary/alluvial groundwater and non-tributary, non-alluvial groundwater? In Colorado, the answer to that question began as both a constitutional and a hydrological one, but needed history, litigation, and legal reliance to answer.[209] What are the boundaries of the water supply of a river basin? In the Republican River Basin, the answer to that question began with an interstate compact, but needed history, hydrology, a negotiated groundwater model, a common understanding of the impacts of irrigation, and two interstate lawsuits to articulate.[210] Other boundaries require more subjective but no less defensible determinations. What is the boundary between sustainable and unsustainable groundwater supplies, and between permanent and impermanent ones? What are the respective rights and responsibilities for these different categories of supply? Answers to these questions require a correlative determination of what is economically feasible for the irrigators who rely upon the water supplies, as well as what the public, what aquatic habitats, and what groundwater-dependent ecosystems can tolerate in terms of depletion. In one way or another, all of these boundaries involve fundamental boundaries between private property rights in the use of water and public ownership of the state's unused water supplies, as well as the public interest in how water is used and conserved.

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[208] *See supra* note 16 and accompanying text.

[209] COLO. REV. STAT. § 37-92-101 *et seq.* (2015) (designated groundwater); *see supra* note 103 and accompanying text; *see also* Griggs, *supra* note 100, at 1286–88.

[210] Republican River Compact, 57 Stat. 86 (May 26, 1943); Kansas v. Nebraska & Colorado, No. 126 Orig., FIRST REPORT OF THE SPECIAL MASTER (SUBJECT: NEBRASKA'S MOTION TO DISMISS), (Jan. 28, 2000), approved in Kansas v. Nebraska & Colorado, 530 U.S. 1272 (2000); Kansas v. Nebraska & Colorado, No. 126 Orig., FINAL SETTLEMENT STIPULATION (Dec. 15, 2002), *approved in* 538 U.S. 720 (May 19, 2003); Kansas v. Nebraska & Colorado, No. 126 Orig., FINAL REPORT OF THE SPECIAL MASTER WITH CERTIFICATE OF ADOPTION OF RRCA GROUNDWATER MODEL (Sept. 17, 2003), 540 U.S. 964 (2003) (Report and Certificate received and ordered filed); Kansas v. Nebraska, No. 126 Orig., 547 U.S. ___ (slip opinion) (Feb. 24, 2015).

It is well past time to address these boundaries explicitly in the law. Kansas and Nebraska present fundamentally different boundary issues, because of the differences between their respective water supplies, and because of the differences between their respective water law regimes.

In Kansas, the most pressing problem is that of rapid and permanent groundwater depletion across its portion of the Ogallala. Yet the formal virtues and powers of the Kansas Water Appropriation Act—its centralized jurisdiction over both surface and groundwater, and its regulation of both waters according to the prior appropriation doctrine—have not really been exercised there. Holders of water rights fear the regulatory uncertainties of such an exercise, largely because the doctrine does not mesh well with non-renewable water supplies. Consequently, the idea of administering water rights according to the Act's provisions does not enjoy legitimacy among the holders of water rights that the Act is largely intended to protect.[211]

To remedy this problem of legitimacy, the stream/aquifer adjudication and its enabling legislation require a third and interdependent component—statutory power, granted to the water court, to classify adjudicated rights into one of two classes. The first class of right would be that of the current (and presently formalistic) Kansas water right; but this right would rest upon a permanence that is legally definite, fully protectable, and hydrologically justified. During water shortages, this right would receive prompt priority protection under existing law, without the delay of administrative investigation; the adjudication will have removed this regulatory disincentive.[212] This right would also retain the status of a real property right.[213] Granting this classifying power to the water court will place the burden on the water rights holder to establish two things: the quantitative (and backward-looking) aspects of his or her historic water use, as in a traditional adjudication; but also the right's qualitative (and forward-looking) aspects. Most important to this latter aspect would be the subject right's ability to endure well into the future, based on the hydrological realities undergirding its water supply, and the legal reality of its priority date. Because the quality of a groundwater right depends upon both of these characteristics, true temporal priority works both ways. Where the adjudication finds that a water right whose usage, supply, and priority together doom it to relative impermanence, then such a right cannot legitimately claim to retain its status as a permanent and protectable right. Such a right should therefore be demoted. The record would require it.

Demoted to what? To a second class of water right or permit, which would receive status and protections commensurate with its relative impermanence, as

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[211] Griggs, *supra* note 100, at 1308–12.

[212] *See, e.g.*, KAN. ADMIN. REGS. § 5-4-1a (2015).

[213] KAN. STAT. ANN. § 82a-701(g) (2015).

determined through the adjudication. Such rights could potentially be recognized as a new type of water permit, one similar to the well permits in the designated basins of Eastern Colorado, which receive a lower level of protection than tributary groundwater rights.[214] Lower down the status scale, Kansas water law already offers a pre-existing template for such a second-class right: a term permit, an appropriative right which enjoys priority protection, but is valid for a limited amount of time, and does not qualify as a permanent, real property right.[215] In any case, the State, DWR, and the water court would face the hard political and institutional issue of whether to set a limit on the depletion of the subject water supply, and at what level.[216] Given the difficulty of such an issue, the temporary nature of a term permit offers certain advantages. It can be renewed or extended at a lower authorized quantity of withdrawal, and it expires on its own terms, rather than by a water court decision or agency action.

Nebraska faces a different boundary challenge. The state enjoys bountiful Ogallala supplies, far more than any other state; but its water code suffers from the practical inability to administer water rights fairly across the surface/groundwater divide during dry periods. Nebraska law requires the equitable treatment of these distinct and structurally opposed property interests.[217] But these interests answer to different masters and distinct doctrines; and because groundwater irrigators vastly outnumber surface water irrigators in Nebraska, state water policy tends to favor groundwater pumping over surface diversions during times of shortage, and surface water irrigators have yet to obtain the protections which Nebraska law claims to afford them under the priority doctrine.[218] As a result, there is considerable unease, and potential litigation, concerning Nebraska's failure to protect surface water rights.[219] A general stream/aquifer adjudication in basins that have become chronically water-short, such as those in the Republican River Basin, could decree a detailed administration plan across the spectrum of Nebraska water rights: surface water rights, alluvial groundwater rights, upland and bench-land groundwater rights more distant from the stream, and deep Ogallala rights which are mostly unconnected from the surface system. Given Nebraska's constitutional assertion of the prior appropriation doctrine, such a decree should honor the priority dates for the relevant surface rights.[220] Regarding the various groundwater rights, the decree could establish an equitable, and correlative, approach to administration in dry periods, which recognizes that from an administration

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[214] COLO. REV. STAT. § 37-90-102(1) (2015); *see supra* note 117 and accompanying text.

[215] KAN. STAT. ANN. § 82a-708c (2014) *amended by* 2015 Kan. Sess. Laws ch. 60.

[216] Kansas attempted such a "two-pool" regulatory approach, which failed due to opposition from western Kansas irrigators. Peck, *supra* note 148, at 505–06.

[217] NEB. REV. STAT. § 46-703(2) (2014).

[218] *See supra* notes 136, 138, 173 and accompanying text.

[219] *See supra* note 138 and accompanying text.

[220] NEB. CONST. art. XV, § 6.

standpoint, not all groundwater rights are created equal. Such an adjudication could complement the integrated management plans of the NRDs, but it would probably require their revision, because they currently lack equitable protections for surface waters and surface rights.[221]

While legislation should formally recognize the existence of these boundaries, it should leave to the water court the task of locating them, applying them, and determining their legal porosity within the subject basin, as part of the adjudication process. Establishing and protecting this judicial duty will enable water rights holders, agencies, and the public to present evidence and testimony that supports their respective positions, on a site- and case-specific basis that recognizes the hydrological variability of the Ogallala formation, and will enable the court to provide specific and equitable determinations. That duty seems especially important regarding environmental and habitat issues, given the variety of Great Plains ecosystems and the continued importance of the ESA. Ideally, the stream/aquifer adjudication would comprise an integrated whole, with interdependent elements: the legislation enabling the adjudication; concurrent legislation redefining reasonable use, waste, and property rights; and the adjudication process itself. In both states, such an adjudication could achieve what adjudications are supposed to achieve: better clarity and definition in water rights, so those rights can be protected in times of shortage, and subjected to more effective water supply management.

V. CONCLUSION: ADJUDICATION AND THE FUTURE OF WATER MANAGEMENT ACROSS THE GREAT PLAINS

The Big Horn and Snake River Basin general stream adjudications faced numerous and difficult challenges. Ultimately, those challenges revolved around a large but mostly monolithic problem: adjusting the respective quantities of water diverted and used under all of the water rights in a subject basin, and adjusting the administration regimes for regulating those rights, both within the prior appropriation system. These adjustments became necessary to meet a water budget broken by the force of federal reserved rights and environmental law. Repairing that budget required laborious legal work, hydrological analysis, intense negotiation, repeated litigation, and federally financed storage and irrigation infrastructure. For all of the difficulties that have attended these adjudications, fights about the prior appropriation doctrine have not really been among them.[222]

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[221] INTEGRATED MANAGEMENT PLAN FOR THE UPPER REPUBLICAN, *supra* note 135. This is the allegation put forth by the Department of Interior. *See supra* note 138 and accompanying text.

[222] This is a generalization, of course, and the exceptions are significant. For example, Arizona spent decades litigating the legal issue of "subflow" in the Gila River and Little Colorado River adjudications, an issue peculiar to Arizona. Weldon, *supra* note 5; Feller, *supra* note 4, at 423–25.

By contrast, the possibility of a stream/aquifer adjudication across the Ogallala portions of Kansas and Nebraska presents more fundamental challenges to their respective water law regimes, and will require candid and ambitious changes to them. But that should not be a disincentive. As described in this article, basic elements of these regimes are not functional, as both regulators and holders of water rights avoid and are refused the remedies which prior appropriation supposedly confers. Both states have developed elaborate technical and administrative mechanisms to cope with this avoidance, but these mechanisms have their limits, and we are probably past them. An adjudication, supported in its pivotal stages by supportive and declarative legislation, can bring much needed clarity and definition to these Great Plains water rights, especially when supplies run short—because, after all, you can't administer what you can't define.

More importantly, an adjudication can force needed changes at the most fundamental level of water management, by motivating all parties to reconsider property rights in water in the harsh light of permanent groundwater depletion. Across the Ogallala region, the technical, legal, and administrative tools are available to bring such an adjudicative effort to a comparatively efficient resolution; what has been lacking is resolve.

An adjudication would help create that resolve. It would force the state to articulate what its water rights actually confer. It would enable its water rights holders to explain and to defend what rights they are fighting for. And it would do both within a judicial forum that is as independent from the water politics of the Ogallala as possible. The ultimate question, of course, is whether there is sufficient courage and political will to embark upon an adjudication in the first place. Abraham Lincoln complained to himself about his top general in 1862, "if McLellan is not using the Army I should like to borrow it for awhile."[223] Had he done so, the Civil War would have ended sooner. Likewise, the Great Plains states can no longer afford to play the role of a General McLellan, devoting their collective and credentialed expertise to admiring the problem of depletion and parading it about. They need to confront that problem instead, and an adjudication would put that expertise to work.

[223] President Abraham Lincoln to General McLellan, April 9, 1862 (unsent), *in* THE COMPLETE WORKS OF ABRAHAM LINCOLN, ED. JOHN G. NICOLAY AND JOHN HAY, VII, at 141 (New York, 1908).