Arizona Law Where Ground and Surface Water Meet

Part 2 of 2

by

John D. Leshy and James Belanger

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and *Southwest Cotton* had been construed to hold that overlying landowners "own" the percolating groundwater beneath their land. It rejected these statements as *dictum*, and dismissed the whole line of cases with the scoff that "[d]ictum thrice repeated is still dictum."[270] For this dictum, the court substituted the proposition that overlying landowners do not own percolating groundwater *prior to* its capture and withdrawal.[271]

Ironically, this discussion in *Chino Valley* may itself have been dictum. The core issue was whether the 1980 Groundwater Code was constitutional as applied to existing pumpers of groundwater, as both the town and the city were.[272] The court's statement about the rights of overlying landowners who were *not* pumping groundwater arguably did not change the town's position as an existing pumper—it had rights under either the new or the old view. On the other hand, the court may have been saying that a groundwater pumper perfects legal rights in specific molecules of water only after those molecules are brought to the surface; that is, a landowner has no rights in groundwater *in situ*. This would mean, among other things, that surface streams can be protected from interference even by long-established groundwater pumping, because preventing further groundwater pumping to protect surface streams could not interfere with landowners' legal rights.[273]

The next case challenging the Code was brought by overlying landowners who were prohibited by the Code from initiating groundwater pumping for new agricultural irrigation. The federal court applied the *Chino Valley* dictum as the authoritative view of state law, and rejected the challenge.[274] The Ninth Circuit affirmed, specifically rejecting the argument that *Chino Valley* was a major, unexpected change in the law that unconstitutionally interfered with the overlying landowners' expectations of property rights in the groundwater beneath their land.[275]

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270. *Id.* at 81, 638 P.2d at 1327.

271. *Id.* at 82, 638 P.2d at 1328.

272. *See supra* note 269 and accompanying text.

273. This interpretation of *Chino Valley II* was recently employed by the court of appeals in Aikins v. Arizona Dep't of Water Resources, 154 Ariz. 437, 743 P.2d 946 (Ct. App. 1987). Landowners whose plans to begin pumping groundwater were thwarted by the 1980 Groundwater Management Act challenged the Act as unconstitutionally taking their property without compensation. The court rejected the argument because "appellants do not own the groundwater beneath their property [and therefore] their right to use that groundwater has always been subject to modification by the legislature." 154 Ariz. at 442, 743 P.2d at 951.

274. Cherry v. Steiner, 543 F. Supp. 1270, 1277 (D. Ariz. 1982).

275. 716 F.2d 687 (9th Cir. 1983), *cert. denied*, 466 U.S. 931 (1984). Lest one think that groundwater rights are peculiar in their fragility in Arizona, the reader should ponder ARIZ. REV. STAT. ANN. § 45-159 (1987), which in essence says that any surface water right permit in Arizona

Although *Chino Valley* did not specifically address the ground/surface water interface, it effectively rewrote Arizona law on rights to percolating groundwater.[276] Overlying landowners now have property interests in groundwater only to the extent they are actively pumping or, perhaps, only to water they actually bring to the surface. This brings the law applicable to percolating groundwater close to an appropriation system—without an appropriation (pumping) and use there are no rights. This, in turn, makes the law applicable to percolating groundwater nearly congruent with surface water law.[277] *Chino Valley* states that a landowner has no ownership right in ordinary percolating groundwater "prior to its capture and withdrawal from the common supply," and thereafter only a right to use that water, as opposed to ownership of the *corpus*.[278] Significantly, the cases it cites for this proposition are decisions from other jurisdictions effectively applying (or upholding legislative application of) a prior appropriation system to groundwater.[279] Thus, the landowner's right to groundwater is conceptually much the same as a landowner's right to surface water—it depends upon appropriation and use.

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can be purchased for public purposes for no more than the "amount paid to the state" for the permit, which is at most a small filing fee of a few dollars. This provision has been in the water code since it was adopted in 1919, *see* 1919 Ariz. Sess. Laws ch. 164, § 9, and was amended in a minor way in 1986, *see* 1986 Ariz. Sess. Laws ch. 179, § 1, so it has not been forgotten. We are not aware of its ever being exercised.

276. One knowledgeable commentator has called it "the most significant [decision] in the history of Arizona water law." Kyl, *The 1980 Arizona Groundwater Management Act: From Inception to Current Constitutional Challenge*, 53 U. COLO. L. REV. 471, 495 (1982). *See also* Wheeler, *The Right to Use Groundwater in Arizona After Chino Valley II and Cherry v. Steiner*, 25 ARIZ. L. REV. 473 (1983).

277. While *Chino Valley* made Arizona groundwater functionally subject to appropriation as a matter of common law, it did not go the next step and sort out the rights of competing appropriators (pumpers). Surface water appropriation systems do this on the basis of priority, but the court in *Chino Valley* did not have to address this issue as a matter of common law because the legislature had effectively resolved the question on the facts there presented in the transportation provisions of the 1980 Groundwater Management Act. *See Chino Valley II*, 131 Ariz. at 80, 638 P.2d at 1326. *See also* Doyle, *The Transportation Provisions of Arizona's 1980 Groundwater Management Act: A Proposed Definition of Compensable Injury*, 25 ARIZ. L. REV. 655, 662-65 (1983).

278. *See Chino Valley II*, 131 Ariz. at 82, 638 P.2d at 1328.

279. *Id.* The two cases relied on (and quoted from) were Knight v. Grimes, 80 S.D. 517, 127 N.W.2d 708 (1964) (upholding a statute abandoning the absolute ownership doctrine for percolating groundwater and applying the appropriation doctrine instead); and Village of Tequesta v. Jupiter Inlet Corp., 371 So. 2d 663 (Fla.), *cert. denied*, 444 U.S. 965 (1979) (upholding a statute that substituted a permit system for the reasonable use doctrine as applied to groundwater, in circumstances where an overlying landowner was denied a permit to pump groundwater. The new statute was functionally, although not in name, akin to an "appropriation" system because it substituted a permit right for the common law right).

Functionally, then, the general concept of appropriation now applies to all surface and groundwater. The principal question that remains is whether this single concept, as applied to all categories of water, will be formally merged into one common system of water management.

Significantly, the *Chino Valley* court did not regard itself as limited in any way by prior legislative action. It plainly assumed that the law in this area remained common law. It easily rejected statements in its previous cases as dicta, and did not pause to reflect on the extent to which the legislature may have codified or otherwise ratified the teachings of those earlier cases. Instead, the court unabashedly replaced the older view with its own, more modern view of what the law required.

Although the court did not address how the quasi-appropriation system applicable to percolating groundwater ought to be correlated with the appropriation system applicable to surface water, it seems sensible to try to mesh them as much as possible. *Chino Valley*, then, is strong, albeit indirect, support for merging the law of ground and surface water, requiring water from both sources to be managed together to the extent they interrelate. Moreover, *Chino Valley* clearly stands for the proposition that the legislature has not removed these questions from judicial purview; they are, instead, still subject to resolution in the courts.

The latest development is the Arizona Court of Appeals' decision in *Collier v. Arizona Department of Water Resources*.[280] The Colliers applied for a permit to appropriate water from a spring located on their property. Downstream appropriators protested, arguing that the spring, which first appeared in 1979, was fed by percolating water that had been tributary to the creek on which their appropriations had already been made. The protestors conceded at oral argument that the Colliers could have pumped this water from beneath their land, "notwithstanding that this pumping would reduce the flow" of the creek.[281]

The court found that the water in the spring was surface water subject to the downstream users' vested rights and thus held for the protestors. Nevertheless, the court characterized Arizona water law as a "bifurcated system in which percolating groundwater is regulated under a set of laws completely distinct from the laws regulating surface water."[282] Conceding that this approach "ignores the scientific reality that groundwater and surface water are often connected," the court offered the *dictum* (based on the apparent agreement of the parties)

280. 150 Ariz. 195, 722 P.2d 363 (Ct. App. 1986).
281. *Id.* at 197, 722 P.2d at 365.
282. *Id.* at 198, 722 P.2d at 366.

that the water that formed the supply of the spring and the creek was "in an unappropriable form" prior to its emergence in the spring.[283]

In its strict holding, *Collier* is irrelevant to our analysis, because the court determined the Colliers were not pumping groundwater. The court's *dictum* would, however, allow the Colliers to begin pumping with impunity, even if their pumping dried up the spring and injured the prior appropriators downstream, merely because of the legal fiction the court presumed to exist in Arizona water law—that hydrologic reality must bow to the arbitrary legal classification of water as either surface or groundwater. As the lengthy review carried out in this section has shown, however, Arizona law on the point is best read to the contrary, to support unitary management of surface and hydrologically related groundwater.[284]

F. The Curious Dormancy of the Constitutional Prohibition Against Riparian Rights in the Groundwater Context

When reviewing Arizona law on this issue, one might ask: Why have the courts not considered more seriously the constitutional prohibition against riparian rights in the context of groundwater? That prohibition is broadly framed[285] and can be viewed as influencing, if not controlling, the choice among groundwater property doctrines. Because it is a constitutional mandate, it controls not only the judiciary's choice as a matter of common law, but also constrains the legislative and executive branches as well.

The Arizona constitutional provision first appeared in a territorial statute adopted in 1887 and was included verbatim in the constitution drafted 23 years later.[286] No direct evidence exists that the framers of either the territorial statute or the constitution had groundwater specifically in mind; in fact, the legal doctrine applicable to groundwater did not become important until several decades later.

One fact slightly complicates this analysis. At the time this provision was included in the Arizona constitution, the territorial supreme court

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283. *Id.*

284. Lawyers in the state attorney general's office continue to subscribe to the simplistic view that "Arizona law treats surface water and groundwater as though they are distinct and unconnected sources," even though they concede that "[s]cientifically, it makes no sense to isolate one source from another," with the result that law does "not deal adequately with conflicts that arise between prior appropriations and groundwater pumpers." WATER RIGHTS ADJUDICATION TEAM, OFFICE OF THE ATTORNEY GENERAL, ANNUAL REPORT FISCAL YEAR 1986-87, 10-11 (Feb. 1988).

285. The "common law doctrine of riparian water rights *shall not* obtain or *be of any force or effect in the State.*" ARIZ. CONST. art. XVII, § 1 (emphasis added).

286. *See supra* notes 83-84.

had already decided *Howard v. Perrin*.[287] This permits an argument that if the framers of the Arizona Constitution intended to overrule this decision by generally prohibiting riparian rights, some stronger indication of that intent ought to exist. Support might also be found for this argument in the only other constitutional provision dealing with water, which "recognized and confirmed" all "existing rights to the use of any of the waters in the State for all useful or beneficial purposes."[288] *Howard v. Perrin*, it might be said, established rights to percolating groundwater in surface landowners, and this second provision cemented that result into the constitution.

If followed, however, this analysis extends too far. It would have the framers of the constitution forever freezing the common law of water rights as developed by the courts prior to 1912. Following this reasoning renders the 1919 Water Code and all other legislative enactments that have changed the common law, including the 1980 Groundwater Management Act, unconstitutional. Surely that is too heavy a burden to place on these unexceptional constitutional phrases. Instead, the framers ought not to be regarded as having done anything more than constitutional framers usually do—set basic policies and leave subsequent application and implementation to the ordinary processes of government.[289]

The absence of evidence of the framers' specific intent does not justify concluding that their view of basic water policy is irrelevant. To the contrary, the thrust of the prohibition against riparian rights is self-evident: the common law doctrine of landownership-based water rights was deemed, as a matter of general policy, simply inapplicable to the conditions and needs of Arizona. Like other Western states, the founding fathers of Arizona concluded that the doctrine of prior appropriation better conformed to those conditions.

Construed in this way, the prohibition casts considerable doubt on the constitutionality of any landowner-based system of groundwater rights, whether it be the absolute ownership, reasonable use, or correlative rights doctrines.[290] Each of these begins with the premise that only overlying landowners have a protected right to pump groundwater. In that sense, they are identical to the common law doctrine of riparian

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287. 8 Ariz. 347, 76 P. 460 (1904), *aff'd*, 200 U.S. 71 (1906). *See supra* text accompanying notes 97-109.

288. ARIZ. CONST. art. XVII, § 2.

289. *See* Boswell v. Phoenix Newspapers, 152 Ariz. 9, 17-18, 730 P.2d 186, 194-95 (1986) (a state constitutional provision preserving common law rights does not "freeze the principles and incidents of [the] common law . . . as of 1912").

290. *See generally* D. GETCHES, *supra* note 2, at 19-28, 55-60.

rights, which in its classic form (unanimously subscribed to in states that followed it in 1910, although somewhat weakened in a few jurisdictions since) gives only owners of land riparian to a stream the right to use water from it.[291] Moreover, the two most important surviving common law groundwater doctrines—reasonable use and correlative rights—each strongly favor using groundwater only on overlying land. Because the classical riparian rights doctrine reflects the same policy, its rejection in the Arizona constitution undermines application of such groundwater doctrines in Arizona.

As applied to surface water, the riparian doctrine's sharp limitations on ownership and use were obviously out of step with the relatively arid climate that characterizes many Western states. Thus, the doctrine was rejected, not only in Arizona, but also in nearly all other Western states. In Arizona, the territorial supreme court once intimated that the riparian concept might have some viability, but within a month it renounced this suggestion even though the applicable territorial statute (later incorporated into the constitution) was not cited.[292] It does not stretch this analysis very far to conclude that the state constitution forbids giving an overlying landowner any inchoate rights to groundwater.[293]

The task of squaring the groundwater rights doctrine with the state constitution has not entirely escaped the Arizona courts. To be sure, *Howard v. Perrin* did not refer to the territorial statute, and the early cases addressing groundwater rights after adoption of the state constitution similarly made little of the riparian rights prohibition.[294] In *Pima Farms*, the Arizona Supreme Court acknowledged that "the territory at an early date, and the state upon its organization, abrogated the common law rule of riparian rights as unsuitable to our conditions, and, in accord with most of the Western arid states, adopted the doctrine of prior appropriation."[295] The context of this observation was groundwater, but the court accepted the parties' characterization of the

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291. *Id.*

292. *See supra* notes 87-91.

293. Nearly all other Western states have reached the same conclusion, even without a constitutional provision like Arizona's. *See, e.g.*, Yeo v. Tweedy, 34 N.M. 611, 216 P. 975 (1929), discussed *supra* at notes 164-68 and accompanying text; Wrathall v. Johnson, 86 Utah 50, 40 P.2d 755 (1935), discussed *infra* at note 300. *See generally* D. GETCHES, *supra* note 2.

294. For example, McKenzie v. Moore, 20 Ariz. 1, 176 P. 568 (1918), holding that spring water was not appropriable because it was not a "stream" within the meaning of the then-applicable statute, was written by Chief Justice Cunningham, who had served as a delegate at the constitutional convention. The opinion did not, however, address the possible applicability of the constitutional provision. *See also supra* notes 113-14 and accompanying text.

295. Pima Farms v. Proctor, 30 Ariz. 96, 102, 245 P. 369, 371 (1926).

groundwater involved in that case as a subterranean stream subject to appropriation; therefore, the dispute presented no occasion to consider the riparian rights abrogation in the context of percolating groundwater. Justice Lockwood cited the constitutional provision in *Southwest Cotton*[296] but did not discuss its possible relevance, apparently because of his conclusion that the territorial legislature had, before statehood, rejected the prior appropriation doctrine as applied to groundwater. He was implicitly unwilling to consider the possibility that the constitutional framers might have overruled the legislature.

The court did, however, face the issue in the *Bristor* cases. In its first opinion, the majority did not address the state constitution in holding that percolating groundwater was subject to appropriation. This was probably because the principal ground for the decision was that Congress had imposed the doctrine on the state prior to statehood. But in his concurring and dissenting opinion, Justice Evo DeConcini advocated applying the "reasonable use doctrine" to groundwater and therefore felt compelled to address the argument that this doctrine was inconsistent with the constitutional prohibition of riparian rights because it was "an offshoot" of that doctrine.[297] He argued, however, that "no connection" existed between the two: "land riparian to a stream is not analogous to land with percolating water under the surface."[298] He "prefer[red] . . . the reasoning of the Utah court" on the question, quoting *Glover v. Utah Oil Refining Co.*[299] for the proposition that there was "little or no analogy whatever, especially as affecting the question under review." Although the quotation was accurate, it was taken out of context.[300]

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296. *See* Maricopa County Mun. Water Conservation Dist. No. One v. Southwest Cotton Co., 39 Ariz. 65, 80, 4 P.2d 369, 375 (1931), *aff'd on reh'g as modified*, 39 Ariz. 367, 7 P.2d 254 (1932).

297. Bristor v. Cheatham, 73 Ariz. 228, 255, 240 P.2d 185, 203 (1952) (*Bristor I*) (DeConcini, J., dissenting).

298. *Id.*

299. 62 Utah 174, 218 P. 955 (1923).

300. *Id.* at 180, 218 P. at 957. *Glover* was a dispute between a plaintiff who extracted groundwater from an artesian well and used it on his land, and a defendant who had similar wells, but used the water off the land from which it was extracted. The defendant prevailed because the court found that the plaintiff was not injured by defendant's extraction and transportation. *Id.* The plaintiff argued that the defendant's transportation of groundwater off the land was *per se* unlawful under the reasonable use doctrine; the defendant countered by drawing the analogy to riparian water rights, which it argued were prohibited in Utah. The reason the court rejected the analogy was, however, because the water in question was from an artesian aquifer, where the aquifer pressure naturally brought the water to the surface. This meant that using the water on overlying land would *not* recharge the aquifer. Riparian rights doctrine favors use on riparian land precisely because "the return waters therefrom will find their way back into

The tables were turned in the second *Bristor* decision. Justice DeConcini was no longer on the Court. His successor, Justice Windes, wrote the majority opinion that rejected applying prior appropriation to groundwater and adopted the reasonable use doctrine. Windes' opinion does not discuss whether this was consistent with the constitutional prohibition on riparian rights, despite the fact that it relied heavily on a provision of the *Restatement of Torts* that addressed reasonable use in the context of surface water riparian rights doctrine.[301] Indeed, Windes blithely observed, with unintended irony, that although the *Restatement* addressed surface water *riparian* rights, it also indicated that the problem of determining reasonableness was the same "whether the water is in a water course or lake or under the surface of the earth . . . ."[302] Thus, Windes explicitly married surface water riparian rights doctrine to the groundwater doctrine he adopted for Arizona. At the same time, however, he ignored the state constitutional provision explicitly directing that the "common law doctrine of riparian water rights shall not obtain or be of any force or effect in the State."[303]

The irony was not lost on dissenting Justices Phelps and Udall, who noted that the riparian rights doctrine "has long been repudiated in this jurisdiction[, a] principle . . . firmly imbedded in article 17, section 1 [of the Arizona Constitution]."[304] They also observed that the *Restatement*, in its explanatory notes, cautioned that the riparian rights

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the stream from which they were diverted." *Id.* But on the facts of *Glover*, "[t]he physical attributes of the condition under which artesian water finds its way to the surface are such as to preclude the idea of returning the water, or any part thereof, to the basin from which they were taken." *Id.* Thus, the Court rejected the analogy "as affecting the question under review." *Id.* This subtlety was lost in the quotation excerpted by Justice DeConcini. He then compounded his error by ignoring the fact that, seventeen years before *Bristor I*, the Utah Supreme Court fully embraced the doctrine of prior appropriation as it applied to percolating groundwater. Wrathall v. Johnson, 86 Utah 50, 40 P.2d 755 (1935). In that case, the court surveyed previous decisions on the subject of groundwater in Utah and other states, and firmly concluded that prior appropriation applied to all underground waters in Utah, even though, as in Arizona, the applicable statute applied it only to "all streams and other sources in this State, whether flowing above or under the ground, in known or defined channels." 86 Utah at 103-07, 40 P.2d at 778-80. The court regarded the apparent statutory limitation to "known or defined channels" as allowing enough room, given the hydrologic fact of it being "impossible to put one's finger upon . . . where the flow of percolating [ground]water becomes a stream," for the court to interpret it to apply to all underground waters. *Id.* at 103, 40 P.2d at 778. The court buttressed its conclusion with the idea that the common law of riparian water rights had already been rejected or greatly limited in Utah, and once that process of departure had begun, "we see no place for us to stop short of the rule of prior appropriation [as applied to ground as well as surface water]." *Id.* at 106, 40 P.2d at 780.

301. *Bristor II*, 75 Ariz. at 236-38, 255 P.2d at 179-80.

302. *Id.* at 237, 255 P.2d at 179.

303. ARIZ. CONST. art. XVII, § 1.

304. *Bristor II*, 75 Ariz. at 329, 255 P.2d at 181 (Phelps and Udall, JJ., dissenting).

doctrine was inapplicable to Western states, including Arizona, where the "common law" was the "law of Prior Appropriation."[305]

Brasher v. Gibson,[306] decided a dozen years later, was the next case to discuss the constitutional provision. This was a surface water case, involving the rights of owners of riparian land along the Colorado River. The court of appeals, in successive opinions, indicated that the parties' legal rights might be influenced to some degree by the notion of riparian rights.[307] The supreme court rejected that analysis. Quoting the constitutional prohibition in full, the court was emphatic:

> This does not mean that sometimes the riparian water rights doctrine has no force or effect in Arizona, nor does it mean that the courts will enforce the provisions of the constitution as is deemed expedient. It means that the doctrine shall not obtain nor shall it be of any force or effect in the state. *Ever.*[308]

Nine years later, the supreme court revisited the constitutional prohibition, this time in the context of groundwater. In *Neal v. Hunt*,[309] it conceded that it had been "inconsistent" by failing to apply the riparian rights prohibition to groundwater. Nevertheless, it did not act to correct, or even attempt to rationalize, the inconsistency in its previous decisions.[310]

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305. *Id.* 75 Ariz. at 240, 255 P.2d at 181. The current Restatement takes the position that a groundwater pumper is liable for interference with the use of water by another if "the withdrawal of the groundwater has a direct and substantial effect upon a water course . . . and unreasonably causes harm to a person entitled to the use of its water." RESTATEMENT (SECOND) OF TORTS § 858(1)(c) (1977). One comment on this section recognizes that ground and surface water "are often closely interrelated and should be treated as a single source." *Id.*, comment c at 260. It recommends a "pragmatic test" rather than "doubtful and unscientific categorizations" used in some older cases. *Id.*

306. 101 Ariz. 326, 419 P.2d 505 (1966).

307. 2 Ariz. App. 91, 98, 406 P.2d 441, 447-48 (1965); 2 Ariz. App. 507, 508, 410 P.2d 129, 130 (1966). In the second opinion, then court of appeals Judge Cameron dissented, arguing that the constitutional provision "completely abrogates" the doctrine of riparian rights, at least as to surface waters. 2 Ariz. App. at 510, 410 P.2d at 132.

308. *Brasher*, 101 Ariz. at 330, 419 P.2d at 509 (emphasis in original).

309. 112 Ariz. 307, 541 P.2d 559 (1975).

310. The dispute was between a groundwater user who was transporting the water off the land from which it was pumped, and nearby groundwater users who were using groundwater on the land from which it was pumped. The court held that the latter had not shown injury from the former's transportation. In State v. Bonelli Cattle Co., 107 Ariz. 465, 489 P.2d 699 (1971), *rev'd on other grounds*, 414 U.S. 313 (1973), riparian rights to the bed of the stream were at issue. The majority disposed of the case by regarding the state's title to the bed as paramount to whatever right the private riparian owner could claim. Dissenting, Justice Lorna Lockwood argued that private riparian owners had a common law riparian right to the bed under certain circumstances, but she carefully distinguished this from a riparian water right. *Bonelli Cattle Co.*, 107 Ariz. at 469, 489 P.2d at 703.

The court's failure to reconcile its inconsistent applications of the constitutional prohibition becomes even more inexplicable in light of the court's modern willingness to look to the surface water statutes for guidance on groundwater legal issues. In the second *Jarvis*[311] opinion, for example, the court relied on a surface water appropriation statute[312] as "clearly evidenc[ing] a legislative policy that the needs of agriculture give way to the needs of municipalities."[313] The court applied this policy to bend the common law rule it had previously adopted for groundwater, and allow Tucson to pump and transport water for its municipal needs under certain circumstances. Similarly, the court has relied on the surface water appropriation maxim "first in time, first in right" in the groundwater context.[314] If surface water legal principles are relevant to resolving groundwater disputes, it is difficult to see why the general constitutional prohibition of riparian water rights is not relevant to such disputes.

Although the court did not explicitly wrestle with the constitutional prohibition on riparian rights in the groundwater context in *Chino Valley*,[315] the basis for its rewriting of Arizona groundwater law was, arguably, this long-ignored constitutional policy. By announcing that "there is no right of ownership of groundwater in Arizona prior to its capture and withdrawal from the common supply,"[316] the court, whether knowingly or not, rejected riparian rights as applied to groundwater. No longer would ownership of land, without more, carry the right to appurtenant water. For a century the Arizona courts have recognized the wisdom of that approach with respect to water found in surface watercourses. *Chino Valley* simply applied the same idea to water found beneath the land. Although the reasoning employed by the courts to reach that conclusion is not unassailable, the fact that its conclusion was, arguably, fully responsive to the constitutional policy adds considerable credibility to its result.

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311. Jarvis v. State Land Dep't, 106 Ariz. 506, 479 P.2d 169 (1970) (*Jarvis II*).

312. ARIZ. REV. STAT. ANN. § 45-147 (1987). This statute set priorities among different kinds of uses in the narrow context of pending conflicting applications to appropriate a limited supply of surface water.

313. *Jarvis II*, 106 Ariz. at 511, 479 P.2d at 174.

314. Farmers Inv. Co. v. Bettwy, 113 Ariz. 520, 527, 558 P.2d 14, 21 (1976).

315. Chino Valley v. City of Prescott, 131 Ariz. 78, 638 P.2d 1324 (1981) (*Chino Valley II*).

316. *Id.* at 82, 638 P.2d at 1328. The court in *Chino Valley II* was, in one sense, merely applying the holding of the Territorial Supreme Court in Boquillas Land & Cattle Co. v. St. David Coop. Comm'l & Dev. Ass'n, 11 Ariz. 128, 137, 89 P. 504, 507 (1907). In the earlier case, the court said that even if the territorial statutes conferred riparian rights to water, those rights "cannot be said to be vested in such a sense as that they may not be subsequently abrogated by statute, at any rate when the riparian owner has made no use of the water permitted him at common law." *Id.*

In short, Arizona's founders wisely rejected the idea that a water right "accrues to land adjoining the water."[317] They opted, instead, for the opposite approach: "A man has no right to water that adjoins or flows through his land . . . ."[318] In the face of a huge overdraft of largely non-recharging groundwater, the courts and the legislature have apparently breathed life into the prohibition of riparian rights, this time in the groundwater context. The effect is to limit landowners' ability to resist conjunctive management of ground and surface water on the basis of their claimed "rights" to the percolating groundwater found beneath their land.

IV. TAKING RESPONSIBILITY FOR UNITARY MANAGEMENT: THE 1980 GROUNDWATER MANAGEMENT ACT AND THE ROLE OF THE DEPARTMENT OF WATER RESOURCES

It is now time to turn to a more detailed look at the landmark 1980 Groundwater Management Act (Act).[319] This examination is necessary, first, to assess the implications of some of its provisions on the law applicable to the ground/surface water interface, and second, to examine more generally the authority it vests in the Director of the Arizona Department of Water Resources to manage Arizona's water resources on a sensible, hydrologically sound basis.

In a nutshell, the Act provides for the comprehensive, practical, and economical management of the state's water resources and is intended to eliminate the overdraft of most of the state's heavily used aquifers by the year 2025.[320] To these ends, the legislature placed centralized control of administration of the state's water in the DWR in order to "[f]ocus the responsibility for water management and administration of water related programs" in Arizona and to "[s]tabilize the use of water resources . . . ."[321] Its Director[322] was impressed with considerable power[323] to manage the state's water resources effectively. The legislature delegated to the Director "general control and supervision

317. JOURNALS OF THE CONSTITUTIONAL CONVENTION OF ARIZONA 482 (C. Cronin ed. 1925) (remarks of delegate Short).

318. *Id.*

319. Act of June 12, 1980, ch. 1, § 86, 1980 Ariz. Sess. Laws 1392 (codified as amended at ARIZ. REV. STAT. ANN. §§ 45-401 through 45-637 (1987)).

320. ARIZ. REV. STAT. ANN. §§ 45-401, 561(6), 562 (1987). *See generally* Higdon & Thompson, *supra* note 23, at 621-24.

321. ARIZ. REV. STAT. ANN. § 45-102, Historical Note (1987).

322. *Id.*

323. ARIZ. REV. STAT. ANN. § 45-105 (1987). *See also* Connall, *A History of the Arizona Groundwater Management Act*, 1982 ARIZ. ST. L.J. 313, 333-34.

of surface water, its appropriation and distribution, and of ground water, to the extent provided for by [the Act]."[324] The result was a reaffirmation of an administrative agency model of water resource administration that has long dominated in the West.[325]

The story behind the groundwater code has been told elsewhere;[326] for present purposes it is enough to say that it was powerful medicine adopted by an unusual combination of powerful gubernatorial leadership and interest group compromise fashioned almost wholly outside normal legislative channels, made necessary by the repeated failure of the legislature and judiciary to address effectively Arizona's heavy use of dwindling supplies of groundwater. As a response to these past failures, the Act delegated to DWR and its Director wide-ranging authority to manage Arizona's water.[327] Referred to by some of the Code's drafters as a "water czar," the Director was the embodiment of the drafters' recognition that comprehensive administration by an expert agency was Arizona's best hope to manage its water resources on a sound long-term basis.[328]

The Code gives the Director a long list of responsibilities, duties, and powers.[329] Among these is the authority to "formulate plans and develop programs for the practical and economical development, management, conservation and use of surface water [and] groundwater."[330] The Director is also given authority to "issue rules and regulations necessary to carry out the purposes of the [Code]."[331] The Director's sweeping responsibility to carry out the highly complex act extends both outside and especially inside the special management areas created by the act—the so-called "active management areas" (AMAs)[332] and irrigation non-expansion areas (INEAs).[333] The Director's approval is required, for example, to drill a new or replacement well in an AMA, and the Director may reject such a permit if he determines the new well would "unreasonably increase damage to surrounding land or other water users."[334] The Director may also create new AMAs and

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324. ARIZ. REV. STAT. ANN. § 45-103(B) (1987).
325. *See infra* notes 457-60 and accompanying text.
326. Connall, *supra* note 323.
327. *Id.* at 332-33.
328. *Id.* at 333.
329. ARIZ. REV. STAT. ANN. § 45-105 (1987).
330. ARIZ. REV. STAT. ANN. § 45-105(A)(1) (1987).
331. ARIZ. REV. STAT. ANN. § 45-105(B)(1) (1987).
332. ARIZ. REV. STAT. ANN. § 45-402(2) (1987).
333. ARIZ. REV. STAT. ANN. § 45-402(19) (1987).
334. ARIZ. REV. STAT. ANN. §§ 45-598(A), -599(C) (1987).

INEAs[335] or convert existing INEAs into AMAs.[336] The Act explicitly gives the Director practically complete discretion to prescribe the management goals and practices for each subsequent AMA.[337]

The Director's extensive authority was intentionally crafted to allow him considerable discretion to anticipate and deal with problems raised by managing Arizona's water resources. This discretionary authority forms the cornerstone of the Act's implementation and ultimate success. Such prescient delegation is remarkable when one considers that the architects of the Act—the farmers, miners, and cities—had historically been at odds with one another and had vigorously promoted their own interests at the expense of efficient water management:

> The method of administration chosen [centralized state management] is one of the most striking features of the code. It is remarkable that parties who fought so vigorously to protect their rights to use groundwater were willing ultimately to place their fates in the hands of the Water Czar. Although his decisions are appealable to superior court, the director has enormous power under the law. He decides—within a few vague standards—how much water each group can use. Indeed, the success or failure of the act rests largely with the director.[338]

The Act did not generally affect the Director's wide-ranging authority over surface water that dated back to the 1919 Water Code.[339] These include such important powers as the right to reject any new appropriation of surface water that "conflicts with vested rights, is a menace to public safety, or is against the interests and welfare of the public."[340] The Director also must approve any change in the place or the use of a water right. That is, a severance and transfer of a water right requires the Director's approval, which he may exercise conditionally.[341] A change in the use of water appropriated for domestic, municipal, or irrigation uses also requires the Director's approval.[342]

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335. ARIZ. REV. STAT. ANN. §§ 45-412, -432 (1987).

336. ARIZ. REV. STAT. ANN. § 45-439 (1987).

337. ARIZ. REV. STAT. ANN. § 45-569 (1987).

338. Connall, *supra* note 323, at 333 (footnotes omitted).

339. These powers over surface water were initially assumed by the state in the 1919 Water Code. Prior to 1980, and the creation of DWR, however, they had been the responsibility of the State Land Department and the Arizona Water Commission. Act of Apr. 24, 1979, ch. 139, § 79, 1979 Ariz. Sess. Laws 442; Act of June 12, 1980, ch. 1, § 169, 1980 Ariz. Sess. Laws 1492. *See infra* note 497.

340. ARIZ. REV. STAT. ANN. § 45-153(A) (1987).

341. ARIZ. REV. STAT. ANN. § 45-172(1) (1987).

342. ARIZ. REV. STAT. ANN. § 45-156(B) (1987).

The legislature has also given the Director important responsibilities in connection with general stream adjudications. These include providing technical assistance to the superior courts "in all aspects of the general adjudication[s]" with respect to which the Director is proficient[343] as well as "[i]dentify[ing] the hydrological boundaries of the river system[s]" subject to state water rights adjudications.[344]

In short, the Director is the linchpin of water management in the state. If a pressing management problem like the groundwater/surface water interface requires resolution by the application of hydrologic and regulatory expertise, the Director has authority to deal with it, unless some provision of law specifically prevents her from doing so.

A. Possible Code Limitations On The Director's Authority To Manage Ground & Surface Water On A Unified Basis

The 1980 Arizona Ground Water Management Act may be the most comprehensive groundwater quantity code ever enacted.[345] Three provisions, however, pose problems that might, at first glance, seem inconsistent with the idea of managing ground and surface water together. The Act first purports to retain the "beds and banks" distinction between underground streams and other kinds of groundwater.[346] Second, the Act contains a seemingly broad disclaimer of any effect on "decreed and appropriative water rights."[347] Third, although the Director has broad authority over surface and groundwater uses inside an AMA,[348] in areas outside of an AMA, a "person may . . . withdraw and use groundwater for reasonable and beneficial use."[349] We will consider each in turn.

B. The Act's Definition Of Ground And Surface Water

As pointed out earlier,[350] the Code's drafters apparently did not intend to alter existing law defining ground and surface water. Existing law was, we have argued, best construed as allowing management of ground and surface water together.[351] Thus the Code's definitions ought

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343. ARIZ. REV. STAT. ANN. § 45-256(A) (1987).
344. ARIZ. REV. STAT. ANN. § 45-256(A)(1) (1987).
345. Higdon & Thompson, *supra* note 23, at 623-24.
346. ARIZ. REV. STAT. ANN. §§ 45-101(4), (6) (1987). *See supra* notes 262-67 and accompanying text.
347. ARIZ. REV. STAT. ANN. § 45-451(B) (1987).
348. ARIZ. REV. STAT. ANN. § 45-402(2) (1987).
349. ARIZ. REV. STAT. ANN. § 45-453(1) (1987).
350. *See supra* note 265 and accompanying text.
351. *See supra* Part III.

not to be interpreted to prevent that result. An interpretation allowing for unified management is particularly apt in light of two features of the Act: (1) it frequently applies an appropriation-like concept to groundwater; and (2) it frequently treats surface and groundwater as a single resource.

Inside AMAs and, to a lesser extent, inside INEAs, the Act drew sharp distinctions between existing pumpers of groundwater and those not pumping groundwater.[352] Pumping of groundwater to bring new acreage under agricultural irrigation was essentially eliminated[353] and, although the Act does allow new pumping of groundwater for non-agricultural uses, such new wells are generally subject to potentially heavy regulation.[354] Existing pumpers are afforded more protection, although they too are subject to some regulation. The twin overarching

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352. In INEAs the Act grandfathered existing legal withdrawals of groundwater for irrigation purposes. ARIZ. REV. STAT. ANN. §45-437(A) (1987). This section allows irrigation with groundwater only of acreage legally irrigated between January 1, 1975 and January 1, 1980, and of acreage in which a substantial irrigation-related capital investment had been made in the year prior to the passage of the Act. *Id.* Irrigation with groundwater of any other acreage was eliminated, except for acreage substituted for flood damage or irregularly shaped acreage. *Id.* at §§ 437.02-03. *See also Aikins v. Arizona DWR*, 154 Ariz. 437, 743 P.2d 946 (Ct. App. 1987).

In AMAs, the Act grandfathered existing legal withdrawals of groundwater, § 45-462; provided for the regulated use of groundwater by cities, towns, private water companies, and irrigation districts within their areas of existing service, §§ 45-491 through -498; allowed for the continued use of a limited amount of groundwater for state university educational purposes, § 45-452(H); and allowed for continued groundwater use for specific mining processes, § 45-513(B). Virtually all other new uses of groundwater were either eliminated or made subject to the receipt of a groundwater withdrawal permit from the Director. § 45-512.

353. ARIZ. REV. STAT. ANN. § 45-452 (1987). In an initial AMA, only land that was legally being irrigated at any time from January 1, 1975, through January 1, 1980, "may be irrigated with any water." *Id.* All other irrigation uses, except for very limited enumerated exceptions, are eliminated. For example, a person may retire acres legally irrigated pursuant to § 452(A) and substitute new acreage and irrigate with CAP water. However, among other conditions, the substituted acres must have been legally irrigated between September 30, 1958, and September 30, 1968, § 45-452(B)(1), they must be located outside of the exterior boundaries of a service area, § 45-452(B)(2), and the substitution must "benefit the management of the active management area in which the acres are located." § 45-452(B)(5) (1987). There are also exceptions for state university agricultural experiments, § 45-452(H), and for the substitution of new acreage for flood damaged acres, § 45-465.01, and irregularly shaped irrigation acres, § 45-465.02. Each of the foregoing, however, is subject to stringent conditions. Similarly, in initial INEAs, irrigation is allowed only upon acres that were legally irrigated at any time between January 1, 1975, and January 1, 1980. § 45-437. Exceptions to this *per se* rule, allowing substitution of new acres for legally irrigated acres, also exist. *E.g.*, §§ 45-437.01, -.03 (1987). As with active management areas, however, each exception requires that legally irrigable acreage be retired.

354. In AMAs, ARIZ. REV. STAT. ANN. § 45-451(A)(1) (1987) subjects all withdrawals and uses of groundwater to the numerous restrictions of Articles 5 through Article 12 of the Act (§§ 45-461 through -637). In non-AMAs, groundwater may be withdrawn and used only for reasonable and beneficial uses, may be transported only in accordance with Article 8 of the Act, and, if in an INEA, may be used for irrigation only in accordance with Article 3 of the Act.

themes of the Act are that the state will carefully control how the state's groundwater is used, and that existing pumping of groundwater will be more leniently treated than proposed new uses. Such concepts are strongly reminiscent of the prior appropriation doctrine.[355]

Another important feature of the Act is that a number of its controls expressly apply to the use of all water, not just groundwater. For example, the Act prohibits irrigation with *any* water of any acreage in an initial AMA not legally irrigated at some time between January 1, 1975, and January 1, 1980.[356] Similarly, before a new well can be drilled in an AMA, the Director must determine whether the well will unreasonably damage "other water users,"[357] whether of surface or groundwater.

The conservation requirements of Article 9 of the Act also apply to the use of *any* water, so long as some of the water used is groundwater.[358] For example, Article 9 requires the establishment of increasingly strict "irrigation water duties"[359] for farm units during each of the five management periods established by the Act.[360] These water duties encompass *any* water "reasonably required to irrigate the crops" regardless of its source[361] and are applicable to all persons "*entitled* to withdraw or receive groundwater" whether they actually do or not.[362]

Article 9 also provides for the augmentation of the water supply of the active management areas by, among other means, importing water, storing it, or artificially recharging the groundwater aquifers.[363] Article 9 calls for the augmentation of the *entire* water supply of an AMA, not just the groundwater supply. There is, furthermore, no statutory restriction on the sources of water to be used for augmentation.

In a similar vein, the Article 9 management plans provide for progressively stricter conservation measures to be applied to industrial and

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355. *See* D. GETCHES, *supra* note 2, at 78-110.

356. ARIZ. REV. STAT. ANN. § 45-452(A) (1987).

357. ARIZ. REV. STAT. ANN. § 45-598(A) (1987).

358. ARIZ. REV. STAT. ANN. § 45-563 (1987). Management plans developed by the Director "shall include a continuing mandatory conservation program for all persons withdrawing, distributing or receiving groundwater . . . ."

359. ARIZ. REV. STAT. ANN. § 45-402(21) (1987).

360. ARIZ. REV. STAT. ANN. §§ 45-564 to -568 (1987).

361. *Id.*

362. ARIZ. REV. STAT. ANN. § 45-564(B)(1) (1987) (emphasis added).

363. ARIZ. REV. STAT. ANN. § 45-561(1) (1987). Beginning with the second management period and continuing through the fourth management period, the Director is obligated to establish a program to augment the water supply of AMAs, including incentives for artificial groundwater recharge. ARIZ. REV. STAT. ANN. §§ 45-565(5), 566(5), 567(4) (1987).

municipal uses of water.[364] Again, however, neither the definitions of industrial use and municipal use[365] nor the use of these terms in the provisions of Article 9 indicate applicability only to groundwater. On the contrary, the conservation measures of the management plans cover all industrial and municipal uses of water, so long as some of the water used is groundwater.

Other provisions of the Act expressly contemplate conjunctive use of surface and groundwater. Some groundwater withdrawal permits, for example, may be issued only if alternative, non-groundwater sources of water are unavailable.[366] If alternative sources of water become available after a groundwater withdrawal permit has been issued, the Director may require the permittee to stop pumping groundwater and substitute the alternative source of water.[367] The Act also contains special provisions for farms irrigated with both surface and groundwater, requiring complex accounting and management of the combination.[368]

The assured water supply provision[369] also expressly requires conjunctive water use. This section is designed to ensure that persons who intend to sell or lease subdivided land in AMAs obtain a certificate of assured water supply from the Director before they offer the land for sale or lease.[370] An assured water supply means "[s]ufficient *groundwater or surface water* of adequate quality will be continuously available to satisfy the water needs of the proposed use for at least one hundred years."[371]

C. *The Disclaimer Regarding Decreed and Appropriative Water Rights*

Another part of the Act might appear to be an obstacle to the idea that groundwater and connected surface water need to be managed together. The Act provides that it "shall not be construed to affect

364. ARIZ. REV. STAT. ANN. §§ 45-564 to -575 (1987).

365. ARIZ. REV. STAT. ANN. §§ 45-561(2), (5) (1987).

366. Before a groundwater withdrawal permit may be issued for mineral extraction or metallurgical processing, it must be determined that municipal and industrial Central Arizona Project Water is unavailable to the applicant and also that adequate quality surface water or effluent are unavailable. ARIZ. REV. STAT. ANN. §§ 45-514(A)(2), (3) (1987). Similar restrictions apply to general industrial use permits. ARIZ. REV. STAT. ANN. § 45-515 (1987).

367. ARIZ. REV. STAT. ANN. §§ 45-514(C), 515(C) (1987).

368. *See, e.g.*, ARIZ. REV. STAT. ANN. §§ 45-467(D), (E); 45-468 (1987).

369. ARIZ. REV. STAT. ANN. § 45-576 (1987).

370. ARIZ. REV. STAT. ANN. § 45-576(A) (1987). A certificate is not needed only in areas that the Director has designated as having an assured water supply.

371. ARIZ. REV. STAT. ANN. § 45-576(L)(1) (1987) (emphasis added).

decreed and appropriative water rights."[372] It is not entirely clear what is meant by "decreed or appropriative"—they are not defined[373]—but it might be read as suggesting that nothing in the Act should have an adverse physical impact on surface water rights.

But surely this is too broad an interpretation. As discussed earlier, numerous parts of the Act specifically and deliberately restrict surface water uses.[374] Existing surface water appropriative rights cannot be used, for example, to bring new crop land into production inside an AMA,[375] but this provision would be nullified if section 45-451(B) were interpreted broadly.

Instead, section 45-451(B) should be read simply to prevent any legal as opposed to physical effect on these decreed and appropriative rights. These rights were already subject to regulation, prior to the Act, under existing law applying to surface waters. Their place or type of use could not be changed, for example, without approval of the Director.[376] And their continued use was subject to continuing review to ensure that the use was "beneficial."[377] The provisions of the Groundwater Act that specifically restrict uses of the surface water right can readily be seen as merely giving greater definition to the legal restrictions that already existed on these rights. A broader interpretation of this general savings clause would nullify the specific restrictions of the Code, and disable its enforcement to carry out its ambitious objectives.

D. "Reasonable and Beneficial" Use Outside AMAs

Another potential obstacle to interpreting the Act to promote unitary management of ground and surface water is section 45-453. It states that "[i]n areas outside of active management areas, a person may . . . withdraw and use groundwater for reasonable and beneficial use."[378] Whether this preserves the doctrine of reasonable use outside

372. ARIZ. REV. STAT. ANN. § 45-451(B) (1987).

373. *Cf.* ARIZ. REV. STAT. ANN. § 45-466 (1987), which cautions that the Act's irrigation conservation requirements "shall not be applied to diminish surface water delivered to lands pursuant to appropriative *surface* water rights or decreed *surface* water rights" (emphasis added). This explicit reference to decreed and appropriative surface water rights could be construed as suggesting that § 45-451(B)'s broader reference to "decreed and appropriative rights" embraces such rights in groundwater as well, but that would, in effect, nullify the Act's numerous restrictions on the use of groundwater as well as surface water.

374. *See supra* text accompanying notes 356-71.

375. ARIZ. REV. STAT. ANN. § 45-452(A) (1987).

376. ARIZ. REV. STAT. ANN. §§ 45-156(B), -172 (1987)

377. ARIZ. REV. STAT. ANN. § 45-141(B) (1987).

378. ARIZ. REV. STAT. ANN. § 45-453 (1987). If the prior appropriation doctrine is extended to all hydrological-related surface and groundwater, the Director's authority will necessarily be statewide. *See* ARIZ. REV. STAT. ANN. § 45-153 (1987).

AMAs is unclear. The Arizona Supreme Court first recognized the doctrine of reasonable use in *Bristor II*.[379] It allowed a landowner to take water from beneath his own land for reasonable use upon his land without exposing him to liability for harm to his neighbors' water supply.[380] But "reasonable use" is, and always has been, a bit of a misnomer. "Reasonableness" of use under this doctrine was determined by only one factor—where the water pumped was used. If it was used on the land from which it was pumped, it was reasonable; if it was used off that land, it was unreasonable.[381] In effect, any use of subjacent water on overlying land short of intentional, malicious harm to an adjoining landowners' use of subterranean water was generally considered reasonable.[382]

Under this standard, those who used water on their own land, particularly farmers, could and did easily justify their water use regardless of the impact upon their neighbor's well.[383] Such uses were not subjected to damages nor could they be enjoined.[384] Attempts to transfer water off of the land from which it was pumped, on the other hand, formed the basis of a cause of action in favor of neighboring landowners whose use of subsurface water was threatened.[385]

The Act significantly altered the reasonable use doctrine by substantially modifying and, in some cases (such as inside AMAs), eliminating it. Inside AMAs, almost all use of groundwater is regulated regardless of whether it is used on or off the land from which it is pumped.[386]

Outside AMAs, the new water transportation provisions of the Act radically modify the reasonable use doctrine.[387] These provisions take into account surface water recharge of aquifers, lift impractical restrictions on the transportation of water off of the overlying land, and generally contain transportation provisions that accord with hydrological reality.[388] For example, the Act freely allows for the transfer of groundwater within sub-basins even if the water is used on different land from

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379. Bristor v. Cheatham, 75 Ariz. 227, 255 P.2d 173 (1953) (*Bristor II*). *See supra* text accompanying notes 297-305.

380. 75 Ariz. at 236, 255 P.2d at 178-79.

381. *Id.*

382. *Id.*

383. *Id.* at 238, 255 P.2d at 180.

384. *See id.*

385. *Id.*

386. ARIZ. REV. STAT. ANN. §§ 45-561 to -575 (1987). The Act does exempt certain small-capacity, non-irrigation wells. ARIZ. REV. STAT. ANN. § 45-454 (1987).

387. ARIZ. REV. STAT. ANN. §§ 45-541 to -545 (1987).

388. *Id.*

which it was pumped.[389] If there are no sub-basins, water can be transferred within groundwater basins without penalty.[390] All told, by recognizing aquifer recharge, Article 8 eliminates many of the impractical restraints the reasonable use doctrine imposed on water transfers.

The most profound effect of section 45-453, however, may be its incorporation of the concept of beneficial use to groundwater. Putting water to a beneficial use has long been the final step in perfecting an appropriative water right and in establishing its priority.[391] As applied to groundwater uses outside AMAs in section 45-453, the concept of "beneficial use" suggests the incorporation of surface water notions to groundwater use. It may, for example, require analysis of existing groundwater uses. In water law, "beneficial use" has continually evolved to incorporate emerging needs and values. Arizona, for example, has expanded its statutory list of beneficial uses to include water used for recreation, wildlife and artificial groundwater recharge.[392] The "reasonable and beneficial use" standard can also be construed as acknowledgement of the breadth of the state's police power in regulating its water resource.[393] Under this reading, section 45-453 readily provides a basis for statewide regulation of groundwater uses by the Director, including the power to conjunctively regulate ground and surface water together.

If the Director's authority to manage water conjunctively is nevertheless considered most clearly established inside AMAs, the Director

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389. ARIZ. REV. STAT. ANN. § 45-544(1) (1987). This recognizes that at least a portion of the water applied on any part of the land surface overlying a sub-basin will find its way into the common aquifer.

390. *Id.* One who transfers water between sub-basins or away from a groundwater basin can no longer be enjoined, but may have to pay damages. ARIZ. REV. STAT. ANN. § 45-544(2) (1987). Injury, however, is not presumed from transportation. ARIZ. REV. STAT. ANN. § 45-545(A) (1987). *See generally* Doyle, *The Transportation Provisions of Arizona's 1980 Groundwater Management Act: A Proposed Definition of Compensable Injury*, 25 ARIZ. L. REV. 655 (1983). A water transporter may counteract claims of injury with evidence of mitigation. ARIZ. REV. STAT. ANN. § 45-545(B)(1)-(3) (1987). Mitigation includes retiring farmland, eliminating other water uses, conserving water, and taking other such actions, such as importing water, that benefits the sub-basin or groundwater basin or landowners within them. *Id.*

391. ARIZ. REV. STAT. ANN. § 45-141(B) (1987); *see also* Gila Water Co. v. Green, 27 Ariz. 318, 232 P. 1016 (1925), *modified*, 29 Ariz. 304, 241 P. 307 (1925); Salt River Valley Water User's Ass'n v. Kovacovich, 3 Ariz. App. 28, 410 P.2d 201 (1966).

392. ARIZ. REV. STAT. ANN. § 45-151(A) (1987). Wildlife (including fish) was added as a beneficial use in 1941, recreation in 1962, and water use for artificial groundwater recharge was added in 1986. *Id.*, Historical Note. Beneficial uses had previously encompassed domestic, mining, agricultural and stock watering uses. *Id.*

393. The Act's declaration of policy, for example, notes that "[t]he legislature further finds that it is in the best interest of the general economy and welfare of this state and its citizens that the legislature evoke its police power to prescribe which uses of groundwater are most beneficial and economically effective." ARIZ. REV. STAT. ANN. § 45-401(A) (1987).

is given authority to designate new ones.[394] So-called "subsequent" AMAs[395] may be created if the Director determines that: (1) active management practices are necessary to preserve the existing supply of groundwater for future needs; (2) land subsidence is endangering property or potential groundwater storage capacity; or (3) groundwater use is resulting in actual or threatened water quality degradation.[396]

The first is particularly important, because future needs could include, for example, preserving recreation and wildlife habitat that depend upon surface water flows. If these surface flows require a stable, proximate water table, the Director could create an AMA. The Arizona legislature has already designated "recreation" and "wildlife, including fish," as beneficial uses of water.[397] Accordingly, if surface water is necessary in a watershed to sustain riparian habitat or to maintain recreation or wildlife use, and the surface flows depend upon the supply of connected groundwater, this groundwater could be protected under the Act by "active management."

The advantage of creating a new AMA is that it offers the possibility for flexible and creative management goals and plans.[398] Upon creating a subsequent AMA, the Director can establish regulations that recognize the unique characteristics of the watershed for which the AMA was created.[399] For example, if the ultimate goal of a subsequent AMA is to preserve riparian habitat and wildlife, the management goals of the AMA might be designed to protect the surface water flows. This could be accomplished by a plan requiring safe yield in the watershed.[400] Such a goal, furthermore, would not necessarily result in the elimination of existing groundwater pumping or surface water diversion at the time the AMA is created. If in a given year there were heavy precipitation and run-off, and excess water were available in the watershed, increased diversions could be allowed and the water could be stored.[401] On the other hand, if the resources of a watershed were deficient, the Director could curtail pumping or surface water diversion and require diverters

394. ARIZ. REV. STAT. ANN. § 45-412 (1987); *cf.* Aikins v. Arizona DWR, 154 Ariz. 437, 442, 743 P.2d 946, 951 (Ct. App. 1987).

395. ARIZ. REV. STAT. ANN. § 45-412 (1987).

396. *Id.*

397. ARIZ. REV. STAT. ANN. § 45-151(A) (1987).

398. ARIZ. REV. STAT. ANN. § 45-569 (1987). Designation of a subsequent active management area is subject to the notice and hearing provisions of § 45-413.

399. *Id.*

400. Safe yield here is as defined in ARIZ. REV. STAT. ANN. § 45-561(6) (1987)—maintaining a long-term balance between groundwater withdrawals and recharge.

401. *See*, for example, the underground storage provisions of ARIZ. REV. STAT. ANN. §§ 45-801 to -818 (1987).

to use the water stored from prior "wet" years.[402] In sum, if future needs required the protection of surface water flows, and regulation of groundwater is necessary to protect surface water flows, the Act not only authorizes creation of a subsequent AMA, but gives the Director substantial discretion in formulating goals and regulating water practices to provide this protection.

E. The Director's Powers are Vast, But Not Unfettered

The Arizona Groundwater Management Act is a remarkable piece of legislation, providing the structure necessary for comprehensive and economical administration of Arizona's water resources. Although the Director is given broad powers to make the lofty goals of the act a reality, those powers are not plenary. Section 45-405 subjects all of the Director's decisions to an administrative hearing upon request,[403] and the decisions can be appealed to a specially-designated superior court judge.[404] Decisions of the DWR must comport with standard tenets of administrative law; agency regulations must be supported by substantial evidence and the Director's decisions must not be arbitrary, capricious, or an abuse of discretion.[405] To find abuse of discretion or arbitrary and capricious action, the court reviews the record for unreasoned action taken without consideration of the underlying evidence. An action is neither arbitrary nor capricious if based upon due consideration, even if the court may believe the agency could have reached another conclusion.[406]

The Arizona Supreme Court has already acknowledged the DWR's role as the primary fact finder and expert in the state's water management efforts.[407] In general stream adjudications, for example, DWR's

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402. A similar scheme is already in effect in AMAs for withdrawals of water in excess of, or less than, existing grandfathered irrigation rights in AMAs. *See* ARIZ. REV. STAT. ANN. § 45-467 (1987).

403. ARIZ. REV. STAT. ANN. § 45-405(A) (1987).

404. ARIZ. REV. STAT. ANN. § 45-406 (1987).

405. *See, e.g.*, DeGroot v. Arizona Racing Comm'n, 141 Ariz. 331, 686 P.2d 1301 (Ct. App. 1984); Arizona Game & Fish Dep't v. Arizona State Land Dep't, 24 Ariz. App. 29, 535 P.2d 621 (1975).

406. Petras v. Arizona State Liquor Bd., 129 Ariz. 449, 452, 631 P.2d 1107, 1110 (Ct. App. 1981). If the record supports two inconsistent factual conclusions, then there is substantial evidence to support agency action based upon either conclusion. Webster v. State Bd. of Regents, 123 Ariz. 363, 365-66, 599 P.2d 816, 818-19 (Ct. App. 1979). See also *In re* Reinhard & Buena Vista Public Service (Decision of Director, DWR, July 19, 1984) and the appeal to superior court, Reinhard v. DWR, Santa Cruz County Superior Court No. 11594 (Sept.2, 1986), for an actual application of this process.

407. United States v. Superior Court, 144 Ariz. 265, 279-80, 697 P.2d 658, 671-73 (1985).

role includes identifying the source and boundaries of a river system and identifying potential claimants to the river system and source potential claimants.[408] DWR, as "a provider of expert and administrative assistance," is expected to provide the factual analysis necessary for effective water resource management.[409] Outside of the general adjudication context, the management of the state's water resources, the making of factual findings, the development of a regulatory scheme, and the resolution of water rights disputes are all part of DWR's responsibility.[410]

F. The Director's Implantation of Unitary Principles to Date

The discussion so far has illustrated the substantial power the Director has to carry out unified management of ground and surface water. But this authority is not merely latent; the Director has already demonstrated in several different contexts a sensitivity to the interaction problem, and has actually taken a number of discrete steps toward unified management.

For example, the Act requires developers to have an assured water supply for subdivisions in AMAs before offering such lands for sale or lease.[411] Assured water supply means that "[s]ufficient groundwater or surface water of adequate quality will be continuously available to satisfy the water needs of the proposed use for at least 100 years."[412] Pursuant to these statutory provisions, the Director has established guidelines that require developers to take into account the connection between ground and surface water and to secure their water rights in light of that connection.[413] Without the assured water supply, the sub-

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408. *Id.*

409. *Id.*

410. *Id.* Clearly, the availability of judicial review is an important and necessary check on the Director's broad powers. Properly utilized, judicial review ensures that all affected parties are fairly treated by the agency and that their rights and claims are handled with due consideration. Given the Act's broad delegation of authority to the Director, however, it should also be noted that the Act also provides for expedited appeals. ARIZ. REV. STAT. ANN. § 45-407(B) (1987). While this provision recognizes the importance of judicial review, it also underscores the fact that the proper functioning of the Act depends heavily upon discretionary administration by the Director.

411. ARIZ. REV. STAT. ANN. § 45-576(A) (1987).

412. ARIZ. REV. STAT. ANN. § 45-576(L)(1) (1987).

413. A "water supply which is diverted from surface water either directly, or indirectly through pumpage of wells connected to and obtaining from surface waters or the subflow of surface waters will be deemed assured only if such diversion is the exercise of a valid right to divert appropriable surface water." Department of Water Resources, Interim Information and Guidelines for Demonstration of Assured Water Supplies Within Designated Active Management Areas Pursuant to ARIZ. REV. STAT. ANN. § 45-576, Guideline 406 (September 8, 1982).

division plat must be rejected.[414] With these guidelines, the department has recognized that the only way to assure the availability of interrelated water supplies is to recognize the interrelation between ground and surface water.[415]

The Director has also set forth criteria for determining whether "water underlying or adjacent to a surface stream" is appropriable subflow or unappropriable groundwater.[416] In finding that there was "not a direct hydraulic connection between the groundwater underflow and the ephemeral flows of Cienega Creek,"[417] DWR used the following criteria:

A. There must be a flow of water occurring within the material which constitutes the bed of the stream or the lands under or adjacent to the surface stream. (Note that although the vertical and horizontal extent of the geologic units are an important factor, definite bank and bed boundaries are not necessarily required);

B. The water is noticeably related, in terms [of] its chemical characteristics and flow direction, to the flows which occur in the surface stream;

C. The gradient, elevation and flow direction of the water must generally correspond to those of flows in the surface stream. (Gradients which converge toward or diverge from the surface stream are generally indicative of water that is either contributing to or being recharged by the streamflow);

D. Withdrawal of the water must directly and appreciably affect flows in the surface stream (i.e., there must be a direct hydraulic connection between the groundwater underflow and the streamflow).[418]

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414. ARIZ. REV. STAT. ANN. § 45-576(B) (1987).

415. Article 8 of the Act, pertaining to transportation of groundwater, also overtly recognizes empirically-established hydrological principles. For example, groundwater may be transported off of the overlying land without payment of damages within a sub-basin, because application of that water on the overlying land can recharge the sub-basin aquifer beneath. Groundwater transportation away from a sub-basin is more highly restricted, however, because application of such water does not benefit the sub-basin from which it is withdrawn. *See* ARIZ. REV. STAT. ANN. §§ 45-541 to -545 (1987).

416. Letter from Kathleen Ferris, Director of DWR, to Julia Fonseca, Planning Division, Pima County Transportation and Flood Control District (December 5, 1986).

417. *Id.* Cienega Creek is located southeast of Tucson. The analysis was conducted in reference to a development project known as Empirita Ranch, Phase I.

418. *Id.*

These criteria indicate that the Director is attempting to determine whether groundwater is related to surface water in light of established hydrological principles and whether, therefore, the water is appropriable.[419] In this case, the Director concluded that "due to the presence of an unsaturated zone between the [ephemeral flows of Cienega Creek and the groundwater underflow], the underground water withdrawn would be groundwater, not subflow, and not subject to appropriation."[420] The converse, presumably, is that the presence of a saturated zone between the two water regimes indicates a direct hydraulic connection subjecting the underground water to appropriation.

Efforts by DWR's predecessor agency to conjunctively manage the state's ground and surface water resources have also been approved by the courts in at least one case. The Arizona State Land Department was upheld on appeal when it denied a permit to appropriate surface waters on the basis that the appropriation would unduly deplete the supply of a groundwater basin located in a critical groundwater area.[421] The Arizona Game and Fish Department had applied to appropriate water that flowed intermittently in the Papalote Wash, an indirect tributary of the Santa Cruz River.[422] The Papalote Wash was a principal source of recharge to the Upper Santa Cruz Basin, an area that had been declared a critical groundwater area by the State Land Commissioner in 1954.[423] Game and Fish's appropriation, to be used to construct a reservoir, was estimated to be "about 680 acre feet per year or approximately 1.7 percent of the total annual recharge of the upper Santa Cruz Basin."[424] Although the State Land Department found that "the proposed use would not conflict with any existing rights of prior appropriation and would not be a menace to public safety,"[425] it rejected Game and Fish's application because "the creation of 'another charge on the already over-burdened [groundwater] supply in the area does not appear . . . to be in the best public interest . . .'."[426]

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419. *Id.* For example, the Director acknowledges that a "bed and banks" restriction may be unworkable. The Director has also considered chemical composition of the groundwater and connected surface water and the gradient effect on flows to determine a connection.

420. *Id.*

421. Arizona Game and Fish Dep't v. Arizona State Land Dep't, 24 Ariz. App. 29, 535 P.2d 621 (1975).

422. *Id.* at 30, 535 P.2d 622.

423. *Id.* It was established that between 110,000 and 150,000 acre feet of water per year were pumped out of the basin and that the annual rate of recharge was approximately 40,000 acre feet per year.

424. *Id.*

425. *Id.*

426. *Id.*

Two questions were posed on appeal: (1) whether the State Land Department had authority to reject a surface stream appropriation when the protests were raised by downstream users of underground waters; and (2) whether the State Land Department abused its discretion in disallowing Game and Fish's application.[427] On the first issue, the court noted that it was irrelevant that the protestors had no vested rights in the water because the State Land Department was empowered to administer all of the laws relating to the appropriation of waters of the state, as well as to take evidence on those matters.[428] On the second issue, the court found that the evidence supported the State Land Department's exercise of discretion, particularly because the upper Santa Cruz basin was a critical groundwater area.[429]

This decision is noteworthy for a number of reasons. First, it reveals a sound understanding on the part of the administering state agency of the delicate interaction between surface flows and groundwater—in this instance, that allowing the appropriation of surface flows would materially impair the recharge of the upper Santa Cruz basin and thus deplete the basin's water supply. Second, the decision indicates the breadth of discretionary authority delegated to the agency to act in the public interest. Third, the decision demonstrates the heightened authority granted to the agency to manage water resources in a critical groundwater area. In that sense, the decision is a harbinger of the Director's authority to manage the state's water in AMAs.

Although DWR did not submit a brief to the court on the issue of groundwater-surface water interaction in the Gila River General Stream Adjudication, it did submit an extensive study on the issue and offered a technical summary and conclusions.[430] DWR also concluded that methodology exists for distinguishing between tributary and non-tributary aquifers, and is available to determine the effect of a pumping well on streamflow.[431]

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427. *Id.*

428. *Id.*

429. *Id.* at 30-31, 535 P.2d at 622-23.

430. DWR INTERACTION STUDY, *supra* note 31. The report concluded that in the Gila River System, there are a number of aquifers that contribute to surface flows, particularly in the upper Santa Cruz and San Pedro watersheds. *Id.* at 85.

431. *Id.* at 85, 87. The only exception DWR recognized was in cases of confined aquifers, where assessing the connection between groundwater and surface water is much more difficult. In such situations, absent clear evidence to establish a relationship between confined aquifers and streamflow, DWR advocated considering confined aquifers to be non-tributary, i.e., not contributing to surface flows. *Id.* DWR classified the effect of pumping from tributary aquifers upon streamflow into two ways: direct interference and indirect interference. "Direct interference occurs when the cone of depression reaches to the stream and begins to withdraw water directly from

In its study, DWR offered a range of objectives to be accomplished by the court's decree.[432] These scenarios ranged from a rigid adherence to the appropriative rights system that apparently exists today in Arizona, to more flexible and fact-specific approaches such as drought administration and streamflow protection, to a complete integration of rights in groundwater and connected surface waters requiring intensive factual analysis and computer modeling as well as use of bright line rules.[433]

DWR outlined the extent of hydrologic analysis that would be required for each objective. For example, a rigid application of existing Arizona appropriation doctrine would require DWR to ascertain whatever the court determined to be "subflow."[434] If the court chose to include all groundwater uses that interfered with senior surface water rights and incorporated a bright line rule,[435] then DWR would have to develop extensive analytical methods and computer modeling programs.[436]

On the other hand, an objective such as streamflow protection would allow DWR to use a more flexible administrative scheme suited to the uses and demands of each watershed.[437] DWR would analyze existing groundwater uses in light of the extent of interference on surface flows and the relative priority date of the use.[438] New uses from tributary aquifers could be allowed if their impact was not material.[439] Where interference is increasing, on the other hand, and materially affecting existing rights, new uses could be restricted and existing uses could be curtailed.[440] Such an approach would allow DWR to assess all pertinent evidence and apply controls suited to the purposes and characteristics of each particular watershed.

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streamflow." *Id.* at 85. According to DWR, this type of interference occurs in the flood-plain aquifers adjacent to a stream, and streamflow depletion is generally noticeable in the same season that pumping occurs. Indirect interference occurs when the pumping of the well intercepts groundwater flow or recharge that would eventually make its way to a stream and become part of surface flows. *Id.* at 86. Indirect interference will eventually result in decrease in surface flows, but the effect may not be felt for several seasons.

432. *Id.* at 88-89.

433. *Id.* at 88-90.

434. *Id.* at 88.

435. "For example, it could encompass all [groundwater] uses which would have the potential to withdraw 50% of their volume from the stream within 50 years." *Id.* at 89.

436. *Id.* at 89. DWR estimated such analytical methods may take five years to develop.

437. *Id.* at 89-90.

438. *Id.*

439. *Id.* at 90.

440. *Id.*

The foregoing examples illustrate that DWR recognizes the physical connection frequently present between surface water and groundwater. DWR also recognizes, however, that conjunctive management is not an easy task and that it requires sophisticated analysis to be done effectively. DWR has also demonstrated that it understands the technical hurdles to overcome in order to proceed on a unified basis. Armed with this knowledge, DWR has taken steps to develop means of dealing with the interaction. For the courts to stop this progress by a wooden, unreal, and ultimately unworkable reading of the law would be a significant step backward.

G. The Legislature's Recent Promotion of Conjunctive Management

The legislature also recognized the hydrologic interface between ground and surface water when it enacted, in 1986, a program to encourage and regulate artificial groundwater recharge.[441] This law was designed to, among other things, "further the conjunctive management of the water resources of this state."[442] Although conjunctive management was not defined in the Act, it is generally understood to mean managing ground and surface water on a coordinated, integrated basis.[443]

The Underground Water Storage Act does not directly confront the legal issues addressed in this article.[444] Parts of the act do, however, squarely support the approach suggested in this paper. For example, the Director may approve a recharge project only if she finds that it "will not cause unreasonable harm to . . . other water users within the area of hydrologic impact."[445] This appears to set out a legal standard for evaluating the interference a groundwater recharge project might create for surface water rights holders. The act defines "area of hydrologic impact" in hydrological terms, rather than by using artificial legal concepts.[446] Finally, a groundwater recharger needs a separate permit to recover the water stored.[447] The Director may grant the recovery well permit upon a determination that recovery "will not unreasonably increase damage to . . . other water users from the

441. Underground Water Storage Act, ARIZ. REV. STAT. ANN. §§ 45-801 to -818 (1987).

442. ARIZ. REV. STAT. ANN. § 45-801 (1987).

443. *See* Trelease, *supra* note 14, at 1853-54.

444. It defines neither surface water nor groundwater, ARIZ. REV. STAT. ANN. § 45-802 (1987), disclaims any effect on "vested water rights," ARIZ. REV. STAT. ANN. § 45-803 (1987), and contains only a vague requirement that the applicant for a recharge project show that it has "a right to use the proposed source of water." ARIZ. REV. STAT. ANN. § 45-804(B)(2) (1987).

445. ARIZ. REV. STAT. ANN. § 45-804(B)(4) (1987).

446. ARIZ. REV. STAT. ANN. § 45-802(2) (1987).

447. ARIZ. REV. STAT. ANN. § 45-807(A) (1987).

concentration of wells."[448] Although such protection might more readily be applicable to other groundwater pumpers rather than surface water users, the legislature used general language ("water users") that did not attempt to draw distinctions between the two. Thus, this Act supports the idea that ground and surface water must be managed on a unitary, coordinated basis in Arizona.

V. LESSONS FROM OTHER STATES

The experiences of Arizona's neighboring western states with unified management of water resources have three themes: (1) the doctrine of prior appropriation is pervasive; (2) a majority of western states manage groundwater and connected surface water as one resource; and (3) water resources, virtually without exception, are administered by expert state administrative agencies largely through regulations.[449]

Riparian principles have long been regarded as unsuited to the arid regions of the Western United States.[450] As the Supreme Court of the Colorado territory noted over 100 years ago, "in a dry and thirsty land it is necessary to divert the waters of streams from their natural channels, in order to obtain the fruits of the soil, and this necessity is so universal and imperious that it claims recognition of the law."[451] Today, all of the nineteen western states, except for Hawaii, generally follow the doctrine of prior appropriation.[452]

Thirteen of the eighteen states that apply prior appropriation extend its application to all hydrologically connected surface water and groundwater.[453] Of these, six have a single water code for all hydrologically

448. ARIZ. REV. STAT. ANN. § 45-807(B)(1) (1987).

449. *See generally* NATIONAL WATER COMMISSION, A SUMMARY DIGEST OF STATE WATER LAWS (1973) [hereinafter SUMMARY DIGEST].

450. *Id.*

451. Yunker v. Nichols, 1 Colo. 551, 553 (1872).

452. Grant, *The Complexities of Managing Hydrologically Connected Surface Water and Groundwater Under The Appropriation Doctrine*, 22 LAND & WATER L. REV. 64 (1987). The universal rejection of riparian principles in the arid west is a tribute to the recognition of fact and the willingness to discard obsolete legal doctrine. Virtually every early western state confronted the issue of whether its water would be administered under common law principles of riparianism or under a system of prior appropriation. SUMMARY DIGEST, *supra* note 449, at 12. Because riparianism was not well-suited to the demands of an arid environment, it was rejected. Similarly, as hydrologic knowledge advanced, and evidence establishing connections between surface water and groundwater mounted, the other Western states rejected obsolete legal doctrines that bifurcate rights to surface water and tributary groundwater, and instead began to conjunctively manage their water and integrate the rights to this resource. *Id.* at 6-7.

453. Grant, *supra* note 452, at 64. *See* ALASKA STAT. § 46.15.030 (1987); COLO. REV. STAT. § 37-92-102 (Supp. 1987); IDAHO CODE §§ 42-101, -103 -226, -229, -230 (Supp. 1988); KAN. STAT. ANN. §§ 82a-703, -707 (1984); MONT. CODE ANN. §§ 85-2-101, -102(14) (1987); NEV. REV. STAT.

connected water resources,[454] five have statutes that require the integration of related surface water and groundwater,[455] and two have courts that have upheld integrated administration of rights by state agencies.[456]

Actual experience in the other states shows how unitary management requires a centralized administrative structure in order to manage a state's water resources comprehensively.[457] Increased settlement of the west in the late nineteenth century led to increasing and conflicting claims of water rights that the courts were unable to resolve.[458] Some centralized mechanism was necessary to manage a state's water resources efficiently and equitably.[459] This pervasive development of state water resource administrative agencies was the product of trial and error in dealing with the formidable task of cataloguing and administering water rights. Consequently, all nineteen western states have some form of centralized administration of their water resources.[460]

Perhaps more than any other state, Colorado has refined its administration and integration of rights to groundwater and connected surface water. Its approach, which has been in force for almost thirty years, has been to recognize that such administration is largely a question of fact and to give primary responsibility for dealing with water management to the state engineer. Regardless of the problem encountered, the state engineer's structural approach has been uniform, involving three phases: (1) gathering evidence relevant to the water management problem at hand; (2) promulgating rules and regulations based upon the evidence gathered; and (3) issuing administrative orders pursuant to those rules and regulations.[461] Requirements for notice and hearing and

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§§ 533.025, .030, 534.020 (1987); N.M. STAT. ANN. §§ 73-1-1, -1-3, -3-1 (1978 & Supp. 1988); N.D. CENT. CODE § 61-01-01 (1985); OR. REV. STAT. §§ 537.120, .515, .525, .535 (1987); S.D. CODIFIED LAWS ANN. §§ 46-1-1 to -3 (1987); UTAH CODE ANN. §§ 73-1-1, -1-3, -3-1 (1980); WASH. REV. CODE ANN. §§ 90.03.010, 44.020, 44.035, 44.040 (1987); WYO. STAT. §§ 41-3-101, -901, -905, -930, -936 (1977 & Cum. Supp. 1988).

454. Grant, *supra* note 452, at 64. *See* ALASKA STAT. §§ 46.15.010 to -.270 (1987); COLO. REV. STAT. §§ 37-92-101 to -602 (Supp. 1987); KAN. STAT. ANN. §§ 82a-701 to -731 (1984); MONT. CODE ANN. §§ 85-2-101 to -520 (1987); N.D. CENT. CODE §§ 61-01-01, 61-04-01 to -25 (1985); UTAH CODE ANN. §§ 73-3-1 to -29 (1980).

455. Grant, *supra* note 452, at 64; IDAHO CODE § 42-237a(g) (Supp. 1988); OR. REV. STAT. §§ 537.525(9), .620(3) (1987); S. D. CODIFIED LAWS ANN. § 46-6-3 (1987); WASH. REV. CODE ANN. § 90.44.030 (1987); WYO. STAT. § 41-3-916 (1977 & Cum. Supp. 1986).

456. Grant, *supra* note 452, at 65; City of Albuquerque v. Reynolds, 71 N.M. 428, 379 P.2d 73 (1963); Griffin v. Westergard, 96 Nev. 627, 615 P.2d 235 (1980).

457. SUMMARY DIGEST, *supra* note 449, at 13.

458. *Id.* at 12.

459. *Id.* at 11.

460. *Id.*

461. *See, e.g.*, Kuiper v. Well Owners Conservation Ass'n, 176 Colo. 119, 490 P.2d 268

for judicial review protect water users from arbitrary or unreasonable discrimination.[462]

The problems encountered include delayed impact of groundwater diversions, timing and selection of junior groundwater appropriators for closure, incommensurate impact of junior diversions, and decisions concerning the rate at which to deplete groundwater in storage.[463] The Colorado state engineer and the Colorado courts have addressed many of these problems. The solutions devised to meet these problems illustrate how conjunctive use management and the attendant integration of priorities to water resources might be approached. A brief discussion of one problem demonstrates the general process by which solutions are reached.

The delayed impact of junior groundwater diversions[464] poses at least three administrative problems: (1) when should junior groundwater diversions be terminated to allow senior rights to be satisfied; (2) which junior diversions should be terminated; and (3) at what point is the impact too far removed in time to require closure.

Colorado's state engineer has been given authority to discontinue diversions by junior right holders to prevent "material injury" to senior rights.[465] In assessing the materiality of injury, the state engineer considers a variety of factors, including how much water will be made available by stopping junior diverters; hydrogeologic composition of the stream bed and the distance between the diversion points; the rate at which the water is moving both on the surface and underground; and the availability of surface flow.[466] The state engineer develops a regulatory scheme based on information relating to the unique composition of each watershed. Such a detailed regulatory scheme, carried out by administrative rule, was upheld in *Kuiper v. Well Owners Conservation Association*.[467]

Colorado courts have similarly upheld state engineer regulation in cases involving incommensurate and inconsequential impact of ground-

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(1971); *In re* Rules and Regulations Governing the Use, Control and Protection of Water Rights, 196 Colo. 197, 583 P.2d 910 (1978); *In re* Amendment to the Rules & Regulations Governing the Use, Control and Protection of Surface and Ground Water Rights, 195 Colo. 557, 581 P.2d 293 (1978).

462. *See* Fellhauer v. People, 167 Colo. 320, 447 P.2d 986 (1968).

463. *See supra* note 461.

464. When water is pumped from a well, it generally has a delayed impact on connected stream flows. DWR INTERACTION STUDY, *supra* note 31, at 23.

465. COLO. REV. STAT. § 37-92-502 (Supp. 1987).

466. *Id.*

467. 191 Colo. 53, 550 P.2d 288 (1976). *See also* Southeastern Colo. Water Conservation Dist. v. Rich, 625 P.2d 977 (Colo. 1981).

water diversions,[468] allowing the agency considerable discretion to determine the point at which a junior groundwater diversion has a material impact on surface water rights.

The most important message from this experience is that Colorado, long considered the most progressive and effective state in managing its hydrologically-connected water resources, has delegated water management authority to an institution specifically designed and designated to handle this task. Not surprisingly, Colorado's experiences echo the sentiments of the National Water Commission, which ardently advocated administrative control of water resources some fifteen years ago: "Experience has demonstrated that effective distribution of water can only be accomplished through centralized control where the water commissioner is independent from the influence or control of the users."[469]

VI. The Role of Federal Law

A. *Federal Substantive Law on the Groundwater/Surface Water Interface*

In the end, Arizona's attempts to manage the interface between ground and surface water under its own law may be overshadowed by federal law. The presence of so much federal and Indian land in Arizona—much of which supports water rights arising under federal law—might hold the key for bringing water management in the state fully into line with hydrologic imperatives.

These federal rights are based on the U.S. Supreme Court's 1908 decision in *Winters v. United States*.[470] The Court held that when the federal government set aside land for federal purposes, it implicitly reserved sufficient water to carry out those purposes. Originally thought to apply only to Indian reservations, it was explicitly extended to other federal lands such as national parks, forests, and wildlife refuges by the U.S. Supreme Court's decision in *Arizona v. California* in 1963.[471]

In the context of surface and groundwater interrelations, the most important case applying the doctrine is the unanimous decision in *Cappaert v. United States*, rendered in 1976.[472] There the Supreme

468. Danielson v. Jones, 698 P.2d 240 (Colo. 1985); Giffen v. City and County of Denver, 690 P.2d 1244 (Colo. 1984).

469. Summary Digest, *supra* note 449, at 15.

470. 207 U.S. 564 (1908).

471. 373 U.S. 546, 601 (1963).

472. 426 U.S. 128 (1976).

Court held that the *Winters* doctrine could prevent groundwater pumping that was lawful under state law. Federal law controlled, so that where a federal water right exists, the United States "can protect its water from subsequent diversion, whether the diversion is of surface or groundwater."[473]

The supremacy clause and the history of federal involvement in water development in the West made this a logical and unsurprising decision. The federal government has, on more than one occasion, exercised its constitutional powers by preventing the pumping of groundwater, otherwise lawful under state law, to protect an overriding federal interest. In Arizona, for example, the courts have upheld the federal government's right to prohibit groundwater pumping that would interfere with a federal project.[474] Congress, in authorizing the Central Arizona Project in 1968, demanded each federal contract for project waters to require that "there be in effect measures, adequate in the judgment of the Secretary [of the Interior] to control expansion of irrigation from aquifers affected by irrigation in the contract service area."[475]

Therefore, given the location and magnitude of the federal *Winters* water rights in Arizona, federal law may control how groundwater hydrologically connected to surface water is managed in large parts of the state. Arizona has recognized this possibility. The state filed an *amicus* brief in *Cappaert*, asserting that if federal water rights affected management of related groundwater under state law, tremendous dislocations in the state water law system would follow, wreaking "economic havoc" on the state, "possibly preclud[ing] future growth and development" and making groundwater-dependent cities like Tucson "ghost towns."[476] Specifically, Arizona warned in its brief, if the lower court decision were affirmed (which it was), "virtually all underground water in Arizona will be subject to [federal reserved water rights]. State granted water rights will be worthless and Arizona as we know it today will not survive."[477]

Some important questions about how completely federal law overrides state law remain somewhat unresolved. It is not clear, for example, whether federal or state law will fix the burden of proof on such questions as whether the pumping of groundwater pursuant to state

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473. *Id.* at 143.

474. Brophy v. United States, 231 F.2d 437 (9th Cir.), *cert. denied*, 351 U.S. 927 (1956).

475. 43 U.S.C. § 1524(c) (1982).

476. Brief of State of Arizona and Arizona Water Commission as *amicus curiae* in support of petition for certiorari at 17-18, Dkt. Nos. 74-1107, 74-1304, Cappaert v. United States, 426 U.S. 128 (1976) [hereinafter Brief].

477. *Id.* at 22.

law is adversely affecting a federal water right. One case has addressed that question, but most unclearly. In *United States v. Smith*,[478] the United States sought to enjoin groundwater pumping near the Gila River that allegedly interfered with Indian *Winters* water rights on the river. The court rejected the challenge. It saw Arizona law as creating a "presumption" that all underground water is "percolating water, i.e., independent of surface water," which is rebuttable only with "clear and convincing evidence."[479] Significantly, the court noted that the question of hydrologic connection must be "decided according to scientific factual determinations, and not on a state law presumption without basis in fact."[480] This explicit rejection of the idea that state law controls the determination was somewhat muted by the court's assumption that the federal government had the burden of proof on the hydrologic connection.[481] This allocation of the burden of proof was not made explicitly on the basis of state law; indeed, the court expressly refused to decide whether the district court's view that state law controlled the question was correct.[482] Instead, it regarded the case as controlled by the trial court's factual finding that the groundwater being pumped was not affecting water in the Gila River.[483]

A range of possible answers exists to the question whether state or federal law controls the allocation of the burden of proof concerning hydrologic connections. One may fairly regard the question as one of federal common law, because it might be vital in protecting the federal water right. Or, federal common law may borrow from state law, at least to the extent the federal substantive water right is not seriously compromised.[484]

In considering whether any state law presumption might apply, however, one should not forget that Arizona law is itself not completely

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478. 625 F.2d 278 (9th Cir. 1980).

479. *Id.* at 280 n.1. The court did not cite *Southwest Cotton* for these propositions, although that was apparently their source. *See also supra* notes 171-75.

480. *Id.* at 280 n.3.

481. *See id.* at 280 n.2.

482. *Id.* at 280.

483. *Id.* at 280-81.

484. To the extent federal water rights for the benefit of Indians are involved, a federal statute that generally places the burden of proof on a white person in a property dispute with an Indian might come into play. *See* 25 U.S.C. § 194 (1982). *Cf.* Wilson v. Omaha Indian Tribe, 442 U.S. 653 (1979) where the Court held that a state is not a "white person" within the meaning of this statute, and state law should be borrowed as the rule of decision in a dispute over title to riparian land. On remand, however, the Indians prevailed. *See* Omaha Indian Tribe v. Wilson, 614 F.2d 1153 (8th Cir.), *cert. denied*, 449 U.S. 825 (1980); United States v. Wilson, 523 F. Supp. 874 (N.D. Iowa 1981).

clear on the question. *Southwest Cotton* announced that the burden of proof is on the party claiming the groundwater is not percolating, but that statement is seriously undercut, if not wholly vitiated, by later discussion in that case and the subsequent evolution of Arizona water law.[485]

B. The Arizona General Stream Adjudication Statute: Has Arizona State Law Incorporated Federal Law on the Groundwater/ Surface Water Interface?

The statute authorizing Arizona courts to assert jurisdiction over suits to quantify federal water rights further complicates the matter.[486] One can easily interpret this statute as settling whether groundwater pumping must be managed together with uses of hydrologically-related surface water.

In 1979, in response to demands to quantify the water rights held by the United States in trust for the Arizona Indian Tribes, the Arizona legislature enacted a general stream adjudication statute.[487] The idea was simply to try to ensure that the Indian water rights would be quantified and adjudicated in state rather than federal court. Although these water rights are based upon federal substantive law, Congress in 1952 adopted the McCarran Amendment,[488] which waived federal sovereign immunity in general stream adjudications in state courts when federal water rights were implicated.[489]

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485. *See supra* text accompanying notes 171-284.

486. ARIZ. REV. STAT. ANN. §§ 45-251 to -260 (1987).

487. *Id.*

488. 43 U.S.C. § 666 (1982).

489. On its face, the amendment did not encompass water rights held by the United States for Indians, but the Supreme Court decided in 1976 that these Indian rights were included. Colorado River Water Conservation Dist. v. United States, 424 U.S. 800 (1976). This decision gave the states the opportunity they had long sought, to give their own courts, presumably more expert in water adjudications and less friendly to Indian water claims, first crack at determining these rights.

In its editorial response to a later Supreme Court decision affirming Arizona state court jurisdiction over Indian claims (Arizona v. San Carlos Apache Tribe, 463 U.S. 545 (1983)), the Arizona Republic called it an "historic" decision that "indirectly diminishes" the Indian claims, and "puts pressure on Arizona tribes to reduce water claims . . . ." The result, according to the Republic, will make "[g]reat amounts of water . . . available to states to accommodate the needs of growth." Arizona Republic, July 7, 1983, at A-6, col. 1. The then-Director of the Arizona Department of Water Resources responded to this claim by pointing out that the court was "very careful to point out that its decision 'in no way changes the substantive law by which Indian rights in state water adjudications must be judged.'" Letter from Wesley E. Steiner to editor, published in Ariz. Republic, July 20, 1983, at A-6, col. 5. Steiner went on to charge that "the editorial only increases the perception by the Indian tribes that they will be treated unfairly in a state court proceeding." *Id.*

The McCarran Amendment was not, however, an unmitigated surrender to state control. First, it waived federal sovereign immunity only for *general* stream adjudications; it did not allow the state courts to single out the federal government for special treatment. Specifically, the waiver pertained only to suits for the adjudication of all "rights to use the water of a river system or other source."[490] If the states wanted to adjudicate federal water rights, they would, in the same proceeding, have to adjudicate water rights grounded on state law in the same water source.[491]

Second, the McCarran Amendment was only procedural; it did not alter the applicable substantive law. Thus, Indian and other federal water rights would be tested against the requirements of federal law, even in state courts.[492] It also meant that federal issues could, after the state courts had completed their labors, be reviewed by the Supreme Court on writ of certiorari.[493]

Third, the amendment did not require the state courts to hear these cases, nor did it disable the federal courts from continuing to adjudicate federal water rights. Rather, it merely gave the state courts concurrent jurisdiction over federal water rights in the context of a state court general stream adjudication. On such a sensitive subject, the states and federal agencies would inevitably come into conflict, and race each other to the courthouse. In decisions in 1976 and 1983, however, the Supreme Court effectively changed the McCarran Amendment from one calling for concurrent jurisdiction to one favoring state jurisdiction.[494] Encouraging comprehensive adjudication, and emphasizing the state courts' familiarity with water law matters, the Court said that when factors such as convenience and priority of initiation were in rough balance, the federal courts ought to let the state courts adjudicate.[495]

Fourth, the McCarran Amendment waived federal sovereign immunity only in "suits" for general adjudication of water rights.[496] This suggested that state laws giving administrative agencies jurisdiction over general adjudications of water rights would not qualify. For Arizona, this was particularly problematic. The Arizona water code gave the

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490. 43 U.S.C. § 666(a) (1982).

491. *See* Dugan v. Rank, 372 U.S. 609 (1963).

492. *See, e.g.*, United States v. Superior Court, 144 Ariz. 265, 277, 697 P.2d 658, 670 (1985).

493. *See, e.g.*, Arizona v. San Carlos Apache Tribe, 463 U.S. 545, 571 (1983).

494. Colorado River Water Conservation Dist. v. United States, 424 U.S. 800, 818-20 (1976); *Arizona v. San Carlos Apache Tribe*, 463 U.S. at 571.

495. *Colorado River Water Conservation Dist.*, 424 U.S. at 818-20.

496. 43 U.S.C. § 666 (1982).

state land department responsibility to adjudicate water rights.[497] This meant that the federal government could not be joined because the amendment's waiver of sovereign immunity did not extend that far. In 1979, the state legislature responded by revising the adjudication procedure to remove jurisdiction from the administrative agency and vest it in the superior courts.

This did not completely solve the problem. For the judicial proceeding to qualify, it also had to be comprehensive; in the language of the McCarran Amendment, it had to embrace all "rights to the use of water of a river system *or other source.*"[498] In *Cappaert*, the U.S. Supreme Court had avoided deciding whether federal water rights extended to groundwater, but it left no doubt that as a matter of federal law, federal water rights to surface water were protected from subsequently initiated pumping of nearby, hydrologically-connected groundwater, even when that pumping was fully lawful under state law.[499] Congress itself had supported the notion that groundwater was not immune from federal claims by approving settlements of Indian water rights that strongly indicated its belief that Indian tribes had powerful legal claims to groundwater.[500]

Thus, Arizona's problem in designing a new general stream adjudication statute was to capture Indian and other federal water rights that probably extended to groundwater, and in any event were protected by federal law from more recently-vested state law rights to pump groundwater.[501] As a matter of federal substantive law, how the state chose

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497. *See* ARIZ. REV. STAT. ANN. §§ 45-231 to -245 (repealed 1979). Originally the water commissioner performed this function, but it was transferred to the state land department in 1943. *See* 1943 Ariz. Sess. Laws, ch. 28. It might be regarded as significant that, in the 1928 recodification, the category of water subject to adjudication was expanded from "streams" to "any stream or water supply." ARIZ. REV. CODE § 3293 (1928). The system of an administrative adjudication was upheld against the challenge that it vested judicial power in administrative agency in Stuart v. Norviel, 26 Ariz. 493, 226 P. 908 (1924).

498. 43 U.S.C. § 666(a) (1982) (emphasis added).

499. *See* Cappaert v. United States, 426 U.S. 128 (1976), discussed *supra* at text accompanying notes 472-73. The side-stepping occurred when the Supreme Court described the water pool in the Devil's Hole in Nevada, some 50 feet below the mouth of the cavern, as surface water. 426 U.S. at 142.

500. *E.g.*, 92 Stat. 409 (1978), as amended by 98 Stat. 2698 (1984) (Ak Chin settlement). In this Act, Congress found that the Indian community "relies for its economic sustenance on farming, and that ground water [is] necessary thereto . . . ." *See also* Southern Arizona Water Rights Settlement Act, 96 Stat. 1274 (1982) (settling a portion of the water rights claims of the Tohono O'Odham (formerly Papago) Tribe).

501. Federal water rights vest no later than the date of the reservation of land to which they pertain, and because most federal reservations were created in the nineteenth century, this usually gives federal rights an earlier priority than rights to the same source obtained under state law. *See, e.g.*, *Cappaert*, 426 U.S. at 138.

to characterize its groundwater was irrelevant. State law might distinguish between percolating groundwater and groundwater in underground streams or channels, but *Cappaert* made clear that federal law drew no such distinctions.[502] For federal law, the question is one of hydrology, not legal compartmentalization.

Therefore, to design a statute capable of drawing the federal government into a state court adjudication of its water rights, the state had to allow the adjudication of all state law water rights that were hydrologically related to these federal rights. The state had to be prepared, in other words, to adjudicate all rights in any "river system or other source"[503] that related to any federal rights in the same system or source.

The Arizona statute was enacted within two months after several Indian tribes filed an action in federal court to establish their water rights. The tribes' action was itself in response to a state administrative adjudication initiated with the same objective.[504] The statute allows the adjudication "of the extent and priority of the rights of all persons to use water in any river system and source."[505] It defines "person" to include the United States and Indian tribes,[506] and "river system and source" to mean "all water appropriable under § 45-141 *and* all water subject to claims based upon federal law."[507]

This last definition does not say that only federal claims to the water of a river system and source can be adjudicated. Such a definition would probably not have permitted joinder of the United States under the McCarran Amendment, because such an adjudication would not have been general, but instead would have targeted federal claims only. Instead, the statute embraces "all water subject to claims based upon federal law."[508] Because this is preceded by the conjunctive "and," it

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502. *Id.* at 142-43 (1976). *See also* the decree in Arizona v. California, 376 U.S. 340 (1964) which, among other things, defined consumptive use of water from the mainstream of the Colorado River as including water "drawn from the mainstream by underground pumping," *id.* at 340, § I(C), and placed certain restrictions on New Mexico's use of water from certain streams, their tributaries, and their "underground water sources." *Id.* at 347-51, §§ IV(A), (B), (C), and (D).

503. 43 U.S.C. § 666(a) (1982).

504. *See* United States v. Superior Court, 144 Ariz. 265, 271, 697 P.2d 658, 664 (1985); Pfister & Smith, *Resolution of Indian Water Claims*, ARIZONA WATERLINE (Salt River Project, Summer 1984); Moore & Weldon, *General Water-Rights Adjudication in Arizona: Yesterday, Today and Tomorrow*, 27 ARIZ. L. REV. 709 (1986).

505. *See* ARIZ. REV. STAT. ANN. § 45-251(1) (1987); *cf.* the nearly identical language of the McCarran Amendment, 43 U.S.C. § 666(a) ("river system or other source").

506. ARIZ. REV. STAT. ANN. § 45-251(2) (1987).

507. ARIZ. REV. STAT. ANN. § 45-251(3) (1987) (emphasis added).

508. ARIZ. REV. STAT. ANN. § 45-251(4) (1987).

is in addition to all water appropriable under section 45-131. This means, in turn, that some water not appropriable under section 45-131 must be included in the adjudication, if that water is subject to federal claims. Specifically, if the state wants to have federal law claims to percolating groundwater adjudicated in state court, it must join all those pumpers of that same aquifer—the "source" of that groundwater—who claim rights to pump under state law. *Cappaert* makes clear that a federal law claim to water of a stream is protected against interference by subsequently initiated pumping of hydrologically-connected groundwater, even if lawful under state law.[509] Meshing this holding with the McCarran Amendment means that to meet the McCarran test of comprehensiveness, a state court adjudication must encompass those who claim rights to pump that groundwater under state law.[510]

Thus, the proceeding has to be a "*general* adjudication" of all the water rights to a source, rather than "a private suit to determine water rights solely between [particular private parties] and the United States."[511] The Supreme Court has not yet addressed whether hydrologically-related groundwater falls within the amendment's scope. It has, however, repeatedly emphasized that the thrust of the amendment is to avoid "[p]iecemeal adjudication of water rights" because such rights are "highly interdependent."[512] It has spoken of "comprehensive state systems for adjudication of water rights" as a precondition for application of the amendment.[513] Senator McCarran, the provision's sponsor, aimed it at the situation where "it is necessary to adjudicate all of the rights of various owners on a given stream . . . because unless all of the [water rights holders] on a particular stream can be joined . . . any subsequent decree would be of little value."[514] In the same vein, the Supreme Court more recently described the amendment as waiving the federal government's sovereign immunity in comprehensive state

509. *See* Cappaert v. United States, 426 U.S. 128, 142 (1976).

510. The Arizona general adjudication statute embraces hydrologically-related groundwater in yet another way. It requires the Director of the DWR to "assist the court in determining the scope of adjudication by recommending the portion of the river, *its tributaries, and any other relevant sources subject to the adjudication.*" ARIZ. REV. STAT. ANN. § 45-253(A)(2) (1987) (emphasis added). This shows a legislative understanding that tributaries (without express limitation to surface tributaries) and other sources of water may need adjudicating, along with ordinary surface streams.

511. Dugan v. Rank, 372 U.S. 609, 618 (1963) (emphasis in original).

512. *See, e.g.*, Colorado River Water Conservation Dist. v. United States, 424 U.S. 800, 811 (1976).

513. *See id.* at 819; *see also* United States v. District Court, 401 U.S. 520, 525 (1971).

514. *See* S. Rep. No. 755, 82nd Cong., 1st Sess., 9 (1951).

water rights adjudications, and underscored the "important federal interest in allowing all water rights on a river system to be adjudicated in a single comprehensive state proceeding."[515]

The kind of piecemeal adjudication the McCarran Amendment was designed to avoid would occur if federal water rights to percolating groundwater were adjudicated without determining rights to the same source that may exist under state law. *Dugan v. Rank*[516] and its progeny[517] make clear that a state court simply cannot assert jurisdiction over the United States to adjudicate federal water rights to a particular stream segment, without also joining and adjudicating the rights of all others who claim rights to the same source. If the source of water is not a stream, but instead an aquifer, the same result should obtain. The McCarran Amendment applies to adjudications "of rights to the use of water of a river system *or other source*,"[518] and therefore does not distinguish between surface and groundwater in waiving federal sovereign immunity.

Nevertheless, one federal district court has come to a contrary conclusion.[519] In the litigation leading up to the Supreme Court's decision in the *San Carlos* case, Indian tribes argued that the general stream adjudication being prosecuted by the non-federal water users in state court was not comprehensive enough to qualify under the McCarran Amendment. The litigation, the tribes argued, did not involve non-federal rights to pump percolating groundwater from the same source to which the Indians were laying claim under federal law. The court rejected this argument, although its reasoning for doing so was, at the very least, unclear. It began by describing *Southwest Cotton* as creating two classes of appropriable groundwater: "(1) the subflow of surface streams or rivers; and (2) underground streams flowing in defined underground channels with definite banks."[520] In starting with *South-*

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515. Arizona v. San Carlos Apache Tribe, 463 U.S. 545, 551 (1983). *See also id.* at 549, 569. The Arizona Supreme Court and commentators agree that comprehensiveness is essential if the general stream adjudication is to be worthwhile. *See* United States v. Superior Ct., 144 Ariz. 265, 276, 697 P.2d 658, 669 (1985) ("no adjudication can be effective unless all claimants are before the court"); Moore & Weldon, *supra* note 504, at 725 ("[c]omprehensiveness is at the heart of the . . . process . . . [without it, the proceedings] are worthless").

516. 372 U.S. 609 (1963).

517. *See, e.g.*, Colorado River Water Conservation Dist. v. United States, 424 U.S. 800, 819 (1976); United States v. Eagle County, 401 U.S. 520, 524-25 (1971); United States v. Water Div. No. 5, 401 U.S. 527, 529 (1971).

518. 43 U.S.C. § 666 (1982) (emphasis added).

519. *In re* Determination of Conflicting Rights, 484 F. Supp. 778 (D. Ariz. 1980), *rev'd sub nom.* San Carlos Apache Tribe v. Arizona, 668 F.2d 1093 (9th Cir. 1982), *rev'd on other grounds sub nom.* Arizona v. San Carlos Apache Tribe, 463 U.S. 545 (1983).

520. 484 F. Supp. at 783.

west Cotton, the court may have been implicitly suggesting that the category of appropriable water was a large one under Arizona law—so broad, in fact, that few if any pumpers of groundwater from the same source that the Indians were claiming would actually be absent from the litigation.[521] The court did not, however, develop this point.

The court then asserted that rights to percolating groundwater were not relative in Arizona, because each landowner was entitled to the reasonable use of so much of it as might be found under her land.[522] This reasoning ignores the fact that reasonableness cannot be judged in the abstract. Instead, as the Arizona courts have recognized,[523] it must be measured by looking at other users.

Finally, the court simply asserted that because federal law would be applied to the rights claimed under federal law and state law would be applied to the others, "[i]t is difficult . . . to imagine how the state proceedings could be considered as anything less than a general adjudication of water rights."[524] This conclusion does not withstand scrutiny; indeed, it flies in the face of decisions like *Dugan v. Rank*.[525] A state court proceeding that examines only federal law claims, or federal claims and only a few claims (among thousands) under state law could, under this approach, be deemed a general stream adjudication. Yet, that was the exact situation in *Dugan*.[526] There the Supreme Court held that the state court adjudication was not sufficiently general, because a number of claimants to the same source were not before the court.

The result the district court reached—that the general stream adjudication in state court could proceed while parallel proceedings in federal court would be stayed—was eventually affirmed by the United States Supreme Court[527] and, in a related proceeding growing out of the state court adjudication, by the Arizona Supreme Court.[528] None of these other courts, however, addressed the extent to which pumpers of groundwater, claiming rights under state law, needed to be joined in the proceeding.

One might say that Congress had several broad purposes in adopting the McCarran Amendment. Perhaps the most obvious was to allow

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521. *See supra* notes 202-26.

522. 484 F. Supp. at 783.

523. *See, e.g.*, Jarvis v. State Land Dep't, 106 Ariz. 506, 479 P.2d 169 (1970) (the use of percolating groundwater off the land from which it is pumped is unreasonable *if* it injures the use others are making of water from the same source).

524. 484 F. Supp. at 784.

525. *See* 372 U.S. at 618-19.

526. *Id.*

527. Arizona v. San Carlos Apache Tribe, 463 U.S. 545 (1983).

528. United States v. Superior Ct., 114 Ariz. 265, 697 P.2d 658 (1985).

federal water rights to be adjudicated in state courts. At the same time, however, Congress did not, because of tradition and concern about state courts treating the federal government unfairly, want to permit the state courts to single out federal water rights and to concentrate on them to the exclusion of all other rights to the same source. Moreover, Congress might have believed that it was wise to encourage the states to undertake general stream adjudications, because that was the best, and perhaps the only, way that comprehensive determinations of water rights could be achieved. The desirability of promoting more certainty in property rights in water could, in other words, be seen as a national policy objective of the McCarran Amendment. At the least, that amendment says that, if the states want to adjudicate water rights comprehensively in their own courts, the federal government will not be an obstacle. Indeed, it will encourage such adjudications by waiving its immunity from state court litigation for such proceedings.

In one sense, the question whether a state court may decide federal law claims to groundwater when state law claims to the same source are excluded is jurisdictional. Absent a qualifying McCarran Amendment proceeding, the state court has no jurisdiction over the United States. The question can, however, be asked in another way: What did the Arizona legislature intend in enacting the new statutory process for general stream adjudications? It was aiming for comprehensiveness, not only because it was good policy, but also because it appeared to be a prerequisite for qualifying under the McCarran Amendment to obtain jurisdiction over the potentially large federal (especially Indian) claims that loomed over state water rights. Read against that backdrop, the statute ought to be construed in accordance with its text, to apply to categories of water and not categories of claimants. Under that approach, the statute ought to be read to embrace all claimants to all water subject to federal claims. Specifically, it ought to include all pumpers of groundwater hydrologically related to surface streams subject to federal water rights claims.[529]

VII. Environmental Quality Considerations

The desirability of protecting Arizona's dwindling riparian areas also argues for managing surface and hydrologically-related groundwater

529. A state district court in Idaho has reached a similar conclusion, finding that the state general stream adjudication statute and the McCarran Amendment "must be read together," and requiring inclusion of all related claims in the adjudication. *In re* General Adjudication of Rights to the Use of Water from the Snake River Basin Water System, Civ. No. 39576, slip. op. at 25-26 (D. Idaho, Oct. 14, 1987).

together. A recent Governor's Task Force on Recreation on Federal Lands called natural riparian areas a "fragile and threatened recreational resource" in the state.[530] The Commission on the Arizona Environment in 1987 identified maintenance of instream water flows and protection of riparian zones as the top environmental action priority for the state.[531] Only about 10% to 15% of quality riparian habitat, or some 300,000 acres (about one-half of one percent of the total land area in the state) remains from what existed a century or more ago.[532]

This resource serves a variety of uses that depend upon the continuing availability of stream water. For example, about 85% of Arizona's wildlife species depend directly on riparian zones,[533] and about half the breeding birds in the state use riparian habitat.[534] The value of these places, however, reaches far beyond wildlife. Many of the prime recreational areas in the state are within riparian zones, and the recreational and associated tourist industries are among the state's largest, far outstripping the economic contributions of the agricultural industry, which still uses more than four-fifths of the state's developed water supplies.[535] Furthermore, maintaining the riparian habitat can capture water-borne sediments, improve water quality, and reduce peak flood flows, thus reducing the rate at which downstream reservoirs silt up, and protecting downstream areas from floods. Moreover, protecting riparian habitat by maintaining adequate streamflows slows the velocity

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530. GOVERNOR'S TASK FORCE ON RECREATION ON FEDERAL LANDS, ARIZONANS' RECREATION NEEDS ON FEDERAL LANDS 49 (1986). The Task Force, of which one of the authors was a member, specifically (and unanimously) recommended that the state "should use existing legal authorities (or, if necessary, seek additional authority) to ensure that surface water important to recreation is not depleted by unregulated or poorly regulated pumping of hydrologically related groundwater." *Id.* at 52.

531. COMMISSION ON THE ARIZONA ENVIRONMENT, MINUTES OF PUBLIC MEETING, Agenda Item No. 4 (April 3, 1987) (copy on file with Arizona State Law Journal). The Commission was established by ARIZ. REV. STAT. ANN. § 41-121 (1986). According to a recent news report, the Commission will soon, after 15 months of study, urge state government to take several additional steps to protect and preserve riparian resources. Arizona Capitol Times, October 12, 1988, at 25. The Arizona State Parks Department is publishing in November 1988 a rivers, streams and riparian areas study that raises similar concerns.

532. *Id. See also* Arizona Section of the American Water Resources Ass'n, *Proceedings of the Symposium on Instream Flow: Rights and Priorities*, 19-20, 84 (October 1987) [hereinafter *Instream Flow Symposium*].

533. *See Instream Flow Symposium*, *supra* note 532, at 19-20, 84.

534. *Id.*

535. *Id.* at 22, 62-65. *See also* Arizona Statistical Review 1 (43d ed., Valley Nat'l Bank, Sept. 1987). In fact, agriculture and mining accounted for only 3% and 2%, respectively, of total personal income in Arizona in 1987, and provided only 3% and 1%, respectively, of the state's total employment in 1986, ranking at the bottom of the nine economic sectors surveyed. Arizona Business 10 (Sept. 1988).

of water and can improve the rate of groundwater recharge.[536] Less subject to conventional measurement, but no less important, is an enduring image of the state—both for its own residents as well as many outsiders—that is fixed by the photographs in *Arizona Highways* and assorted coffee table books depicting the surprising sylvan streams and other live watercourses in magnificent natural settings.

A wooden view of Arizona law—one that subjects much hydrologically-related groundwater to a separate legal regime—could allow the unthinking destruction of these few remaining riparian habitats by depleting streamflows with groundwater pumping. This is not to say that all remaining streamflows in Arizona should be preserved in their natural state. Any destruction, however, ought to result from a conscious, deliberate policy choice, rather than from an artificial legal doctrine that does not comport with hydrologic reality. In this context, Justice Holmes's teachings are relevant: "A river is more than an amenity, it is a treasure,"[537] and "there are benefits from a great river that might escape a lawyer's view."[538]

VIII. Conclusion and Recommendations

Arizona's quest for coherent legal principles governing the interface between ground and surface water has involved a complex interplay among Arizona's legislature, courts, and executive, as well as federal law and institutions. It has become increasingly clear that in some Arizona watersheds, as elsewhere, surface and groundwater are hydrologically related. The extent to which the law in Arizona has kept pace

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536. *See* Western Division of American Fisheries Society, *Management and Protection of Western Riparian Stream Ecosystems: A Position Paper* (1980), *cited in* S. Hoover, D. King, and W.J. Matter, *Wilderness Riparian Environment: Visitor Satisfaction, Perception, Reality, and Management*, in Riparian Ecosystems and Their Management: Reflecting Conflicting Uses 223 (1985) (proceedings of First North American Riparian Conference, published as U.S. Dept. of Agric. Forest Service Gen. Tech. Rep. No. RM-120). *See also* Arizona Riparian Council, Riparian Classification Inventory Committee, Riparian Classification for Arizona I (1988) (copy on file with Arizona State Law Journal).

537. New Jersey v. New York, 283 U.S. 336, 342 (1931).

538. Hudson County Water Co. v. McCarter, 209 U.S. 349, 357 (1908). The Upper San Pedro River furnishes an illustrative case study of the recreational, aesthetic, and other benefits of riparian ecosystems in Arizona. The federal Bureau of Land Management has recently completed a study of these values on that river, and their dependence upon maintaining stream flows. BLM San Pedro Study, *supra* note 63, at 51-56. The study also documented the hydrologic interconnections between surface and groundwater, *id.* at 95-114, and concluded that with a "lowered water table near the River," the stream flows "would be extremely diminished, or would disappear," destroying the riparian vegetation with its associated benefits. *Id.* at 114. In short, "groundwater depletion from lands adjacent to the stream will be quickly reflected in diminished stream flow." *Id.* at 131.

with that emerging knowledge remains unclear. Several ideas have generally become accepted, however, that together lay a firm legal basis for managing Arizona's surface and hydrologically related groundwater on a unified basis.

First, Arizona's common law of water rights has proved flexible enough to conform legal principles to emerging knowledge and local conditions. The Arizona legislature has encouraged that flexibility since territorial days.[539] Recently, the Arizona courts have continued to modify the common law applicable to Arizona groundwater in cooperation with numerous legislative pronouncements on the general subject.[540]

Second, the common and statutory law in Arizona must be construed against the backdrop of the state constitutional prohibition of riparian water rights. That principle argues powerfully against wooden application of the idea that a landowner has, merely by owning land, a fully vested interest in the groundwater beneath that land.[541]

Third, state law does not operate alone in this field because the federal government possesses significant water rights, held for Indian tribes as well as for its land management agencies. Thus, federal law also provides a backdrop against which state law must be analyzed. Indeed, federal law significantly limits the state's ability to ignore surface/groundwater interactions, at least where federal interests are threatened.[542]

Fourth, the Arizona legislature has recognized, most notably in the landmark 1980 Groundwater Management Act, that wisely managing the state's limited water resources requires extensive public regulation by an expert administrative agency. Accordingly, the state Department of Water Resources has broad powers to manage both surface and groundwater. In some respects, DWR is already managing both on a unitary basis where they are hydrologically related.[543]

Experience from other states teaches generally that the complexities of ground and surface water interaction demand strong and sensitive administrative regulation.[544] That imperative is perhaps more manifest in Arizona where these rights have to some extent been subject to separate laws and administrative regulatory systems. On balance, however, the legal system in Arizona has substantially blurred the separation

539. *See supra* text accompanying notes 81-82.
540. *See supra* text accompanying notes 270-79.
541. *See supra* text accompanying notes 285-318.
542. *See supra* text accompanying notes 470-529.
543. *See supra* text accompanying notes 411-440.
544. *See supra* text accompanying notes 449-69.

between ground and surface water. Thus, groundwater users have on several occasions been warned that their pumping might be curtailed to protect surface water uses.[545] Still, Arizona does not have a long, consistent history of unitary management; therefore, special sensitivity is necessary to reach that goal fairly.

One thoughtful commentator recently observed that the "long history of regulating priorities on surface streams shows that priority in time does not [always protect the] senior appropriator."[546] The same will probably hold true as Arizona moves toward a fully unitary system of ground and surface water management. Strictly applying the priority system may not be able to serve the diverse objectives of water management that the state has identified. In *Southwest Cotton*, for example, Justice Lockwood suggested that surface users ought to be protected against groundwater diversions regardless of who was first;[547] similarly flexible departures from strict priority might sometimes be used to protect later groundwater users against earlier surface users. Preferably, ways can and ought to be found to satisfy the interests of both ground and surface water users in obtaining usable quantities of water, ways which might require adjustment by both.

Furthermore, groundwater pumpers who have a relatively insignificant (in quantity) or temporally remote impact on surface water systems need not face special regulation to protect surface users and values. A rule of reason is required, and regulatory lines should be drawn that exclude relatively insignificant users from the restrictions a unified system will demand. "Where to draw the line" is, after all, as Holmes said, "the question in pretty much everything worth arguing in the law."[548] There have long existed similar principles in standard prior appropriation law that can work here, and other states have addressed these issues with considerable success, as Professor Grant recently pointed out.[549] Such an approach would considerably simplify administration of a unified system.[550] Again, experience elsewhere will prove helpful as Arizona continues down the path most other states have followed for decades.[551]

The solutions ultimately fashioned will necessarily be complex and sometimes painful. It must be remembered, however, that there will be

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545. *See supra* text accompanying notes 220-26, 357, 412-20.
546. Grant, *supra* note 452, at 94.
547. *See supra* text accompanying notes 220-26.
548. Irwin v. Gavit, 268 U.S. 161, 168 (1925).
549. Grant, *supra* note 452.
550. *See supra* note 468 and accompanying text.
551. *See supra* notes 449-69 and accompanying text.

pain and complexity regardless of what view of the groundwater/surface water interface is followed. The stark fact is that Arizona has recognized more water rights than there is water, considered over the long term. A conclusion that ground and surface water are subject to entirely different legal systems would mean pain for some water users; presumably, for those with surface water rights, no matter how long ago they were perfected. These right-holders would find their rights susceptible to destruction, without recourse, by pumping from hydrologically related groundwater that the law might label, in its wisdom, "percolating." Only a legal approach that candidly recognizes the hydrologic interrelations can forthrightly address the difficult policy issues of equity, efficiency, and environmental quality that have to be addressed.

The immediate task is for the courts and DWR to recognize that Arizona law already provides ample authority to begin to work toward those solutions. Unified management will likely be forced on the state by the courts in those stream systems where federal water rights may be interfered with as a result of ground and surface water interconnections. This might not dictate unification everywhere in the state, but it would be messy—perhaps not unworkable, but at least confusing—if a major part of the state was under unified management as a result of the *Winters* doctrine while a different set of rules was applied elsewhere.

Furthermore, greater delay would undermine many parts of the Groundwater Management Act. It could also lead to substantial new investment being made in facilities dependent upon water hydrologically connected with other water to which rights already exist. This hydrologic connection will ultimately have to be addressed. The longer the state avoids a definitive policy of unified management, the more painful and expensive such management is likely to be, whenever it comes.

Finally, the most pronounced trend in modern water management is toward more transfers and marketing of water rights. In order for the emerging water markets to function properly, sellers and buyers need relative certainty as to what those rights are. The general adjudications of water rights now underway in Arizona will be dismal (and expensive) failures if they do not inform the holders of water rights of the extent to which they will be protected against interference from ground or surface water uses.

Sound public policy requires bold steps to address this problem. Currently, the Arizona courts are dealing with the general adjudication of water rights in the Gila River system.[552] The courts ought to direct

552. *See supra* note 25.

the Department of Water Resources to begin formulating unified management regulations on those stream segments where federal claims and significant interrelations between ground and surface water exist. Although doubts may exist about DWR's will and ability to confront such a complex job (as well as the legislature's provision of enough money to do it fairly and sensibly), the problem is too important to let the current uncertainty continue. A judicial pronouncement that the law already places this responsibility upon DWR can supply the will, and force development of the ability, to deal with these problems. DWR's solutions would, of course, be subject to judicial review to ensure that they are not arbitrary.

If unitary management is accomplished, Arizona will have achieved a more effective water management system, measured by stability, fairness in protecting existing investments, environmental quality, and general economic health. The result may not be elegant; indeed, it will almost certainly be complex and controversial. It is clearly preferable, however, to resolving groundwater/surface water conflicts on the basis of arbitrary legal distinctions that comport with neither hydrological reality nor sound public policy. Professor Corker put it this way: "[T]o forbid diversion of a surface stream, but to permit the stream to be depleted by a nearby well that taps the same source of water, is an absurdity."[553] As Felix Frankfurter once wrote, "[w]isdom too often never comes, and so one ought not to reject it merely because it comes late."[554]

Addendum

On September 9, 1988, Judge Goodfarb of the Maricopa County Superior Court issued an order in the Gila River general stream adjudication that addressed a number of the issues dealt with in this article.[555] The order announced, first, that percolating groundwater is not subject to appropriation in Arizona, and the McCarran Amendment requirement of comprehensiveness does not change that result, "where the right claimed is under state [law]."[556]

Next, the order required the Department of Water Resources to create a data base on all wells in the watershed to be adjudicated, including

553. Corker, Groundwater Law, Management and Administration 146-47 (Background Study for the National Water Commission, 1971).

554. *See* Hensley v. Union Planters Nat'l Bank, 335 U.S. 595, 600 (1949) (Frankfurter, J., dissenting).

555. In the General Stream Adjudication of All Rights to Use Water in the Gila River System and Source, Nos. W-1 through W-4 (Maricopa County Sup. Ct.) [hereinafter Order].

556. *Id.* at 9.

for each its "location, date of drilling, first use, historical data, and amount of water," whether or not the individual wells will be adjudicated in this proceeding.[557]

The order also recognized that appropriable water includes not only surface flow "but also the sub-surface flow which supports and is connected to the surface flow."[558] It set out a two-part, physical test for determining subflow, at least for purposes of the Department of Water Resources' preparation of the hydrographic survey reports that underpin the factual part of the adjudication process.[559] Specifically, DWR was directed to regard as subflow that water pumped from wells (a) "located in or close to [the] younger alluvium" of a stream basin that (b) would result in the depletion of the stream by at least 50% of the total volume pumped within a fixed period of time.[560]

The order concluded that groundwater is included within appropriable water subject to the adjudication "only when it meets [these] criteria of 'sub-surface flow'."[561] It would allow any owner of a well classified as pumping subflow to demonstrate at an evidentiary hearing that the well is not pumping subflow.[562] The order did not, however, specifically address the opposite situation; i.e., whether anyone else will be precluded from arguing or introducing evidence to show that wells excluded by the DWR as not pumping subflow ought to be included. Fairness would seem to demand that DWR's determinations be subject to scrutiny from both directions.

The order did defend, in passing, what the court perceived to be the narrowness of Justice Lockwood's characterization of "subflow" in *Southwest Cotton*, while acknowledging that the description lacks "technical accuracy" in light of emerging knowledge.[563] Indeed, the order candidly conceded that this restrictive definition of subflow is not congruent with hydrological reality; that is, a person may withdraw subterranean water that is not considered subflow even though it might

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557. *Id.* at 10.

558. *Id.*

559. *See* ARIZ. REV. STAT. ANN. § 45-256 (1987).

560. Order, *supra* note 555, at 11. The order established the time period for measuring depletion as "during one growing season for agricultural wells or during a typical cycle of pumpage for industrial, municipal, mining, or other uses, assuming in all instances and for all types of use that the period of withdrawal is equivalent to 90 days of continuous pumping for purposes of technical calculation." *Id.* The order also determined that those wells previously designated or considered by the state as pumping surface water or an "in lieu well" (presumably, those pumping in lieu of surface water) are each pumping appropriable water and subject to the adjudication.

561. *Id.* at 23.

562. *Id.* at 12.

563. *Id.* at 13.

have an "effect on his neighbor's . . . surface flow [right]."[564] Finally, the order recognized that the Groundwater Management Act has significantly changed the legal right to withdraw and use percolating groundwater, by moving toward a "much more restricted 'appropriative' right."[565]

Having delineated state law on the subject, the order then turned to the question of federal law, and essentially reached the same conclusion we have; namely, that federal law follows hydrologic reality, and protects federal water rights from impairment by groundwater pumping as well as surface diversion, regardless of how state law legally characterizes the groundwater being pumped. "The fact that under Arizona case law, surface flow appropriators have no right to protection against upstream groundwater pumpers does not diminish the right of holders of federal reserved water rights from protection against such diminishment . . . ."[566] The order also properly recognized that hydrologic conditions as well as the presence of federal water rights vary with location; thus, evidentiary hearings may be necessary to determine the extent to which groundwater pumpers under state law need to be regulated to protect the federal water rights.[567]

Judge Goodfarb's order seems generally consistent with the approach advocated in this article, with one major exception;[568] namely, the order

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564. *Id.* at 14 (citations omitted). Indeed, this would mean that a well that met the two-part test for subflow the court announced earlier (*see supra* text accompanying note 560) could simply be relocated so that it was no longer "in or close to [the] younger alluvium," and pump at the same rate as before. Even if the effect on the stream were about the same, legally the result would be different—the well at the new site would not be considered to pump subflow and therefore would not be subject to restriction to protect senior appropriations on the stream.

565. *Id. See also supra* text accompanying notes 268-279.

566. Order, *supra* note 555, at 22. *Cf. supra* text accompanying notes 470-529. Judge Goodfarb's order does allow the possibility of excluding small wells from regulation—even if they meet his two-part test and are deemed to pump subflow—where they would have an insignificant effect on the federal water right. *Id.* at 25-26. Specifically, the order allows DWR to exclude "[t]o the extent possible . . . each domestic and stock water well and irrigation well irrigating no more than 2 acres, where D.W.R. determines that such wells diversions [sic] have so little effect as to be significantly unmeasurable."

567. Order, *supra* note 555, at 25-26.

568. The order does seem to be somewhat confused about the legal basis for its conclusion that percolating groundwater has to be included in the adjudication where it could appreciably affect federal law water rights. Specifically, while it describes the McCarran Amendment as not requiring inclusion of percolating groundwater, it says that "federal law requires its inclusion where the claim is based on federal reserved rights." *Id.* at 23. This seems to be a distinction without a difference. *Cappaert* establishes beyond peradventure that federal law protects federal reserved rights against pumpers of percolating groundwater. Cappaert v. United States, 426 U.S. 128 (1976). *See supra* text accompanying notes 472-477. But it is the McCarran Amendment, when combined with *Cappaert*, that requires a state court adjudicating federal reserved rights to

seems to take a much narrower view of the concept of appropriable "subflow" under Arizona law than we take. The result is to create two different versions of the law in Arizona on the groundwater/surface water interface—one where only some groundwater pumpers that appreciably deplete surface streams are subject to regulation to protect surface water rights, and a second where all such groundwater pumpers are regulated. The difference between the two turns on whether federal or state water rights are threatened by such pumping; federal rights are protected by federal law, but state rights are not fully protected because of the order's narrow, hydrologically imperfect definition of "subflow."

While this two-tiered system of water law is not as wrong-headed as the old common law dual system of ground and surface water rights, it would, if affirmed on appeal, be awkward to administer and probably lead to some quite irrational results in particular cases. It is, indeed, somewhat ironic that the state courts would, under this approach, provide greater protection against interference by groundwater pumping to water rights based upon federal law than they would provide to water rights based upon state law.[569] This irony is heightened by the fact that the federal water rights do not depend upon actual beneficial use of water, while the state surface water rights do.[570] Thus, the state surface water right holders may often have stronger investment-backed expectations of protection.

Still, the order ought fairly to be regarded as a step in the right direction, at least compared to many previous Arizona court decisions on the subject. It candidly confronts the basic issue and forthrightly tries to deal with it within the constraints a trial court encounters in searching for guidance in appellate decisions that only dimly outline the contours of state law on the subject. In the end, Judge Goodfarb has created an adequate basis for appellate review and a clear opportunity for higher courts to provide, at long last, the definitive guidance

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adjudicate, at the same time, the rights of those pumpers, because that is the only way such an adjudication can be meaningful. Stated another way, *Cappaert* is the rule of substantive federal law that protects federal reserved rights against subsequently initiated groundwater pumping that is lawful under state law. But the McCarran Amendment is the procedural federal law requiring any state court adjudication of federal reserved rights to be comprehensive. *See supra* text accompanying notes 488-529.

569. Thus, in the example in note 564, *supra*, moving the well outside the "younger alluvium" would allow it to escape restriction under state law to protect state appropriative rights, but it would not escape restriction under federal law to protect any federal reserved rights that are adversely affected by pumping that well. As this illustrates, the basic problem with Judge Goodfarb's test for subflow is that it can operate in a hydrologically arbitrary manner; that is, it does not ensure that wells are regulated on the basis of their impact on stream flows.

570. *See* ARIZ. REV. STAT. ANN. § 45-141(B) (1987).

necessary to put Arizona water management on a hydrologically sound basis.