

LEXSEE 175 ARIZ 382

**In re the GENERAL ADJUDICATION OF ALL RIGHTS TO USE WATER IN the
GILA RIVER SYSTEM AND SOURCE**

Nos. WC-90-0001-IR, WC-90-0001-IR, WC-90-0002-IR, WC-90-0003-IR, WC-90-0004-IR, WC-90-0005-IR, WC-90-0006-IR, WC-90-0007-IR, WC-79-0001, WC-79-0002, WC-79-0003, WC-79-0004

Supreme Court of Arizona

175 Ariz. 382; 857 P.2d 1236; 1993 Ariz. LEXIS 60; 144 Ariz. Adv. Rep. 17

July 27, 1993

SUBSEQUENT HISTORY: Related proceeding at San Carlos Apache Tribe v. Superior Court, 193 Ariz. 195, 972 P.2d 179, 1999 Ariz. LEXIS 5 (Ariz., 1999)
Appeal after remand at In re General Adjudication of All Rights to Use Water in the Gila River Sys. & Source, 198 Ariz. 330, 9 P.3d 1069, 2000 Ariz. LEXIS 94 (Ariz., 2000)

PRIOR HISTORY: [***1]

Maricopa County Nos. W-1, W-2, W-3, W-4 (Consolidated) In re General Adjudication of All Rights to Use Water in the Gila River Sys. & Source, 171 Ariz. 230, 830 P.2d 442, 1992 Ariz. LEXIS 25 (Ariz., 1992)

DISPOSITION:

REMANDED

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JUDGES:

En Banc. Feldman, Chief Justice. Moeller, V.C.J., Corcoran and Zlaket, JJ., and William E. Druke, Court of Appeals Chief Judge, concur. Martone, J., did not participate in the determination of this matter; pursuant to Ariz. Const. art. VI, § 3, the Honorable William E. Druke, Chief Judge of Division [***5] Two, Arizona Court of Appeals, was designated to sit in his stead.

OPINIONBY:

FELDMAN

OPINION:

[*384] [**1238] **OPINION**

This appeal presents the second of six issues accepted for interlocutory review on December 11, 1991. We decide today whether the trial court erred in adopting a test to determine whether the underground water known as subflow is appropriable under A.R.S. § 45-141. We have jurisdiction pursuant to A.R.S. § 45-252 and Ariz. Const. art. 6, § 5(3).

FACTS AND PROCEDURAL HISTORY

This case is a consolidated general adjudication brought under A.R.S. § 45-251 *et seq.* to determine the extent and priority of the rights of all persons to use water in the Gila River system and source. For the full procedural history of the case, see *Arizona v. San Carlos Apache Tribe of Arizona*, 463 U.S. 545, 103 S. Ct. 3201, 77 L.Ed.2d 837 (1983); *United States v. Superior Court*, 144 Ariz. 265, 270-71, 697 P.2d 658, 663-64 (1985), *In re Rights to the Use of the Gila River*, 171 Ariz. 230, 232-33, 830 P.2d 442, 444-45 (1992). For the present opinion, [***6] the relevant facts are brief.

For five days in October 1987, the trial court held hearings on the relationship between surface water and groundwater. [*385] [**1239] Hydrologists and hydrological engineers testified and submitted reports on the relation between ground and surface water in general, and in the San Pedro and Santa Cruz watersheds in particular. The hearings were for the general education of

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all parties and the court, but the material adduced at the hearing was to be considered evidence on which the court could rely when appropriate.

Following the hearings, several cities n1 filed a Motion to Exclude Wells From the General Adjudication, asking the trial court to exclude from the adjudication all wells pumping percolating groundwater, and to include only those wells pumping surface flow and subsurface flow, within the meaning of *Maricopa County Municipal Water Conservation District No. One v. Southwest Cotton Co.*, 39 Ariz. 65, 4 P.2d 369 (1931) ("*Southwest Cotton*"). The trial court decided to use the cities' motion, and the information developed at the hearings, as a vehicle to resolve several surface water and [***7] groundwater issues. Thus, in January 1988, the trial court ordered the parties to brief eight specific questions it believed it could decide as a matter of law based on the evidence adduced at the October 1987 hearings. In May 1988, the trial court heard argument and in September it issued its order answering those questions.

n1 Those cities were Chandler, Tempe, Mesa, Scottsdale, Glendale, Peoria, Goodyear, Casa Grande, Avondale, Nogales, and Prescott.

One of the eight questions the trial court answered in its September order was:

Is ground water included within the phrase "river system and source" as it is used in A.R.S. § § 45-141 and 45-251(4), and if so, to what extent is it included? n2

The trial court concluded that underground water is included in the river system and source if it is a stream's subflow, as that term is used in *Southwest Cotton*. The effect of this ruling was to declare that groundwater pumpers extracting water within the court's definition of "subflow" were diverting water appropriable [***8] under A.R.S. § 45-141(A). Therefore, their rights to that water would depend on the priority of their appropriation, rather than on an owner's right to remove water percolating under the surface of the owner's land.

n2 A.R.S. § 45-141(A) reads:

The waters of all sources, flowing in streams, canyons, ravines or other natural channels, or in definite underground channels, whether perennial or intermittent,

flood, waste or surplus water, and of lakes, ponds and springs on the surface, belong to the public and are subject to appropriation and beneficial use as provided in this chapter.

The court then concluded that certain wells withdrawing water from the younger alluvium of a stream basin should be presumed to be pumping appropriable subflow. The court instructed the Department of Water Resources ("DWR") to designate such wells in its hydrographic survey reports n3 as pumping appropriable subflow if:

As to wells located in or close to that younger alluvium, the volume of stream depletion would reach 50% or more [***9] of the total volume pumped 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.

The court acknowledged that this test (the "50%/90 day rule") appeared to be somewhat arbitrary but explained it was essential for use in instructing DWR in the preparation of its hydrographic survey reports. Well owners would be allowed to prove that their wells were not pumping subflow at the time of their evidentiary hearing.

n3 These hydrographic survey reports are to be prepared by DWR pursuant to A.R.S. § 45-256 as part of its role as technical advisor to the trial court.

Many parties sought review of this ruling pursuant to this court's Special Procedural Order Providing for Interlocutory Appeals and Certifications, filed September 26, 1989. We granted review and framed the issue [***10] as follows:

[*386] [**1240] Did the trial court err in adopting its 50%/90 day test for determining whether underground water is "appropriable" under A.R.S. § 45-141?

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THE ISSUE

This issue arises from the way Arizona water law has developed from territorial days. Those seeking a detailed history of the evolution of Arizona water law, going back to the organization of the Arizona Territory, are referred to John D. Leshy & James Belanger, *Arizona Law Where Ground and Surface Water Meet*, 20 Ariz. St.L.J. 657 (1988). As will be seen below, rights associated with water found in lakes, ponds, and flowing streams -- surface water -- have been governed by the doctrine of prior appropriation. This doctrine developed in the western part of the country where the common law riparian rights doctrine was unsuited to prevailing arid conditions. On the other hand, underground water has been governed by the traditional common law notion that water percolating generally through the soil belongs to the overlying landowner, as limited by the doctrine of reasonable use. *Id.*

This bifurcated system of water rights was not unique to Arizona. It was typical [***11] of western states until around the turn of the twentieth century. At that time, scientific investigation was revealing that most underground water is hydraulically connected to surface water. As scientific knowledge progressed, most states revised their water laws to provide for unitary management of hydraulically connected underground and surface water. Arizona, however, did not, and continues to adhere to a bifurcated system of water rights, with compelling implications for general stream adjudications. *Id.*

The purpose of a general stream adjudication under title 45 is to determine the rights of all persons to use the waters of a river system and source. A.R.S. § 45-252(A). "River system and source" is defined as "all water appropriable under [A.R.S.] § 45-141 and all water subject to claims based upon federal law." A.R.S. § 45-251(4). Thus, basic to this case is the extent to which water pumped from wells must be treated as appropriable under § 45-141 or, conversely, as groundwater excluded from the legal rules applying to prior appropriation. The need to resolve the question early in the proceeding impelled us to grant review.

HISTORICAL PERSPECTIVE

We start with [***12] *Southwest Cotton*, this court's early and most important attempt to enunciate the relative rights of groundwater and surface water users. The court's comment in that case applies to the present dispute:

The case is one of the most important which has ever come before this court, involving as it does not only property interests of [great] value . . . but also a declaration of legal principles which will in all

probability determine and govern to a great extent the course of future . . . development within the arid regions of Arizona. The real question involved is the law applicable to the relative rights to the ownership and use of the subterranean waters of the state as against those of the surface waters.

39 Ariz. at 71, 4 P.2d at 372.

Southwest Cotton involved a suit by Southwest Cotton Company and others ("Southwest Cotton") against Maricopa County Municipal Water Conservation District No. 1 and others ("Conservation District"). Southwest Cotton owned a large tract of land west of Phoenix. It drilled almost one hundred wells in and around the Agua Fria River bed n4 to irrigate 19,000 acres. In 1925, plans for a dam on [***13] the Agua Fria River upstream of Southwest Cotton's development matured, and the Conservation District floated bonds to finance the project. Southwest Cotton sued to enjoin the project, fearing that the upstream [*387] [**1241] dam would prevent water from reaching the downstream wells.

n4 The Agua Fria River flowed only intermittently. Southwest Cotton's wells were located in an area roughly ten miles wide and twenty miles long. Some were in the river bed, and others ranged from a few feet to six miles from the river.

In the trial court, Southwest Cotton argued that the water it pumped was subject to appropriation under the predecessor of A.R.S. § 45-141(A). n5 The trial court ruled for Southwest Cotton, holding that the water was appropriable as water flowing in definite underground channels.

n5 Southwest Cotton also claimed rights to a surface diversion in connection with a tunnel and canal system at what was known as the Marinette heading.

[***14]

On appeal, Southwest Cotton advanced three theories: (1) percolating underground water was appropriable; (2) water running in underground channels was appropriable; and (3) subflow of the Agua Fria River was appropriable. This court decided to treat all issues as matters of first impression. First, it addressed Southwest

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Cotton's claim that percolating groundwater is appropriable. At the time of *Southwest Cotton*, percolating water was defined generally as water that passes through the ground and does not form part of a body of water or a water course. 2 Clesson S. Kinney, *The Law of Irrigation and Water Rights* § 1188, at 2152 (2d ed. 1912). It was further classified with reference to the streams or other bodies of water to which it was tributary. "Diffused percolations" were not tributary to any definite surface or underground stream or body of water. *Id.* "Percolating waters tributary to surface water" were, as the name implies, "waters which infiltrate their way through the adjoining ground to some surface water course or other body of surface water." *Id.* § 1193, at 2162.

The *Southwest Cotton* court examined Arizona statutes from 1864 and its previous decisions [***15] and reaffirmed its prior holding that percolating subterranean water was not subject to appropriation. 39 Ariz. at 84, 4 P.2d at 376. Language in the opinion makes it clear that the court meant that all percolating water, however classified, was not subject to appropriation. While distinguishing certain California cases on which *Southwest Cotton* relied, the court stated:

Whether [the water underlying *Southwest Cotton's* land] be diffused percolations in the common law sense of the term . . . , or whether it be percolating waters whose extraction will tap other waters, . . . is immaterial in this instance, for neither class is subject to appropriation under the law of Arizona.

Id. at 100, 4 P.2d at 382. n6

n6 Any decision as to what law applied to percolating water was left for another day. *Id.* at 83-84, 4 P.2d at 376. That day arrived more than twenty years later. See *Bristor v. Cheatham*, 75 Ariz. 227, 255 P.2d 173 (1953), which established the right of the surface owner to reasonable use of the water percolating under his property.

[***16]

The court also addressed *Southwest Cotton's* argument that its water came from underground streams. The court rejected that argument because there was insufficient evidence to show that *Southwest Cotton's* wells tapped underground channels with known and definite banks from which Arizona law allowed appropriations. *Id.* at 95, 4 P.2d at 380.

Finally, the court addressed the argument that *Southwest Cotton* was pumping appropriable subflow of the Agua Fria River. The court defined "subflow" as

those waters which slowly find their way through the sand and gravel constituting the bed of the stream, or the lands under or immediately adjacent to the stream, and are themselves a part of the surface stream.

Id. at 96, 4 P.2d at 380.

In almost all cases the so-called subflow is found within, or immediately adjacent to, the bed of the surface stream itself.

Id. at 97, 4 P.2d at 381.

Subflow "physically . . . constitute[s] a part of the surface stream itself, and [is] simply incidental thereto." *Id.* at 96, 4 P.2d at 380. It is subject to the same rules of appropriation as the surface stream itself. *Id.* at 97, 4 P.2d at 380-81.

[*388] [**1242] The court [***17] set forth a test for determining whether underground water is appropriable subflow. First, it wrote:

The best test which can be applied to determine whether underground waters are as a matter of fact and law part of the surface stream is that *there cannot be any abstraction of the water of the underflow without abstracting a corresponding amount from the surface stream*, for the reason that the water from the surface stream must necessarily fill the loose, porous material of its bed to the point of complete saturation before there can be any surface flow.

Id. at 96, 4 P.2d at 380 (emphasis added).

In the next paragraph, the court wrote:

Not only does [subflow] move along the course of the river, but it percolates from its banks from side to side, and the more abundant the surface water the further will

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it reach in its percolations on each side. But, considered as strictly a part of the stream, the test is always the same: *Does drawing off the subsurface water tend to diminish appreciably and directly the flow of the surface stream?* If it does, it is subflow, and subject to the same rules of appropriation as the surface stream itself; if it does not, then, [***18] although it may originally come from the waters of such stream, it is not, strictly speaking, a part thereof, but is subject to the rules applying to percolating waters.

Id. at 96-97, 4 P.2d at 380-81 (emphasis in original).

Concluding that there was no evidence that Southwest Cotton's pumping directly or appreciably diminished the flow of the river, the court reversed and remanded the case for a new trial. *Id.* at 99, 106, 4 P.2d at 381, 384.

Until *Bristor v. Cheatham*, 73 Ariz. 228, 240 P.2d 185 (1952) ("*Bristor I*"), this court consistently applied *Southwest Cotton's* rule that percolating groundwater is not subject to appropriation. In *Bristor I*, the court held by a 3-2 margin that percolating water was subject to appropriation. The court granted rehearing, however, and fourteen months later reversed itself by a 3-2 margin. In *Bristor v. Cheatham*, 75 Ariz. 227, 255 P.2d 173 (1953) ("*Bristor II*"), the majority reaffirmed our prior holdings that percolating water is not subject to appropriation. Arizona's courts have followed *Bristor II* to this day.

DISCUSSION [***19]

The parties in this appeal generally agree that *Southwest Cotton* is at the heart of the issue before us. One group argues that *Southwest Cotton's* concept of subflow is narrow, and that the 50%/90 day rule is too broad, because it includes wells that pump underground water not appropriable under A.R.S. § 45-141(A). Another group argues that *Southwest Cotton's* concept of subflow is broad, and that the 50%/90 rule is too narrow, because it fails to include all wells that pump appropriable subflow. The third group argues that the trial court was correct. Although it seems to agree that the 50%/90 day rule is not faithful to *Southwest Cotton*, the third group contends that the trial court's order should not be disturbed because it merely creates a rebuttable presumption. We address this argument first.

A. The presumption

The 50%/90 day rule was formulated to instruct DWR in the preparation of hydrographic survey reports, and merely creates a rebuttable presumption that wells

meeting the test are pumping subflow. Nonetheless, if the test is defective, its use would adversely affect the adjudication. It would plant errors in every hydrographic survey report, which [***20] would have to be litigated according to the procedures set out in the Rules for Proceedings Before the Special Master, Rules 6.00-16.00. This would exacerbate an already lengthy and costly process. Perhaps even more significantly, use of a flawed test for identifying wells pumping subflow could cause significant injustice. Many surface owners unable to mount a challenge could effectively lose their right to pump percolating groundwater, simply because their wells were improperly presumed to be pumping [***389] [***1243] appropriable subflow. Considering the time, expense, and importance of accurate hydrographic survey reports, and the complex lawsuits over their correctness, it would be a senseless waste to use a flawed presumption for identifying wells pumping subflow.

B. Applying the rule of Southwest Cotton

1. *Stare decisis*

We now determine whether the trial court's 50%/90 day rule accurately reflects *Southwest Cotton's* subflow rationale. We perceive our role as interpreting *Southwest Cotton*, not refining, revising, correcting, or improving it. We believe it is too late to change or overrule the case. More than six decades have passed since *Southwest Cotton* [***21] was decided. The Arizona legislature has erected statutory frameworks for regulating surface water and groundwater based on *Southwest Cotton*. Arizona's agricultural, industrial, mining, and urban interests have accommodated themselves to those frameworks. *Southwest Cotton* has been part of the constant backdrop for vast investments, the founding and growth of towns and cities, and the lives of our people. Of course, this court is not absolutely bound by *stare decisis* and may change judge-made law, especially when the need for change is apparent, the error or confusion in previous decisions is evident, and change is possible without causing significant damage. We have done so in the recent past. See *Wiley v. Industrial Commission*, 174 Ariz. 94, 847 P.2d 595 (1993). We do not do so lightly, however, or in the absence of compelling reasons. *State v. Huerta*, 175 Ariz. 262, 855 P.2d 776 (1993); cf. *State v. Lara*, 171 Ariz. 282, 285, 830 P.2d 803, 806 (1992).

If this principle applies to ordinary cases, it must be applied with [***22] particular care when the prospective effect of change threatens important vested rights and may affect every Arizonan's well-being. Thus, even though *Southwest Cotton* may be based on an understanding of hydrology less precise than current theories, it would be inappropriate to undo that which has been done in the past. Instead, we will attempt only to resolve as best we can the ambiguities and uncertainties left by

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that decision. Given the inexact nature of the "direct and appreciable diminution" test laid down by *Southwest Cotton*, that in itself is no small task.

2. Application

Those who argue that the 50%/90 day rule is too narrow suggest that *Southwest Cotton's* test is very broad. They argue that pumping underground water from a tributary aquifer n7 causes direct stream depletion, either by intercepting water that otherwise would reach the stream or by dewatering an area, thereby inducing water to flow from the stream to fill the void. Such depletion is "appreciable," the argument goes, if it is "[c]apable of being estimated . . . or recognized . . . [;] perceptible." Citing Oxford English Dictionary (2d ed. 1989). These parties contend that any well pumping [***23] from a tributary aquifer is pumping subflow if it causes any measurable stream depletion in a period of one or more decades. n8 Viewed outside the context in which the *Southwest Cotton* test was formulated, that interpretation is plausible. Viewed in context, however, it clearly is too expansive from both geographical and time standpoints.

n7 A tributary aquifer is an aquifer having a direct hydraulic connection with a stream or with another aquifer that has such a connection.

n8 The lead brief for those arguing that the test is too narrow suggests a period of ten years. The brief filed by the Nature Conservancy suggests a period of forty years. Both briefs allow for exclusion of wells that pump de minimis amounts of water or that have de minimis impact on surface streams.

When *Southwest Cotton* was decided, subflow was a well known water law concept. The primary authority on which the *Southwest Cotton* court relied concerning subflow was 2 Kinney, *supra* § 1161. Kinney addressed the concept of [***24] subflow in Chapter 60, entitled "Subterranean Water Courses." He subdivided subterranean water courses into two general categories, [*390] [**1244] known and unknown. Known subterranean water courses were those in which the channel had been identified. Unknown courses were those in which the channel had not been identified. *Id.* § 1155, at 2098-99. Known subterranean water courses were further subdivided into independent or dependent. Independent courses were those that flowed "independent of the influence of any surface streams." *Id.* § 1156, at 2100. Dependent courses were "waters . . . dependent for their supply upon the surface streams, or are the 'underflow,'

'sub-surface flow,' 'subflow,' or 'undercurrent,' as they are at times called, of surface streams." *Id.* § 1161, at 2106. Kinney's definition of subflow was the one used in *Southwest Cotton*. See 39 Ariz. at 96, 4 P.2d at 380. n9

n9 See also Black's Law Dictionary 1425 (6th ed. 1990), defining "subflow" as "[t]hose waters which slowly find their way through sand or gravel constituting bed of a stream, or lands under or immediately adjacent to [a] stream."

[***25]

Kinney specifically discussed subflow in the context of intermittent streams, such as the Agua Fria River, at issue in *Southwest Cotton*. He explained that a large volume of water flows through the sand and gravel underlying most streams in arid regions. During dry seasons, the surface of these streams may be dry, but water flows underneath the surface. This underground water is not a separate underground stream but still a part of the surface stream. 2 Kinney, *supra* § 1161, at 2106-10. Furthermore, speaking again about intermittent streams, Kinney wrote:

[W]aters, in order to constitute the underground flow of surface streams, must be connected with the stream and strictly confined to the river bottom and moving underground, as was stated in a California case, "in connection with it, and a course with a space reasonably well defined." In other words, the water must be within the bed of the surface stream itself. Otherwise such underground waters must be classified with percolating waters, herein-after discussed.

Id. § 1161, at 2110 (footnotes omitted).

In his later discussion of percolating water, Kinney wrote:

Our second class of percolating waters we will [***26] define as those waters which infiltrate their way through the adjoining ground to some surface water course or other body of surface water.

Id. § 1193, at 2162 (footnote omitted). Kinney described what the parties in this case have referred to as tributary groundwater. He pointedly distinguished tributary groundwater from subflow:

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[Percolating waters tributary to surface waters] differ from the underflow of surface streams in the fact that they have not yet reached the channels of the water courses to which they are tributary; while, upon the other hand, the underflow of surface streams have reached these channels and are therefore dealt with as component parts of such streams.

Id. (footnote omitted).

Thus, Kinney defined subflow narrowly and specifically distinguished it from tributary groundwater. It is clear that we adopted that narrow definition in *Southwest Cotton*. The court's discussion of subflow, 39 Ariz. at 96-97, 4 P.2d at 380-81, is a virtual paraphrase of large portions of Kinney's discussion in § 1161, at 2106-10. Furthermore, in its answering brief Southwest Cotton made essentially the same argument [***27] that is being made in this proceeding. In a section of its brief entitled "Underground Waters Tributary to or Dependent Upon Surface Streams Subject to Appropriation as Part of the Stream," Southwest Cotton argued that underground water that is hydraulically connected -- tributary -- to surface water should be considered part and parcel of the surface stream. As such, it should be subject to appropriation as waters of the stream. Brief of Appellees (Conservation District) at 199-200.

The court rejected that argument, holding that all types of percolating water were not subject to appropriation under Arizona law. *Southwest Cotton*, 39 Ariz. at 84, 4 P.2d at 376. Having so held, it is unreasonable [***391] [**1245] to suppose that the court then turned around and adopted a concept of subflow broad enough to include all underground water hydraulically connected to a surface stream. It seems clear that the court considered subflow and tributary groundwater to be two different classes of underground water. The former is subject to appropriation under the predecessor of A.R.S. § 45-141(A); the latter is not.

The rehearing proceedings [***28] in *Southwest Cotton* further indicate the court's narrow view of subflow. In its petition for rehearing, Southwest Cotton argued that the court defined subflow too narrowly. It took issue with the use of the term "immediately" in the following portion of the opinion:

stream may be defined as those waters which slowly find their way through the sand and gravel constituting the bed of the stream, or the lands under or *immediately* adjacent to the stream, and are themselves a part of the surface stream.

39 Ariz. at 96, 4 P.2d at 380 (emphasis added). Southwest Cotton argued that neither Kinney nor any other text writer used the word "immediately" or any of its synonyms as a limitation on the word "adjacent." Petition for Rehearing at 22. In its opinion on rehearing, the court made no specific mention of this argument but essentially affirmed its original test for identifying subflow. *Maricopa County Mun. Water Conservation Dist. No. One v. Southwest Cotton Co.*, 39 Ariz. 367, 369, 7 P.2d 254, 254 (1932). [***29] Obviously, therefore, the court meant it when it said that in almost all cases "subflow is found within, or immediately adjacent to, the bed of the surface stream itself." 39 Ariz. at 97, 4 P.2d at 381. Subflow is a narrow concept. Thus, all water in a tributary aquifer is not subflow.

We believe the *Southwest Cotton* court drew a line between subflow as part of the stream and water in the surrounding alluvium that is either discharging into the stream or being discharged by the stream. That line is relatively close to the stream bed, with variations depending on the volume of stream flow and other variables. Thus, if a well is drawing water from the bed of a stream, or from the area immediately adjacent to a stream, and that water is more closely related to the stream than to the surrounding alluvium, as determined by appropriate criteria, the well is directly depleting the stream. If the extent of depletion is measurable, it is appreciable. This is not an all-or-nothing proposition. For example, if the cone of depression n10 of a well has expanded to the point that it intercepts a stream bed, it almost certainly will be pumping [***30] subflow. At the same time, however, it may be drawing water from the surrounding alluvium. Thus, part of its production may be appropriable subflow and part of it may not. Even though only a part of its production is appropriable water, that well should be included in the general adjudication.

n10 The cone of depression is the "funnel-shaped area around a well, where the water table has been lowered by the withdrawal of groundwater through the well." 6 Robert E. Beck, ed., *Waters and Water Rights* 503 (1991).

The underflow, subflow, or undercurrent,
as it is variously called, of a surface

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We believe that the trial court's approach is inconsistent with *Southwest Cotton*. The trial court instructed DWR to apply the 50%/90 day test to all wells located in or near the younger alluvium. The record shows, however, that in a given area the younger alluvium may stretch from ridge line to ridge line so that all wells in the valley would be in or near the younger alluvium. To say that all of an alluvial valley's wells may be pumping subflow is at odds with *Southwest Cotton's* statement that subflow [***31] is found within or immediately adjacent to the stream bed.

Likewise, the 50%/90 day "volume-time" test does not find its origin in *Southwest Cotton*. Given enough time, and with certain exceptions, all extractions from a tributary aquifer will cause a more-or-less corresponding depletion from stream flow volume. That, indeed, is the basis of the continuing controversy between groundwater pumpers and surface appropriators. *Southwest Cotton*, however, did not purport [*392] [**1246] to identify subflow in terms of an acceptable amount of stream depletion in a given period of time. It sought to identify subflow in terms of whether the water at issue was part of the stream or was percolating water on its way to or from the stream.

Furthermore, the actual time and volume elements adopted by the trial court are essentially arbitrary. Under the trial court's test, a pumper extracting 1,000 acre feet, diminishing stream flow by "only" 499 acre feet within 90 days, would be presumed to be pumping groundwater, whereas a well owner extracting 100 acre feet, depleting stream flow by 51 acre feet, would be presumed to be pumping surface water. Nothing in *Southwest Cotton* or [***32] the record in this proceeding justifies so arbitrary a classification. The same, of course, is true of application of the 90-day time period. Why not 75 or 100 days?

Whether a well is pumping subflow does not turn on whether it depletes a stream by some particular amount in a given period of time. As we stated above, it turns on whether the well is pumping water that is more closely associated with the stream than with the surrounding alluvium. For example, comparison of such characteristics as elevation, gradient, and perhaps chemical makeup can be made. Flow direction can be an indicator. If the water flows in the same general direction as the stream, it is more likely related to the stream. On the other hand, if it flows toward or away from the stream, it likely is related to the surrounding alluvium. The present record certainly allows neither the trial court nor us to identify a definitive set of criteria. Furthermore, it also is likely that differences in geology and hydrology from location to location may require that different criteria be given more or less emphasis, depending on the area under

analysis. The record allows neither the trial court, nor us, to make [***33] those determinations.

We conclude, therefore, that the 50%/90 day test for identifying wells presumed to be pumping subflow is inconsistent with *Southwest Cotton* and should not be used.

3. The burden of proof

The trial court's 50%/90 day rule created a presumption that wells meeting the test are pumping appropriable water. The burden of proof then fell on well owners to prove that their wells did not pump appropriable water. Those arguing that the 50%/90 day test is too narrow point out that under Arizona law underground water is presumed to be percolating and that one claiming otherwise has the burden of proving the claim by clear and convincing evidence. *Neal v. Hunt*, 112 Ariz. 307, 311, 541 P.2d 559, 563 (1975); *Southwest Cotton*, 39 Ariz. at 85, 4 P.2d at 376. Thus, they conclude, the trial court's order improperly shifted to well owners the burden of proving that their wells do not pump appropriable water. We disagree. If DWR uses the proper test and relies on appropriate criteria for determining whether a well meets the test, its determination that a well is pumping appropriable [***34] subflow constitutes clear and convincing evidence. It is consistent with Arizona law, then, to require the well owner to come forward with evidence that DWR is wrong.

4. The future

Finally, we recognize that the line between surface and groundwater drawn by the *Southwest Cotton* court and reaffirmed by this court today is, to some extent, artificial and fluid. As discussed above, however, we do not feel free to redraw or erase that line. It is important to remember that the *Southwest Cotton* court did not create an all-encompassing set of common law principles. It purported, instead, to interpret the relevant statutes codifying the doctrine of prior appropriation and identifying the water sources to which the doctrine applied. Those statutes remain relatively intact. See A.R.S. § 45-141. *Southwest Cotton* argued at the time for a different interpretation of the statutes and the Arizona Constitution. Since *Southwest Cotton*, many have criticized Arizona's adherence to a bifurcated system of water management. See Leshy & Belanger, *supra*, at 657-60. Now, sixty years later, [*393] [**1247] similar arguments are made that *Southwest Cotton* [***35] misinterpreted our statutes and constitution. See *id.* at 767-90. We recognize compelling arguments in favor of unified management of Arizona's water resources. Nonetheless, in the decades since *Southwest Cotton* was decided, the Arizona Legislature has not significantly altered the opinion's reach.

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Southwest Cotton's concept of subflow added marginally to the statutory definition of water subject to appropriation, but we do not propose to rewrite the statute further by broadening the concept of subflow. We believe the trial court's 50%/90 day rule expands the clear words of A.R.S. § 45-141(A) to include not only waters flowing in streams but, potentially, waters pumped any place in the younger alluvium. The court's order does not explain the rule's derivation. The 50%/90 day rule does not comport with the tests laid down in *Southwest Cotton*. Water may be considered appropriable underflow if the "abstraction" by pumping results in "abstracting a corresponding amount from the surface stream." Considering subflow as "strictly a part of the stream, the test is always the same: *Does drawing off the subsurface water tend to diminish appreciably and directly the flow* [***36] *of the surface stream?*" 39 Ariz. at 97, 4 P.2d at 380 (emphasis in original).

Thus, we reaffirm *Southwest Cotton's* narrow concept of subflow. We realize this does not solve the problems of equitably apportioning all available water in the state between conflicting interests and claims of groundwater users and surface appropriators. We believe, however, that in this area of the law, as much or more than any other, any appropriate change in existing law must come from the legislature. See *Arizona Groundwater Code*, Title 45, ch. 2; *Chino Valley v. City of Prescott*, 131 Ariz. 78, 638 P.2d 1324 (1981). That is as it should be. As we stated in *Arizona Public Service Co. v. Long*, 160 Ariz. 429, 436, 773 P.2d 988, 995 (1989):

Regulation of water use, . . . especially in a desert state, does not lend itself to case-by-case definition. In this field, we not only confer private rights and interests but deal in the very survival of our society and its economy. Simply put, there is not enough water to go around. All must compromise and some [***37] must sacrifice. Definition of those boundaries is peculiarly a function for the legislature. It is plainly not a judicial task. Accordingly, we must look to the legislature to enact the laws they deem appropriate for wise use and management.

D. Comprehensiveness Requirement

The United States is a party to this case under the McCarran Amendment, which gives consent to suits against the United States in state court adjudications that embrace "rights to the use of water in a river system or other source." 43 U.S.C. § 666(a). The United States

argues that unless this adjudication includes all water hydrologically connected to the Gila River system, it will not be comprehensive enough to satisfy the McCarran Amendment requirement that it embrace all rights to the use of water in the river system or other source. At oral argument, the United States also asserted that the trial court in this case cannot exclude wells having only a de minimis effect on the river system. We disagree.

The McCarran Amendment recognizes that any decree from a water rights adjudication would be of little value unless it joined all parties owning rights to a stream [***38] or water source, including the United States. According to Senator McCarran, who introduced the bill and chaired the reporting committee:

S. 18 is not intended . . . to be used for any other purpose than to allow the United States to be joined in a suit wherein it is necessary to adjudicate all of the rights of various owners on a given stream. This is so because unless all the parties owning or in the process of acquiring water rights on a particular stream can be joined as parties defendant, any subsequent decree would be of little value.

United States v. District Court in and for Eagle County, Colo., 401 U.S. 520, 525, 91 [*394] [**1248] S. Ct. 998, 1002, 28 L.Ed.2d 278 (1971) (quoting from S.Rep. No. 755, 82d Cong., 1st Sess., at 9 (1951)). The McCarran Amendment was not intended to impose on the states a federal definition of "river system or other source." Rather, as the Court held in *Colorado River Water Conservation District v. United States*, 424 U.S. 800, 819, 96 S. Ct. 1236, 1247, 47 L.Ed.2d 483 (1976):

The consent to jurisdiction [***39] given by the McCarran Amendment bespeaks a policy that recognizes the availability of comprehensive state systems for adjudication of water rights as the means for achieving [the goal of avoiding piecemeal adjudication of interdependent water rights by resolving them in a single unified proceeding].

The United States has cited no authority supporting its reading of the McCarran Amendment, n11 but there is contrary precedent. In *United States v. Oregon Water*

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Resources Department, 774 F. Supp. 1568, 1578 (D.Ore.1991), the court wrote:

Finally, the United States and the Tribe argue that because the adjudicative procedures of the State of Oregon do not call for simultaneous adjudication of rights to surface water and rights to groundwater within a given river system, the adjudication is not comprehensive within the meaning of the McCarran Amendment. The language of the McCarran Amendment does not support this construction, and the United States and the Tribe point to no provision in the legislative history and no case precedent, state or federal, in support of this construction of the McCarran Amendment.

This correctly states the law.

n11 The United States provided this court with a copy of an unpublished decision of a California superior court in which the court granted a federal motion to dismiss on the ground that the proceeding was not comprehensive because it did not include groundwater users. We do not find that to be persuasive authority. In any event, the California court did not base its decision on what

it perceived to be a rule of general application but on the peculiar facts of the case before it.

[***40]

We believe that the trial court may adopt a rationally based exclusion for wells having a de minimis effect on the river system. Such a de minimis exclusion effectively allocated to those well owners whatever amount of water is determined to be de minimis. It is, in effect, a summary adjudication of their rights. A properly crafted de minimis exclusion will not cause piecemeal adjudication of water rights or in any other way run afoul of the McCarran Amendment. Rather, it could simplify and accelerate the adjudication by reducing the work involved in preparing the hydrographic survey reports and by reducing the number of contested cases before the special master. Presumably, Congress expected that water rights adjudications would eventually end. It is sensible to interpret the McCarran Amendment as permitting the trial court to adopt reasonable simplifying assumptions to allow us to finish these proceedings within the lifetime of some of those presently working on the case.

CONCLUSION

We vacate the portion of the trial court's September 8, 1988 order that formulated the 50%/90 day rule. We remand the matter to the trial judge to take evidence and, by applying the principles [***41] contained in this opinion, determine the criteria for separating appropriate subflow from percolating groundwater.