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Twenty Years of Local Groundwater Export Legislation in California: Lessons from a Patchwork Quilt (Part 1)

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Twenty Years of Local Groundwater Export Legislation in California: Lessons from a Patchwork Quilt

ABSTRACT

Over the last 20 years, in response to actual or threatened water development projects, eight California counties have enacted ordinances that attempt to restrict the export of groundwater from those counties. State legislation enacted in 1992 may encourage a new wave of such local groundwater restrictions. In an effort to evaluate the appropriateness of using the eight extent ordinances as models for further local legislation, the article describes and critiques the current ordinances against the backdrop both of fundamental hydrogeological concepts and the California decisional and statutory law on the acquisition and transfer of groundwater rights. In particular, the article exhaustively analyzes the texts of each of the ordinances, both individually and in comparison to the texts of the other ordinances. The analysis points out numerous instances of vague, ambiguous, or hydrologically inappropriate drafting. To the extent that these eight ordinances may become models for a new wave of state approved locally initiated groundwater management legislation, the article summarizes drafting lessons learned from the current ordinances and suggests problems to avoid. Finally, drawing from the lessons learned from the eight ordinances, the article broadly criticizes the wisdom of allowing this kind of local management of a state resource. It concludes that the state's ad hoc approach to groundwater issues has resulted in an incoherent policy that can ultimately only be remedied by greater state direction and control over local management efforts.

I. INTRODUCTION

Groundwater has been an important water source for California's farms and cities throughout this century.[1] Groundwater basins underlie

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1. California Dep't Of Water Resources, Bulletin 118, California's Ground Water 20-24 (1975) [hereinafter Bulletin 118-75]. Groundwater basins have several advantages over surface storage: "(1) A groundwater aquifer can act as a distribution system; (2) evaporation from groundwater basins is insignificant compared with that from surface reservoirs; (3) groundwater basins provide natural treatment and purification for both naturally

about 40 percent of California lands.[2] On average, groundwater provides 40-45 percent of the state's annual *applied* water needs, and about 25 percent of the state's annual *net* water demands.[3]

The two droughts that have struck California in the last 16 years have focused the attention of many California water providers on the state's extensive groundwater supplies.[4] In a drought, groundwater is like money in a bank.[5] Over millennia, nature made the original deposits into the account.[6] During wet years, natural and artificial groundwater

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percolating and artificially recharged water; (4) surface systems, including distribution, may be destroyed during catastrophes such as earthquakes or acts of war; (5) groundwater often provides emergency drought relief." D. Jaquette & N. Moore, Efficient Water Use In California: Groundwater Use And Management 3-4 (1978). Other than shortages and the costs of extraction, the principal problems associated with groundwater development have involved quality degradation. *Id.* at 4.

2. Jaquette & Moore, *supra* note 1, at 5.

3. *See* California Dep't Of Water Resources, Bulletin 160-87, The California Water Plan: Outlook In 1987 55 (1987) [hereinafter Bulletin 160-87] (distinguishing applied and net water demand).

In the early 1970s, groundwater represented about 24 percent of the *net* water demand. *See* California Dep't Of Water Resources, Bulletin 160-74, The California Water Plan: Outlook In 1974 55 (1974). About half of the groundwater pumped in an average water year represented "reuse of water percolated from applications of excess surface water." *Id.* The 1985 contribution of groundwater to net water use is nearly identical to the earlier figures. *See* Bulletin 160-87, *supra*, Statistical App. at 30 (sum of "groundwater" and "overdraft," divided into total net water use.) Estimates of groundwater's relative contribution to the total state applied water use varies. For example, the Department of Water Resources concludes that groundwater provides 40 percent of the applied water demands, while surface water supplies provide the remaining 60 percent. *See, e.g.*, Bulletin 118-75, *supra* note 1, at 3; California Dep't of Water Resources, California's Continuing Drought 1987-1991 16 (1991) (40 percent of applied water) [hereinafter, Continuing Drought II]. Professor Zachary Smith ascribes to groundwater 45 percent of applied water supplies. Z. Smith, Groundwater in the West 53 (1989) (45 percent) [hereinafter Groundwater In The West]. The differences in estimate between these and other studies stem from the lack of documentation of much of the actual pumping occurring in the largely unregulated groundwater basins. *See* Jaquette & Moore, *supra* note 1, at 8. n.11.

4. Water years begin on October 1 of the preceding calendar year. For example, water year 1991 began on October 1, 1990. *See, e.g.*, California Dep't of Water Resources, California's Continuing Drought vii (1991). Since water year 1976, runoff in the important Sacramento River system has been considered critically dry in seven of the sixteen completed water years. *See, e.g.*, California Dep't of Water Resources, The Hydrology of the 1987-1992 California Drought, Technical Information Paper (1992) (see charts 9 & 11). The first two of these critically dry years formed the 1976-77 drought. The remaining five have occurred during the 1987-1992 drought.

5. *See, e.g.*, R. Howitt & C. Nuckton, *Is Overdrafting Groundwater Always Bad?*, Cal. Agric. 10 (1982) ("Like money in the bank, groundwater can be spent now or saved for the future.").

6. The Department of Water Resources estimates that the usable storage capacity of the underground basins is 143 million acre-feet. Bulletin 118-75, *supra* note 1, at 7. Many of these basins are still full. *Id.* The usable storage space represents more than three times the total

recharge can add net deposits to the account.[7] During dry years, Californians withdraw this groundwater for municipal, industrial and agricultural uses.[8] If carefully managed, the water levels in the basin will remain stable at optimal levels, and the resource can be used perpetually.[9]

In many parts of the state, however, the groundwater account is way overdrawn.[10] State wide, average annual groundwater extractions

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storage capacity of the state's surface reservoirs. Governor's Commission To Review California Water Rights Law, Final Report 138 (1978) [hereinafter Final Report].

7. Each year, rainfall, snowmelt and stream seepage percolate an average of 5.8 million acre-feet of natural recharge. Bulletin 160-87, *supra* note 3, at 31. In addition to natural recharge, more than 65 artificial groundwater recharge projects have added to the "deposits" in several areas of the state. *Id.* at 35-36. Annually, these projects add approximately 1.4 million acre-feet of water. *Id.* at 36. The averages do not demonstrate the relatively greater contributions of wet years to the quantities of water available in the state's groundwater basins. *See, e.g., id.* at 37; *see also* California Dep't Of Water Resources, Groundwater Trends In The San Joaquin Valley 9-15 (1990) [hereinafter San Joaquin Groundwater].

The preceding pamphlet's title raises a nomenclature question. Consistent with Department of Water Resources practice, the pamphlet spells "groundwater" as two words: ground water. Many other authors, however, spell "groundwater" as one word. *See, e.g.*, Howitt & Nuckton, *supra* note 5. Some hyphenate the word: "ground-water." *See, e.g.*, J. Holzschuh, *Ground-Water Mining: An Often Misused Term*, 25 Ground Water 346 (1987). The legislative bodies considered in this article show no consistency. For example, the Imperial County ordinance spells "groundwater" as two words. *See, e.g.*, Imperial County, Cal., Codified Ordinances at § 56201 (a) (1972) (amended 1978). Other ordinances in other counties spell "groundwater" as one word. *See, e.g.*, Nevada County, Cal., Land Use And Development Code § L-X 6.2 (F) (1988). Occasionally, ordinances spell "groundwater" both as two words and as one word *in the same sentence! See, e.g.*, Tehama County, Cal., Code § 9.40.010. 10 (1992). The different spellings seem only different conventions, without any legal or hydrological significance. For convenience and uniformity, this article spells "groundwater" as one unhyphenated word regardless of the particular spelling in the original source quoted.

8. During both the 1976-77 and the 1987-1992 drought, groundwater extractions increased substantially. For example, during the 1976-77 drought, Californians drilled, deepened or repaired an estimated 28,000 wells. Final Report, *supra* note 6, at 138. In the San Joaquin basin, reliance on groundwater as a proportion of applied water demands went from 41 percent in 1975 to 66 percent in 1977. *Id.* at 139. In the Tulare Basin it went from 54 percent to 84 percent during the same period. *Id.* Similarly, the 1987-92 drought also saw a doubling of well drilling and considerable drops in groundwater levels in the San Joaquin Valley. *See* Continuing Drought II, *supra* note 3, at 16.

The integrated, active management of groundwater and surface water is called "conjunctive operation" or "conjunctive use." *See, e.g.*, Bulletin 118-75, *supra* note 1, at 4; *see generally* D. Jaquette, Efficient Water Use in California: Conjunctive Management of Ground and Surface Reservoirs (1978); J. Anderson, *Some Thoughts on Conjunctive Use of Groundwater in California*, 16 W. ST. U. L. REV. 559 (1989).

9. This assumes no water quality degradation. *See, e.g.*, Bulletin 118-75, *supra* note 1, at 118, 121-23. On "optimal" water table levels and basin "safe yield," see *infra* notes 86-109 and accompanying text.

10. Groundwater is a "common pool" resource. *See, e.g.*, Jaquette & Moore, *supra* note 1,

have exceeded average annual replenishment by 2 to 2.5 million acre-feet per year.[11] The state has identified eleven "critically overdrafted" groundwater basins.[12] In addition to these eleven basins, the state has identified at least 42 basins where overdraft has occurred but has not yet reached critical levels.[13] Prolonged overdraft can lead to long term economic and environmental effects. Economic effects include increased pumping expenses as water tables decline.[14] Environmental effects may include land subsidence, surface vegetation reduction, and, along the coast, saltwater intrusion into aquifers.[15]

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at 12-13. As a "common pool" resource, groundwater lacks "clearly defined property rights to its use when two or more pumpers extract water from the same aquifer or basin. Also, each pumper's extraction costs depend, at least indirectly on all other pumpers' rates of extraction . . . . Without a well-designed management program, individual extractors who pursue their own self interests will cause an inefficient use of their common pool resource." Jaquette & Moore, *supra* note 1, at 12.

11. Smith, *supra* note 3, at 54. Smith's figures come from a 1980 estimate. *Id.* This represented an approximate 50 percent reduction from a 1955 estimate of 4 million acre-feet per year of overdraft. *Id.*

The Department of Water Resources estimates average overdraft is 2 million acre-feet. Bulletin 160-87, *supra* note 3, at 31. About two thirds of this overdraft occurs in the San Joaquin Valley. *See id.* at 33.

12. California Dep't Of Water Resources, Bulletin 118-80, Groundwater Basins In California 4 (1980) [hereinafter Bulletin 118-80]. A "critically overdrafted" groundwater basin is one where "continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." *Id.* at 11.

13. Bulletin 118-80, *supra* note 12, at 5. Bulletin 118-80 identified 42 groundwater basins "in which 1) studies have indicated overdraft, or 2) there is evidence of adverse impacts of overdraft." *Id.* at 13.

14. Wells have to be deepened, pumps lowered, or more powerful pumps need to be installed. *See, e.g.*, Final Report, *supra* note 6, at 140. Pumping costs increase as water has to be lifted higher from a declining water table. *See, e.g., id.*; San Joaquin Groundwater, *supra* note 7, at 1. Eventually, overdrafting can deplete a groundwater basin entirely, drying up the local economy that had grown upon overdrafting the groundwater basin. Bulletin 118-75, *supra* note 1, at 115, 119, & 129-31.

Once depletion of historical storage occurs, then all future extractions will never be able to exceed the rate of replenishment. Z. Smith, *Rewriting California Groundwater Law: Past Attempts and Prerequisites to Reform*, 20 Calif. W. L. R. 223, 255 (1984) [hereinafter *Rewriting California Groundwater Law*]. Since such a steady state eventually must occur, policy makers need to determine whether that steady state arrives at relatively high or low aquifer levels. *Id.* at 255-56. On the one hand, a steady state reached at relatively high aquifer levels can reduce future pumping costs and provide a margin of safety for economic or environmental problems. *Id.* It can also help avoid the boom/bust cycle that can accompany development and exhaustion of "mined" groundwater basins. *See* Final Report, *supra* note 6, at 145. On the other hand, a steady state arrived at a relatively lower aquifer level allows for greater short term economic development. Such short term resource development may trigger infrastructural investments that can attract long term economic investment for the overlying community.

15. *See, e.g.*, Bulletin 118-75, *supra* note 1, at 115-19; *Rewriting California Groundwater Law*, *supra* note 14, at 223-24 (depletion, subsidence, saltwater intrusion); A. Gregory, *Groundwater and Its Future: Competing Interests and Burgeoning Markets*, 11 Stan. Envtl. L.J. 229, 232-33

Despite the importance of groundwater to the state's economy, and the widespread evidence of overdraft, state regulation of groundwater extraction has been minimal, especially when compared with the extensive state legislation controlling surface water diversions.[16] Calls for enactment of state groundwater control laws last reached a peak during and shortly after the 1976-77 drought.[17] The legislature was unable to enact legislation recommended by a special governor's commission, and a statewide groundwater management initiative was soundly defeated.[18] The sentiment remains strong that groundwater should be managed locally, if at all.[19]

In response to the statewide regulatory vacuum, and concerned over the local effects of groundwater extraction, local governments have enacted local groundwater extraction regulations over the past 20 years.[20] Many of their efforts have resulted in homegrown county ordinances.[21] In a few instances, counties have approached the legislature for permission to create special local agencies to manage local groundwater supplies.[22]

A central feature of both the county groundwater ordinances and many of the special district acts has been provisions governing control of

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(1992) (loss of surface vegetation and increased contaminant concentration).

16. *See infra* notes 176-214 and accompanying text.

17. *See, e.g., Rewriting California Groundwater Law, supra* note 14, at 240-42. The reform calls following the 1976-77 drought were but one brief moment in the long history of calls for state groundwater management. *See* R. Kletzing, *Imported Groundwater Banking: The Kern Water Bank—A Case Study*, 19 PAC. L.J. 1225, 1254-57 (1988) (outlining history of unsuccessful efforts to develop state groundwater control legislation).

18. *See* A. Rossmann & M. Steel, *Forging the New Water Law: Public Recognition of "Proprietary" Groundwater Rights*, 33 Hastings L.J. 903, 926-929 (1982) (reviewing failed legislation). The failed referendum was 1982's Proposition 13. *See Rewriting California Groundwater Law, supra* note 14, at 224.

19. *See, e.g.*, S. Trager, *California's Groundwater: Who's in Charge?*, 2 Cal. Water L. & Pol'y Rptr. (Jan. 1992) 81, 81-85. Drawing upon a University of California at Davis report, Professor Smith cited five reasons for local opposition to groundwater management. Groundwater in The West, *supra* note 3, at 65. These reasons include: 1) farmers in non-overdrafted areas find groundwater regulation unnecessary; 2) true costs of overdrafting may be hidden or mitigated by other trends; 3) farmers fear that groundwater management rules will shift control to urban bureaucrats less sympathetic to agricultural needs; 4) farmers fear reduction in irrigated acreage; and 5) new surface water supplies will offset the overdraft before overdrafting becomes uneconomical. *Id.* Given these political realities, Smith advocated that state control should be kept at a minimum. *Rewriting California Groundwater Law, supra* note 14, at 252. For example, he urged that local managers should retain authority over when and how to pump or conserve. *Id.*; *cf.* Final Report, *supra* note 6, at 146, 166-69, & 215.

20. *See* Kletzing, *supra* note 17, at 1261.

21. *See infra* notes 215-430 and accompanying text.

22. *See infra* notes 431-470 and accompanying text.

groundwater exports from groundwater rich areas to areas of water demand.[23] As drought continues, state population builds, and surface water supplies remain inadequate to meet all demands, interest in exporting groundwater has grown.[24]

These groundwater exports can take many forms. For example, for over twenty years, the City of Los Angeles has exported groundwater from Inyo County to Los Angeles.[25] During the 1976-77 drought, a Yolo County farm proposed to pump groundwater into the Sacramento River for transportation, via the state water project, for use in Kern County orchards.[26] In the mid-1980s, Nevada County worried that groundwater might be exported from eastern Nevada County down the Truckee River.[27] In 1989, landowners in Mono County proposed exporting groundwater to Southern California.[28] In 1991, the California Drought Water Bank purchased the equivalent of over 250,000 acre-feet of groundwater for transfer from Northern California to thirsty cities and farmers along the coast and in the San Joaquin valley.[29] Also in 1991,

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23. *See, e.g.*, Butte County, Cal., Code § 33-4 (Supp. 1978) (permit required to export groundwater "outside the area in which said pumping affects the natural available water supply"); Cal. Water Code-App. § 119-706 (West Supp. 1993) (permit needed to export water beyond the boundaries of the Sierra Valley Groundwater Management District).

24. *See, e.g.*, Gregory, *supra* note 15.

25. *See, e.g.*, Rossmann & Steel, *supra* note 18, at 915-16 & nn. 82-85. For example, in 1970, Los Angeles was pumping 90 cubic feet per second of water from the Owens Valley. Rossmann & Steele, *supra* note 18, 916 n.85. But concerns over the effects of the City's doubling and even quadrupling export pumping ultimately led Inyo County to enact a groundwater management ordinance. Rossmann & Steele, *supra* note 18, at 914-33. *See infra* notes 353-379.

26. *See* Anderson Farms Co., No. D-1474 (Cal. St. Water Resources Control Bd. Sept. 22, 1977). The County of Yolo and others complained to the State Board over the proposed transfer. As the Board acknowledged, ordinarily it has only "limited jurisdiction" over groundwater. *Id.* at 2. Nevertheless, the Board concluded that it had jurisdiction to review the transfer under a drought emergency delta export regulation, see 77 Cal. Regulatory Notice Reg. 54.2 (1977) (codified at Cal. Code Reg. tit. 23, § 764.20(c)(3)) (banning exports unless essential for emergency municipal, domestic or other "essential" uses), and under its authority under California Constitution, art. X, § 7, to prevent an unreasonable method of water diversion. *See* Andersen Farms Co., *supra*, at 9, 13. Ultimately, the Board concluded that there was insufficient evidence: 1) to exempt the proposed export from the emergency delta export restrictions as an "essential use;" to find the proposed export was within the public interest; and 3) to find that the proposed extraction was a reasonable method of diversion. See Andersen Farms, Co., *supra*, at 14-15.

27. *See* Letter from Melanie K. Wellner, Deputy County Counsel, Nevada County, to Gregory S. Weber (Oct. 29, 1992). This led to enactment of the Nevada County ordinance. *See infra* note 380-402 and accompanying text.

28. *See* Letter from James S. Reed, Mono County Counsel, to Gregory S. Weber (Oct. 27, 1992). Ultimately, this proposal led to the enactment of the Mono County Tri-Valley Groundwater Management District Act. *See infra* note 462.

29. California Dep't Of Water Resources, The 1991 Drought Water Bank 2 (1992). Almost

Colusa County farmers drilled a well on land they owned in Tehama County, hoping to export the water to their Colusa County fields.[30]

Over the last 21 years, eight California counties have enacted ordinances restricting groundwater exports.[31] At least half of these ordinances have been enacted in response to either the 1976-77 drought, or the 1987-1992 drought.[32] In addition to these county ordinances, over the past twelve years, the legislature has created four special districts with groundwater export control authority.[33] The pace of both state and

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all of this "groundwater" came from parties who sold the Bank their surface water rights and then pumped groundwater instead. *Id.* at 8. Less than 10,000 acre-feet represented groundwater actually pumped for transfer to the Bank. *Id.* For the 1992 Drought Water Bank, the Department of Water Resources purchased 150,000 acre-feet of this "groundwater." California Dep't Of Water Resources, State Drought Water Bank (1993) at 7 (Draft Program Envir. Impact Report) [hereinafter Draft EIR]. Many of the environmental effects of this increased pumping in lieu of surface water use are the same as if the groundwater had been sold directly. For example, the Department of Water Resources evaluates all such exchanges for four "water level related impacts": "1) overdraft, 2) land subsidence, 3) effects on other pumpers, and 4) effects on flows in the surface water system." *Id.* at 110.

In 1992, in recognition of the potential impact of these water bank transactions that induce increased groundwater extraction in order to free surface water deliveries for transfer, the legislature passed A.B. 2897. *See* Cal. Water Code § 1745.10 (West. Supp. 1993). As codified, that bill states:

> A water user that transfers surface water pursuant to this article may not replace that water with groundwater unless the groundwater use is either of the following:
> (a) Consistent with a groundwater management plan adopted pursuant to state law for the affected area.
> (b) Approved by the water supplier from whose service area the water is to be transferred and that water supplier, if a groundwater management plan has not been adopted, determines that the transfer will not create, or contribute to, conditions of long-term overdraft in the affected groundwater basin.

Cal. Water Code § 1745.10 (West. Supp. 1993).

30. *See* Petition for Writ of Mandate at 2-4, Myers v. County of Tehama, No. 18498 (Cal. Super. Ct., Tehama County, Mar. 3, 1992). This led to enactment of the Tehama County ordinance. *See infra* notes 403-429 and accompanying text.

Another group of irrigators also have exported groundwater from Tehama County. Baldwin Pacific Farms, a Glenn County almond rancher, and Magnesium Alloy Products Farms (Mapco), a Colusa County almond rancher, both sought to export groundwater from a Tehama County ranch owned by Haleakala Orchards, a general partnership of which Baldwin Pacific is a partner. *See* Petition for Writ of Mandate, at 2-3, Baldwin v. County of Tehama, Tehama No. 34446 (Cal. Super. Ct. May 27, 1992). Indeed, Haleakala began pumping for Mapco in 1990 and continued in 1991. *Id.*

31. These include, in chronological order: 1) Imperial (1972), 2) Butte (1977), 3) Glenn (1977), 4) Modoc (1978), 5) Sacramento (1980), 6) Inyo (1980), 7) Nevada (1986) and 8) Tehama (1992). *See infra* notes 216-220 and accompanying text.

32. The Butte, Glenn, and Modoc ordinances were enacted during or soon after the 1976-77 drought. The Tehama ordinance was enacted during the 1987-92 drought.

33. These include, in chronological order: 1) Sierra Valley Groundwater Management

county sponsored groundwater export legislative efforts has been increasing. Indeed, since 1989, ten counties either have had groundwater export legislation enacted (or amended) or have seriously reviewed possible legislation or formal water export policies.[34]

To varying extents of intent and degrees of success, the local export controls seemingly attempt to accomplish one or more of three goals. First, where applicable, the local permit systems set up for groundwater exports functions as a local equivalent to the state administered appropriative rights permits for surface watercourses. As described more fully below, no centrally administered permit system governs state groundwater extraction rights.[35] Pumpers wishing to verify

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District (1980); 2) Mono County Tri-Valley Groundwater Management District (1989), 3) Honey Lake Valley Groundwater Management District (1989), and 4) Ojai Basin Groundwater Management District (1991). *See infra* notes 431-470 and accompanying text. In addition, in October 1992, the governor vetoed two bills that would have established the Glenn County Groundwater Management District. *See infra* notes 201 & 469.

34. Tehama County enacted an export control ordinance for the first time in early 1992. *See infra* notes 403-429 and accompanying text. Glenn County amended its ordinance in 1990. *See infra* notes 324-335 and accompanying text. In addition, in 1992, Glenn County sought express state legislative authority to create a groundwater management district with export control authority. *See infra* note 201.

In 1989, Mono County got the Legislature to enact the Mono County Tri-Valley Groundwater Management District Act in 1989. *See infra* note 461 and accompanying text. In 1991, Ventura County residents in the Ojai Basin convinced the legislature to create a special groundwater management district that had export authority. *See infra* note 464 and accompanying text.

Since 1991, Butte County, which has had an export control ordinance since 1978, has participated in the formation of the "Butte Basin Water Users Association." *See infra* note 487. This organization addresses "the need to manage the Butte Basin's surface and groundwater resources to ensure that water transfers in or outside the Basin do not adversely impact Butte Basin water users." *Id.*

In addition to these complete actions, several counties have reviewed or are contemplating new ordinances or legislation. In 1992, Sutter County circulated a proposed groundwater export ordinance. *See infra* note 430. Since 1991, Imperial County, the first county ever to enact a groundwater export ordinance, has been reviewing legislation to create a special district similar to the Mono County district. Letter from Joanne L. Yeager, *Assistant Count Counsel, Imperial County*, to Gregory S. Weber (1992) (on file with author). Yuba County has indicated interest in enacting water transfer ordinances. Response from Yuba County Counsel to survey by Gregory S. Weber (Nov. 1992) (on file with author). In 1992, San Joaquin County announced a general policy opposing any transfers of water from San Joaquin County where the water had not been offered first to other San Joaquin county users, or where affected water agencies had not yet consented. San Joaquin County, Cal., Resolution 4-92-236 (Apr. 7, 1992). Yolo County has moved to create a new county wide water agency charged with developing a water export policy. *See County to Form Water Agency*, Davis Enterprise, (Oct. 14, 1992), A-1 & A-5. Finally, Napa County has indicated that it is working on a formal water export policy statement. Response from Napa County Flood Control and Water Conservation District to survey by Gregory S. Weber (Nov. 12, 1992).

35. *See infra* notes 113-179.

(or quantify) pumping rights thus must sue for a judicial determination of rights.[36] The local groundwater export control ordinances provide an administrative process, albeit locally supervised, that determines the availability of groundwater for export and considers some of the impacts on the environment from a prospective groundwater appropriation.[37]

Second, the ordinances provide a handle to allow local review of transfers of groundwater use. Increasingly, state statutory law addresses surface water transfers in great detail.[38] For the most part, these statutes do not address groundwater. Moreover, the common law on temporary changes in place of groundwater use remains largely undeveloped.[39] Since the ordinances address all exports without distinguishing source of pumping right or duration of proposed export, they arguably apply even to short term transfers by a pumper traditionally exercising overlying rights.[40]

Third, in varying degrees of explicitness, the local groundwater export provisions exemplify local "area of origin" restrictions.[41] Such

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36. *See* Final Report, *supra* note 6, at 143.

37. *See, e.g.*, Tehama County, Cal., Code §§ 9.40.060, .40.060 (1992). The local efforts mimic simplistically some of the broader range of factors that the State Water Resources Control Board considers when reviewing a permit to appropriate water from a watercourse. For example, the Board, too, must determine generally the availability of water in light of other diversions and public interest considerations. *See, e.g*, Cal. Water Code §§ 1201 to 1203, 1253 to 1259 (West 1971 & Supp. 1993) (sections respectively addressing water available for appropriation and public interest considerations).

38. *See, e.g.*, Cal. Water Code §§ 109, 475 (West Supp. 1993) (policy support for transfers). *See generally* B. Gray, *A Primer on California Water Transfer Law*, 31 Ariz. L. Rev. 745 (1989).

39. *See infra* notes 154-175 and accompanying text.

40. *See infra* notes 154-175 and accompanying text.

41. Tehama County's ordinance exemplifies the more explicit (if not necessarily coherent) approach to reservation of water for future, in county uses. *See* Tehama County, Cal., Code § 9.40.010(10) (1992) (mining definition). This ordinance is discussed in detail *infra*, notes 413-421 and accompanying text.

"Area of origin" protections attempt to reserve water for use by an area at or near the water's source. Such statutes, unique to water among the natural resources, are likely a function of the lack of market pricing for most water rights. *See, e.g.*, National Water Comm'n, Water Policies For The Future 323-24 (1973). *See generally* L. MacDonnell & C. Howe, *Area-of-Origin Protection in Transbasin Water Diversions: An Evaluation of Alternative Approaches*, 57 U. Colo. L. Rev. 527, 539 (1986) (surveying the laws and concluding, to be economically desirable, transbasin diversion must be "least-cost source of reliable water supply to the prospective user" and "its benefits must exceed all related costs)."

California has several "area of origin" provisions. Initially, riparian rights, with their limitation of water extraction to the parcel of land adjoining the watercourse, themselves accomplish some "area of origin" protections. National Water Comm'n, *supra*, at 323; MacDonnell & Howe, *supra*, at 530. Beyond riparian rights, the legislature has enacted four main area of origin statutes. First, the "County of Origin" law prohibits the assignment of appropriative rights applications filed by the state if required for the future needs of a county in which the water originates. Cal. Water Code § 10505 (West 1971).

provisions attempt to reserve water for future needs in the areas where precipitation falls or groundwater is extracted. When enacted and administered locally, without any state authorization, such provisions serve parochial interests at the possible expense of the interests of the state as a whole.

As a result of these local legislative efforts, a patchwork quilt of groundwater export regulations has sprung up across the state. This patchwork raises two principal sets of legal issues.[42] First, the ordinances raise important questions of statutory interpretation. Many of the ordinances suffer from vagueness, ambiguity and incoherence.[43] They frequently define hydrological terms imprecisely. By themselves, many of the ordinances demonstrate a need for substantial revision. Moreover, while most of the local legislative efforts share common features, the various schemes differ in many critical ways. The differences potentially force a prospective groundwater exporter, such as the state's Department of Water Resources, to deal with four current and four

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Second, the "Watershed Protection" law grants preferences to water users in the "watershed of origin" and areas "immediately adjacent thereto." *Id.* § 11460. The Watershed Protection law applies to "any agency of the state or federal government." *Id.* § 11128. Third, the Delta Protection Act prohibits diversion of water from the delta of the Sacramento and San Joaquin rivers to which delta users have legal entitlements. *Id.* §§ 12200 to 12204. For a discussion of these three statutes, see R. Robie & R. Kletzing, *Area of Origin Statutes--The California Experience*, 15 Idaho L. Rev. 419 (1979). The most recent California area of origin statute involves seven specified river systems in Northern California. Cal. Water Code §§ 1215 to 1222 (West Supp. 1993). These latter provisions are discussed in more detail *infra*, notes 182-194 and accompanying text.

42. A third issue involves the power of California counties to pass their ordinances. In three unpublished trial court decisions, county actions restricting groundwater exports have been successfully challenged as preempted under the state constitution. *See* Judgment on the Pleading, City of Los Angeles v. County of Inyo, No. 12908 (Cal. Super. Ct. Inyo County July 13, 1983); Order Granting Plaintiff's Motion for Summary Judgment and Denying Defendant's Motion for Partial Summary Judgment, Truckee-Donner Pub. Util. Dist. v. County of Nevada, No. 35920 (Cal. Super. Ct. Sutter County Dec. 8, 1988); Ruling on Motion for Summary Judgment, Myers v. County of Tehama, Nos. 34147 & 34446 (Cal. Super. Ct. Tehama County Aug. 11, 1993) (consolidated with Petition for Writ of Mandate, Baldwin v. County of Tehama, No. 34446 (Cal. Super. Ct. May 27, 1992)), *appeal filed*, No. 3 Civil C017301 (Cal. Ct. App. Dec. 3, 1993); *see generally* G. Weber, *Forging a More Coherent Groundwater Policy in California: State and Federal Constitutional Law Challenges to Local Groundwater Export Restrictions*, 34 Santa Clara L. Rev. 373, 386-90 (1994). In addition, a partially successful challenge was raised against the Imperial ordinance under the federal constitution's commerce clause. *See* Munoz v. County of Imperial, 604 F.2d 1174, 1175 (9th Cir. 1979), *vacated*, 449 U.S. 54 (1980), *on remand*, 636 F.2d 1189 (9th Cir. 1981), *on remand*, 510 F. Supp. 879 (S.D. Cal. 1981), *aff'd*, 667 F.2d 811 (9th Cir. 1982), *cert. denied*, 459 U.S. 825 (1982); *see generally* Weber, *supra*, at 448-51 & nn. 330-33. The complexity of the preemption and dormant commerce clause analysis requires separate treatment and is beyond the scope of this article.

43. *See, e.g.*, Tehama County, Cal., Code § 9.40.010(10) (1992) (defining "mining"); *infra* note 413-421 and accompanying text.

possible county groundwater export ordinances in the Sacramento Valley alone. Thus, second, the patchwork raises important policy questions about the role of state legislation in coordinating groundwater export controls to balance local economic and environmental interests with statewide needs.

The pace of local legislative efforts to address groundwater exports is likely to accelerate even more markedly. At the end of the 1991-92 legislative session, the legislature enacted, and the governor signed, A.B. 3030.[44] That legislation authorizes hundreds of local public agencies to enact groundwater management programs.[45]

In an attempt to bring some coherence to the emerging patchwork, this article surveys and criticizes the local groundwater export legislative efforts to date. Part II of this article introduces several critical hydrological concepts.[46] Part III summarizes state laws on groundwater appropriation and export.[47] Part IV surveys the county ordinances that address groundwater export.[48] Part V surveys the major legislative alternative to county ordinances: state legislation to create special groundwater management districts with export control authority.[49] Part VI summarizes the conclusions and considers the need for some central, state wide control over groundwater transfers.[50]

II. GROUNDWATER HYDROLOGY

The legal efforts to manage groundwater draw heavily upon concepts addressed by groundwater hydrology.[51] Too often, the legal

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44. *See infra* notes 197-210 and accompanying text.

45. For the A.B. 3030 definition of "local public agency," see *infra* note 199. As of 1977, there were about 900 special districts in California that had some water utility functions. Groundwater In The West, *supra* note 3, at 59. An admittedly incomplete March 1992 Department of Water Resources listing tallies 994 active, and 73 inactive, water agencies statewide. California Dep't Of Water Resources, Interim Statewide Alpha Listing Of Water Service Agencies (1992). Many of these agencies may have some authority to act under A.B. 3030.

46. *See infra* notes 51-109 and accompanying text.

47. *See infra* notes 110-214 and accompanying text.

48. *See infra* notes 215-430 and accompanying text.

49. *See infra* notes 431-470 and accompanying text.

50. *See infra* notes 471-497 and accompanying text.

51. Broadly defined, "hydrology" is "the discipline dealing with the properties, occurrence, distribution, and movement of water on and beneath the surface of the land." R. Kazmann, Modern Hydrology 1 (1965). "Groundwater hydrology" is "concerned primarily with the movement of potable subsurface water caused by a difference in potential or head." *Id.* at 129. "Hydrogeology" explores the "control and influence" of the "physical properties of rock formations . . . [upon] . . . the movement of water within them." *Id.*

system adopts such concepts imprecisely,[52] or, worse, adopts terms that lack a firm hydrological foundation.[53] The following discussion explores the hydrological basis for four sets of terms that permeate groundwater legislation: 1) groundwater and water table; 2) groundwater basin and aquifer; 3) cone of depression and well interference; and 4) overdraft, safe yield, and mining.

1. "Groundwater" & "Water Table"

In common parlance, all underground water is "groundwater."[54] Most hydrologists, however, use "groundwater" to refer to one class of subsurface water: water in the "zone of saturation."[55]

Hydrologists broadly divide subsurface water into two classes: 1) water in the unsaturated zone, formerly called "vadose" water, or water in the zone of "aeration," and 2) "groundwater," or water in the zone of saturation.[56] Water in the unsaturated zone does not flow freely into wells, although knowledge of its complicated hydraulics is becoming increasingly necessary in cleaning up toxic contamination.[57] In contrast, water in the zone of saturation will flow freely to supply wells and

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52. For example, several of the ordinances discussed below fail to define the boundaries of a "groundwater basin," even though hydrogeologists have offered numerous different ways to indicate a basin's boundaries. *See, e.g.*, Glenn County, Cal., Code §§ 20.04.030-20.04.280 (1991) (no definition of "groundwater basin" even though the term is used in several of the listed definitions). For a discussion of the possible boundaries of "groundwater basins," see *infra* notes 66-80 and accompanying text.

53. For example, groundwater ordinances are often enamored with addressing a groundwater basin's "safe yield" and preventing groundwater "mining." *See, e.g.*, Butte County, Cal., Code §§ 33-2.12,-2.19 (Supp. 1978) (section respectively addressing "mining" and "safe yield"). Groundwater hydrologists, however, question the value of either concept. *See infra* notes 86-109 and accompanying text.

54. *See, e.g.*, Kazmann, *supra* note 51, at 129 (groundwater "includes all of the waters found beneath the surface of the ground").

55. *See, e.g.*, R. Heath, Basic Groundwater Hydrology 4 (1982). "Water in the saturated zone is the only underground water that is available to supply wells and springs and is the only water to which the name *ground water* is correctly applied." *Id.* (emphasis added).

56. 1 California Dep't Of Water Resources, 1967 Groundwater Course, *Groundwater Geology*, 49-50 (1967) (Asilomar Conference Grounds, Pacific Grove, Cal. 1967) [hereinafter 1967 Conference]. Hydrologists appear to use synonymously "zone of aeration," "soil zone," and "unsaturated zone" to refer to all vadose water. *See* E. Murphy & C. O'Neill, *Geology and Hydrology, in* 3 Waters And Water Rights § 18.02, at 10-11 (R. Beck ed., 1991) [hereinafter Waters and Water Rights]. The United States Geological Survey (USGS) no longer uses "vadose water" or zone of "aeration." U.S. Geolological Survey, Definitions Of Selected Groundwater Terms--Revisions And Conceptual Refinements 14-15 (1972) [hereinafter Groundwater Terms] (Water Supply Paper No. 1988) .

57. *See* M. Anderson, *Hydrogeologic Framework for Groundwater Protection, in* Planning For Groundwater Protection 1, 3, 6-12 (G. Page ed., 1987) [hereinafter, *Hydrogeologic Framework*].

springs.[58] Echoing the distinctions most hydrologists make, this article will consider as "groundwater" only water in the zone of saturation.

Groundwater will reach different levels in wells drilled in confined and unconfined aquifers.[59] In a well drilled into an unconfined aquifer, water will reach the top of the zone of saturation, known as the "water table."[60] In a tightly cased well drilled into a confined aquifer, water will reach the "potentiometric surface."[61]

The regulatory schemes considered below have also created different classes of subsurface water. As discussed more fully below, California courts have erected a common law of subsurface water classification upon the foundation of the nineteenth century's poor understanding of hydrology.[62] For their part, the state and local legislative schemes reviewed below generally follow hydrology's classification of "groundwater" as "water in the zone of saturation."[63] Similarly, while lawyers commonly may not distinguish between "water table" and "potentiometric surface,"[64] the regulatory schemes considered below generally follow the hydrological distinctions between the two concepts.[65]

2. *"Groundwater Basin" & "Aquifer"*

In simplest terms, both "groundwater basin" and "aquifer" connote a subsurface geological formation that can yield water to a well.[66] Indeed, hydrologists uniformly define an "aquifer" simply as "a

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58. *Hydrogeologic Framework*, *supra* note 57, at 3; Heath, *supra* note 55, at 4.

59. *See* A. Schneider, *Groundwater Rights in California*, Governor's Comm'n To Review Cal. Water Rights Law 100 (1977) (Staff Paper No. 2, *adapted from* R. Richter, *California Groundwater Geology*, in University of Cal., Davis Extension, Concepts Of Groundwater Management 2-41 (1974)). *See also* Heath, *supra* note 55, at 6 (distinguishing "confined" and "unconfined" aquifers).

60. *See Hydrogeologic Framework*, *supra* note 57, at 3 (describing role of pressure on water table).

61. *See* Heath, *supra* note 55, at 6 (discussing artesian wells).

62. *See infra* note 112.

63. *See, e.g.*, Cal. Water Code § 10752(a) (West Supp. 1993); Butte County, Cal., Code § 33-2.6 (Supp. 1978).

64. Waters and Water Rights, *supra* note 56, at 11.

65. *See, e.g.*, Glenn County, Cal., Code §§ 20.04.180, 20.04.270 (1991) (defining respectively, "piezometric surface" and "water table").

66. Two non-technical studies demonstrate the simplicity of the commonplace meanings of "aquifer" and "groundwater basin." Describing an "aquifer," one author stated: "[a] typical aquifer . . . in some ways is similar to a bucket of sand half-filled with water. Drilling a well is like digging a hole in this sand and allowing it to fill with water which can then be removed." G. Widman, *Groundwater--Hydrology and the Problem of Competing Well Owners*, 14 Rocky Mtn. Min. L. Inst. 523, 525 (1968). Similarly, another author described "groundwater basins" as "elaborate [subterranean] lattice works of rock, [that] like giant sponges, store

rock unit that will yield water in usable quantity to a well or spring."[67] The reference to "usable quantity" imports some subjectivity into the definition; usability may depend upon the extractor's purpose.[68] The legal systems considered below generally adopt definitions of "aquifers" virtually identical to the hydrological definition.[69]

Unlike "aquifer," "groundwater basin" does not command as universal a following among hydrologists or as precise a definition. As a leading survey of California groundwater law notes, "there is no single, widely-accepted definition [of groundwater basin]."[70] Some hydrologists speak only, or primarily, of "aquifers."[71] Others define "groundwater basin" as: "an area underlain by one or more permeable formations capable of furnishing a substantial water supply."[72] This definition substantially overlaps the concepts of "aquifer" and "groundwater basin."[73] It adds, however, two important notions. First, it focuses attention on the surface area. Second, it notes that multiple aquifers may underlie any given surface area.[74] Despite the impreciseness of the

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water in their passageways." Office Of Planning And Research, Offices Of The Governor Of California, California Groundwater Management 7 (1982).

67. Heath, *supra* note 55, at 6. Heath notes that "[i]n geologic usage, 'rock' includes unconsolidated sediments." *Id.* Thus, Anderson defines "aquifer" as "a unit of *porous material* that yields economically significant quantities of water to wells." *Hydrogeologic Framework*, *supra* note 57, at 15. *See also* Kazmann, *supra* note 51, at 137; Bulletin 118-75, *supra* note 1, at 4. The USGS defines "aquifer" as: "a formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs." Groundwater Terms, *supra* note 56, at 2.

68. *See Hydrogeologic Framework*, *supra* note 57, at 15.

69. *See, e.g.*, Glenn County, Cal., Code § 20.04.030 (1991) ("aquifer" meaning a geologic formation that stores, transmits and yields significant quantities of water to wells and springs).

70. Schneider, *supra* note 59, at 98.

71. For example, Heath does not appear to use "groundwater basin" at all in his "Basic Groundwater Hydrology." Rather, he appears to prefer "groundwater system" to include both the "aquifers and confining beds that underlie any area." Heath, *supra*, note 55, at 14. Kazmann speaks primarily of "aquifers." *See, e.g.*, Kazmann, *supra* note 51, at 137-207 *passim*. Still, he occasionally uses "basin," apparently synonymously with "aquifer." *See, e.g., id.* at 160-61, 181.

72. 1967 Conference, *supra* note 56, at 19; *see also id.* at 21 (identifying six types of "groundwater basins" in California).

73. Indeed, the Governor's Commission's proposed legislation defined "groundwater basin" as: "a geologically and hydrologically defined area which contains one or more aquifers which store and transmit water and will yield significant quantities of water to wells." Final Report, *supra* note 6, at 174.

74. The surface of groundwater basins, however, may be underlain by numerous separate aquifers. For example, in two plates accompanying the Department of Water Resources' study, "Evaluation of Groundwater Resources: Sacramento Valley," maps show elevations of sections of the Sacramento Valley groundwater basin. California Dep't Of Water Resources, Bulletin 118-6, Evaluation of Groundwater Resources: Sacramento Valley (1978)

term—or perhaps because of it—drafters of water management schemes frequently prefer to base their programs on "basin" rather than on "aquifer."[75]

Whether based on "aquifer," "groundwater basin," or some combination of the two, a regulatory scheme needs to delineate where one aquifer or basin ends, and another begins. The same groundwater survey that noted the disagreement over definition of "basin" also noted that "[m]any different lateral and vertical boundaries can be used to define a groundwater basin."[76] Again, borrowing from one compilation, the survey broke the potential lateral boundaries into three classes: physical, hydraulic, and political.[77] Within each of these three broad groups of boundary choices lie five to twelve specific choices.[78] Similarly, multiple options exist for determining a basin's vertical boundaries.[79] A complete discussion of the geological bases is beyond the scope of this article. The variety of geological features that might lead to distinctions between "basins" and "sub-basins," and the use of "political boundaries" as basin boundaries, demonstrates the fluidity of "basin" as a regulatory concept. With this fluidity comes the opportunity for gross imprecision. When coupled with the even more fluid concept of a basin's "safe yield," regulatory schemes based on imprecisely defined "groundwater basins" may become incoherent.[80]

[hereinafter Bulletin 118-6] (see plates 3 & 4). A portion of "Diagram D," covering a section in Colusa and Sutter counties, shows as many as a dozen different layers of predominantly coarse grained materials, separated by layers of fine grained materials. *Id.* All of the separate layers may yield small to large quantities of water to wells. *Id.*

75. *See, e.g.*, Cal. Water Code § 10752(b) (West Supp. 1993) ("groundwater basin" defined); Bulletin 118-80, *supra* note 12 (entitled "Groundwater Basins in California"). The Department prepared Bulletin 118-80 in response to specific legislation asking it to identify the state's groundwater basins. Cal. Water Code § 12924 (West 1992). The legislature instructed the Department to identify basins by reference not only to geological and hydrological conditions, but also, where feasible, to political boundary lines. *Id.*; *see* Bulletin 118-80, *supra* note 12, at iii.

76. Schneider, *supra* note 59, at 101 (citing Richter, *California Ground Water Geology*, *in* Concepts Of Ground Water Management 2-48 (1974) (Univ. of Cal. Davis Extension)).

77. Schneider, *supra* note 59, at 101. *See also* 1967 Conference, *supra* note 56, at 19 (three groundwater basin categories based on basin underflow characteristics).

78. Schneider, *supra* note 59, at 101; *see also* 1967 Conference, *supra* note 56, at 19 (subdividing tripartite basin underflow characterizations).

79. Schneider identifies eight options for determining a basin's "vertical" boundaries. Schneider, *supra* note 59, at 101.

80. For a discussion of "safe yield" see *infra*, notes 89-109 and accompanying text. For a discussion of the glaring analytical consequences of the failure to define the appropriate "basin" central to a local regulatory scheme, see *infra* notes 275-281 and accompanying text (discussing Butte County, Cal., Code § 33-3 (Supp. 1978)).

3. *Cone of Depression & Well Interference*

"Cone of depression" and "well interference" are two concepts that describe relatively immediate effects of groundwater pumping.[81] These concepts, uniformly embraced by hydrologists, have found their way occasionally into regulatory schemes without substantial lawyerly interpretation.[82] Heath states: "[p]umping a well causes a drawdown in the groundwater level in the surrounding area. The drawdown in water level forms a conical-shaped depression in the water table or potentiometric surface, which is referred to as a cone of depression."[83] He continues:

> "Where pumping wells are spaced relatively close together, pumping of one will cause a drawdown in the others. Drawdowns are additive, so that the total drawdown in a pumping well is equal to its own drawdown plus the drawdowns caused at its location by other pumping wells. The drawdowns in pumping wells caused by withdrawals from other pumping wells are referred to as well interference."[84]

Well interference from a large well may cause nearby smaller wells to run dry if they are located within the large well's cone of depression.[85]

4. *Overdraft, Safe Yield & Mining*

Three enticingly simple, interrelated concepts—"overdraft," "safe yield" and "mining"—have generated years of controversy among hydrologists. In their popular sense, all three terms *connote* a management choice between treating an aquifer as a renewable or a nonrenewable resource.[86] Ultimately, however, hydrologists have been unable to agree on what, if anything, the terms actually denote. Despite the substantial misgivings of hydrologists over the terms' value as technical concepts, all of the regulatory programs discussed below have placed "overdraft" and

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81. *See* Final Report, *supra* note 6, at 150 ("[w]ell interference, however, sometimes develops very quickly . . . ."); Heath, *supra* note 55, at 44.

82. *See, e.g.*, Tehama County, Cal., Code § 9.40.010(16) (1992) ("radius of influence" defined in reference to a well's "cone of depression"). *See infra* notes 410, 426-429 and accompanying text.

83. Heath, *supra* note 55, at 44 (emphasis deleted).

84. Heath, *supra* note 55, at 44 (emphasis deleted).

85. Final Report, *supra* note 6, at 150.

86. *See, e.g.*, W. Balleau, *Water Appropriation and Transfer in a General Hydrogeological System*, 28 Nat. Res. J. 269, 278 (1988) ("groundwater mining is generally described as the opposite of safe-yield management and as appropriate for unrechargeable or nontributary groundwater basins").

"safe yield" at the heart of their legal schemes. Some understanding of the hydrological significance of the terms will illustrate the conceptual limits of the legal schemes themselves.

The definitions offered by the California Department of Water Resources (DWR) exemplify the definitions that have found their way into the regulatory schemes discussed below. In particular, the definitions of "overdraft" and "mining" focus on the relationship between groundwater extractions and groundwater replenishment. In its principal groundwater publication, commonly referred to as "Bulletin 118-75," DWR defines "overdraft" as "the temporary condition of a groundwater basin where the amount of water withdrawn by pumping exceeds the amount of water replenishing the basin over a period of time."[87] DWR then defines "mining" as "pumping from groundwater bodies greatly in excess of replenishment."[88] Finally, it defines "safe yield" as "the maximum quantity of water that can be continuously withdrawn from a groundwater basin without adverse effect."[89]

These three definitions appear in substantially similar form in various hydrological discussions.[90] More significantly for purposes of this article, they have been adopted virtually verbatim by several of the

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87. Bulletin 118-75, *supra* note 1, at 4; *see also* Bulletin 160-87, *supra* note 3, at 31 (elaborating on "overdraft").

In Los Angeles v. San Fernando, 537 P.2d 1250, 1309 (Cal. 1975), the California Supreme Court defined "overdraft" as the point at which "extractions from the basin exceed its safe yield plus any . . . temporary surplus." "Temporary surpluses" occur during wet years; in such years, extraction greater than long term safe yield is permissible in order to create aquifer storage space for percolation of above normal precipitation or active spreading of increased surface water. *See, e.g.*, Final Report, *supra* note 6, at 140 ("Temporary surplus is the amount of water that can be extracted from a basin to provide storage space for wet year runoff that would otherwise be lost").

88. Bulletin 118-75, *supra* note 1, at 4. *See also id.* at 124, 129 (noting "mining" apparently synonymous with "continued overdrafting" and "mining" involves "withdrawing substantial quantities of water from storage in an underlying basin").

89. Bulletin 118-75, *supra* note 1, at 5. DWR noted that, prior to the California Supreme Court's opinion in Los Angeles v. San Fernando, 537 P.2d 1250 (Cal. 1975), California groundwater law defined "safe yield" in terms of "average annual natural recharge of the basin." Bulletin 118-75, *supra* note 1, at 125 (fig. 26). In Los Angeles v. San Fernando, the court agreed that a broader definition of "safe yield" would encourage the conjunctive use of groundwater basins. *Los Angeles*, 537 P.2d at 1307-09. Accordingly, as the court approved the "safe yield" definition now used by DWR, it glossed: "[t]he phrase 'undesirable result' is understood to refer to a gradual lowering of the groundwater levels resulting eventually in depletion of the supply." *Id.* at 1308. For a discussion of other portions of Los Angeles v. San Fernando, see *infra* notes 141-150 and accompanying text.

90. *See, e.g.*, R. Freeze & J. Cherry, Groundwater 364 (1979) (noting definitions of "safe yield" and "overdraft"); Waters & Water Rights, *supra* note 56, § 18.04, at 16 (mining occurs when an aquifer "is not capable of recharge or can recharge only in extraordinarily long time periods").

local ordinances.[91] Nevertheless, none of the definitions have garnered uniform support from hydrologists. For example, some hydrogeologists would object that the "mining" definition is overly narrow or un-focused.-[92] The use of "safe yield" as a regulatory concept, however, has borne the brunt of hydrologists' criticism.[93]

Hydrologists have criticized the "safe-yield" definition for two principal reasons. First, the definition is inherently subjective. If "safe yield" is the amount of water that can be withdrawn from a groundwater basin without causing an undesirable effect, hydrologists Mary P. Anderson and C. Alan Berkebile ask: "what constitutes an undesired result[?] The answer, of course, will vary with the respondent."[94] Second, hydrologists question the traditional and still frequent linkage of "safe yield" with pumping based on recharge to an aquifer.

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91. *See, e.g.*, Butte County, Cal., Code §§ 33-2.12, -2.13, -2.19 (Supp. 1978) (defining respectively "mining", "overdraft", and "safe yield"); Glenn County, Cal., Code §§ 20.04.140, .150, .210 (1991) (defining respectively, "mining", "overdraft", and "safe yield"); Tehama County, Cal., Code §§ 9.40.010(11), .010(18) (1992) (defining "overdraft" and "safe yield").

92. *Compare* Holzschuh, *supra* note 7, at 346 (concluding "because ["mining"] is fraught with psychological implications, we as groundwater professionals must take care to use it correctly, and further, to educate those in related disciplines who misuse it") *with* Balleau, *supra* note 86, at 280 ("[a]ll groundwater developments initially mine water, and finally do not"). For Balleau, "mining" is simply the removal of water from storage in an aquifer. "Every groundwater development ... begins with 100 percent of withdrawals being derived from storage. The timing of the change from *storage depletion (mining)* to induced recharge from surface water bodies is key to the water policy question." Balleau, *supra* note 86, at 278 (emphasis added). In recognition that removal from storage marks the initiation of all groundwater extractions, Balleau prefers to speak of the "mining phase" of groundwater development. *Id.* at 278-80. He defines this "phase" as the period in which 98 percent or more of the extracted water comes solely from storage. *Id.* at 278-79. Where the "mining phase" will last for a "reasonable planning horizon," Balleau believes that "mining" is a "reasonable" management option for unrechargeable or nontributary water. *Id.* at 278-81; *accord*, J. Bredehoeft et al., *Groundwater: The Water-Budget Myth, in* Scientific Basis Of Water Resource Mgmt. 51, 52 (1988) ("Some water must be taken from storage in the system to create gradients toward a well . . . [Thus] some water must always be mined to create a development . . . . ") [hereinafter, *The Water-Budget Myth*].

93. *See, e.g.*, M. Anderson & C. Berkebile, *Hydrogeology of the South Fork of Long Island, New York: Discussion and Reply*, 88 Geolological Soc'y Am. Bull. 895, 895 (1977). Materials distributed by DWR in its "1967 Conference" summarized ten definitions proffered by hydrologists over forty years. *See* 1967 Conference, *supra* note 56.

94. Anderson & Berkebile, *supra* note 93, at 895. *See also Hydrogeologic Framework*, *supra* note 57, at 16-17. As support for their conclusions, Anderson and Berkebile quote from the landmark 1951 work by Harold E. Thomas. Anderson & Berkebile, *supra* note 93, at 895. Thomas discussed extensively hydrologists' concerns with the legal system's adoption of "safe yield." H. Thomas, The Conservation Of Groundwater 261-64 (1951) ("'Safe Yield' is an Alice-in-Wonderland term which means whatever its user chooses"); *cf.* C.W. Fetter, Jr., *Reply*, 88 Geolological. Soc'y Of Amer. Bull. 896 (1977) (using "safe yield" but acknowledging that the term is "a subjective phenomena based upon human values").

> According to Anderson, safe yield has been approximated to be equal to some fraction of the net annual precipitation using the flawed rationale that safe yield is equal to groundwater recharge. While such an approach may be justified on a regional scale to get a rough estimate of this type of parameter for comparison purposes . . . the weaknesses inherent in the approach should be fully recognized. Specifically, groundwater recharge is very difficult to estimate accurately . . . equating recharge to some fraction of precipitation is at best only a rough approximation of the actual groundwater recharge. Furthermore, it is physically impossible to capture 100 percent of the natural groundwater recharge by pumping. Finally, the true basin yield depends on interaction of the unsaturated and surface water zones with the groundwater zone.[95]

Similarly, hydrologist W.P. Balleau summarizes the fallacy of equating natural recharge and safe yield: "[n]atural recharge is a spurious part of the wellfield water budget and is irrelevant to the magnitude of an artificial groundwater development."[96] In short, critics brand "safe yield" as a "myth"[97] or a "shibboleth."[98] Indeed, for nearly 40 years, hydrologists have attempted to eliminate the term from their literature.[99]

In place of the regulatory preoccupations with "safe yield," and its cousins "mining" and "overdraft," several hydrologists have proffered new, hopefully more quantifiable terms. For example, R. Allan Freeze and John A. Cherry offer two new terms: "maximum stable basin yield" and "optimal yield."[100] Both concepts allow greater integration into management schemes of the relationship between groundwater pumping and surface water flows.[101] "Maximum stable basin yield" describes the point at which pumping from a basin lowers the water table to "a depth

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95. *Hydrogeologic Framework*, *supra* note 57, at 22-23 (citations omitted).

96. Balleau, *supra* note 86, at 280 (natural recharge is "generally already appropriated at downstream discharge point as the reliable baseflow of springs, wetlands and rivers"). *See* Freeze & Cherry, *supra* note 90, at 364; *The Water Budget Myth*, *supra* note 92, at 51-57. *See also* J. Emel, *Effectiveness and Equity of Groundwater Management Methods in the Western United States* 16-18 Ariz. St. U., Center For Envir. Studies (1984) [hereinafter *Effectiveness & Equity*] (Working Paper No. 3; basin wide estimates of discharge fail to account for temporal and spatial effects of pumping from a location far from a basin's natural discharge site).

97. *Hydrogeologic Framework*, *supra* note 57, at 22.

98. Kletzing, *supra* note 17, at 1242-44. While not a hydrogeologist, attorney Kletzing has a strong background in water regulation. *See id.* at 1225 (see the note at asterisk).

99. *See, e.g.*, Anderson & Berkebile, *supra* note 93, at 895 (citing R. Kazmann, *"Safe Yield", in Groundwater Development, Reality or Illusion*, 82 Am. Soc'y Civil Engineers Proc. J. Irrigation & Drainage Divisions p. 1103-1). Indeed, the United State Geological Survey no longer includes "safe yield" within its lexicon. *See* Groundwater Terms, *supra* note 56, at 11.

100. Freeze & Cherry, *supra* note 90, at 364, 367.

101. *See, e.g.*, Freeze & Cherry, *supra* note 90, at 367.

below which *no* stable recharge rate can be maintained."[102] According to Freeze and Cherry, basin planners should set planned extraction rates at some point below the maximum limit of stability, in order to allow a for "a factor of safety."[103] Determination of the precise point, however, depends upon non-hydrological factors. "Optimal yield" recognizes that:

> "groundwater has value only by virtue of its use, and the *optimal yield* must be determined by the selection of the optimal groundwater management scheme from a set of possible alternative schemes. The optimal scheme is the one that best meets a set of economic and/or social objectives associated with the uses to which the water is to be put."[104]

The combination of "maximum stable basin yield" and "optimal yield," as conceived by Freeze and Cherry, improves upon the DWR "safe yield" definition. Construed broadly, the DWR definition does allow consideration of economic and social factors. The "undesirable effects" might include the economic, social, and environmental costs of over—*or* underdevelopment of a particular basin.[105] Nevertheless, "maximum stable basin yield" offers a potentially quantifiable extraction limit that suffers not from "safe yield's" patent vagueness and its historical reliance on the irrelevant notions of "natural recharge."[106] Moreover, "optimal yield" replaces the psychologically charged, pseudo-technical "safe yield" concept with one that expressly embraces human or ecosystem use values.[107] While the quantification of such values may ultimately suffer

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102. Freeze & Cherry, *supra* note 90, at 366.

103. Freeze & Cherry, *supra* note 90, at 367. They note that "[o]ne dry year might cause an irrecoverable water-table drop." *Id.* Moreover, development of a basin to this maximum level might cause surface flows to drop, as extractions induced basin recharge from surface watercourses. *Id.* Thus, Freeze and Cherry note that optimal watershed development requires integration, or conjunctive use, of surface and subsurface waters. *Id.*

104. Freeze & Cherry, *supra* note 90, at 364-65. They continue:

> In some cases and at some points in time, consideration of the present and future costs and benefits may lead to optimal yields that involve mining groundwater, perhaps even to depletion. In other situations, optimal yields may reflect the need for complete conservation. Most often, the optimal groundwater development lies somewhere between these extremes.

Id. at 365. *See also Hydrogeologic Framework*, *supra* note 57, at 23.

105. Indeed, as the DWR itself has noted, the reformulation of "safe yield" from its original meaning of "average annual natural recharge" recognizes that "the dangers of permanent damage from overproduction have been oversold to the courts." Bulletin 118-75, *supra* note 1, at 124.

106. *Cf.* Anderson & Berkebile, *supra* note 93, at 895 (noting that "[p]erhaps the concept of maximum stable basin yield . . . is a step toward formulating a more rational approach [than 'safe yield'].")

107. *Cf.* Balleau, *supra* note 86, at 280-81 (policymakers still find natural recharge based "safe yield" an attractive regulatory concept).

from imprecision, the imprecisions can be recognized properly as those inherent in the environmental and social sciences.

Balleau cautions that "[t]here is no valid generic rule, such as pumping the natural recharge, that will lead to a desirable economic or stable (non-depleting) level of groundwater development."[108] Still, policymakers continue to look for such a fix. Anderson notes that "safe yield" appears "to be immortal despite repeated death blows."[109] Only if "safe yield" denotes a broad optimization approach will the term allow responsible groundwater resource management.

III. GROUNDWATER RIGHTS & REGULATION UNDER STATE LAW

A. *Private Rights to Groundwater Extraction and Use in California*

1. *Acquisition & Loss of Rights*

California law divides subsurface water into two classes: 1) water flowing in defined subterranean channels;[110] and 2) percolating waters.[111] These largely arbitrary, nonscientific distinctions are relics of the nineteenth century legal and scientific communities' poor understanding of hydrology.[112] Under the California Water Code, private rights to use

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108. Balleau, *supra* note 86, at 280. Once optimization determines the extent to which a basin should be managed as a renewable resource, a variety of management options occur. For example, Emel suggests as a paradigm for managing a basin as a renewable resource "a steady-state equilibrium wherein withdrawals capture rejected recharge and natural discharge." Emel, *supra* note 96, at 16; *see Groundwater Terms*, *supra* note 56, at 3 (defining "capture"). According to Emel, if "capture" equals "withdrawal" for a small enough unit area, then "over" and "under"development may be avoided. Emel, *supra* note 96, at 16-18. Nevertheless, Emel does not offer this equation as a rigid formula appropriate to all basins. Rather, he recognizes that "[m]anaging withdrawals to achieve or approximate capture ignores the fostering of equity in property right protection. Rates of water level decline are not necessarily uniform (and optimal safe-yield management may dictate their nonuniformity) and the economics of pumping are ignored." *Id.* at 20. Managing a basin to limit withdrawals to an approximation of capture "gives value to property rights and leads to the development of a water market." *Id.* at 21; *cf. id.* at 33-36 (summarizing effectiveness and equity of various management alternatives.)

109. *Hydrogeologic Framework*, *supra* note 57, at 17.

110. "[A]ll hydrologists agree that almost none of California's groundwater resources flows in subterranean streams." Bulletin 118-75, *supra* note 1, at 124 n.1.

111. W. Hutchins, The California Law Of Water Rights 419 (1956). *See generally* Widman, *supra* note 66, at 530-31 (noting similar dichotomy in other states). In addition, the law of surface watercourses determines the rights to a surface stream's underflow. Hutchins, *supra*, at 422. In general, California law recognizes two types of rights to surface watercourses: riparian and appropriative. *See infra* note and accompanying text.

112. Rossmann & Steel, *supra* note 8, at 113, 905-06. To little avail, lawyers and hydrologists have urged greater integration of the laws of surface and subsurface water. *See*,

the first class of *subsurface* waters are created under the same appropriative system otherwise applicable to nonriparian *surface* waters.[113] Only the second class of subsurface waters are governed by the largely judge made body of "groundwater" rights law.[114]

California law recognizes three types of private rights to extract and use groundwater: 1) overlying rights, 2) appropriative rights and 3) prescriptive rights.[115] Extensive dicta in the 1903 case of *Katz v. Walkin-*

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e.g., Waters & Water Rights, *supra* note, § 18.01, at 6; E. Murphy & C. O'Neil, *Economics and Groundwater Interconnections*, *in* 3 Waters and Water Rights § 19.03, at 30-31 (R. Beck ed., 1991).

113. Calif. Water Code § 1200 (West 1971). California recognizes two main classes of private rights to divert and use surface waters: riparian and appropriative rights. Hutchins, *supra* note 111, at 40-55. For an overview of these two systems, see W. Attwater & J. Markle, *Overview of California Water Rights and Water Quality Law*, 19 PAC. L.J. 957, 959-75 (1988) [hereinafter *Overview*]. In addition to these two main classes of private rights, California recognizes prescriptive and pueblo rights. *Overview, supra*, at 969. Property law notions of adverse possession underlie prescriptive rights. *Id.; see generally Rewriting California Groundwater Law, supra* note 14, at 227 (discussing doctrine). Pueblo rights trace their origin to Spanish and Mexican law. *Id.* at 252. Paramount to all other rights, they allow a municipality formed under Mexican or Spanish law to "use the waters of sources that ran through the pueblo, both surface and underground, from their source to the sea." *Overview, supra*, at 969. *See generally Rewriting California Groundwater Law, supra* note 14, at 232-33 (discussing doctrine).)

The California law of appropriative rights generally follows the broad contours of the prior appropriation doctrine prevalent throughout the western United States. *See generally* R. Beck, *Prevalence and Definition*, *in* 2 Waters And Water Rights, §§ 12.01-12.04 (R. Beck ed. 1991). Prior to 1872, appropriative rights in California were almost entirely governed by judicial decision. *Overview, supra*, at 966. Between 1872 and 1914, the California Legislature enacted a number of provisions that created a statutory mechanism for obtaining appropriative rights. *Id.* Since 1914, appropriative rights have been obtained under a permit and license system now administered by the State Water Resources Control Board. *Id.* at 983; *see* Calif. Water Code §§ 1003.5, 1200-1851 (West 1971 & Supp. 1993).

114. *See* Schneider, *supra* note 59, at 2-3. All references to "groundwater" in this article include only those subsurface waters that do not flow in known and definite underground channels. "Percolating waters" simply means any water that does "not constitute part of a definite underground stream." Hutchins, *supra* note 111, at 426.

115. *See, e.g.*, Hutchins, *supra* note 111, at 431-61. "Overlying rights" are the rights of an overlying owner to extract groundwater from its property and use it on, or in connection with, the land overlying the basin. *See* Schneider, *supra* note 59, at 6-7. "Appropriative rights" involve extractions for use on non-overlying land. Hutchins, *supra* note 111, at 454-58; *see also* Rossmann & Steele, *supra* note 18, at 906-09. "Prescriptive rights" refer to rights against either overlying or appropriative rights holders that ripen under adverse possession. *See* Hutchins, *supra* note 111, at 503-06; *see also infra* note 133 (prescriptive rights described).

The precise contours of "overlying" land and "overlying use" remain unclear. Schneider, *supra* note 59, at 7-8. For example, one court has implied that an overlying right allows an owner of land overlying a groundwater basin to extract water from a parcel and use it on *other* land that owner owns that also overlies the groundwater basin, *even if* the owner could not extract groundwater from the second parcel itself. *Id.* at 7 (citing City of Pasadena v. City of Alhambra, 207 P. 2d 17, 28 (Cal 1949)). In addition, the meaning of

shaw established the foundations of the modern law governing the acquisition of overlying and appropriative rights in California groundwater.[116] *Katz* rejected the English rule that "percolating groundwater was governed by the rule of land law that the landowner owns everything that lies beneath the surface of his land."[117] In its place, *Katz* adopted "the doctrine of reasonable use of percolating waters."[118] As a corollary, the court also announced a "rule of correlative rights."[119] Under this corollary, "[d]isputes between overlying landowners, concerning water for use on the land, to which they have an equal right, in cases where the supply is insufficient for all, are to be settled by giving to each a fair and just proportion."[120]

As developed in later opinions,

> each owner of land overlying a groundwater supply enjoys the privilege of making reasonable and beneficial use of that supply of water, in connection with that land. This 'correlative' privilege is shared equally by all other owners of land overlying the same groundwater supply. Thus, in periods of shortage, the privilege of withdrawing water is apportioned pro rata among the various overlying privilege holders.[121]

"groundwater basin" for purposes of defining "overlying use" also remains unclear. Schneider, *supra* note 59, at 7-8. A recent lawsuit considered whether land within the same watershed as a groundwater basin was "overlying" land, even if no portion of the land in question actually overlay the basin. San Benito County Water Dist. v. Del Piero, No. 18123, (Cal. Super. Ct. June 1991); *see New Lawsuit Would Define Overlying Groundwater Rights*, 2 CAL. L. & POL'Y REP. 65 (1992).

In general, extraction for use by a public water system is an appropriative use, even if the municipality overlies the groundwater basin. Schneider, *supra* note 59, at 8; *see also* Hutchins, *supra* note 111, at 458-60.

116. 74 P. 766 (Cal. 1903), aff'g on reh'g, 70 P. 663 (1902); *see* Schneider, *supra* note 59, at 3-6.

117. Schneider, *supra* note 59, at 3-4 (noting Acton v. Blundell, 152 Eng. Rep. 1223 (Ex. 1843)).

118. *Katz*, 74 P. at 766-67; *see* Hutchins, *supra* note 111, at 434 (in effect, *Katz* adopts reasonable use rule).

119. *Katz*, 74 P. at 772.

120. *Id.*

121. Rossmann & Steele, *supra* note 18, at 908 (footnotes omitted). *See also* Burr v. Maclay Rancho Water Co., 98 P. 260, 263 (Cal. 1908); Kletzing, *supra* note 17, at 1233-35. As such, the correlative rights of overlying owners are analogous to the rights of riparian landowners to surface waters. *See, e.g.*, Hutchins, *supra* note 111, at 446-54.

Katz has been criticized as "unintentionally establish[ing] principles that were prone to produce overdrafted groundwater basins." Kletzing, *supra* note 17, at 1234 (citing F. Trelease, *Legal Solutions to Groundwater Problems, A General Overview*, 11 Pac. L.J. 863, 873 (1980)). The only enforcement mechanism for these rights is costly and slow judicial action. Kletzing, *supra* note 17, at 1234. Kletzing notes that the *Katz* court, however, even if it had been "prescient" about the effect of its rule, nevertheless lacked the power to create the kind

Thus, "[a]n overlying user does not obtain any priority over adjacent overlying users solely by pumping first from the common supply."[122]

In addition to addressing the relative rights of overlying users, *Katz* discussed the relative rights of appropriators. The court distinguished two classes of overlying rights holders: 1) "those who have used the water on their land before the attempt to appropriate"[123] and 2) "those who have not previously used it, but who claim the right afterwards to do so."[124] As between the first class of owners and appropriators, *Katz* gave the overlying owners priority to "the quantity of water that is necessary for use on [the owner's] land, and the appropriator may take the surplus."[125] *Katz* did not determine the relative rights between appropriators and the second class of overlying users.[126] Later cases, however, suggest that the initiation of overlying rights will normally take priority over prior appropriations.[127] As between appropriators, however, "priority in time applies; the appropriator 'first in time' is entitled to all reasonably and beneficially used surplus water, to the exclusion of subsequent appropriators."[128]

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of administrative system Trelease prefers. Kletzing, *supra* note 17, at 1234.

122. Schneider, *supra* note 59, at 9. The protection extends even to *unexercised* overlying rights. *Id.* (citing Burr v. Maclay Rancho Water Co., 116 P. 715, 721.

123. Katz v. Walkinshaw, 74 P. 766, 772 (Cal. 1903).

124. *Id.*

125. *Id.* As against an overlying owner, an importer of water that is added to (spread across) a basin for storage, however, has priority to extract that added water. *See* Los Angeles v. San Fernando, 537 P.2d 1250 (Cal. 1975). In addition, under the doctrine of "intervention of public use,":

> a water user who is junior in right to other water users, but who puts the water to a public use, acquires a permanent right to the water. Damages may be available to the injured senior parties, but the potential danger to the health and welfare of the public justifies a grant of continued use.

Final Report, *supra* note 6, at 162 (citing, inter alia, Peabody v. City of Vallejo, 40 P.2d 486 (Cal. 1935)).

126. *Katz*, 74 P. at 772.

127. At least two qualifications exist. First, the "intervening public use" doctrine may allow a junior appropriator for a public water supply to continue pumping if it compensates the overlying owner. *See supra* note 125. Second, an enjoinable extraction may ripen into prescriptive rights. Absent these qualifying circumstances, overlying rights will take priority over appropriative rights. *See* Los Angeles v. San Fernando, 537 P.2d 1250, 1318 n.100 (Cal. 1975); *see also* Wright v. Goleta Water District, 219 Cal. Rptr. 740, 746-51 (Cal. App. 1985). An overlying owner may get a judicial declaration to prevent an appropriative extraction from ripening into a prescriptive right, even against an unexercised, prospective overlying use. *See* Schneider, *supra* note 59, at 15 (citing Burr v. Maclay Rancho Water Co., 98 P. 260, 263 (Cal. 1908)); *see also* Hutchins, *supra* note 111, at 457 n. 35 and accompanying text.

128. Rossmann & Steel, *supra* note 18, at 909; *see Katz*, 74 P. at 772. A prior appropriator, however, has to endure reasonable inconveniences resulting from a junior appropriator's reduction of the groundwater level. City of Lodi v. East Bay Mun. Util. Dist., 60 P.2d 439, 450-51 (Cal. 1936); *see* C. Schulz & G. Weber, *Changing Judicial Attitudes Towards Property Rights in California Water: From Vested Rights to Utilitarian Reallocations*, 19 PAC. L.J. 1031, 1077-82 (1988).

A groundwater appropriator's rights thus depend upon the determination of the water "surplus" to prior rights.[129] In its most recent decision, the California Supreme Court stated that "surplus" occurred "when the amount of water being extracted from it is less than the maximum that could be withdrawn without adverse effects on the basin's long term supply."[130] As noted above, to the extent that "overlying use" and "groundwater basin" remains unclear, "surplus" will remain correspondingly unclear.[131] In an action brought to challenge the validity of an appropriation, the burden of proof that appropriated water is "surplus" lies with the appropriator.[132] If there is no "surplus" water beyond the needs of overlying users, then an appropriator can only establish a prescriptive right.[133]

In two major decisions, the California Supreme Court has addressed the acquisition and scope of prescriptive rights in overdrafted groundwater basins.[134] In *City of Pasadena v. City of Alhambra*, the court faced two problems in a long overdrafted basin: 1) what overall pumping limit to set; and 2) how to apportion the reductions among the various overlying, appropriative, and prescriptive rights holders.[135] The court announced that, as against both overlying owners and prior appropriators, prescriptive rights could attach to appropriations initiated after a basin became overdrafted.[136] Addressing its first problem, the court

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The "reasonable burden" rule, apparently mandated now by the 1928 amendment to the Constitution, likely prevents overlying users from complaining about a minor drop in pumping lift. *See* Burr v. Maclay Rancho Water Co., 116 P. at 721; *see also* Rancho Santa Marguarita v. Vail, 81 P.2d 533, 561-63 (Cal. 1938); Hillside Water Co. v. City of Los Angeles, 76 P.2d 681, 686-87 (Cal. 1938).

129. "Prior rights" holders thus include both all overlying users and any prior groundwater appropriator. *See* Hutchins, *supra* note 111, at 455 (text accompanying note 22).

130. City of Los Angeles v. City of San Fernando, 537 P.2d 1250, 1307 (Cal. 1975); *see supra* notes 89-109 and accompanying text (hydrologists' discussion of "safe yield," "mining," and "overdraft").

131. *See supra* note 115.

132. Hutchins, *supra* note 111, at 455 & n.23. The holder of a prior right must first establish the extent of that prior right. *Id.*

133. *See* City of Pasadena v. City of Alhambra, 207 P.2d 17, 28-29 (Cal. 1949). "[A]n appropriative taking of water which is not surplus is wrongful and may ripen into a prescriptive right where the use is open and notorious, hostile and adverse to the original owner, continuous and uninterrupted for the statutory period of five years, and under claim of right." *Id.* at 29.

134. In *Los Angeles v. San Fernando*, the court defined "overdraft" as: "extractions from the basin [that] exceed its safe yield plus any . . . temporary surplus." 537 P.2d at 1309. "Temporary surplus" is "the amount of water that can be pumped from a basin to provide storage space for surface water that would be wasted during wet years if it could not be stored in the basin." Schneider, *supra* note 59, at 32; *see supra* notes 89-109 and accompanying text ("overdraft," "safe yield," and "mining" discussed).

135. 207 P.2d 17; *see* Kletzing, *supra* note 17, at 1236-37; *Rewriting California Groundwater Law*, *supra* note 14, at 228-29.

136. *Pasadena*, 207 P.2d at 29.

upheld a judgment that limited overall pumping to "safe yield."[137] The court apparently used a "safe yield" definition that approximated "safe yield" with annual average recharge.[138] In addressing its second problem, rather than applying a strict rule of temporal priority in determining the relative rights among the various pumpers in the long overdrafted basin, the court refused to eliminate entirely any prior rights holder's pumping. Rather, the court limited each pumper's extractions in proportion to the amount of water each party had withdrawn during the five year prescriptive period.[139] Although the *Pasadena v. Alhambra* court does not adopt the term, its holding has been characterized as the "mutual prescription" doctrine.[140]

In *City of Los Angeles v. City of San Fernando*, the court modified the scope of the prescriptive rights doctrine's applicability to groundwater extractions from overdrafted basins.[141] The court refused to allow prescription against municipalities.[142] It rejected mechanical application of the *Pasadena v. Alhambra* notion of "mutual prescription."[143] That doctrine had been criticized as encouraging a "race to the pumphouse."[144] Instead, the court opted for apportionment based on broader, equitable factors.[145] Under *Los Angeles v. San Fernando*, temporal priority among appropriative and prescriptive rights holders can play a substantial part in determining which pumpers have their rights curtailed.[146] The court also concluded that, to trigger the running of the limitations period, the prior rights holder must have *actual* notice of overdraft.[147] The court excluded years of surplus from the five year period.[148] It reformulated the standard for determining the scope of a

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137. *Pasadena*, 207 P.2d at 27-28.

138. *See Pasadena*, 207 P.2d at 30.

139. *Id.* at 31-33; *see* Hutchins, *supra* note 111, at 504.

140. *See* Hutchins, *supra* note 111, at 504. *See also Los Angeles v. San Fernando*, 537 P.2d at 1298-99 (noting so-called mutual prescription doctrine).

141. 537 P.2d 1250 (Cal. 1975); *see generally Rewriting California Groundwater Law*, *supra* note 14, at 229-35.

142. *Los Angeles v. San Fernando*, 537 P.2d at 1298. The court, however, did allow municipalities to establish prescriptive rights *against* private persons. *Id.* at 1319 n.101.

143. *Id.* at 1298-99.

144. *Id.* at 1299. *See Groundwater in the West*, *supra* note 3, at 231. At the same time, the doctrine provided a formula parties could use to negotiate settlements of pumping limitations. *See* Schneider, *supra* note 59, at 23-24.

145. *Los Angeles v. San Fernando*, 537 P.2d at 1298 n.61 and accompanying text. The court cited the "equitable apportionment" factors used by the United States Supreme Court to apportion water between states. *Id.* (quoting Nebraska v. Wyoming, 325 U.S. 589, 618 (1945)).

146. *Los Angeles v. San Fernando*, 537 P.2d at 1298 n.61 and accompanying text.

147. *Id.* at 1310-11. Overdraft alone does not trigger the running of the prescriptive rights period. Rather, prior rights holders need notice of "adversity *in fact* caused by the actual commencement of overdraft." *Id.* at 1311.

148. *Id.* at 1311-12.

prescriptive right.[149] Finally, the court redefined "overdraft" to mean "extractions from [a] basin that exceed its safe yield plus any . . . temporary surplus."[150]

In summary, the law governing the acquisition of groundwater pumping rights is fraught with uncertainty.[151] Since the law is judge made, and judges have not had the opportunity to iron out all the doctrinal wrinkles, basic uncertainty remains in such critical concepts as "overlying user," "groundwater basin," "surplus," and "safe yield."[152] Even where the concept is clear, lack of data in many groundwater basins makes application uncertain. Beyond these limitations, uncertainty stems in large part from the correlative rights doctrine itself. Like riparian rights to surface water, overlying rights are not quantified. Moreover, because correlative rights depend upon other overlying owners' actions, the amounts that can be pumped may change dramatically over time. Finally, no administrative system exists to coherently, consistently, and inexpensively determine the scope of an overlying right, or the availability of a "surplus."

The great uncertainty has not prevented the development of the groundwater resource. It may well have made development sub-optimal. The expense, delay and difficulty of basin adjudication may well have encouraged pumpers to deepen or enlarge their wells, or to increase their extractions, rather than to attempt to quantify and thus limit all pumpers' extractions.[153] Still other pumpers may have decided not to invest in expensive pumping equipment if water levels were going to continue to decline over time. Finally, uncertainty in the nature of the right has likely inhibited the creation of markets for transferring such rights.

2. *Transfer & Change in Place of Use*

Compounding the market-inhibiting inherent uncertainty in the scope of the groundwater extraction right itself, state law provides neither much substantive law, nor a centralized administrative body, for evaluating a proposed sale or transfer of groundwater for a new, use.[154]

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149. *Id.* at 1313.

150. *Id.* at 1309. The trial court had found "safe yield" as "equivalent to an adjusted figure for net groundwater recharge." *Id.* at 1308. In wet years, however, extractions that exceeded the basin's safe yield could make room for storage of additional recharge. *Id.* at 1308-09. This ability to extract groundwater in wet years in order to use above normal precipitation for basin recharge formed the "temporary surplus." *See supra* note 87.

151. *See, e.g.*, Final Report, *supra* note 6, at 143 (only holders of rights in adjudicated basins have any certainty).

152. *See supra* notes 133-40 and accompanying text.

153. *See, e.g.*, Schneider, *supra* note 59, at 18.

154. Final Report, *supra* note 6, at 163-65. In one case, upon the DWR's request, the State Water Resources Control Board reviewed the proposed transfer of groundwater from a Yolo County farm to a Kern County water district via the state water project. The state board assumed jurisdiction both under a temporary regulation barring nonessential exports of

Three scenarios relevant to this article may occur.[155] First, an overlying user may wish to use groundwater on an overlying parcel that was extracted from a different, noncontiguous overlying parcel. Second, an overlying user may wish to sell water for ultimate nonoverlying use. Third, an existing appropriator (or holder of a prescriptive right) may wish to sell or use the extracted groundwater for a different, nonoverlying use.

The situation of the overlying users who wish to use groundwater on one overlying parcel that was extracted from a different, noncontiguous overlying parcel raises questions inherent in the uncertain overlying right itself. Two situations might set up this uncertainty. First, an overlying user might wish to use water pumped from one parcel it owns on another parcel owned by the same pumper.[156] Second, an overlying owner might simply wish to purchase groundwater extracted by another overlying owner.[157]

Both of these situations require determination of the ability of an overlying user to use water on a noncontiguous overlying parcel.[158] In *Pasadena v. Alhambra*, the court stated: "an overlying right . . . is the right of the owner of the land to take water from the ground underneath for use *on his land within the basin or watershed*."[159] This definition would appear to sanction the first situation.[160] The qualification of "on his

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water from the delta, and under the California constitution. *See supra*, note 26.

155. A fourth scenario involves the transfer of adjudicated rights to groundwater. *See* C. Lee, Governor's Comm'n To Review California Water Rights Law, The Transfer of Water Rights in California 28-29, (1977) (Staff Paper No. 5). Lee suggests that, after *Los Angeles v. San Fernando*, "even after a basin adjudication, overlying users may be required to meet the place of use restrictions that are characteristic of unadjudicated overlying rights." Lee, *supra*, at 30. Full treatment of local regulation of the transfer of adjudicated rights is beyond the scope of this article.

156. This is the circumstance presented by the Colusa County farmers who pumped water from the Sacramento Valley groundwater basin from parcels they owned in Tehama County for use on parcels they owned that overlie the same basin in Colusa County. *See supra* note 30.

Several localized differences in basin conditions might trigger such pumping and use patterns. Water quality might be better in one part of the basin than in another. *See, e.g.*, Bulletin 118-6, *supra* note 74, at 75-79 (describing localized groundwater quality in Sacramento Valley groundwater basin). Pumping lifts may be lower in one part of the basin than in another. For example, one part of the basin may overlie a shallower aquifer than another. *See id.* (Plates 3 & 4). Or, localized pumping patterns might create different cones of depression in different parts of the same aquifer.

157. If an irrigator did not already have sufficient pumps installed, it might be cheaper to purchase water from an irrigator who had excess capacity, or who found it otherwise more profitable to fallow some land and sell water.

158. As noted above, case law has not yet answered this question definitively. *See supra* note 115.

159. *Pasadena v. Alhambra*, 207 P.2d 17, 28 (Cal. 1949) (emphasis added).

160. Even if the definition encompasses this first situation, further uncertainties exist over

the ability of other water rights holders to challenge the extraction. In general, water rights holders might challenge either a change in place of use of groundwater, a change in place of diversion, or a change in means of diversion. As an example of the first, assume that an irrigator has been pumping 10,000 acre-feet of groundwater on Parcel *A*, which drains into Stream *A*, and wants to pipe it for use on Parcel *B*, which drains into Stream *B*. Assume further that 10 percent of the 10,000 acre-feet drains off the field of Parcel *A* into stream *A*, and another 10 percent percolates back into the basin under Parcel *A*. If both parcels overlie the same aquifer, can the irrigator move the entire 10,000 acre-feet to the other overlying parcel, or only the 80 percent portion "consumptively" used (either incorporated into a plant or lost to the atmosphere through evapotranspiration)? Surface water diverters downstream of Parcel *A* might complain that the change in place of use was interfering with their rights to use the 1,000 acre-feet of tailwater. Other overlying users near Parcel *A* might complain about the localized effects loss of the 1,000 acre-feet of recharge.

As for the potential complaints of overlying owners to the drop in well water level, California case law has not addressed in any detail the rights of one overlying owner to complain about the drop in well water levels caused by another overlying owner's pumping of a correlative share. *See* Hutchins, *supra* note 111, at 484 (concluding "it is difficult to see why there should be priority in the means of diversion, which is essentially a means of effectuating use of the water"). Ultimately, the reasonable "method of use" provisions of Article X of the California Constitution probably provide a standard for determining the correlative rights of overlying owners to maintenance of a static well water level. *See id.* at 485. Other states have addressed well water levels in great detail statutorily. *See generally* D. Grant, *Reasonable Groundwater Pumping Levels Under the Appropriation Doctrine: The Law and Underlying Economic Goals*, 21 Nat. Res. J. 1 (1981); *Effectiveness & Equity*, *supra* note 96, at 5-10, 24-30.

As for the potential challenge of the downstream appropriator to the 1,000 acre-feet of tail water, again, the California cases do not address the relative legal rights. Between appropriators to surface water, a junior appropriator has at least a limited right to insist that a senior maintain the conditions extant at the time the junior began appropriating. *See* Hutchins, *supra* note 111, at 157. For two reasons, however, this rule should not apply to an appropriator's right to take tail water added to a surface stream by an overlying owner. First, such a rule would force a pumper to keep pumping perpetually. In contrast, in the case of junior and senior appropriators to a surface watercourse, if the senior wishes to stop diverting, it makes more water available to the junior. Second, the water added to the stream system--at least at the point where the tail water discharges into the stream--is functionally equivalent to "foreign water." As noted below, *infra* note 169, an importer of water into a watershed has absolute right to recapture that water and change its use or place of use. Unless the 1,000 acre-feet of tail water would have discharged naturally from the aquifer into the surface stream above the junior appropriator's point of diversion, that water is in effect water that would otherwise never have been available for appropriation.

Commentators have also noted that even were the "consumptive use" limit to apply, that standard "does not internalize all third-party effects. Effects not internalized include those resulting from changes in timing of use, in water quality, and in patterns of use." G. Gould, *Transfer of Water Rights*, 29 NAT. RES. J. 457, 467 (1989)[hereinafter *Transfer of Water Rights*]; *see also* J. Emel, *Groundwater Rights: Definition and Transfer*, 27 Nat. Res. J. 653, 666-67 (1987) [hereinafter *Definition & Transfer*].

Similar challenges might occur to changes in place of extraction. If localized differences make it more economical for our hypothetical irrigator to stop pumping on Parcel *A* and pump instead from Parcel *B*, this change may lower water levels in wells adjoining Parcel *B*.

land," however, would appear to prohibit transfers *under overlying rights* in the second situation.[161]

The second category of changes relevant to this article involves an overlying user who wishes to sell all or part of its previous extractions for a nonoverlying use. As noted above, an overlying owner's rights are analogous in many instances to riparian rights of surface water users.[162] Riparian owners are limited to using their water on judicially defined riparian lands; generally they have no ability to transfer water to nonriparian lands.[163] Thus, a riparian owner who wished use water on nonriparian lands would have to initiate a new appropriation. By analogy, an overlying user who wished to sell water for use on nonoverlying lands would need to initiate a groundwater appropriation. As such, the legal parameters of that right would appear to be governed by groundwater appropriation law.[164]

The third category of cases involves an appropriator who wishes to change the place of use from one nonoverlying site to another nonoverlying site. Groundwater law places uncertain limits, if any, on that change. An appropriative *surface* water rights holder may not change the place of use if such a change would harm other legal users.[165] Older

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Finally, additional uncertainty attends the ability of persons other than water rights holders to challenge the effects. Although unlikely, in a basin as big as the Sacramento Valley, a change in place of use or extraction might impact local agricultural economies or the local environment. *See infra* notes 170-75 and accompanying text.

A complete analysis of all of these matters is beyond the scope of this article.

161. If "surplus" groundwater existed, such a transfer could probably qualify as a new appropriation. Such an appropriation would have the most junior priority date in the event the basin became overdrafted.

If the actual pumper were extracting no more than enough water to meet the combined correlative rights of both overlying owners, little justification exists for restricting either overlying owner's rights to find the most economical way to extract the water. The only possible concerns might be the localized effects of the actual pumper increasing its extractions from that necessary to satisfy its own correlative rights to that necessary to satisfy both overlying owners' rights. For example, since the pumper would have to run its pumps longer, or install more powerful pumps, water levels in wells on nearby parcels might drop or stay lower longer. These potential concerns, however, would evaporate entirely if the overlying pumper were simply selling the water it had used. Such a sale, however, would raise the issues involved in a change of place of use. *See supra* note 160.

162. *See supra* note 121.

163. Lee, *supra* note 155, at 23-26. A riparian can sell to an appropriator a promise not to divert. Lee, *supra* note 155, at 23-26.

164. Such a result, while compelled by groundwater law, does nothing to further the state's expressed policy of encouraging voluntary water transfers. *See, e.g.*, Cal. Water Code §§ 109, 1244 (West Supp. 1993).

165. *See, e.g.*, Cal. Water Code §§ 1702, 1706 (West 1971) (addressing respectively, post 1914 appropriations and pre-1914 appropriations). These provisions codified prior case law. *See, e.g.*, Hutchins, *supra* note 111, at 175-78. Appropriative rights permitees or licensees must get permission of the State Water Resources Control Board prior to changing the point

cases involving changes in the point of *extraction* analogized to the law governing changes in points of surface water *diversion*.[166] By analogy, then, changes in place of groundwater use would be permissible provided no other legal water rights holders are injured.[167]

If the groundwater appropriator had always taken the pumped water completely out of the watershed from which it was pumped, then no water rights holders would have standing to complain about any new place of use.[168] California law gives the importer of water to a basin the absolute right to recover and use that water as the importer sees fit.[169] As such, the only possible claims might be by third parties economically or environmentally impacted by the appropriator's change in place of use.

The ability of persons other than water rights holders to raise economic or environmental concerns in any proposed change in place of groundwater use or extraction is almost completely unaddressed by California law.[170] The ability of third parties to raise such concerns over proposed *surface* water transfers has received a lot of attention in recent years.[171] Indeed, recent legislation has broadened the factors the State Water Resources Control Board considers when reviewing such surface water transfer proposals.[172] These statutes, however, have not been

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of diversion, place of use, or purpose of use. Cal. Water Code § 1702 (West 1972). The Water Code details separate provisions for temporary and long term transfers of rights under state appropriative permits or licenses. *Id.* §§ 1725 to 1737.

166. See, e.g., City of San Bernardino v. City of Riverside, 198 P. 784, 793 (Cal. 1921); see generally, Hutchins, supra note 111, at 475-76.

167. *Cf. San Bernardino v. Riverside*, 198 P. at 793. In dicta the court notes, "neither *the particular place of use*, the character of the use, nor the place of taking is a necessary factor" in acquiring an appropriative right. *Id.* (emphasis added).

168. Arguably, the same result should apply with an appropriator who returned tail water to the watershed from which it was extracted, but at a place above where the tail water would have discharged naturally. *See supra* note 160. Thus, a change in place of use of an appropriative groundwater right that still returned water above its place of natural discharge should be allowed over the objections of a surface water appropriator. Where a groundwater appropriator sought to change the place of use and thus remove water entirely out of a watershed, or below its point of natural discharge, then downstream appropriators would have standing to challenge the change. Resolution of such a challenge, of course, might place great practical difficulties on the party with the burden of proof.

169. *See, e.g.*, Hutchins, *supra* note 111, at 69-70 (discussing "foreign waters).

170. *See* B. Gray, *A Primer on California Water Transfer Law*, 31 Ariz. L. Rev. 745 (1989).

171. *See, e.g.*, G. Gould, *Water Rights Transfers and Third Party Effects*, 23 Land & Water L. Rev. 1, 27-35 (1988); *Transfer of Water Rights, supra* note 170, at 473-75; D. Grant, *Public Interest Review of Water Right Allocation and Transfer in the West: Recognition of Public Values*, 19 ARIZ. ST. L. J. 681 (1988); Gray, *supra* note 170, at 749-54.

172. In recent years, the Legislature has added provisions that protect the public's interest, particularly in beneficial instream uses for fish and wildlife, from the effects of a water transfer. *See, e.g.*, Cal. Water Code §§ 1435(b), 1727(a), 1736 (West Supp. 1993)

applied to evaluate proposed groundwater transfers. Moreover, with rare exception, the State Water Resources Control Board has not asserted jurisdiction over proposed groundwater transfers.[173]

Protection of third parties from the effects of proposed groundwater transfers has begun to receive attention from commentators.[174] In addition, the Department of Water Resources has begun to look at the environmental and economic consequences of proposed conjunctive use transfers of surface water that irrigators replace with groundwater.[175] Nevertheless, there remains little law governing groundwater transfers, and little assurance that third party effects, both to water rights holders, and to the environment or local economies, will be reviewed efficiently and coherently by the State Board.

B. Legislative Regulation of Private Rights to Groundwater Extraction and Use

Unlike the extensive statutory provisions governing private rights to surface water, no comprehensive state legislation addresses private rights to groundwater in California.[176] The state Constitution's prohibitions against unreasonable or wasteful water use apply to groundwater.[177] Similarly, the Water Code's general policy statement about the state's "paramount interest in the use of all the water of the State" also expressly extends to "underground" waters.[178] Only a handful of statutes, however, address groundwater extraction.[179] In none of these

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(addressing respectively, temporary urgent changes, temporary changes, and long term transfers).

173. The rare exception to date has been the proposed transfer in 1977 from Yolo County farmers to Kern County farmers via the State Water Project facilities. *See supra* note 26; *cf.* Lee, *supra* note 155, at 67-70 (concluding that the decision increases the uncertainty attendant to interbasin groundwater exports).

174. *See, e.g.*, Gregory, *supra* note 15, at 237-39; *see also Definition & Transfer*, *supra* note 160 (focusing on clarification of property rights in groundwater pumping levels).

175. *See* Draft EIR, *supra* note 29, at 35-39, 68-69, 110-16, 136-37, 143-44, 172-75.

176. Final Report, *supra* note 6, at 145. Groundwater pumpers who extract more than 25 acre-feet annually from aquifers in four Southern California counties must file an annual "notice of extraction and diversion of water" with the State Water Resources Control Board. Cal. Water Code §§ 4999-5008 (West 1971 & Supp. 1993).

177. This provision applies to groundwater extractions. *See* Peabody v. City of Vallejo, 40 P.2d 486 (Cal. 1935) (construing Cal. Const. art. X, § 2, repealed and replaced by Cal. Const. art. 10, § 2).

178. Cal. Water Code § 104 (West 1972).

179. While the legislature has not adopted uniform groundwater appropriation, use, or transfer legislation, it has addressed statewide concerns with groundwater quality, basin conditions, and recharge projects in four types of statutes. Three sets of water quality statutes address groundwater. These include: a) the Porter-Cologne Water Quality Control Act, addressing water quality planning, *see, e.g.*, Cal. Water Code §§ 13050(e), (j), 13142(a)

has the legislature created a uniform scheme for establishing and transferring rights to extract and use groundwater. Instead of regulating groundwater rights comprehensively at the state level, the legislature's few efforts to regulate private rights to groundwater uses have generally taken one of three paths. First, some statutes have created specific classes of agencies, subject to local formation, with power to manage groundwater.[180] Second, the legislature has created special groundwater management districts.[181] Finally, three statutes enacted over the last nine years generically allow some local groundwater regulation by existing local entities.

In 1984, the legislature enacted sweeping "area of origin" protections for over a dozen identified Northern California stream systems.[182] The legislation bars groundwater pumping for export "from within the combined Sacramento and Delta-Central Sierra Basins . . . unless the pumping is in compliance with a groundwater management plan that is adopted by [county] ordinance . . . ."[183] It expressly announces: "[n]oth-

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(West. 1971 & Supp. 1993); b) the statewide water well drilling standards legislation, *id.* §§ 13700-13806; and c) the State Water Resources Control Board's authority to initiate a groundwater basin adjudication to preserve water quality; *see id.* §§ 2100-2102. The Porter-Dolwig Groundwater Basin Protection Law announces the State's concern with overdraft. *See id.* §§ 12920-12924. The Porter-Dolwig law allows the Department of Water Resources to review local groundwater management "projects," but funding provisions have been eliminated. *Id.* § 12923; *see also* 1961 Cal. Stat. 3315 (repealed by 1967 Cal. Stat. 969, 970). The Porter-Dolwig act's principal contribution was the preparation of a report issued in 1980 addressing groundwater problems. Bulletin 118-80, *supra* note 12; *see* Calif. Water Code § 12924 (mandating report). Other state legislation has included studies of groundwater conditions and use. *See, e.g.*, Cal. Water Code §§ 10825-26 (West 1992) (a survey of groundwater resources and uses is required as part of mandatory agricultural water management plans). And, the legislature has authorized funding for certain groundwater recharge projects. *See, e.g., id.* §§ 12925 to 12928.6.

180. Three examples of general legislation establishing classes of agencies with groundwater management include: 1) Groundwater replenishment districts. Cal. Water Code §§ 60000-60449 (West 1966 & Supp. 1993). Such districts have express authority to commence "actions and proceedings" to, inter alia, "prevent unlawful exportation of water from the district." *Id.* § 60230(g) (West Supp. 1993). The statutes do not address the circumstances constituting "unlawful exportation." 2) Water conservation districts. *Id.* §§ 74000 to 76501. These statutes authorize groundwater replenishment funded by groundwater management charges, *id.* at §§ 75500-75523, but the enabling statutes do not expressly mention groundwater export restrictions. 3) Metropolitan water districts. *Id.* §§ 71000 to 73001. These districts also have power to replenish groundwater and assess charges for groundwater pumping, *id.* §§ 71682 to 71689.6, but the enabling legislation does not directly address groundwater exportation.

181. For a discussion of one of these acts, the Sierra Valley Groundwater District Act, and its progeny, see *infra* notes 431-70 and accompanying text.

182. Cal. Water Code §§ 1215 to 1222 (West Supp. 1993).

183. Cal. Water Code § 1220 (a) (West Supp. 1993). The section defines "Sacramento and Delta-Central Sierra Basins" by reference to California Dep't of Water Resources, The

withstanding any other provision of law, a county board of supervisors whose county contains part of the combined Sacramento and Delta-Central Sierra Basins may adopt groundwater management plans to implement the purposes of this section."[184] The statute says nothing, however, about the elements of such a plan.[185]

California Water Plan Outlook, Bulletin 160-74 (1974) [hereinafter Bulletin 160-74]. Bulletin 160-74, however, does not "define" these two basins; rather, it indicates on a map the general location of two "hydrologic study areas" bearing the same names. Bulletin 160-74, *supra*, at 3-4, 6. Thus, as the Department of Water Resources noted prior to the statute's enactment, "the bill technically applies to nothing." N. Waters, California Dep't Of Water Res., *Enrolled Bill Report A.B. 178* 1 (1978) [hereinafter *Enrolled Bill Report*]; *see also* N. Waters, California Dep't Of Water Resources, *Bill Analysis A.B. 178* 3 (1974) [hereinafter *Enrolled Bill Analysis*].

These technical flaws, and the host of unanswered questions raised below about the statute's scope, demonstrate that the counties have no monopoly on poor statutory drafting. They also temper hopes that the state legislature is more likely to produce a coherent groundwater plan than the sum total of efforts by individual counties. At the very least, even a poorly drafted state scheme would allow for greater consistency throughout the state, at least after judicial interpretation.

184. Cal. Water Code § 1220(b) (West Supp. 1993). It precludes the exercise of such powers, however, "within the boundaries of another local agency supplying water to that area without the prior agreement of the governing body of that other local agency." *Id.* § 1220(c).

Section 1220 imposes two additional requirements that greatly confuse the groundwater management planning process. Subsection (a) requires the appropriate county board of supervisors to consult with "affected water districts" before adopting a groundwater management plan. *Id.* § 1220(a). The same subsection also requires approval of such a plan by "a vote in the counties or portions of counties that overlie the groundwater basin." *Id.* These two provisions raise a host of unanswered questions, and might combine to make enactment of any groundwater management plan impossible.

The "consultation" requirement neither defines "district" nor indicates the statute's geographic reach. As to the definition of "district," does it apply only to local public agencies that supply water? As noted above, subsection (c) allows other local agencies who supply water to veto the enforcement of any such plan within the water supplier's service area. This veto power would seem to adequately protect these public agency water suppliers. Arguably, the consultation requirement should extend to any agency concerned with water management activities, such as flood control. Even if such other agencies lack a veto power under subsection (c), they may still be "affected" by the plan, and deserve consultation. As to the statute's geographic scope, does a county who wishes to manage groundwater under section 1220(b) have to consult only with those "affected districts" within the county itself? Arguably, a district in a different county that nevertheless overlies a different portion of the same aquifer might also be "affected" by a proposed groundwater management plan. Indeed, the consultation requirement's reach might extend even further, to any water district within the state that proposed to import groundwater, or surface water replaced by groundwater. To date, no court has addressed any of these requirements.

The "voting" requirement further confuses the statutory scheme. Assume that County *A* wishes to use its powers under section 1220(b). Further assume that Counties *B* through *X* also overlie a portion of the combined basins identified by section 1220(a). Who votes to approve the ordinance adopting the groundwater management plan? The statute seems to imply a public referendum. Do all registered voters in County *A* vote, or only landowners in County *A*? or only those voters (or landowners) who live in the portion of

Several circumstances may limit the otherwise broad reach of this statute. First, it does not apply to exports by either the federal Bureau of Reclamation or the state Department of Water Resources.[186] Second, the

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the county that overlies the designated basins? Section 1220(a) refers to a vote "in the counties *or portions of counties* that overlie the groundwater basin." *Id.* § 1220(a) (emphasis added). Does that mean that citizens of the other 23 counties (*i.e.*, Counties *B* through *X*) also get to vote on County *A*'s ordinance? To approve the plan, must a majority of eligible voters in *each* eligible county vote to approve it? If so, that would give any one county veto power over all the other counties' plans. Alternatively, will the ordinance pass if a majority of all voters (from all counties combined) vote to approve it? That would give the more populated counties the power to control the outcome.

During the legislative process, the Department of Water Resources noted some ambiguity in the voting requirement. Its report to the governor states: "[Section 1220] also requires the plan to be approved by one county board of supervisors, but there is no way of determining which one. This establishes a condition that cannot be met. These problems were called to the attention of the author's staff during the session." *See Enrolled Bill Report, supra* note 183, at 1.

These latter two points demonstrate the practical absurdity of allowing a vote on County *A*'s groundwater management plan outside of County *A*. Indeed, in a letter urging the governor to sign the bill, the statute's principal author suggested that "*the* county" that proposed the ordinance would be the county that voted on it. Letter from Norman S. Waters, California Assemblyman, to George Deukmejian, Governor, California 1 (Sept. 5, 1984). "A local groundwater management plan adopted by ordinance by *the* county board of supervisors . . . and subsequently approved by a vote in *the* county." *Id.* (emphasis added). If this view were to prevail, the "portions of counties that overlie the groundwater basin" might simply mean that if a county overlies only part of the basin, it, too, may manage groundwater in that portion of the county that overlies the basin. *See* Cal. Water Code § 1220(c) (West Supp. 1993). If such a county only overlay a portion of the basin, under this narrower interpretation of the voting requirement, only those citizens who lived in the portion overlying the designated basins would be able to vote.

A glance at Bulletin 160-74 demonstrates that only ten counties entirely overlie the "combined Sacramento and Delta-Central Sierra Basins:" Shasta, Tehama, Butte, Plumas, Colusa, Sutter, Yuba, Yolo, Sacramento and Amador. Seventeen counties overlie a portion of the combined basins, but also overlie other "basins" (*i.e.*, "hydrologic study areas"): Modoc, Siskiyou, Glenn, Lassen, Sierra, Nevada, Alpine, Placer, El Dorado, Calaveras, San Joaquin, Stanislaus, Lake, Napa, Solano, Contra Costa, and Alameda.

185. *See* Cal. Water Code § 10753.7 (West Supp. 1993) (A.B. 3030 groundwater management plan legislation may include any of twelve specified elements).

186. Section 1215 exempts appropriations that are "subject to [Water Code] Section 11460." *Id.* § 1215. Section 11460 is part of the "Watershed Protection Act." *Id.* §§ 11460-11465 (West 1992). Section 11128 makes section 11460 apply to "any agency of the State or Federal Government which shall undertake the construction or operation of the [Central Valley Project]." Id. at § 11128. While the "Central Valley Project" often refers to only that portion of the massive dam and aqueduct empire constructed and operated by the Bureau of Reclamation, sections 11200-11295 demonstrate that "Central Valley Project" includes all the elements associated with both the Bureau's "CVP" facilities and the Department of Water Resources' "State Water Project" (SWP) facilities. *See id.* §§ 11200 to 11295.

Two possible interpretations of the interplay of this exemption and the other area of origin exemptions exist. First, in enacting sections 1215-1222, the legislature may have concluded that the state and federal projects were burdened enough by section 11460 to

legislation applies only "to a *water supplier* exporting or intending to export water *for use outside a protected area* pursuant to . . . groundwater *appropriations* initiated after January 1, 1985."[187] On its face, then, the statute apparently does not limit, or authorize limitation of, the transfers of groundwater out of the county of extraction for use in another county on land that is also within the same protected area.[188] Similarly, on its face, the legislation does not apply to "groundwater appropriations" that had been initiated before 1985. The undefined reference to "appropriations" creates confusion. If, on the one hand, the legislature used it

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make undesirable additional restrictions. Alternatively, the legislature may have concluded that the restrictions of sections 1215-1222 duplicated the restrictions of section 11460, and thus *made unnecessary* the additional restrictions. Under this latter interpretation, section 11460 already prohibits groundwater export by the Bureau and Department. Under the former interpretation, no export bar exists directly, so long as the two projects do not deprive the watersheds of origin of the water they otherwise need.

An additional question arises from DWR's operation of the Drought Water Bank. To the extent the Water Bank transactions do not involve the use of SWP or CVP facilities to store or wheel water, then, arguably, sections 1215-1222 might apply and restrict the export of groundwater. For example, purchases from the Yuba County Water Agency could be sold to the City of San Francisco without use of SWP or CVP facilities. *See* Draft EIR, *supra* note 29, at xxv-xxvi. Two quick answers to this problem appear. First, so far, little actual groundwater has been pumped for the Drought Water Bank. *See supra* note 29. Second, all the Water Bank purchases collectively could be considered to create a unified pool of water inevitably stored or transported in part in some SWP or CVP facility.

187. Cal. Water Code § 1215 (West Supp. 1993) (emphasis added). The "protected areas" are those stream systems specifically identified in section 1215.5. *See id.* § 1215.5.

188. Thus, the statute would not bar the proposed transfer of water by the Colusa County farmers, *supra* note 30, from their Tehama County property to their Colusa County property as both parcels are within the same protected area.

Arguably, the statute also might not prohibit a transfer from within one protected area for use on land in *another* protected area. Section 1215 limits the legislation to export for use "outside *a* protected area." Cal. Water Code § 1215 (West Supp. 1993) (emphasis added). In this context, "'a' protected area" is ambiguous. On the one hand, removal of groundwater from any one listed protected area involves use outside of *that* protected area. As such, the prohibitions would apply. On the other hand, however, groundwater transported from one protected area for use in *another* protected area is not being used outside of "*a*" protected area. Rather, the groundwater is simply being used outside of the original protected area. Under this interpretation, the export restrictions might not apply.

References to "a" protected area pepper the statutes. *See, e.g., id.* §§ 1215.6, 1216, 1218, 1219 and 1219.5. In section 1217(a), however, the legislature gives water users in "a protected area" the right to purchase from a water supplier who is intending to export water from "*the*" protected area. *Id.* § 1217(a) (emphasis added). Similarly, subsection (b) allows water users from "a" protected area to require a potential water exporter from "*the*" protected area to meet and negotiate a potential water supply contract. *Id.* § 1217(b) (emphasis added). Arguably, the legislature's use of "the" demonstrates that it knew how to specify a protected area when it so intended. Section 1217(d), however, blunts this conclusion. In that section, the legislature allows the proposed exporter from "a" protected area and the water users of "a" protected area to set up their negotiations as they choose. *Id.* § 1217(d). Thus, the legislature itself is inconsistent in its use of "a" and "the."

generically to refer to any groundwater *extractions*, the statute would exempt *all* pre-1985 extractions from the export restrictions.[189] On the other hand, the legislature might have used "appropriations" in a traditional legal sense to distinguish overlying from nonoverlying uses. Under such an interpretation, a pre-1985 nonoverlying use would appear exempt from the export restrictions. Post-January 1, 1985, conversions to non-overlying use of pre-existing extractions made under overlying rights would appear to be within the export restrictions.[190] Finally, the statute does not define "water supplier." On the one hand, this might apply to any one who diverts or extracts groundwater. On the other hand, it might apply only to an organization or entity proposing to *sell* water.[191]

An additional aspect of the legislation's scope also requires clarification. As noted above, section 1220 requires the relevant groundwater export pumping to be "in compliance with [an adopted] groundwater management plan."[192] The legislation does not directly address the effect on potential exports of a county's failure to adopt a groundwater management plan. On the one hand, if no such management plan exists, exports are not *not in compliance*. If there is no such plan, then there is nothing with which to comply. Such an interpretation would appear to allow exports until such time as a county enacts an applicable management plan.[193] On the other hand, the statute arguably bans all export

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189. Of course, common law may otherwise limit an overlying owner's ability to sell groundwater for use off basin. *See supra* notes 155-64 and accompanying text.

190. The legislative history sheds no light on the meaning of "appropriations."

191. Under this narrower interpretation, the statute would not bar export from land owned by one owner for use outside the protected area on land also owned by that same overlying owner. Support for this narrower reading comes from the subsequent definition of "water user or users." Section 1215.6 states: "For the purposes of this article, 'water user or users' within a protected area means an appropriator or appropriators, a riparian user or users, or a groundwater user or users of water on land owned or controlled by them within a protected area." Cal. Water Code § 1215.6 (West Supp. 1993). By separately defining "water user" without reference to "water suppliers," arguably the legislature intended the two terms to have different meanings.

In its "Bill Analysis," DWR concluded that "[t]he only likely agencies that would be brought under the law are the East Bay Municipal Utility District, City of San Francisco and Los Angeles Department of Water and Power when they seek new permits." *Enrolled Bill Analysis*, *supra* note 183, at 2.

192. Cal. Water Code § 1220(a) (West Supp. 1993).

193. More precisely, such an interpretation would mean that section 1220 does not itself independently restrict groundwater exports. Several counties have argued that their inherent police powers support groundwater export restrictions. *See, e.g.*, Rossmann & Steel, *supra* note 18, at 933-50 (arguing that the Inyo County groundwater management ordinance, restricting exports without permits, is within the county's police power). To date, while no California appellate court has addressed the matter, the three state trial courts that have considered the matter have not upheld these claims. *See supra* note 42 (noting decisions on exporting in Inyo, Nevada, and Tehama counties).

pumping *until* authorized by an appropriate management plan. Only after such a plan's enactment would export pumping "comply."[194]

In 1991 and 1992, the legislature expanded its generic authorization of groundwater management plans beyond the local agencies permitted to act by section 1220. In 1991, it enacted A.B. 255.[195] That statute allowed specified "local agencies" in the 11 basins identified as "critically overdrafted" to adopt "programs for the management of groundwater resources" within their service areas.[196]

In 1992, with A.B. 3030, the legislature repealed A.B. 255.[197] In its place, the legislature extended the authorization to enact "groundwater management programs"[198] to specified local agencies in *all* major groundwater basins within the state.[199] The statute applies to those

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194. A review of the statute's legislative history supports this latter interpretation. For example, a bill analysis prepared by the staff of the Assembly Water, Parks, and Wildlife Committee stated: "This bill would prohibit the extraction and export of Sacramento Valley groundwater unless there is a groundwater management plan adopted by the Board of Supervisors." Assembly Water, Parks & Wildlife Committee, *Staff Report: A.B. 178* 1 (1984); *see also id.* at 2 (uncertain whether measure will encourage local planning). *Cf. Enrolled Bill Analysis, supra* note 183, at 1-2; Letter from Jim Nielsen, State Senator, to Norm Waters 1-2 (Mar. 26, 1984) 1-2 (inability to obtain agreement among overlying counties will preclude all groundwater export).

195. Cal. Water Code §§ 10750-10767 (repealed 1992).

196. Cal. Water Code §§ 10750-10752 (repealed 1992). The statute provided absolutely no legislative guidance about the features of such "programs."

197. Law of Sep. 26, 1992, ch. 947, § 1 [hereinafter A.B. 3030]. Portions of A.B. 3030 allow continuation of plans initiated under A.B. 255. A.B. 3030, *supra* (adding § 10750.9 to the California Water Code).

198. A.B. 3030 defines a "groundwater management program" as: "a coordinated and ongoing activity undertaken for the benefit of a groundwater basin, or a portion of a groundwater basin, pursuant to a groundwater management plan adopted pursuant to this part." Cal. Water Code § 10752(e) (West Supp. 1993). It defines a "groundwater management plan as "a document that describes the activities intended to be included in a groundwater management program." Cal. Water Code § 10752(d) (West Supp. 1993).

199. A.B. 3030, *supra* note 197 (adding Cal. Water Code § 10753). The legislation excludes two types of basins and one type of well. First, it excludes any portion of any basin "that is subject to groundwater management by a local agency or a watermaster pursuant to other provisions of law . . . unless the local agency or watermaster agrees...[to be subject to a new plan]." Cal. Water Code § 10750.2(b) (West Supp. 1993). Second, it exempts any basin "in which the average well yield is less than 100 gallons per minute." *Id.* Finally, except in critically overdrafted basins, it excludes groundwater extraction facilities that are "used to provide water for domestic purposes to a single-unit residence (and any additional authorized attached dwellings)." Cal. Water Code § 10755.4 (West Supp. 1992).

The statute specifies two classes of "local agencies" authorized to undertake "groundwater management programs." First, it expressly defines "local agencies" as: "any local public agency that provides water service to all or a portion of its service area." *Id.* § 10752(g). Second, it also allows other "local public agencies" that do not meet the criteria of section 10752 (g) also to undertake such programs if: a) "water service is not provided by a local agency", and b) "[t]he local public agency provides flood control, groundwater

"groundwater basins" as defined by the Department of Water Resources in Bulletin 118-75.[200] Like A.B. 255 "programs," A.B. 3030 programs have no mandatory requirements.[201] Rather, the statute specifies twelve provisions that such a program *may* contain.[202]

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quality management, or groundwater replenishment." *Id.* § 10753(b)1-2.

These definitions would thus not authorize a *county* to manage groundwater unless that county either provided water service itself, or, in some circumstances, provided flood control, groundwater quality management, or groundwater replenishment. The statute only authorizes county management in the latter instances if no other local public agency supplies water service within the groundwater basin.

The statute addresses some of the problems of overlapping jurisdictions. In critically overdrafted groundwater basins, "a local agency may not manage groundwater [under A.B. 3030] within the service area of another local agency without the agreement of that other entity." *Id.* § 10750.8. In basins that are not critically overdrafted, a local agency that seeks to regulate groundwater must get the approval not only of any other local agency, but also of any "water corporation regulated by the Public Utilities Commission, or a mutual water company." *Id.* § 10750.7.

In addition, it promotes "coordinated" basin planning where multiple empowered agencies have jurisdiction over a portion of the basin. *See id.* §§ 10750, 10752(e), 10755.2(a), 10755.3 (noting respectively, interagency cooperation encouraged, "program" defined as a "coordinated . . . activity", a coordinated plan intended, and empowered agencies with jurisdiction meet annually).

200. By limiting the management powers to *DWR identified* groundwater basins, the statute does not authorize regulation of groundwater resources not formally identified as "basins." For example, some fractured rock groundwater in mountain regions would escape regulation.

201. For a time during the 1992 session, the legislature was considering a bill that would have created the "California Groundwater Management Act." *See* S.B. 867 (1992) (as amended Jul. 29, 1992). This bill would have established general duties and responsibilities of groundwater management districts. *See* Assembly Committee on Local Government, Digest-S.B. 867, 1 (1992). These powers would have included, *inter alia*: 1) imposition of well spacing requirements and well operation regulations; 2) export restrictions, including a permit; 3) well registration requirements; 4) and extraction fees. *Id.* at 1-3. Ultimately, the legislature removed the sweeping, state wide provisions, and passed the bill as special legislation creating the Glenn County Groundwater Management District. S.B. 867 (1992) (version enacted). Governor Wilson, however, vetoed both that bill and S.B. 207, a substantially identical, subsequently enacted bill that removed a provision that had earlier offended the Governor. *See* Governor Pete Wilson to the California Senate Members, letter of Oct. 26, 1992, vetoing S.B. 207; *see also infra* note 469; *see also* A.B. 3030, *supra* note 197 (as amended in Assembly April 20, 1992, requiring four components of all groundwater management plans).

202. Cal. Water Code § 10753.7 (West Supp. 1993). The express list includes: 1) saltwater intrusion control; 2) wellhead protection and recharge area management; 3) contaminated groundwater migration control; 4) well abandonment and destruction management; 5) overdraft mitigation; 6) groundwater replenishment; 7) groundwater levels and storage monitoring; 8) conjunctive use facilitation; 9) well construction policy identification; 10) authorization of projects for groundwater contamination cleanup, recharge, storage, conservation, water recycling and extraction; 11) development of relationships with state and federal agencies; and 12) land use planning coordination. *Id.*

On its face, A.B. 3030 does not directly authorize groundwater export controls. Arguably, such provisions are a component of a groundwater management programs.[203] Section 10753.7 (k) authorizes the appropriate local agencies to "mitigate conditions of overdraft."[204] "Mitigation" can mean "to lessen in severity or burden."[205] Reduction of export pumping could be one component of an effort "to lessen [the] severity or burden" of overdraft.[206] Moreover, section 10753.8 implicitly allows an authorized agency to "limit or suspend extractions" when that agency "has determined through study and investigation that groundwater replenishment programs or other alternative sources of water supply have proved insufficient or unfeasible to lessen the demand for groundwater."[207] Finally, section 10754 extends the powers of water replenish-

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203. Some authority, however, implicitly supports a conclusion that A.B. 3030 districts have no export restriction authority. In the few special district acts that have expressly created local regulatory bodies with authority over groundwater export, the legislature has placed groundwater export provisions and groundwater management provisions in separate sections. *See infra* notes 434-60 and accompanying text (discussing Sierra Valley Groundwater Basin Act); Cal. Water Code-App. §§ 119-706 to 119-709.7, 119-702 (West Supp. 1993) (addressing export management and general management powers). The close proximity of these sections only weakly supports a distinction between export and management authorities. Equally plausible is an interpretation that has export restrictions merely one instance, albeit one described in detail, of management powers. Supporting this conclusion is the district's name: the Sierra Valley Groundwater Management District. The export restrictions are thus simply one of this groundwater *management* district's *management* powers.

204. Cal. Water Code § 10753.7(e) (West Supp. 1993).

205. Ballentine's Law Dictionary 808 (1969). *Cf.* Cal. Code Regs. tit. 14 § 15370 (1990) (CEQA guidelines definition of "mitigation").

206. If groundwater export controls are proper components of overdraft mitigation exports, an additional question arises. Can the appropriate local public agencies enact a groundwater management program that *only* contained an export ban? Section 10753.7 does not mandate any particular component or set of components that such a plan must contain. Similarly, even if such an export ban were a "plan," A.B. 3030 does not appear to validate retroactively groundwater export ordinances that counties passed prior to the statute's enactment. *See* Cal. Water Code §§ 10750.9, 10753.2 to 10753.6 (West Supp. 1993).

207. Cal. Water Code § 10753.8(c) (West Supp. 1993). The authorization is only implicit since the section begins: "[n]othing in this part shall be construed as authorizing the local agency to limit or suspend extractions *unless* [the agency makes the two required determinations]." *Id.* (emphasis added).

Section 10753.8 (b) states that A.B. 3030 does *not* authorize a local agency "to make a binding determination of the water rights of any person or entity." *Id.* § 10753.8 (b) (emphasis added). Superficially, an appropriator whose export use was curtailed under a groundwater management scheme might seek some solace under this provision. Most likely, however, it provides little comfort. A.B. 3030 authorizes local regulation of rights otherwise created under state law. Section 10753.8 (b) merely negates any suggestion that A.B. 3030 bestows *adjudicative* powers over the scope and acquisition of state created rights. The entire scheme, however, expressly grants *legislative* powers to the identified local agencies. It is in the exercise of such legislative powers that the local agencies can restrict the state created

ment districts to public agencies who adopt groundwater management plans under A.B. 3030.[208] "For the purposes of replenishing the groundwater supplies within the district, a [water replenishment] district . . . [may] conserve water within or outside of the district."[209] Arguably, such "conservation" powers authorize an export ban. Moreover, as noted above, water replenishment districts also may "commence, maintain, intervene in, defend and compromise . . . any and all actions and proceedings . . . to prevent the unlawful exportation of water from the district."[210]

The 1992 legislative session saw one additional law addressing groundwater export and local groundwater management plans. In A.B. 2897, the legislature addressed water users who replaced transferred surface waters with groundwater.[211] In adding section 1745.10 to the

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rights. A consideration of the constitutionality of such a grant of power, or the compensability under the takings clause of any appropriative rights curtailed as a result of the exercise of such power, is beyond the scope of this article.

208. Cal. Water Code § 10754 (West Supp. 1993).

209. *Id.* § 60230(f).

210. *Id.* § 60230(g). As previously noted, nothing in the water replenishment district act defines "unlawful exportation of water." *See supra* note 180.

211. *See* Cal. Water Code §§ 1745 to 1745.11 (West Supp. 1993). As noted above, many of the environmental effects of such replacement pumping are identical to the effects of outright pumping for export. *See supra* note 29. Since groundwater is pumped from the basin, overdraft related problems may well be exacerbated. Some differences in the scope and type of harms from such replacement pumping may reduce somewhat the magnitude of problems when compared with the potential from literal pumping for export. First, some return flows will percolate back to the aquifer from the replacement pumping, whereas no such return flows will percolate back from an outright export. By itself, this distinction goes only to the question of the quantification of the right to transfer groundwater out of a basin.

A second difference has also been raised by some, such as the noted Sacramento attorney George Basye. Mr. Basye argues that replacement water users are limited in the amount of water they will pump from the basin by the overlying uses to which they will apply the water. Remarks of George Basye, CLE International, California Water Law Conference, San Francisco, California (March 18, 1993). For example, a farmer who transfers entitlements to 1,000 acre-feet of surface water that would normally irrigate a 250 acre parcel is only going to pump 1,000 acre-feet from the basin to irrigate that same parcel. In contrast, he argues, no such practical limitations restrict the pumper for export. Only the capacity of the literal export pumper's wells would limit its ability to remove groundwater out of the basin.

This second distinction seems only a matter of degree, and not of true difference. If the replacement water use is long enough and widespread enough, it seems perfectly able to have the same long-term environmental consequences as true export pumping. The main difference between pure export pumping and replacement pumping seems to lie not in the ability of the two schemes to overdraft a basin, but in the local economic consequences of such depletion. Replacement pumping does keep local agro-economies operating. Pure export pumping does not necessarily guarantee the economies at the water source that locally circulating dollars will replace the waters overdrafted from the basin. The concerns about local third party effects of water transfers demand attention. The attention, however,

Water Code, the legislature prohibited such replacements "unless the groundwater use is either . . . . (a) Consistent with a groundwater management plan adopted pursuant to state law for the affected area. (b) [or, if no such plan exists, the replacement is] [a]pproved by the water supplier from whose area the water is to be transferred."[212] In the latter instance, the water supplier must determine that the "transfer will not create, or contribute to, conditions of long-term overdraft in the affected groundwater basin."[213] By its own terms, A.B. 2897 does not authorize groundwater management authority; rather, it refers only to plans adopted pursuant to other, unspecified "state laws."[214]

IV. COUNTY ORDINANCES: A SURVEY

Given the lack of state attention to groundwater regulation, much of the development of the law in this area has occurred as a result of local legislative efforts. A survey of the these efforts serves at least two purposes.[215] First, as noted above, the legislature has recently and increasingly granted express authority for counties and other local bodies to regulate groundwater. The extent crop of ordinances, even if pre-empted completely or partially, nevertheless will likely serve as the models for the new ordinances likely to be budding under A.B. 3030 and its progeny. Several important lessons in legislative drafting can be learned from the current ordinances. Second, the survey leads to some

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should be as part of a coherent state plan to use resources wisely, and not to balkanize or erect underground Berlin walls against the possibility of *any* groundwater export.

212. Cal. Water Code § 1745.10 (West Supp. 1993).

213. *Id.*

214. It is unclear whether A.B. 2897, like Water Code § 1220, is a disincentive to enacting a groundwater management plan in an area that is opposed to groundwater exports. As noted above, Water Code § 1220 purports to ban groundwater exports until a water plan exist. *See supra* note 183 and accompanying text. Thus, if an area of origin is opposed to any exports, section 1220 gives such an area an incentive not to enact a plan. Similarly, the first subsection of section 1745.10 gives an area of origin a similar disincentive to enact a plan that would authorize such replacement pumping. The second subsection, however, tempers this disincentive by allowing the surface water supplier to authorize replacement pumping even without going to the trouble (and potential controversy) of enacting a groundwater management plan.

The interaction of A.B. 2897 and A.B. 3030 is not addressed directly by either statute. Presumably, in most instances, the "water supplier" addressed in A.B. 2897 will also be a "local public agency" within the meaning of A.B. 3030.

215. To obtain the materials discussed in this section, the author surveyed the county counsels for all 58 California Counties. The survey asked whether a given county has had, now had, or is considering a groundwater export ordinance or policy statement. Of the 58 counties, 43 responded. The author appreciates the survey respondents' efforts in bringing several useful matters to his attention.

conclusions about the overall coherence and wisdom of the state's slow motion progress towards groundwater management.

The counties surveyed represent three distinct regions: five predominantly lie in the groundwater rich Sacramento Valley;[216] two lie in the Eastern Sierra;[217] and the last lies in the southern desert.[218] Of these eight counties, six still have ordinances on the books: Butte, Glenn, Imperial, Modoc, Sacramento and Tehama.[219] The two remaining counties, Nevada and Inyo, have ordinances that are no longer enforced as a result of settlements of litigation.[220] For convenience, the article discusses the ordinances in the approximate order of their enactment.

A. Imperial County: The Original Groundwater Export Ordinance

As part of a long and tortuous effort to restrict groundwater exports from Imperial County to Mexico,[221] in 1972, Imperial County enacted the first county ordinance restricting groundwater export.[222] Over twenty years later, the ordinance remains on the books, although its

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216. These five counties include Butte, Glenn, Modoc, Sacramento, and Tehama. *See* Bulletin 160-74, *supra* note 183, at 6 (dividing state into 11 Hydrologic Study Areas).

217. These two include Nevada and Inyo Counties. *See* Bulletin 160-74, *supra* note 183, at 6.

218. The desert county is Imperial County. *See* Bulletin 160-74, *supra* note 183, at 6.

219. Butte County, Cal., Code ch. 33 (Supp. 1978); Glenn County, Cal., Code ch. 20.04 (1991); Imperial County, Cal., Code §§ 56300-56315 (1978); Modoc County, Cal., Code ch. 13.08 (1978); Sacramento County, Cal., Code § 15.08.095 (1980); Tehama County, Cal., Code title 9, ch. 9.40 (1992). The Tehama County ordinance was recently invalidated in Myers v. County of Tehama, No. 18498 (Tehama County Super. Ct. Aug. 8, 1993). *See also infra* note 223 (Imperial County seeking special district legislation).

220. Inyo County, Cal., Code ch. 7.01 (1980) (added by Referendum Measure A); Nevada County, Cal. Land Use And Development Code, ch. X, art. 6 (1988). After the trial court struck down the Nevada County ordinance, the Nevada County Board of Supervisors, sitting in their capacity as head of the Nevada County Water Agency, enacted a virtually identical ordinance. *See infra* note 380.

221. *See* County of Imperial v. McDougal, 564 P.2d 14, 16, *application denied*, 434 U.S. 899, *appeal dismissed*, 434 U.S. 944 (1977) (for want of substantial federal question); Munoz v. County of Imperial, 604 F.2d 1174, 1175 (9th Cir. 1979), *cert. granted*, 445 U.S. 903, *judgment vacated*, 449 U.S. 54 (1980), *on remand*, 636 F.2d 1189 (9th Cir.), *on remand*, 510 F. Supp. 879 (S.D. Cal. 1981), *aff'd*, 667 F.2d 811 (9th Cir.), *cert. denied*, 459 U.S. 825 (1982).

222. Imperial County, Cal., Ordinance No. 432 (Nov. 21, 1972). Section 2 of Ordinance No. 432 added Chapter 2 ("Ground Water Appropriations") to Division 6, Title 5 of the Codified Ordinances of Imperial County. *Id.* § 2. In 1978, Imperial County renumbered the chapter to Chapter 3. Imperial County, Cal., Ordinance No. 669, § 2 (Nov. 21, 1978).

Ordinance No. 432 replaced a similarly titled chapter that had been added by Ordinance No. 420 only four months before Ordinance No. 432's enactment. Imperial County, Cal., Ordinance No. 420 (July 18, 1972). Because the scheme set up under Ordinance No. 420 was so short lived, and largely incorporated into the scheme set up under Ordinance No. 432, the article focuses solely on Ordinance No. 432.

immediate future looks dim.[223] Like the later ordinances from other counties that also address groundwater export, the Imperial ordinance makes findings,[224] defines terms,[225] and establishes a permit process affecting some water exporters.[226]

1. *Findings and Definitions*

The ordinance's initial section first notes the importance of groundwater to portions of arid Imperial County.[227] It then announces its principal concern: protection of the local water supply from "overdrafts."[228] It concludes strongly: "[t]he Board intends that the right to appropriate water should be denied or limited where there is substantial evidence of overdraft."[229]

After announcing its concern with overdraft, the Imperial ordinance then defines ten terms.[230] Five of these terms are crucial to understanding the ordinance's substantive provisions. First, it defines the ordinance's central concern, "overdraft," as "any draft of water from the groundwater basin in excess of the safe yield of the basin."[231] It then defines two components of "overdraft:" "groundwater basin" and "safe yield."

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223. Imperial County is currently reviewing possible state legislation that would create an Imperial County Groundwater Management District. Letter from Joanne L. Yeager, Assistant County Counsel, County of Imperial, to Brad Epstein, Legal Research Assistant (Oct. 8, 1992). The district's boundaries would be coextensive with the county's boundaries. *Id.*; *see* Imperial County Groundwater Management Act § 102 (Feb. 20, 1992) (draft). The possible legislation draws extensively from the Sierra Valley Groundwater Management District Act, Cal. Water Code-App. §§ 119-101 to -1301 (West Supp. 1992), and the Mono County Tri-Valley Groundwater Management District Act, Cal. Water Code-App. §§ 128-1 to -901 (West Supp. 1992). *See infra* notes 434-60 and accompanying text.

224. Imperial County, Cal., Codified Ordinances § 56200 (1972) (amended 1978). *See infra* notes 227-29 and accompanying text.

225. Imperial County, Cal., Codified Ordinances § 56201 (1972) (amended 1978). *See infra* notes 230-53 and accompanying text.

226. Imperial County, Cal., Codified Ordinances §§ 56202-56212 (1972) (amended 1978). *See infra* notes 254-59 and accompanying text.

227. *Id.* § 56200.

228. *Id.* Section 56200 also announces an intent to "gather and analyze data so as to understand the effects of water appropriations on particular water basins and surrounding areas." *Id.*

229. *Id.*

230. *Id.* § 56201.

231. *Id.* § 56201(f). The ordinance does not separately define "draft."

The ordinance defines "groundwater basin" as: "a water aquifer or series of interrelated aquifers located in the County of Imperial."[232] It defines "safe yield" in detail:

> the amount of groundwater which can be withdrawn from a basin or series of interconnected basins annually without producing harmful effects on the supply in the basin. Specifically, safe yield is the amount of water which can be withdrawn without either:
>
> (1) Exceeding in any calendar year the long-term mean annual water supply of the basin (considering all sources of recharge and withdrawal);
> (2) Lowering water levels so as to make further drilling of water wells for local beneficial purposes uneconomical;
> (3) Causing water pumped from the basin to deteriorate below drinking water standards;
> (4) Violating water rights or restrictions in pumpage in the groundwater basin as established by court adjudication or applicable state or federal law.[233]

In several ways, the Imperial definition of "overdraft," as clarified by "groundwater basin" and "safe yield," leaves much less confusion than later versions adopted in other counties.[234] As noted above, "safe yield" is a hydrologically mushy and legally vague term that invites subjective interpretations.[235] The Imperial definition restricts the range of subjectivity in several ways. Most importantly, it specifies four categories of "adverse effects" that indicate that "safe yield" has been exceeded. In addition, the first of the four alternative "safe yield" criteria both provides an explicit time period in which to compare extractions and recharge, and quantifies the standard to be applied during the comparison.[236] In addition, the second "safe yield" criterion qualitatively equates "overdraft" with an inability to drill wells *economically* for "local beneficial uses."[237]

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232. *Id.* § 56201(a). Unlike most of the subsequent ordinances, the Imperial ordinance does not separately define "aquifer" or "interrelated aquifers." In Bulletin 118-75, the California Department of Water Resources identifies 16 "groundwater basins" located entirely or partially in Imperial County. Bulletin 118-75, *supra* note 1, at 95. Of these, ten cross county boundaries. *See* Bulletin 118-75, *supra* note 1, at 85.

233. Imperial County, Cal., Codified Ordinances § 56201(E) (1972) (amended 1978).

234. *See, e.g., infra* notes 271 & 407, and accompanying text.

235. *See supra* notes 89-109 and accompanying text.

236. The "time period" for "extractions" is a "calendar year;" the time period for "recharge" is also "annual," but as quantified by the "long-term mean annual water supply." Imperial County, Cal., Codified Ordinances § 56201(e) (1972) (amended 1978).

237. *Id.* In contrast, the Butte, Glenn, and Tehama ordinances' vaguer "safe yield" criteria speak only of long term declines in water levels leading to depletion. *See infra* notes 271, 325, 407, and accompanying text.

Of course, these definition are not entirely precise. For example, the ordinance does not further indicate the length of the "long-term" used for computing the "long-term mean annual water supply."[238] Similarly, the ordinance does not further define "uneconomical." Perhaps most importantly, the "groundwater basin" definition does not precisely address the problem of multiple county groundwater basins. The ordinance applies to "a water aquifer . . . located in the County of Imperial."[239] Ten aquifers, however, underlie both Imperial and some other county.[240] For these ten aquifers, the ordinance does not determine whether the "overdraft" definition looks only to the Imperial County portion of the extraction and replenishment figures, or includes *all* sources of extraction and replenishment in the aquifer, both within and without Imperial County.

The biggest uncertainty created by the "safe yield" definition comes from the second alternative's reference to "local beneficial purposes." By itself, this term raises uncertainty about the scope of "local."[241] More significantly, however, is its apparent allusion to the separately defined "beneficial local use."[242] That definition, in turn, opens the door to the largest area of confusion created by the Imperial scheme.

The ordinance defines "beneficial local use" as: "the use of water pumped or flowing from any water well *within a defined 'area of influence.'*"[243] Fortunately, the ordinance separately defines "area of influence" as: "that area within Imperial County in which either the production, diversion, or use of water *affects or is affected by, the natural available supply* of said area."[244] Unfortunately, the ordinance gives little hint about what the italicized portion of the definition means.[245] Even

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238. Ultimately, the length of the period for which water supply records existed would likely provide the broadest measure of "long-term mean annual water supply." If suspected inaccuracies, data gaps, or other record anomalies existed, a shorter period might properly be used.

239. Imperial County, Cal., Codified Ordinances § 56201(a) (1972) (amended 1978).

240. *See supra* note 232.

241. It appears also to incorporate the "beneficial use" limitation of water appropriation law. To perfect and maintain an appropriation, water must be put to "a beneficial use." *See, e.g.*, Hutchins, *supra* note 111, at 135. While not entirely free from imprecision itself, the "beneficial use" limitation is well established in case law. *Id.* It is generally applied very broadly, to refer to a non-wasteful use of water. The requirement is also restated in the 1928 amendment to the state Constitution. Cal. Const., art. X, § 2.

242. Imperial County, Cal., Codified Ordinances § 56201(i) (1972) (amended 1978). Literally, "safe yield" refers only to "local beneficial purposes," *not* to "beneficial local uses." As no meaningful distinction between these two phrases readily appears, they seem synonymous.

243. *Id.* § 56201(i) (emphasis added).

244. *Id.* § 56201(b) (emphasis added).

245. The county apparently borrowed the term from the "Stipulation for Judgment" filed August 11, 1970. See Stipulation for Judgment, Mojave Water Agency v. Abbey, Civil Nos. 130759 & 152413 (Cal. Super. Ct. San Bernardino County June 7, 1976) [hereinafter, *Stipulated*

more unfortunately, understanding the "area of influence" definition is critical to understanding the definition of "appropriation."[246] The ordinance defines "appropriation" as: "causing or permitting of [sic] water pumped or flowing from a water well to be used or sold for uses *outside of a defined 'area of influence.'*"[247] Since only an "appropriation" triggers the need for a permit, the entire permit scheme turns on the meaning of "area of influence."[248]

The elusive definition identifies six different circumstances that might define "area of influence." The definition first distinguishes "affects . . . the natural available water supply" from "is affected by the natural available supply." Either of these two circumstances, in turn, may be caused by three factors: "production, diversion or use of water." In combination, six permutations result.

Assuming that groundwater pumping is water "production," how might such pumping "affect" the water supply in a given area? At the very least, by removing water from the aquifer, the water removed is no longer available in that aquifer as a supply to others.[249] Thus considered broadly, the "area of influence" would be the entire aquifer. Under such a definition, someone who wished to use the water outside of the land overlying the aquifer would be an appropriator who required a permit.

If this were the only plausible interpretation, the "appropriation" definition would merely codify the common law distinction between overlying and nonoverlying users. If that were what were intended, it would have been much cleaner to simply use those terms.[250] The failure

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Judgment]. *See* A. Schneider, *supra* note 59, at 26-27. Exhibit 1 to that Stipulated Judgment defines "area of influence" as: "that area within the Mojave Water Agency which is contiguous to the Mojave River *and in which either the production, diversion or use of water affects or is affected by the natural available supply of the Mojave River system.*" *Stipulated Judgment, supra,* at 4, (quoted in A. Schneider, *supra* note 59, at 27 n.110). Unlike the Imperial ordinance, however, the *Stipulated Judgment* grounded its definition with two additional exhibits, one map and one 50 page legal description of the precise area constituting the "area of influence" of the Mojave River. *Stipulated Judgment, supra,* at 6. Thus, the complete definition of "area of influence" in the Stipulated Judgment begins "the area shown on Exhibit A and described in Exhibit B." *Stipulated Judgment, supra,* at 6. Unfortunately, the Imperial County ordinance does not also contain a map or legal descriptions of the "area of influence" addressed therein.

246. Imperial County, Cal., Codified Ordinances § 56201(g) (1972) (amended 1978).

247. *Id.* § 56201(g) (emphasis added).

248. Section 56202 prohibits appropriation from a water well without a permit. *Id.* § 56202.

249. To be more precise, the portion of the pumped water that is consumed or evaporated, and does not recirculate to the aquifer, is removed from the supply.

250. Other counties have also struggled with imprecise geographic distinctions between classes of groundwater extractors. *See* Nevada County, Cal., Land Use And Development Code § L-X 6.2(D) (1988) ("export of groundwater."); *see also* Cal. Water Code Append. § 119-709.7 (West Supp. 1993) (distinguishing between overlying users, nonoverlying but in district users, and exporters in Sierra Valley Groundwater Management District).

to use "overlying" and "nonoverlying" within the ordinance suggests alternative definitions. For example, an "area of influence" narrower than the entire aquifer might be only that portion of the aquifer where pumping produces immediately perceptible effects. The land surface above a well's "cone of depression"[251] might circumscribe the "area of influence" immediately impacted by water extraction. Under such a narrow definition of "area of influence," any one who pumped water for use beyond the cone of depression would need a permit. Alternatively, a definition broader than "land overlying an aquifer" could be supported by the reference in the findings to the county's desire "to understand the effects of water appropriations on particular water basins *and surrounding areas*."[252]

Full analysis of the range of interpretations between "cone of depression" and "land overlying the aquifer," or beyond, is beyond the scope of this article. "Area of influence," as defined so vaguely by the Imperial Ordinance, exemplifies an extremely imprecise standard that has no basis in law or hydrology.[253]

2. *Substantive Provisions*

As noted already, the Imperial ordinance requires "appropriators," as defined in the ordinance, to get a permit.[254] The applicant must provide, at its own cost, specified extraction data.[255] In reaching its permit decision, the county Public Works Director must consider three matters: 1) the basin's geology and hydrology; 2) the effects of past and current appropriations; and 3) zoning and land use regulations.[256] The ordinance allows for inspection.[257] It also allows residents or property owners within the "area of influence" to appear and object to the permit application.[258] Finally, the ordinance exempts "political subdivisions,

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251. For a discussion of "cone of depression," see *supra* notes 82-85 and accompanying text.

252. Imperial County, Cal., Codified Ordinances § 56200 (1972) (amended 1978) (emphasis added).

253. Portions of the ordinance imply that the County Board of Supervisors might determine "area of influence" by resolution. *Cf. id.* §§ 56201(g), (i) (noting "*defined* area of influence") (emphasis added). *See id.* § 56214 (Board resolutions to determine chapter's applicability). This suggestion begs the question: what criteria will the Board use in making that determination?

254. The ordinance exempts then existing and otherwise lawful appropriators. *Id.* § 56202.

255. Section 56203 requires the applicant to furnish, inter alia, proposed well location, extraction amounts, extraction purposes, places of use, and required hydrological data. *Id.* § 56203.

256. Imperial County, Cal., Codified Ordinances § 56204 (1972) (amended 1978).

257. *Id.* § 56205. Inspection includes the right to make water level tests and chemical analyses. *Id.*

258. *Id.* § 56210.

public entities [and] agencies formed pursuant to the provisions of the State Water Code."[259]

B. Butte, Glenn & Modoc Counties: Three Sacramento Basin Counties Respond to the 1976-77 Drought

The next three counties to pass groundwater export ordinances were all primarily located in the groundwater rich, largely rural, Sacramento Valley. In the summer of 1977, and within just two weeks of each other, both Butte and Glenn Counties responded to the 1976-77 drought with substantially similar groundwater export ordinances.[260] Just six months later, in early 1978, Modoc County enacted its ordinance.[261] All three ordinances remain on the books, although Modoc and Glenn have recently amended their ordinances.[262] In addition, Glenn County recently sought express state legislation to create its own groundwater management district.[263] The Butte, Glenn and Modoc ordinances have influenced both the recent Tehama County ordinance and a draft ordinance Sutter County circulated in 1992.[264] Both the Butte and the Glenn ordinances, however, have substantial flaws that make them ill equipped as models for future legislation. In contrast, the less ambitious Modoc ordinance avoids some of the problems plaguing Butte and Glenn.

1. Butte County

The structure of the Butte County ordinance typifies the Sacramento Basin counties' ordinances.[265] Like most of its counterparts, the Butte County ordinance contains: 1) legislative findings; 2) definitions; 3) prohibitions on groundwater mining; and 4) a permit requirement.

As its legislative findings, the ordinance notes that groundwater raises both general "health, welfare and safety" concerns and specific

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259. *Id.* § 56212.

260. Butte County, Cal, Ordinance No. 1859 (Aug. 23, 1977) (codified at Butte County, Cal., Code, §§ 13.08010-0.70 (1991)); Glenn County, Cal., Ordinance No. 672 (Sept. 6, 1977) (codified at Glen County, Cal., Code §§ 20.04010-.0460 (1991)).

261. Modoc County, Cal., Ordinance No. 255 (Mar. 6, 1978).

262. Modoc County, Cal., Ordinance No. 255-A, § 1 (1987); Glenn County, Cal., Ordinance No. 971 (1990).

263. Cal. S.B. 207 (1992) (vetoed October 26, 1992). *See infra* note 469.

264. *See infra* notes 403-29 and accompanying text (Tehama County); *see also infra* note 430 (draft Sutter County ordinance).

265. Only the short Sacramento County ordinance adopts a different structure. *See infra* notes 346-52 and accompanying text.