

**Changing Rules For Agricultural Water Use:
Policy Options Related To Metering
And Forfeiture For Non-use**

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Abstract

The purpose of this paper is to argue the case for requiring the metering and annual reporting of all water use in the State of Georgia, as well as the case for requiring that all water use permits include provisions for the forfeiture of the permit for non-use.

We argue that the case for requiring metering and annual reporting of water use turns on its importance for the state's efforts to protect stakeholder interests in the event of water-related litigation, its contribution to the ability of the state to adopt actions in times of water emergencies that treat all stakeholders fairly, its potential contribution to more effective farm management, and its contribution to more effective basin-wide planning.

Recommendations are offered for implementing a program requiring metering and the annual reporting of water use. Our primary recommendation is that the state offer cost-sharing for the installation of meters that is based on timely participation by stake-holders. In terms of the related issue of quantifying the limit on water use allowed by existing water use permits, we recommend procedures similar to those used in other states: quantification based on actual use over recent years, or alternatively one based on average water use over recent years.

While we argue that the case for requiring forfeiture for non-use of agricultural water permits is a strong one — it allows for defensible measures of water use, and has positive effects (of relevance to all stakeholders) on the state's ability to plan and protect water resources and the interests of stakeholders, we recognize the complex issues that arise in attempting to impose such conditions on existing permits. Our intended contribution in these regards is then limited to an effort to set out the issues which must be faced by the EPD and stakeholders in the Flint River Basin if water management in this region is to realize the benefits associated with this important provision.

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I. Introduction And Overview

In a recent White Paper prepared by Georgia's Department of Natural Resources,¹ a number of recommendations were offered, including two that relate to agricultural water use permits. First, the White Paper recommends that current law be changed to require holders of agricultural water use permits to measure (with water meters) and report (to the EPD) the amounts of water that are used.² Second, it is recommended that Georgia law be changed to allow for the revocation of agricultural permits that have not been used for "an extended period of time."³ This is based on the assertion that current law allows revocation of agricultural permits for which irrigation has never occurred, but does not allow the revocation of permits for which irrigation has occurred in the past but has not occurred for an extended period of time.

The purpose of this paper is two-fold. First, to state our agreement with the principles underlying both of these recommendations. We more fully make the case as to why the recommended changes with respect to requiring measurement of agricultural water use better serves the interests of farmers, as well as the non-farming public in Georgia. We also offer comments in support of the forfeiture for non-use issue, but point out the incredibly complicated questions with which any such directed legislation will have to deal. Second, we offer some policy options for implementing the suggested changes. The metering issue is considered in section II of this paper. In section III we consider the issue of requiring forfeiture of water use permits for non-use. Concluding remarks are offered in section IV.

¹"Board of Natural Resources Water Issues White Paper," mimeo 63 pp., Draft 05/22/01.

² *Supra* Note 1 at p. 21.

³ *Supra* Note 1 at p. 20.

II. Metering Agricultural Water Use: Rationale And Policy Options For Implementation

A. The Issues.

The advantages to farmers associated with metering water use are reasonably straightforward. First, if the state is to protect the farmer's interests in any litigation related to the state's rights to water use in a given basin, the state's ability to unambiguously quantify existing uses is critically important. Following equitable apportionment criteria established by the U.S. Supreme Court, a state has a positive duty to "preserve the treasure of the river."⁴ An important burden that the State must carry in meeting this duty is to provide an accurate accounting of the volume of water used in the state, and to demonstrate that such use is reasonable -- i.e., that there is no waste of the precious resource.

Second, measuring water use allows the state a wider range of options for dealing with any future drought-related water emergencies than would be otherwise be the case. As we have noted elsewhere,⁵ "Does Georgia Have Sufficient Policy Tools?" Albany State/Georgia Southern/Georgia State Water Policy Working Paper #2001-002, Flint River Water Policy Center, Albany State University (Albany, GA: 2001) the State has broad powers in the event of emergency periods of water shortage. Rules published by the Department of Natural Resources provide that:

12-5-31(L)-(1) Whenever it clearly appears to the director from specific facts shown by affidavits of residents of the affected area of this state that an emergency period of water shortage exists within such area, so as to place in jeopardy the health or safety of the citizens of such area *or to threaten serious harm to the water resources of the area*, (emphasis added) he may by emergency order impose restrictions on one or more permits previously issued pursuant to this Code section as may be necessary to protect adequately such citizens or water resources; ... The director may impose such restrictions based upon any reasonable system of classification established by the Board of Natural Resources through rule or regulation....

12-5-31(L)-(2) ... Any permittee, other than a farm use permittee, to whom such order is directed shall comply therewith immediately. Upon application to a hearing officer

⁴ See *Colorado v. New Mexico*, 467 U.S. 310 (1984).

⁵ Cummings, R., N. Norton, and V. Norton, "Enhancing In-stream Flows In The Flint River Basin:

appointed by the Board of Natural Resources of this state, a permittee, including a farm use permittee, shall be afforded a hearing within 20 days of receipt of such notice by the hearing examiner in accordance with subsection (c) of Code Section 12-2-2. Farm use permittees may continue to make use of water to their permitted capacity during the appeal process, but failure to timely request a hearing in accordance with subsection (c) of Code Section 12-2-2 shall waive such right,

12-5-31(L)-(3) During emergency periods of water shortage, the director shall give first priority to providing water for human consumption and second priority to farm use....

Thus, during periods of emergency water shortage, the EPD's power to restrict or modify water use permits goes beyond protecting public health and safety to include protection of the water resources in an area from "serious harm."

Assume that acreage reduction for any application of provisions set out in the Flint River Drought Protection Act was later found to be inadequate to protect in-stream flows. The interesting question then becomes: if the EPD declares an emergency period, how would the provisions described above be implemented? Conservation measures to be imposed on municipalities and industries appear to be an integral part of the permitting process for these uses (*ad passim*, Rules, 12-3). However, we find no description of the manner in which agricultural uses would be restricted under this rule.

It might be argued that a fair approach would be to have all irrigators reduce water use by the same amount or same percentage. But such an approach would be unenforceable (for all practical purposes) *absent* reliable means for measuring each farmer's water use, i.e., metering. The alternative would be for the EPD to require the total cessation of water use by *some* irrigators, using, for example, the LIFO (last-in-first-out) method mandated in the Drought Protection Act.⁶ It is difficult to think of a more inefficient and potentially litigious way to reduce agricultural water use⁷. However, little in the way of options exists unless water use can be reliably measured.

Third, measured water use provides for a wide range of policy changes that could serve

⁶ The Flint River Drought Protection Act (O.C.G.A. 12-5-540 through 12-5-550).

⁷ *Supra* Note 6 at pp 2-6.

the farmer's interests. Such information can contribute to effective farm management. Another example is the possibility of allowing farmers to sell or lease portions of their usufructuary rights to water.⁸ Fourth, water use metering can enhance the quality of Basin Water Plans designed to serve the future interests of all stakeholders in a water basin.

We feel compelled to address what will likely be the most substantive source for concern with a requirement for metered (and reported) water use, namely, that farmers feel that it will ultimately lead to pressures for improved water use efficiency, and to restrictions on water use. Farmers' concerns for pressure to improve water use efficiency can, or at least should, be allayed by several considerations. First, there are a number of ongoing projects to assist farmers in cost-effective means for increasing water use efficiency, including projects sponsored by the Georgia Soil and Water Commission, UGA's extension services at Tifton, and a joint Albany State University-National Peanut Research Laboratory project. Second, greater water use efficiency directly benefits farmers by lowering pumping and distribution costs. Third, farmers share the state's responsibility to "preserve the treasure of the river," which implies a duty to avoid waste (inefficient water uses).

It is not necessarily the case that the metering question must give rise to considerations related to water use restrictions/limitations. It could well be the other way around: water use restrictions/limits will give rise to considerations related to metering. The water use restriction issue is, in our opinion, one that must inevitably arise in the near future, and any resolution of the issue will require measuring and reporting of water use.⁹ Whatever the sequence of events, water use restrictions/limits are inextricably tied to metering, in which case we now wish to focus attention on the water use restriction/limit question.

⁸ See our earlier work "Water Rights Transfer Options For Institutional Reform," Albany State/Georgia Southern/Georgia State Water Policy Working Paper 2001-001, Flint River Water Policy Center, Albany State University (Albany, GA: 2001).

⁹ Clearly, several years with above average precipitation during the critical summer months could delay the inevitability of having to face this issue; but normal weather cycles with less than average rainfall, combined with continually expanding demand for water and endangered species legislation, will eventually bring forth limits on use.

The real issue here turns on the question: what is the *limit* to water use allowed by any agricultural water use permit - - what is the maximum amount of water that can be diverted and used by the holder of a permit? At present, this limit is vaguely defined. Georgia Code 12-5-31(a)(3) provides that surface water permits (for agricultural uses) based on use prior to July 1, 1988 “...shall be granted for diversion equal to the greater of the operating capacity in place for withdrawal or diversion on July 1, 1988, or, when measured in gallons per day on a monthly average for a calendar year, the greatest withdrawal or diversion capacity during the five-year period immediately preceding July 1, 1988.” Applications submitted after July 1, 1991, or regardless of when submitted if based upon withdrawals or diversion after July 1, 1988, the permit “...shall be issued to ensure the applicant’s right to *a reasonable use* of such surface waters (emphasis added).” Identical provisions related to permits for ground water use are found in Georgia Code 12-5-105.

What then *are* the limits to water use for any permit holder? For applications submitted before July 1, 1991, is it pumping capacity, measured in gallons-per-minute, times 525,600 (the number of minutes in a year)? One would think not. The fact that a water use permit requires a description of the uses to which the water is to be put, and in the case of agriculture, the number of acres to be irrigated, one would think that any judicial interpretation of this limit would be (consistent with the common law, riparian doctrine) reasonable use required for the stipulated number of acres to be irrigated. As we have noted in earlier work,¹⁰ regardless of when a permit was granted, “reasonable use” is the likely (but uncertain and clearly arguable) limit to water use under the permit.

However, even if we can agree that “reasonable use” is the limit to water use allowed under a permit, this limit remains unquantified. We do not know the meaning, in any quantitative sense, of the term “reasonable use” (this could differ by crop, type of soil, and intensity of irrigation management). Thus we still cannot respond to the following question,

¹⁰ *Supra* Note 8.

which is of critical importance for the state and for the farmer: what is the maximum quantity of water that the permit holder is entitled to divert and put to use? In the following section we explore possible means by which this problem might be resolved.

B. Suggested Solutions and Implementation Policies.

Thus far we have presented our views as to the rationale for the metering of water use and for the interrelated issue of explicit quantification of limits to water use allowed under water use permits. Attention is now turned to suggested methods for implementing these requirements.

B.1 Metering water use. Costs for acquiring and installing meters for pumps will be on the order of \$800 per pump.¹¹ There are a number of approaches that might be used for legislation requiring the installation of meters on all pumps covered by agricultural water use permits issued by the EPD. One approach would be to require farmers to initiate metering within some fixed period of time (e.g., the next two to five years), with all costs borne by the permit holder. Given extraordinarily low crop prices that have characterized major crops grown in the region - - especially corn and cotton - - this approach could impose a financial burden on farmers, particularly small scale farmers without peanut quotas. Thus, farmers would have an incentive to defer such expenditures for as long as possible, and significant enforcement costs might be incurred by the EPD to assure compliance.

Ideally, a metering program would be designed with positive incentives for compliance and participation by those affected by the program. This could be accomplished by legislation that recognizes broad state interests that may justify cost-sharing by the state.¹² Such legislation

¹¹ During the period 1999-2001, 933 meters were installed in the lower section of the Republican River Basin in Nebraska for an average cost (meter plus installation) of \$780 each (personal conversation with the general manager of that natural resource district, which is responsible for irrigation matters).

¹²As an example, the Nebraska Legislature passed legislation in 1998 (LB1161) that required the installation of meters on all irrigation wells in the alluvial aquifer of the Republican River. The legislation authorized funds to pay half of the cost to purchase and install meter devices, with a maximum cost share amount of \$600 per well (e.g., half of the full costs of up to \$1200 per well). The purpose of the action was to "... gather data for a lawsuit ..." that Kansas had filed against Nebraska. The suit claims that Nebraskans' unrestricted drilling and pumping of irrigation wells in the Basin was keeping Kansas from getting water to which it is entitled. See "A Review: Ninety-Fifth Legislature Second Session, 1998 and First Special Session, 1998", Legislative Research Division of the Nebraska Legislature, June 1998.

would then require the installation of meters within a fixed time period, but with cost-sharing (e.g., at 50% of costs) provided to permit holders that install meters *within much shorter time periods*, e.g. one or two years. An extension of this approach could be to have a graduated cost-share program: The percent of cost-share paid to irrigators would be fairly high for those participating within the first one or two years, and then would decline with each successive year. In some instances, irrigation districts have phased-in metering programs by requiring compliance in different sections¹³ each year. For example, section one through 12 is metered in the first year, then sections 13 through 24 during the second year, and finally sections 25 through 36 during the third year. Other districts have phased-in metering programs over a four-year period, based on quarter-sections (i.e., the NE quarter during the first, the NW quarter during the second year, etc.). The latter approach may increase EPD monitoring activities, but has the effect of spreading the costs for most farmers over a multiple year period.¹⁴ Those designing any metering program should also take into consideration the availability of meters and qualified persons to install them.

Associated with any metering program is the issue of reporting. A prime prerequisite for any effective regulatory program is that it be viewed as fair by all participants - - i.e., all participants are treated equally (there is no cheating in the program). Any metering program would require, at a minimum, an annual report to the EPD of each permit holder's measured water use. A preferred approach, however, may be the elimination of any potential for misreporting by (a) the requirement that meters be appropriately sealed; and (b) the EPD's annual reading of each meter, a task that could be accomplished at reasonable cost. Farmer acceptance of this preferred approach would be obviously enhanced by the incentives introduced with a program of cost sharing noted above.

¹³Sections are used as legal descriptions in townships. One section is one-square mile, and 36 sections comprise one township.

¹⁴See Nebraska legislation cited in *Supra* Note 12; and personal experience of two of the authors of this paper.

B.2 Quantifying water use limits for permits. As discussed above in section II-A, the quantification of allowable water use for agricultural permits requires the quantification of “reasonable use.” All else equal, the definition of “reasonable use” might appear to be straightforward: how much water has the irrigator used over the past few years? That quantity, assuming that such use is not grossly wasteful, might be taken as “reasonable,” thereby serving as a means for quantifying the limit to a permit holder’s water use permit.

However, a major source of uncertainty remains associated with the “reasonable use” rule, which derives from riparian law. The source of this uncertainty arises from the fact that one cannot predict what “reasonable uses” might be in *future* years. For instance, a farmer may have been irrigating corn for the last decade using (during drought years) 18" of water per acre over the irrigation season. We may assume that such use was reasonable. However, ten years from now this farmer may decide to produce sod, using (again during drought years) 30" of water per acre. Assuming that this use is not wasteful, the amount of water satisfying the “reasonable use” criterion has changed -- it has increased substantially.

In states with growing water shortages, such uncertainties make water planning extremely difficult for obvious reasons, and can have the effect of retarding investments in downstream reaches of any river. Some states that have incorporated riparian rights into their appropriation system¹⁵ have encountered this problem. The primary method used by them to resolve the problem has been the adoption of legislation that has the effect of eliminating any future increases in water use that might attend “new” reasonable uses of water - - i.e., the riparian right is limited to a level of use reflecting actual use in the current or past years. Thus, the riparian proprietor simply provides evidence of a specific use during a specified number of previous years (e.g., the irrigation of a given number of acres), and provides information as to the amount of water required for the specified uses. This amount of water then establishes the

¹⁵ Examples include Kansas, Oregon, South Dakota, Texas, and Washington; see George A. Gould and Douglas L. Grant, *Cases and Materials on Water Law*, 6th Ed., West Group Publishing Company (St. Paul: 2000) at Ch. 3, Section 5.

limit of the riparian right (or permitted right to use water). Such legislation has been upheld by the courts as not constituting an illegal “taking” of property.¹⁶ As examples, Oregon courts held constitutional a 1909 Water Code that limited vested rights of riparian proprietors to only actual applications of water prior to the passage of the act.¹⁷ A similar statute in Kansas was upheld,¹⁸ as was a part of the Texas Water Adjudication Act of 1967 that limited riparian claimants to the quantity of water actually used during one of the five years between 1963 and 1967.¹⁹

As a means for establishing a limit on water use permits in Georgia, we recommend that the State give serious consideration to approaches similar to those described above. Having said this, we wish to quickly acknowledge that such approaches do not represent a panacea -- additional problems will be encountered. Most important among these problems will surely be the issue of equity - - water use permits held by farmers with heavy water using crops have greater worth (higher water use limitations) than those held by farmers with crops using less water. *If* a system allowing water transfers was in place, a possible solution to this problem would be to limit all water use permits to some average water use measure, relying on water markets to provide additional water for those farmers whose needs exceed the average. For a discussion of such a system see our earlier study regarding the transfer of water rights.²⁰

¹⁶ An exception is seen in *Franco-American Charolaise, Ltd. v. Oklahoma Water Resources Board*, 855 P.2d 568 (1990); see, however, the dissent by Vice Chief Justice Lavender.

¹⁷ For example, *In re Hood River*, 227 P. 1065 (Or. 1924).

¹⁸ See *State ex rel. Emery v. Knapp*, 207 P.2d 440 (Kan. 1949).

¹⁹ *In re Adjudication of Water Rights in the Upper Guadalupe River*, 642 S.W.2d 438 (Tex. 1982).

²⁰ *Supra* Note 8.

III. Forfeiture Of Water Use Permits For Non-Use

A. The Issues.

As we have noted in an earlier work,²¹ in most Western states if the holder of an appropriative right fails to use that right within a fixed amount of time (usually 3 to 5 years) the right is forfeited to the state. Under the prior appropriation doctrine, the rationale for forfeiture is straightforward: since an appropriative right is obtained and rationalized by the act of putting water to “beneficial use,” this rationale for a right disappears with non-use.²² Thus, with non-use the right is forfeited, and such forfeiture is obtained without compensation.

Under Georgia law, the Director of the EPD is empowered to revoke a permit on the basis of non-use over a period of two consecutive years; however, this provision does not apply to agricultural water use permits.²³ It is our view that the case for extending a forfeiture provision to include agricultural water use is compelling. We also hold that the time period established for non-use will necessarily need to differ for existing permits versus new or transferred agricultural water permits. These views are based on the following arguments.

The existence of unused water permits can have at least two deleterious effects on a community’s efforts to prepare and implement rational water management plans. The first of these effects derives directly from the need to have accurate, defensible measures of water use which was discussed above in section II. The existence of unused water permits effectively obligates the state to include water use allowed under these permits when assessing claims to a basin’s water supplies. Obviously, unused permits result in an overstatement of these claims, the effect of which can be to deny future economic opportunities in the basin. Furthermore, management problems associated with low flow and/or declining aquifer levels in periods of drought could be exacerbated if a number of unused permits were activated during drought

²¹ *Supra* Note 5.

²² The inextricable tie between appropriative rights and beneficial use has a long history. For example, the Reclamation Act of 1902 states: “The right to the use of water acquired under the provisions of this Act shall be appurtenant to the land irrigated, and beneficial use shall be *the basis, the measure, and the limit of the right.*” (emphasis added) Reclamation Act of 1902, **43 USCS** §§372.

²³ Georgia Code 12-5-31(k)(4).

periods, and this resulted in a substantial unexpected increase in water use.

Secondly, in river basins like the Flint River wherein a cap is placed on new water use permits, it will ultimately become necessary for the basin to adopt policies that allow for (voluntary) changes in permit ownership.²⁴ If water permits can be acquired, but then not put to use within a reasonable amount of time, the potential for speculative acquisition of water use permits can arise. Speculation in the acquisition of water can result in artificially inflated water costs, which in turn can negatively affect future economic development in the region.²⁵

B. Implementation Issues

In riparian states that have adopted legislation imposing forfeiture for non-use, most have been successful so long as new laws provide permit holders adequate time to exercise their existing rights,²⁶ and such provisions have been upheld by the courts as not constituting a “taking” of the riparians’ property requiring compensation.²⁷ Support for this position derives from the U.S. Supreme Court’s decision in *Texaco, Inc. v. Short*²⁸ wherein the Court concludes that:

“..the State may treat a mineral interest that has not been used for 20 years...as abandonment...the former owner retains no interest for which he may claim compensation. It is the owner’s failure to make any use of the property - - and not the action of the State - - that causes the lapse of the property right...”

²⁴ See our arguments in this regard in the work cited at *Supra* Note 8.

²⁵ See related discussions in Clay J. Landry, *Saving Our Streams Through Water Markets: A Practical Guide*, 62 pp., Political Economy Research Center (Bozeman, MT: 1998).

²⁶ Referring to the Washington case *In re Deadman Creek Drainage Basin*, 694 P.2d 1071 (Wash. 1985), the court held that 15 years (from the date of the statute terminating riparian rights not exercised within a reasonable amount of time) was a “reasonable amount of time.”

²⁷ *Supra* Note 16.

²⁸ 454 U.S. 516.

This suggests that Georgia may wish to consider similar legislation, following the lead of other states in allowing 10 to 20 years for existing permit holders to establish reasonable uses of their water use permits. However, as suggested by the following questions, the complications inherent in any involuntary forfeiture requirements are great.

1. Would permit holders that have switched from irrigated crops to long term non-irrigated “crops” such as pine trees be subject to forfeiture for non-use?
2. If the above pine tree growers leave their pumps in place, and annually irrigate with only a small amount of water, would such actions qualify as “use”?
3. Would an individual who holds a permit, but chooses for several years not to irrigate crop land (because of very low commodity prices, illness, or a variety of other business or personal reasons) be subject to forfeiture?
4. If the answer to #2 or #3 is yes, how much would the individual have to irrigate to qualify as “use”? For example, would applying one-fourth of an inch per acre qualify as “use”?
5. How many years of non-use would make an existing permit subject to forfeiture?
6. For any implementation plan, how does the plan affect the permit holder’s incentives?²⁹

²⁹ For example, if an individual knows that his water use will be established on the basis of (e.g.) water use during years 9 and 10 in the future, as a means for increasing the level of the quantified water right he/she may have incentives to adopt high water-using crops in year 9 regardless of any immediate economic losses.

Answers to questions 1-5 require clear definitions of “reasonable use” and an “extended period of time.” In section II-B of this paper, and in two previous papers,³⁰ we discuss the concepts surrounding “reasonable use.” Typically, reasonable use refers to some maximum allowable amount of water use. But, in the issue of forfeiture for non-use, does “reasonable use” also imply some practical minimum? For example, if it takes 26" (soil moisture, rainfall and/or irrigation) per acre to produce a good corn crop, and available soil moisture and growing season precipitation only total six inches, does one inch of applied irrigation water represent “reasonable use?”³¹

The complications relative to what is “an extended period of time” are likewise great. For example, if an irrigator uses water every 2 years, would that be adequate to protect the permit? Every 4 years? Every 8 years? What are the criteria, other than *Texaco, Inc. v. Short*?³² In response to these questions, we summarize our concerns on the issue of forfeiture for non-use: In principle, requiring the forfeiture of unused agricultural water permits seems generally desirable. However, placing such a policy in effect is ripe with practical complications, definitional problems, conflicting issues, and the potential for long and drawn out litigation.

Given the above concerns, we venture to suggest three possible actions regarding this issue. First, we suggest that the state consider making the forfeiture clause, that now applies to industrial uses, applicable to all new transactions that involve agricultural water use (i.e., any new permits or any transfers of existing permits). As we indicate in an earlier section of this paper, if forfeiture for non-use is not imposed, and voluntary transfers (with the review and approval of EPD) are allowed, substantial speculation in purchasing and holding of water rights

³⁰ *Supra* notes 5 and 8.

³¹ While not based in case law, it is useful to point out here that, in some cases, the federal government answers no to this question with regard to disaster program payments. In instances where an individual claims a disaster-related loss for an irrigated crop and the inspector is of the opinion that the loss was due at least in part to poor management decisions and lack of adequate irrigation water, the payment application may be denied. In areas where water use is measured, water use evidence is sometimes collected from the individual and from neighbors who irrigated appropriately, and had good crop yields. Thus in the context of the federal program, reasonable use would seem to apply in the minimal context. (Personal communication with personnel of federal crop insurance program.)

³² *Supra* note 28.

or rights-to-use may occur. Such speculation would diminish local economic activity and raise the price of transferable permits. Arguably, this would not represent a “taking” because the forfeiture requirement would be a condition of the voluntary purchase of the permit. The time period specified for non-use before the permit is forfeited could be two or three years to give the new permit holder time to install the appropriate irrigation equipment.

If new permits come with a forfeiture clause, it is critical that current permit holders also face some kind of forfeiture clause. Otherwise, the incentive to speculate by holding is increased for those that currently have permits. Therefore, our second suggestion, previously alluded to, is that forfeiture for non-use should also be imposed on holders of existing permits. However, the time period for non-use should be in the range of 10 to 20 years. Because these users acquired their permits in the absence of a forfeiture clause, giving them adequate time to exercise their existing rights strengthens the case of the State in any legal challenges.

Third, we point out that allowing the leasing of permitted water use is a potential tool for addressing question #1 above (Are permit holders that have switched from irrigated crops to long- term non-irrigated “crops” such as pine trees subject to forfeiture for non-use?) Some may argue that growing trees rather than crops is environmentally beneficial -- less chemicals would be used, less soil erosion occurs, and wildlife habitat would be enhanced; therefore, incentives should exist for encouraging farmers to switch. Furthermore, it is possible that pine trees use less water per acre than row crops.³³ Regardless of these arguments, it is clear that requiring forfeiture of a water permit for non-use will be a disincentive for farmers to switch to trees. However, if the permit holder would be able to lease out his/her permit for the duration of the

³³ Comparing water use for pine tree production and row crop production is not straightforward. One source estimates average annual conifer transpiration as approximately 13.5 inches in a temperate zone. For purposes of our discussions, this *annual* estimate is not directly comparable to evapotranspiration (ET) of row crops for two reasons. First, our concern is with water use by row crops which is concentrated in a four to five month period during which demands on water resources are the greatest *vis-a-vis* water supplies. Second, the ET of row crops includes both soil evaporation and plant transpiration. ET for corn and cotton is commonly cited as 25 to 30 inches; ET for peanut crops is lower, ranging from 20 to 25 inches. However, since row crop plant transpiration is estimated to be 70 to 80 percent of total ET, transpiration estimates for corn, cotton, or peanuts would range from a low of 14 inches to a high of 24 inches. Reference for conifer transpiration is: John Roberts, “The Influence of Physical and Physiological Characteristics of Vegetation on their Hydrological Response,” *Hydrological Processes*, 14, 2885-2901, 2000.

period required for growing and harvesting the pine trees, this would have two effects:

1. It would act as an incentive for the permit holder to switch to trees.
2. It would continue local economic activity associated with water use by the current holder.

Of course, leasing options should also be available to irrigated crop producers who desire to switch to dryland crops or native growth. Although leasing does provide the incentive to speculate on higher prices in the future, the leased water would be put to beneficial use during the lease period. To assure that this is true, it would also be necessary to add a forfeiture provision for non-use to leased water. The purpose would be to prevent a current permit holder from circumventing the forfeiture law by leasing permitted water (for a nominal fee) to second party who does not plan to use the water.

In summary, we suggest that forfeiture for non-use of new and existing irrigation water permits is generally desirable. For reasons mentioned above, the time period established for non-use of existing permits should be longer (perhaps 10 to 20 years) than that established for new or transferred permits (maybe two to three years). Much effort will be required on the part of all involved in water policy and legislation in the state to deal with the contentious issues involved.

IV. Concluding Remarks

In this paper we have attempted to argue the case for requiring the metering and annual reporting of all water use in the State of Georgia, as well as the case for requiring that all water use permits include provisions for the forfeiture of the permit for non-use. In terms of metering and reporting, our arguments focused on the importance of metering/reporting for the state's efforts to protect stakeholder interests in the event of water-related litigation, for the ability of the state to adopt actions in times of water emergencies that treat all stakeholders fairly, for its potential contribution to more effective farm management, and for its contribution to more effective basin-wide planning.

The case for requiring forfeiture for non-use of agricultural water permits focused on the fact that such provisions allow for defensible measures of water use, and have positive effects (of relevance to all stakeholders) on the state's ability to plan and protect water resources and the interests of stakeholders.

We attempt to suggest means by which these changes in Georgia's water management systems might be implemented. As is true with any effort to modify systems that have been in place for some time, implementing changes involve complex issues that often involve trade-offs between differing views of equity and the need for a more efficient water management. It would be presumptuous of us to suggest "the" solutions for these issues. Therefore, in exploring issues related to implementation, we simply offer our best effort at setting the nature of these issues which can only be resolved by reasonable debate between the state and stakeholders. Hopefully, given the critical importance of resolving these issues as soon as possible, this debate will take place in the near future.