

**Enhancing In-stream Flows  
In The Flint River Basin:  
Does Georgia Have Sufficient Policy Tools?**

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## **Enhancing In-stream Flows In The Flint River Basin: Does Georgia Have Sufficient Policy Tools? Executive Summary**

The Georgia Legislature, the Governor’s Office, the Department of Natural Resources Environmental Protection Division, and various other state and local entities and stakeholders have efforts underway to develop plans and policies to meet the challenges of actual and potential water scarcity. The issues involved are numerous, complex, and (in many instances) controversial. Among these issues, the enhancement of in-stream flows during periods of drought is critically important, particularly along the Flint River. In this paper the authors address the question: does the Environmental Protection Division have sufficient policy tools to effectively deal with the in-stream flow problem? We review the four principle tools that might be used by the EPD, and suggest five additional policy designs that might increase the effectiveness of the EPD in enhancing in-stream flows.

The four policy tools presently available to the EPD for increasing/enhancing in-stream flows in the Flint River Basin are: the Drought Protection Act; modifying water use permits; invoking the DNR’s “emergency powers;” and use restrictions based on the public trust doctrine. We argue that these four tools, either individually or in concert, are not adequate for protecting in-stream flows.

We suggest five additional policy tools that might have a potential role in enhancing in-stream flows. These are: (a) purchase/lease of water use permits; (b) enhancing in-stream flows with a “water tax”; (c) shifting surface water use to ground water use; (d) small, off-main-stream reservoirs; and (e) increased water use efficiency. We argue that (a) has the most potential for direct effect on stream flows. It would, however, be expensive and would likely require an extensive collaborative effort among public agencies, private not-for-profit entities, and private stakeholders. While (c) and (d) have substantial potential of enhancing in-stream flows, their feasibility is clearly uncertain and requires substantial investigation. The potential of (b) and (e) is moderate in terms of increasing in-stream flows, with (b) requiring new legislation.

# Enhancing In-stream Flows In The Flint River Basin: Does Georgia Have Sufficient Policy Tools?

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# **Enhancing In-stream Flows In The Flint River Basin: Does Georgia Have Sufficient Policy Tools?**

## **I. Overview of the In-Stream Flow Problem in the Flint River**

Population growth and rapid expansion of irrigated agriculture during the past three decades have resulted in greatly increased water use in the Flint River Basin. There is concern as to whether, during periods of drought and even lower than average rainfall, flows in the Flint River will be sufficient to satisfy the growing municipal, industrial, and agricultural demand for water, and the needs for protecting wet lands and the fish and wildlife that depend on such flows.

The Georgia Legislature, the Governor's Office, the Department of Natural Resources Environmental Protection Division, and various other state and local entities and stakeholders have efforts underway to develop plans and policies to meet the challenges of actual and potential "water scarcity". The issues involved are numerous, complex, and (in many instances) controversial.

The drought experiences of 2000 and the low flows in the Flint River and its tributaries have motivated a desire on the part of Georgians to find means to prevent such conditions - - means by which in-stream flows in the Flint River (as well as all Georgia Rivers) might be enhanced during periods of drought. The authors' purpose in this paper is to contribute to ongoing assessments of such means; and more specifically, to address the question: are there, at the disposal of EPD, enough effective tools to protect in-stream flows in the Flint River? If not (and we will argue that such is the case), what new policy tools might enhance the EPD's options in these regards? To these ends, in Section II we briefly review tools now available to the EPD for affecting in-stream flows. In Section III we suggest some new tools that might be made available to the EPD. Concluding remarks are offered in Section IV.

## II. Existing Policy Tools For Enhancing In-stream Flows

Our understanding of current regulations and laws in Georgia leads us to believe that there are four policy options available to EPD that would appear to be applicable for use in managing in-stream flows in the Flint River Basin during periods of drought. These are:

- The Flint River Drought Protection Act (O.C.G.A. 12-5-540 through 12-5-550);
- Provisions for modifying water use permits (DNR regulations [hereafter, “Rules”], 12-5-31(k)(7), (8));
- Invoking the DNR’s “emergency powers” (Rules, 12-5-31-l); and
- Use-restrictions based on the Public Trust Doctrine.

We discuss these options in turn.

**A. The Drought Protection Act.** Basically, the Drought Protection Act provides for the Director of the EPD to announce, on March 1 of every year, whether or not (based upon the best available information) drought conditions will occur during the upcoming summer. If drought conditions are declared, the Director determines the number of acres (target acreage) that must be taken out of irrigation in order to protect in-stream flows, and then takes action to do so. Given potentially large differences in effects on in-stream flows between irrigation from ground water and from surface water,<sup>1</sup> the EPD (to date) has chosen to apply these actions only to permits involving the use of surface water. To proceed under the Act when a drought has been declared, the Director must first hold an auction that allows farmers to offer prices/acre they are willing to accept for voluntarily taking their permitted acreage out of irrigation (Rules, 391-3-28-.08(c)(i-d)). If acres acquired in the voluntary auction are less than the Director’s target acreage, a second set of actions may be taken. These involve “non-voluntary irrigation acreage reduction” (Rules, 391-3-88-.10). The non-voluntary reduction would be accomplished

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<sup>1</sup> There is great uncertainty regarding the effects of pumping from the Floridan aquifer on stream flow. The effect on stream flows of pumping from any well likely depends on proximity to the river or tributary and numerous geological and hydrological factors.

in the following way: starting with the last permit to be issued and continuing with next “junior in time” permits (this process can be described as “last-in, first-out,” or LIFO), owners of permits are *required* to forego use of their water use permit for the balance of the calendar year and are compensated at a price-per-acre equal to the *average* price paid in the voluntary auction. This process continues until the target acreage is attained.

A drought was declared by the Director on March 1, 2001, and an auction was held on March 17, 2001. The effect of the auction was to voluntarily eliminate for the balance of 2001, irrigation on 33,101 acres included in 208 permits for surface water use at an average price of \$135.00 per acre.

Although the auction was effective in lowering surface water withdrawals, there are problems and limitations associated with provisions of the Drought Protection Act as a long-term tool for enhancing in-stream flows in the Flint River. First, the 2001 auction reduced the \$10 million set-aside under the Act for auctions by \$4.5 million. One can only speculate as to whether or not the Georgia legislature will replace depletions in the Fund that would be spent for future drought periods.

Problems may also arise with the provisions for non-voluntary reductions in irrigated acreage, an action that could be a part of any future auction. The potential for law suits that arise with the involuntary reduction in irrigated acreage abound. In any application of the LIFO process to reduce acreage, it will undoubtedly be the case that some holders of surface water permits who are required to reduce their irrigated acreage will be senior (in terms of the date of their permit) to holders of ground water use permits. Since (to our knowledge) there is nothing in Georgia law that makes a surface water permit inferior to a ground water use permit, holders of surface water permits that are senior relative to some groundwater use permits may challenge the process on grounds (among others) of being denied “equal protection under the laws.” Moreover, one may reasonably suppose that a permit holder, whose permit was not accepted in

the EPD's auction, places a value on the permit at an amount greater than the *highest* offer price accepted in the auction. When this permit holder is required to involuntarily reduce his/her irrigated acreage with compensation set at the *average* price paid in the auction (which will always be less than the highest accepted offer price), the question of "just compensation" will surely be raised. Such a question could arise even if the permit holder was compensated an amount equal to the highest price paid in the auction, which by supposition is less than the value placed on the permit by that permit holder.

These considerations lead us to conclude that provisions of the Drought Protection Act are limited, and perhaps unsustainable, long run tools for enhancing in-stream flows.

**B. Provisions for modifying water use permits.** The extent to which provisions allowing the EPD to modify use permits for the purpose of increasing in-stream flows also appears to be limited. The Georgia Code provides that:

(12-5-31(k)(7): The director may suspend or modify a farm use permit if he should determine through inspection, investigation, or otherwise that the quantity of water allowed under the permit would prevent other applicants from reasonable use of surface waters for farm use; and

(12-5-31(k)(8): Consistent with the considerations set forth in subsection (g) of this Code section, the director may revoke, suspend, or modify a permit for any other good cause consistent with the health and safety of the citizens of this state and with this article.

It is certainly not obvious what kind of farm use would be judged as that which would "...prevent other applicants from reasonable use of surface waters..." (sub-section (k)(7)). What does seem clear, however, is that it would be difficult to justify suspensions strictly for the purpose of increasing in-stream flows under this sub-section.

Similarly, it would seem that the use of criteria for revoking, suspending, or modifying both farm and non-farm permits under sub-section (k)(8) for the purpose of increasing in-stream flows would be possible only under conditions where in-stream flows could be shown as adversely affecting the health and safety of Georgia citizens. It is unclear how broadly defined such effects would need to be in order to provide justification for revocation, suspension, or

modification of water use permits under this sub-section .

**C. Invoking the DNR’s “emergency powers.”** The EPD has broad powers in the event of “emergency periods of water shortage.” The Rules 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....

-(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 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,

-(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 extends beyond protecting public health and safety to include protection of the water resources of an area from “serious harm.”

It is difficult to assess the potential effectiveness of this tool for maintaining in-stream flows because we do not find documents that set out specifically how these provisions would 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. As examples, would all irrigators be required to reduce use by the same amount or same percentage? How could such a provision be effectively enforced? Would the EPD require the

total cessation of water use by some irrigators, using, for example, the LIFO method mandated in the Drought Protection Act? Furthermore, limitations of these provisions on the EPD's ability to maintain in-stream flows during periods of drought would derive from delays in the implementation of the hearing processes (and possible legal challenges to the hearing officer's decisions) which must be afforded to all water use permittees, particularly if a very large number of individuals filed for a hearing. Note that farm uses *continue* during the hearing and appeal processes.

**D. Use restrictions based on the public trust doctrine.**<sup>2</sup> The Georgia Code provides, “the General Assembly finds and declares that the State of Georgia became the owner of the beds of all tidewaters within the jurisdiction of the State of Georgia as successor to the Crown of England and by the common law. The State of Georgia continues to hold title to the beds of all tidewaters within the state, except where title in a private party can be traced to a valid Crown or state grant which explicitly conveyed the beds of such tidewaters. The General Assembly further finds that the State of Georgia, as sovereign, is trustee of the rights of the people of the state to use and enjoy all tidewaters which are capable of use for fishing, passage, navigation, commerce, and transportation, pursuant to the common law **public trust doctrine**. Therefore, the General Assembly declares that the protection of tidewaters for use by the state and its citizens has more than local significance, is of equal importance to all citizens of the state, is of state-wide concern, and, consequently, is properly a matter for regulation under the police powers of the state. The General Assembly further finds and declares that structures located upon tidewaters which are used as places of habitation, dwelling, sojournment, or residence interfere with the state's proprietary interest or the **public trust**, or both, and must be removed to ensure the rights of the state and the people of the State of Georgia to the use and enjoyment of such tidewaters. It is declared to be a policy of this state and the intent of this article to protect the tidewaters of the state by authorizing the

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<sup>2</sup> Discussions in this section draw heavily from Gould and Grant's review of the public trust doctrine. See George A. Gould and Douglas L. Grant, *Cases and Materials on Water Law*, 6<sup>th</sup> Ed., American Case Book Series, West Group (St Paul MN: 2000), at pp. 528-548.

commissioner of natural resources to remove or require removal of certain structures from such tidewaters in accordance with the procedures and within the timetable set forth in this article.” (Emphasis added) (O.C.G.A. §52-1-2)

From the above it is clear that the public trust doctrine applies to “tidewaters” capable of use for fishing, passage, navigation, commerce, and transport, and that the State, as sovereign, acts as the trustee of such rights of all the people of the state to use and enjoy. While strict interpretation of §52-1-2 would suggest that the doctrine is limited to tidewaters and the enumerated uses, the doctrine has been significantly expanded over the last 30 years.

“Although many states still require some connection to navigable waters, the doctrine is no longer confined to waters which are navigable for title purposes. It has been extended to bodies navigable only under more liberal state tests, to non-navigable waters, and to resources which have no direct connection to water...As National Audubon (commonly referred to as the ‘Mono Lake’ case<sup>3</sup>) illustrates, the interests protected have been extended from the public’s historic rights of navigation, commerce, and fishing to include recreation, esthetics, and environmental preservation.”<sup>4</sup>

Contemporarily,<sup>5</sup> the landmark public trust case is the California Mono Lake Case.<sup>6</sup> The Mono Lake Court makes clear the difficulties faced by a state in balancing the needs for security and stability on the part of water users, and the state’s obligations to protect the public trust.

“As a matter of current and historical necessity, the Legislature...has the power to grant usufructuary licenses that will permit an appropriator to take water from flowing streams and use that water in a distant part of the state, even though this taking does not promote, and may unavoidably harm, the trust uses at the source of the stream. The population and economy of this state depend upon the appropriation of vast quantities of water for uses unrelated to in-stream trust values...Now that the economy and population centers of this state have developed in reliance upon appropriated water, it would be disingenuous to hold that such appropriations are and have always been improper to the extent that they harm public trust uses...(However) The state has an affirmative duty to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible. Just as the history of this state shows that appropriation

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<sup>3</sup> *National Audubon Society v. Superior Court of Alpine County*, 33 Cal. 3d. 419 (1983).

<sup>4</sup> *Supra* Note 2 at p. 545.

<sup>5</sup> We acknowledge that many would point to *Illinois Central Railroad v. Illinois*, 146 U.S. 387 (1892) as the “landmark” public trust case.

<sup>6</sup> *Supra* Note 3.

may be necessary for efficient use of water despite unavoidable harm to public trust values, it demonstrates that an appropriative water rights system administered without consideration of the public trust may cause unnecessary and unjustified harm to trust interests. As a matter of practical necessity the state may have to approve appropriations despite foreseeable harm to public trust uses. In so doing, however, the state must bear in mind its duty as trustee to consider the effect of the taking on the public trust..., and to preserve, so far as consistent with the public interest, the uses protected by the trust.”<sup>7</sup>

Thus, in ruling against the state in Mono Lake, the Court’s major concern was not with potential harm to trust resources *per se*; rather, its concern was with the fact that neither state agencies nor the legislature had even attempted to consider public trust values, to “...determine that the needs of Los Angeles outweigh the needs of the Mono Basin, that the benefit gained is worth the price.”<sup>8</sup>

Regarding the implications of Mono Lake for public trust applications to water use permits in Georgia, it is first appropriate to point out that appropriative rights were at issue in Mono Lake while Georgia’s surface water rights rely on the riparian doctrine. The perhaps fine distinction<sup>9</sup> here is that in Mono Lake the State was creating *vested* rights in a trust resource (water), while in Georgia water use permits create *usufructuary rights to use water*.

In looking for guidance as to how Georgia courts might apply the public trust doctrine, we have been unable to find case law in Eastern States where application of the public trust doctrine to water use permits issued by a state was at issue. Nor are we aided in this regard by public trust cases in Western States. Outside the State of California, “...only the North Dakota and Idaho Supreme Courts have explicitly declared that the doctrine applies to water rights.”<sup>10</sup> However, following the Idaho Legislature’s adoption of a statute *precluding* the adjudication of public trust issues in general stream adjudications, the Idaho Court refused to intervene in the Snake River Basin Adjudication to assert public trust issues; on the other hand, following similar

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<sup>7</sup> *Supra* Note 3 at 4(b).

<sup>8</sup> *Ibid.*

<sup>9</sup> Thus, as noted by Trelease, “...both laws (riparian and prior appropriation) create types of water rights.” Frank J. Trelease, “The Model Water Code, the Wise Administrator, and the Goddam Bureaucrat,” 14 *Natural Resources Journal* 207 (1974) at p. 211.

<sup>10</sup> *Supra* Note 2 at p. 548.

legislation in Arizona, the Arizona Supreme Court struck down the legislation on grounds that since the doctrine is a constitutional limitation on the legislature, the legislature lacks the power to make the doctrine inapplicable in judicial proceedings.<sup>11</sup> Little help is obtained from a survey of law review papers given the broad diversity in the opinions of legal scholars concerning appropriate applications of the public trust doctrine to water rights.<sup>12</sup>

What can we then conclude as to the potential effectiveness of the EPD's reliance on the public trust doctrine as a means for increasing in-stream flows? In terms of any future issuance of water use permits, the EPD has imposed a moratorium on new permits in the Flint River Basin and *is* in the process of trying to develop information that will allow it to weigh the gains from additional permits against any potential harm to trust resources *a la* the Court's requirement in Mono Lake. In terms of actions based on the doctrine that would involve the revocation of existing water use permits, our best response to this question is: we can't *conclude* much of anything until a great deal more is heard from the courts.<sup>13</sup> The uncertainties surrounding how Georgia courts would go about balancing the state's historical dependence on the issuance of usufructuary water use permits for traditional uses (municipal, industrial, agricultural) against collateral harm to in-stream values are simply too great to allow for meaningful speculation.<sup>14</sup>

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<sup>11</sup> *Ibid.*

<sup>12</sup> For an overview of the debate among legal scholars, as well as a considerable set of references, see *Supra* Note 2 at pp. 544-548.

<sup>13</sup> We should note that the Georgia Supreme Court, in *Pyle v. Gilbert*, 265 S.E.2nd 584 (1980), held that on a non-navigable stream a riparian right is a *property* right. The relevance of this decision for the discussions at hand is problematic, however, in that any perennial stream that is a tributary to the Flint River would not be regarded as non-navigable. This statement may appear to contradict the Court's ruling that Ichawaynochaway Creek was non-navigable in *Givens v. Ichauway, Inc.*, 268 Ga. 710 (1997). In *Givens*, however, the Court did not "...address the question as to whether this creek is subject to a federal navigational servitude...Givens did not raise the issue below and the court did not rule on it..." (at Note 1). Admittedly based on informal discussions with legal scholars, in our view it is unlikely that the Georgia Court would apply the narrow definition of "navigability" used in *Givens* in issues related to the public trust.

<sup>14</sup> We note, however, Plater, *et. al.*'s observation that the Supreme Court's re-emphasis in weighing a regulations' validity on the basis of principles of property and tort law, in *David h. Lucas v. South Carolina Coastal Council*, 112 S.Ct. 2886 (1992), this emphasis would presumably include public trust law. Thus, in *Lucas* the Court argues that "Where the State seeks to sustain regulation that deprives land of all economically beneficial use, we think it may resist compensation only if the logically antecedent inquiry into the nature of the owner's estate shows that the proscribed use interests were not part of his title to begin with." Zygmunt J.B.Plater, Robert H. Abrams, and

These uncertainties are greater still when the question is raised as to whether or not permit holders must be compensated for revoked permits.<sup>15</sup>

Finally, we must echo Dr. Draper's "compelling question" regarding ground water in Georgia: "...what is the legal status of Georgia's groundwater aquifers (in terms of the application of the public trust doctrine to them)?"<sup>16</sup>

**E. Existing policy tools for enhancing in-stream flows: Summary.** We have attempted to briefly assess the potential applicability and effectiveness of four tools that are presently available for the EPD's use to increase/enhance in-stream flows in the Flint River Basin: the Drought Protection Act; modifying water use permits; invoking the DNR's "emergency powers;" and use restrictions based on the public trust doctrine. Under ideal conditions, the auction and involuntary acreage reduction provisions of the Act could have the effect of substantively increasing in-stream flows during periods of drought. Relevant conditions that must be "ideal" include: droughts and their relative magnitudes are always accurately "predicted" by March 1 of every year; sufficient acreage can always be obtained from the voluntary auction *or* the State does not get bogged down in legal challenges to the involuntary acreage reduction process; and the legislature continues indefinitely to replace monies expended from the Drought Protection Fund. Perhaps these conditions could always be met. It is our view, however, that is reasonable to expect that the conditions will not always (ever?) be fully met, in which case the long term effectiveness of this tool is problematic.

Provisions for modifying permits appear to be much too limited to serve as an effective tool for the management problem at hand. It is impossible to assess the effectiveness of the

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William Goldfarb, Supplement for Environmental Law and Policy: Nature, Law, and Society, American Casebook Series, West Publishing Company (St. Paul: 1994) at pp. 161 and 135.

<sup>15</sup> For opposing views on this question, see Joseph L. Sax, "The Limits of Private Rights in Public Waters," 19 Environmental Law 473 (1989), and James R. Rasband, "Equitable Compensation for Public Trust Takings," 69 U. Colo. L. Rev. 331 (1998).

<sup>16</sup> Stephen E. Draper, "Effective Georgia Water Policy for the 21<sup>st</sup> Century," *Proceedings of the World Water & Environmental Resources Congress*, Environmental and Water Resources Institute, American Society of Civil Engineers, Orlando, Florida, May 21-24, 2001, at p. 2.

DNR's emergency powers for enhancing in-stream flows until particularly important implementation questions are resolved.

Finally, it is our view that the morass of uncertainties surrounding the application of the public trust doctrine to surface and/or ground water use permits precludes reasonable assessment of its potential contribution to any efforts by the EPD to accomplish the tasks at hand. These uncertainties will remain until (1) we move beyond general references to the public trust doctrine to *specific definitions* of exactly how use of the doctrine is contemplated, and (2) legal opinions are forthcoming to guide policy designs that may rely on the doctrine.

## II. Are there Other Tools that the EPD Might Effectively Use?

Some readers may not agree with our assessment of the potential effectiveness of the four tools discussed in Section II. We can all surely agree, however, that the EPD -- indeed, the citizens of Georgia -- would benefit from expanding the tools available for managing in-stream flows. In this section we offer five tools/approaches that might serve the EPD in this regard.

**A. Purchase/lease of water use permits.** The public's appreciation of the value of in-stream flows in Western States intensified in the late 1970s and the 1980s. One result has been evolving partnerships among federal and state governments and private entities to purchase or lease water rights for the purpose of increasing in-stream flows.<sup>17</sup> The Oregon legislature, in 1987, passed legislation allowing purchases/leases of water rights to be converted to in-stream flow rights. This action was quickly followed by similar legislation in Montana, Washington, and California.<sup>18</sup> In 1992, Idaho allowed exceptions to its water banking statutes to make possible the Bureau of Reclamation's lease of water for in-stream use.<sup>19</sup> Gillilan and Brown argue the case for voluntary re-allocations of water with full compensation on the following grounds:

“It is easy to understand why attempts to retroactively protect in-stream flows...raise serious objections. Some people argue that water uses that have lowered In-stream flows below the minimum levels necessary to, say, maintain healthy fish populations, should never have been allowed in the first place, so that retroactive reallocation is merely correcting a past wrong. But the fact is that these uses were allowed, and even encouraged, to occur at a time when values and conditions were different. Retroactive protection without compensation essentially asks just a portion of the population, current water users, to bear the entire cost of the larger public's benefit.”<sup>20</sup>

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<sup>17</sup> This is not to say that all Western States have adopted legislation allowing entities, public or private, to acquire water rights for in-stream purposes. David M. Gillilan and Thomas C. Brown, *In-stream Flow Protection: Seeking a Balance in Western Water Use*, Island Press (Washington D.C.: 1997), pp. 301-302. See, also, Bonnie G. Colby, “Enhancing In-stream Flow Benefits in an Era of Water Marketing,” 26 *Water Resources Research* 1117, 1118 (June 1990).

<sup>18</sup> Clay J. Landry, *Saving Our Streams Through Water Markets: A Practical Guide*, 62 pp., Political Economy Research Center (Bozeman, MT: 1998), at p. 4.

<sup>19</sup> *Ibid.* See, also, Bonnie G. Colby, “Enhancing In-stream Flow Benefits in an Era of Water Marketing,” *Water Resources Research*, 26(6), 1113-1120, June, 1990.

<sup>20</sup> Gillilan and Brown, *Supra* Note 17 at p. 302.

Groups involved in the purchase and/or lease of water rights for in-stream flows are diverse. In addition to state governments (typically involving fish and wildlife agencies), the Bureau of Reclamation and the U.S. Fish and Wildlife Service have been active in buying and leasing water for these purposes.<sup>21</sup> Private organizations participating in these programs include the Oregon Water Trust, the Washington Water Trust, Nevada's Great Basin Land and Water, the Environmental Defense Fund, the Nature Conservancy, and Trout Unlimited. Moreover, private individuals have donated water rights to funds designed to enhance in-stream flows. Most donations have been small, ranging from 15 to 1,000 acre feet, but in sum have contributed substantially to in-stream flow programs.<sup>22</sup>

Over the eight-year period 1990-1997, 2,380,021 acre feet of water rights were purchased (132,333 af), leased (2,002,426 af), or donated (245,261 af) for in-stream flows by federal, state, and private entities at a total cost of \$61.7 million (Table 1). The average purchase price paid was \$397/af, ranging from \$65/af to \$850/af; the average annual lease price was \$29.84/af, ranging from \$0.08/af to \$214.10/af (Table 2).

One must use caution in attempting to infer likely lease/purchase prices for water use permits in Georgia with prices paid in Western States. Water acquired for these purposes typically comes from the agricultural sector.<sup>23</sup> Prices that would have to be paid to Georgia farmers for voluntarily giving up water to enhance in-stream flows would depend on a myriad of factors, including: whether the transaction was a purchase or a lease; the duration of any lease; net revenue returns to irrigation; alternatives available for lands involved in the transaction; soil type and amount of water required to grow the crops of interest; and even the farmers attitude about the objective of maintaining in-stream flows at a particular level.<sup>24</sup>

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<sup>21</sup> For a description of imaginative partnership programs in Nevada, see Sabrina Isè and David L. Sunding, "Reallocating Water from Agriculture to the Environment under a Voluntary Purchase Program," *Rev. Ag. Econ.*, 20(1), 214-226, 1998, and S. Lovell, K. Millock, and D.L. Sunding, "Using Water Markets to Improve Environmental Quality: Two Innovative Programs in Nevada," *J. Soil and Water Conservation*, 55(1), 19-26, 2000.

<sup>22</sup> *Supra* Note 18 at pp. 11, 12.

<sup>23</sup> Gillilan and Brown, *Supra* Note 17 at p. 304.

<sup>24</sup> See, e.g., John Duffield, Chris Neher, Mark Josephson, and Richard Josephson, "Market Value of Agricultural Water Leased for In-stream Flows, 140 pp., Final report to the Montana Department of Fish, Wildlife, and parks, Bioeconomics Associates (Missoula: February 1991).

**Table 1: Market Activity By Acquisition Method, 1990-1997**

	Federal	State	Private	Total
Lease expenditures	\$27,653,410	\$10,095,861	\$ 96,482	\$37,845,754
Purchase expenditures	\$ 5,857,956	\$14,970,577	\$2,059,055	\$23,887,588
Total expenditures	\$33,511,366	\$25,066,438	\$3,155,537	\$61,733,342
Lease quantity (af)	1,595,088	385,255	22,083	2,002,426
Purchase quantity (af)	59,391	63,962	8,979	132,333
Donation quantity (af)	0	31,477	213,783	245,261
Total quantity (af)	1,654,479	480,695	244,846	2,380,021
No. of leases	64	50	13	127
No. of purchases	15	20	24	59
No. of donations	0	10	50	60

Source: Landry<sup>25</sup>

**Table 2: Market Price and Quantity Summary, 1990-1997**

	Average	High	Low	No. Transactions
Purchase price (\$/af)	\$397.47	\$850.00	\$65.00	59
Lease price (\$/af)	\$29.84	\$214.10	\$0.08	124
Purchase quantity (af)	2,242.94	44,900.00	11.27	59
Lease quantity (af)	16,148.60	232,839.10	12.00	124

Source: Landry<sup>26</sup>

Given Georgia's history of success in private-state partnerships, approaches similar to those described above may provide the EPD with a substantive tool for enhancing in-stream flows in the Flint River Basin. Moreover, should the state move in this direction, it may well be able to join Western States in obtaining federal monies to support an activity to which state agencies are already committed.

<sup>25</sup> Clay Landry, "Market transfers of water for environmental protection in the Western United States, 1 *Water Policy* 462 (1998).

<sup>26</sup> *Ibid.*

To some extent, this approach may appear to be a simple expansion of actions allowed under the Drought Protection Act. However, two basic, but non-trivial, changes in Georgia's current water management laws and regulations would be required for the EPD to make use of this tool:

- Usufructuary rights to water use established under water use permits issued by the EPD would have to be quantified; and
- Provisions related to the transfer of water use permits would have to be broadened and clarified to allow for transfers of permits from current permit holders to an entity (private or public) that would hold permits for purposes of in-stream flow.<sup>27</sup>

**B. Enhancing in-stream flows with a “water tax.”** We will briefly touch on this option, the substance of which is thoroughly developed elsewhere by the authors of this paper.<sup>28</sup> The essence of this suggested option is that, under a fairly restrictive set of conditions, water use permits issued by the EPD could be transferred (voluntarily) from a current permit holder to some new entity, with reimbursement to the original permit holder. One key aspect of this suggested permit transfer system is that for every acre foot of water/year needed for use by the new entity, the new entity must also purchase permits for *some additional amount* (say one extra acre foot). The new entity would be entitled to use the one acre foot, but the extra acre foot would be ceded to the EPD who could then “retire” the right, thereby reducing water use in the basin. In-stream flow is increased accordingly.

**C. Shifting surface water use to ground water use.** Following the Georgia Legislature's passage of the Flint River Drought Protection Act in 2000, GSU researchers conducted analyses of the potential impacts on flows in the Flint River that would result from

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<sup>27</sup> For related discussions, see Ronald G. Cummings, Nancy A. Norton, and Virgil J. Norton, “Water Rights Transfers: Options For Institutional Reform,” Water Policy working Paper #2001-001, Georgia State University (Atlanta: September, 2001) and Albany State University (Albany: September 2001).

<sup>28</sup> *Ibid.*

retiring alternative amounts of land from irrigation that used ground and surface water. It was found, as one might expect, that retiring surface water permitted use would have a greater direct effect on in-stream flows than retiring the same amount of ground water permitted use. To gain information on the subject, an exploratory study of the hydrological feasibility of shifting sources of irrigation water from surface to ground water was funded by GSU. A draft report by Hicks, issued on July 18, 2001<sup>29</sup> identifies two areas in the Flint River Basin where increased ground water use *might* take place without adverse effects:

- the Claiborne aquifer in No. Dougherty, Lee, S.E. Sumpter, Crisp, N.E. Worth, and So. Dooly counties, which are in the Kinchafoonee and Mucklee Creek sub-basin. (p. 19), where wells might produce yields on the order of 1,000 gpm.
- North Baker and N.E. Mitchell counties, where the Claiborne aquifer “...is practically unused because of the high yield and accessibility of upper Floridan aquifer” ( p.18). This area is in the Ichawaynochaway creek sub-basin, where, according to Hicks, wells might yield 500 gpm.

***(We emphasize the tentative nature of results from the study. The author gives emphasis to the fact that much more hydrological testing and exploration is needed before conclusions can be drawn concerning the feasibility of transferring water use from surface to ground water sources.)***

In the two areas above, specified by Hicks, we identified 30 permits for surface water use in Lee County, with permitted use for the irrigation of 9,753 acres; and 21 surface permits in North Baker County for irrigation of 16,631 acres (for a total of 51 permits and 26,384 permitted acres).

Assume, for illustrative purposes, that (a) all of the 26,384 acres have actually been under irrigation, (b) during drought years irrigators withdraw 24 inches per acre for the irrigation season, (c) four of the 24 inches represent return-flow to the stream, and (d) 42% of the total

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<sup>29</sup> David W. Hicks, *Distribution of Permitted Agricultural Water Use and Water Availability in the Flint River Basin, Southwestern Georgia*, Paul B. Krebs & Associates, Inc. (Albany, GA: 2001).

irrigation application occurs in June. If, and we stress *if*, further research confirmed the feasibility of shifting those 51 surface water use permits to ground water use, the effect would be to increase in-stream flows by approximately 200 mgd (there should be little effect of ground water pumping from the Claiborne aquifer on Flint River surface flows). Given these assumptions, the transfer of these 51 permits from surface to ground water use could have the effect of increasing stream flows during this critical month of June by as much as 115 cfs in the Kinchafoonee and Mucklee Creek sub-basin, and 195 cfs in the Ichawaynochaway Creek sub-basin. During drought periods such as that experienced during the summer of 2000, such increases could offer *significant* improvement in the riverine environment in these areas (for example, during a period of several days during June, 2000, flows in Ichawaynochaway creek were below 24 cfs). Of course, factors such as evaporation from the increased stream flows, and loss of flows as a result of infiltration of the increased stream water back into the ground would impact on the net effects of this type of action.

Should such a transfer system be shown to be hydrologically feasible, the economic feasibility of a state program to finance such shifts is reasonably straightforward. To serve the 9,753 acres of surface permitted irrigated acres in Lee county (assuming that each new well would yield about 1,000 gpm, and that each well irrigates 160 acres), 61 wells would be required. The estimated costs for drilling a well and installing a pump is about \$50,000.<sup>30</sup> Given this per-well cost, shifting the 9,753 acres from surface irrigation to ground water irrigation would cost approximately \$3 million. In Baker County, to serve the 16,631 irrigated acres indicated above, 208 wells (with an average yield of 500 gpm, each serving 80 acres) would be required and would cost about \$10.4 million.

Thus, at a cost of approximately \$13.4 million (\$508/acre), surface water irrigated acres would be reduced by 26,384 acres for *all future years*. This compares with \$4.5 million spent in

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<sup>30</sup> Estimates for well costs were kindly provided by Mr. Doyle Medders, Sylvester, GA (August 3, 2001).

the March 17, 2001 Flint River Drought Protection auction to reduce surface irrigation by 33,100 acres for **one year only**, at per acre costs as high as \$200/acre, and averaging \$135/acre. If these data can be considered as somewhat indicative of the actual situation, the implied policy question is whether it would be more prudent to retire all surface permits in drought years only at \$135 per acre, or to retire some surface permits permanently at about 3.8 times (\$508) that per acre cost .

**D. Small, off-main-stream reservoirs.** Some argue that new reservoirs are needed for enhancing seasonal water supplies in the Flint River Basin. However, as a result of some 25 years of environmental legislation and changes in public attitudes, it is generally accepted that new, large, main-stream reservoirs have become a thing of the past. Therefore, *if* reservoirs are to be considered as a possible tool for the EPD to enhance in-stream flow during periods of drought, such consideration will likely have to focus on a system of relatively small impoundments of water in off-main-stream tributaries. Even when considering smaller impoundments, however, it is essential to note that *society currently places very high values on natural, unregulated, free flowing rivers.*

At this point, therefore, we can do no more than simply mention this option as one that *may* deserve attention. A great deal of study will be required concerning the engineering, economic, and environmental feasibility of any sites. Even if the environmental feasibility of any small catchment is established, the engineering and economic feasibility of such systems will be difficult to demonstrate. In areas like those found in the Flint River Basin, the engineering feasibility of a proposed reservoir can be confounded by lack of possible sites with sufficient slope to provide significant storage capacity. In terms of economic feasibility, small reservoirs, almost by definition, will not enjoy the multiple sources of project benefits that have played such a major role in justifying the historical development of large-scaled reservoir

systems in the United States.<sup>31</sup> Moreover, given that benefits attributable to small, off-main-stream reservoirs will likely not occur annually -- rather, they occur only periodically during periods of drought -- the annual, *expected* value of benefits may be quite small.

While the economic feasibility of such small systems may appear problematic, there is little in the way of hard evidence on the issue. Thus, the viability of this option as a tool for the EPD should remain an open question. To assist in laying out the framework for study of the issue, the authors are in the process of conducting an exploratory study, which should be available by early summer, 2002.

**E. Increase water use efficiency.** Water conservation and improved efficiency in water use can be important for enhancing in-stream flows. In some cases, voluntary conservation can be encouraged through education activities aimed at water users. Alternatively, price incentives can be effective for encouraging water conservation and efficiency of water use. For example, EPD water use permits for municipalities could require the utility to have an increasing block or increasing continuous rate structure for all uses. A carefully constructed increasing water rate structure can prevent detrimental price effects on lower income (typically low water use) customers, while at the same time providing incentives for large domestic water users to cut back, especially on outside water uses. The latter can even result in enhanced development of native plant areas instead of grasses that need frequent watering. This, in turn, may lessen the need for mandatory watering restrictions, and minimize necessary adjustments on the part of water users should such restrictions be required.

A large proportion of total surface water withdrawals from streams in the Lower Flint River Basin is by irrigators. Water use for irrigation in proportion to in-stream flows is highest in the summer months, and in times of drought -- the latter being the same period when in-stream flows due to natural drought would be at the lowest. Even a relatively small percentage

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<sup>31</sup> See, e.g., Burness, H.S., *et al.*, "U.S. Reclamation Policy and Indian Water Rights," *Natural Resources Journal*, 20, 4, 807-26, October, 1980.

reduction in surface water withdrawals for irrigation during a drought could represent a significant amount relative to in-stream flows during a drought period. Potentials for reducing water use by irrigators include changes in technology, improved system efficiency, irrigation scheduling and management, and cropping patterns. (For illustrative purposes, if as a result of some combination of these water saving practices, surface water use on 50,000 irrigated acres could be decreased by two inches, this is the equivalent of 22 mgd.)

As was previously pointed out in a paper by the authors,<sup>32</sup> adoption by irrigators of water savings practices that require (substantial, in some instances) investment costs, will not occur voluntarily unless the savings in costs resulting from reduced pumping offset the investment costs; or another entity, such as the state, cost-shares on the investments. In those instances where cost savings exceed new costs, a program of research and education to provide information to irrigators may be adequate to bring about changes. In all instances, research on, and demonstrations of new technologies and improved irrigation management are required for farmers to learn about the improvements; and for the state to understand the amount of cost-share funds needed as well as the potential returns in water savings from expenditure of cost-share funds.

One new research and demonstration project aimed at providing information of the type indicated above is a cooperative effort by the USDA-ARS-National Peanut Research Laboratory, the Albany State University Flint River Water Planning and Policy Center, and the Georgia Department of Natural Resources-Environmental Protection Division. Results of the project will be useful to farmers and to state and local resource management agencies as they make decisions about water use, water conservation and water management alternatives. It will quantify potential water savings through irrigation efficiency and identify the amount of cost-share payments needed to encourage adoption of such irrigation practices. Information gleaned from

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<sup>32</sup>*Supra* Note 30

the project, along with other on-going research will provide input for analysis of the relationship between requirements of minimal river flows and impacts on irrigated agricultural production in Southwest Georgia. The project will also contribute to the broader interdisciplinary research required to evaluate irrigation and cropping management strategies. For results of related research and examples of education projects, see the list of references given in an appendix to this report.

#### **IV. Concluding Remarks**

In this paper we assessed the potential applicability and effectiveness of four tools that might be used by the EPD to increase/enhance in-stream flows in the Flint River Basin: the Drought Protection Act; modifying water use permits; invoking the DNR's "emergency powers;" and use restrictions based on the public trust doctrine. In our view these four tools, either individually or in concert are not adequate for protecting in-stream flows.

Therefore, we suggest that five additional tools might have a potential role in enhancing in-stream flows. These are: (a) purchase/lease of water use permits; (b) enhancing in-stream flows with a "water tax; (c) shifting surface water use to ground water use; (d) small, off-main-stream reservoirs; and (e) increased water use efficiency.

In reflection, we believe that (a) has the most potential for direct effect on stream flows. It would, however, be expensive and would likely require an extensive collaborative effort among public agencies, private not-for-profit entities, and private stakeholders. While (c) and (d) have substantial potential of enhancing in-stream flows, their feasibility is clearly uncertain and requires substantial investigation. The potential of (b) and (e) is moderate in terms of increasing in-stream flows, with (b) requiring legislation.

Our concluding comments are:

\* The four tools we identified as currently available to EPD are not likely to provide for the strong actions that may be required to maintain sufficient in-stream flows during periods of drought; and may not be adequate to effectively serve the people of the state in this regard in the future, even under normal rainfall conditions.

\* The five tools suggested in section III of this paper be considered and further evaluated as potential components of the "tool box" that should be available to EPD for enhancing in-stream flows.

**APPENDIX**  
**Irrigation And Cropping Management Strategies:**  
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