

Strategies for Preserving Desired Future Conditions in the Northern Subdivision of Groundwater Management Area 10 (the Barton Springs Segment of the Edwards Aquifer)

John T. Dupnik, P.G.

With Contributions by W F (Kirk) Holland, P.G.

Introduction

With the recent completion of the first round of groundwater planning, the District, as the primary voting member representing the northern subdivision of GMA 10 has established a Desired Future Condition (DFC) for the Barton Springs segment of the Edwards Aquifer that preserves a minimum of 6.5 cfs of springflow during a recurrence of the Drought of Record (DOR). Using this DFC, the Texas Water Development Board has derived the volume of total annual pumpage that may be allowed in order to preserve the DFC, which is now referred to as Modeled Available Groundwater, or MAG. Assuming a 1:1 pumpage to springflow relationship¹ and the lowest recorded monthly volume of discharge (springflow and pumping) of 11.7 cfs, the TWDB established a MAG of 5.2 cfs of pumping - the difference between the DFC (6.5 cfs) and the DOR total discharge rate (11.7 cfs). This includes estimated exempt well pumpage.

The chosen DFC was intended to strike a balance between the ecological needs of the springs and its endangered species, the Historical permitted pumpage of District permittees, and the practical, legal, and regulatory constraints of further reducing pumpage during an extreme drought. However, the current aggregated volume of permitted pumpage authorized during an extreme drought (i.e. after all established regulatory curtailments have been imposed) falls short of ensuring that this minimum DFC can be preserved. The total authorized extreme drought pumping volume, referred to as the Extreme Drought Withdrawal Limitation (EDWL) is equal to approximately 6.7 cfs of pumpage (figure 1). Again assuming the 1:1 pumping to springflow relationship, this rate of pumping would leave only 5.0 cfs of springflow during a recurrence of the DOR (figure 2), which is 1.5 cfs less than the established desired future condition of 6.5 cfs (figure 3).

Purpose and Scope

The purpose of this report is to compile various methods and strategies to close this gap. It is important to note that the pumping rates referenced above represent *authorized* pumpage volumes during extreme drought conditions rather than *actual* pumpage volumes. As a practical matter, the primary focus will be on the proposed strategies as they may affect a reduction of actual pumpage during a recurrence of the DOR as necessary to preserve the DFC. This is consistent with the current statutory intent. The proposed strategies involve approaches that are generally not

¹ Established by the District's Sustainable Yield Study (2004)

currently part of the District's programs or standard operations and are organized as either market-based strategies or regulatory/permitting-based strategies. They range from more permanent measures (such as permit retirement) to more temporary, drought-triggered measures. Each strategy will include a brief description and discussion of feasibility in terms of pros and cons with consideration given to the probable effect on EDWL, District resource commitments, implementation issues and other factors.

The information presented herein is not intended to be policy recommendations; rather, it is a compilation of possible options for the purposes of facilitating further deliberation of potential policy options. It is also important to note that the proposed strategies focus on pumping reductions and not other, supply-side strategies. Supply enhancement strategies are an important component in ERP management and also deserve due consideration in helping achieve the DFC.

Market-Based Strategies

Retirement of or reductions in existing Historical permitted pumpage will be difficult to accomplish without the availability of some mechanism to enable permittees to receive some compensation, particularly when water use fees of District permits are so low relative to other sources and therefore, are an economic disincentive to supply switching. Market-based strategies involve transactions between willing buyers and sellers and can be advantageous because transactions are voluntary and can, in the right situation, facilitate resource management objectives without overly burdensome and complex regulatory approaches. The main advantage is that this strategy allows the use of markets to redistribute resources from low value uses to high value uses (e.g. from agricultural use to public water supply) while providing compensation by third parties for permit relinquishment. This reallocation is intended to allow for resources to be priced in accordance with true value which has the concomitant benefit of encouraging more efficient use because waste would be felt as lost value.

Such market-based strategies, however, require certain critical factors to be successful including: transferable permits, sufficient market-size, allowance of trade with limited impediments, and a proper accounting of transactions, among others. Markets typically involve certain trade rules to prevent unintended consequences but not to the extent that they significantly impede the workings of a free and active market. Market strategies are not appropriate where complicated rules are required and should be considered before implementation. Resource managers must also exercise caution in creating a market because such markets are not easily undone once permits are allowed to become commodities, particularly when these commodities take on substantial monetary value.

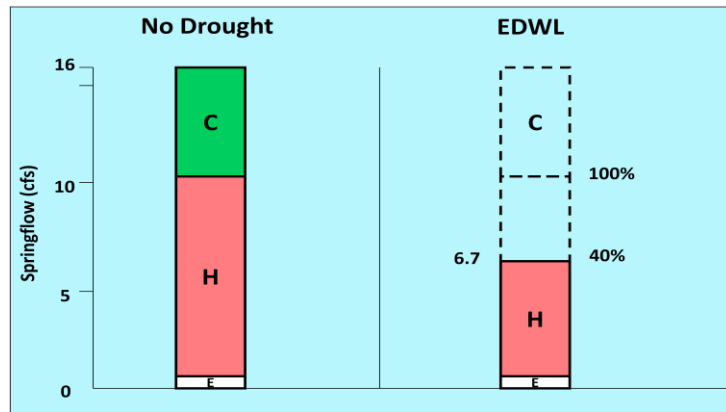


Figure 1 – No Drought column shows authorized pumpage limit during non-drought conditions with distribution by permit type where (H) is Historical permitted pumpage, (C) is Conditional permitted pumpage, and (E) is exempt well pumpage. EDWL shows the total authorized pumpage after 100% and 40% of Conditional and Historical permitted pumpage respectively.

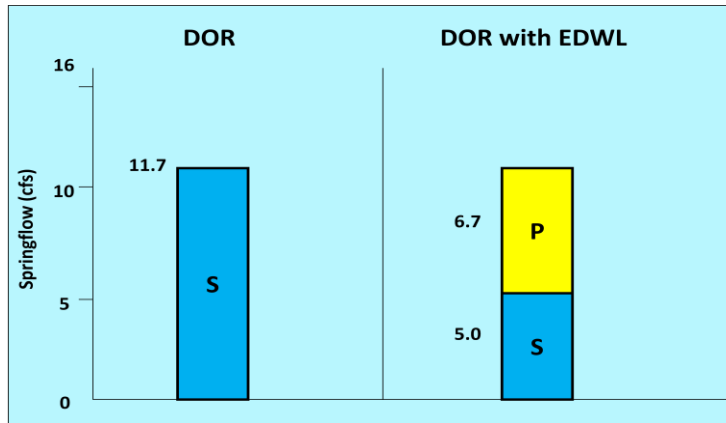


Figure 2 – first column shows the volume of total discharge (springflow and pumping) during the Drought of Record (DOR). Second column shows the volume of springflow expected during a recurrence of the DOR (5.0 cfs) with the current EDWL pumping (6.7 cfs) factored in.

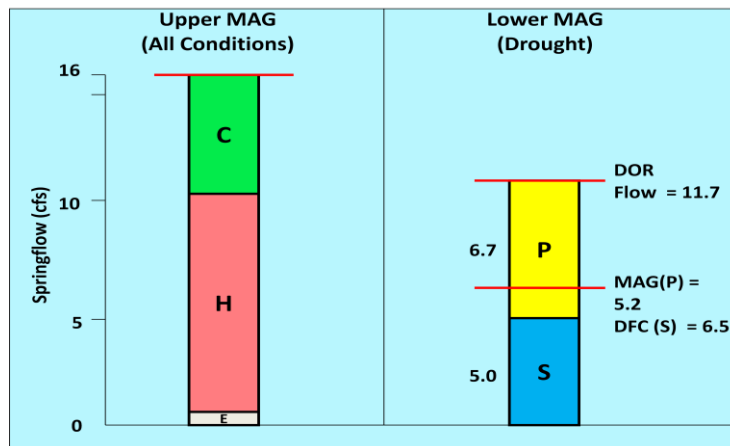


Figure 3 - Upper MAG column shows authorized pumpage limit during non-drought conditions (16 cfs) with distribution by permit type where (H) is Historical permitted pumpage, (C) is Conditional permitted pumpage, and (E) is exempt well pumpage. Lower MAG column shows drought curtailed permitted pumpage (P) and the resulting springflow (S) during extreme drought conditions relative to the adopted DFC (6.5cfs) and corresponding MAG (5.2 cfs).

Cap and Trade

Cap and trade as the concept applies to resource management involves first, the capping of allocations of a resource and then, the creation of a market to allow trade of permits within the confines of the cap. Such a market has been established in the San Antonio segment of the Edwards Aquifer to facilitate the redistribution of relatively low value resources in the western agricultural areas to the public water supply needs of the San Antonio area. It has been implemented with a reasonable amount of success but has also created impediments to certain resource management objectives (e.g. maintaining environmental flows and endangered species habitat).

The District has the first necessary condition in place with the existing cap on Historical firm-yield permitted pumpage. In order to allow for trade, however, a cap and trade program would by necessity require the District to allow permits to be transferable within the confines of the District boundaries. Historically, all District permits were permanently attached to the land and were non-transferable. To allow trade would require an unprecedented change in District Rules and in a long-standing policy of non-transferable permits.

The District's role could range from merely recording transactions that occur in a free-market to being an administrator with approval authority to ensure that any transactions are compliant with any trade rules. As a practical matter, certain trade rules would have to be in place to address potential unintended consequences and to provide the intended benefit to the aquifer, particularly during extreme drought. At minimum, trade rules would have to be in place to govern spatial aspects of trade, such as movement of permitted pumpage from less vulnerable to more vulnerable parts of the aquifer and the prevention of high concentrations of pumpage or "hot spots". Additionally, the District would likely require an "aquifer commission", or a percentage of the pumpage from every transaction (e.g. 25%) to be committed to the Conservation General Permit to provide the intended benefit to the aquifer through permitted pumpage reductions.

Pros

- Allows reductions of permitted pumpage from retirement of a percentage of the pumpage involved in all transactions
- Allows voluntary transactions initiated by willing buyers and sellers
- Avoids the time, expense, and resource allocation needed for more conventional regulatory approach
- Commoditization of permits and the appreciating value would discourage waste and encourage efficiency
- Rewards permittees that have surplus permitted pumpage as a result of reductions in demand, efficiency improvements, or diversified water supplies

Cons

- Requires permits to be transferable which would be unprecedented for the District.
- Commoditization of permits and the increased value could impede and complicate future District efforts to manage or reduce authorized pumpage by more conventional regulatory means (such efforts may be viewed as affecting commodity value)
- Active trade necessary for achieving objectives will not likely occur because:
 - Trade rules necessary to prevent unintended consequences and provide permitted pumpage reductions may be overly complicated and burdensome to allow a relatively active market
 - Market would be too small because of limited area and population of permit holders
 - There is not sufficient “room for a deal” because there is not the requisite variety of uses to allow low value (e.g., agricultural) to high value (e.g., public water supply) trade
- Requires District resources to record, track, account for transactions, and enforce trade rules
- Could be administratively burdensome when involving potentially complicated permit adjustments
- Voluntary nature of transactions limits reliability and timing of pumpage reductions
- Permanent permitted pumpage retirement would reduce District revenue and operating budget, at least under the existing fee structure.

Expand Temporary Transfer Permit Program

For all intents and purposes, a very limited form of cap and trade is currently permitted by the District via Temporary Transfer Permits (TTPs). However, TTPs are limited to agreements between public water supply (pws) Historical permit holders (suppliers) and other non-pws Historical permit holders (receivers). Transfers are only allowed during a Stage IV Exceptional Drought or Emergency Response Period. The maximum transferable volumes are also limited to only 75% percent of the suppliers’ ERP curtailed volume. The receivers are limited to a volume equivalent to the difference between curtailed Stage IV Exceptional Drought or ERP pumpage and the curtailed Stage III Critical Drought pumpage. Currently, no one has applied or seriously considered transfers via a TTP, probably owing to the restrictions, practical limitations, and limited benefit provided by such arrangements. The proposed strategy would involve an expansion of the Temporary Transfer Permit program by relaxing some of the current restrictions to increase participation. The practical utility of a TTP could be enhanced by:

- Allowing for use beginning in Stage III Critical Drought
- Increasing transferable volumes to a maximum of the volume authorized under the receiver’s production permit during Stage II Alarm Drought (80% of permitted volume)
- Allowing for transfers between *any* Historical permit holders within the same management zone
- Allowing Conditional permittees to participate as receivers

Fewer restrictions will increase likelihood of participation. Increased participation would allow for a net reduction in the EDWL realized from the 25% reduction (i.e., 75% limit on suppliers transferable volume) required in all transactions. The District's role would be to record transactions by modifying UDCPs of both the supplier and receiver to reflect the adjustments.

Pros

- Allows reductions of permitted pumpage from the 25% of all transactions dedicated to aquifer benefit during drought
- Allows voluntary transactions initiated by willing suppliers and receivers
- Rewards permittees that have surplus permitted pumpage as a result of reductions in demand, efficiency improvements, or diversified water supplies

Cons

- As with Cap and Trade, market size and activity may not be sufficient to achieve permitted pumpage reduction objectives
- Restrictions may still be too limiting to encourage enough participation to realize significant permitted pumpage reductions
- Number of eligible suppliers with surplus supplies are likely to be limited
- Voluntary nature of transactions limits reliability of permitted pumpage reductions
- Requires District resources to record, track, and account for transactions.
- Could be administratively burdensome when involving potentially complicated permit adjustments

Cap and Retire

A cap and retire program would be very similar to cap and trade except that no permitted pumpage actually changes hands. That is, only transactions that result in a reduction of permitted pumpage would be allowed. In cap and retire transactions, compensation would be provided to a permit holder for purposes ranging from permanent permit retirement to payment for increase curtailments during extreme drought. Buyers could include anyone that had an interest in minimizing pumping during droughts to preserve springflows or to ensure water supplies of existing permittees in vulnerable areas. Potential participants might include the City of Austin, the Hill Country Conservancy, or even the District among others.

The District's role would be to record transactions by committing all retired permits to the Conservation General Permit or by modifying UDCPs to reflect temporary drought-specific arrangements. District investment in terms of resources and time would be relatively minor compared to other market approaches, based on the assumption that transactions are likely to be less complicated.

Pros

- Allows voluntary transactions initiated by willing buyers and sellers
- Avoids the time, expense, and resource allocation needed for more conventional regulatory approaches
- Transferable permits are not required, therefore, District rules and the long-standing precedent of non-transferable permits is not affected
- Does not require development, implementation, and enforcement of new trade rules associated with Cap and Trade
- Transactions will likely be less complicated requiring fewer District resources for recording and accounting.

Cons

- As with Cap and Trade, market size and activity may not be sufficient to achieve permitted pumpage reduction objectives
- Further restricting transactions to not allow transfer of permitted pumpage could substantially limit participation in transactions
- Number of possible buyers and funds for transactions are likely to be limited
- Voluntary nature of transactions limits reliability of permitted pumpage reductions
- Permanent permitted pumpage retirement would reduce District revenue and operating budget.

Advance Conservation Commitments

This strategy would involve reimbursement of all or a portion of water use fees to permittees that agree in advance to voluntarily reduce permitted pumpage beyond mandatory requirements. This program would be administered similarly to the Conservation Credits program but would allow for up to full reimbursement of water use fees for the volume of water permitted in the prevailing UDCP during drought. Reimbursement would be contingent upon 1) a commitment in advance that the permittee would voluntarily increase curtailment levels or cease pumping during drought months for the term of the agreement (terms could be from 1-5 years) and 2) verification that the agreed pumpage reductions were achieved at the end of the permit term. Credits would be equal to volume of pumpage reduced relative to authorized monthly baseline volumes during months of a District-declared drought and would be negotiated for terms of 1-5-years.

The District's role would be to verify compliance with the agreements at the end of each fiscal year as part of the conservation credit analysis and issue credits as appropriate.

Pros

- Allows for voluntary participation as opposed to more conventional regulatory approaches
- Is a modification of a currently existing District program
- Provides alternative to those permittees that may be inclined to "use it or lose"
- Rewards those permittees that have ceased or reduced pumping for other reasons

Cons

- Reductions in permitted pumpage may vary from year to year depending on permittee participation
- Voluntary nature of agreements limits reliability of permitted pumpage reductions
- Requires additional District resources to record, track and account for transactions
- Would increase administrative work load and add complexity to the annual conservation credit assessment
- Widespread participation and the associated reimbursements could reduce District revenue and operating budget. Having agreements in advance, however, may allow the District to plan for known amount of possible reimbursements

Regulatory/Permitting-Based Strategies

The BSEACD, as a Texas Groundwater Conservation District, is enabled by §36 of the Texas Water Code and §8802 of the Special Districts Local Laws Code with the authority to manage the groundwater resources within its jurisdiction. This authority is typically realized through the development of the District's Management Plan and the Rules and Bylaws. As a political subdivision of the State, the conventional approach to groundwater management is through permitting of nonexempt wells and the imposition of production limits with an emphasis on further production limits or curtailments imposed during drought conditions. The District has implemented its authority by capping firm-yield Historical permitted pumpage and by developing drought management rules requiring substantial pumping curtailments (figure 1) and prohibiting waste and proscribed use.

Conventional regulatory strategies are the mainstay of the District's management tools and have proven to be effective. Effective regulation, however, is contingent on reasonable and rational regulations and more importantly, the consent of the governed. The following strategies should be considered within the context of whether 1) explicit or established implicit authority is in place, 2) the rules have a sound basis and rationale, and 3) the regulations are reasonable. These strategies are also generally based on authorized use, not actual use; such a basis is consistent with the District's current regulatory approach and also with the typical situation that actual water use reported by District permittees approaches authorized use during prolonged extreme drought.

"Right-Sizing" Production Permits - Permanent

This strategy involves reinstating and expanding the scope of the District's under-pumpage analysis and making permanent adjustments to permitted pumpage based on the results. The annual under-pumpage analysis had previously been suspended indefinitely as a result of the capping of firm-yield permitted pumpage with the creation of Conditional Permits in 2004. The program was suspended recognizing that new Historical permit amendments were no longer available and that reductions in Historical permitted pumpage were permanent and could not be undone.

This strategy would expand the analysis to also “right-size” permits to ensure that permitted volumes are commensurate with reasonable demand. Reasonable demand would be determined based on regional water use standards, system size, and efficiency standards for each water use type (e.g. public water supply, irrigation, industrial, etc.). Permitting to the actual reasonable demand has been a well-established policy and such permit adjustments would be consistent with that policy. Adjustment resulting from reasonable demand assessment could be announced with a phase in period (e.g. 2 years) for those that need time to make improvements to meet efficiency standards. The volume of reduced permitted pumpage would be retired and committed to Conservation General Permit.

The District’s role in this strategy would require a periodic (e.g. annual) analysis of permitted pumpage relative to actual pumpage and/or reasonable demand and public hearings to allow permittees to contest any proposed reductions.

Pros

- Would allow permanent reductions in permitted pumpage and the EDWL that would not vary from year to year
- Permitting to the actual reasonable demand is consistent with long-standing District policy
- Recognizes that historic use based on inefficiency and waste does not have to be continued and permitted by District in perpetuity
- Adjustments based on the reasonable demand could be technology forcing resulting in improved efficiency
- Would have secondary benefit of compelling real conservation measures to comply with drought curtailments rather than compliance as a result of a “padded” permit

Cons

- Volume of permitted pumpage reductions uncertain prior to analysis
- Sends “use or lose it” message for permit adjustments resulting from “under-pumpage” and may encourage full utilization of permitted volume even if not necessary
- Reductions would be permanent adjustments of pumpage that would no longer be available if permittee experiences growth or future increases in demand
- Proposed reductions may be contentious and may generate animosity between the District and permittees
- Performing analysis, preparing for hearings, and other related tasks would increase the District workload
- Permanent permitted pumpage retirement would reduce District revenue and operating budget, at least under existing fee structure.

“Right-Sizing” Production Permits with Reservation Permits – Temporary

This strategy would also involve permit adjustments resulting from the reinstated and expanded under-pumpage analysis in order to “right-size” permits based on the actual use and reasonable demand. The significant difference would be that the adjustments would be temporary rather than permanent. The volume of the permit adjustments would be committed to a Reservation permit for each permittee and released back to permittee if or when a sufficient demonstration of system growth or increased need in actual demand has been provided. The reservation permits would also be renewed annually with the Production permits at a reduced fee (e.g., \$0.10/1,000 gallons). Alternatively, the permittee could choose to relinquish or donate the Reservation permit volume which would then be committed to the Conservation General Permit. This strategy could also work with one of the market-based strategies that would allow the reserved amount to be purchased for retirement or for trade minus the requisite percentage for the transaction.

The District’s role in this strategy would require a periodic (e.g. annual) analysis of pumpage and/or reasonable use and public hearings to allow permittees to contest any proposed reductions. The District would also be required to issue and renew Reservation permits and to review all requests for release of permitted pumpage held in Reservation permits.

Pros

- Permitting to the actual reasonable demand is consistent with long-standing District policy
- Recognizes that historic use based on inefficiency and waste does not have to be continued and permitted by District in perpetuity
- Adjustments based on the reasonable demand could be technology forcing resulting in improved efficiency
- Would have secondary benefit of compelling real conservation measures to comply with drought curtailments rather than compliance as a result of a padded permit
- Adjustments are not permanent and allow for access to reserved permitted pumpage with demonstration of increases in demand

Cons

- Volume of permitted pumpage reductions uncertain prior to analysis
- Reductions in accessible permitted pumpage may vary from year to year as permitted pumpage in reservation permits is released and re-permitted
- Sends “use or lose it” message for permit adjustments resulting from “under-pumpage” and may encourage full utilization of permitted volume even if not necessary
- Proposed reductions may be contentious and may generate animosity between the District and permittees
- Performing analysis, preparing for hearings, and other related tasks would increase the District workload
- Reduced water use fee for Reservation permits would reduce District revenue and operating budget, at least under existing fee structure.

Proportional Adjustment

This strategy would involve an across-the-board reduction of all firm-yield Historical permits by the proportion necessary to comply with the MAG (5.2) and preserve the DFC (6.5 cfs).

Proportional adjustments to all Historical permit holders would serve to evenly distribute the adjustments such that the reductions are minimally felt and shared by all. The adjustments could be in the form of permanent reductions to annual permitted pumpage volumes that would result in the necessary reduction of the EDWL. This would allow the reductions to be distributed throughout the drought stages with the maximum MAG-level curtailments being reached with the deepest levels of curtailment (40%) during Stage IV Exceptional Drought. Reductions could be announced in advance and phased-in in accordance with a pre-determined schedule to allow time for permittees to make necessary accommodations (e.g. total % of reduction divided into 3-4 increments phased in every 3-5 years).

Alternatively, the adjustments could be reserved as an emergency measure to be implemented only during an ERP. This would allow for regular curtailments of unadjusted annual permit volumes through the initial drought stages but would require a more drastic reduction to achieve the MAG during ERP. The reductions may later be proportionally readjusted back up if the EDWL is reduced to beneath the MAG and pumpage is available for permitting.

The District's role would be to establish rules defining the proportional adjustment levels and any scheduling or phasing if implemented over time. The District would also be responsible for recording adjustments, requiring an update of all UDCPs, and for implementation and enforcement of reduced permit volumes.

Pros

- Proportional adjustments to all Historical permit holders would serve to evenly distribute the adjustments such that the "pain" is minimally felt and shared by all
- Would effectively reduce the EDWL to the MAG satisfying groundwater planning obligations

Cons

- Reductions necessary during the deepest stages of drought may not be realistically achievable, particularly by permittees that are permitted very close to actual demand
- Preservation of the DFC may not be achieved if MAG-level curtailments are not realistically achievable
- Adjusting all permits, updating all UDCPs, and enforcement of increased curtailment levels (that may not be realistically achievable) would require significant dedication of District resources and time

Mandatory ERP Curtailments

Current District rules require a maximum curtailment of 40% of permitted pumpage during Stage IV Exceptional Drought. This strategy would involve an increase in mandatory curtailment levels to 50% for all nonexempt Historical permit holders with declaration of an ERP. To increase drought curtailments would require a rule change and modification of every District UDCP. The District's role would be to develop revised UDCP templates and target volume drought charts and oversee the update of all UDCPs.

Pros

- Would reduce the EDWL to the MAG satisfying groundwater planning obligations
- Is consistent with the increasing curtailment levels as drought severity increases and reflects the severity of an Emergency Response Period, the deepest District drought condition

Cons

- Increased curtailments may not be realistically achievable, particularly for permittees that are permitted very close to actual demand or that do not have discretionary water use that is more easily curtailed
- Preservation of the DFC may not be achieved if increased curtailments are not realistically achievable
- Requiring an update of all UDCPs and enforcement of increased curtailment levels (that may not be realistically achievable) would require significant dedication of District resources and time

Summary

The strategies presented do not represent an exhaustive list of options but are more of a sampling of proposed strategies that are not currently utilized by the District; they range over the gamut of probable efficacy and feasibility. None are likely to provide a silver bullet but some combination of these, after being fully vetted and developed, may serve to facilitate the District's efforts in developing a plan and allocating the resources necessary to satisfy the District's obligations to preserve the DFC.