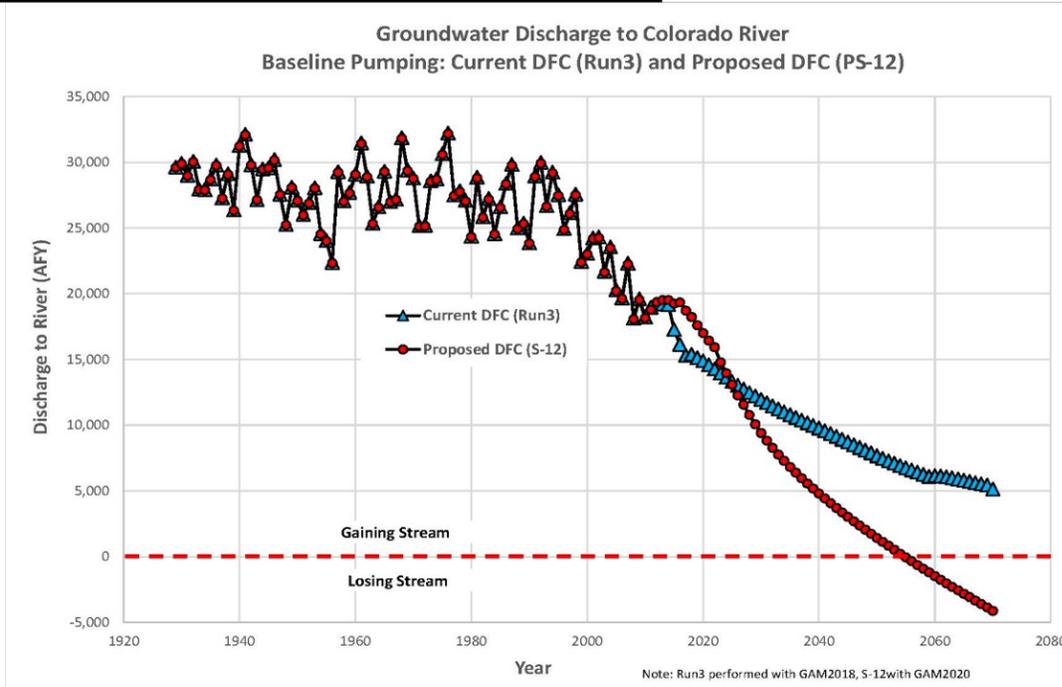


I. IMPACTS OF PROPOSED DFCs ON SURFACE WATERS



IMPACT OF PUMPING ON OUTFLOWS TO MAIN STEM COLORADO RIVER

Adopted 2017 DFCs vs. Proposed DFCs:



Predicted reduction of discharge of groundwater into the mainstream Colorado River due to Current DFC Run 3 and Proposed DFCs S-12 (George Rice, New GAMs).

This graphic represents the impacts that are predicted by the new GAM. The graph shows the relationship between the pumping associated with each DFC and the impact on outflows to the Colorado River

- Blue is the Currently Adopted 2017 DFCs as depicted by Run 3 using the NEW GAM.
- Red is the Proposed DFCs based on Scenario S-12.
- The Historical Calibration period is from 1930 to 1995
- The Developmental Period is 1995-2070
- Gaining Stream vs Losing Stream Redline

Comparing the two runs we see that the greater the amount of groundwater being pumped, the greater the reduction in discharge from the aquifers to the main stem of the Colorado River. This trend toward reversing the groundwater-surface water relationship over the next 50 years is undisputed. This is an example of how the model serves to demonstrate the difference between these two runs, in this case the two DFCs. The key difference is that the Current DFCs do not cause the relationship between the river and the aquifer to reverse, whereas the S-12 Scenario causes the river to change from a gaining to a losing stream somewhere in the 2050-60 timeframe.

IMPACT OF PUMPING ON OUTFLOWS TO MAIN STEM COLORADO RIVER

Discharge to Colorado River - AFY (1)				
Year	Pre- Development	Early Pumping	Current DFC	Proposed S-12
1930	29,600			
1995	27,500			
2011		18,700		
2070			5,150	-4,100
Change from 1930	-2,100	-8,800	-22,350	-31,600
	-7%	-37%	-83%	-114%

(1) Data From Rice Current vs Proposed DFC Graph

This table gives a quantitative view of the predictions from an historic perspective. It is very clear that the early pumping -- from around 1995 to 2011 -- caused considerable impact on the river; about a 37% decline in discharge to the Colorado River compared to 1930. Following that early unregulated pumping time period is the Current DFC time period. This is the regulated joint-planning phase where desired future conditions are being established. In the currently adopted DFCs column the predicted decrease in discharges to the Colorado River is whopping *83% less discharge* than the historical outflows.

In the Proposed DFCs column, the predicted decrease in discharge is an additional 31% more that the Current DFCs. This results in a devastating *114% less discharge than historic flows and reverses the relationship between the river and the aquifers.*

- Whereas the quantity of pumping in the 2017 adopted DFCs is predicted to cause a significant decrease in outflows to the river; an impact that may be unreasonable in-and-of itself,
- The Proposed DFCs are predicted to decrease outflow to the point that the Colorado River **LOSES** water to the aquifers. **This is an impact that Environmental Stewardship sees as a *bright line between what is reasonable and what is unreasonable.***

Hydrologically, this is a complete reversal in the flow of groundwater and surface water relationship. At this point the river starts contributing water to the aquifer on an on-going basis. This sets up hydrological conditions for the RIVER could go dry during drought periods. But more certainly, it sets up condition where the river will lose its biological and ecological resilience that enables it to bounce back to being an ecologically sound environment after a serious drought.

The Proposed DFCs based on Scenario Run S-12 cross the bright line and are unreasonable.

At the December 2020 GMA-12 meeting, Environmental Stewardship provided the GMA Representatives with the results of an analysis of the impacts of current and proposed pumping on the Colorado River from the perspective a surface water scientist - Joe Truangale – using surface water modeling techniques. Mr. Truangale

used the environmental flow standards as a means of evaluating the impact of reduce groundwater discharges to the Colorado River.

This evaluation also predicted unreasonable impact of groundwater pumping on the Colorado River.

Senate Bill 3, the basis for the environmental flow standards, established that maintaining the biological soundness of the state's surface waters is of great importance to the economic health and general well-being of Texans.

In summary:

- The Colorado River at Bastrop and below is fully appropriated to surface water right holders. As such, ***any decrease in flow due to reduced groundwater discharge will negatively impact these permit holders.***
- ***Such reductions in flow also impact the ecological health of the river and its ability to recover from drought conditions.*** As you might recall, the lower Colorado basin was intensively studied during the LCRA/SAWS project by many different scientists and engineers. These were major studies making this basin one of the most studied basins in the State. Based on these studies instream flow standards were set at several gages on the river – including Bastrop. The intent is that these standards be maintained at recommended frequencies year round.
- These standards are not being met at recommended frequencies, and ***any reduction in flow due to groundwater pumping will likely result in future reductions in these frequencies, damaging the ecology of the river. Such damage to the ecology of the river is a trend in the wrong direction, and we consider this to be an unreasonable impact.***

Environmental Stewardship has demonstrated, from a groundwater availability perspective and from a surface water availability perspective, that the predicted pumping will likely result in *unreasonable* impacts to the Colorado River. Certainly, the Proposed S-12 DFCs cross the line into unreasonable territory and should be *rejected*. If not outright rejected, the potential of unreasonable harm must be recognized and dealt with.

As such, it is our view that the only reasonable option is to *reject* the Proposed DFCs and *remand* the process back to the GMA Representatives to develop DFCs using the Currently Adopted DFCs as the basis for setting DFCs that are not predicted to cross this hydrologically and ecologically unreasonable line of impact.