BIG BEND G.M.D.#5

Orrin Feril, Manager
125 South Main Street
Stafford, Kansas 67578
ph: (620) 234-5352
fx: (620) 234-5718
gmd5@gmd5.org
www.gmd5.org

September 9, 2016

Brian Caruso
Department of the Interior
PO Box 25486, DFC
Denver, CO 80225-0486

Proposed Scope of Work
for Augmentation

Dear Mr. Caruso:

This letter and enclosed document were prepared to follow up on our mutually beneficial discussion of August 22, 2016 at Quivira National Wildlife Refuge headquarters. On behalf of the board and staff of the District, we appreciate your willingness to participate in the process of crafting a sustainable solution for the Refuge. The District is committed to working through the issues at hand to develop a resolution that is reasonable, sustainable, and acceptable to all of the parties involved.

To this end, the enclosed document is intended to describe the framework for a solution that can achieve enhanced water management at the Refuge. We look forward to your review and comments on this document.

We greatly appreciate your time and consideration in this matter.

Sincerely,

Orrin Feril
Manager

Enclosure

cc: Project Leader, Quivira National Wildlife Refuge
Refuge Supervisor, CO/KS/NE
Rocky Mountain Region Solicitor's Office
Chief Engineer, Division of Water Resources
Water Commissioner, Stafford Field Office
WaterPACK

Stakeholder Proposal in Connection with USFWS Impairment Complaint

Prepared at the request of
United States Fish and Wildlife Service

September 08, 2016

Big Bend Groundwater Management District #5

Executive Summary

The United States Fish and Wildlife Service ("the Service") established the Quivira National Wildlife Refuge ("the Refuge") in the mid to late 1950s. The Refuge comprises 22,135 acres of both sandy grasslands and naturally occurring shallow saltwater marshes. These marshes are fed by the naturally occurring groundwater springs in the area and man-made canals that weave throughout the Refuge (Figure 1). The Refuge lies at a critical junction in the central flyway of North America. It provides forage and nesting habitat for several wildlife species throughout the calendar year.

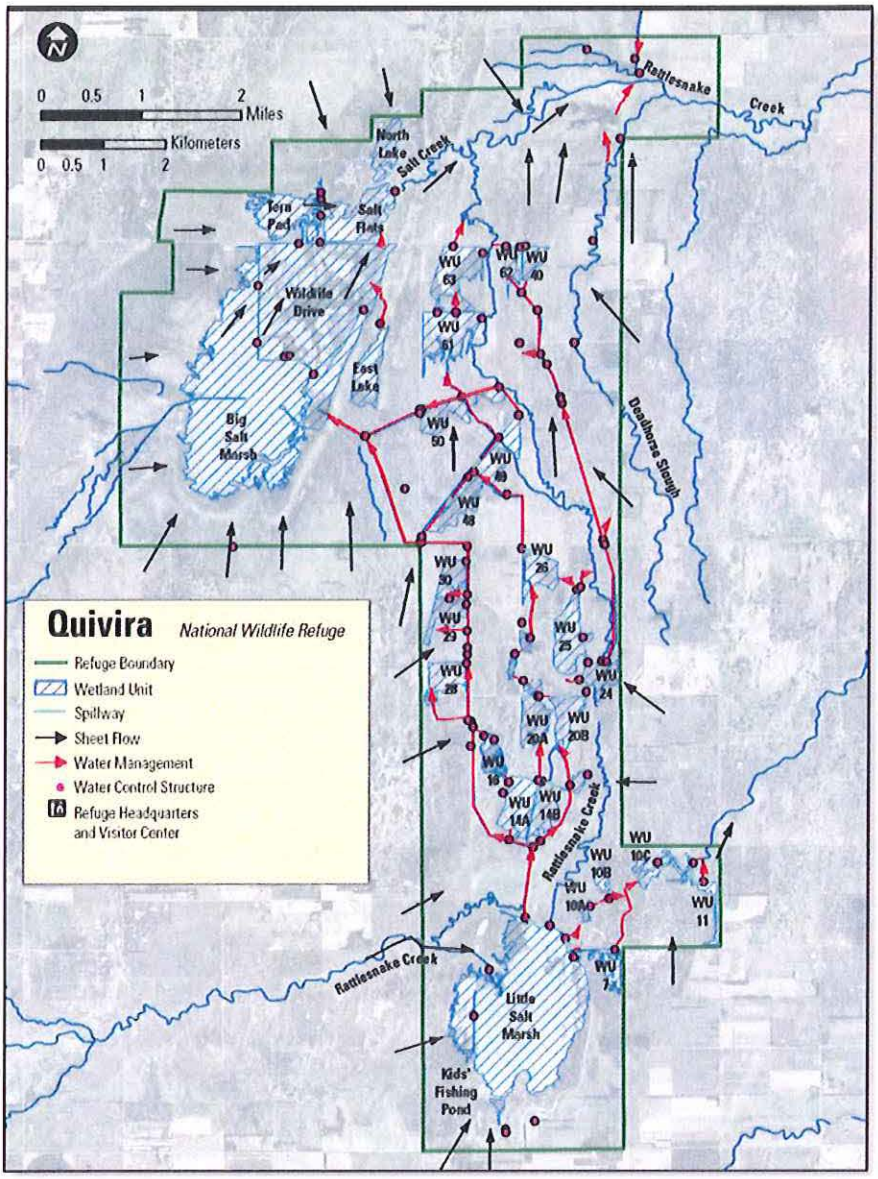

Figure 1 – Quivira NWR features
credit: *U.S. Fish & Wildlife Service*

The Refuge needs water to meet management objectives established under the 1929 Migratory Bird Conservation Act, 1929 Fish and Wildlife Act, and 1997 National Wildlife Refuge System Improvement Act. In addition to these Federal mandates, several state and

federal wildlife conservation plans are being fulfilled through the operation and maintenance at the Refuge. These Federal statutes and plans are laid out in the Service's Comprehensive Conservation Plan adopted in 2013. Additionally, the Refuge is a Ramsar Wetland of International Importance, a Western Hemisphere Shorebird Reserve Network site, and a Globally Important Bird Area. The Refuge has been recognized internationally as a location that should be preserved and maintained properly with the objective of providing suitable forage and habitat for a wide variety of avian species.

In order to secure its future with respect to surface flows on the Rattlesnake Creek, the Service needed to obtain a water right from the State of Kansas in the same manner as other water users in the state. In August 1957, the Service applied for 22,000 Acre-Feet ("AF") for recreation use throughout the Refuge. During the following thirty years, the Service worked to complete the diversion works and finalize the perfection of this water right. In April 1996, the Chief Engineer for the Kansas Department of Agriculture – Division of Water Resources ("KDA–DWR") certified Water Right File No. 7,571 for an amount not to exceed 14,632 AF per calendar year at a maximum diversion rate of 300 cubic feet per second ("cfs"). In the cover letter accompanying the certificate, the Chief Engineer noted that "Kansas Water Law does provide a mechanism to prevent impairment of senior water rights, but that does not necessarily mean that the natural flow of a stream will continually be available for use when an appropriator desires, no matter what priority date the appropriator holds." This declaration applies to all water rights within the State of Kansas. Figure 2 shows the distribution of water right diversion points throughout the Rattlesnake Creek subbasin ("the subbasin").

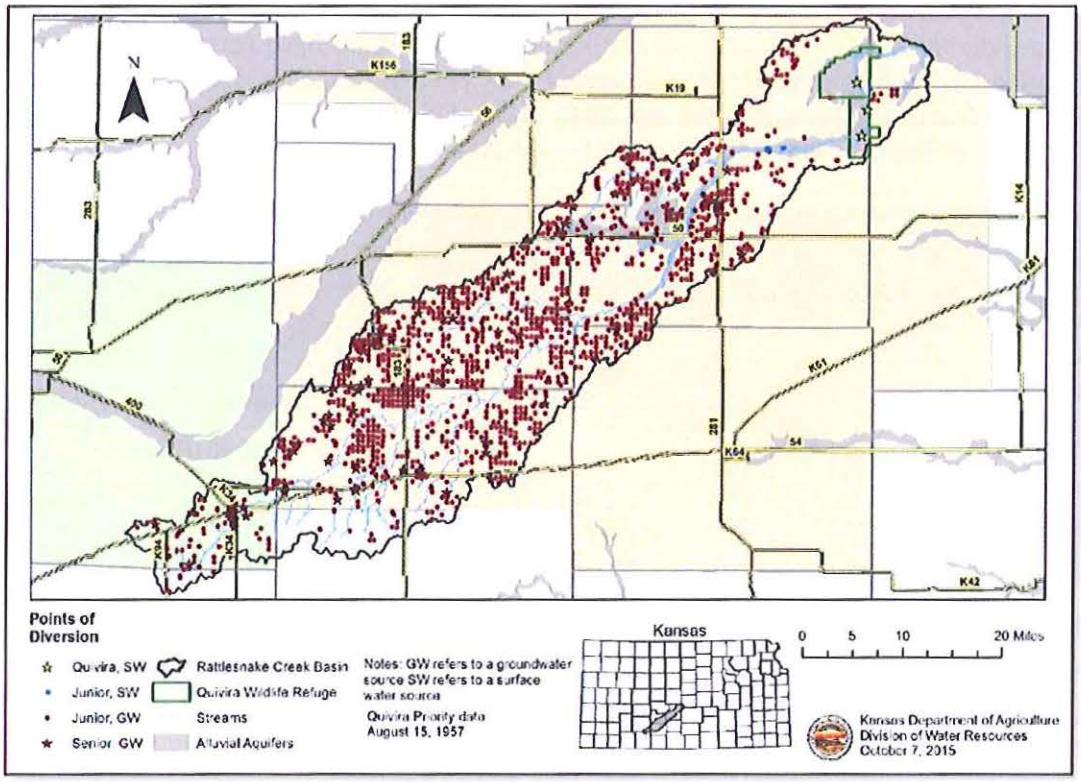

Figure 2 – Rattlesnake Creek Subbasin & Water Rights
credit: *Kansas Dept. of Agriculture – Division of Water Resources*

On April 8, 2013, the Service officially filed an impairment claim on the Rattlesnake

Creek against junior appropriators within the subbasin. The Service stated that junior appropriators were reducing the flows in the Rattlesnake Creek such that their use prevented the Service from exercising Water Right File No. 7,571. Following this filing, the Chief Engineer and KDA-DWR staff began investigating the hydrologic effects of junior pumping on the subbasin. The District's hydrologic model was used to conduct this investigation in addition to further discussions with Service staff regarding water management at the Refuge. In July 2016, the Chief Engineer published the final report detailing the investigation.

Technical Evaluation of Options

The following overview will explore a few solutions that could be utilized to craft a reasonable and sustainable remedy to the Rattlesnake Creek impairment report. It should be noted that several points in the following sections are based on preliminary data that will need further study to determine the accuracy and viability.

1. Augmentation

In 2014, Governor Sam Brownback signed into law a provision specific to the Rattlesnake Creek subbasin to "allow augmentation for the replacement in time, location and quantity of the unlawful diversion, if such replacement is available and offered voluntarily." This legislation had overwhelming supporting testimony from several groups from across the State that resulted in unanimous action from the Kansas legislature to approve this bill. The concept of augmentation is to utilize the aquifer underground as a reservoir to supply water to the stream in times of shortage. In many cases, augmentation is used as a short-term tool to supply water while other long-term solutions are developed and implemented. There have been several studies on augmentation within this subbasin in the past: (1) the 1998 Burns & McDonnell study, (2) the 2006 Kansas Water Office study, (3) the 2015 KDA–DWR study, and (4) the 2016 District study. The key differences between these studies are shown below in Table 1.

Study	Wellfield Location	Annual Capacity (AF)	Pump Rate* (gpm)	Delivery Rate (cfs)	Water Quality (Cl^- ppm)	Frequency	Delivery Location
Burn & McDonnell	West Edge of Refuge	500 – 2000	800	8 – 42	< 1925	50% of year as needed	Stream West of Refuge
KWO	West Near Hwy 281	1000 – 2000 [1146]	--	21	Freshwater	5 out of 10 years	Stream West of Refuge
KDA	West Near Hwy 281	1200	600	6.7	N/A	Varied	Stream Near Hwy 281
District	East Edge of Refuge	1500	250	15	Same as LSM	As needed > -3.0 Palmer Drought	Defined by Refuge Staff
						* Proposed rate of diversion per well within wellfield.	

Table 1 – Historic Augmentation Studies
credit: *Burns & McDonnell, Kansas Water Office, KDA-DWR, Balleau Groundwater, Inc.*

In review of the various augmentation studies conducted within this subbasin, there are several key factors that need to be addressed. These include, but are not limited to: wellfield

location, wellfield capacity, pumping rate, delivery rate, water quality, delivery frequency, and delivery location. The District's latest hydrologic study utilizes a new approach to augmentation that re-evaluates each factor independently for sustainability, validity, and reasonableness.

While not all of the previous studies analyzed the same location west of the Refuge, none of them evaluated a wellfield location east of the Refuge. There are unique reasons for this that will have to be addressed by further studies. Historically, the water table on the east side of the Refuge is shallower and more stable. This makes the sustainability of the eastern wellfield more attractive. The water quality in the upper zones of the aquifer is very similar to the water quality already existing in the Little Salt Marsh. There are confining clay layers that help to prevent future up-coning of the poorer quality water. The water quality will further be protected by pumping the wellfield at a lower rate. Studies indicate that pumping in this area at or below 250 gpm will eliminate the potential for up-coning of poor quality water into the upper zones of the aquifer.

The current proposal is for the District to pay the cost to develop, construct, and operate a 15 cfs wellfield at or near the Refuge. Water can be delivered to various locations per the designation of Refuge staff. Water lines will be installed in a manner that will minimize any disturbance to surface lands and utilize already authorized right of ways where possible. The development of a 15 cfs wellfield, while maintaining the 250 gpm limit, is more economical than developing a 30 cfs wellfield. Future studies may indicate a need for a larger wellfield capacity that can be implemented in future phases of augmentation if required.

The proposal is to provide up to 1,500 AF of groundwater per year for use on the Refuge to meet or exceed the management objectives for maintaining forage and habitat. The quality of this water would fall within a specified range agreed to by the Service. Refuge personnel would "control the switch", so to speak—meaning they could pump water when and where it is needed. The authority for such water will be processed in the same manner as any other water right with KDA–DWR. This evaluation by KDA–DWR will further insure that there will not be an increase in consumptive use in the area and no degradation to the water quality of the upper aquifer. In times of severe drought, as defined by the Palmer Drought Index of -3.0 or less, augmentation will be scaled down to provide water to only those water management structures defined in the Service's water conservation plan as adopted in October 2000. As noted previously, further studies may be required as final quantities and rates are determined based on local test pumping and drilling logs.

The initial term of the agreement would be ten (10) years, which would allow the parties to revisit the terms and evaluate its efficacy after a meaningful period of observation. In no way does the current proposal of augmentation reduce or negatively affect the Service's certified water right. In any given year, the Service is entitled to divert up to 14,632 AF from the Rattlesnake. The addition of augmentation water provides an additional source of water to the Refuge that, to date, has been unavailable.

2. Administration

The lands upstream of the Refuge are utilized largely by modern agriculture practices. The subbasin is approximately 1,300 square miles in area covering parts of ten counties in the Great Bend Prairie region. The subbasin is comprised of sand-dune topography on which 1,680 water rights have been certified by KDA–DWR. Over 95% of all water diverted within the subbasin is junior in priority to Water Right File No. 7,571. The primary use of water within the

subbasin is irrigation from the groundwater resource. While the western half of the subbasin has experienced a loss in aquifer storage in recent history, the eastern half has seen minimal loss in storage in comparison. The difference between the east and west is the result of several factors including, but not limited to: a marginal increase in rainfall amounts; the aquifer is closer to land surface; and the water quality is less suitable for large scale agriculture. The reduction in aquifer storage does not necessarily indicate the water resource is in jeopardy. However, it means that the aquifer is not high enough to interact with the incised streambanks of the Rattlesnake Creek as frequently (Figure 3). This stream-aquifer interaction is the key factor in the impairment claim filed by the Service on April 8, 2013.

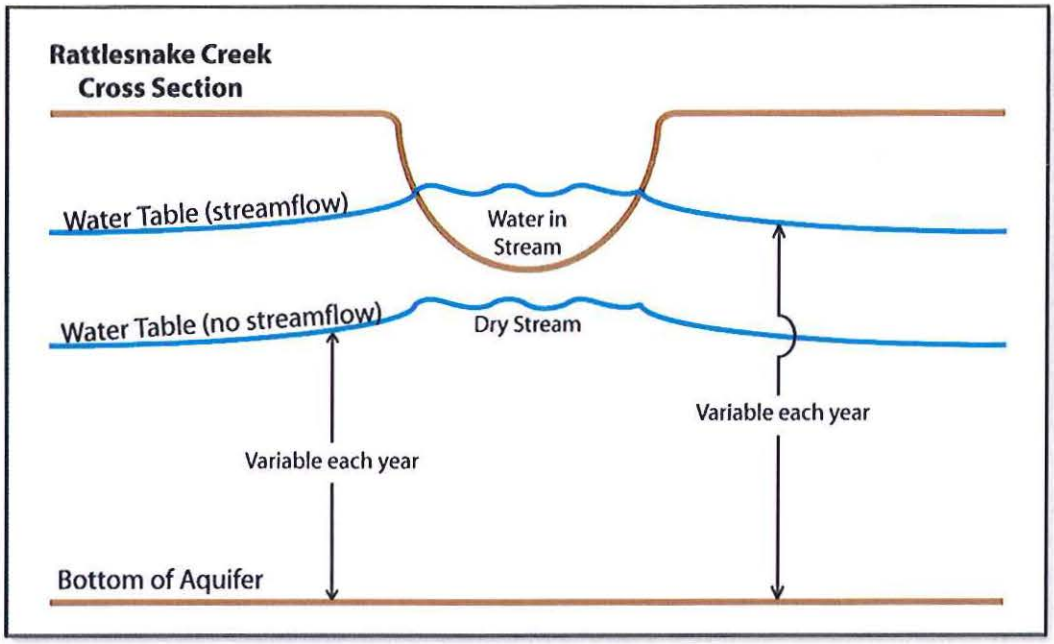

Figure 3 – Streambank Cross Section
credit: *WaterPACK*

In 2015, Balleau Groundwater, Inc., in cooperation with the District and WaterPACK, used the model to conduct a thorough review of the hydrologic impacts the Program would have made if the water use reduction goals were met for all objectives. This preliminary study indicated that a water use reduction of 27,345 AF would result in a net gain to the Zenith gage, upstream of the Refuge, of 2.3 cfs. The other component of this data is time. According to this analysis, it would take 12 years to achieve the net gain of 2.3 cfs to the Zenith gage.

WaterPACK estimated the economic impact of such a water use reduction within the subbasin to be approximately $88,320,000 in Fixed Asset Losses and an additional $8,413,860 in Revenue Losses annually. Kansas State University Agriculture Economics Department estimates that a dollar will circulate the local economy 5-7 times as a result of business revenue generation. When this is factored in, the annual loss to the economy would conservatively be $42,000,000. The methodology for arriving at these figures can be found in Table 2. Taking into account the time it would take to achieve 2.3 cfs gain to Zenith gage, the local economy would incur approximately $504,000,000 in lost revenue in 12 years.

Acre-Feet Reduced	Acre-Feet per Center Pivot (typical)	Center Pivots Affected by Reduction
27,000	195	138
Acres per Quarter Section	**Total Acres Converted (Center Pivots x Acres)**	**Land Value Differential (per Acre)**
160	22,080	$4,000.00
Total Loss of Land Value due to Conversion from Irrigated to Dryland		**$88,320,000.00**
Acres Irrigated per Center Pivot	**Irrigated Acres Reduced (Center Pivots x Irr. Acres)**	**Additional Revenue Per Acre for Irrigated vs Dryland**
130	17,940	$469.00
Annual Revenue Loss		**$8,413,860.00**

Table 2 - Projected Economic Impact
credit: *WaterPACK*

Request for Information from the Service

As counsel for the District explained during the August 22nd meeting, the District is unable to provide more specific siting information for the proposed wellfield without knowing whether the Service will approve the construction of wells and/or the laying of pipes on the Refuge itself. Therefore, the District needs to know as soon as possible whether any structures or pipes may be sited on the Refuge, and under what conditions.

Also during the August 22nd meeting, the District received the impression from Service representatives that the persons with the authority to decide whether any structures or pipes associated with augmentation pumping could be constructed on the Refuge were not in attendance. The District requests that the Service provide these individuals' names and contact information so that the District may include them in future communications concerning enhanced water management at the Refuge.

Conclusion

The task of developing a sustainable remedy for the Rattlesnake Creek impairment report is quite complex. The region in which the Refuge lays is predominantly sandy soils and overlays the rechargeable Great Bend Prairie aquifer. Groundwater well development throughout the past 50 years has had an impact on the aquifer to date. However, in the immediate vicinity of the Refuge, there is minimal development due to the high concentrations of chloride in the water. This creates an opportunity to craft a remedy that will supply the Refuge with suitable water for its needs via an augmentation wellfield. The monitoring of the water quality and quantity continues to be a top priority for the District.

In the near future, the District will work with other agencies and stakeholder groups to tackle the localized water depletions in the Great Bend Prairie aquifer. The District continues to be an advocate for conservative water use within the region. The Great Bend Prairie aquifer is a valuable resource that generates millions of dollars in revenue annually. While this resource has historically been utilized by the agricultural communities in the region, this proposal is designed to offer the same resource to the wildlife of the area.