# Draft Findings on Desired Future Conditions in GMA-7

Kinney County GCD Board Meeting

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# GMA-7 DFC
# Kinney County

In Kinney County, that drawdown which is consistent with maintaining, at Las Moras Springs, an annual **average flow of 23.9 cfs** and a **median flow of 24.4 cfs based on Scenario 3** of TWDB flow model

1. The stated DFC is a statistical indicator, **not** a hard cap on minimum spring flow.

2. The DFC is tied explicitly to annual **end-of-year** conditions in the model.

# 2021 Summary of DFC and Explanatory Report

- 2021 Summary of DFC

| | | | |
|---|---|---|---|
| Kinney | Edwards-Trinity (Plateau) | Total net drawdown in Kinney County in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an annual average flow of 23.9 cfs and an annual median flow of 23.9 cfs at Las Moras Springs | 8/19/2021 |

- 2021 Explanatory Report

a) Total net drawdown in Kinney County in 2070, as compared with 2010 aquifer levels, shall be consistent with maintenance of an annual average flow of 23.9 cfs and an annual median flow of 23.9 cfs at Las Moras Springs (Reference: Groundwater Flow Model of the Kinney County Area by W.R. Hutchison, Ph.D., P.E., P.G., Jerry Shi, Ph.D. and Marius Jigmond, TWDB, dated August 26, 2011).

# KCGCD Management Plan (2023)

The **KCGCD Management Plan confirms** that the GMA 7 DFC for Kinney County is expressed as an average and median Las Moras **Spring flow based on Scenario 3** of TWDB Draft GAM Task 10-027. The Plan reiterates that the **average flow of 23.9 cfs** and **median flow of 24.4 cfs** were calculated from a 56-year simulation under a constant pumping assumption and emphasizes that the simulated spring flow values **are end-of-year results**.

# Groundwater Pumping

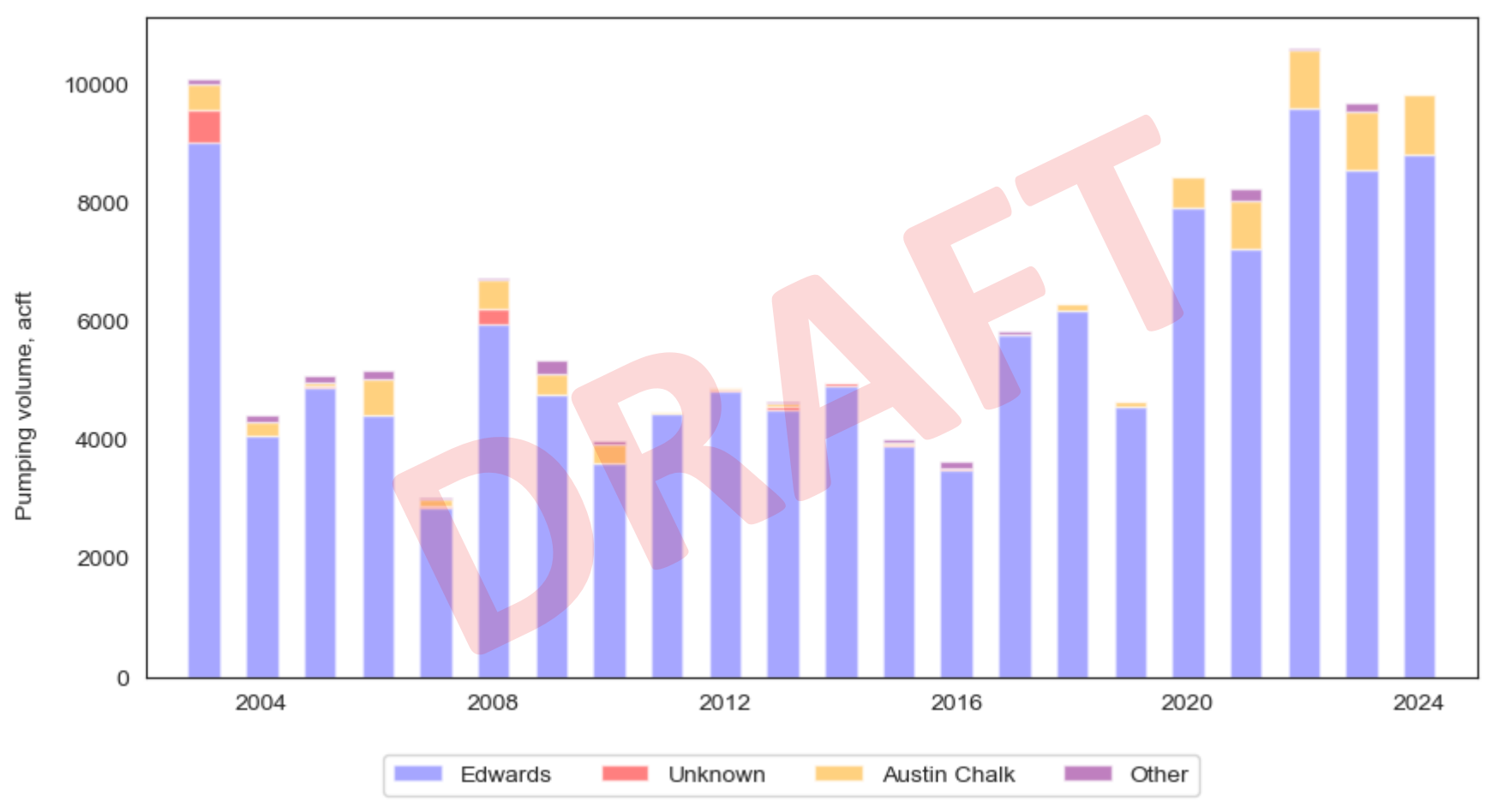



Figure 2. Annual groundwater (acre-feet per year) pumping by aquifer.

# Precipitation (cont.)

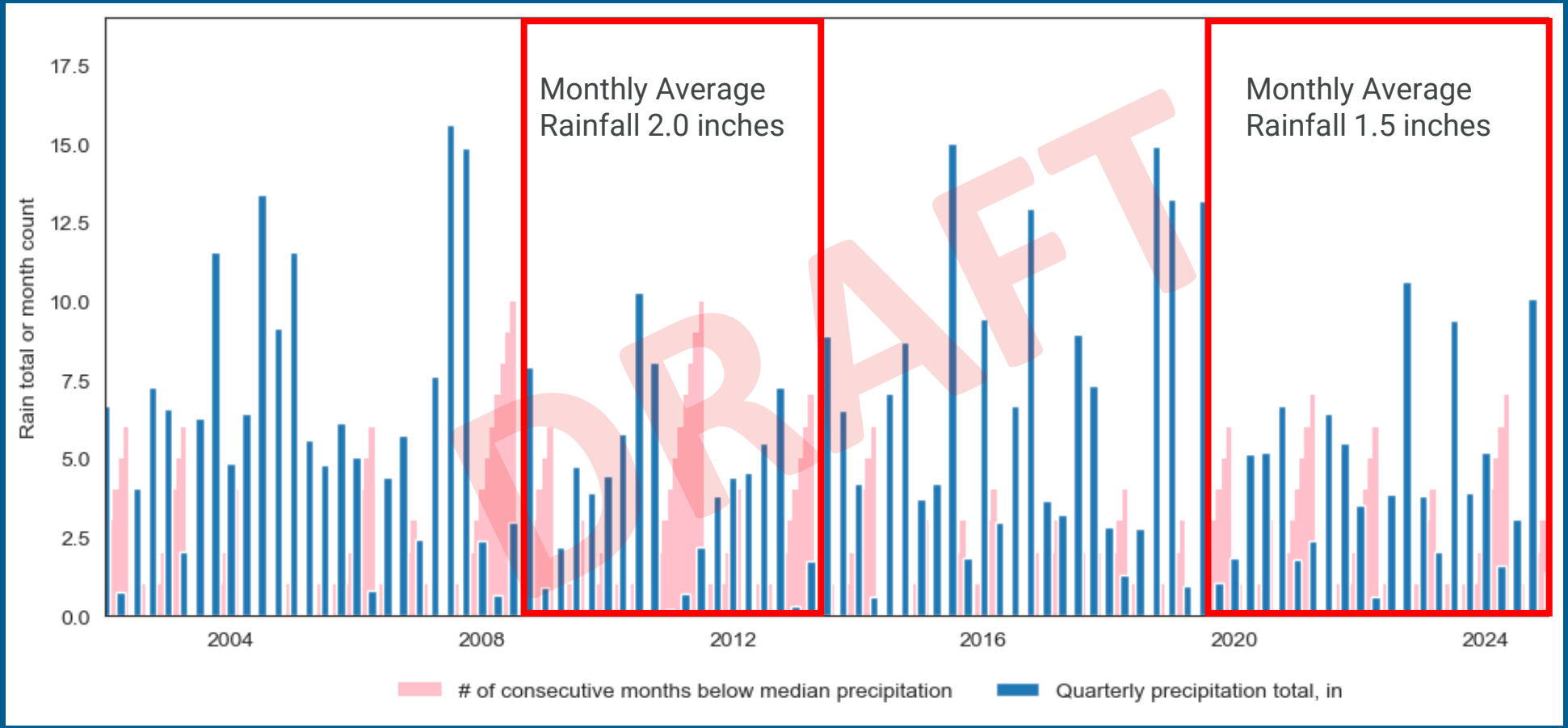



Figure 5. Quarterly precipitation totals and number of consecutive months below median precipitation.

# Las Moras Spring Discharge

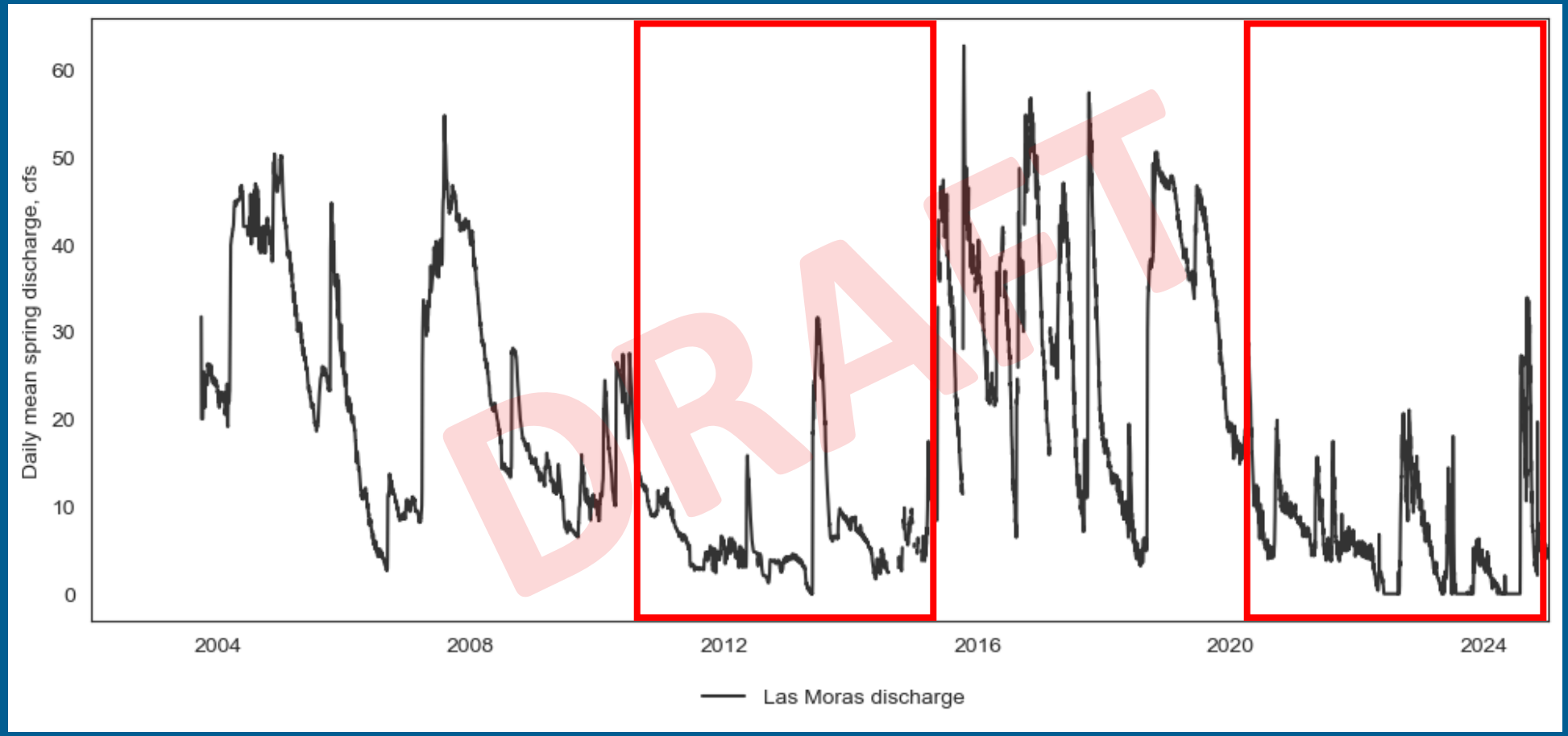



Figure 6. Las Moras Spring Discharge, 2023 to 2025.

# Distribution of Spring Discharge

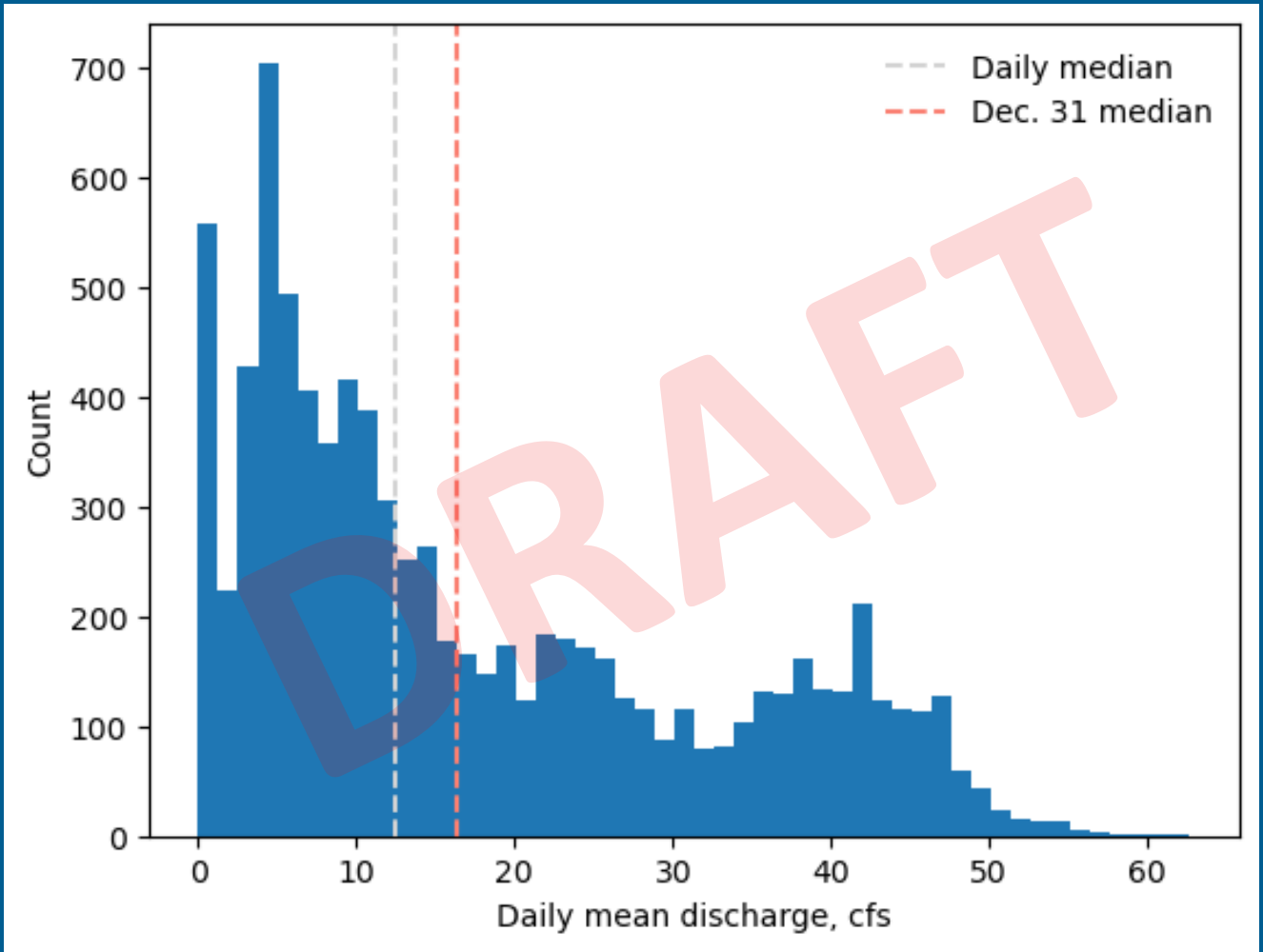



**Figure 7 – Distribution of daily mean discharge at Las Moras Springs for the period of record.**

# Las Moras Spring Discharge (cont.)

Table 4. Summary statistics of mean daily discharge at Las Moras Springs.

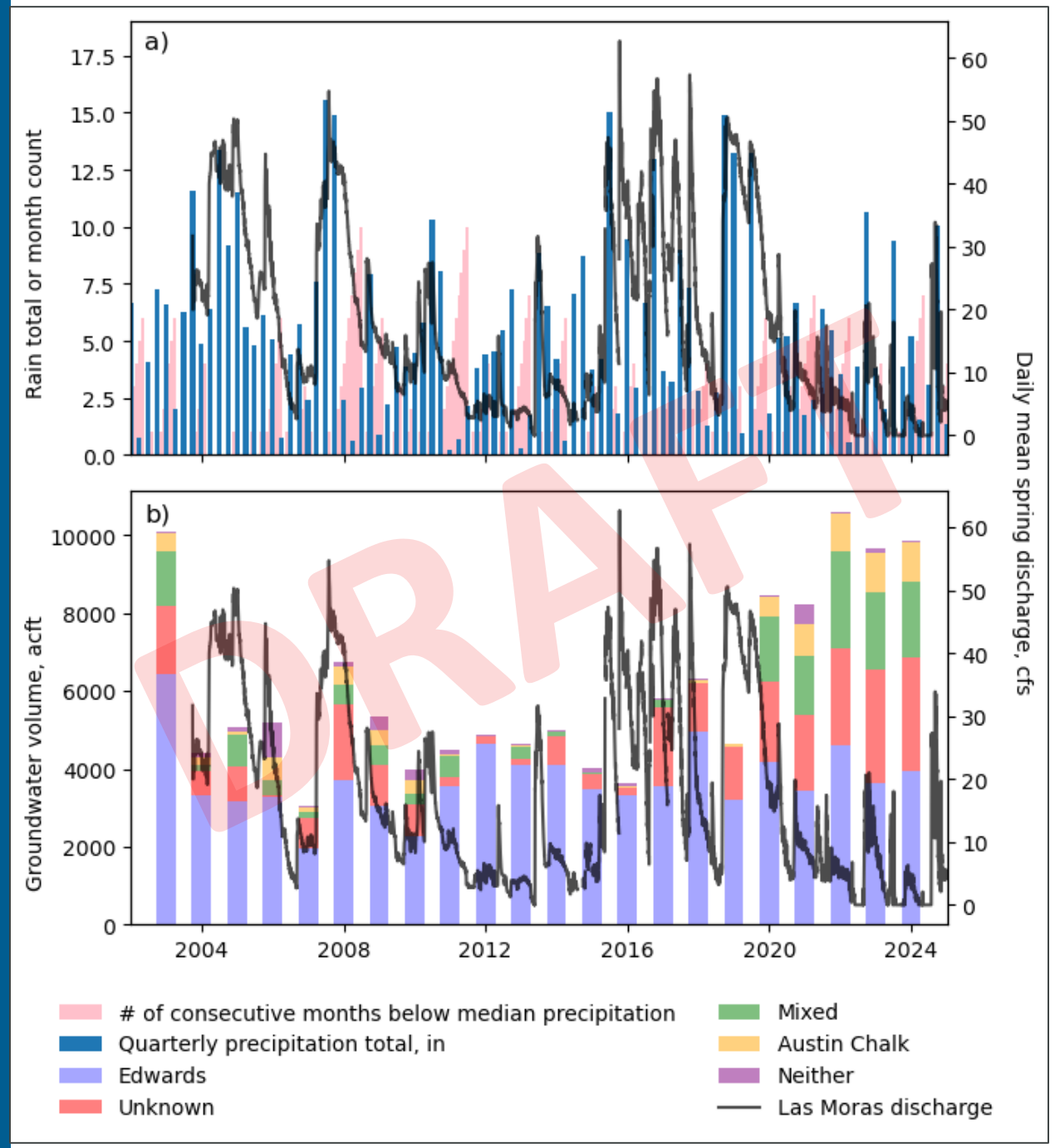
| | Period of record (1900 to 2025) | Kinney GAM 56-Year Period | Pre-2020 Pumping Period | Drought (2009 to 2015) | Increased pumping (2020 to 2025) |
|---|---|---|---|---|---|
| Minimum | - | - | - | - | - |
| Median | 12.50 | 26.7 | 17.60 | 5.07 | 7.23 |
| Mean | 17.62 | 28.51 | 21.12 | 7.04 | 8.91 |
| Maximum | 62.66 | 62.66 | 62.66 | 40.70 | 31.60 |



| | Period of record (1900 to 2025) | Kinney GAM 56-Year Period | Pre-2020 Pumping Period | Drought (2009 to 2015) | Increased pumping (2020 to 2025) |
|---|---|---|---|---|---|
| Minimum | 2.91 | - | 4.12 | 4.12 | 2.91 |
| Median | 16.34 | 21.35 | 19.06 | 6.49 | 5.61 |
| Mean | 20.67 | 23.08 | 21.95 | 7.12 | 6.62 |
| Maximum | 49.80 | 49.80 | 49.80 | 11.00 | 9.92 |

Table 5. Summary statistics of mean daily discharge on Dec. 31 for Las Moras Springs.

# Pumping Record Overlay

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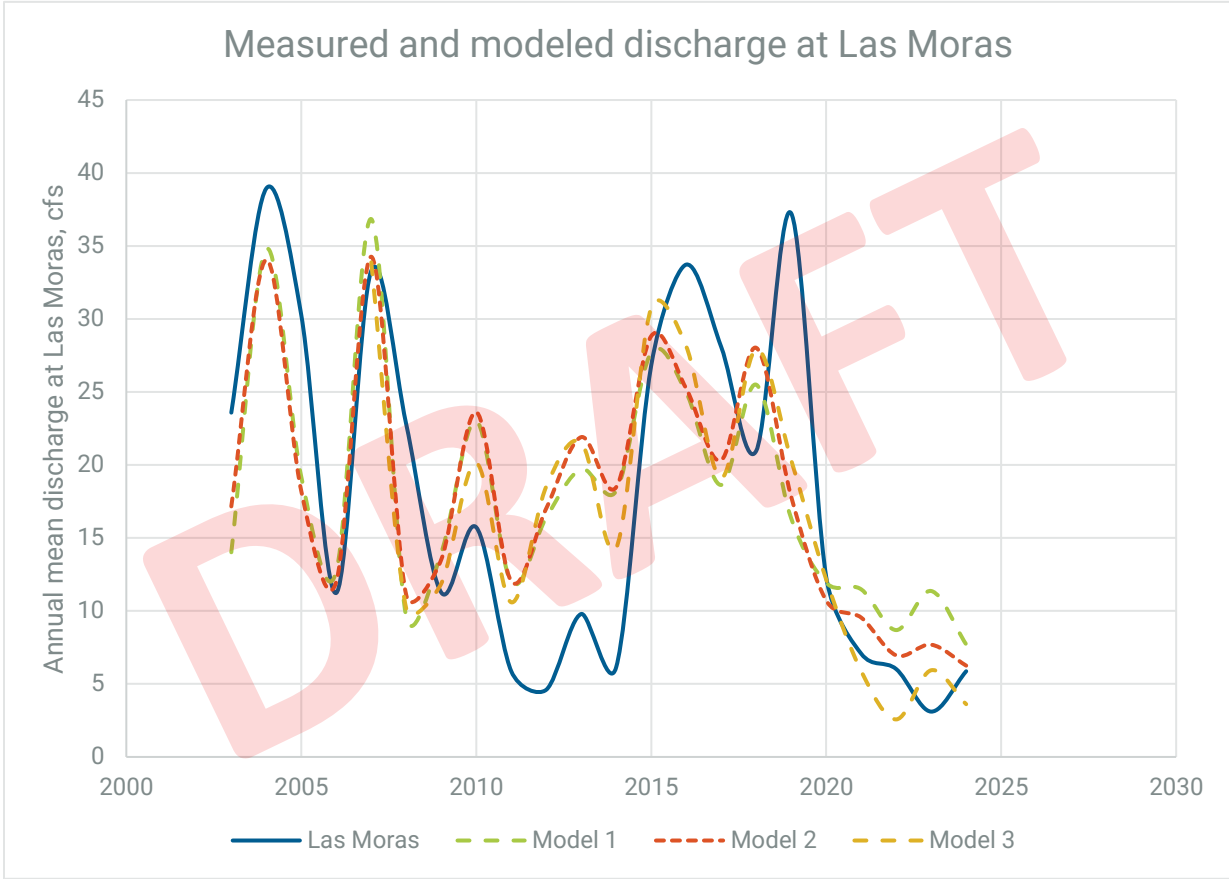
# Regression Analysis

## Approach 1: Multivariate Linear Regression Analysis

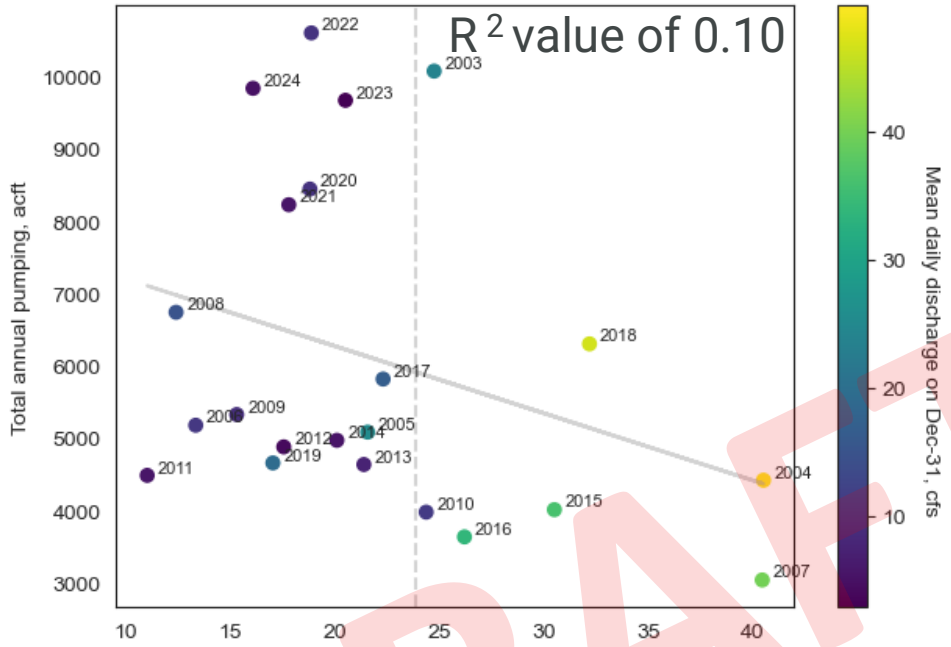
- Input variables annual precipitation and pumping
- Generated $R^2$ values between 0.3 and 0.5

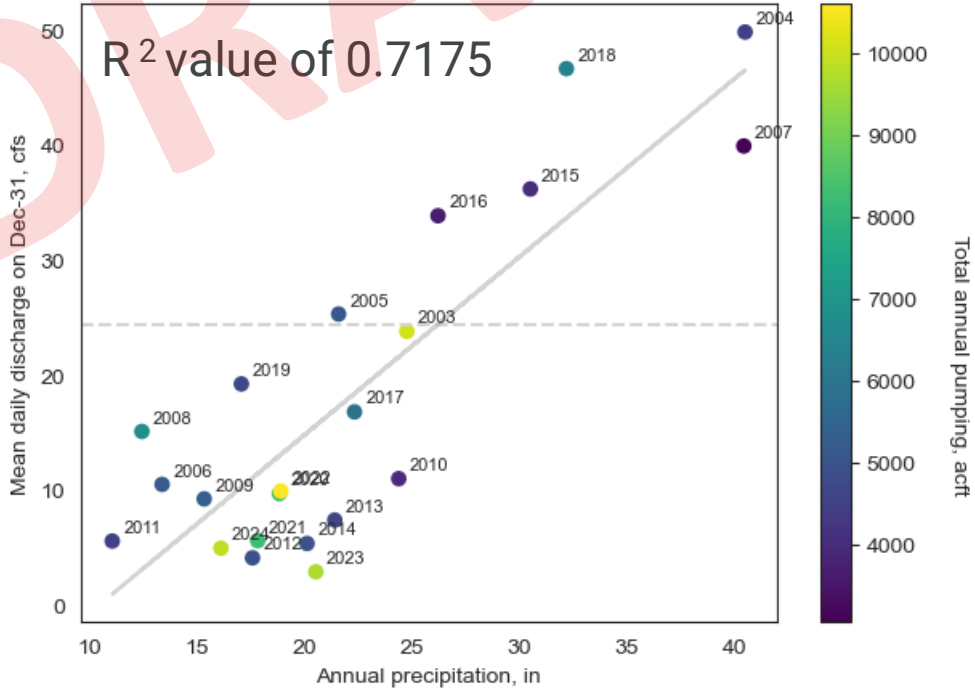


# Regression Analysis

## Approach 2: Linear Regression Analysis

- Input variables (a) annual precipitation (b) annual pumping
- Precipitation $R^2$ value of 0.7175
- Pumping $R^2$ value of 0.10



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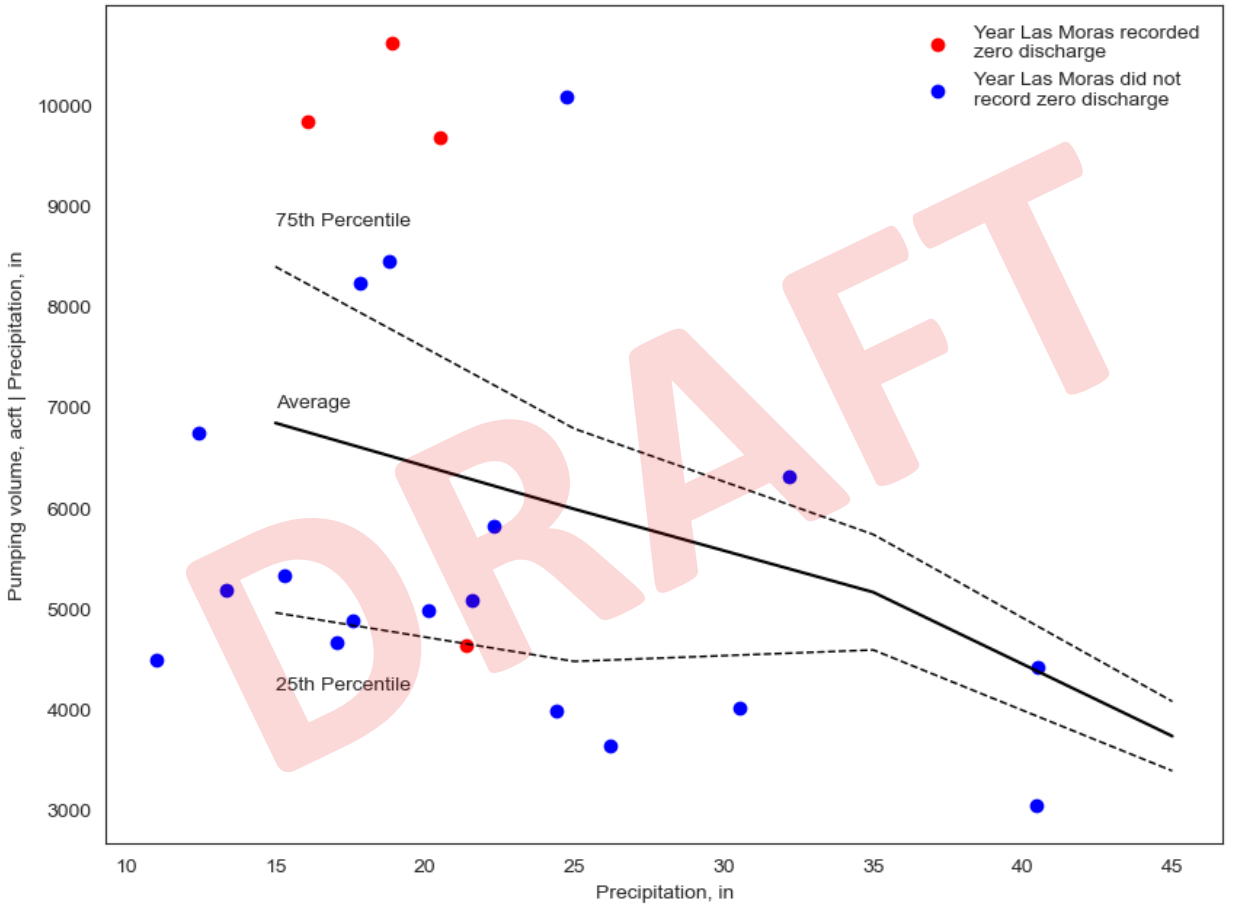
# Conditional Probability Analysis

Using the relationship between precipitation and spring discharge we developed a conditional probability model

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# Recommendations

## Option 1: Consider the Edwards-Trinity (Plateau) Aquifer in Kinney County as Non-Relevant for Joint Planning In GMA 7

This classification would apply only to joint planning and would not diminish KCGCD's authority to manage, monitor, and permit groundwater production locally.

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1. A DFC that is framed in terms of long-term statistical spring-flow metrics is hard to interpret and difficult to manage.

2. Strong correlation in climate driven variability and Las Moras Spring flow, which is outside the control of the GCD or GMA.

3. Insufficient evidence that policy-level changes in pumping are likely to generate a meaningful change in DFC (at or below current pumping levels).

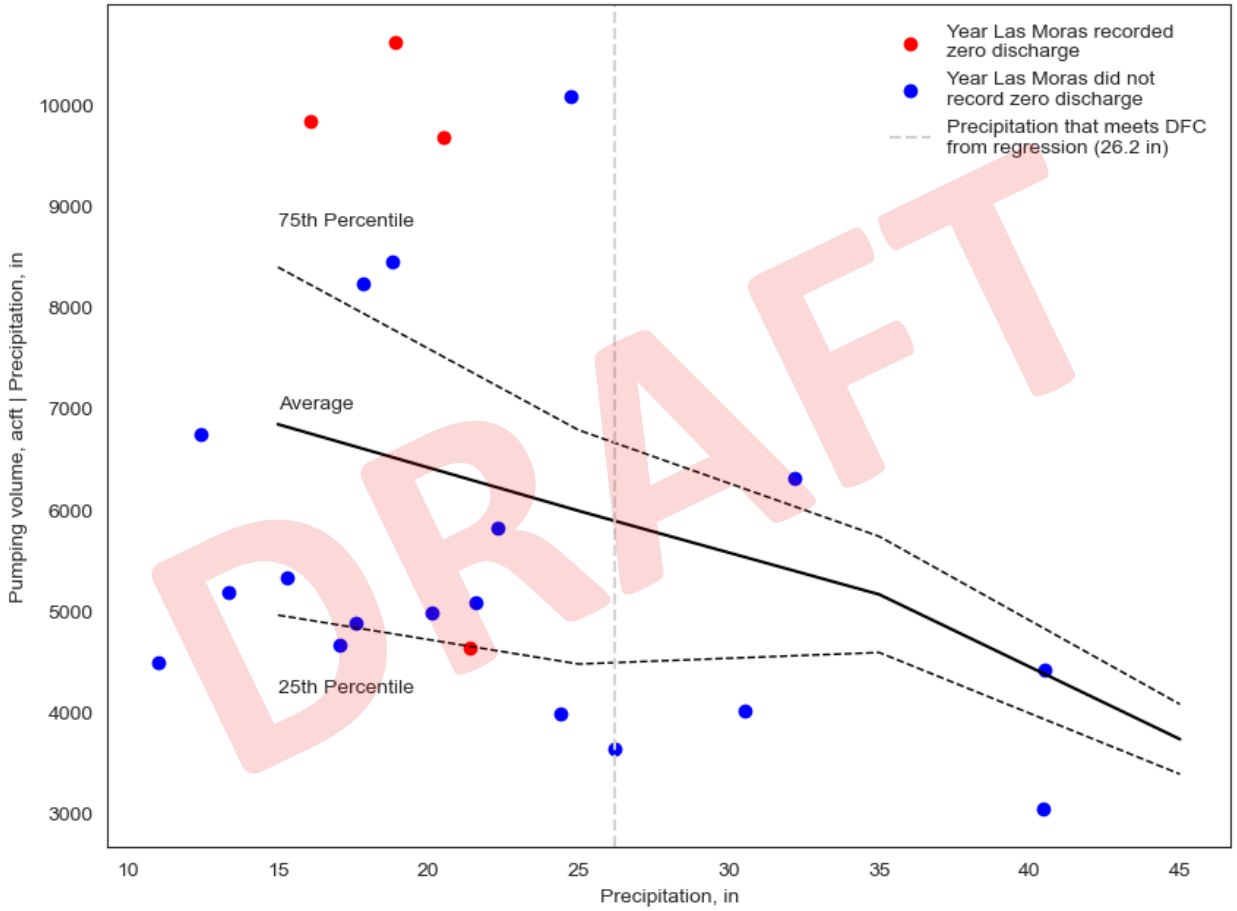
4. Relatively small and localized role that the Edwards-Trinity (Plateau) groundwater in Kinney County plays in regional water supply planning.

# Recommendations (cont.)

## Option 2: Replace the existing GAM framework with a statistical analysis that aligns with the existing DFC

Using the conditional probability analysis, pumping (MAG) can be estimated at 6,200 acre-feet per year.

- Key Limitation: Lack of Data



# Questions?

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