APPENDIX B
Hydrologic Variance Request and Approval for Surface Water

July 20, 2023

Jeff Walker
Executive Administrator
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Hydrologic Variance Requests for Water Availability Determination of Current Surface Water Supplies in Region F

Dear Mr. Walker:

Region F is one of the largest regions in the state, encompassing 32 counties in west Texas. Surface water supplies are obtained from the upper Colorado River Basin and Pecos River Basin, which is a tributary of the Rio Grande River Basin. A small portion of the region lies in the Brazos River Basin but there is little to no surface water supplied to Region F from this river basin.

In accordance with regional planning rules and guidelines, Region F intends to use the Full Authorization Run (Run 3) of the TCEQ-approved WAMs to determine surface water availability in the region. However, to more accurately reflect the current conditions and operations of the region, some following modifications to WAM Run 3 are requested. In accordance with *Exhibit C First Amended General Guidelines for Development of the 2026 Regional Water Plans*, the Region has completed the Hydrologic Variance Checklist for each of the three river basins partially lie within the boundaries of Region F and the checklists are attached to this letter. These requests were reviewed and approved by the Region F Water Planning Group at a public meeting held on July 20, 2023.

Please call me or our consultant Lissa Gregg (817-946-2058) if you have any questions regarding our request.

Sincerely,

Cole Walker
Region F Chairman

Attachments:

Upper Colorado River Basin Surface Water Hydrologic Variance Checklist
Rio Grande River Basin Surface Water Hydrologic Variance Checklist
Brazos River Basin Surface Water Hydrologic Variance Checklist

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: F

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Brazos River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   - **Safe Yield.** Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.
   - **Adoption of Region G Modifications.** The Brazos basin is largely located in Region G, with some areas extending into Region F. Region F proposes to adopt the version of the Brazos WAM (including any hydrologic variances) that Region G requests and is approved to use.

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   Modification request is the same as in the previous cycle of planning.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing and Strategy Supply

   Adoption of Region G Modifications. The Brazos basin is largely located in Region G, with some areas extending into Region F. Region F proposes to adopt the version of the Brazos WAM (including any hydrologic variances) that Region G requests and is approved to use.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Yes
    Region G

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: F

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Upper Colorado River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   - **Safe Yield.** Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.
   - S**ubordination WMS Variance Requests.** In Region F, a major water management strategy is the subordination of downstream senior water rights in the lower Colorado basin (Region K) to junior water rights in the upper Colorado basin (Region F). For the subordination strategy, Region F requests to use the Region K Colorado WAM "cutoff model" (including any hydrologic variances) that Region K requests and is approved to use. The Region K cutoff model modifies the priority dates for all water rights at and

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

above Lakes Ivie and Brownwood by making them senior to water rights below those locations. The cutoff model does not change the relative seniority within the upper Colorado River Basin. In addition to the Region K hydrologic variances, Region F requests the following:

- Include the City of Junction run-of-river right and Brady Creek Reservoir's water right as senior to those downstream in Region K. These water rights are in the upper Colorado River Basin within Region F.
- Consistent with previous regional planning efforts, Region F requests to coordinate with reservoir owners in the Pecan Bayou watershed to establish mutually agreeable terms for priority calls within the Pecan Bayou watershed.
- Region F also requests the use of safe yield for all reservoirs under the subordination strategy.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   This request is consistent with previous planning cycle requests.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Strategy Supply

   In Region F, a major water management strategy is the subordination of downstream senior water rights in the lower Colorado basin (Region K) to junior water rights in the upper Colorado basin (Region F). For the subordination strategy, Region F requests to use the Region K Colorado WAM "cutoff model" (including any hydrologic variances) that Region K requests and is approved to use. The Region K cutoff model modifies the priority dates for all water rights at and above Lakes Ivie and Brownwood by making them senior to water rights below those

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

locations. The cutoff model does not change the relative seniority within the upper Colorado River Basin. In addition to the Region K hydrologic variances, Region F requests the following:

- Include the City of Junction run-of-river right and Brady Creek Reservoir's water right as senior to those downstream in Region K. These water rights are in the upper Colorado River Basin within Region F.
- Consistent with previous regional planning efforts, Region F requests to coordinate with reservoir owners in the Pecan Bayou watershed to establish mutually agreeable terms for priority calls within the Pecan Bayou watershed.
- Region F also requests the use of safe yield for all reservoirs under the subordination strategy.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Yes

    Region K.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: F

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Rio Grande River Basin

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   - **Safe Yield.** Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.
   - **Adjust calls on spring flows by water rights on the Pecos River.** Availability of spring flow was being impacted by several large diversions on the main stem of the Pecos River associated with the Red Bluff Irrigation District. In the WAM, these are modeled as run-of-the-river diversions that are backed up by releases from Red Bluff Reservoir. In actual operation, these water rights are dependent on releases from Red Bluff Reservoir and do not use or make calls on spring flow from San Solomon or Griffin

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

Springs. Also, it is likely that a priority call on spring flow would be considered a futile call since almost all of the water would be lost before it reached the Red Bluff Irrigation District diversions. To address these issues we request the following modifications:

- Modify the WAM to direct excess flows (flows not diverted directly from the creek) to Lake Balmorhea for storage in accordance with the Lake Balmorhea water right. The storage would then be modeled as backup for the run of river diversions.
- Model the Toyah Creek watershed to reflect actual operations and address potential futile calls.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   Modification request is the same as in the previous cycle of planning.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   Region F requests the use of safe yield for the allocation and distribution of surface water supplies from all reservoirs within the region. Safe yield is the amount of water that can be used during the critical drought while leaving a minimum one-year supply in reserve. Safe yield is consistent with the current operations of surface water in the region and previous regional water planning. In accordance with the TWDB planning rules, firm yields will also be determined and reported in the plan.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable

for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

No

Existing and Strategy Supply

Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Existing and Strategy Supply

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing Supply

   Yes, see response to question No. 2. These changes better reflect the operation of the basin and avoid futile calls.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Existing and Strategy Supply

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    Unknown

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

November 28, 2023

Mr. Cole Walker
General Manager
Colorado River Municipal Water District
400 E. 24th Street
Big Spring, TX 79720

Dear Mr. Walker:

I have reviewed your request dated July 20, 2023, and received on September 24, 2023, for approval of alternative water supply assumptions to be used in determining existing and future surface water availability. This letter confirms that the TWDB approves the following assumptions:

1. Use of one-year safe yield for all reservoirs in the Brazos, Colorado, and Rio Grande Basins within the region.
2. Use of the Brazos Water Availability Model (WAM) as modified by the Brazos G Planning Group (*i.e.,* the Brazos G WAM) for existing and strategy supplies from the Brazos River Basin as approved by the TWDB for Region G.
3. Use of Region K's cutoff WAM model (as approved for use by the TWDB for Region K), to model the Lower Colorado subordination strategy, including considering the City of Junction's run-of-river right and Brady Creek Reservoir's water right as senior to those downstream in Region K, and using safe yield for all reservoirs under the subordination strategy. This includes coordinating with reservoir owners in the Pecan Bayou watershed to establish mutually agreeable terms for priority calls.
4. Undertake several modifications to the Rio Grande WAM to reflect actual operations for modeling existing supply. These modifications include:
    a. Model the Toyah Creek watershed to reflect actual operations where irrigation water rights within the Red Bluff Irrigation District are met with releases from Red Bluff Reservoir and are not reliant on spring flow from San Solomon Springs or Giffin Springs.
    b. Direct flows not diverted from the creek to Lake Balmorhea for storage, and model storage at Lake Balmorhea as backup for run-of-river diversions.

Although the TWDB approves the use of a one-year safe yield for developing estimates of current water supplies, firm yield for each reservoir must still be reported to the TWDB in the online planning database and plan documents.

While the use of these modified conditions may be reasonable for planning purposes, WAM RUN3 would be utilized by the Texas Commission on Environmental Quality for analyzing permit applications. It is acceptable to use the approved modified conditions for WMS supply evaluations only if the yield produced is more conservative (less) for surface water appropriations than WAM RUN3. For the purpose of evaluating potentially feasible surface water management strategies not addressed in this request, the appropriate TCEQ WAM Run 3 is to be used unless a separate hydrologic variance request is submitted and approved by the TWDB.

While the TWDB authorizes these modifications to evaluate existing and future water supplies for development of the 2026 Region F RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of water availability are reasonable for drought planning purposes and will reflect conditions expected in the event of actual drought conditions; and in all other regards will be evaluated in accordance with the contract Exhibit C, *General Guidelines for Sixth Cycle of Regional Water Plan Development.*

Please do not hesitate to contact Heather Rose of our Regional Water Planning staff at 512-475-1558 or heather.rose@twdb.texas.gov if you have any questions.

Sincerely,

Jeff Walker
Executive Administrator

c: Audra Hoback, Colorado River Municipal Water District
Lissa Gregg, Freese & Nichols, Inc.
Tony Smith, Carollo Engineers, Inc. (Region G)
Neil Deeds, INTERA (Region K)
Heather Rose, Water Supply Planning
Nelun Fernando, Ph.D., Surface Water

APPENDIX C
Methodology for Non-Relevant Areas and Other Aquifer Availabilities

AGS
Advanced Groundwater Solutions, LLC
www.advancedgw.com

Technical Memorandum

TO: Lissa Gregg, Freese and Nichols, Inc.

FROM: Andrew Donnelly, P.G. and James Beach, P.G.

SUBJECT: Region F Non-MAG Groundwater Availability

DATE: January 24, 2024

Introduction

This memo summarizes non-relevant aquifers within Region F and the 2027 non-MAG groundwater availabilities currently in the DB27 database and recommended changes to these non-MAG availabilities. The reasons and methodology for these recommended changes are described below.

History

In the last round of planning, Region F provided recommendations for changes to non-MAG availabilities that were approved by Region F and the TWDB (Laughlin and Beach, 2018). Although approved by TWDB and used in the 2022 State Water Plan, some of the availability estimates were not incorporated into model runs done by the Groundwater Management Areas (GMAs) while developing desired future conditions (DFCs). Therefore, some estimates have reverted back to estimates that were estimated prior to the 2022 State Water Plan.

Evaluation of Non-MAG Availability

Non-MAG availabilities include the availability in aquifers designated as non-relevant and the availability in "other" aquifers. Portion of aquifers declared non-relevant for this planning cycle are as follows:

GMA 2

- Edwards-Trinity (Plateau) Aquifer in Andrews, Howard, and Martin counties
- Pecos Valley Aquifer in Andrews County

GMA 3

- Ogallala and Igneous aquifers in the entire GMA

GMA 7

- Cross Timbers, Igneous, Lipan, Marble Falls, and Seymour aquifers in the entire GMA
- Edwards-Trinity (Plateau) Aquifer in Concho, Mason, McCulloch, and Tom Green counties
- Ogallala Aquifer in Ector and Midland counties

- Dockum Aquifer in Coke, Crockett, Ector, Glasscock, Irion, Midland, Mitchell, Scurry, Sterling, Tom Green, and Upton counites
- Ellenburger-San Saba Aquifer in Coleman, Concho, and Mason counties
- Hickory Aquifer in Coleman County

GMA 8

- No aquifers within Region F

The major and minor aquifers or portion of these aquifers that have been declared non-relevant are shown in Figures 1 and 2, respectively.

In addition to these non-relevant aquifers, several other aquifers, which are not defined by the TWDB as major or minor aquifers, have non-MAG availability. These "other" aquifers include Cambrian and Permian deposits, the Quartermaster Formation, and the Edwards Aquifer/Antlers Sand, as well as several other smaller, unnamed aquifers that do not have geologic or hydrogeologic description. These aquifers are water-bearing units that may be important locally and therefore have non-MAG availability defined for regional water planning purposes.

The current non-MAG availabilities developed by TWDB for this planning cycle are shown in Table 1. Also shown in Table 1 are the availabilities from the previous (2022) planning cycle and the change from the previous planning cycle availabilities. Note that because the planning period for the previous planning cycle did not extend past 2070, only the availabilities for 2030 through 2070 are included for the previous planning cycle and the differences in Table 1. Also, the availabilities in Table 1 reflect the recommended changes in this memo.

In order to assess the updated non-MAG availabilities and make recommended changes to these availabilities, the following was reviewed.

1. The historic pumping was reviewed for all counties with non-MAG availability to ensure that the 2027 availability and the amount of groundwater currently being produced from the aquifer were reasonable. Counties with availabilities lower than the historic groundwater pumping were evaluated in greater detail. Historic pumping trends were evaluated to determine if recommended availabilities were justified. In a few cases, increased non-MAG availability was recommended based on consistent, or in some cases increasing, historic pumping volumes from an aquifer.
2. The differences between the recommended 2027 availabilities and the 2022 availabilities were assessed. In most cases, the new availability was the same as the previous availability. Where an aquifer's availability changed, the historic pumping was evaluated in greater detail to determine if the recommended availability was justified. Particular attention was paid to counties where the recommended non-MAG availability was lower than the previous availability.

3. The technical memorandum from the previous planning cycle that described the groundwater availability for the region was reviewed. This memorandum contained rationale for previously recommended non-MAG availabilities.

The current total non-MAG availability for Region F is 132,867 ac-ft/yr in 2030, decreasing to 129,819 ac-ft/yr in 2080. Of this total, 27,926 ac-ft/yr is availability from "other" aquifers, with the remainder being for non-relevant aquifers. In the 2022 State Water Plan, total non-MAG availability was 147,613 ac-ft/yr in 2030, decreasing to 141,111 ac-ft/yr in 2070. The decrease of approximately 15,000 ac-ft/yr of non-MAG availability can primarily be attributed to the reduced availability in the Ogallala Aquifer in Midland and Ector counties, which is partially offset by a significant increase in non-MAG availability in the Dockum Aquifer in Scurry County.

Based on our review of the work done in the previous round of planning, a review of new pumping estimates and demands in the region, and input from the planning group, we are recommending several changes in non-MAG availability estimates in this round of planning. Table 2 summarizes the current Region F non-MAG availabilities and the recommended availabilities, along with the reason for the recommended values.

Most of the proposed revisions are for current availabilities that have been reduced or eliminated from those used in the previous planning cycle. These include availabilities in the Dockum Aquifer in Coke, Glasscock, Irion, Tom Green, and Upton counties, the Pecos Valley Aquifer in Andrews County, the Hickory Aquifer in Coleman County, and the Capitan Reef Aquifer in Reeves County. Most of these availabilities were reduced to zero for the current planning cycle. The proposed revision is to change the availability in each of these counties to the amount used in the previous planning cycle. The original rationale for the previous planning cycle availabilities was detailed in the memo dated October 22, 2018, which is included as an attachment to this memo. The recommended availabilities are generally small (less than 1,000 ac-ft/yr) and are mostly based on small amounts of historic pumping which show that a limited amount of groundwater is available in each of these counties for the designated aquifer. These recommendations include:

In addition to these, several proposed revisions to the current availabilities are being made based on recent historic pumping and input from the Region F planning group. These include:

- Lipan Aquifer in Concho County/Colorado Basin- The initial availability is 1,893 ac-ft/yr, which is the same as in the previous planning cycle. However, the historic pumping from the Lipan Aquifer in Concho County has been greater than this amount almost every year since 1984. The average pumping from the Lipan Aquifer in Concho County since 1984 is 2,972 ac-ft/yr, and in several years it has been between 4,000 and 6,000 ac-ft/yr. We recommend an availability of 4,000 ac-ft/yr for the Lipan Aquifer in Concho County based on this historic pumping.

- Edwards-Trinity (Plateau) Aquifer in McCulloch County/Colorado Basin- The initial availability is 148 ac-ft/yr, which is the same as in the previous planning cycle. Recent groundwater pumping from the Edwards-Trinty (Plateau) Aquifer in McCulloch County has been between 150 and 550 ac-ft/yr. We recommend updating the availability of the Edwads-Trinity (Plateau) Aquifer in McCulloch County to 600 ac-ft/yr.
- Dockum Aquifer in Midland County/Colorado Basin- The initial availability is 0 ac-ft/yr. This is less than the availability of 400 ac-ft/yr from the previous planning cycle. Input from the Region F planning group indicated that groundwater production from the Dockum Aquifer in Midland County has increased significantly recently as a supply for fracking operations in the area. We recommend an availability of 1,000 ac-ft/yr for the Dockum Aquifer in Midland County.
- Dockum Aquifer in Mitchell County/Colorado Basin- The initial availability is 13,987 ac-ft/yr in 2030, decreasing to 10,540 ac-ft/yr in 2080. This is less than the availability of 14,018 ac-ft/yr from the previous planning cycle. Historic pumping from the Dockum Aquifer in Mitchell County has been increasing since the late 1990s and has averaged more than 15,000 ac-ft/yr since 2012. We recommend restoring the previous availability of 14,018 ac-ft/yr for the Dockum Aquifer in Mitchell County.
- Dockum Aquifer in Sterling County/Colorado Basin- The initial availability is 27 ac-ft/yr, which is the higher than the availability in the previous planning cycle of 10 ac-ft/yr. However, in 2018 to 2020 there is reported municipal pumping from the Dockum Aquifer in Sterling County of more than 200 ac-ft/yr. We recommend an availability of 300 ac-ft/yr for the Dockum Aquifer in Sterling County.
- Dockum Aquifer in Scurry County/both basins- The non-MAG availability in the Colorado basin in Scurry County was increased from 903 ac-ft/yr in the previous planning cycle to 11,546 to 11,175 ac-ft/yr in the current cycle. However, the non-MAG availability in the Brazos basin decreased from 306 ac-ft/yr in the previous planning cycle to 151 ac-ft/yr in the current cycle, despite the significant presence of irrigation wells producing from the Dockum Aquifer in this basin. Due to the projected irrigation demand in the Brazos basin, we recommend shifting 2,000 ac-ft/yr of non-MAG availability from the Colorado to Brazos basin within Scurry County.

Summary

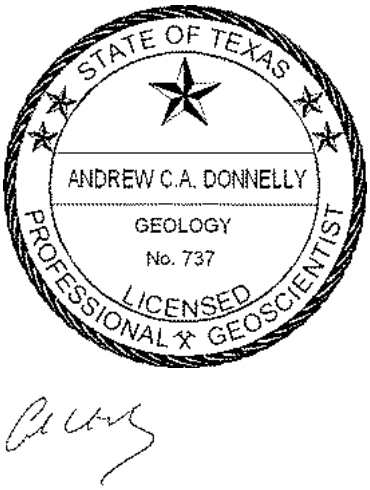
Numerous non-MAG availabilities in Region F were decreased or eliminated in the current planning cycle. In many cases, existing supplies or water management strategies may have been assigned/based on these availabilities. Region F recommends that these non-MAG availabilities be restored to the values from the previous planning cycle.

Historic pumping was also reviewed to ensure that the current non-MAG availabilities were sufficient to allow historic groundwater pumping to be assigned as a supply to the appropriate WUGs in each aquifer. Region F has identified five aquifer/county/basin non-MAG availabilities that should be increased based on the historic pumping. In addition, Region F recommends that 2,000 ac-ft/yr of non-MAG availability in the Colorado basin in Scurry County be shifted to the Brazos basin in order to meet projected irrigation demands in that basin.

References

Laughlin, K., and J. Beach, 2018. *Region F Groundwater Availability Volumes*. Memo to FNI and TWDB dated October 22, 2018.

Geoscientist's Seal:



The seal appearing on this document was authorized by Andrew C.A. Donnelly, P.G. 737 on 1/24/2024.
Advanced Groundwater Solutions, LLC TBPG Firm Registration No. 50639

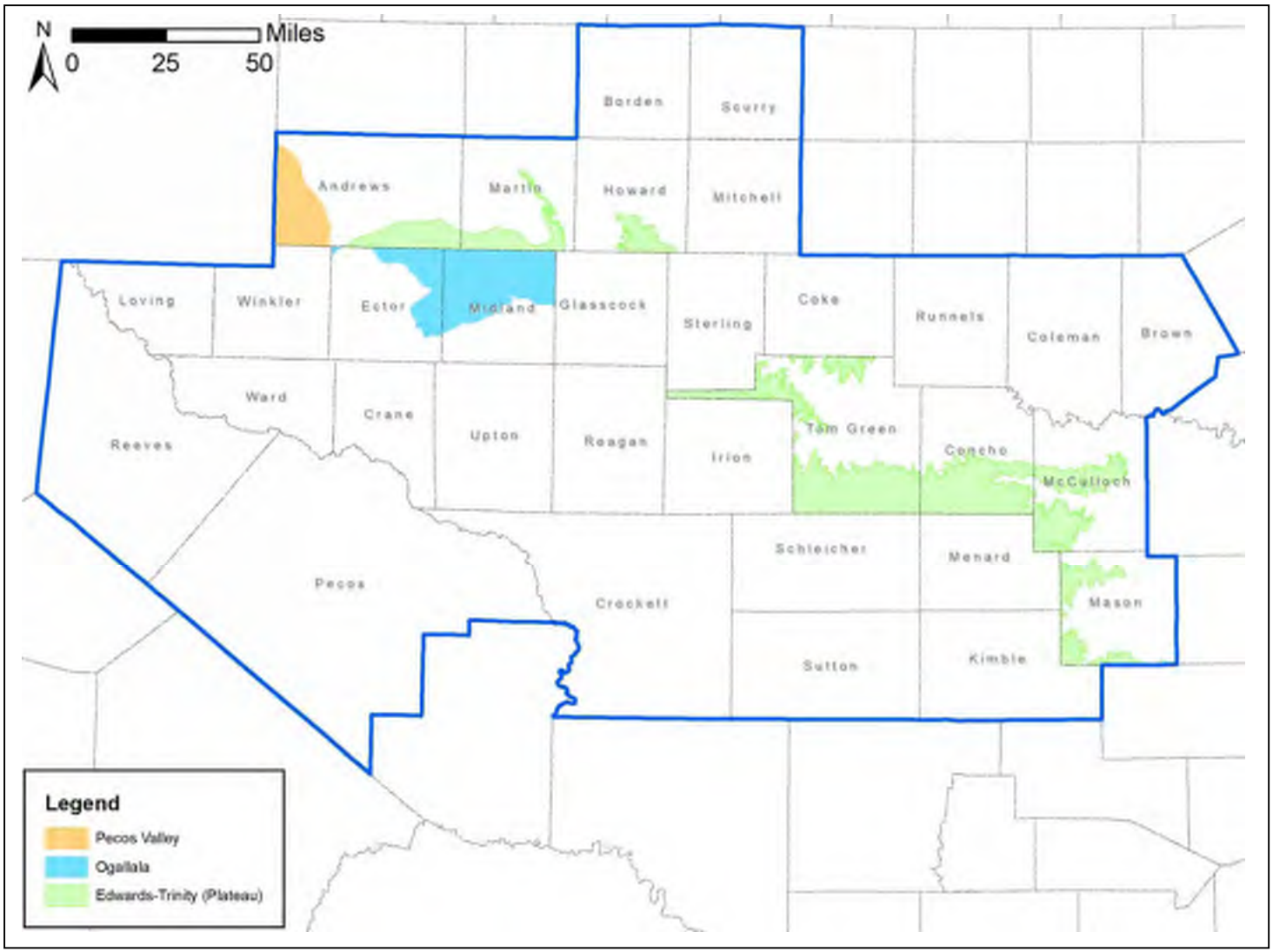


Figure 1. Non-relevant portion of major aquifers in Region F

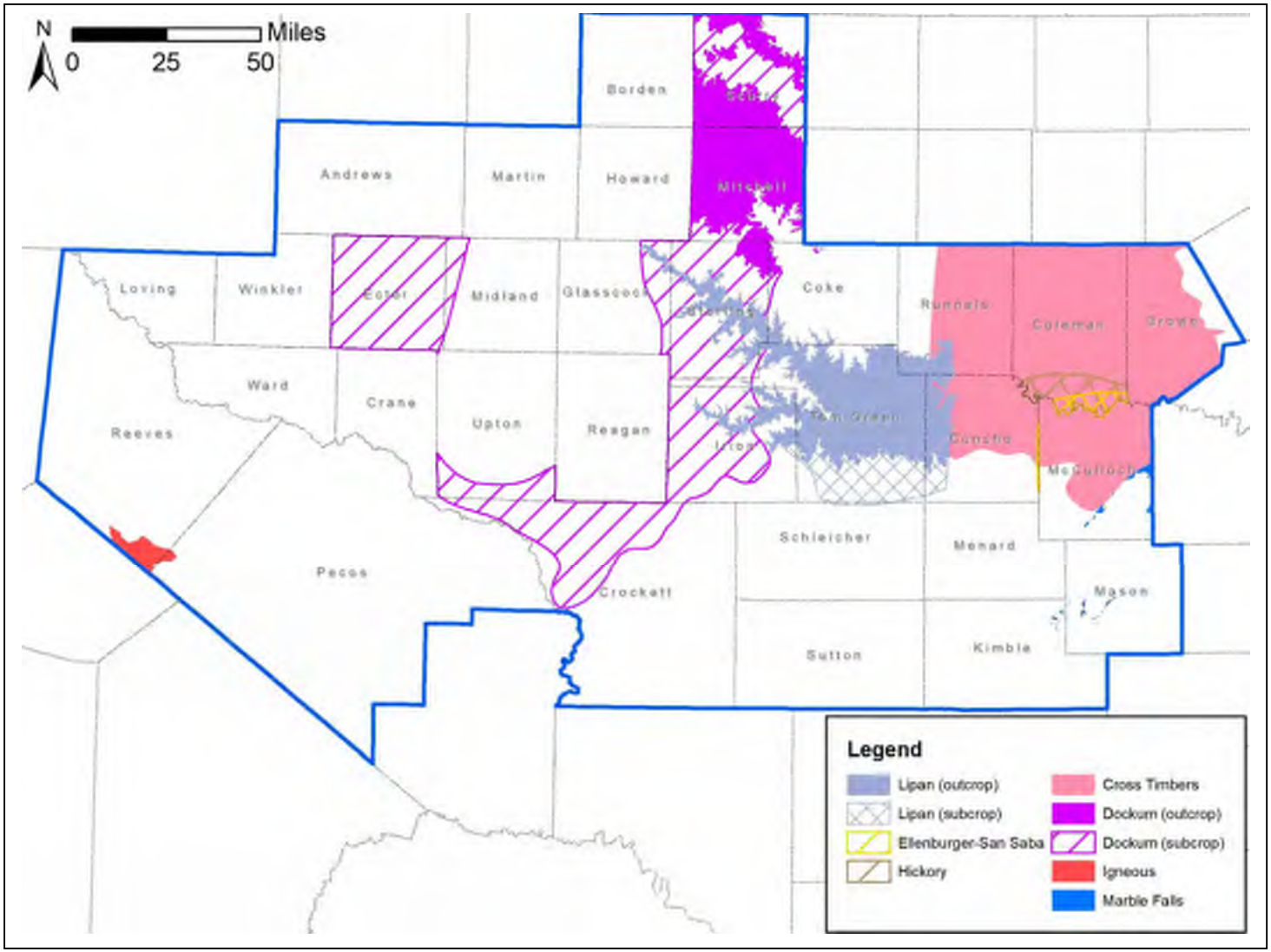


Figure 2. Non-relevant portions of minor aquifer

Table 1. Non-MAG Availabilities in Region F

County	Aquifer	Basin	2027 Non-MAG Availability (ac-ft/yr)						2022 Non-MAG Availability (ac-ft/yr)					Difference in Non-MAG Availability (ac-ft/yr)				
			2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2030	2040	2050	2060	2070
Andrews	Edwards-Trinity-Plateau Aquifer	Colorado	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	1,198	0	0	0	0	0
	Pecos Valley Aquifer	Rio Grande	150	150	150	150	150	150	150	150	150	150	150	0	0	0	0	0
Borden	Other Aquifer	Colorado	2,598	2,598	2,598	2,598	2,598	2,598	2,598	2,598	2,598	2,598	2,598	0	0	0	0	0
Brown	Cross Timbers Aquifer	Brazos	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
		Colorado	993	993	993	993	993	993	993	993	993	993	993	0	0	0	0	0
Coke	Dockum Aquifer	Colorado	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0
	Lipan Aquifer	Colorado	160	160	160	160	160	160	160	160	160	160	160	0	0	0	0	0
	Other Aquifer	Colorado	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	0	0	0	0	0
Coleman	Cross Timbers Aquifer	Colorado	108	108	108	108	108	108	108	108	108	108	108	0	0	0	0	0
	Ellenburger-San Saba Aquifer	Colorado	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
	Hickory Aquifer	Colorado	500	500	500	500	500	500	500	500	500	500	500	0	0	0	0	0
	Other Aquifer (Edwards Aquifer and Antlers Sand)	Colorado	109	109	109	109	109	109	109	109	109	109	109	0	0	0	0	0
Concho	Cross Timbers Aquifer	Colorado	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	459	459	459	459	459	459	459	459	459	459	459	0	0	0	0	0
	Lipan Aquifer	Colorado	4,000	4,000	4,000	4,000	4,000	4,000	1,893	1,893	1,893	1,893	1,893	2,107	2,107	2,107	2,107	2,107
	Other Aquifer (Cambrian Deposits)	Colorado	5,964	5,964	5,964	5,964	5,964	5,964	5,964	5,964	5,964	5,964	5,964	0	0	0	0	0
Crane	Rustler Aquifer (Outside official TWDB aquifer boundary)	Rio Grande	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0	0	0	0	0
Crockett	Dockum Aquifer	Colorado	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2
		Rio Grande	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0
Ector	Dockum Aquifer	Colorado	28	28	28	28	28	28	13	13	13	13	13	15	15	15	15	15
		Rio Grande	721	721	721	721	721	721	515	515	515	515	515	206	206	206	206	206
	Ogallala Aquifer	Colorado	206	213	218	222	226	226	7,730	7,171	7,135	6,727	6,727	-7,524	-6,958	-6,917	-6,505	-6,501
		Rio Grande	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
Glasscock	Dockum Aquifer	Colorado	900	900	900	900	900	900	900	900	900	900	900	0	0	0	0	0
	Lipan Aquifer	Colorado	10	10	10	10	10	10	10	10	10	10	10	0	0	0	0	0
Howard	Edwards-Trinity-Plateau Aquifer	Colorado	672	672	672	672	672	672	672	672	672	672	672	0	0	0	0	0
Irion	Dockum Aquifer	Colorado	150	150	150	150	150	150	150	150	150	150	150	0	0	0	0	0
	Lipan Aquifer	Colorado	13	13	13	13	13	13	13	13	13	13	13	0	0	0	0	0
Kimble	Marble Falls Aquifer	Colorado	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0
Martin	Edwards-Trinity-Plateau Aquifer	Colorado	242	242	242	242	242	242	242	242	242	242	242	0	0	0	0	0
Mason	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	18	18	18	18	18	18	18	18	18	18	18	0	0	0	0	0
	Marble Falls Aquifer	Colorado	100	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0

Table 1. Non-MAG Availabilities in Region F

County	Aquifer	Basin	2027 Non-MAG Availability (ac-ft/yr)						2022 Non-MAG Availability (ac-ft/yr)					Difference in Non-MAG Availability (ac-ft/yr)				
			2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2030	2040	2050	2060	2070
	Other Aquifer	Colorado	873	873	873	873	873	873	873	873	873	873	873	0	0	0	0	0
McCulloch	Cross Timbers Aquifer	Colorado	103	103	103	103	103	103	103	103	103	103	103	0	0	0	0	0
	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	600	600	600	600	600	600	148	148	148	148	148	452	452	452	452	452
	Marble Falls Aquifer	Colorado	50	50	50	50	50	50	50	50	50	50	50	0	0	0	0	0
	Other Aquifer	Colorado	103	103	103	103	103	103	103	103	103	103	103	0	0	0	0	0
Midland	Dockum Aquifer	Colorado	1,000	1,000	1,000	1,000	1,000	1,000	400	400	400	400	400	600	600	600	600	600
	Ogallala Aquifer	Colorado	15,442	14,369	13,732	13,258	12,745	12,745	36,824	34,623	32,693	31,325	31,325	-21,382	-20,254	-18,961	-18,067	-18,580
Mitchell	Dockum Aquifer	Colorado	14,018	14,018	14,018	14,018	14,018	14,018	14,018	14,018	14,018	14,018	14,018	0	0	0	0	0
	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
	Other Aquifer (Permian Deposits)	Colorado	789	789	789	789	789	789	789	789	789	789	789	0	0	0	0	0
Pecos	Igneous Aquifer	Rio Grande	80	80	80	80	80	80	80	80	80	80	80	0	0	0	0	0
	Other Aquifer	Rio Grande	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	0	0	0	0	0
Reeves	Capitan Reef Complex Aquifer	Rio Grande	1,007	1,007	1,007	1,007	1,007	1,007	1,007	1,007	1,007	1,007	1,007	0	0	0	0	0
	Igneous Aquifer	Rio Grande	300	300	300	300	300	300	300	300	300	300	300	0	0	0	0	0
Runnels	Cross Timbers Aquifer	Colorado	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
	Lipan Aquifer	Colorado	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0	0
	Other Aquifer	Colorado	5,001	5,001	5,001	5,001	5,001	5,001	5,001	5,001	5,001	5,001	5,001	0	0	0	0	0
Schleicher	Lipan Aquifer	Colorado	0	0	0	0	0	0	NA	NA	NA	NA	NA	0	0	0	0	0
Scurry	Dockum Aquifer	Brazos	2,151	2,151	2,151	2,151	2,151	2,151	306	306	306	306	306	1,845	1,845	1,845	1,845	1,845
		Colorado	9,546	9,546	9,335	9,248	9,175	9,175	903	903	903	903	903	8,643	8,643	8,432	8,345	8,272
	Other Aquifer	Colorado	315	315	315	315	315	315	315	315	315	315	315	0	0	0	0	0
	Other Aquifer (Quartermaster Formation)	Brazos	74	74	74	74	74	74	74	74	74	74	74	0	0	0	0	0
	Seymour Aquifer	Brazos	10	10	10	10	10	10	10	10	10	10	10	0	0	0	0	0
Sterling	Dockum Aquifer	Colorado	300	300	300	300	300	300	10	10	10	10	10	290	290	290	290	290
	Lipan Aquifer	Colorado	850	850	850	850	850	850	850	850	850	850	850	0	0	0	0	0
Tom Green	Dockum Aquifer	Colorado	200	200	200	200	200	200	200	200	200	200	200	0	0	0	0	0
	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	2,797	2,797	2,797	2,797	2,797	2,797	2,797	2,797	2,797	2,797	2,797	0	0	0	0	0
	Lipan Aquifer	Colorado	43,568	43,568	43,568	43,568	43,568	43,568	43,568	43,568	43,568	43,568	43,568	0	0	0	0	0
Upton	Dockum Aquifer	Rio Grande	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	0	0	0	0	0
Winkler	Ogallala Aquifer	Rio Grande	40	40	40	40	40	40	40	40	40	40	40	0	0	0	0	0
TOTAL			**132,867**	**131,801**	**130,958**	**130,401**	**129,819**	**129,819**	**147,613**	**144,853**	**142,887**	**141,111**	**141,111**	**-14,746**	**-13,052**	**-11,929**	**-10,710**	**-11,292**

Table 2. Recommended Changes to Non-MAG Availabilities in Region F

County	Aquifer	Basin	Initial Non-MAG Availability (ac-ft/yr)						Recommended Non-MAG Availability (ac-ft/yr)						Methodology
			2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080	
Andrews	Pecos Valley Aquifer	Rio Grande	0	0	0	0	0	0	150	150	150	150	150	150	Previous availability, based on historic pumping
Coke	Dockum Aquifer	Colorado	0	0	0	0	0	0	100	100	100	100	100	100	Previous availability, based on estimated rig supply use
Coleman	Hickory Aquifer	Colorado	0	0	0	0	0	0	500	500	500	500	500	500	Previous availability, based on estimated equivalent to Concho County
Concho	Lipan Aquifer	Colorado	1,893	1,893	1,893	1,893	1,893	1,893	4,000	4,000	4,000	4,000	4,000	4,000	Historic pumping
Glasscock	Dockum Aquifer	Colorado	0	0	0	0	0	0	900	900	900	900	900	900	Previous availability
Irion	Dockum Aquifer	Colorado	0	0	0	0	0	0	150	150	150	150	150	150	Previous availability
McCulloch	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers	Colorado	148	148	148	148	148	148	600	600	600	600	600	600	Recent pumping
Midland	Dockum Aquifer	Colorado	0	0	0	0	0	0	1,000	1,000	1,000	1,000	1,000	1,000	Recent pumping
Mitchell	Dockum Aquifer	Colorado	13,987	12,569	11,521	10,944	10,540	10,540	14,018	14,018	14,018	14,018	14,018	14,018	Recent pumping
Reeves	Capitan Reef Complex Aquifer	Rio Grande	0	0	0	0	0	0	1,007	1,007	1,007	1,007	1,007	1,007	Previous availability
Scurry	Dockum Aquifer	Brazos	151	151	151	151	151	151	2,151	2,151	2,151	2,151	2,151	2,151	Shifting basins within the county to meet irrigation demands
		Colorado	11,546	11,546	11,335	11,248	11,175	11,175	9,546	9,546	9,335	9,248	9,175	9,175	
Sterling	Dockum Aquifer	Colorado	27	27	27	27	27	27	300	300	300	300	300	300	Recent pumping
Tom Green	Dockum Aquifer	Colorado	0	0	0	0	0	0	200	200	200	200	200	200	Previous availability, based on estimated rig supply use
Upton	Dockum Aquifer	Rio Grande	67	67	67	67	67	67	1,000	1,000	1,000	1,000	1,000	1,000	Previous availability, based on well reports for fracking use

APPENDIX D
Methodology for Identifying Potentially Feasible WMSs

FREESE AND NICHOLS

Innovative approaches
Practical results
Outstanding service

TO: Region F Water Planning Group

CC: File

FROM: Lissa Gregg, P.E.

SUBJECT: Methodology to Identify Potentially Feasible Water Management Strategies

DATE: October 6, 2023

PROJECT: CMD21867

The Regional Water Planning rules requires each region to develop and document the process to identify potentially feasible water management strategies (PFWMS). This process is in addition to the process set forth by the TWDB to evaluate each PFWMS. This memorandum presents the proposed process to be used by Region F.

For Region F, the identification process for PFWMS will follow the sequence below:

1. Identify entities with needs
2. Review recommended strategies in previous Regional Water Plan (RWP)
3. Review new studies/ reports
4. Determine if new or changed strategies are needed
5. Review strategy types appropriate for Region F
6. Contact entity for input
7. Contact RWPG representative for county-wide WUGs
8. Verify recommendations

As required by TWC §16.053(e)(3), and 31 TAC §357.34(c) the RWPG shall consider a specified list of strategy types. This list includes 24 water management strategy types that require screening as part of the process for identifying PFWMS.[1]

While the TWDB list is comprehensive, each strategy type is not appropriate for every need, and some strategy types may not be appropriate for Region F water users. To determine whether a strategy is potentially feasible, the first considerations are:

- A strategy must use proven technology and must be technically feasible.
- A strategy should have an identifiable sponsor.
- A strategy must consider end use. This includes water quality, economics, geographic constraints, etc. For example, long transmission systems to move water for agricultural use is not economically feasible.
- A strategy must meet existing regulations.

The second consideration is whether a strategy would provide sufficient water to meet a projected need or a sizeable portion of the need. Considerations at this juncture include:

- Is there available existing supply that is not already allocated to another user?
- Can new water be developed? If yes, identify the potential sources.

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[1] Second Amended General Guidelines for the Development of the 2026 Regional Water Plans, September 2023. https://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2026/projectdocs/2026RWP_ExhibitC.pdf

- Does the water quality meet the end use requirements? If not, can it be treated?
- Are there any technical considerations that would preclude the feasibility of the strategy type? For example, are there suitable geologic formations for aquifer storage and recovery?

Strategy types that will be reviewed for consideration as potentially feasible for Region F include:

- Water conservation
  - Review for applicability and consider for all WUGs with a need
  - Consider water conservation for all municipal WUGs
  - Consider the TWDB Water Loss Audit Report and conservation best management practices as part of this review
- Subordination
  - Consider for Colorado River Basin surface water users
- Reuse
  - Consider for WUGs with needs that generate a waste stream. This includes municipal, manufacturing and mining WUGs.
- Management of existing water supplies/System optimization
  - Consider for WUGs/WWPs that operate multiple water supply sources
- Conjunctive use
  - Consider for WUGs/WWPs that use or will use both surface water and groundwater sources
- Acquisition of available existing water supplies
  - Includes purchase of surface water and groundwater rights
- Developing regional water supply facilities or providing regional management of water supply facilities
- Developing large-scale desalination facilities for brackish groundwater that serve local or regional brackish groundwater production zones identified and designated under TWC §16.060(b)(5)
  - Consider for WUGs/WWPs that intend to develop large scale brackish groundwater for municipal use
- Voluntary transfer of water within the region using, but not limited to, contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements
- Emergency transfer of water under TWC §11.139
- Reallocation of reservoir storage to new uses
  - Consider for reservoirs that are no longer being used for the permitted purpose
- Improvements to water quality
- New groundwater supply
- Interbasin transfers of surface water
  - This would likely be considered as part of a voluntary transfer of water strategy
- Brush control
  - Consider for areas with a brush control program
- Precipitation enhancement
  - Consider for areas with a precipitation enhancement program
- Aquifer storage and recovery

There are several strategy types that likely are not appropriate for Region F water users. However, they may be considered if a project sponsor requests a specific strategy.

- Drought management. Drought management is an emergency measure and is generally not recommended for long-term supply.
- New surface water supply. There are limited opportunities to develop new surface water supplies in Region F.
- Enhancements of yields. The sources of water for yield enhancement are limited in Region F.

Three strategy types identified by the TWDB are not appropriate for Region F. These include:

- Developing large-scale desalination facilities for marine seawater that serve local or regional entities. Region F does not have access to seawater.
- Cancellation of water rights. The water rights in the Colorado River Basin have no reliability except Lakes Brownwood and Ivie. Cancellation of water rights in Region F would not provide additional water.
- Rainwater harvesting. The average rainfall over Region F from west to east ranges from 11 to 30 inches per year. During drought there is very little rainfall. This is not a reliable strategy for Region F.

APPENDIX E
List of Potentially Feasible Water Management Strategies

List of Potentially Feasible Strategies Identified for Region F To Date

Sponsor	County	WMS	Project Type
Andrews	Andrews	Additional Groundwater	New/Expansion of Groundwater
Ballinger	Runnels	Purchase Water Rights from Clyde (Fort Phantom Hill Reservoir)	Regional Project
Ballinger	Runnels	Subordination	Subordination
Balmorhea	Reeves	Additional Groundwater	New/Expansion of Groundwater
Big Spring	Howard	New Water Treatment Plant	Infrastructure Improvements
Big Spring	Howard	Subordination	Subordination
Borden County Water System	Borden	Additional Groundwater	New/Expansion of Groundwater
Brady	McCulloch	Subordination	Subordination
Bronte	Coke	Rehabilitation of the Oak Creek Pipeline	Infrastructure Improvements
Bronte	Coke	Water Treatment Plant Expansion	Infrastructure Improvements
Bronte	Coke	Regional System from Lake Brownwood to Runnels and Coke Counties	Regional Project
Bronte	Coke	Regional System from Fort Phantom Hill to Runnels and Coke Counties	Regional Project
Bronte	Coke	Additional Groundwater	New/Expansion of Groundwater
Bronte	Coke	Subordination	Subordination
Brown County WCID	Brown	Brush control	Brush Control
Brown County WCID	Brown	Groundwater Development	New/Expansion of Groundwater
Brown County WCID	Brown	Subordination	Subordination
Coleman	Coleman	Subordination	Subordination
Colorado City	Mitchell	Additional Groundwater	New/Expansion of Groundwater
Colorado River MWD	Multiple	Ward County Well Field Expansion and Development of Winkler County Well Field	New/Expansion of Groundwater
Colorado River MWD	Multiple	Develop Additional Groundwater Supplies in Pecos, Reeves, Ward, and Winkler	New/Expansion of Groundwater
Colorado River MWD	Multiple	Ward County Well Field Well Replacement	New/Expansion of Groundwater
Colorado River MWD	Multiple	Subordination	Subordination
Concho Rural WC	Ector	Purchase from Provider	Voluntary Re-distribution
County-Other, Andrews	Andrews	Additional Groundwater	New/Expansion of Groundwater
County-Other, Midland	Midland	Additional Groundwater	New/Expansion of Groundwater
County-Other, Scurry	Scurry	Purchase from Provider	Voluntary Re-distribution
County-Other, Ector	Ector	Purchase from Provider (Expanded Service Area of ECUD)	Voluntary Re-distribution
Texland Petroleum (Great Plains)	Andrews, Gaines	Additional Groundwater	New/Expansion of Groundwater

List of Potentially Feasible Strategies Identified for Region F To Date

Sponsor	County	WMS	Project Type
Greater Gardendale WSC	Ector	Purchase from Provider	Voluntary Re-distribution
Grandfalls	Ward	Additional Groundwater	New/Expansion of Groundwater
Grandfalls	Ward	Purchase from Provider	Voluntary Re-distribution
Irrigation WUGs	Multiple	Conservation	Conservation
Irrigation, Crockett	Crockett	Weather Modification	Regional Project
Irrigation, Irion	Irion	Weather Modification	Regional Project
Irrigation, Reagan	Reagan	Weather Modification	Regional Project
Irrigation, Pecos	Pecos	Weather Modification	Regional Project
Irrigation, Reeves	Reeves	Weather Modification	Regional Project
Irrigation, Schleicher	Schleicher	Weather Modification	Regional Project
Irrigation, Sterling	Sterling	Weather Modification	Regional Project
Irrigation, Sutton	Sutton	Weather Modification	Regional Project
Irrigation, Tom Green	Tom Green	Weather Modification	Regional Project
Irrigation, Ward	Ward	Weather Modification	Regional Project
Junction	Kimble	Dredge Intake	Infrastructure Improvements
Junction	Kimble	Additional Groundwater	New/Expansion of Groundwater
Junction	Kimble	Subordination	Subordination
Kermit	Winkler	Additional Groundwater	New/Expansion of Groundwater
Manufacturing, Howard	Howard	Purchase from Provider	Voluntary Re-distribution
Manufacturing, Kimble	Kimble	Additional Groundwater	New/Expansion of Groundwater
Manufacturing, Scurry	Scurry	Additional Groundwater	New/Expansion of Groundwater
Mason	Mason	Additional Water Treatment	Infrastructure Improvements
Menard	Menard	Develop New Groundwater	New/Expansion of Groundwater
Midland	Midland	Advanced Treatment with Expanded Use of the Paul Davis Well Field	New/Expansion of Groundwater
Midland	Midland	Purchase from Provider	Voluntary Re-distribution
Midland	Midland	West Texas Water Partnership	Regional Project
Mining WUGs	Multiple	Mining Conservation	Conservation
Municipal WUGs	Multiple	Conservation	Conservation
Municipal WUGs	Multiple	Water Audits and Leak Repairs	Conservation
Odessa	Ector	Development of Brackish Groundwater in Ward County	New/Expansion of Groundwater
Odessa	Ector	Development of Groundwater near Fort Stockton	New/Expansion of Groundwater
Odessa	Ector	Subordination	Subordination
Odessa	Ector	Advanced Treatment	Infrastructure Improvements
Odessa	Ector	Purchase from Provider	Voluntary Re-distribution
Pecos County WCID #1	Pecos	Additional Groundwater	New/Expansion of Groundwater

List of Potentially Feasible Strategies Identified for Region F To Date

Sponsor	County	WMS	Project Type
Pecos County WCID #1	Pecos	Transmission Pipeline Replacement	Infrastructure Improvements
Pecos City	Pecos	Advanced Water Treatment	Infrastructure Improvements
Pecos City	Pecos	Partner with Madera Valley WSC & Expand Well Field	New/Expansion of Groundwater
Pecos City	Pecos	Direct Non-potable Reuse	Reuse
Pecos City	Pecos	Direct Potable Reuse	Reuse
Pecos City	Pecos	Indirect Potable Reuse with ASR	Reuse
Robert Lee	Coke	Purchase from Provider	Voluntary Re-distribution
Robert Lee	Coke	Regional System from Forth Phantom Hill to Runnels and Coke Counties	Regional Project
Robert Lee	Coke	New Water Treatment Plant	Infrastructure Improvements
Robert Lee	Coke	Additional Groundwater	New/Expansion of Groundwater
San Angelo	Tom Green	Brush control	Brush Control
San Angelo	Tom Green	Hickory Well Field Expansion	Infrastructure Improvements
San Angelo	Tom Green	Concho River Water Project	Reuse
San Angelo	Tom Green	Additional Groundwater	New/Expansion of Groundwater
San Angelo	Tom Green	Subordination	Subordination
San Angelo	Tom Green	Desalination of Additional Groundwater Supplies	New/Expansion of Groundwater
San Angelo	Tom Green	West Texas Water Partnership	Regional Project
Sterling City	Sterling	Additional Groundwater	New/Expansion of Groundwater
Steam Electric Power, Mitchell	Mitchell	Subordination	Subordination
UCRA	Multiple	Brush Control	Brush Control
UCRA	Multiple	Subordination	Subordination
Winters	Runnels	Purchase from Provider	Voluntary Re-distribution
Winters	Runnels	Subordination	Subordination

APPENDIX F
List of Infeasible Water Management Strategies and Water Management Strategy Projects from the 2021 RWP

List of Infeasible WMSs and WMSPs Identified in the 2021 Region F Plan

WMS/WMSP Sponsor and/or select WUG Beneficiary	WMS Name	WMS Type	WMS Description	Source Description	Strategy Supply 2020	Strategy Supply 2030	Strategy Supply 2040	Strategy Supply 2050	Strategy Supply 2060	Strategy Supply 2070	RWPG Comments
Junction	Develop Additional Edwards-Trinity Plateau Aquifer Supplies - Junction	Groundwater wells and other	Groundwater Well Development	Edwards-Trinity-Plateau, Pecos Valley, and Trinity Aquifers | Kimble	370	370	370	370	370	370	City has not moved forward on strategy but plans to do so in the future. Recommend moving strategy online decade to 2030.
Balmorhea	Develop Edwards-Trinity-Plateau Aquifer Supplies - Balmorhea	Groundwater wells and other	Groundwater Well Development	Edwards-Trinity-Plateau and Pecos Valley Aquifers | Reeves	150	150	150	150	150	150	City has taken no affirmative action for this strategy yet. Recommend moving strategy online decade to 2030.
Bronte	Develop Other Aquifer Supplies in Southwest Coke County - Bronte	Groundwater wells and other	Groundwater Well Development	Other Aquifer | Coke	800	800	800	800	800	800	Bronte is studying groundwater opportunities in Nolan County, which was identified as an alternative strategy in the 2021 Region F Plan. Recommend substituting this strategy with the alternate strategy for groundwater development in Nolan County.
Colorado City	Reuse - Mitchell County SEP, Direct Non-Potable Sales From Colorado City	Other direct reuse	Non-Potable Reuse	Direct Reuse	500	500	500	500	500	500	Demand has not materialized and project is uncertain. Recommend removing the strategy from the 2021 plan.