REGION H
Water Planning Group

MEETING MATERIALS

June 7, 2017

San Jacinto River Authority

Region H Water Planning Group
10:00 AM Wednesday
June 7, 2017
San Jacinto River Authority Office
1577 Dam Site Rd, Conroe, Texas 77304

AGENDA

1. Introductions.
2. Review and approve minutes of February 28, 2017 meeting.
3. **Receive public comments on specific issues related to agenda items 4 through 12**. (Public comments limited to 3 minutes per speaker)
4. Receive presentation from Texas Water Development Board on Revised 31 Texas Administrative Rules Chapter 357.
5. Receive update from Consultant Team regarding the schedule and milestones for the development of the 2021 Region H Regional Water Plan.
6. Receive update from Consultant Team regarding the Texas Water Development Board funding of the fifth round of regional water planning for Region H and take action authorizing the San Jacinto River Authority to execute amended contracts with subconsultants.
7. Receive update from Consultant Team and Non-Population Demands Committee regarding TWDB draft non-municipal demand projections for the 2021 Region H Regional Water Plan.
8. Receive update from Consultant Team and Population Demands Committee regarding TWDB draft municipal population and water demand projections for the 2021 Region H Regional Water Plan.
9. Receive update from Consultant Team and Population Demands Committee regarding the sub-WUG planning option and consider taking action to authorize the Population Demands Committee to evaluate potential sub-WUGs and submit requests for sub-WUGs to TWDB.
10. Receive update from Consultant Team regarding identification of Major Water Providers for Region H and consider taking action to submit a list of recommended Major Water Providers to TWDB.
11. Receive report regarding recent and upcoming activities related to communications and outreach efforts on behalf of the Region H Planning Group.
12. Agency communications and general information.
13. **Receive public comments**. (Public comments limited to 3 minutes per speaker)
14. Next Meeting: To be determined.
15. Adjourn

Persons with disabilities who plan to attend this meeting and would like to request auxiliary aids or services are requested to contact Sonia Zamudio at (936) 588-3111 at least three business days prior to the meeting so that appropriate arrangements can be made.

Agenda Item 2

Review and approve minutes of February 28, 2017 meeting.

REGION H
Water Planning Group

MINUTES
REGION H WATER PLANNING GROUP
FEBRUARY 28, 2017
SAN JACINTO RIVER AUTHORITY
GENERAL AND ADMINISTRATION BUILDING
1577 DAM SITE ROAD
CONROE, TEXAS 77304

AGENDA

1. INTRODUCTIONS.

The meeting was called to order at 10:03 a.m.

MEMBERS PRESENT: David Bailey, John Bartos, Robert Bruner, James Comin, Mark Evans, Gene Fisseler, Judge Art Henson, Jace Houston, Robert Istre, Kathy Jones, Ivan Langford, Glenn Lord, Marvin Marcell, Carl Masterson, James Morrison, Ruth Stultz, William Teer, Michael Turco, J. Kevin Ward, and Pudge Willcox.

DESIGNATED ALTERNATES: Alisa Max for John Blount, and Mike O'Connell for Bob Hebert. Also in attendance were Philip Taucer, Jason Afinowicz, and Mike Reedy.

MEMBERS ABSENT: David Collinsworth, John Howard, and Jimmie Schindewolf.

NON-VOTING MEMBERS PRESENT: Sarah Backhouse

2. REVIEW AND APPROVE MINUTES OF NOVEMBER 2, 2016 MEETING.

Mr. Henson made a motion to approve the minutes of November 2, 2016, Region H Water Planning Group meeting. The motion was seconded by Mr. Fisseler with all present voting aye.

3. RECEIVE PUBLIC COMMENTS ON SPECIFIC ISSUES RELATED TO AGENDA ITEMS 4 THROUGH 12.

There were no public comments.

4. RECEIVE NOMINATING COMMITTEE REPORT AND ELECT OFFICERS AND MEMBERS OF THE EXECUTIVE COMMITTEE OF THE REGION H WPG.

Mr. Evans reported that the members of the Nominating Committee participated in a conference call to discuss nominations of officers and members to the Executive Committee. Mr. Evans stated that the Acting Chair, Mr. Hebert sent correspondence, in his absence, recommending the following

nominations: Mark Evans, Chair; Marvin Marcell, Vice Chair; Jace Houston, Secretary; John Bartos, At-Large Member; and Pudge Willcox, At-Large Member. With no further discussion, Mr. Turco made a motion to accept the nominations as recommended by the Nominating Committee. The motion was seconded by Mr. Masterson and carried unanimously.

5. CONSIDER AND TAKE ACTION REGARDING ADOPTION OF PROPOSED AMENDMENTS TO THE REGION H BYLAWS.

Mr. Houston provided a brief overview of the proposed amendments to the Region H Bylaws, as previously presented at the November 2, 2016, Region H meeting. He briefly reviewed each amendment. With no further discussion, Mr. Fisseler made a motion to adopt the proposed amendments to the Region H Bylaws. The motion was seconded by Mr. Lord and carried unanimously.

6. RECEIVE PRESENTATION FROM TEXAS WATER DEVELOPMENT BOARD ON REGIONAL WATER PLANNING IN TEXAS - INTRODUCTION TO THE 5TH CYCLE.

Ms. Backhouse presented information related to regional water planning in Texas and introduced the fifth cycle. She provided background information related to regional and state water planning in Texas, an overview of regional water planning groups, fundamentals of water planning, and the foundation of the State Water Plan. Mr. Willcox commended the Texas Water Development Board for its ability to compile sixteen water plans into one concise plan.

7. RECEIVE UPDATE FROM CONSULTANT TEAM REGARDING THE SCHEDULE AND MILESTONES FOR THE DEVELOPMENT OF THE 2021 REGION H REGIONAL WATER PLAN.

Mr. Philip Taucer reviewed the timeline related to the development of the 2021 Region H Regional Water Plan, providing a list of scheduled events and tasks.

8. RECEIVE UPDATE FROM CONSULTANT TEAM AND NON-POPULATION DEMANDS COMMITTEE REGARDING TWDB NON-MUNICIPAL DEMAND PROJECTION METHODOLOGY.

Mr. Taucer reviewed the non-population methodologies related to manufacturing, steam-electric power, and irrigation. He provided details of the revised methodologies, stating that further review is anticipated by the committee. Further, he stated that the draft projections from TWDB are anticipated in June, 2017, and that recommendations from the Regional Water Planning Group are due by November, 2017.

9. RECEIVE UPDATE FROM CONSULTANT TEAM AND NON-POPULATION DEMANDS COMMITTEE REGARDING TWDB DRAFT NON-MUNICIPAL DEMAND PROJECTIONS FOR THE 2021 REGION H REGIONAL WATER PLAN.

Mr. Taucer provided an overview of the non-municipal demand projections related to irrigation,

livestock, manufacturing, and steam-electric power. He stated that TWDB recently released the draft 2022 SWP Mining Water Demand Projections for Region H. He briefly reviewed various data within the report and stated that the deadline for Region H to submit requested changes is November 15, 2017.

10. RECEIVE UPDATE FROM CONSULTANT TEAM AND POPULATION DEMANDS COMMITTEE REGARDING TWDB DRAFT MUNICIPAL POPULATION AND WATER DEMAND PROJECTIONS FOR THE 2021 REGION H REGIONAL WATER PLAN.

Mr. Taucer stated that the draft projections from TWDB were received and he provided an overview of the information related to same. Mr. Taucer reviewed various timelines stating that the deadline for regions to submit requested changes is November 15, 2017.

11. RECEIVE REPORT REGARDING RECENT AND UPCOMING ACTIVITIES RELATED TO COMMUNICATIONS AND OUTREACH EFFORTS ON BEHALF OF THE REGION H PLANNING GROUP.

Mr. Taucer spoke in regards to a presentation at the Gulf Coast Water Authority that took place on January 12, 2017.

12. AGENCY COMMUNICATIONS AND GENERAL INFORMATION.

Ms. Backhouse stated that contract amendments to complete the fifth cycle of regional water planning would be considered at the April 6, 2017, TWDB Board meeting. She stated that Ms. Temple McKinnon is now the Director of Water Use, Projections, and Planning, and that Mr. Kevin Kluge is now the Director of Conservation and Innovative Water Technologies.

13. RECEIVE PUBLIC COMMENTS.

Ms. Jill Savory spoke in regards to agenda item 6. She opined that voters should have an opportunity to vote for upcoming projects if the voters will have to pay for same.

14. NEXT MEETING: JUNE 7, 2017

Mr. Evans announced that the next meeting will take place on June 7, 2017.

15. ADJOURN

Without objection, the meeting was adjourned at 11:38 a.m.

Agenda Item 4

Receive presentation from Texas Water Development Board on Revised 31 Texas Administrative Rules Chapter 357.

REGION H
Water Planning Group

REGION H Water Planning Group

Texas Regional Water Planning

Update on Revised 31 Texas Administrative Rules Chapter 357

Lann Bookout
Water Use, Projections, & Planning
Texas Water Development Board

REGION H Water Planning Group

The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board's statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.

REGION H Water Planning Group

Purpose of 2016 Rule Revisions

- Implement legislative changes
- Address stakeholder concerns
- Improve the planning process
- Increase flexibility in planning requirements
- Reduce certain unessential reporting requirements
- Clarify rules and refine definitions

REGION H Water Planning Group

2016 Rule Revision Process

Obtained Preliminary Stakeholder Input

- State agencies
- RWPG members
- Other stakeholders

Proposed Draft Rule Revisions

- Board approved proposal on July 21st
- Published in Texas Register on August 5th
- Comments accepted through September 6th
- Held public hearing on August 24th

Revised and adopted final rules

- Board adopted rules on November 17th
- Rules effective on December 8th

REGION H Water Planning Group

Revised Water User Group (WUG) Definition - §357.10(41)

- Reflects the utility-based planning approach for municipal WUGs
- Sets a new lower, threshold of 100 acre-feet per year provided by the utility
- Privately-owned utilities must provide an average of 100 acre-feet per year across all owned systems
- County-Other definition revised to be consistent

REGION H Water Planning Group

Definitions of WWP and MWP – §357.10(42) and §357.10(19)

Wholesale Water Provider (WWP)

- Eliminates the annual 1,000 acre-foot delivery or sales threshold
- The RWPG will identify the WWPs in its region to be evaluated

Major Water Provider (MWP)

- Significant public or private WUG or WWP
- Designated by the RWPG
- MWP is a category to be used for reporting purposes in regional and state water planning instead of previous WWP-based reporting requirements

REGION H Water Planning Group

WMSPs and Prioritization of Projects - §357.10(39) and §357.46

Water Management Strategy Project (WMSP) = a water project that has a capital cost and when implemented, would develop, deliver, or treat additional water supplies or conserve water for **WUGs** or **WWPs**

- May be required to implement a water management strategy (WMS)
- Defined to distinguish from a WMS and to clarify what RWPGs are to prioritize at the end of their planning efforts
- New §357.46 requires each RWPG to prioritize recommended WMSPs for SWIFT

REGION H Water Planning Group

Public Notice Revisions - §357.21

RWPGs may now post notices:

- Online on the RWPGs website, OR
- With each County Clerk in the RWPA

New §357.21(e)

- Pertains to notice for requesting research and planning funds from the TWDB

REGION H Water Planning Group

Existing Surface Water Supply Analysis - §357.32(c)

- Availability requirements for existing supplies of stored and run of river water are split out as §357.32(c)(1) and §357.32(c)(2)
- Evaluation of existing run of river surface water availability for municipal WUGs must be based on the minimum monthly diversion amounts that are available 100% of the time, if it is the only supply for the municipal WUG

REGION H Water Planning Group

Groundwater Availability Analysis - §357.32(d)

- Clearly stipulates that for an RWP to be consistent with a desired future condition, the groundwater availability in the RWP must not exceed the modeled available groundwater (MAG)*
- If there is no groundwater conservation district within the RWPA, then the RWPG will determine the availability of groundwater for regional planning purposes (in response to SB 1101)

*Or as adjusted by the MAG Peak Factor

REGION H Water Planning Group

MAG Peak Factor - §357.32(d)(3) and §357.10(20)

MAG Peak Factor = a percentage (e.g., greater than 100%) that is applied to a MAG value reflecting the annual groundwater availability that, for planning purposes, shall be considered temporarily available for pumping consistent with DFCs.

- Developed in response to stakeholder input
- Provides temporary accommodation of increased groundwater demands by accommodating anticipated fluctuations in pumping
- Does **not** limit permitting or guarantee approval of any future permit applications.
- Requires review and approval by relevant groundwater conservation districts, groundwater management areas, and the TWDB Executive Administrator

REGION H Water Planning Group

Additional Rule Changes – New and Revised Definitions

- §357.10(1) – Agricultural Water Conservation *(new)*
- §357.10(3) – Availability *(revised)*
- §357.10(10) – Drought Management WMS *(new)*
- §357.10(11) – Drought of Record *(revised)*
- §357.10(13) – Existing Water Supply *(revised)*
- §357.10(14) – Firm Yield *(revised)*
- §357.10(21) – Planning Decades *(new)*
- §357.10(26) – RWPG-Estimated Groundwater Availability *(new)*

REGION H Water Planning Group

Additional Rule Changes – New and Revised Definitions (continued)

- §357.10(28) – Reuse *(new)*
- §357.10(32) – State Water Planning Database *(new)*
- §357.10(33) – Unmet Water Need *(new)*
- §357.10(34) – Water Conservation Measures *(revised)*
- §357.10(35) – Water Conservation Plan *(revised)*
- §357.10(36) – Water Conservation Strategy *(new)*
- §357.10(37) – Water Demand *(new)*
- §357.10(40) – Water Need *(new)*

REGION H Water Planning Group

Additional Rule Changes (continued)

- §357.22(a) – Impacts on public health, safety, or welfare
- §357.34(c) – Seawater and brackish groundwater WMSs
- §357.34(d) – WMSs and WMPSs must reduce consumption, loss, or waste; improve efficiency; or develop, deliver, or treat additional water supply volumes
- §357.35(g)(2) – Management supply factor

REGION H Water Planning Group

Additional Rule Changes (continued)

- §357.50(j) – Unmet municipal needs
- §357.51(a) – Amendment petitions
- §357.51(b) and (c) – Unmet needs in major and minor amendments
- §357.51(e) – Substituting alternative for recommended WMSs
- §357.60 – Consistency of RWPs

REGION H Water Planning Group

Questions?

Texas Water Development Board

Lann Bookout

lann.bookout@twdb.texas.gov

Modeled Available Groundwater (MAG) Peak Factor slides/graphics

Name
Project Manager
Water Use, Projections, & Planning
Texas Water Development Board
Updated December 2016

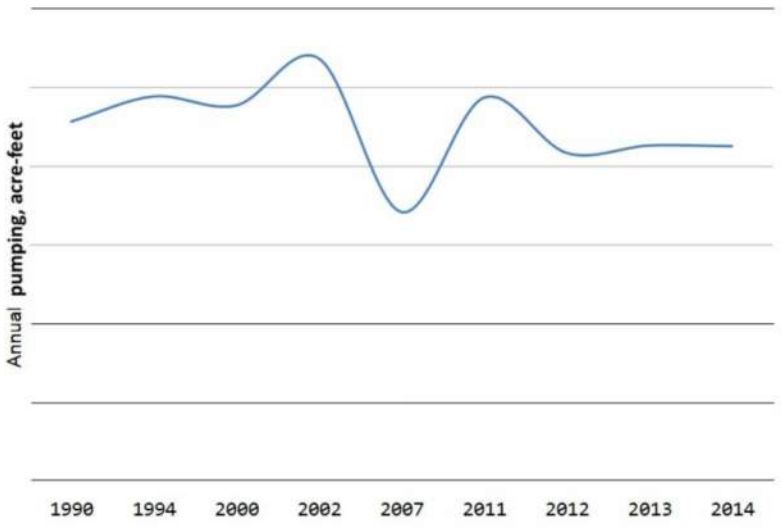
MAG Peak Factor

Its potential use will depend on a combination of many factors including

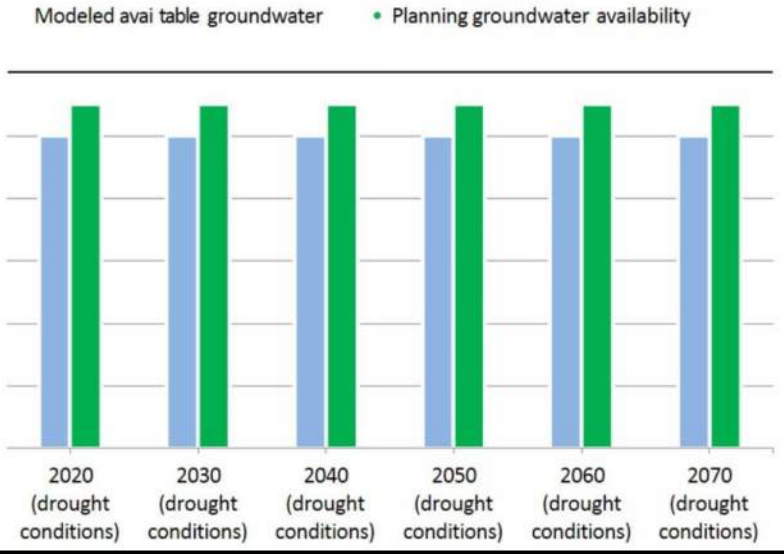
- the character of the aquifer
- specific location
- historical and anticipated future pumping volumes - including relative to the MAG
- historic and estimated future pumping patterns
- GCD, GMA, and TWDB approval

Historic and anticipated future **cyclical pumping** patterns

EXAMPLE Historical Groundwater Pumping (acre-feet)

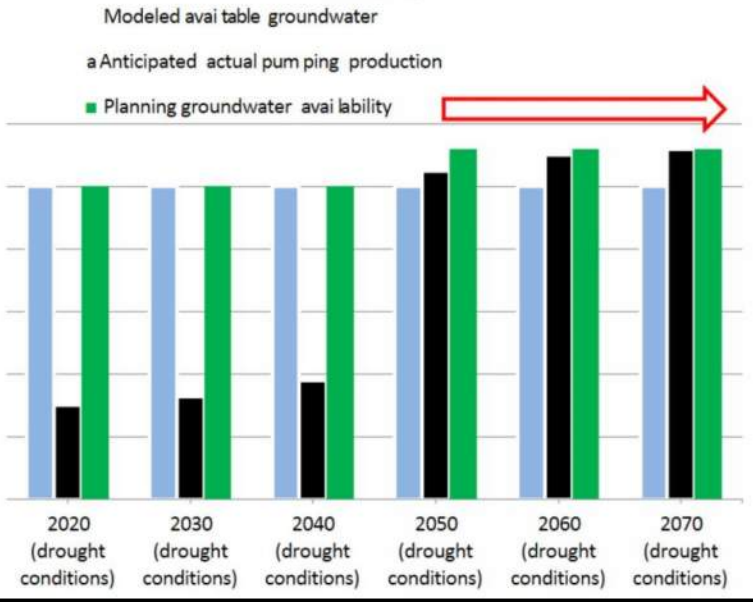


Example 1: MAG peak factor impact on planning groundwater availability *(based on historical and anticipatedfuture cyclical pumping between wet and dry periods)*



Historic/future pumping that remains well below the MAG for a significant period of time

Example 2: MAG peak factor impact on planning groundwater availability *(based on low pumping in early decades)*



Process

Regional water planning groups must request that the TWDB Executive Administrator approve each MAG peak factor. Each planning group requests for MAG peak factors must

- include written approval from the relevant groundwater conservation district and the representative of the groundwater management area,
- include the technical basis for the factor value, and
- document how the MAG Peak Factor will not prevent the associated groundwater conservation district(s) from managing groundwater resources to achieve the desired future condition(s).

Questions?

Modeled Available Groundwater (MAG) Peak Factor

Texas Water Code (TWC) §36.1132 requires management of groundwater production on a long-term basis to achieve applicable desired future conditions. In practice, this may include variations in pumping from year to year, for example, in response to relative wet and dry periods. Modeled available groundwater (MAG) is the amount of water that the Texas Water Development Board (TWDB) Executive Administrator determines may be produced on an average annual basis to achieve a desired future condition. Most of the MAG values were developed using groundwater availability models calibrated for long-term average, not drought of record, conditions.

In response to stakeholder concerns during the fourth cycle of regional water planning, the TWDB revised its planning rules to include a MAG Peak Factor that ensures regional water plans have the ability to fully reflect how, under current statute, groundwater conservation districts anticipate managing *groundwater production* under drought conditions.[i]

What is the MAG Peak Factor?

The purpose of the MAG Peak Factor is to

- provide reasonable flexibility and temporary accommodation of increased groundwater pumping above the MAG;
- accommodate anticipated fluctuations in pumping between wet and dry periods, or to account for other shifts in the timing of pumping while remaining consistent with desired future conditions;
- allow regional water planning groups to develop plans that reflect more realistic drought condition groundwater availability and pumping, where appropriate; and
- maintain the integrity of the regional and state water planning process.

The use of proposed MAG Peak Factors requires review and approval by relevant groundwater conservation districts, groundwater management areas, regional water planning groups, and the TWDB Executive Administrator.

Subject to many factors, the MAG Peak Factor might be considered in instances, for example, where

- actual pumping in wetter years is expected to fall below the MAG, thereby allowing intermittent pumping of volumes greater than the MAG during drought; or,
- groundwater pumping in early decades is expected to consistently remain well below the MAG, thereby accommodating pumping volumes somewhat higher than the MAG in later decades—all while achieving the desired future condition.

The MAG is the amount of water that can be produced on an annual average basis, instead of the amount that can be permitted. Groundwater conservation districts must consider MAGs, along with other factors in TWC §36.1132, when issuing permits for groundwater production. Accordingly, the MAG Peak Factor reflects groundwater available for pumping, not permitting, and is utilized for regional water planning purposes only. The MAG Peak Factor is not intended as a limit to permits or as guaranteed approval or pre-approval of any future permit application.

How does the process work?

It is not a mandatory requirement that regional water planning groups utilize MAG Peak Factors in the development of their regional water plans. Rather, it is the decision of each planning group, in concurrence with the relevant groundwater conservation district and groundwater management area, to determine what, if any, MAG Peak Factor is appropriate for planning efforts. A groundwater conservation district may also initiate the use of the MAG Peak Factor. The definition specifies that a MAG Peak Factor would be expressed as a percentage of modeled available groundwater (e.g., greater than 100 percent) and would represent the quantified annual groundwater availability for planning purposes.

Regional water planning groups must request the TWDB Executive Administrator's approval of each MAG Peak Factor. Each planning group request for MAG Peak Factors must

- include written approval from both the relevant groundwater conservation district, if one exists within the particular aquifer-region-county-basin split, and representatives of the groundwater management area;
- include the technical basis for the request in sufficient detail to support groundwater conservation district, groundwater management area, and the Executive Administrator evaluation; and
- document how the MAG Peak Factor will not prevent the associated groundwater conservation district(s) from managing groundwater resources to achieve the desired future condition(s).

If approved by the Executive Administrator, each MAG Peak Factor would be applied by the TWDB to the associated modeled available groundwater volume to calculate the modified groundwater availability volume that would be used by regional water planning groups.

More Information

To learn more about regional water planning requirements, please visit: www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/current_docs.asp.

Or please contact:
Sarah Backhouse
sarah.backhouse@twdb.texas.gov
(512) 936-2387

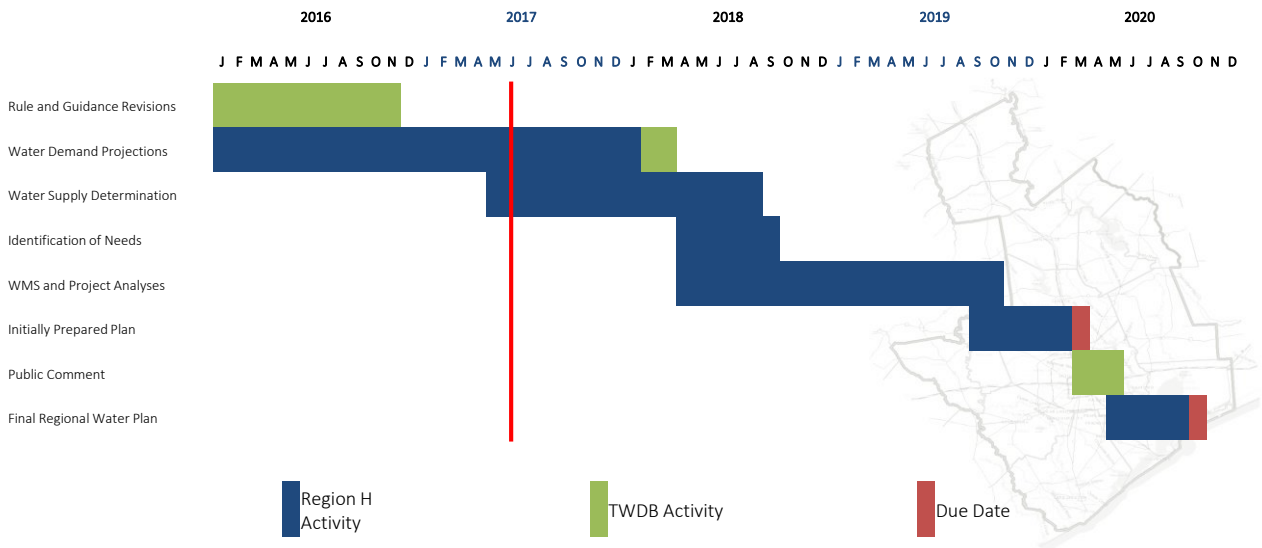
[i] *31 TAC §357.10(20); process §357.32(d)(3). This rule change eliminated the effect of modeled available groundwater values acting as immovable, "hard caps" on groundwater pumping that could be reflected in the regional water plans.*

Agenda Item 5

Receive update from Consultant Team regarding the schedule and milestones for the development of the 2021 Region H Regional Water Plan.

REGION H
Water Planning Group

Agenda Item 5
2021 RWP Schedule



Agenda Item 5
2021 RWP Schedule

Date	Scheduled Events/Tasks
06/2017	**RWPG Meeting**
06/2017	Estimated release of historic reuse, brackish groundwater, per-capita.
09/2017	Estimated due date to submit requests for sub-WUGs
01/2018	Estimated due date for projection adjustment requests to TWDB
03/2018	Estimated adoption date for projections
09/2018	DUE DATE: Technical Memorandum
03/2020	DUE DATE: Initially Prepared Plan
10/2020	DUE DATE: FINAL RWP

Agenda Item 5
2021 RWP Schedule

- Preferences for next meeting(s)
- One near term deadline – only looming a little
- But
  - Holidays
  - Hard data ramping up
  - Normally aim for four meetings
- Committee activity

Agenda Item 6

Receive update from Consultant Team regarding the Texas Water Development Board funding of the fifth round of regional water planning for Region H and take action authorizing the San Jacinto River Authority to execute amended contracts with subconsultants.

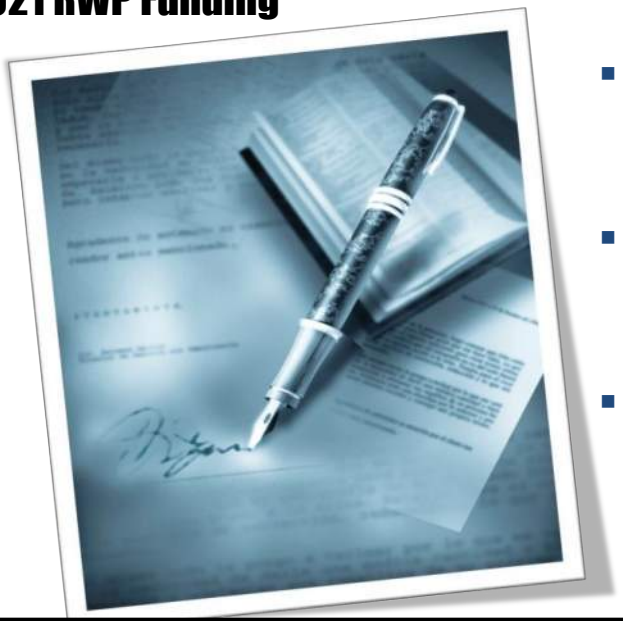
REGION H
Water Planning Group

Agenda Item 6
2021 RWP Funding

- 04/2015 – 1st Phase approval
- 11/2016 – SJRA authorized by RWPG
- 02/2017 - 2nd Phase application
- 04/2017 - TWDB approval
- 08/2017 - Contracts due

Task	Description	Budget
1	Description of Planning Area	$24,694
3	Water Supply Analysis	$107,997
4A	Identification of Needs	$23,332
4B	Identification of Potentially Feasible WMS	$60,943
4C	Technical Memorandum	$36,647
5A	Evaluation and Recommendation of WMS	$948,695
5B	Conservation Recommendations	$81,615
6	Impacts of RWP / Consistency	$106,355
7	Drought Response	$130,918
8	Policy Recommendations and Unique Sites	$14,212
9	Infrastructure Financing Analysis	$46,590
10	Public Participation and Plan Adoption	$225,987
11	Implementation and Comparison	$56,430
12	Project Prioritization	$46,822
	TOTAL	**$1,911,237**

Agenda Item 6
2021 RWP Funding



- Additional steps after TWDB contract
- Amended contracts with subconsultants
- Submit WMS evaluation scope(s) for Task 5

Agenda Item 6
2021 RWP Funding

Action:

Authorize the San Jacinto River Authority to execute amended contracts with subconsultants.

Attachment 1
Exhibit A
Fifth Cycle of Regional Water Planning
First Amended Scope of Work

Contents

Task 1- Planning Area Description[1]

The objective of this task is to prepare a standalone chapter[2] to be included in the 2021 Regional Water Plan (RWP) that describes the Regional Water Planning Area (RWPA).

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.30, including the new requirement of describing major water providers in the RWPA.[3]

2) Review and summary of relevant existing planning documents in the region including those that have been developed since adoption of the previous RWP. Documents to be summarized include those referenced under 31 TAC §357.22.

3) Incorporation of all required Texas Water Development Board (TWDB) Regional Water Planning Application/State Water Planning Database (DB22) reports into document. Note that all DB22 reports are required to be physically located immediately following the RWP Executive Summary. However, Regional Water Planning Groups (RWPGs) may include these reports elsewhere in the document as they deem appropriate.

4) Review of the chapter document by RWPG members.

5) Modifications to the chapter document based on RWPG, public, and/or agency comments.

6) Submittal of chapter document to TWDB for review and approval; and

7) All effort required to obtain final approval of the RWP chapter by TWDB.

Deliverables: A completed Chapter 1 describing the RWPA shall be delivered in the 2021 RWP as a work product.

[1] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[2] This shall be a separate chapter as required by 31 TAC §357.22(b).
[3] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

Task 2A - Non-Population Related Water Demand Projections[4]

TWDB staff will provide draft water demand projections for 2020-2070 for all water demands unrelated to population (e.g. mining, manufacturing, irrigation, steam-electric power, and livestock) based on the projections from the 2017 State Water Plan updated in some cases based on updated methodologies or the most recent TWDB historical water use estimates.

TWDB staff will update water demand projections for all associated Water User Groups (WUGs) and provide draft estimates to RWPGs for their review and input.

Each RWPG will then review the draft projections and may provide input to TWDB or request specific changes to the projections from TWDB.[5] The emphasis of this effort will be on identifying appropriate modifications based on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan.

If adequate justification is provided by the RWPG to TWDB, water demand projections may be adjusted by the TWDB in consultation with Texas Department of Agriculture (TDA), Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). Once RWPG input and requested changes are considered, final water demand projections will be adopted by the TWDB's governing Board (Board). The adopted projections will then be provided to each RWPG. RWPGs must use the Board-adopted projections when preparing their regional water plans.

TWDB will directly populate DB22 with all WUG-level projections and make related changes to DB22 based on Board-adopted projections.

<u>This Task includes, but is not limited to, performing all work in accordance with TWDB rules and guidance required to:</u>

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.31.[6]

2) Prepare a stand-alone chapter[7] (including work from both Tasks 2A & 2B) to be included in the 2021 RWP that also incorporates all required TWDB DB22 reports into the document.

[4] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[5] All requests to adjust draft population or water demand projections must be submitted along with associated data in an electronic format determined by TWDB (e.g., fixed format spreadsheets)
[6] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development.*
[7] This shall be a separate chapter as required by 31 TAC §357.22(b).

3) Receive and make publicly available the draft water demand projections provided by TWDB.

4) Evaluate draft water demand projections provided by TWDB.

5) Review comments received from local entities and the public for compliance with TWDB requirements.

6) Provide detailed feedback to TWDB on water demand projections, as necessary, including justification and documentation supporting suggested changes with a focus on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan

7) Prepare and submit numerical requests for revisions, in tabular format in accordance with TWDB guidance, of draft water demand projections and process such requests based on, for example, requests from local entities within the region. The RWPG and/or local entities should provide required documentation and justification of requested revisions.

8) Communicate and/or meet with TWDB staff and/or local entities requesting revisions, as necessary.

9) Assist TWDB, as necessary, in resolving final allocations of water demands to WUGs to conform with any control totals defined by TWDB, for example, by county and/or region.

10) Prepare water demand projection summaries for WUGs using final, Board-adopted projections to be provided by the TWDB, as necessary.

11) Modify any associated water demand projections for Major Water Providers (MWPs), as necessary based on final, Board-adopted projections.

12) Review the *TWDB DB22 Non-Population Related*[8] *Water Demand* report from the DB22 and incorporate this planning database report into any Technical Memoranda, Initially Prepared Plan (IPP), and adopted RWP (labeled as such and with source reference).

13) Modify any aggregated water demand summaries, for example, for MWPs or irrigation districts, accordingly incorporate this planning database report into any Technical Memoranda, IPP, and adopted RWP (labeled as such and with source reference).

[8] All '*TWDB DB22…*' reports will be provided by TWDB through the online planning database web interface as a customizable report that can be downloaded by RWPGs and must be included as part of any Technical Memoranda and water plan.

14) Update Wholesale Water Provider (WWP) contractual obligations to supply water to other entities and report this information along with projected demands including within the DB22 and within any planning memorandums or reports, as appropriate.

Task 2B - Population and Population-Related Water Demand Projections[9]

TWDB staff will prepare draft population and associated water demand projections for 2020-2070 for all population-related WUGs using data based on the population projections in the 2017 State Water Plan as reassembled by utility service areas.

TWDB staff will develop population projections and associated water demand projections for all WUGs based on utility service areas and provide them to RWPGs for their review and input.

Because there won't be new U.S. Census data available in time to incorporate into the 2021 RWPs, the emphasis of this work will be on the transition of the 2017 State Water Plan population projections and the associated water demand projections from political boundaries to utility service area boundaries and to making limited modifications based on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan.

RWPGs shall then review the draft projections and may provide input to TWDB or request specific changes to the projections from TWDB. If adequate justification is provided by the RWPGs to TWDB, population and/or water demand projections may be adjusted by the TWDB in consultation with TDA, TCEQ, and TPWD. Once RWPG input and requested changes are considered, final population and associated water demand projections will be adopted by the Board. The adopted projections, based on utility service areas, will then be provided to RWPGs. RWPGs must use the Board-adopted projections when preparing their regional water plans and identify WUGs with associated utility service areas.

TWDB will directly populate the DB22 with all WUG-level projections and make related changes to the DB22 if revisions are made.

<u>This Task includes, but is not limited to, performing all work in accordance with TWDB rules and guidance required to:</u>

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 Texas Administrative Code (TAC) Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.31.[10]

[9] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[10] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

2) Prepare a stand-alone chapter[11] (including work from both Tasks 2A & 2B) to be included in the 2021 RWP that also incorporates all of required TWDB DB22 reports into the document.

3) Receive and make publicly available the draft population and associated water demand projections provided by TWDB and that are based on utility service areas rather than political boundaries.

4) Evaluate draft population and associated water demand projections provided by TWDB.

5) Review comments received from local entities and the public for compliance with TWDB requirements.

6) Provide detailed feedback to TWDB on both population and associated water demand projections, as necessary, including justification and documentation supporting suggested changes with a focus on the transition to utility service areas and, more generally, relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan.

7) Prepare and submit numerical requests, in tabular format in accordance with TWDB guidance, for revisions of draft population and/or water demand projections and process such requests based on, for example, requests from local entities within the region. The RWPG and/or local entities should provide required documentation and justification of requested revisions.

8) Communicate and/or meet with TWDB staff and/or local entities requesting revisions, as necessary.

9) Assist TWDB, as necessary, in resolving final allocations of population and water demands to WUGs to conform with any control totals defined by TWDB, for example, by county and/or region.

10) Prepare population and water demand projection summaries for WUGs using final, adopted projections to be provided by the TWDB, as necessary for presentation in documents.

11) Consider and include in all appropriate planning documents the projections of population and associated water demands for any new WUGs to be provided by the TWDB.

12) Modify any associated water demand projections for MWPs, as necessary based on final, adopted projections.

[11] This shall be a separate chapter as required by 31 TAC §357.22(b).

13) Review the *TWDB DB22 Population* and associated *TWDB DB22 Population-Related Water Demand* reports from the DB22[12] and incorporate these planning database reports into any Technical Memoranda, the IPP, and final RWP (labeled as such and with source reference).

14) Modify any aggregated water demand summaries, for example, for MWPs, accordingly and present in planning documents.

15) Update WWP contractual obligations to supply water to other entities and report this information along with projected demands including within DB22 and within any planning memorandums or reports, as appropriate.

Task 3 - Water Supply Analyses[13]

This Task involves updating or adding: a) groundwater, surface water, reuse, and other water source availability estimates, and b) existing WUG and WWP water supplies that were included in the 2021 Regional Water Plan, in accordance with methodology described in **Section 3** of the *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development* for estimating surface water, groundwater, systems, reuse, and other supplies during drought of record conditions. All water availability and water supply estimates will be extended through 2070.

<u>This Task includes performing all work in accordance with TWDB rules and guidance required to:</u>

Meet all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.32.[14]

Prepare a standalone chapter[15] to be included in the 2021 RWP that also incorporates of all required DB22 reports into the document.

I) Estimate a) Surface Water Availability and b) Existing WUG and WWP Surface Water Supplies:

1) Select hydrologic assumptions, models, and operational procedures for modeling the region's river basins and reservoirs using the most current TCEQ Water Availability Models (WAMs) in a manner appropriate for assessment of existing surface water supply and regional water planning purposes. Reservoir systems[16]

[12] RWPG technical consultants must attend mandatory training on DB22.
[13] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[14] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[15] This shall be a separate chapter as required by 31 TAC §357.22(b).
[16] Reservoir systems must be approved by TWDB and identified as such in DB22.

and their yields shall be modeled in accordance with the *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development.*

2) Obtain TWDB Executive Administrator approval of hydrologic assumptions or models and for any variations from modeling requirements in the *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

3) As necessary and appropriate, modify or update associated WAMs or other models to reflect recent changes to permits, transfers, legal requirements, new water rights, and/or specified operational requirements. Note that incorporating anticipated sedimentation into firm yield analyses is a required consideration that does not require a hydrologic variance approval from the Executive Administrator.

4) Assign available water supplies, as appropriate, to WUGs and WWPs including conducting supply analyses for WWPs.

5) Apply the TCEQ WAMs, as modified and approved by TWDB, and/or other appropriate models to quantify firm yield for major reservoirs, reservoir systems, and firm diversion for run-of-river water rights, as determined on at least a monthly time-step basis. Reservoir firm yield shall be quantified based on the most recent measured capacity and estimated capacity in year 2070.

6) Evaluate TCEQ Water System Data Reports[17] from the Drinking Water Watch or Safe Drinking Water Information System (SDWIS) website for municipal WUGs that use surface water and identify any physical constraints limiting existing water supplies to WUGs and/or WWPs. Limitations to be considered based on delivering treated water to WUGs. Other information that the RWPGs collect, for example, survey results, may be included in the evaluation of infrastructure capacity or limitations in delivering treated water to WUGs.

7) Update information on WWP contractual obligations to supply water to other entities including within DB22. Unless the RWPG considers it unlikely that a specific contract will be renewed, water supplies based on contractual agreements shall be assumed to renew at the contract termination date, for example, if the contract provides for renewal or extensions. Report this information within any planning memorandums or reports, as appropriate.

8) Based on the water availability, existing infrastructure, and associated physical and legal limitations, determine the existing surface water supply available from each surface water source to each WUG and WWP (including newly identified WUGs and WWPs) during a drought of record based on source water availability, infrastructure capacity, legal constraints, and/or operational limitations.

[17] Available from TCEQ at http://dww2.tceq.texas.gov/DWW/.

9) Complete and update all required data elements for DB22 through the web interface.[18]

10) Compile firm yield and diversion information by Source, WUG, WWP, county, river basin, and planning region as necessary to obtain decadal estimates of existing surface water supply throughout the planning period. This will be facilitated by *TWDB DB22 Water Source Availability* and associated *TWDB DB22 WUG and WWP Existing Water Supply* reports using data provided by RWPGs and made available to all RWPGs through the DB22 interface.

11) Review, confirm the accuracy of, and incorporate the required associated planning database reports directly into the Technical Memorandum, IPP, and adopted RWP under Task 4C (labeled as such and with source reference).

II) Estimate a) Groundwater Availability and b) Existing WUG and WWP Groundwater Supplies:

Obtain and review the Modeled Available Groundwater (MAG)**[19]** volumes that are developed by TWDB based on the Desired Future Conditions (DFCs) adopted by Groundwater Management Areas (GMAs). MAG volumes for each aquifer will be available from TWDB through the DB22 interface, split into discrete geographic-aquifer units by: Aquifer; County; River Basin; and Region.

1) In areas that were not considered in the DFC process and therefore do not have MAG annual volumes but have groundwater supplies, or in RWPAs in which no Groundwater Conservation District (GCD) exists[20], develop RWPG-estimated groundwater availability for Board review and approval prior to inclusion in the IPP[21] and in accordance with the *First Amended General Guidelines for Regional Water Plan Development*.

2) Consider the impacts of the available MAG annual volumes on the regional water plan including how it impacts existing water supplies.

3) In areas with GCDs, obtain GCD Management Plans and GCD information to be considered when estimating existing supplies and water management strategies under future tasks.

4) Assign available water supplies, as appropriate, to WUGs and WWPs including conducting supply analyses for WWPs.

---

[18] In accordance with the Guidelines for Regional Water Plan Data Deliverables. RWPG technical consultants must attend mandatory training on the Regional Water Planning Application (DB22).
[19] The estimated total pumping from the aquifer that achieves the DFC adopted by members of the associated GMA. MAG data to be entered into DB22 by TWDB (see guidance document).
[20] Related to 84(R) SB 1101 requirements. As of October 2016 these requirements only apply to the North East Texas (Region D) RWPG, as it is the only region currently in the state with no GCDs in its RWPA.
[21] 31 TAC 357.32(d)(2).

5) Select hydrologic and other assumptions for distribution of available groundwater for potential future use by WUGs (e.g. via a pro-rationing policy) as existing supply based on models and operational procedures appropriate for assessment of water supply and regional water planning purposes. A specific hydrologic variance request is required to utilize a MAG Peak Factor to accommodate temporary increases in existing annual availability for planning purposes[22].

6) Evaluate TCEQ Water System Data Reports[23] from the Drinking Water Watch or SDWIS website for municipal WUGs using groundwater and identify any physical constraints limiting existing water supplies to WUGs and/or WWPs. Limitations to be considered based on delivering treated water to WUGs. Other information that the RWPGs collect, for example, survey results, may be included in the evaluation of infrastructure capacity or limitations in delivering treated water to WUGs.

7) Update information on WWP contractual obligations to supply water to other entities including within DB22. Unless the RWPG considers it unlikely that a specific contract will be renewed, water supplies based on contractual agreements shall be assumed to renew at the contract termination date, for example, if the contract provides for renewal or extensions. Report this information within any planning memorandums or reports, as appropriate.

8) Compile and/or update information regarding acquisitions of groundwater rights, for example, for transfer to municipal use, and account for same in the assessment of both availability and existing groundwater supplies.

9) Based on the water availability, existing infrastructure, and associated physical and legal limitations, determines the existing groundwater supply available from each water source to each WUG and WWP (including newly identified WUGs and WWPs) during a drought of record based on water availability, infrastructure capacity, legal constraints, and/or operational limitations.

10) Complete and update all required data elements for DB22 through the web interface. [24]

11) Compile groundwater availability information by Source, WUG, Wholesale Water Provider, county, river basin, and planning region as necessary to obtain decadal estimates of supply throughout the planning period. This will be facilitated by *TWDB DB22 Water Source Availability* and associated *TWDB DB22 WUG and WWP Existing Water Supply* reports using data provided by RWPGs and made available to all RWPGs.

[22] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[23] Available from TCEQ at http://dww2.tceq.texas.gov/DWW/.
[24] In accordance with the Guidelines for Regional Water Plan Data Deliverables. RWPG technical consultants must attend mandatory training on DB22.

III) Estimate System, Reuse, and Other Types of Existing Supplies:

Systems, Reuse, and Other Water Supplies

1) Integrate firm water supplies for WUGs using a system of supply sources (e.g., surface water, storage, and groundwater).

2) Research and quantify existing supplies and commitments of treated effluent through direct and indirect reuse.

3) Compile systems, reuse, and other availability information by source, WUGs, wholesale water provider, county, river basin, and planning region as necessary to obtain decadal estimates of supply throughout the planning period.

4) Assign available water supplies, as appropriate, to WUGs and WWPs including conducting demand analyses for WWPs.

5) Identify and sub-categorize existing sources in DB22 to extract unique sources. In addition to surface water, groundwater, and reuse, for example, further clarify the source types in DB22 to subcategorize other specific water sources such as desalinated groundwater or desalinated surface water, and seawater desalination, and any other supply types that are connected supplies.

6) Review and confirm the accuracy of the *TWDB DB22 Availability* and associated *TWDB DB22 Existing Water Supply* reports from DB22 and incorporate these planning database reports directly into the Technical Memorandum and other planning documents (labeled as such and with source reference).

7) Identify any physical constraints limiting these existing water supplies to WUGs and/or WWPs including based on TCEQ Water System Data Reports[25]. Limitations to be considered based on delivering treated water to WUGs. Other information that the RWPGs collect, for example, survey results, may be included in the evaluation of infrastructure capacity or limitations in delivering treated water to WUGs.

8) Update information on WWP contractual obligations to supply water to other entities including within DB22. Unless the RWPG considers it unlikely that a specific contract will be renewed, water supplies based on contractual agreements shall be assumed to renew at the contract termination date, for example, if the contract provides for renewal or extensions. Report this information within any planning memorandums or reports, as appropriate.

9) Based on the water availability, existing infrastructure, and associated physical and legal limitations, determines the existing system, reuse, and other water supplies

[25] Available from TCEQ at http://dww2.tceq.texas.gov/DWW/.

available from each water source to each WUG and WWP (including newly identified WUGs and WWPs) during a drought of record based on source water availability, infrastructure capacity, legal constraints, and/or operational limitations.

10) Complete and update all required data elements for DB22 through the web interface.

11) Compile these supplies by source, WUG, wholesale water provider, county, river basin, and planning region as necessary to obtain decadal estimates of existing surface water supply throughout the planning period. This will be facilitated by *TWDB DB22 Water Source Availability* and associated *TWDB DB22 WUG and WWP Existing Water Supply* reports using data provided by RWPGs and made available to all RWPGs through the DB22 interface.

12) Review, confirm the accuracy of, and incorporate the required associated planning database reports directly into the Technical Memorandum, IPP, and adopted RWP under Task 4C.

13) In addition to submitting the electronic model files necessary to replicate results, the Technical Memo, IPP, and adopted RWP shall include a written summary of all WAMs and Groundwater Availability Models (GAMs) on which the surface and groundwater availability in the RWP is based (except for availability associated with MAGs), to include:
    - the named/labeled version (incl. date) of each model used;
    - a summary of any modifications to each model and the date these modifications were approved by the EA;
    - name of the entity/firm that performed the model run; and
    - the dates of the model runs.[26]

Includes all work required to coordinate with other planning regions to develop and allocate estimates of water availability and existing water supplies.

Task 4A – Identification of Water Needs (Water User Group analysis to be performed by the TWDB) [27]

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358,

[26] All input files of WAM models shall be included as an electronic appendix in the IPP and RWP.
[27] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.33.[28]

2) Prepare a standalone chapter[29] to be included in the 2021 RWP that also incorporates all required DB22 reports into the document.

3) Based upon updated projections of existing water supply and projected water demands under Tasks 2 and 3, and the associated data entered into DB22, TWDB will update computations of identified water needs (potential shortages) by WUGs and WUG customers of WWPs. As decadal estimates of needs (potential shortages) as well as by county, river basin, and planning region.

4) The results of this computation will be provided by TWDB via DB22 to RWPGs in a customizable format that is in accordance with TWDB rules as the <u>TWDB DB22 Identified Water Needs</u> report

5) Regions may also request additional, unique needs analysis (e.g., for a WWP) that the RWPG considers warranted. Such reports will be provided by TWDB, if feasible based on the DB22 constraints and TWDB resources. The RWPG will need to enter or provide any additional data into DB22 that may be necessary to develop these evaluations.

6) The DB22 needs reports and RWPG-identified water needs for MWPs shall be incorporated by the RWPG into the Technical Memorandum, IPP, and adopted RWP (labeled as such and with source reference).

7) Upon request, TWDB will perform a socioeconomic analysis of the economic effects of not meeting the identified water needs and update and summarize potential social and economic effects under this Task. This report will be provided to RWPGs as part of this Task and incorporated into the adopted regional water plans.

8) If the RWPG chooses to develop its own socioeconomic analysis the resulting socioeconomic report, with documented methodology, shall be incorporated into the IPP and adopted regional water plan by the RWPG.

9) A secondary needs analysis will be calculated by TWDB based on DB22 for all WUGs and WWPs for which conservation or direct reuse water management strategies are recommended. The results of this computation will be provided to RWPGs in accordance with TWDB rules and shall be incorporated by the RWPG into the regional water plan as *TWDB DB22 Second-Tier Identified Water Need* report.

[28] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[29] This shall be a separate chapter as required by 31 TAC §357.22(b).

Task 4B - Identification of Potentially Feasible Water Management Strategies[30]

This Task includes, but is not limited to, performing all work in accordance with TWDB rules and guidance required to:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.34(a)(b)(c).[31]

2) Receive public comment on a proposed process to be used by the RWPG to identify and select water management strategies for the 2021 regional water plan. Revise and update documentation of the process by which water management strategies that are potentially feasible for meeting a need were identified and selected for evaluation in the 2021 regional water plan. Include a description of the process selected by the RWPG in the Technical Memorandum and the IPP and adopted regional water plans.

3) Consider the TWDB Water Loss Audit Report, conservation best management practices, and drought management when considering potentially feasible water management strategies as required by rules.

4) Update relevant portions of the regional water plan summary of existing water supply plans for local and regional entities. This Task requires obtaining and considering existing water supply plans. Updated summary to be included in the IPP and adopted regional water plans.

5) Plans to be considered in developing water management strategies include those referenced under 31 TAC §357.22.

6) If no potentially feasible strategy can be identified for a WUG or WWP with a need, document the reason for this in the Technical Memorandum and the IPP and adopted regional water plans.

7) Consider recent studies and describe any significant changes in water management strategies described as being in the implementation phase in the 2021 RWP as well as any new projects in the implementation phase prior to adoption of the Initially Prepared 2021 Regional Water Plan.

8) Identify potential water management strategies to meet needs for all WUGs and WWPs with identified needs, including any new retail utility WUGs and WWPS that may have been previously aggregated under County-other in the 2016 regional

[30] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[31] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

water plan but which are being treated as unique entities for the 2021 regional water plan.

9) Present a list of the potentially feasible water management strategies, in table format, within the Technical Memorandum and the IPP and adopted regional water plans.

Task 4C - Prepare and Submit Technical Memorandum and Regional Water Planning Group Analysis of Water User Group and Major Water Provider Needs[32]

This Task includes, but is not limited to, performing all work in accordance with TWDB rules and guidance required to:

1) Prepare a concise Technical Memorandum consisting solely of:
    a) each of the DB22 reports described under Tasks 2A, 2B, 3, 4A, and 4B as required by the *First Amended General Guidelines for Regional Water Plan Development* (Table 2) within the body of the memorandum;
    b) the documented process used by the RWPG to identify potentially feasible water management strategies;
    c) a single tabular list of all potentially feasible water management strategies identified by the RWPG to date;
    d) information regarding the versions and dates of all WAM and GAM models on which the surface and groundwater availabilities are based (except for availability associated with MAGs); and
    e) submittal of the electronic model files necessary to replicate results.

2) Approve submittal of the Technical Memorandum to TWDB at a regular RWPG meeting. The Technical Memorandum must be submitted to TWDB in accordance with Section I Article I of the contract.

3) To the extent necessary, this Task budget may also be applied toward effort required to:

    a) Develop preliminary water needs analyses outside of DB22 that may be necessary due to DB22 not yet being available; and
    b) Prepare, organize, enter, and/or update required data elements for DB22 including data related to existing water supplies or water management strategies.

Task 5A - Evaluation and Recommendation of Water Management Strategies and Associated Water Management Strategy Projects

The objective of this task is to evaluate and recommend Water Management Strategies (WMSs) and their associated Water Management Strategy Projects (WMSPs), including preparing a separate chapter and subchapter (on conservation recommendations see -

Task 5B) to be included in the 2021 RWP that describes the work completed, presents the potentially feasible WMSs, recommended and alternative WMSs and WMSPs, including all the technical evaluations, and presents which water user entities will rely on the recommended WMSs and WMSPs.

Work shall be <u>contingent upon a written notice-to-proceed</u> and shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.34 and §357.35 that is not already included under Tasks 4B, 5A, or 5B. [33]

2) Plans to be considered in developing WMSs include those referenced under 31 TAC §357.22.

3) Inclusion of a list of the potentially feasible WMSs that were identified by the RWPG. Information to include what past evaluations have been performed for each potentially feasible WMS listed.

4) Technical evaluations of all categories of potentially feasible WMSs including previously identified or recommended WMSs and newly identified WMSs including drought management and conservation WMSs; WMS and WMSP documentation shall include a strategy description, discussion of associated facilities, project map, and technical evaluation addressing all considerations and factors required under 31 TAC §357.34(d)-(h) and §357.35.

5) Process documentation of selecting all recommended WMSs and associated WMSPs including development of WMS evaluations matrices and other tools required to assist the RWPG in comparing and selecting recommended WMSs and WMSPs.

6) Consideration of water conservation and drought contingency plans from each WUG, as necessary, to inform WMS evaluations and recommendations.

7) Communication, coordination, and facilitation required within the RWPA and with other RWPGs to develop recommendations.

8) Updates to descriptions and associated technical analyses and documentation of any WMSs and WMSPs that are carried forward from the previous RWP to address:

---

[32] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.
[33] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

a) Changed conditions or project configuration
b) Changes to sponsor of WMS and WMSP(s)
c) Updated costs (based on use of required costing tool[34])
d) Other changes that must be addressed to meet requirements of 31 TAC §357.34 and §357.35.

9) Assignment of all recommended WMS water supplies to meet projected needs of specific WUGs.

10) Documentation of the evaluation and selection of all recommended WMS and WMSPs, including an explanation for why certain types of strategies (e.g., aquifer storage and recovery, seawater desalination, brackish groundwater desalination) may not have been recommended.

11) Coordination with sponsoring WUGs, wholesale water providers, and/or other resource agencies regarding any changed conditions in terms of projected needs, strategy modifications, planned facilities, market costs of water supply, endangered or threatened species, etc.

12) If TWC §11.085 applies to the proposed inter-basin transfer (IBT), determination of the "highest practicable level" of water conservation and efficiency achievable (as existing conservation or proposed within a water management strategy) for each WUG or WWP WUG customer recommended to rely on a WMS involving the IBT. Recommended conservation WMSs associated with this analysis shall be presented by WUG.

13) Presentation of the water supply plans in the RWP for each WUG and WWP relying on the recommended WMSs and WMSPs.

14) Consideration of alternative WMSs and WMSPs for inclusion in the plan. Alternative water management strategies must be fully evaluated in accordance with 31 TAC §357.34(d)-(h).

15) Incorporation of all required DB22 reports into document.

16) Submission of data through DB22 to include the following work
a) review of the data,
b) confirmation that data is accurate, and
c) incorporation of the required DB22 reports into the draft and final regional water planning chapter document.

17) Review of the chapter document and related information by RWPG members.

[34] See Section 5.5.1 under 'Financial Costs' in *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development.*

18) Modifications to the chapter document based on RWPG, public, and or agency comments.

19) Submittal of chapter document to TWDB for review and approval; and

20) All effort required to obtain final approval of the regional water plan chapter and associated DB22 data by TWDB.

21) *[SCOPE OF WORK TO BE DETERMINED]*

Scope of Work to be amended based on specific Task 5A scope of work to be developed and negotiated with TWDB. Work under this Task to be performed only after approval and incorporation of Task 5A scope of work and written notice-to-proceed. *NOTE: Work effort associated with preparing and submitting a proposed Task 5A scope of work for the purpose of obtaining a written 'notice-to-proceed' from TWDB is not included in Task 5A and shall <u>not</u> be reimbursed under the Contract.*

Deliverables: A completed Chapter 5 shall be delivered in the 2021 RWP as a work product to include technical analyses of all evaluated WMSs and WMSPs. Data shall be submitted and finalized through DB22 in accordance with the *Guidelines for Regional Water Planning Data Deliverables*.

Task 5B - Water Conservation Recommendations

The objective of this task is to prepare a separate subchapter[35] of Chapter 5 to be included in the 2021 RWP that consolidates conservation-related recommendations and provide model water conservation plans.

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.34(g). [36]

2) Consider water conservation plans from each WUG, as necessary, to inform conservation WMSs and other recommendations.

3) If applicable, explanation of the RWPG's basis for not recommending conservation for WUGs that had identified water needs but did not have a recommended conservation WMS.

[35] This shall be a separate subchapter as required by 31 TAC §357.34(h).
[36] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

4) If applicable, present what level of water conservation (as existing conservation or proposed within a water management strategy) is considered by the RWPG as the "highest practicable level" of water conservation for each WUG and WWP WUG customer that are dependent upon water management strategies involving inter-basin transfers to which TWC 11.085 applies.

5) Provision of model water conservation plans that may be referenced, instead of included in hard copy, in this subchapter, for example, by using internet links.

6) Review of the subchapter document and related information by RWPG members.

7) Modifications to the subchapter document based on RWPG, public, and or agency comments.

8) Submittal of subchapter document to TWDB for review and approval; and

9) All effort required to obtain final approval of the regional water plan by TWDB.

Deliverables: A completed Subchapter of Chapter 5 shall be delivered in the 2021 RWP as a work product.

Task 6 - Impacts of Regional Water Plan and Consistency with Protection of Resources

The objective of this task is to prepare a separate chapter[37] to be included in the 2021 Regional Water Plan (RWP) that describes the potential impacts of the regional water plan and how the plan is consistent with long-term protection of water resources, agricultural resources, and natural resources.

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.40, §357.43(b)(2), and §357.41.[38]

2) Evaluation of the estimated cumulative impacts of the regional water plan, for example on groundwater levels, spring discharges, bay and estuary inflows, and instream flows.

3) Assessment of the impact of the RWP on designated unique river or stream segments by the legislature.

[37] This shall be a separate chapter as required by 31 TAC §357.22(b).
[38] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

4) Review of the chapter document by RWPG members.

5) Modifications to the chapter document based on RWPG, public, and or agency comments.

6) Submittal of chapter document to TWDB for review and approval; and

7) All effort required to obtain final approval of the regional water plan chapter by TWDB.

Deliverables: A completed Chapter 6 shall be delivered in the 2021 RWP as a work product.

Task 7 – Drought Response Information, Activities and Recommendations

The objective of this task is to prepare a separate chapter[39] to be included in the 2021 RWP that: presents information regarding historical droughts and preparations for drought in the region; develops recommendations for triggers and responses to the onset of drought conditions; evaluates potential emergency responses to local drought conditions; and includes various other drought-related evaluations and recommendations.

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.42. [40]

2) Plans to be considered in developing this chapter include relevant plans referenced under 31 TAC §357.22.

3) Collecting information on previous and current responses to drought in the region including reviewing drought contingency plans received from each WUG and determining what measures are most commonly used and whether these measures have been recently implemented in response to drought conditions.

4) Determining whether there is any reliable information on the reduction in demands on individual WUGs caused by their implementation of drought contingency measures.

5) Process of selecting recommended triggers and actions including any tools required to assist the RWPG in comparing options and making recommendations.

[39] This shall be a separate chapter as required by 31 TAC §357.22(b).
[40] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

6) Consideration of drought contingency plans from each WUG, as necessary, to inform WMS evaluations and recommendations.

7) Coordination and communication, as necessary, with entities in the region to gather information required to develop recommendations.

8) Summarization of potentially feasible drought management WMS, recommended drought management WMS, and or alterative drought management WMSs, if any, associated with work performed under Task 5A.

9) If applicable, explanation of the RWPG's basis for not recommending drought management strategies for WUGs that had identified water needs but did not have a recommended drought management WMS.

10) Development by the RWPG of region-specific model drought contingency plans consistent with TCEQ requirements that, at a minimum, identify triggers for and responses to the most severe drought response stages commonly referred as 'severe', 'critical' and 'emergency' drought conditions.

11) Summary of any other drought management measures recommended by the RWPG.

12) Preparation of tabular data for inclusion in chapter.

13) Review of the chapter document and related information by RWPG members.

14) Modifications to the chapter document based on RWPG, public, and or agency comments.

15) Submittal of chapter document to TWDB for review and approval; and

16) All effort required to obtain final approval of the regional water plan chapter and associated data by TWDB.

Deliverables: A completed Chapter 7 shall be delivered in the 2021 RWP as a work product. Data shall be submitted in the form of tables included in the chapter.

Task 8 - Recommendations Regarding Unique Stream Segments and/or Reservoir Sites and Legislative & Regional Policy Issues

The objective of this task is to prepare a separate chapter[41] to be included in the 2021 RWP that presents the RWPG's unique stream segment, unique reservoir site, legislative, administrative, and regulatory recommendations.

[41] This shall be a separate chapter as required by 31 TAC §357.22(b).

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.43 and §358.2. [42]

2) Plans to be considered in developing this chapter include relevant plans referenced under 31 TAC §357.22.

3) RWPG consideration and discussion of potential recommendations for designation of ecologically unique stream segments within the RWPA, based on criteria in 31 TAC §358.2.

4) If applicable, prepare a draft memorandum recommending which stream segments in the region, if any, should be recommended for designation as ecologically unique stream segments. Evaluate and incorporate comments from the RWPG. Upon approval by the group, submit the draft memorandum to TWDB and TPWD for comments.

5) RWPG consideration and discussion of potential recommendations for designation of unique reservoir sites within the RWPA.

6) If applicable, prepare a draft memorandum recommending designation of unique sites for reservoir development. Evaluate and incorporate comments from the RWPG. Upon approval by the group, submit the draft memorandum to TWDB for comments.

7) RWPG consideration and discussion of potential regional policy issues; identification and articulation of recommendations for legislative, administrative, and regulatory rule changes; and negotiations toward RWPG consensus.

8) Review of the chapter document and related information by RWPG members.

9) Modifications to the chapter document based on RWPG, public, and or agency comments.

10) Submittal of chapter document to TWDB for review and approval; and

11) All effort required to obtain final approval of the regional water plan chapter by TWDB.

[42] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

Deliverables: A completed Chapter 8 shall be delivered in the 2021 RWP as a work product.

Task 9 - Water Infrastructure Funding Recommendations

The objective of this task is to report on how sponsors of recommended WMSPs propose to finance projects as a separate chapter[43] to be included in the 2021 RWP.

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.44. [44]

2) Coordination and communication with sponsoring WUGs, wholesale water providers, and/or other water agencies.

3) Perform a survey, including the following work:
    a) Contacting WMSP sponsors/WUGs,
    b) Collection and collation of data,
    c) Documentation of the effectiveness of survey methodology, providing percent survey completions, and whether an acceptable minimum percent survey completion was achieved, and
    d) Submission of data into the online survey tool.

4) Coordination with WUGs and WWPs as necessary to ensure detailed needs and costs associated with their anticipated projects are sufficiently represented in the RWP for future funding determinations.

5) Assisting the RWPG with the development of recommendations regarding the proposed role of the State in financing water infrastructure projects identified in the RWP.

6) Summarizing the survey results.

7) Review chapter document and related information by RWPG members.

8) Submittal of chapter document to TWDB for review and approval; and

9) All effort required to obtain final approval of the regional water plan chapter and associated DB22 data by TWDB.

[43] This shall be a separate chapter as required by 31 TAC §357.22(b).
[44] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

Deliverables: A completed Chapter 9 shall be delivered in the 2021 RWP as a work product to include summary of reported financing approaches for all recommended WMSPs. Data shall be submitted and finalized through the online survey tool in accordance with the *Guidelines for Regional Water Planning Data Deliverables*.

Task 10 - Public Participation and Plan Adoption[45]

The objective of this task is to address public participation, public meetings, eligible administrative and technical support activities, and other requirements and activities eligible for reimbursement and necessary to complete and submit an IPP and final RWP and obtain TWDB approval of the RWP.

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable statute requirements governing regional and state water planning this portion of work shall, in particular, include all technical and administrative support activities necessary to meet all the requirements of 31 TAC Chapters 355, 357, and 358 that are not already addressed under the scope of work associated with other contract Tasks but that are necessary and or required to complete and deliver an IPP and final, adopted RWP to TWDB and obtain approval of the adopted RWP by TWDB.[46]

2) Organization, support, facilitation, and documentation of all meetings/hearings associated with: preplanning meeting; meetings associated with revision of projections; consideration of a substitution of alternative water management strategies; public hearing after adoption of the IPP and prior to adoption of the final RWP; and consideration of Regional Water Plan Amendments, alternative WMS substitutions, or Board-directed revisions.

Technical Support and Administrative Activities

3) Attendance and participation of technical consultants at RWPG, subgroup, subcommittees, special and or other meetings and hearings including preparation and follow-up activities.

4) Developing technical and other presentations and handout materials for regular and special meetings to provide technical and explanatory data to the RWPG and its subcommittees, including follow-up activities.

[45] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Fifth Cycle of Regional Water Plan Development*.
[46] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

5) Collecting and evaluating information, including any information gathering surveys from water suppliers or WUGs, (e.g., on existing infrastructure; existing water supplies; potentially feasible WMSs) and or maintenance of contact lists for regional planning information in the region.

6) Administrative and technical support and participation in RWPG activities, and documentation of any RWPG workshops, work groups, subgroup and/or subcommittee activities.

7) Technical support and administrative activities associated with periodic and special meetings of the RWPG including developing agendas and coordinating activities for the RWPG.

8) Provision of status reports to TWDB for work performed under this Contract.

9) Development of draft and final responses for RWPG approval to public questions or comments as well as approval of the final responses to comments on RWP documents.

10) Intraregional and interregional coordination and communication, and or facilitation required within the RWPA and with other RWPGs to develop a RWP including with water suppliers or other relevant entities such as groundwater conservation districts, WUGs, and or WWPs.

11) Incorporation of all required DB22 reports into RWP document.

12) Modifications to the RWP documents based on RWPG, public, and or agency comments.

13) Preparation of a RWP chapter summarizing Task 10 activities including review by RWPG and modification of document as necessary.

14) Development and inclusion of Executive Summaries in both IPP and final RWP.

15) Production, distribution, and submittal of all draft and final RWP-related planning documents for RWPG, public and agency review, including in hard-copy format when required.

16) Assembling, compiling, and production of the completed IPP and Final Regional Water Plan document(s) that meet all requirements of statute, 31 TAC Chapters 355, 357 and 358, Contract and associated guidance documents.

17) Submittal of the RWP documents in both hard copy and electronic formats to TWDB for review and approval; and all effort required to obtain final approval of the RWP by TWDB.

Other Activities

18) Review of all RWP-related documents by RWPG members.

19) Development and maintenance of a RWPG website or RWPG-dedicated webpage on the RWPG administrator's website for posting planning group meeting notices, agendas, materials, and plan information.

20) Limited non-labor, direct costs associated with maintenance of the RWPG website.

21) Development of agendas, presentations, and handout materials for the public meetings and hearings to provide to the general public.

22) Documentation of meetings and hearings to include recorded minutes and or audio recordings as required by the RWPG bylaws and archiving and provision of minutes to public.

23) Preparation and transmission of correspondence, for example, directly related to public comments on RWP documents.

24) Promoting consensus decisions through conflict resolution efforts including monitoring and facilitation required to resolve issues between and among RWPG members and stakeholders in the event that issues arise during the process of developing the RWP, including mediation between RWPG members, if necessary.

25) RWPG membership solicitation activities.

26) Meeting all posting, meeting, hearing and other public notice requirements in accordance with the open meetings act, statute, and 31 TAC §357.21 and any other applicable public notice requirements.

27) Solicitation, review, and dissemination of public input, as necessary.

Deliverables: Complete IPP and final, adopted RWP documents shall be delivered as work products. This includes a completed Chapter 10 summarizing public participation activities and appendices with public comments and RWPG responses to comments.

Task 11 – Implementation and Comparison to the Previous Regional Water Plan

The objective of this task is to evaluate and recommend water management strategies (WMS) including preparing a separate chapter[47] to be included in the 2021 RWP that reports on the degree of implementation of WMSs from the previous RWP and summarizes how the new RWP compares to the previous RWP.

[47] This shall be a separate chapter as required by 31 TAC §357.22(b).

Work shall include but not be limited to the following:

1) In addition to generally meeting all applicable rules and statute requirements governing regional and state water planning under 31 TAC Chapters 357 and 358, this portion of work shall, in particular, include all work necessary to meet all the requirements of 31 TAC §357.45. [48]

2) Implementation (31 TAC §357.45(a)):

    a) Coordination and communication with RWPG representatives and sponsors of WMSs, including WUGs and WWPs
    b) Documentation of the level of implementation of each WMS that was recommend in the previous regional water plan
    c) Submission of implementation results data in the online survey tool and in spreadsheet format
    d) To the extent feasible, identify other projects implemented by these entities that are not included in the previous RWP

3) Comparison to the Previous Regional Water Plan (31 TAC §357.45(b)):

    a) Compare the RWP to the previous RWP by chapter in the new RWP
    b) Summarize differences quantitatively and qualitatively
    c) Present information in graphical, tabular, and written format

4) Review of the chapter document and related information by RWPG members.

5) Modifications to the chapter document based on RWPG, public, and or agency comments.

6) Submittal of chapter document to TWDB for review and approval; and

7) All effort required to obtain final approval of the regional water plan chapter and associated DB22 data by TWDB.

Deliverables: A completed Chapter 11 shall be delivered in the 2021 RWP as a work product. Survey data shall be submitted and finalized through the online survey tool in accordance with the *Guidelines for Regional Water Planning Data Deliverables*.

[48] Requirements are further explained in the guidance document *First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development*.

Task 12 - Prepare and submit prioritization of projects in the 2021 Regional Water Plan

The objective of this task is to prioritize the projects in the 2021 regional water plan and include all work necessary to meet all requirements of 31 TAC §357.46.

TWDB will provide to the RWPGs an alphabetized **region-sponsor- project prioritization template** that contains projects that the region must prioritize under this Task. The alphabetized region-sponsor-project prioritization template is based upon the recommended WMSP in the 2021 regional water plan, as provided by the RWPG to TWDB through DB22.

Work includes, but is not limited to, the following:

1. Applying all of the uniform standards to each project and filling in the prioritization template provided by TWDB.
2. Approval of submittal to TWDB of the final prioritization template at regular RWPG meetings.
3. Submission to TWDB of the final prioritization templates in the same format as provided by TWDB and that displays each uniform standard score, for each project.

Deliverables: A completed prioritization of projects submitted in the form of a filled-in region-sponsor-project prioritization template to TWDB by the submittal date of the final adopted RWP[49].

≈

[49] The prioritized projects shall be submitted separately with the adopted RWP as required by 31 TAC §357.46.

Agenda Item 7

Receive update from Consultant Team and Non-Population Demands Committee regarding TWDB draft non-municipal demand projections for the 2021 Region H Regional Water Plan.

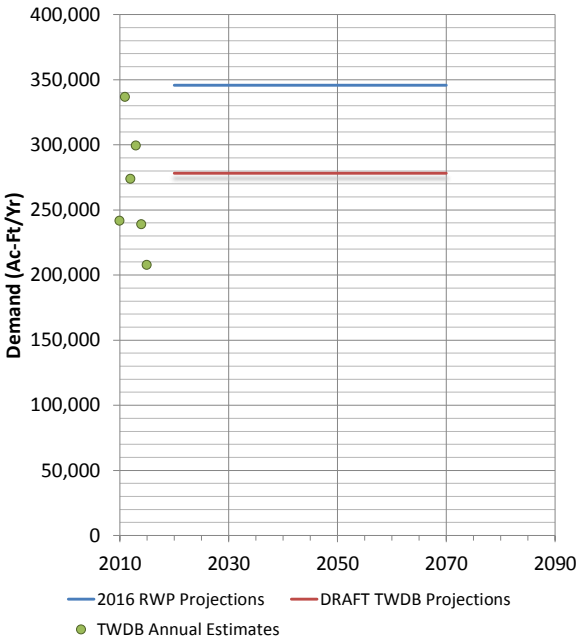
REGION H
Water Planning Group

Agenda Item 7
Non-Population Demands

- Draft non-municipal demands released
- By June
  - Historic reuse and brackish groundwater use
- Review and recommendations by committee
- January 12th
  - Deadline for Regions to submit requested changes

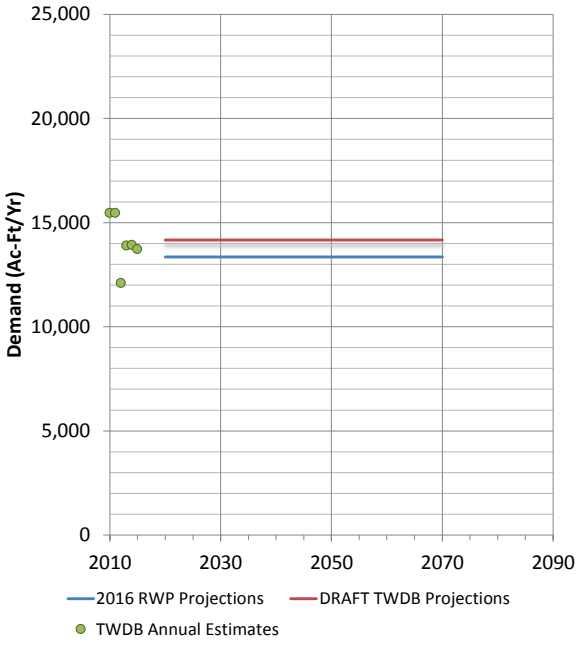
Agenda Item 7
Non-Population Demands

- Irrigation
  - 5-year avg.
  - Constant
  - Where GW demands exceed availability, decline after 2030
  - Includes reuse and brackish
  - *May be revised based on use estimates, trends in groundwater use, local studies*



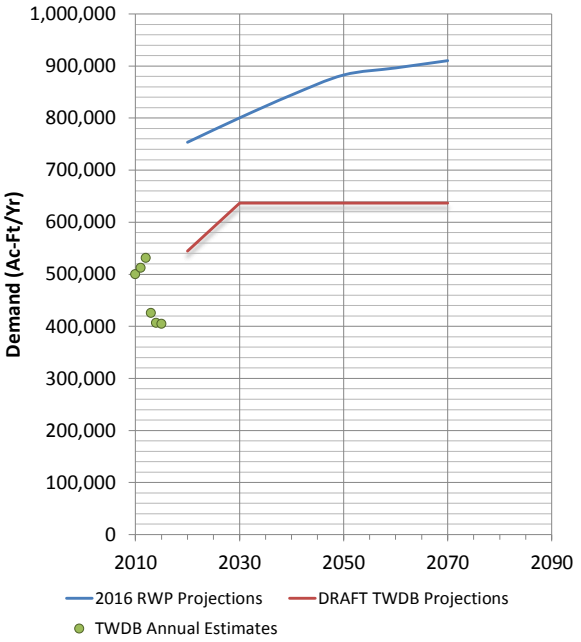
Agenda Item 7
Non-Population Demands

- Livestock
  - 5-year avg.
  - Constant
  - Includes reuse and brackish
  - *May be revised based on use estimates, trends in groundwater use, local studies*



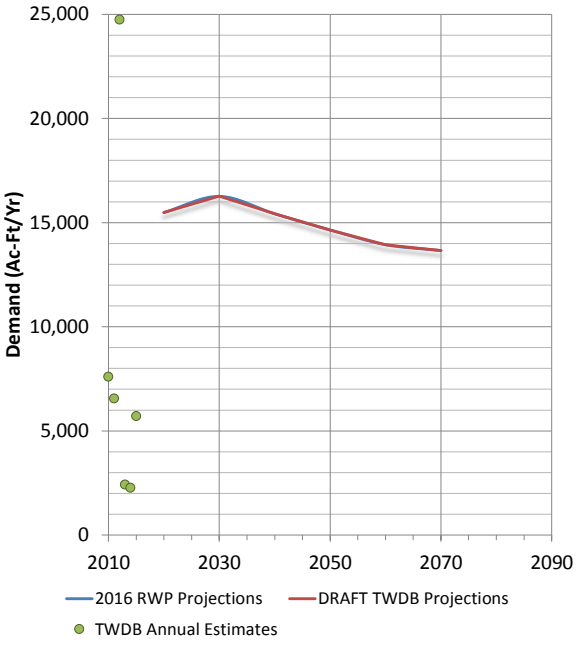
Agenda Item 7
Non-Population Demands

- Manufacturing
  - 2020 demand from highest 5-year water use
  - 2030 increased by employment
  - Constant 2030-2070
  - Includes reuse and brackish
  - *May be revised based on new, closed, or planned facilities or other documentation supporting long-term projections*



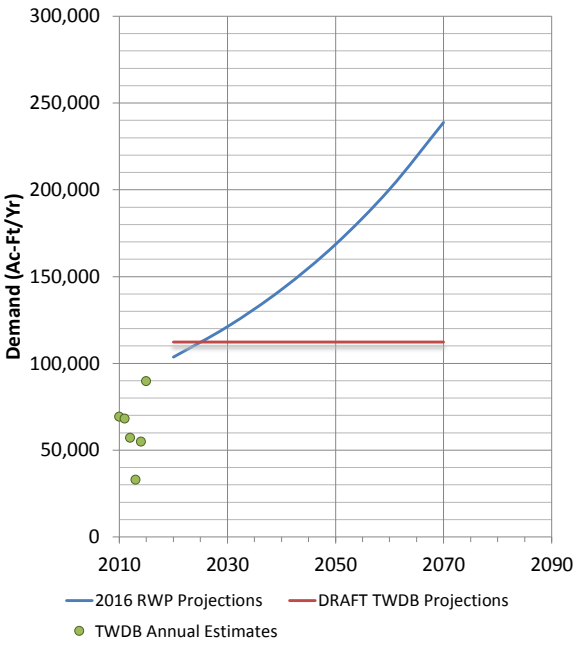
Agenda Item 7
Non-Population Demands

- Mining
  - Retained from 2016 RWP
  - *May be revised based on new, closed, or planned facilities or other documentation supporting long-term projections*



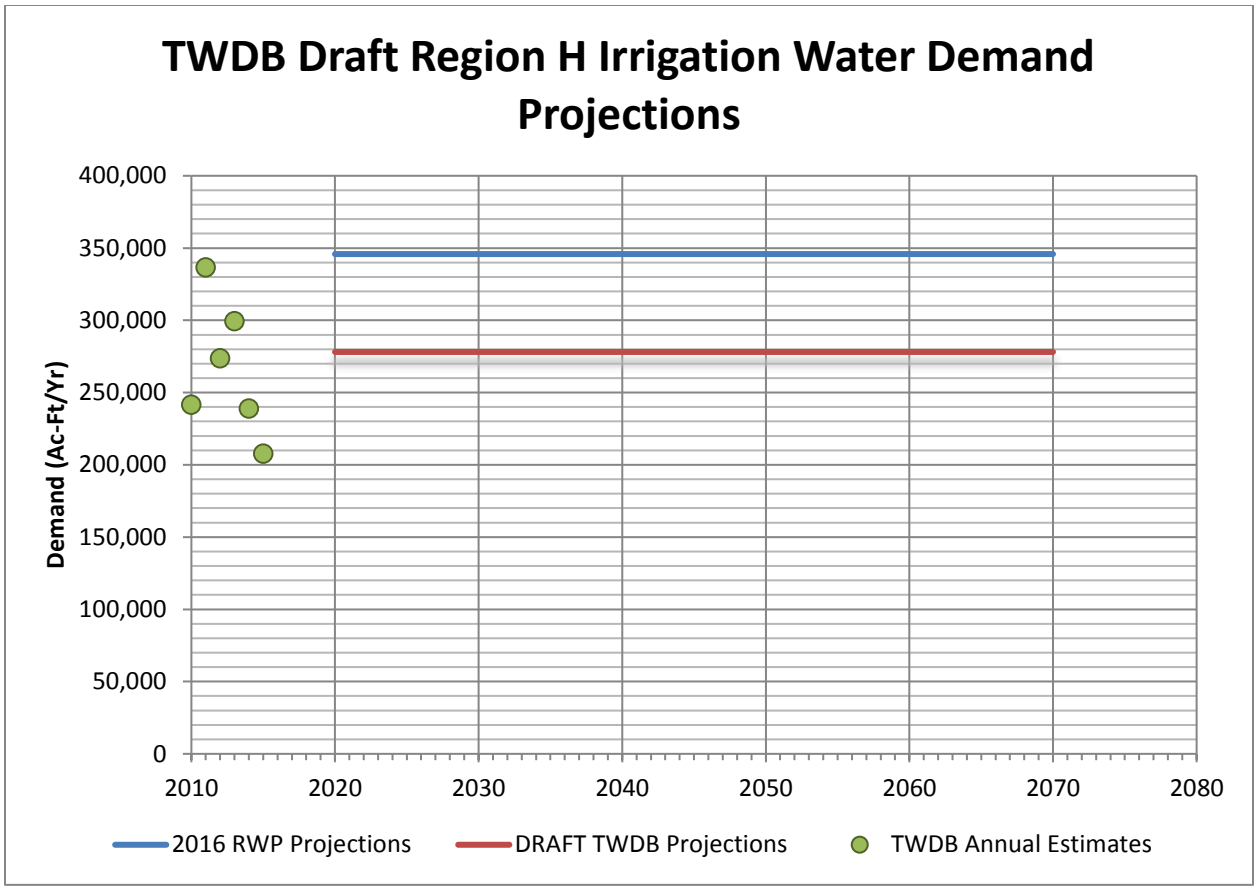
Agenda Item 7
Non-Population Demands

- Steam-Electric Power
  - Highest 5-year use + use of recent facilities – announced retirements
  - Constant
  - Includes reuse and brackish water
  - *May be revised based on local information on facilities, documentation of long-term demand, dry-year demands occurring in 5-10 year window*

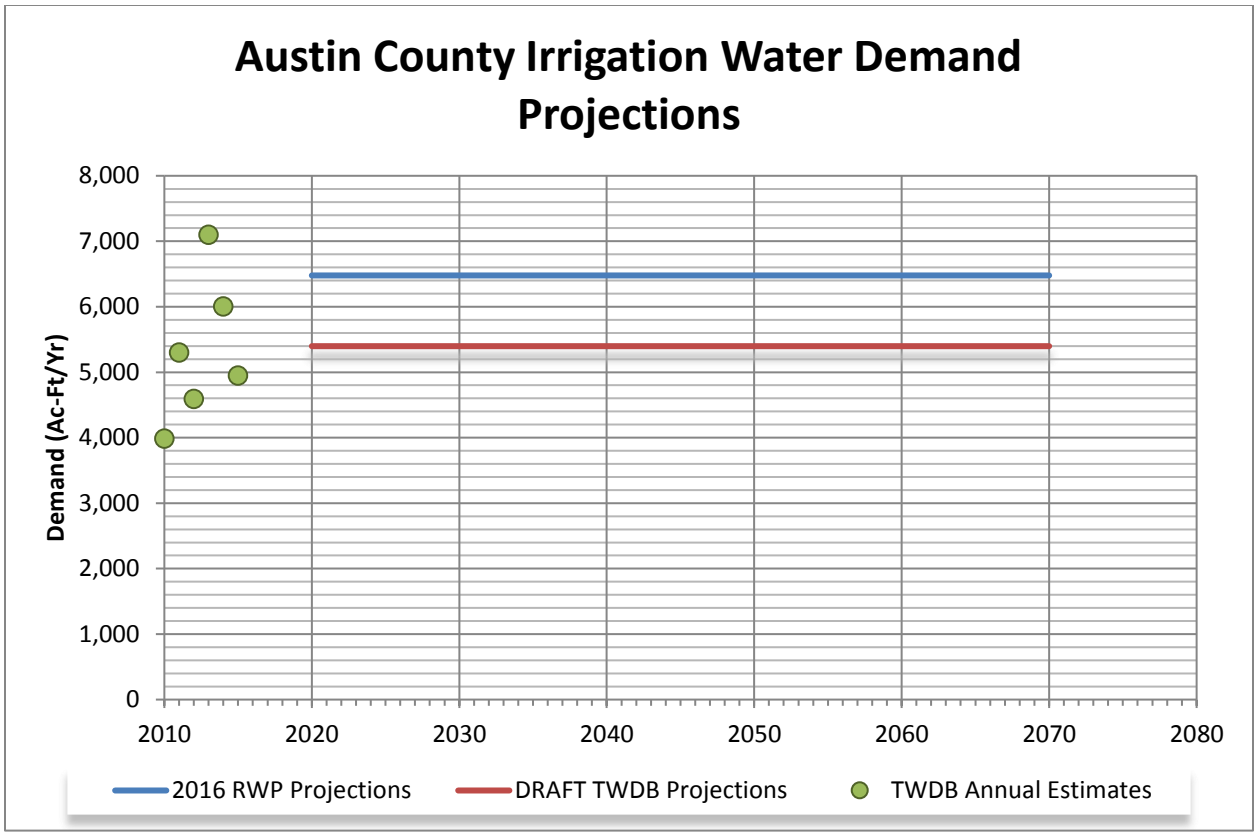


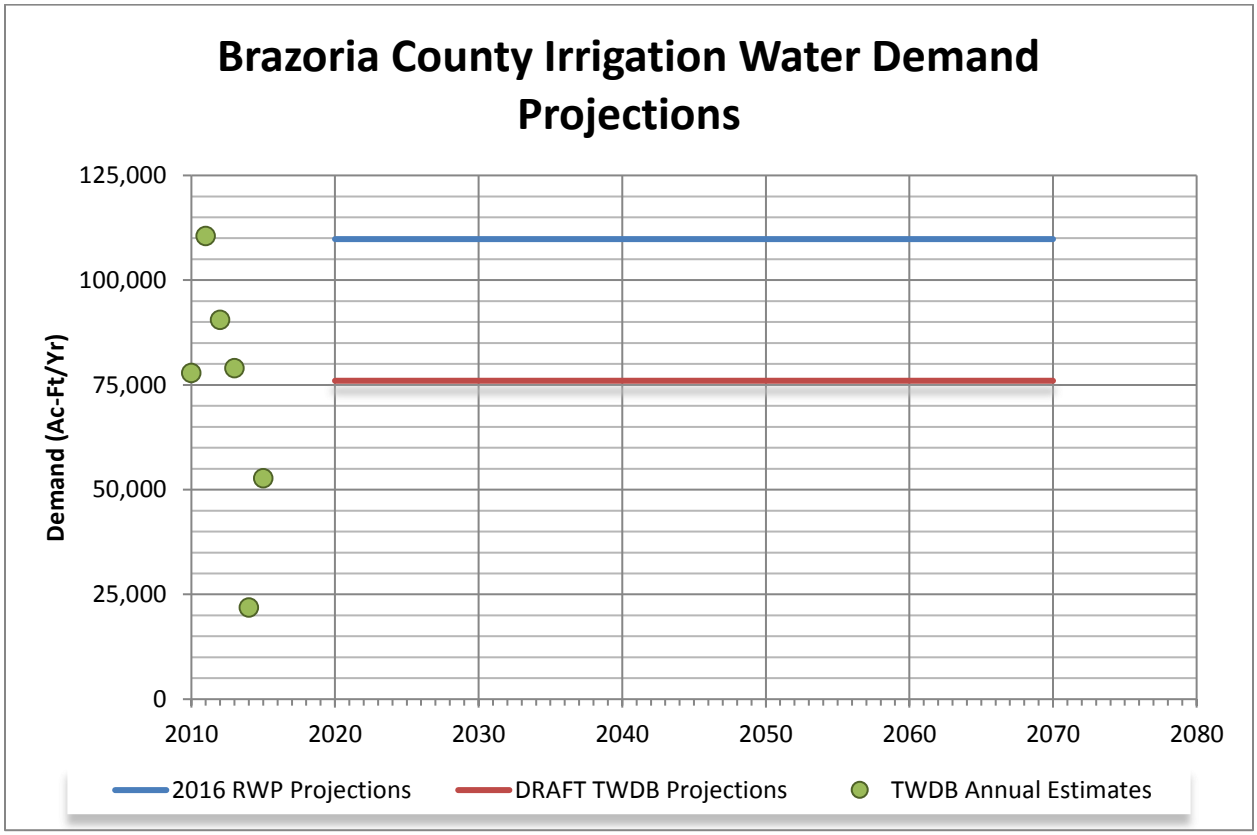
TWDB Draft 2021 RWP
Irrigation Water Demand
Projections for Region H

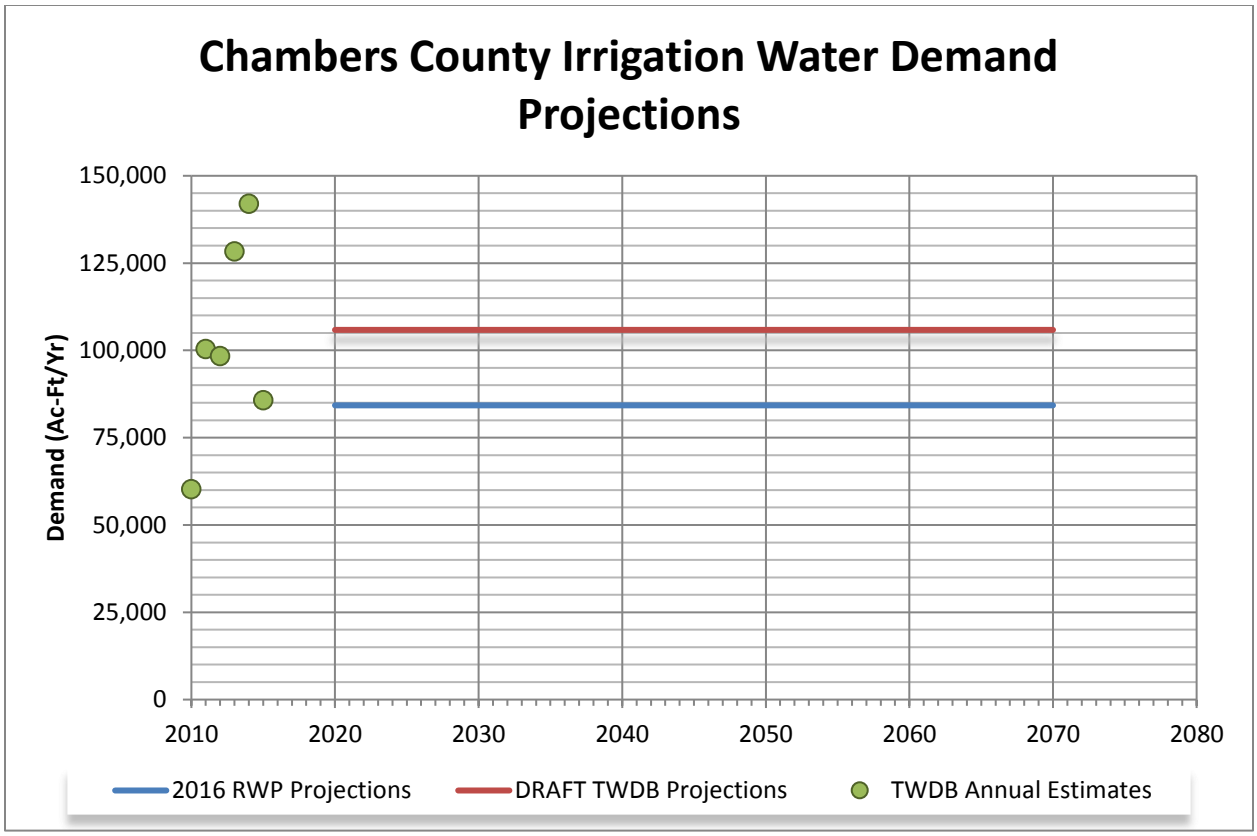
REGION H
Water Planning Group

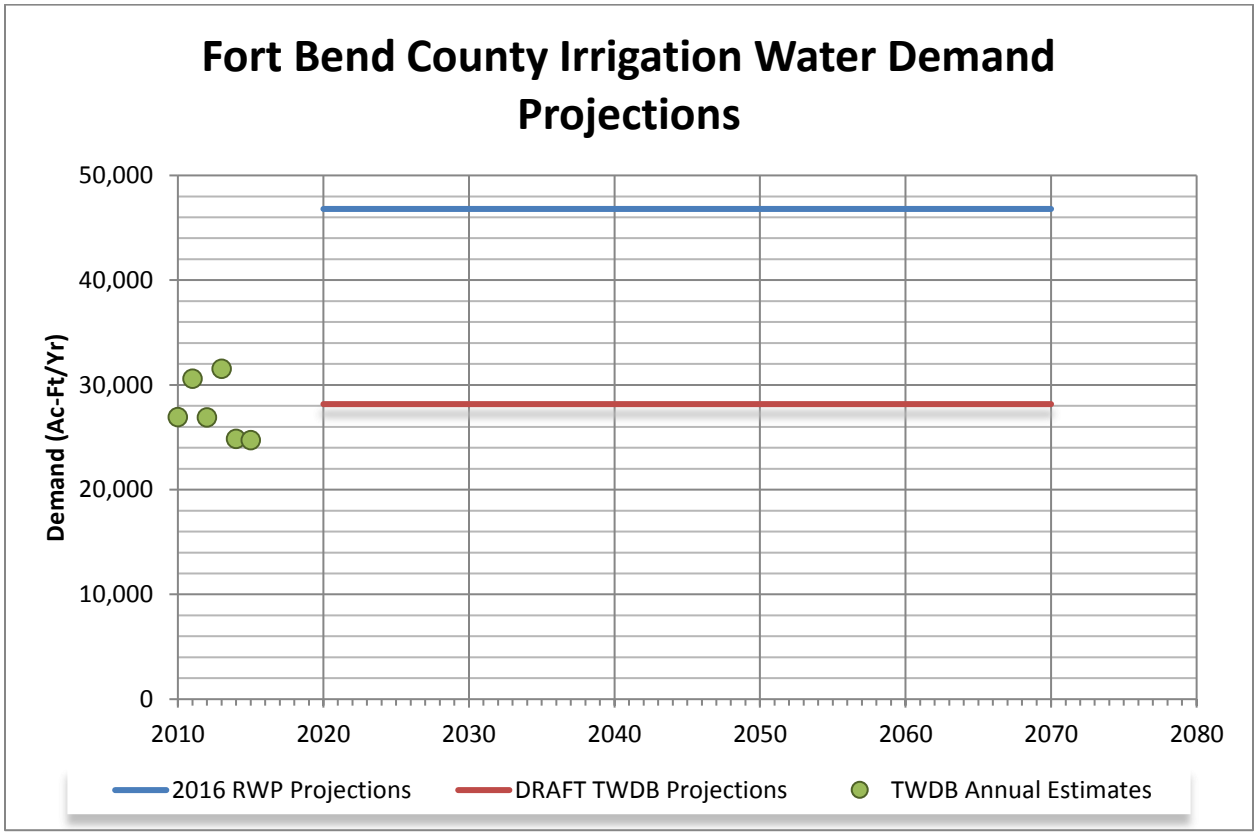


County	TWDB Draft Region H Irrigation Water Demand Projections (ac-ft)					
	2020	2030	2040	2050	2060	2070
Austin	5,398	5,398	5,398	5,398	5,398	5,398
Brazoria	75,997	75,997	75,997	75,997	75,997	75,997
Chambers	105,878	105,878	105,878	105,878	105,878	105,878
Fort Bend	28,169	28,169	28,169	28,169	28,169	28,169
Galveston	3,969	3,969	3,969	3,969	3,969	3,969
Harris	6,965	6,965	6,965	6,965	6,965	6,965
Leon	300	300	300	300	300	300
Liberty	28,360	28,360	28,360	28,360	28,360	28,360
Madison	96	96	96	96	96	96
Montgomery	4,639	4,639	4,639	4,639	4,639	4,639
Polk	259	259	259	259	259	259
San Jacinto	126	126	126	126	126	126
Trinity	278	278	278	278	278	278
Walker	449	449	449	449	449	449
Waller	17,223	17,223	17,223	17,223	17,223	17,223
Total	**278,106**	**278,106**	**278,106**	**278,106**	**278,106**	**278,106**

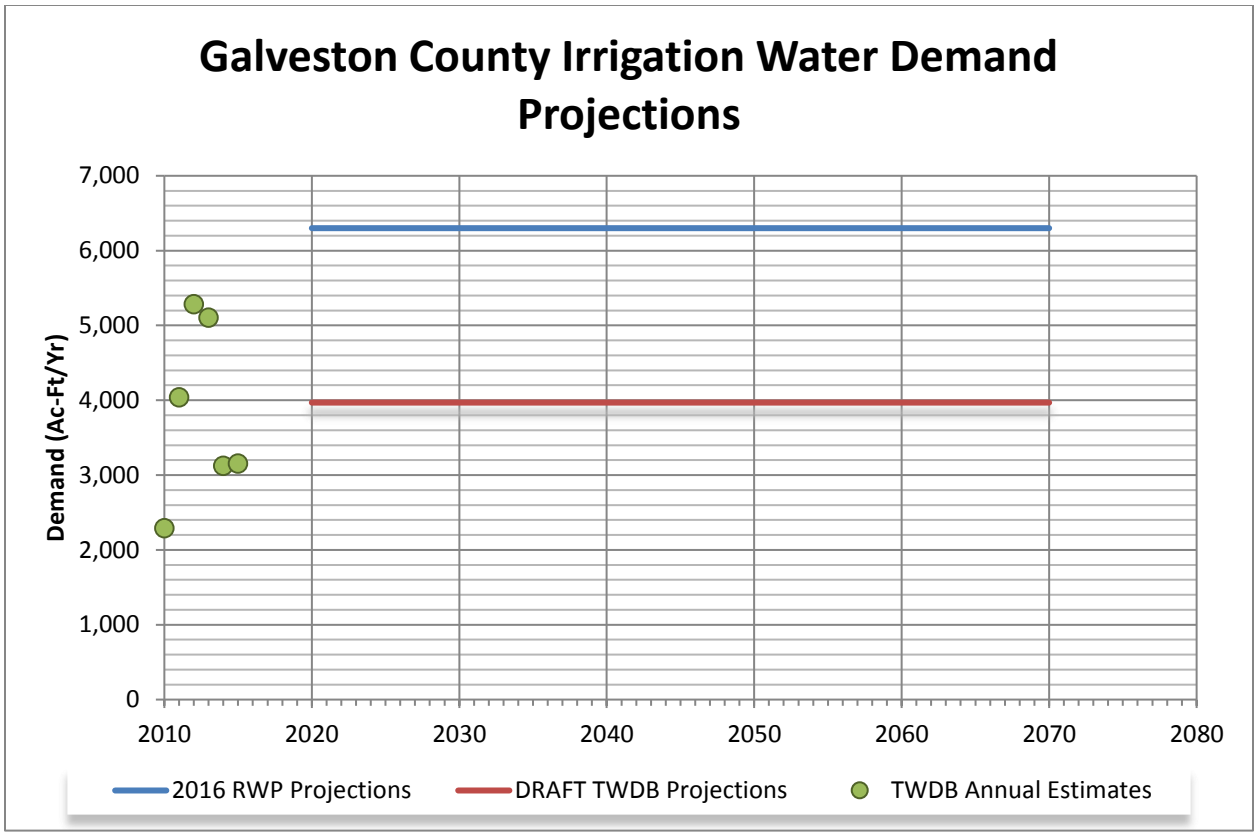

Austin County Irrigation Water Demand Projections
Demand (Ac-Ft/Yr)
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

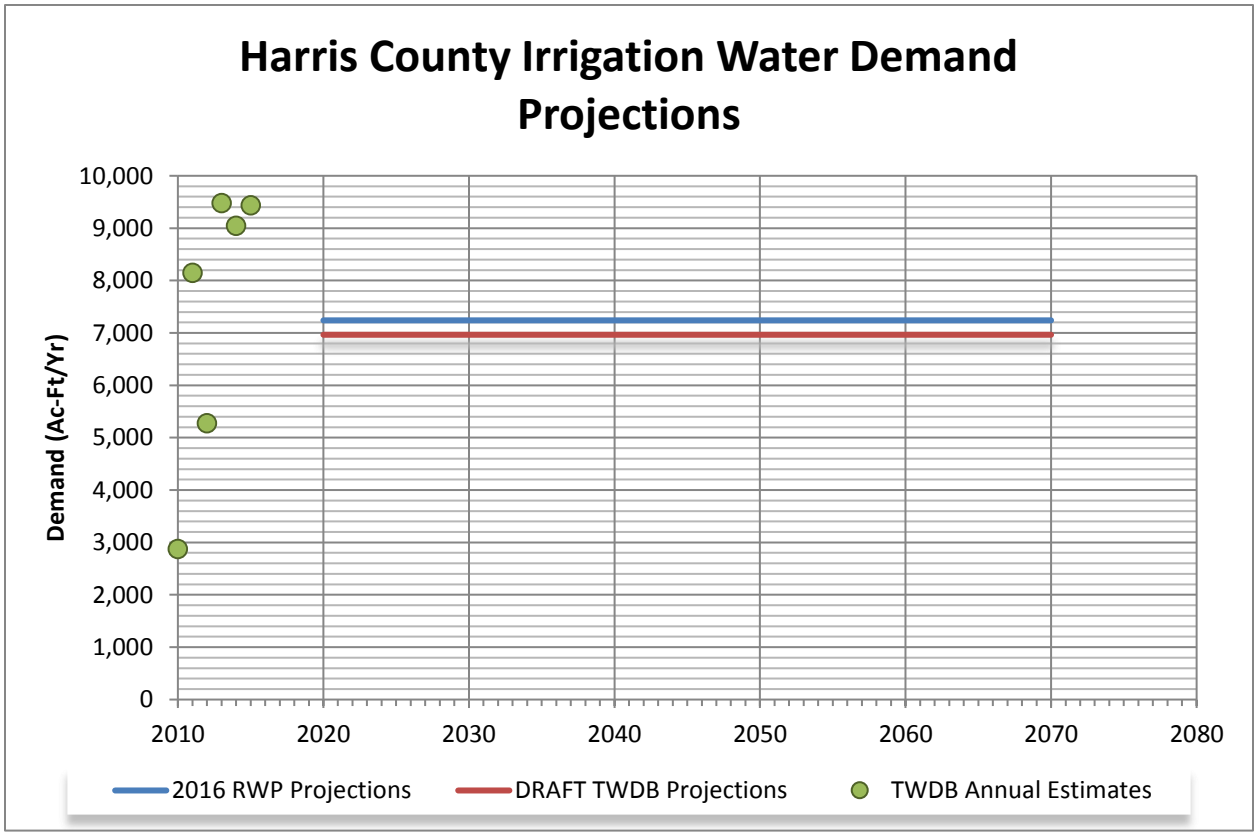

Brazoria County Irrigation Water Demand Projections
Demand (Ac-Ft/Yr)
125,000
100,000
75,000
50,000
25,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates



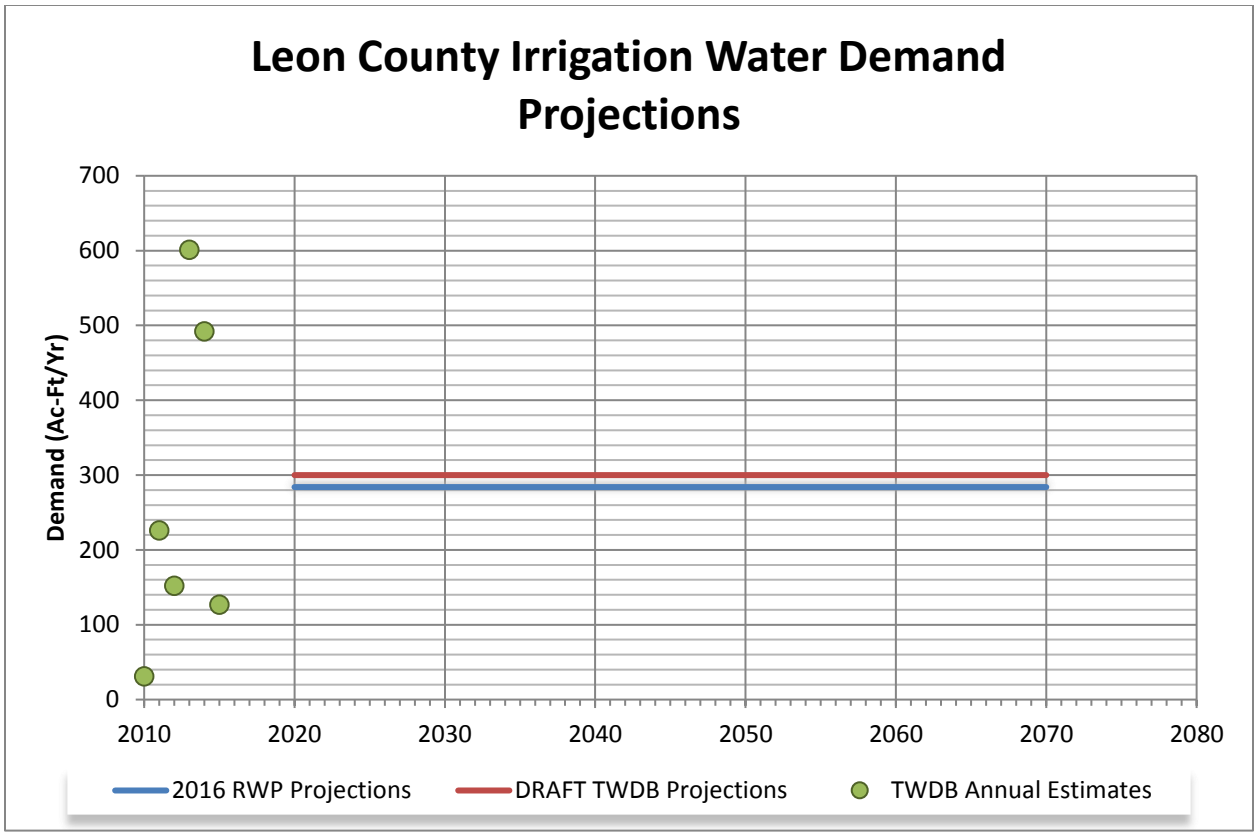


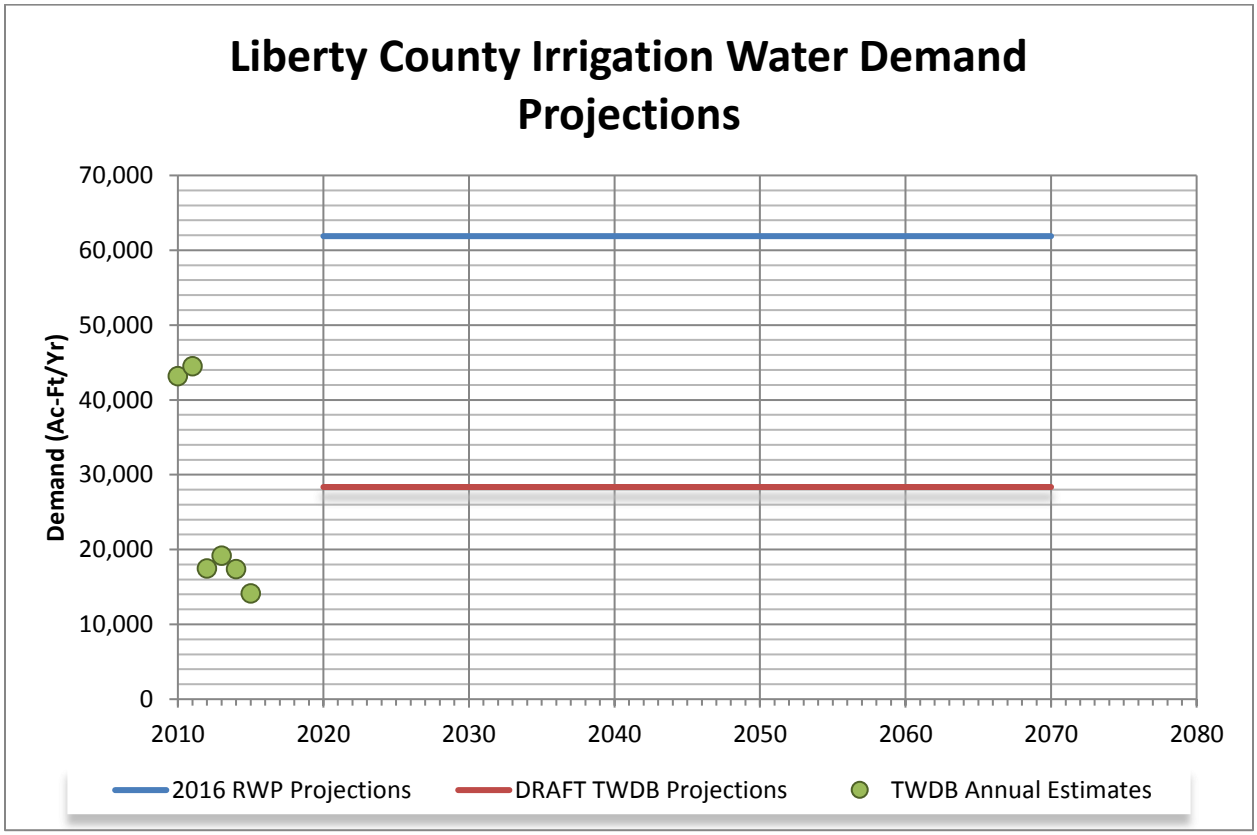
REGION H
Water Planning Group



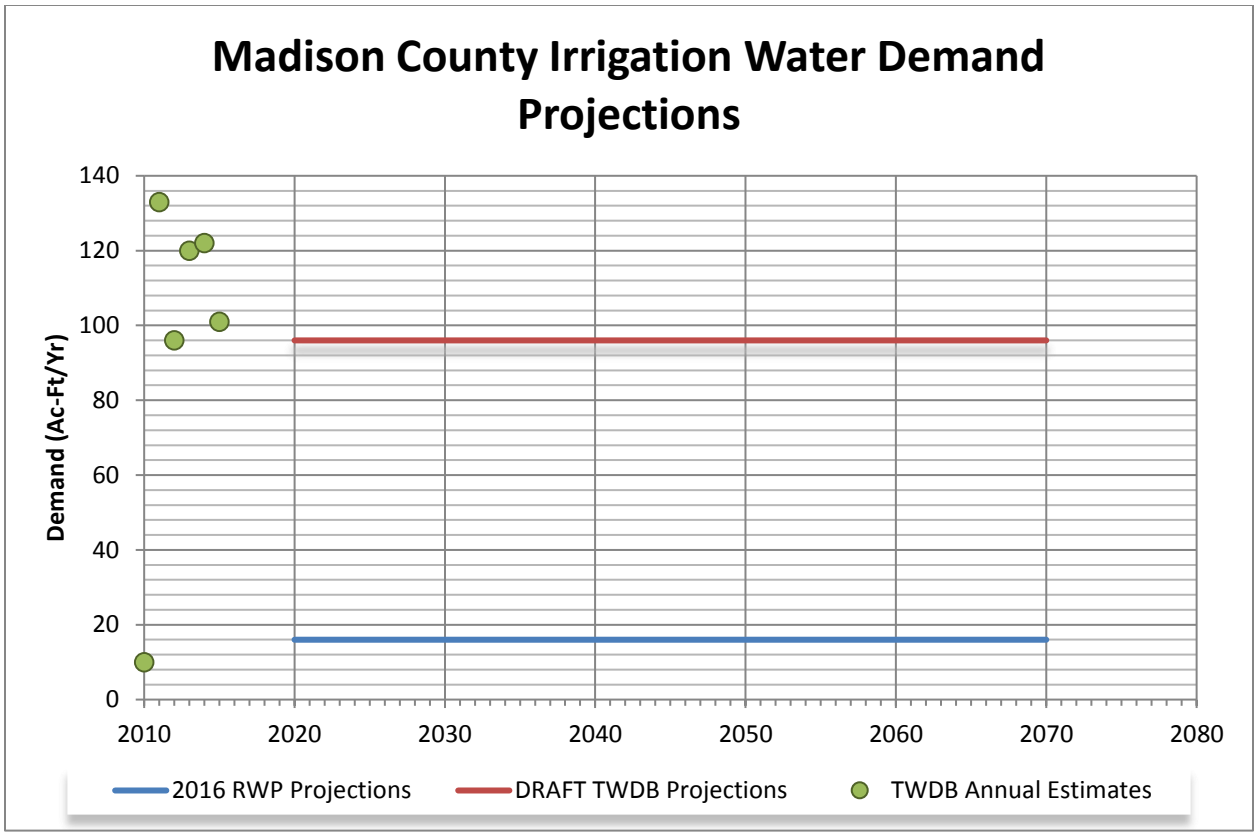


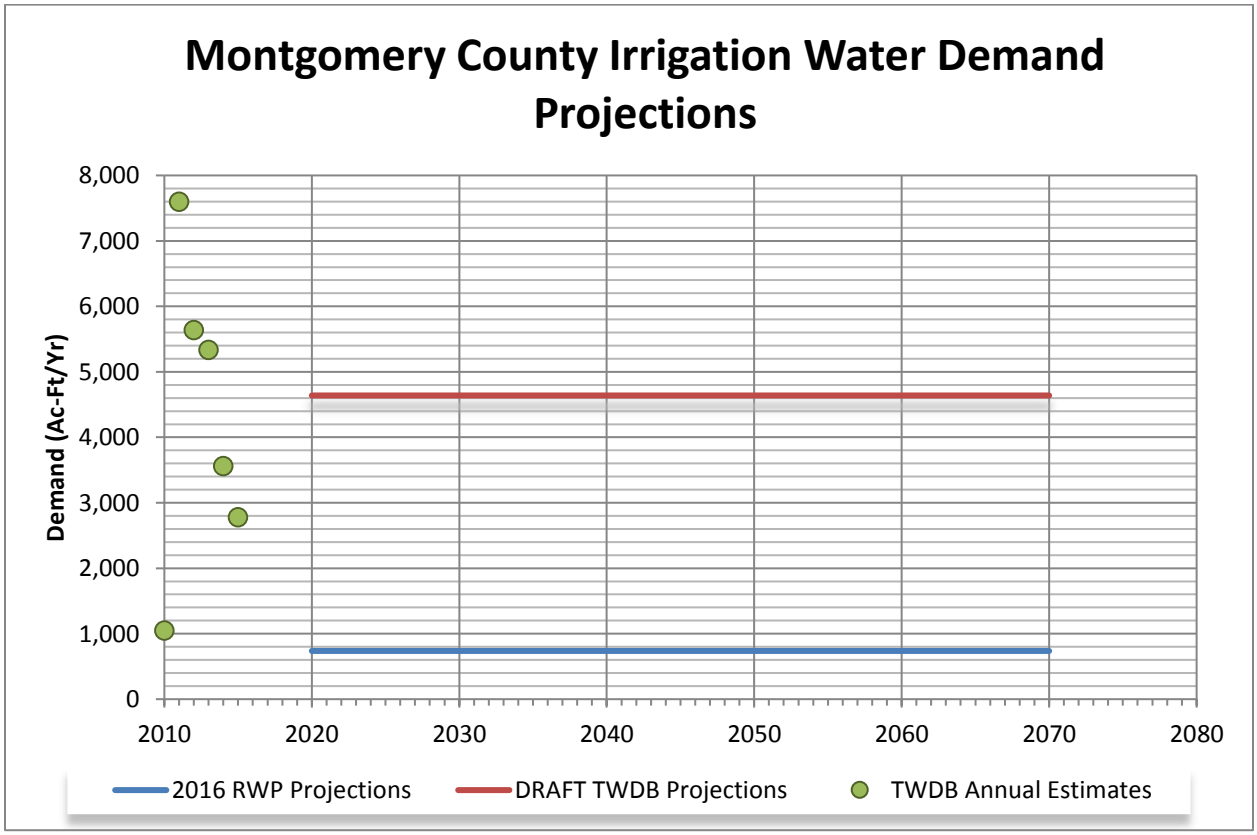
REGION H
Water Planning Group



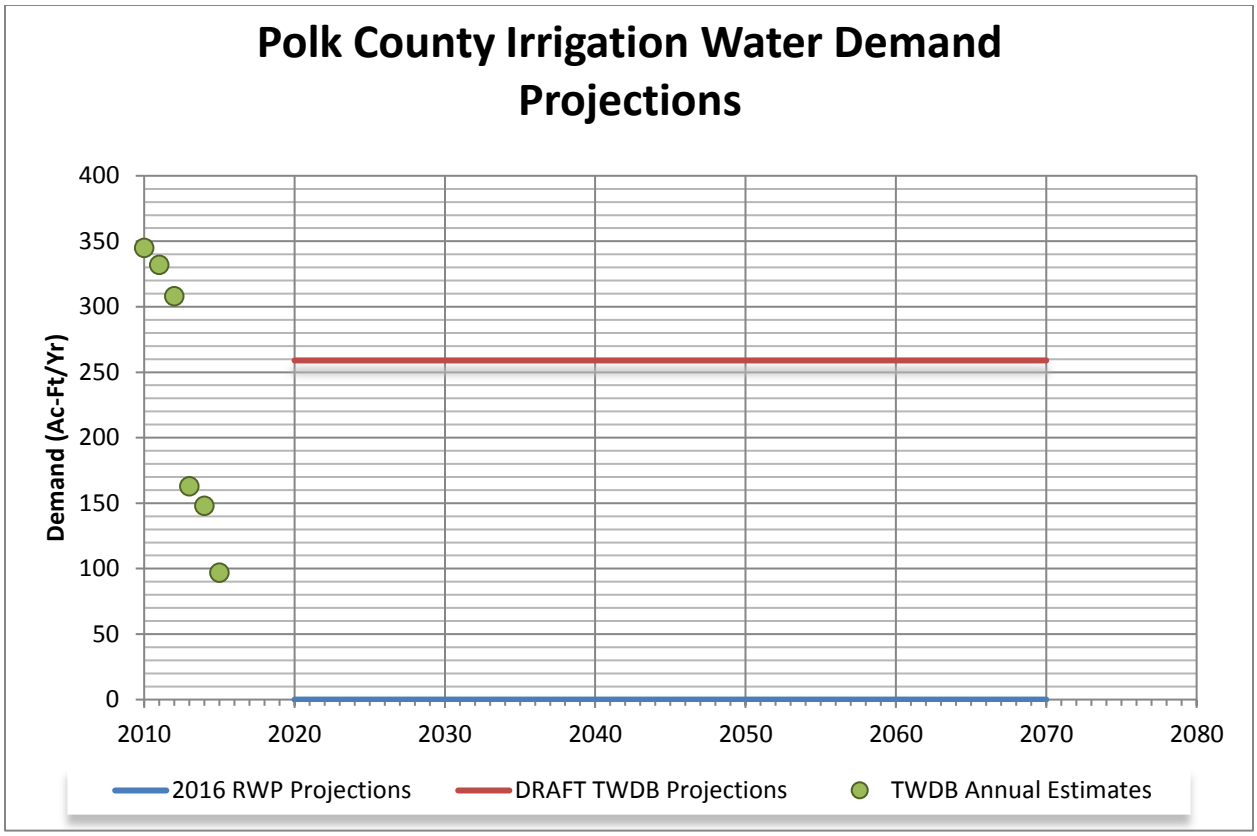


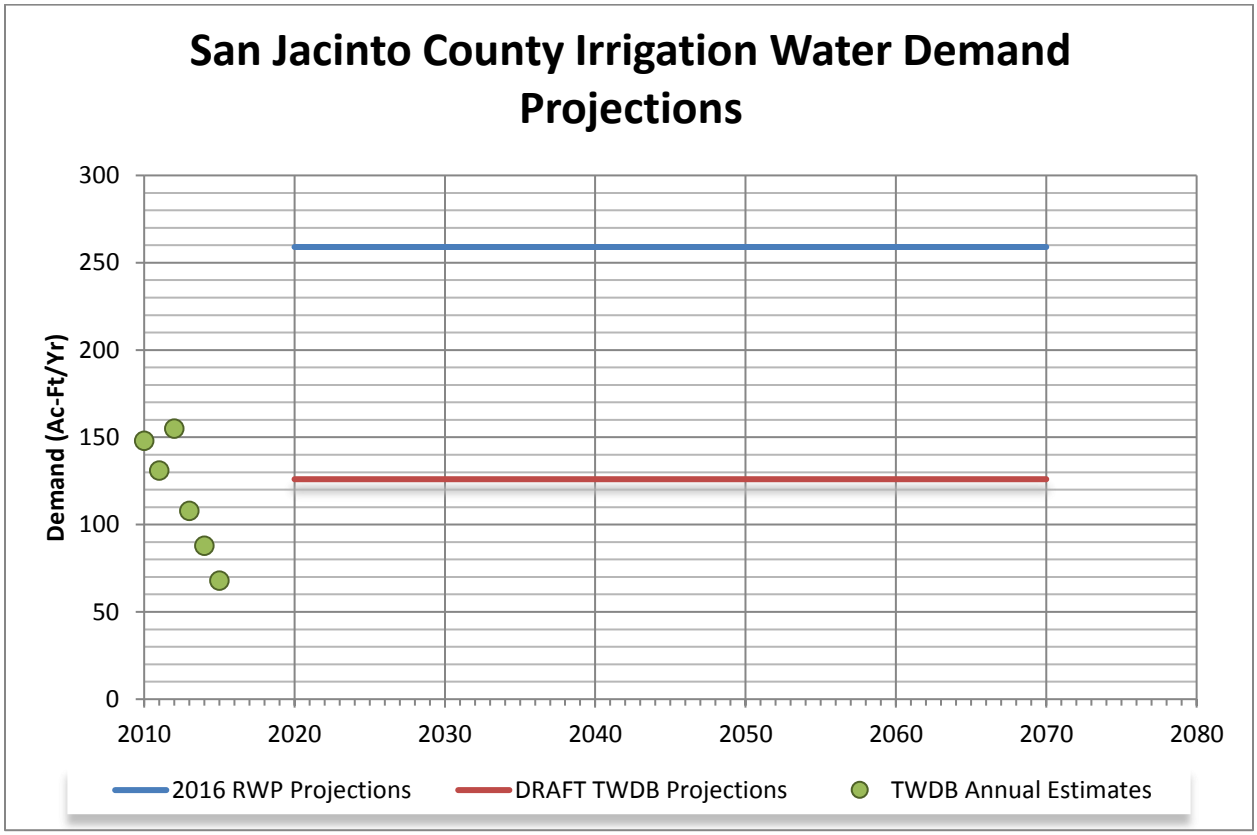
REGION H
Water Planning Group



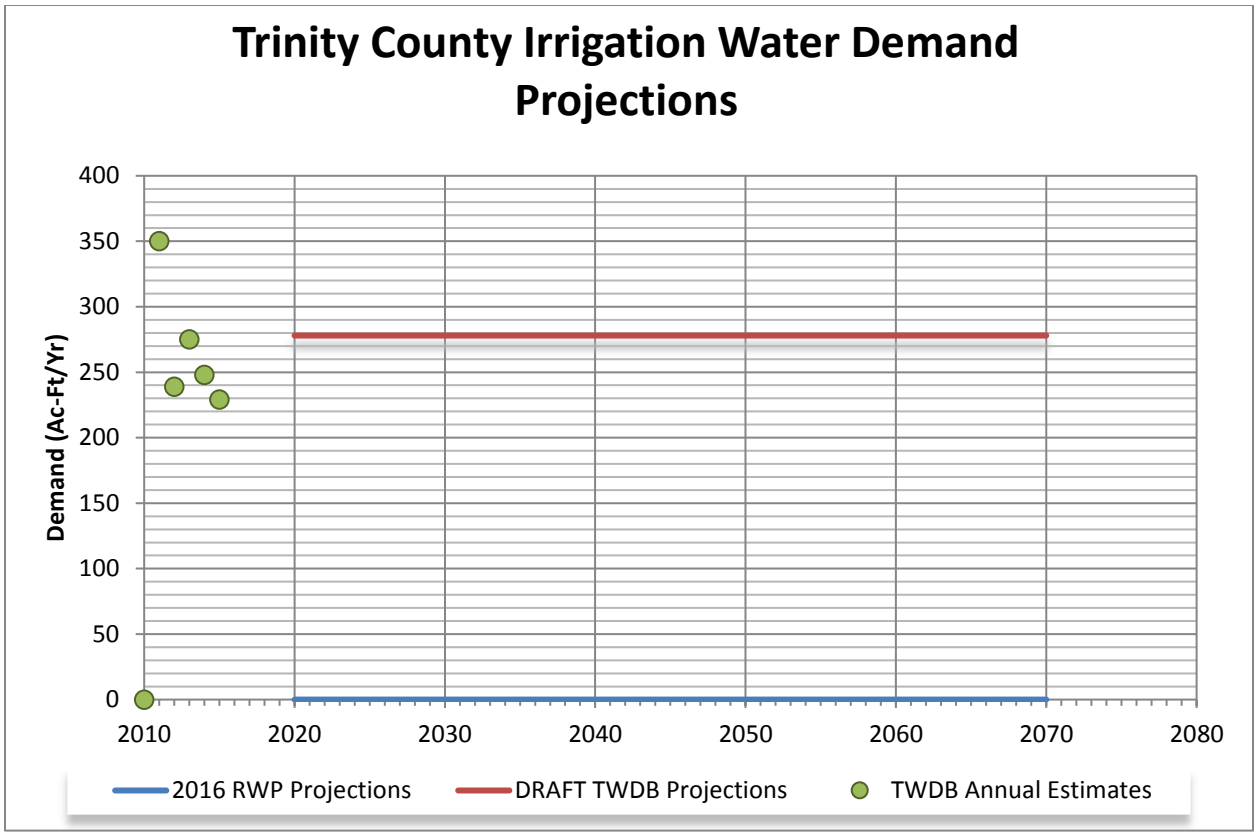


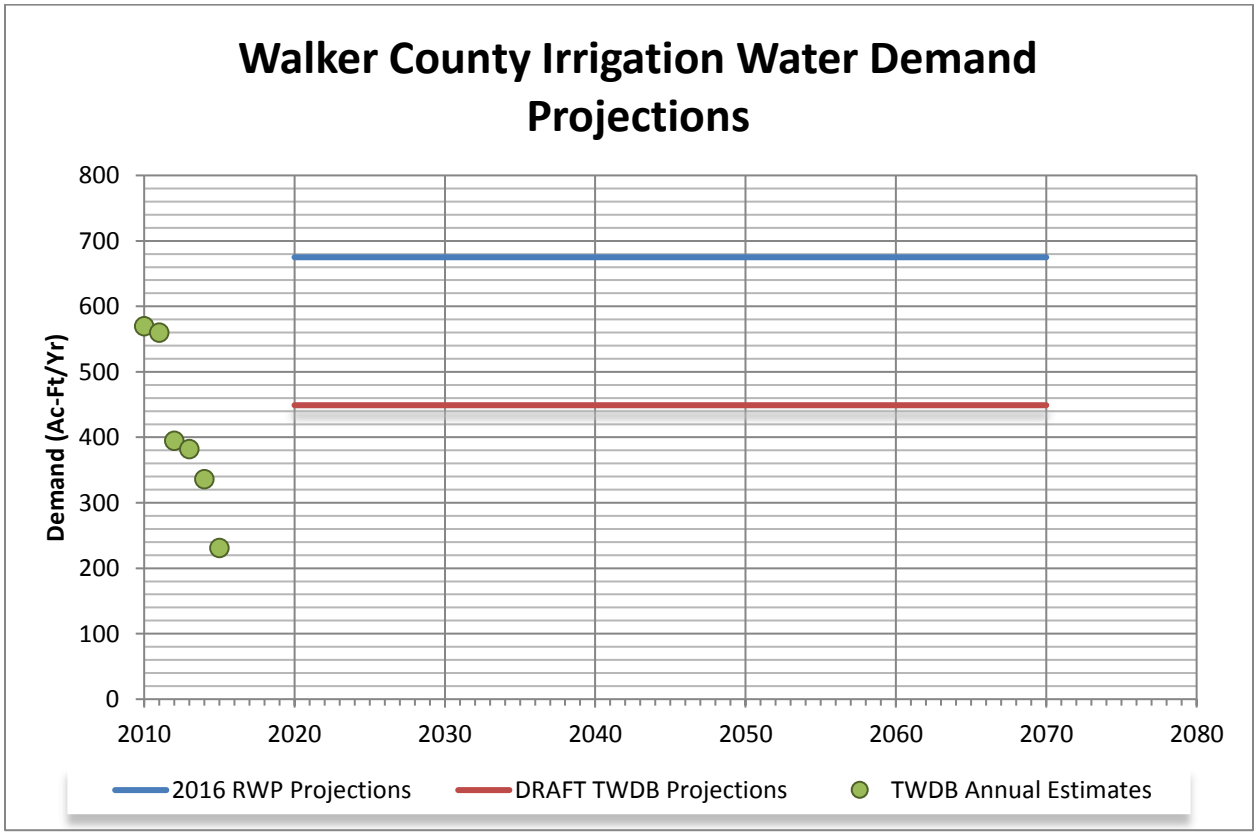
REGION H
Water Planning Group



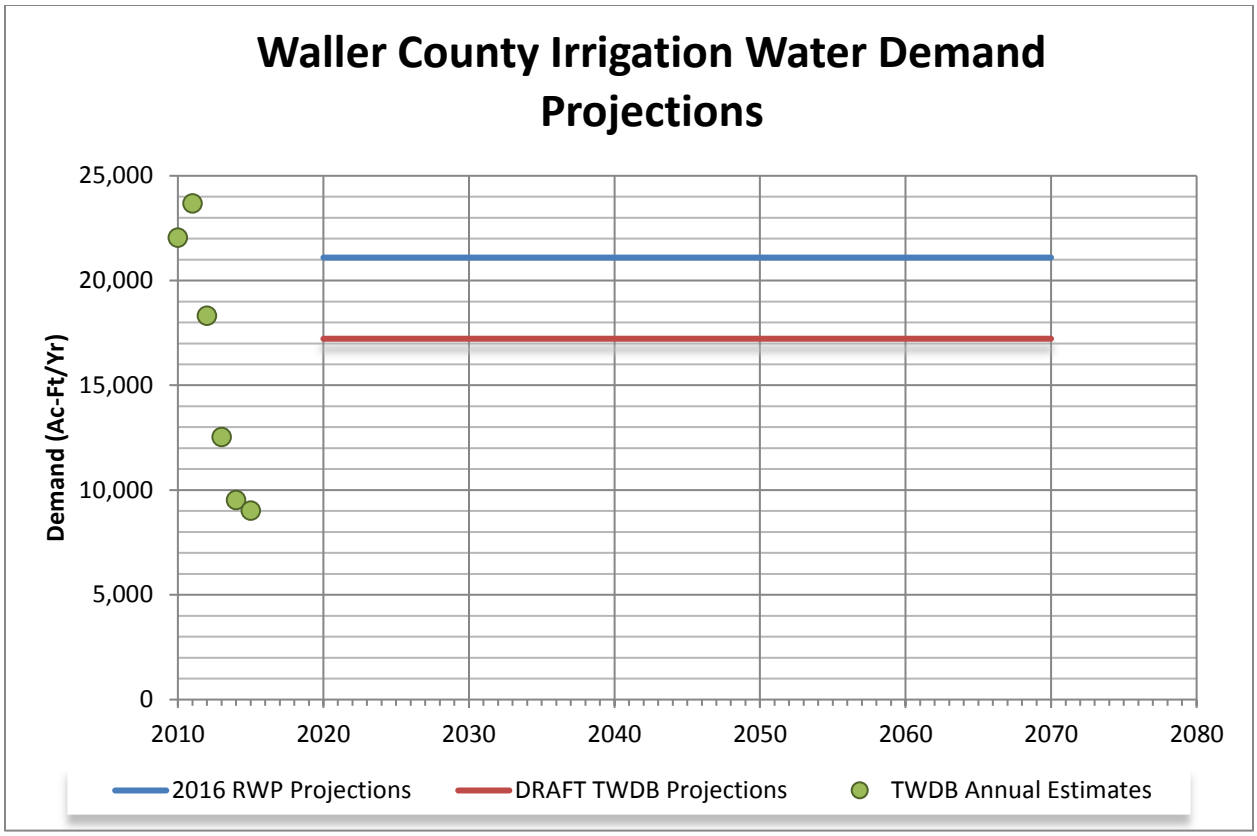


REGION H
Water Planning Group



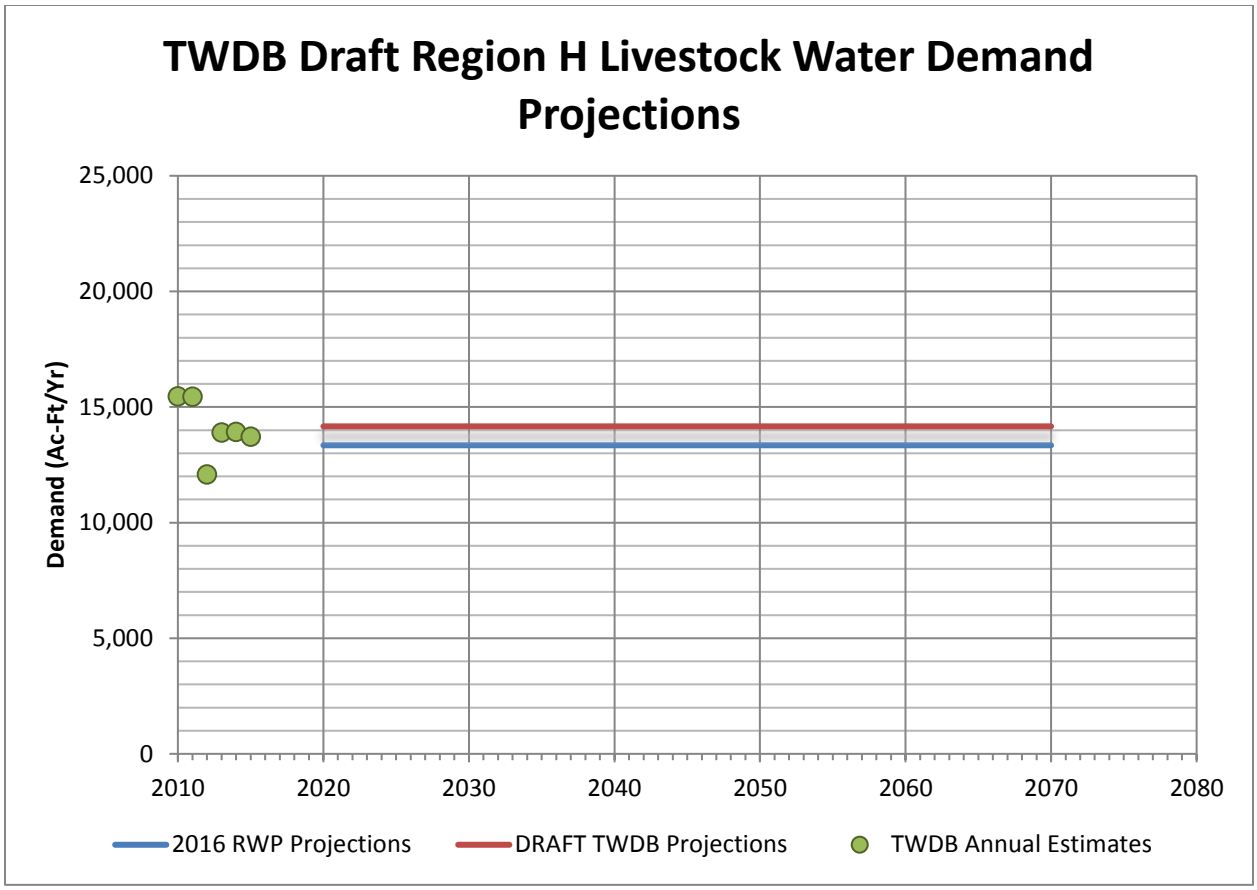


REGION H
Water Planning Group

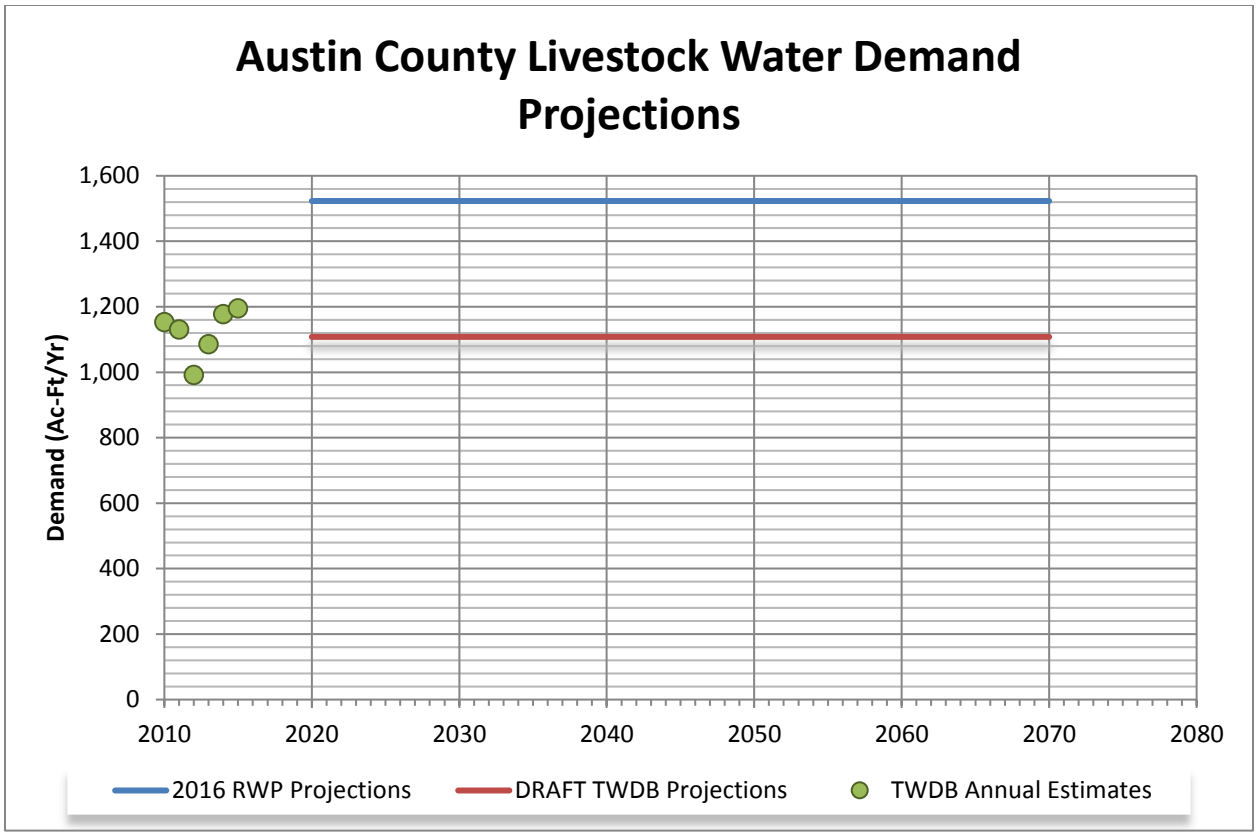

Waller County Irrigation Water Demand Projections
Demand (Ac-Ft/Yr)
25,000
20,000
15,000
10,000
5,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

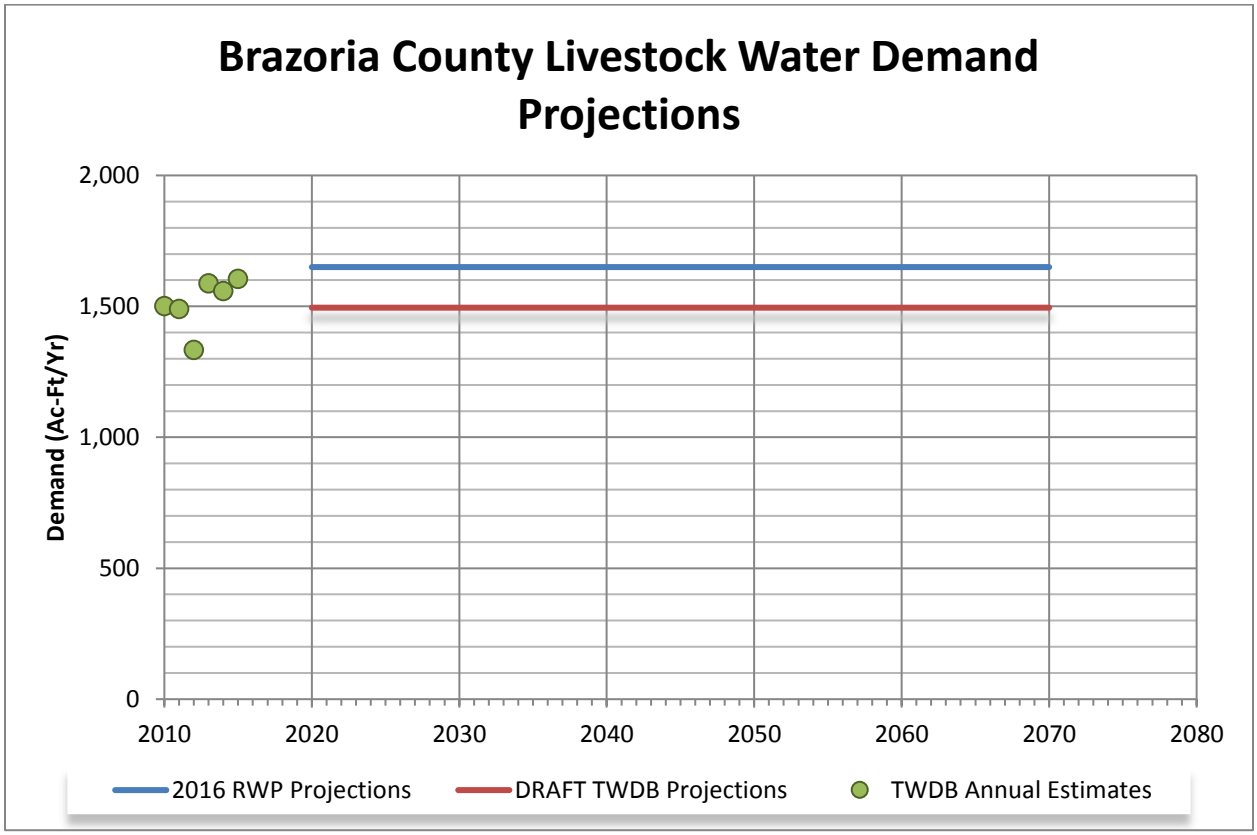
TWDB Draft 2021 RWP
Livestock Water Demand
Projections for Region H

REGION H
Water Planning Group

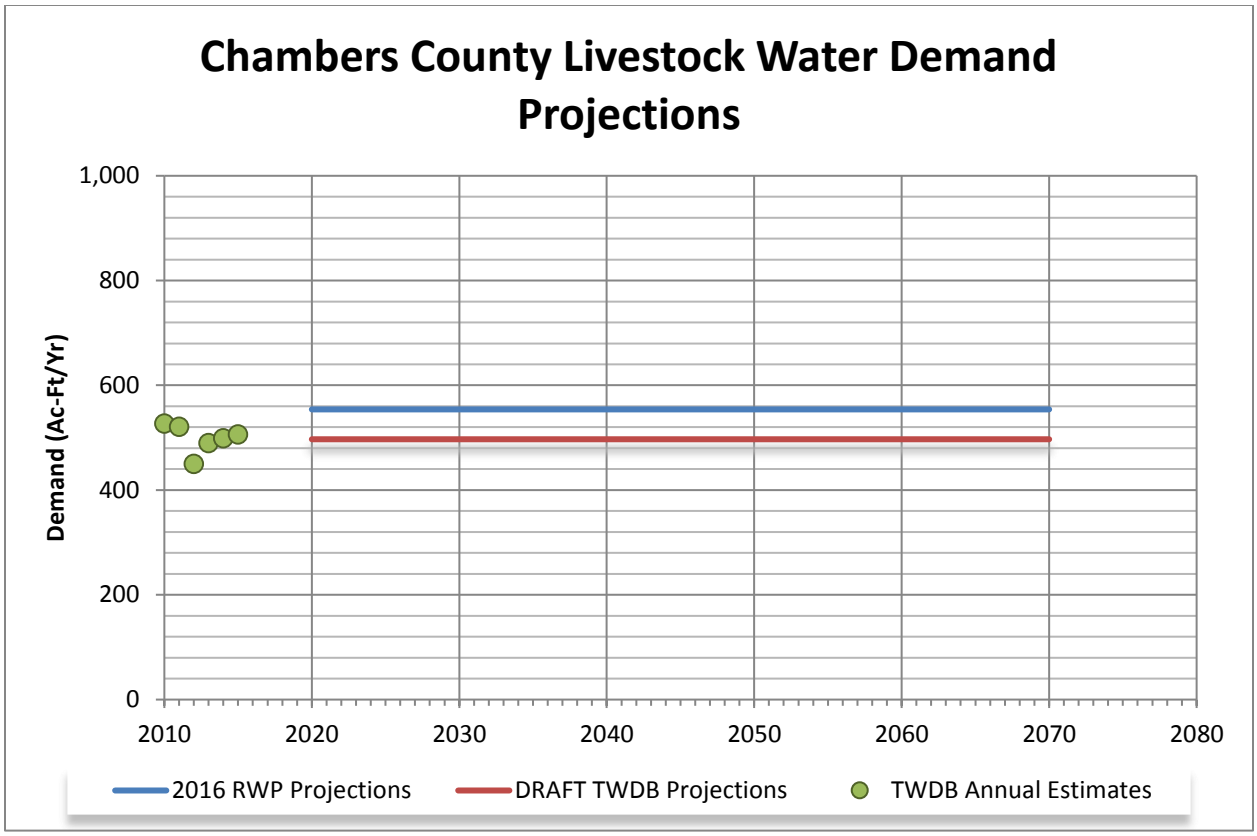


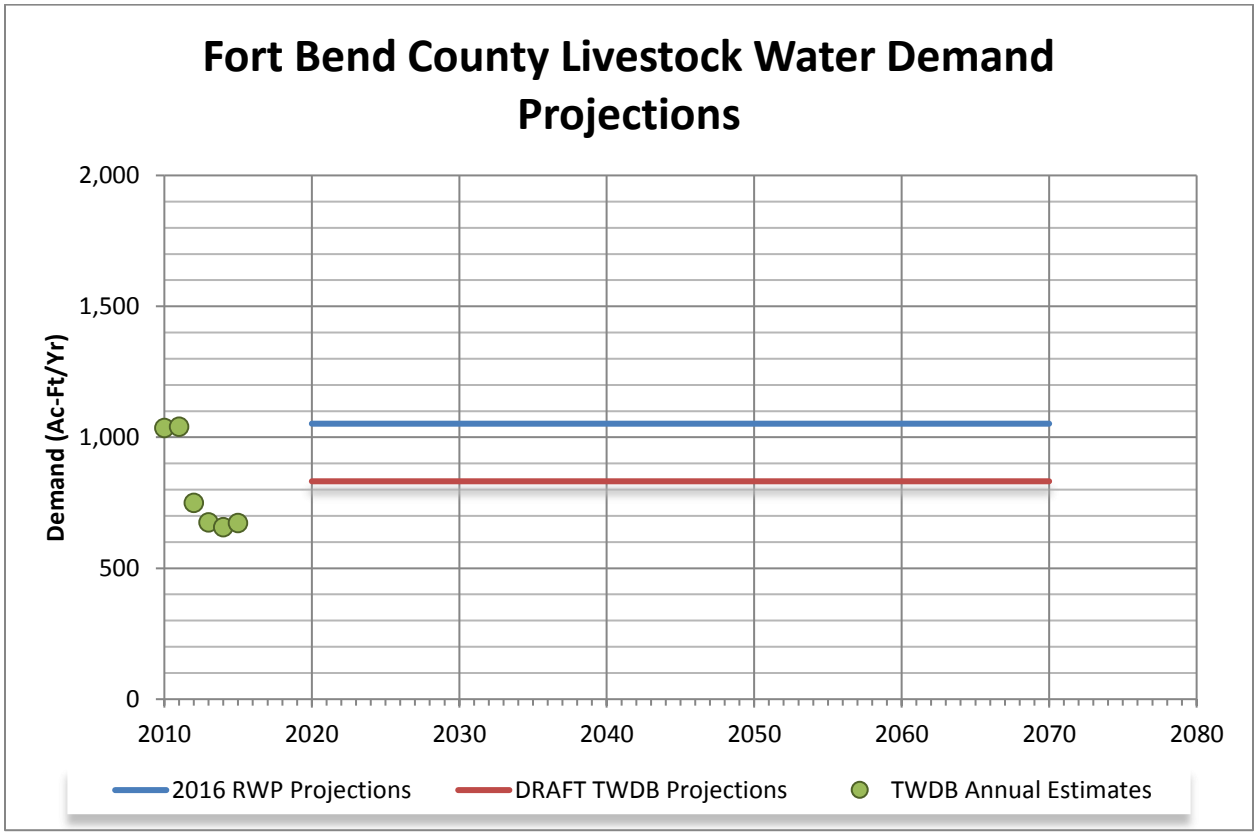
County	TWDB Draft Region H Livestock Water Demand Projections (ac-ft)					
	2020	2030	2040	2050	2060	2070
Austin	1,108	1,108	1,108	1,108	1,108	1,108
Brazoria	1,495	1,495	1,495	1,495	1,495	1,495
Chambers	497	497	497	497	497	497
Fort Bend	832	832	832	832	832	832
Galveston	263	263	263	263	263	263
Harris	1,403	1,403	1,403	1,403	1,403	1,403
Leon	2,904	2,904	2,904	2,904	2,904	2,904
Liberty	992	992	992	992	992	992
Madison	1,406	1,406	1,406	1,406	1,406	1,406
Montgomery	537	537	537	537	537	537
Polk	181	181	181	181	181	181
San Jacinto	413	413	413	413	413	413
Trinity	201	201	201	201	201	201
Walker	753	753	753	753	753	753
Waller	1,179	1,179	1,179	1,179	1,179	1,179
Total	**14,164**	**14,164**	**14,164**	**14,164**	**14,164**	**14,164**



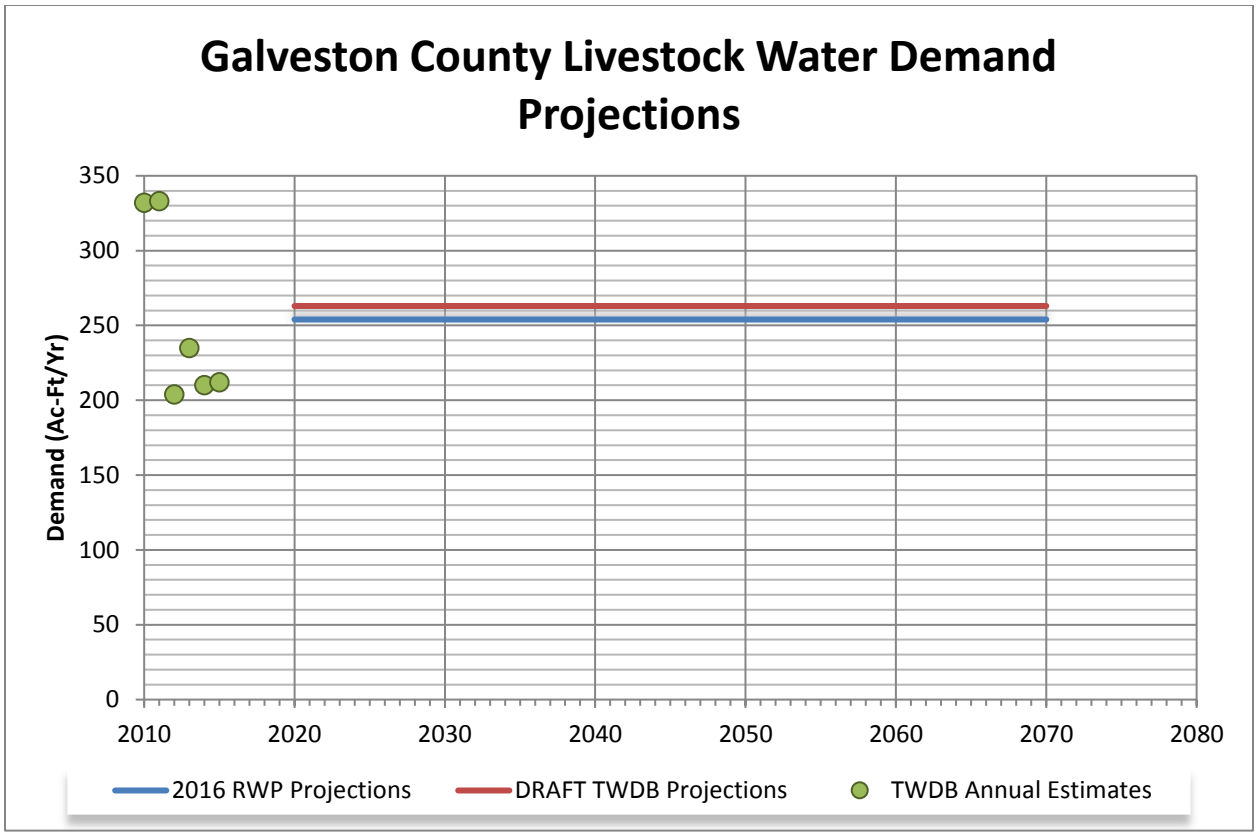


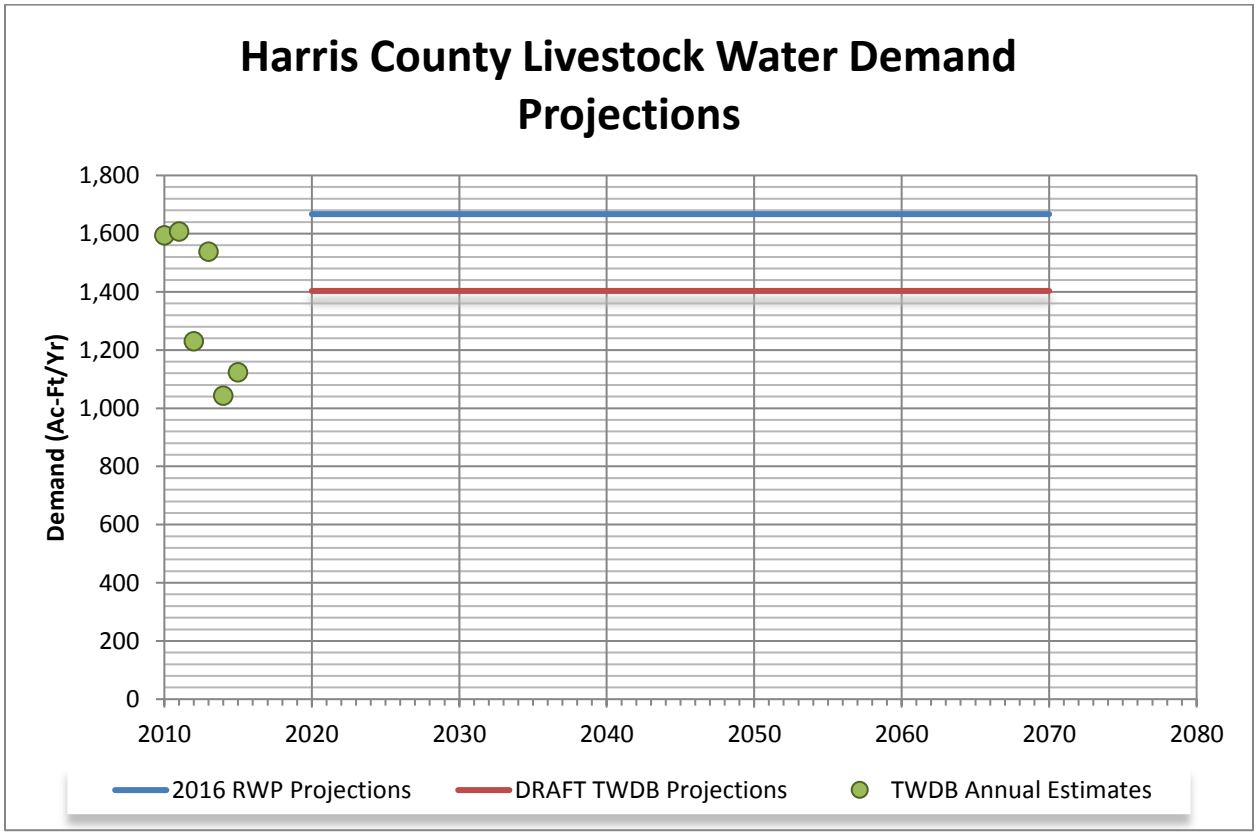
REGION H
Water Planning Group



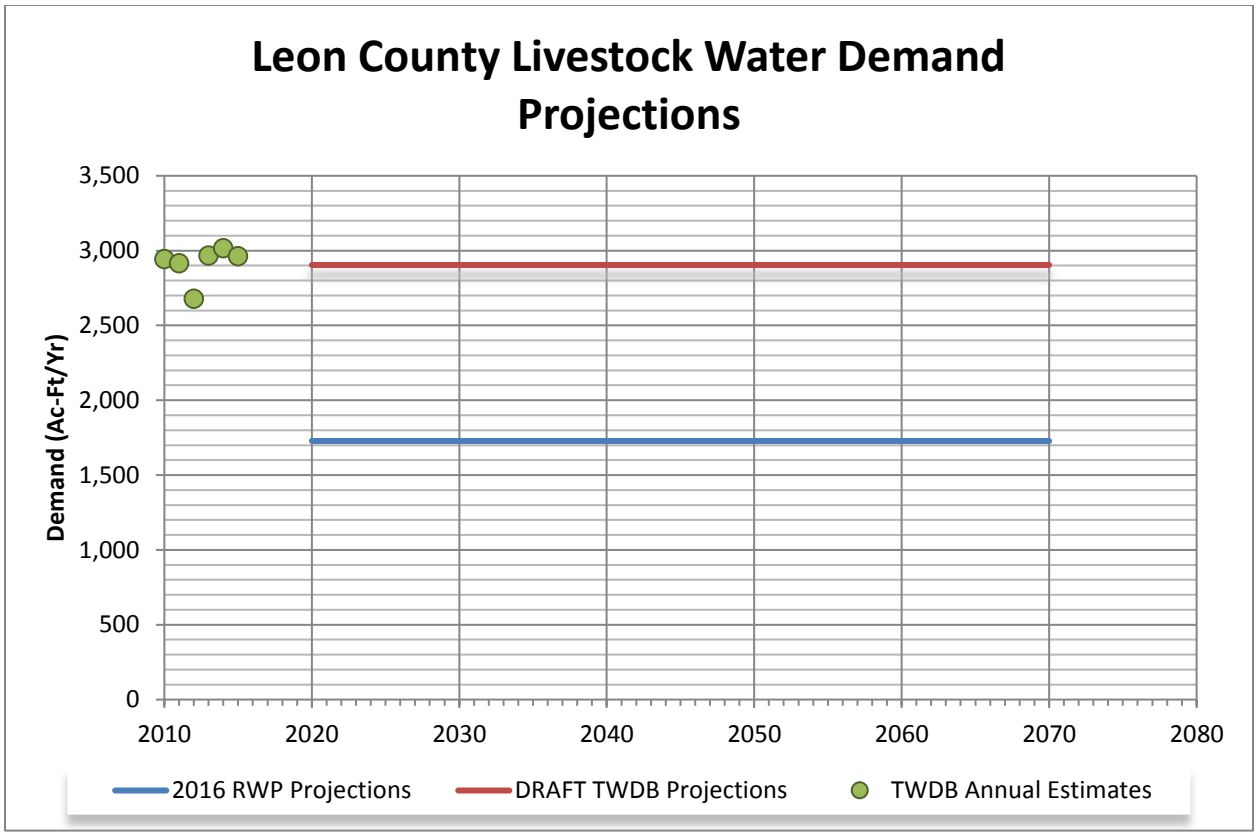


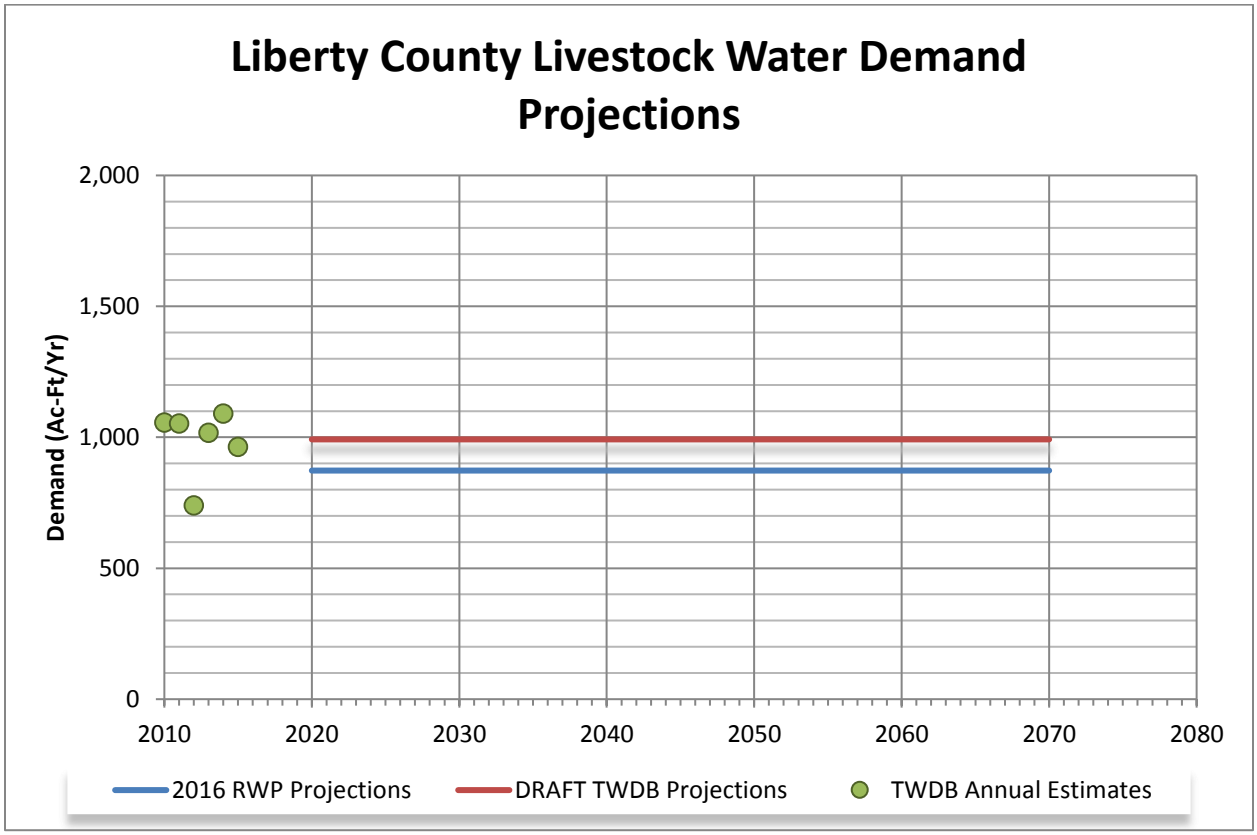
REGION H
Water Planning Group



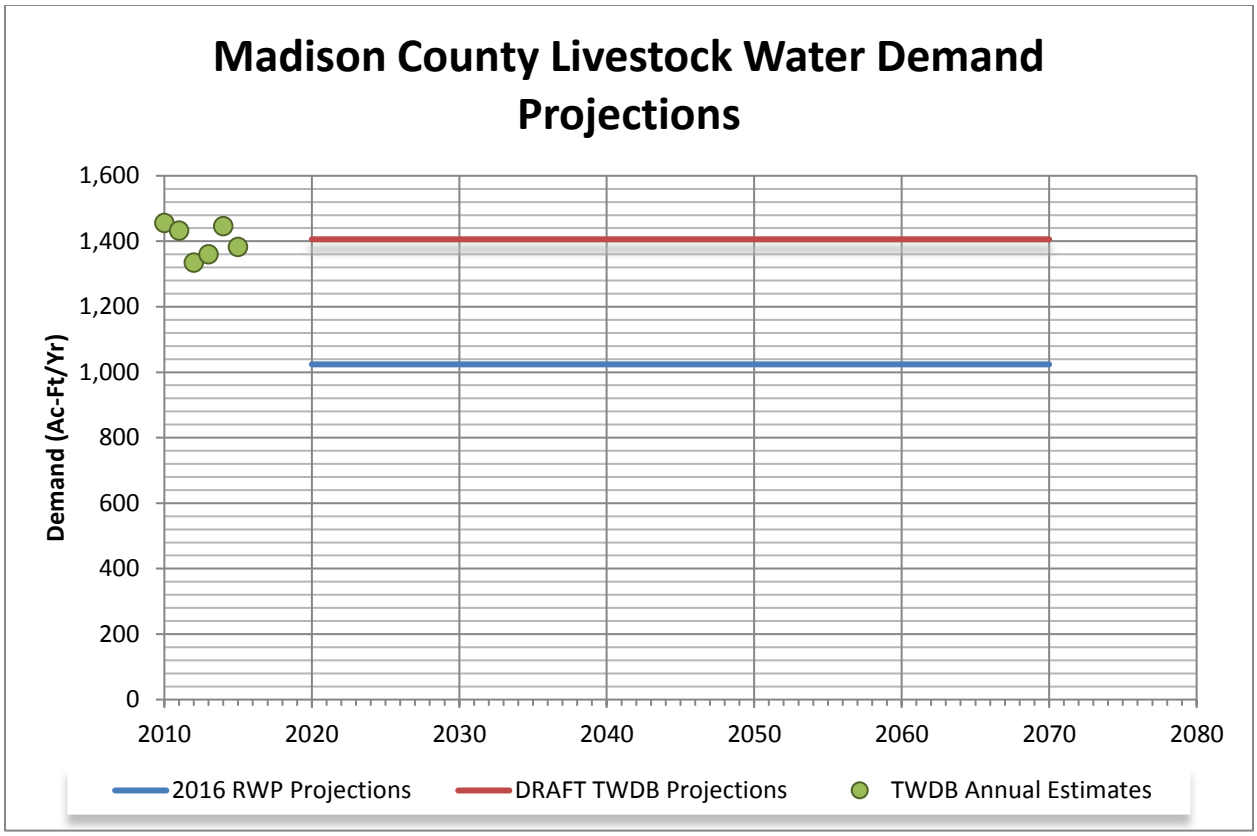


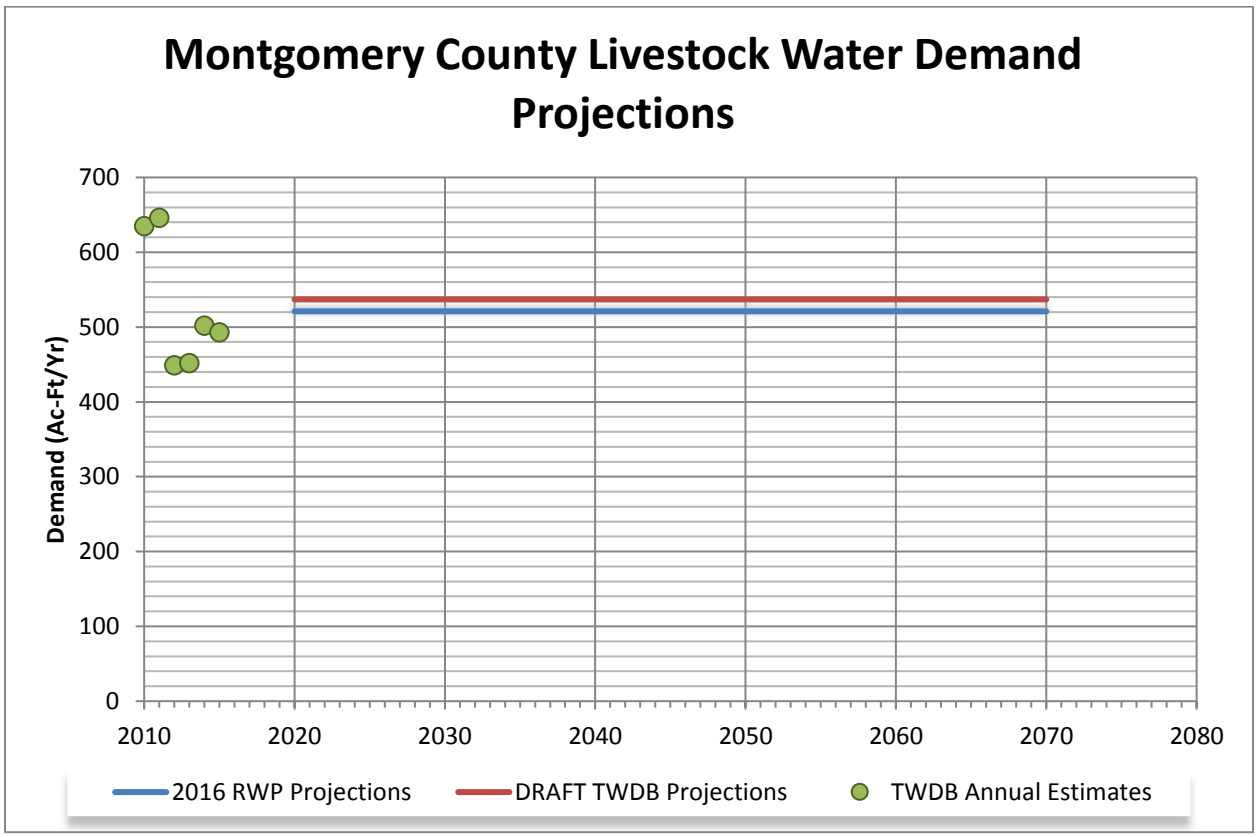
REGION H
Water Planning Group



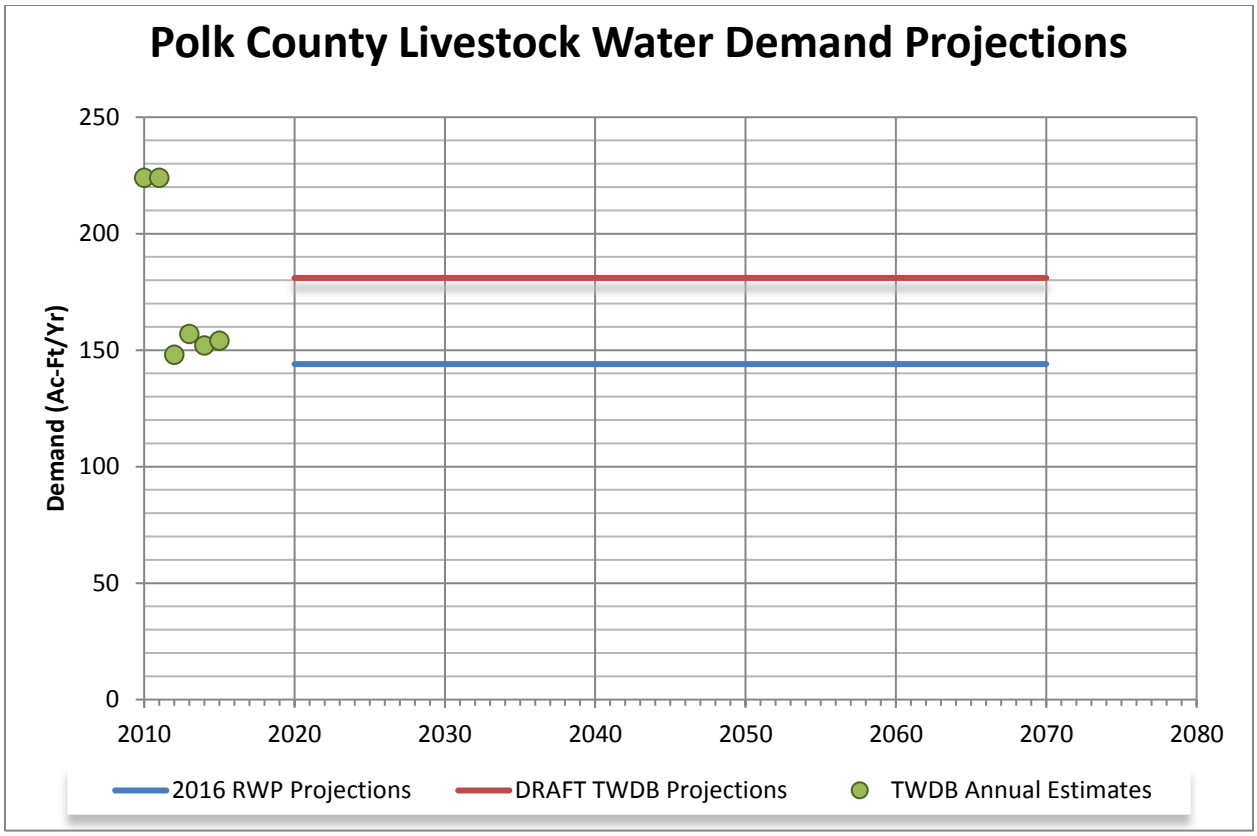


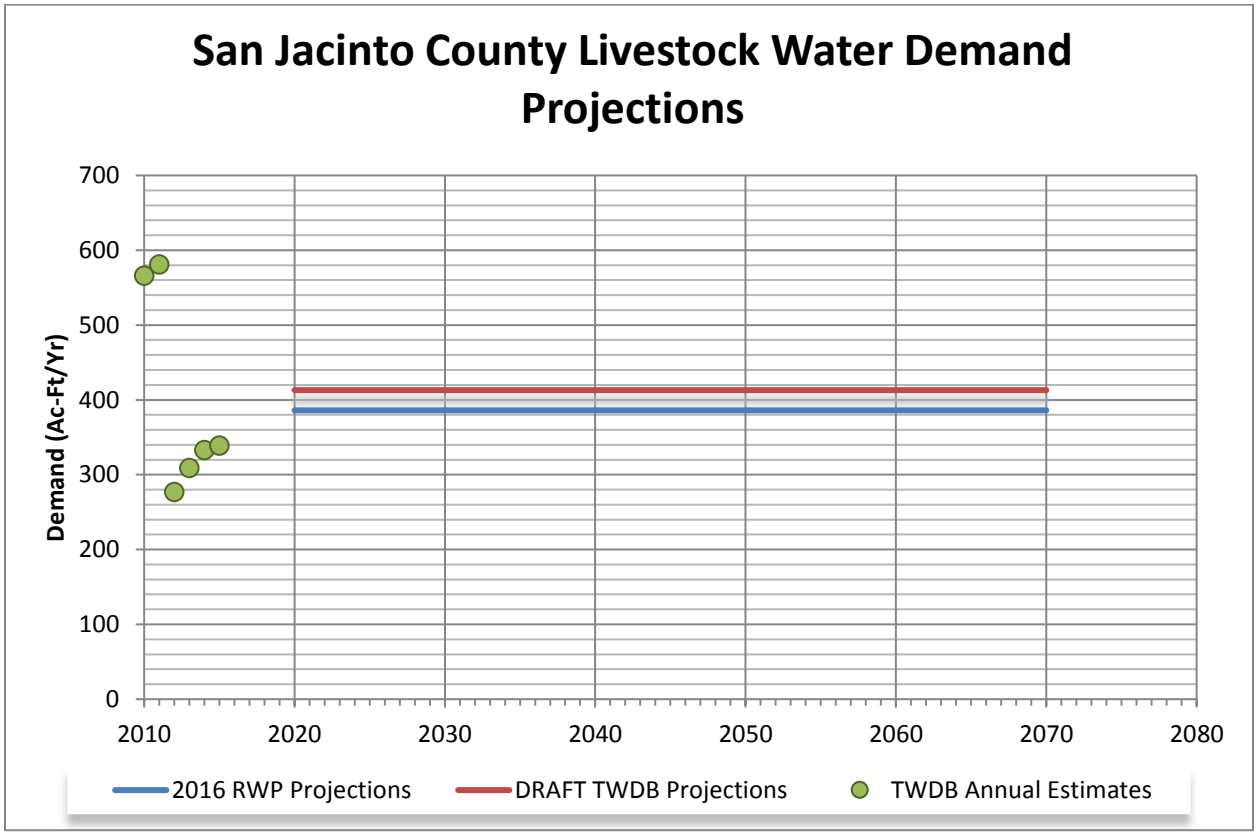
REGION H
Water Planning Group



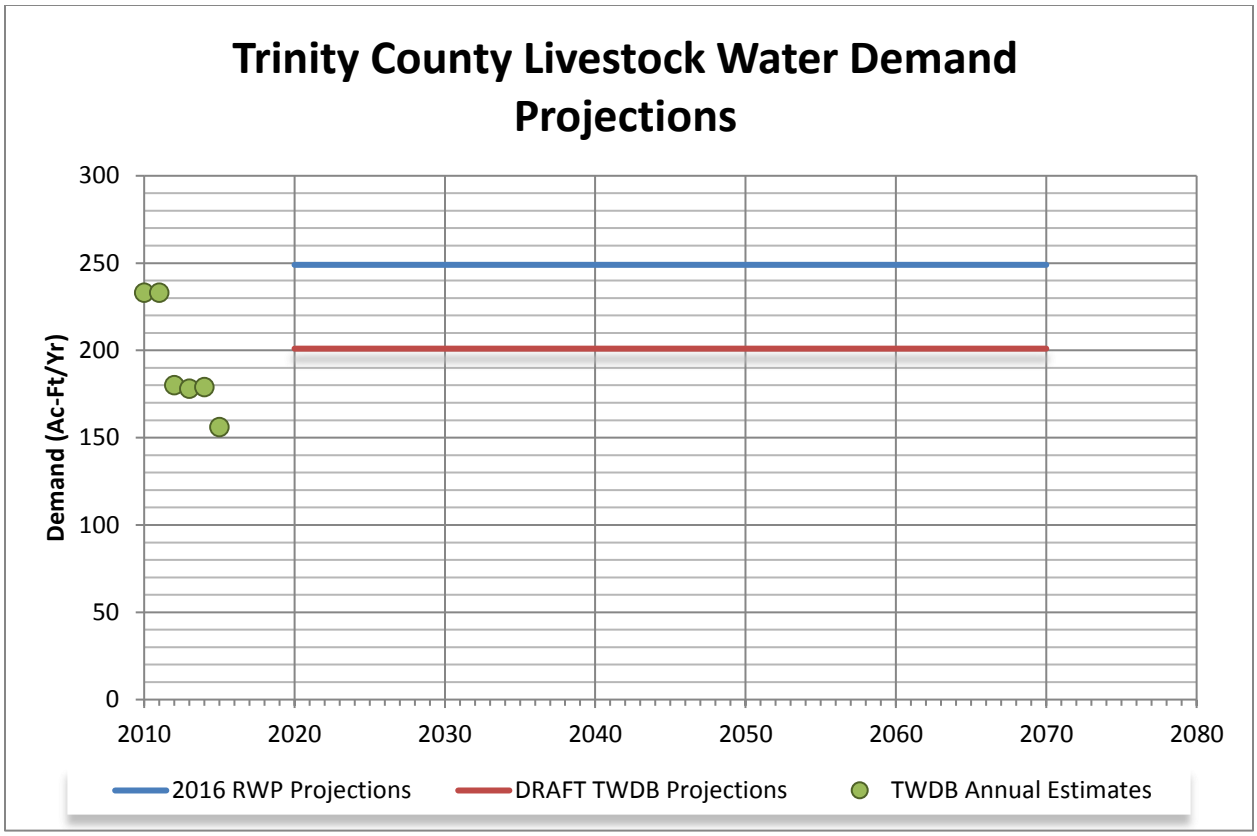


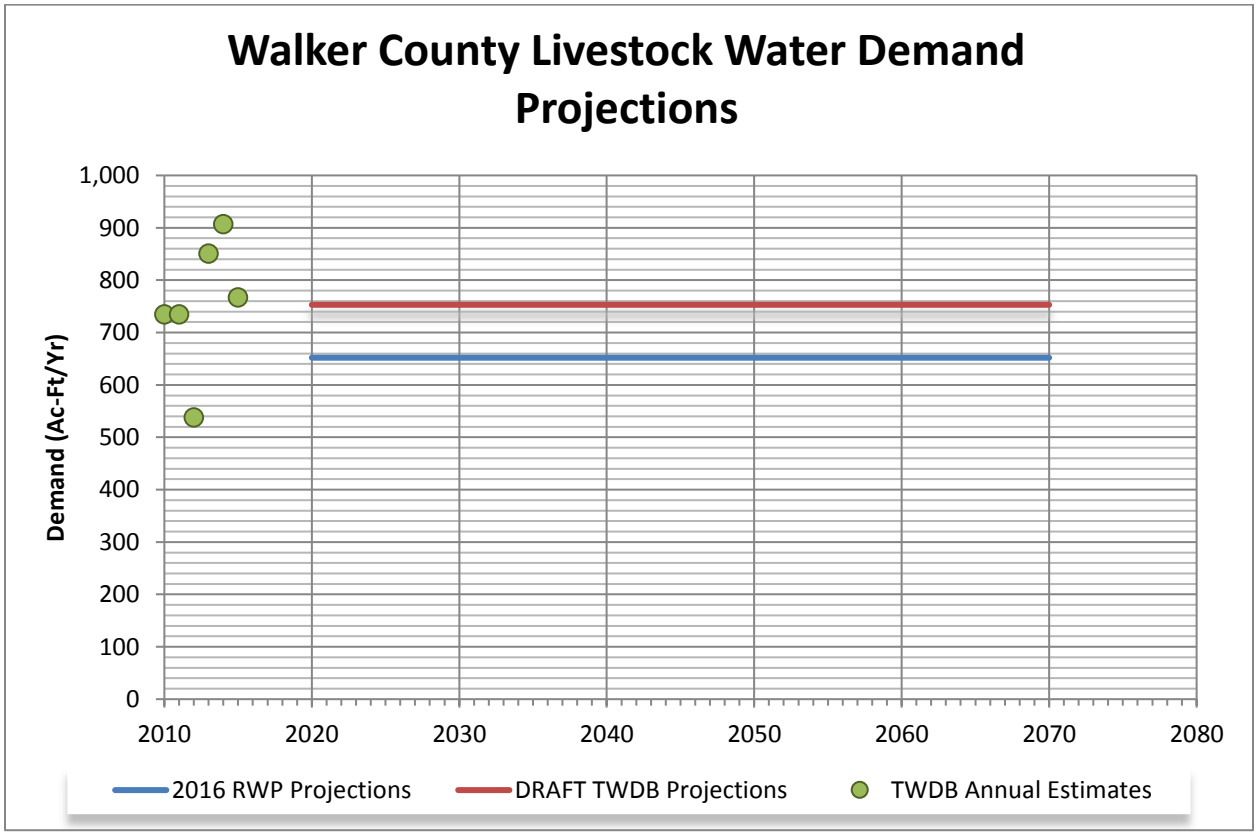
REGION H
Water Planning Group



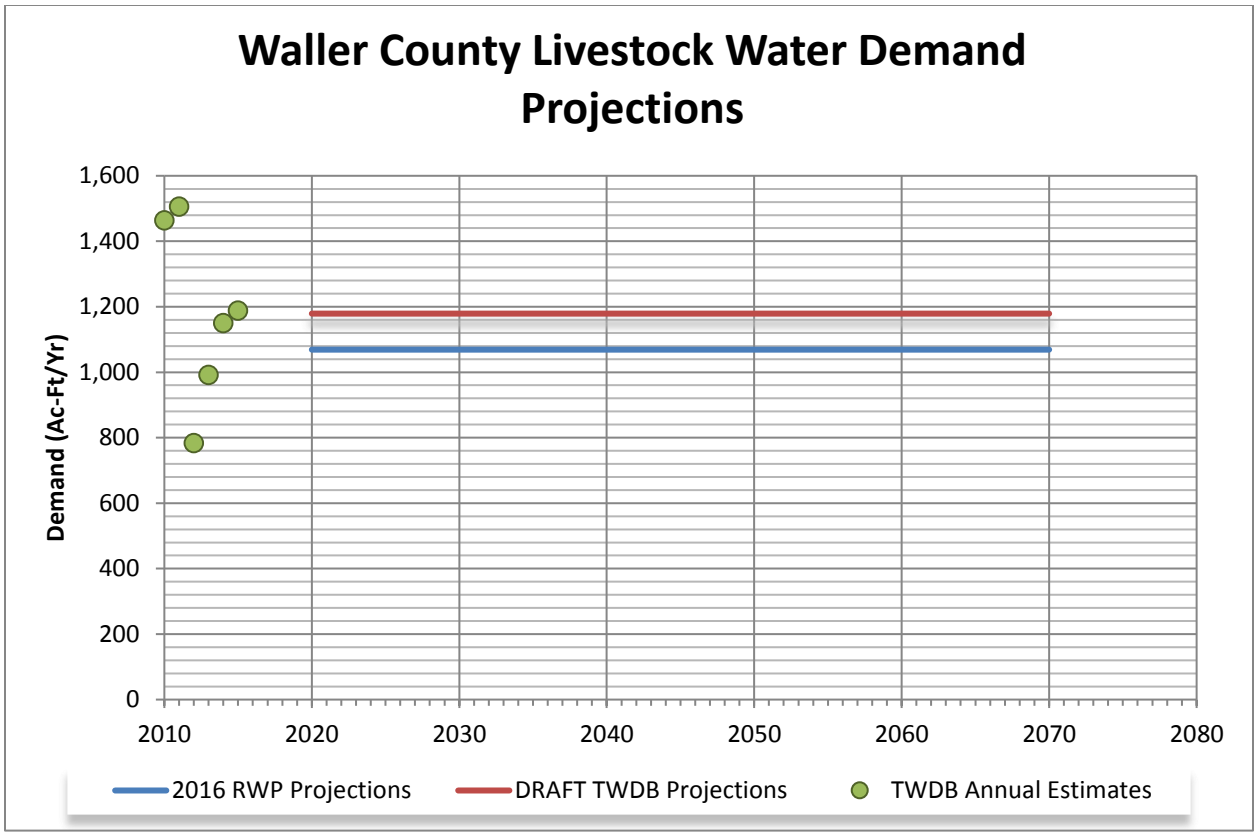


REGION H
Water Planning Group



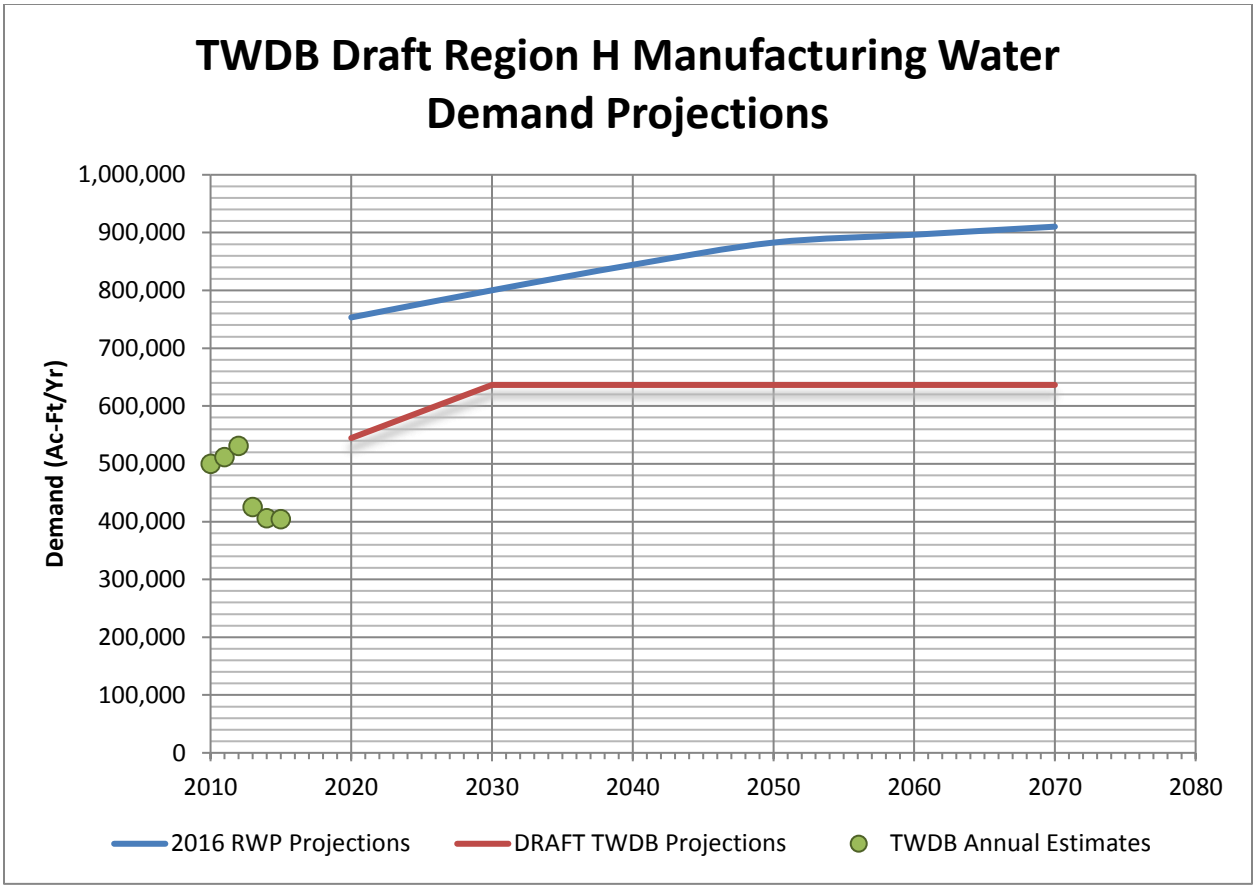


REGION H
Water Planning Group

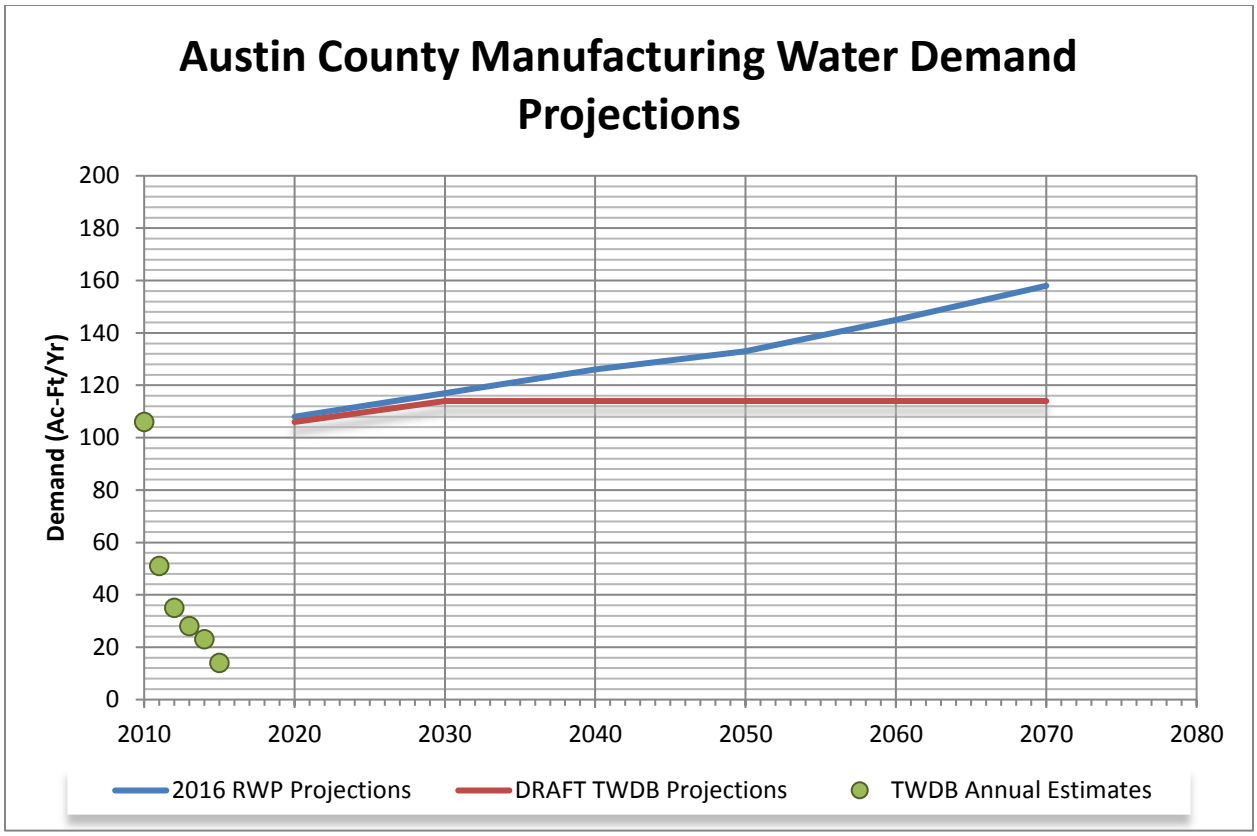

Waller County Livestock Water Demand Projections
Demand (Ac-Ft/Yr)
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

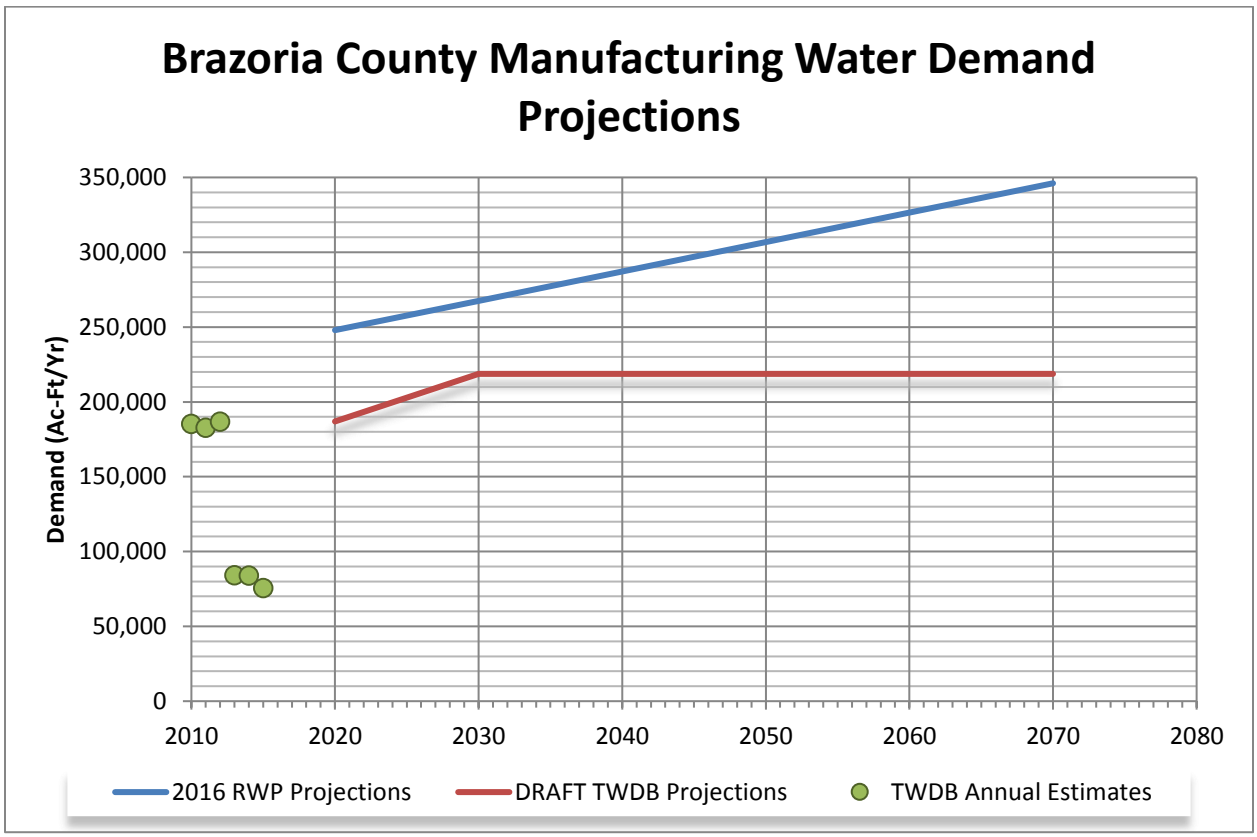
TWDB Draft 2021 RWP Manufacturing Water Demand Projections for Region H

REGION H
Water Planning Group

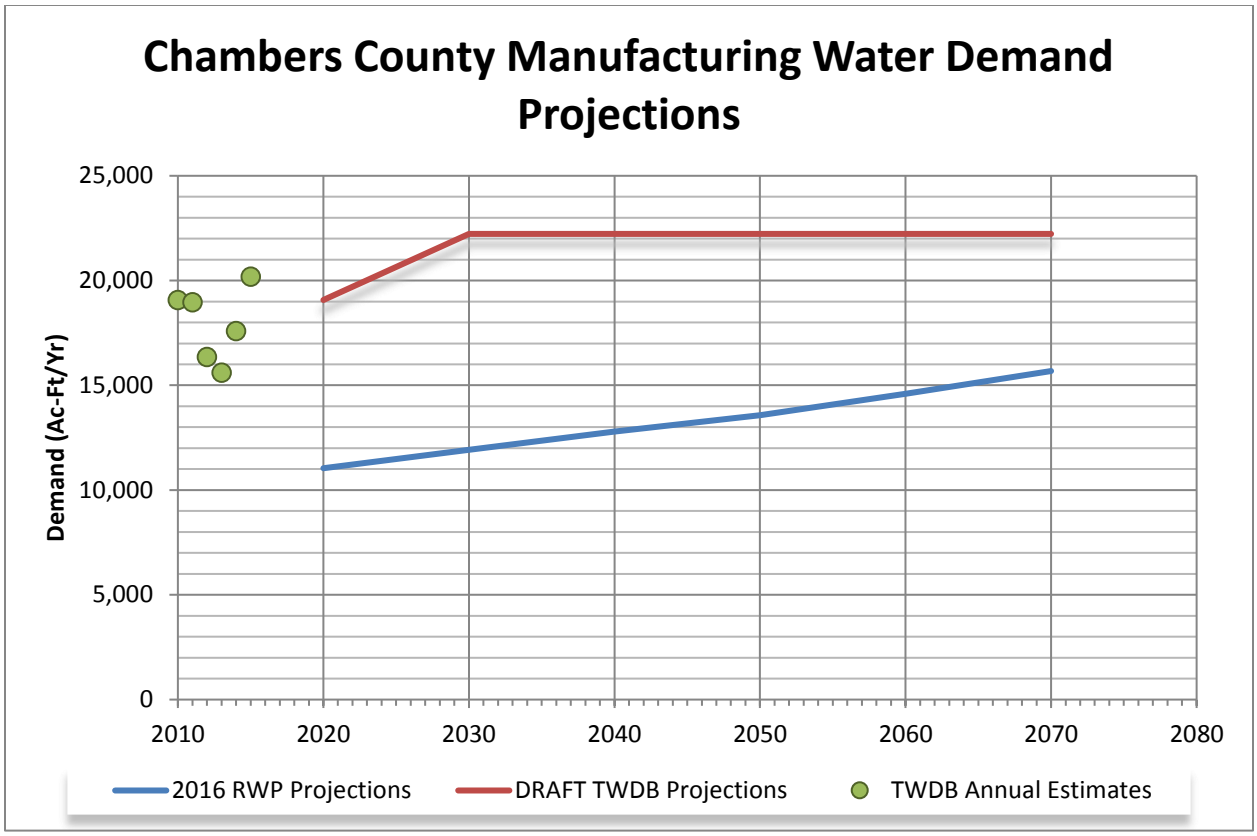


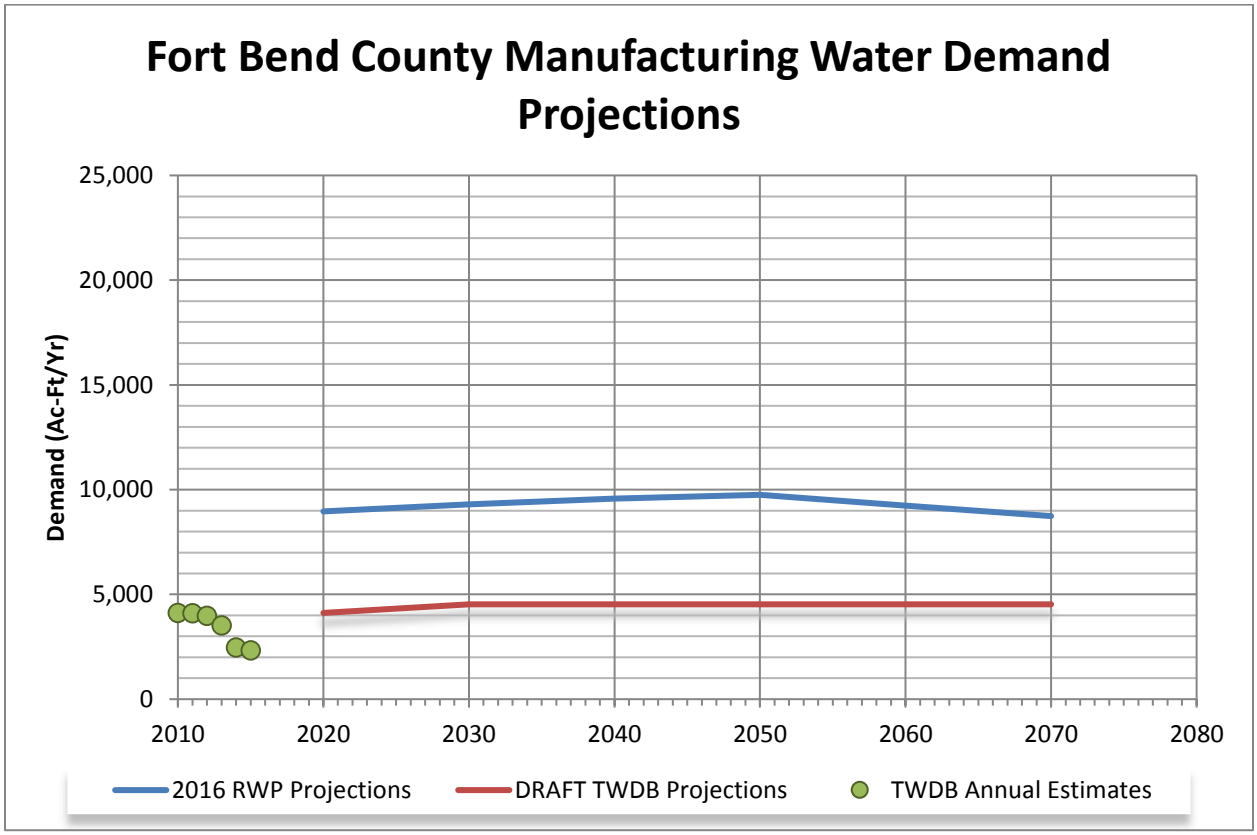
County	TWDB Draft Region H Manufacturing Water Demand Projections (ac-ft)					
	2020	2030	2040	2050	2060	2070
Austin	106	114	114	114	114	114
Brazoria	186,924	218,713	218,713	218,713	218,713	218,713
Chambers	19,073	22,227	22,227	22,227	22,227	22,227
Fort Bend	4,118	4,528	4,528	4,528	4,528	4,528
Galveston	33,429	39,028	39,028	39,028	39,028	39,028
Harris	298,253	348,713	348,713	348,713	348,713	348,713
Leon	846	1,069	1,069	1,069	1,069	1,069
Liberty	188	222	222	222	222	222
Madison	-	-	-	-	-	-
Montgomery	1,299	1,468	1,468	1,468	1,468	1,468
Polk	5	5	5	5	5	5
San Jacinto	9	10	10	10	10	10
Trinity	-	-	-	-	-	-
Walker	249	303	303	303	303	303
Waller	77	78	78	78	78	78
Total	**544,576**	**636,478**	**636,478**	**636,478**	**636,478**	**636,478**



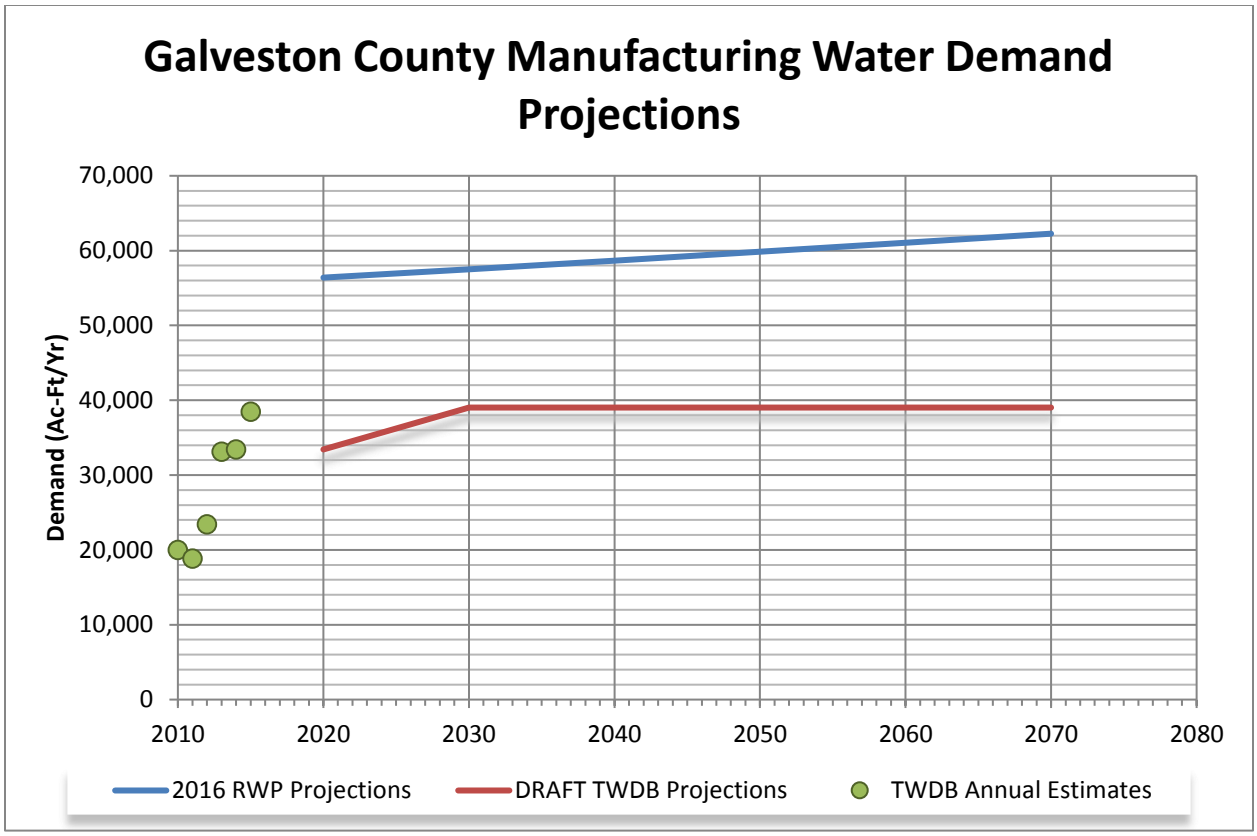


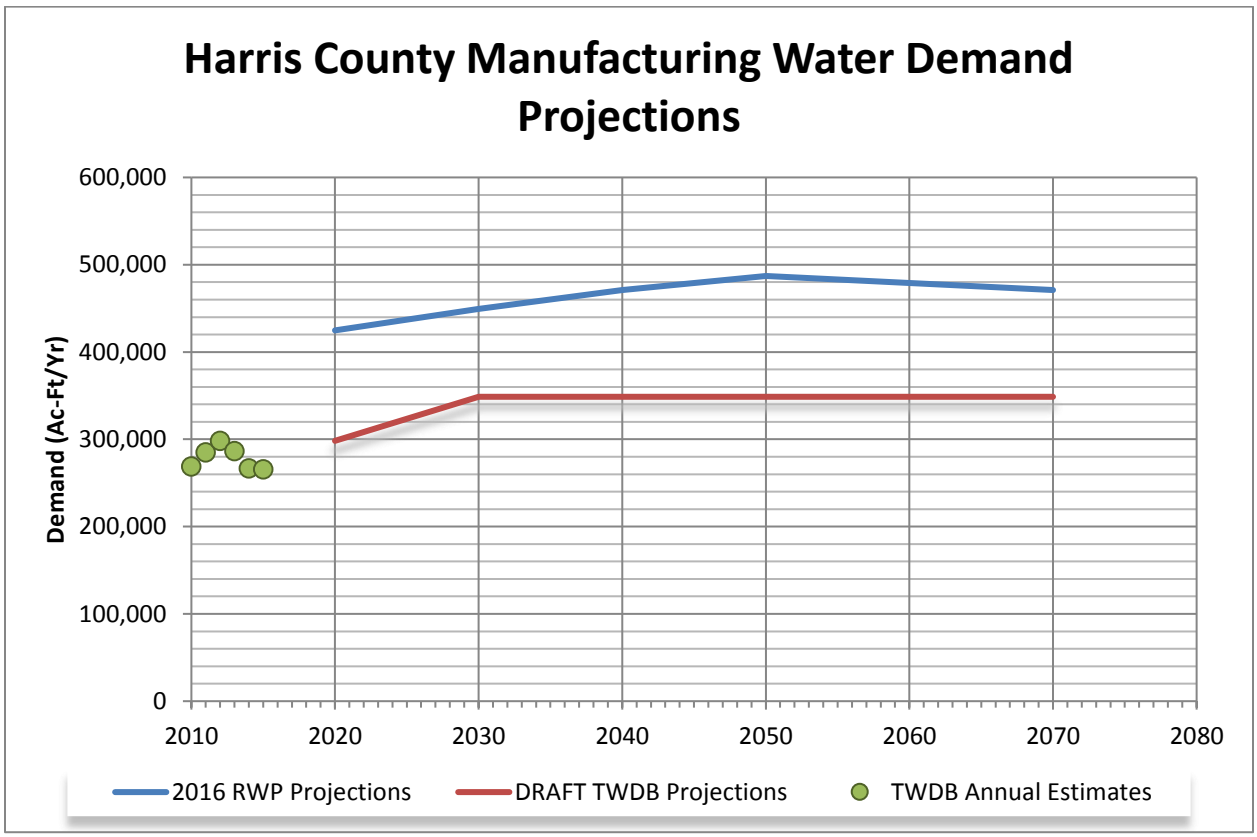
REGION H
Water Planning Group



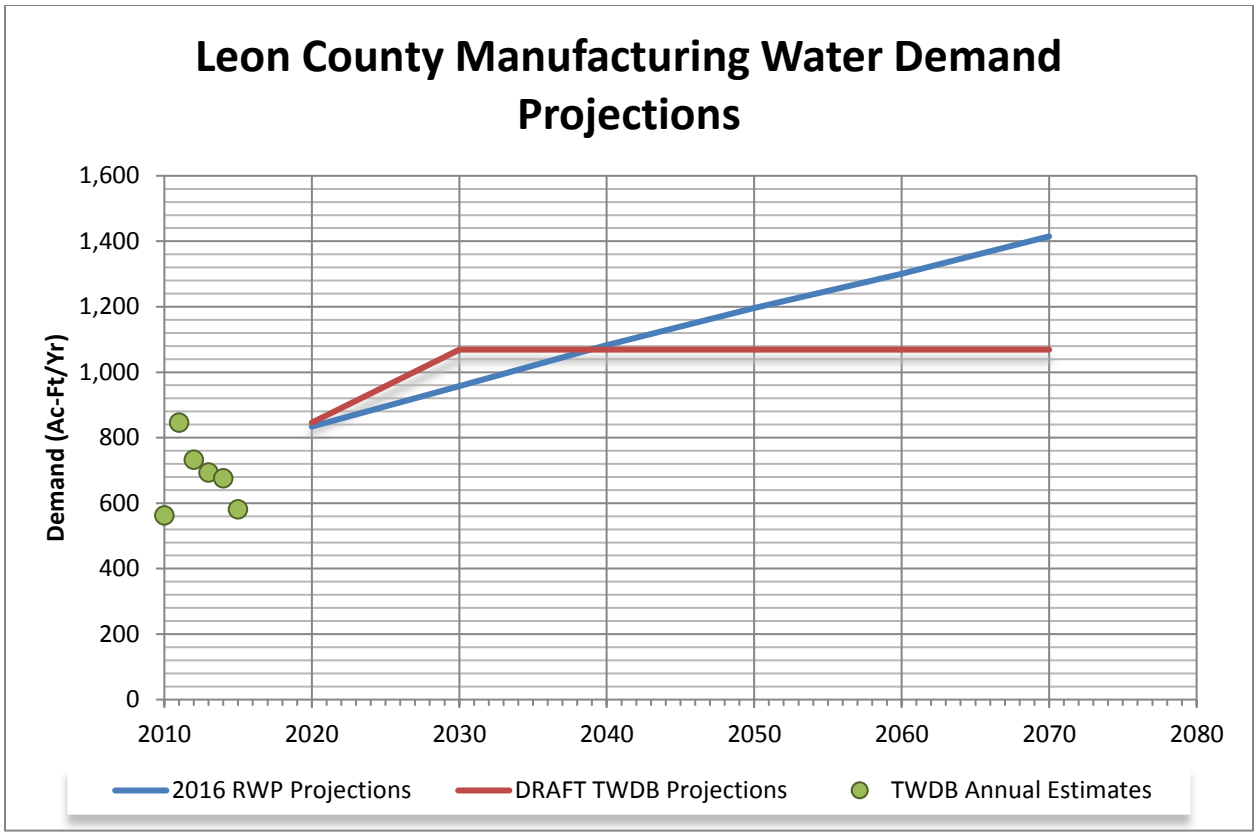


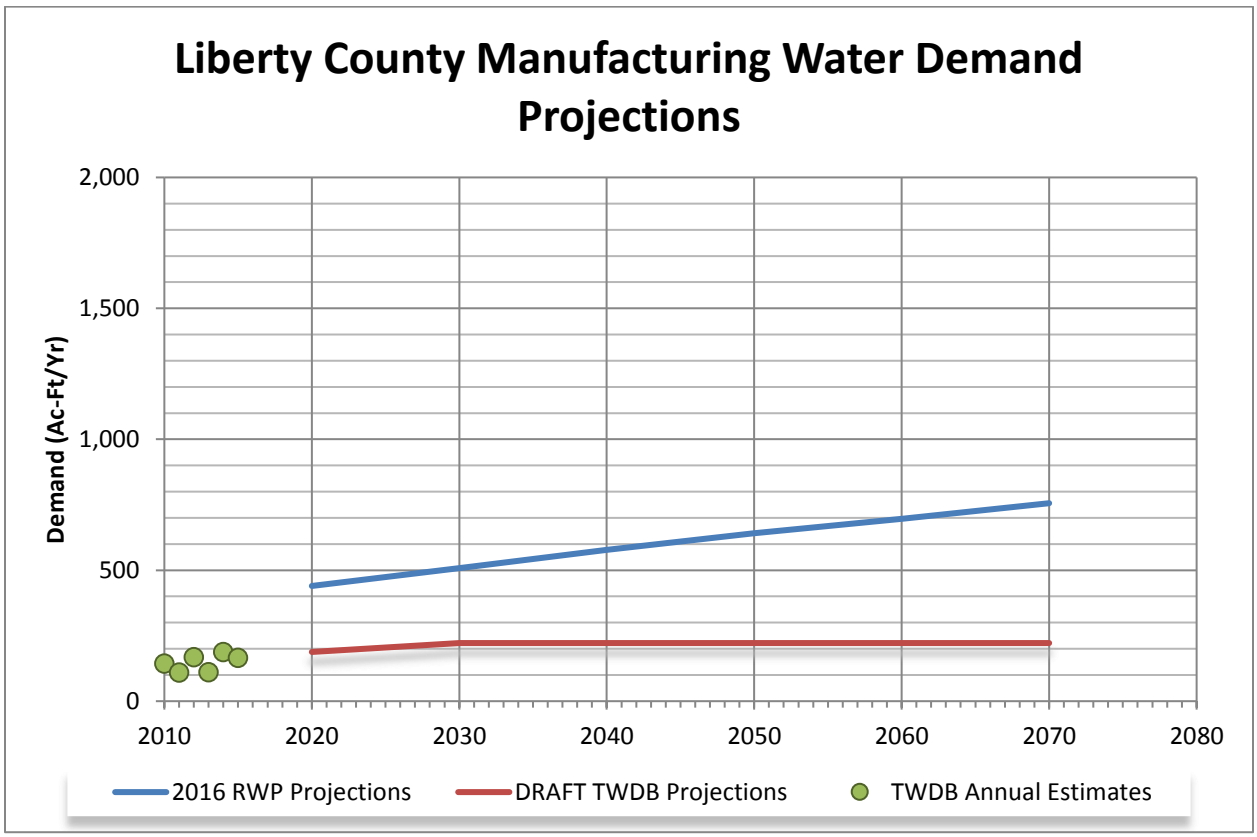
REGION H
Water Planning Group

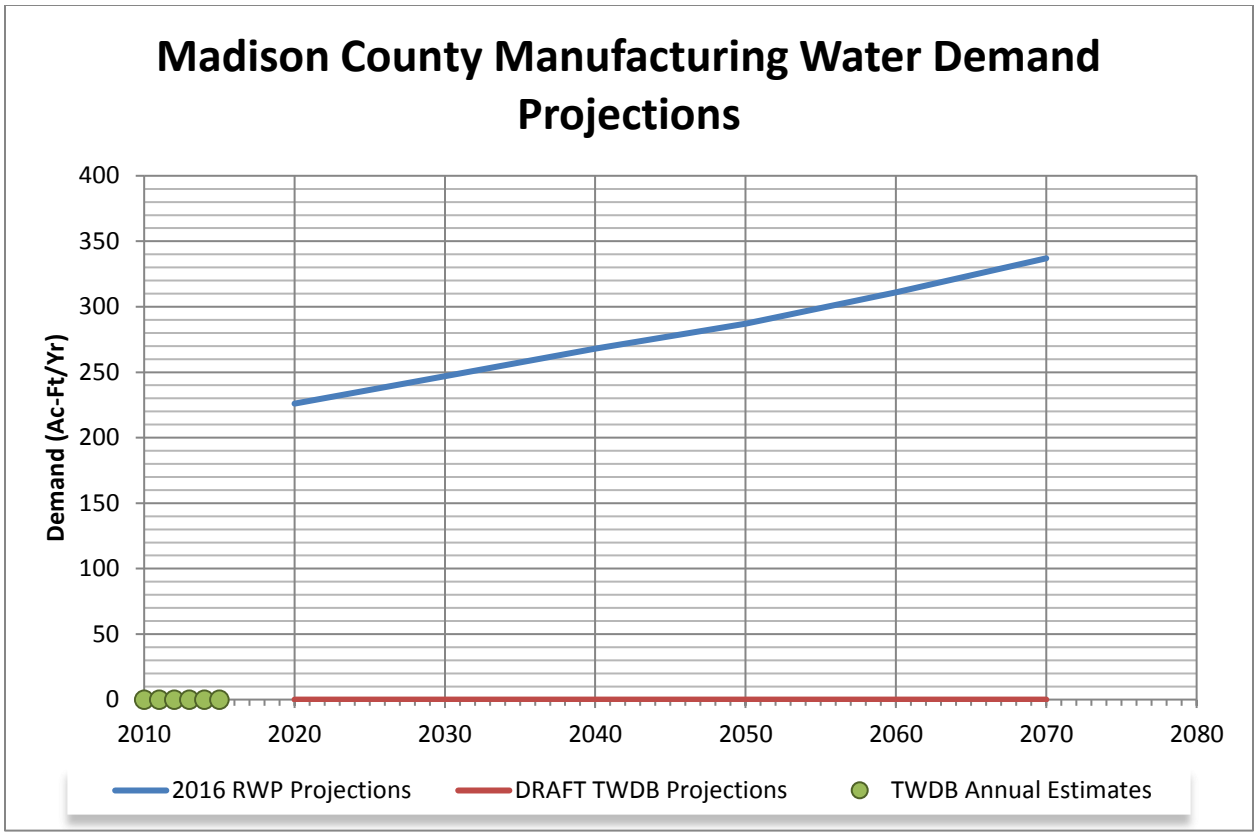


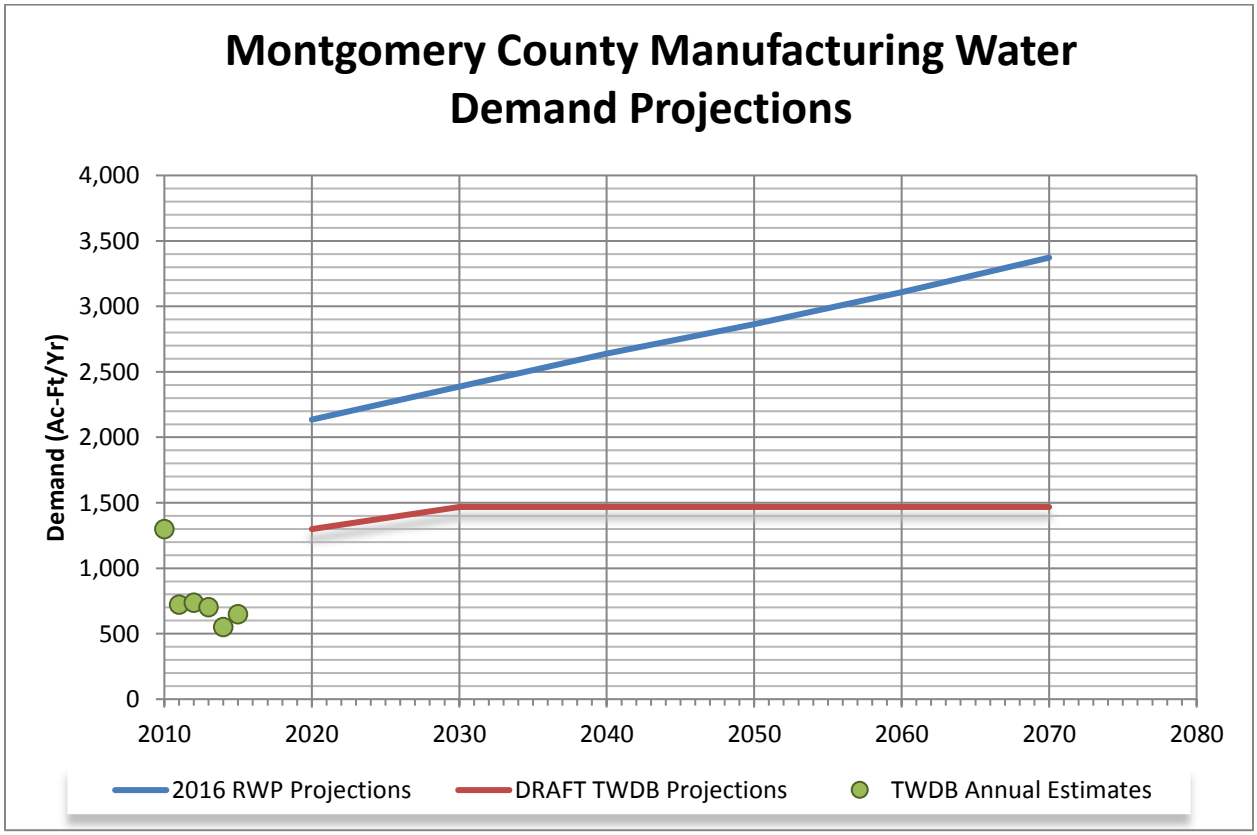


REGION H
Water Planning Group

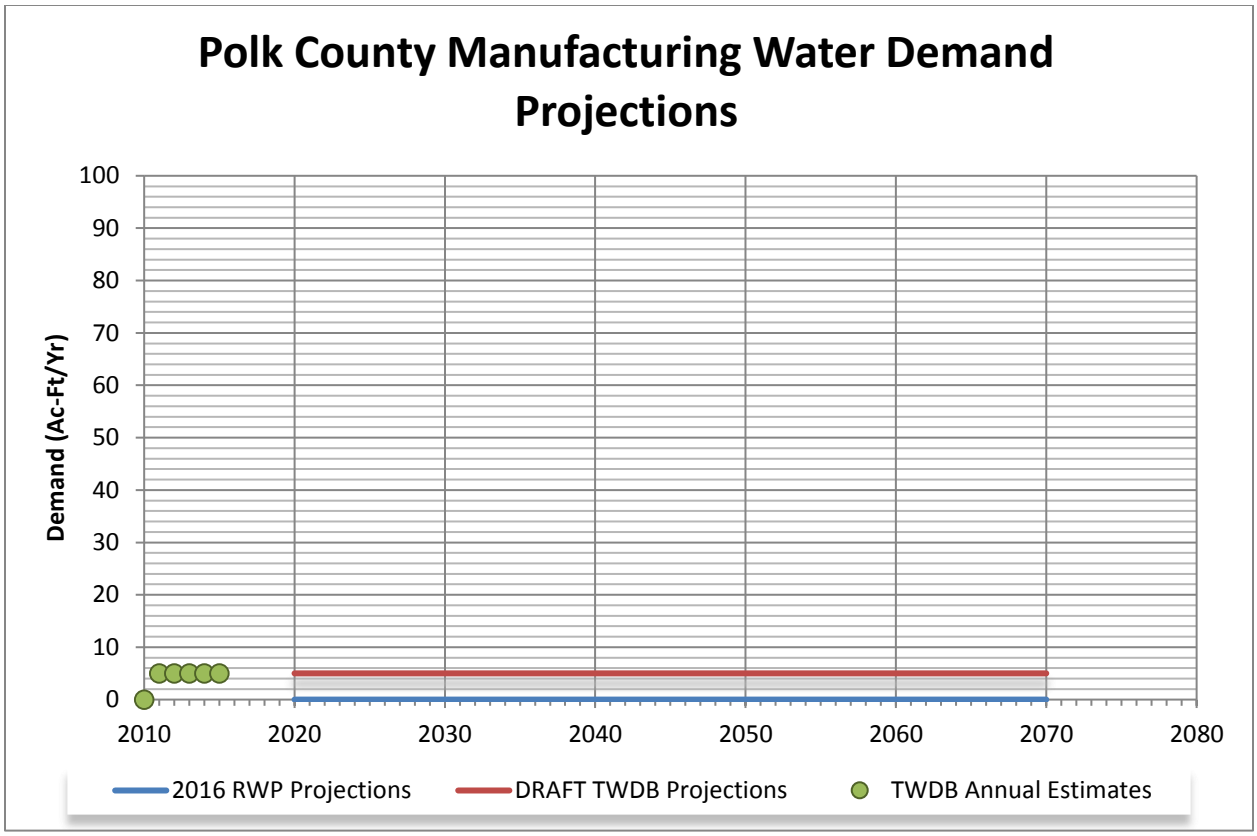

Leon County Manufacturing Water Demand Projections
Demand (Ac-Ft/Yr)
1,600
1,400
1,200
1,000
800
600
400
200
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

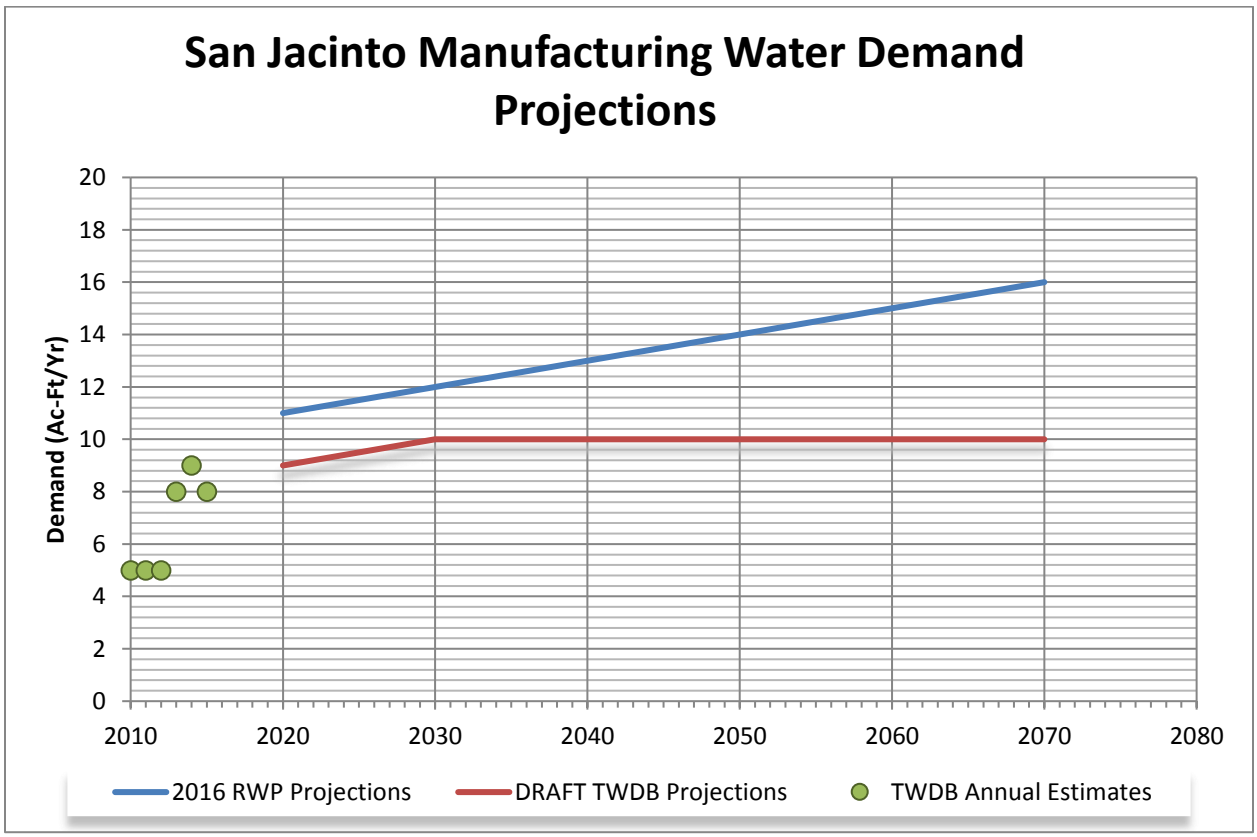

Liberty County Manufacturing Water Demand Projections
Demand (Ac-Ft/Yr)
2,000
1,500
1,000
500
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates



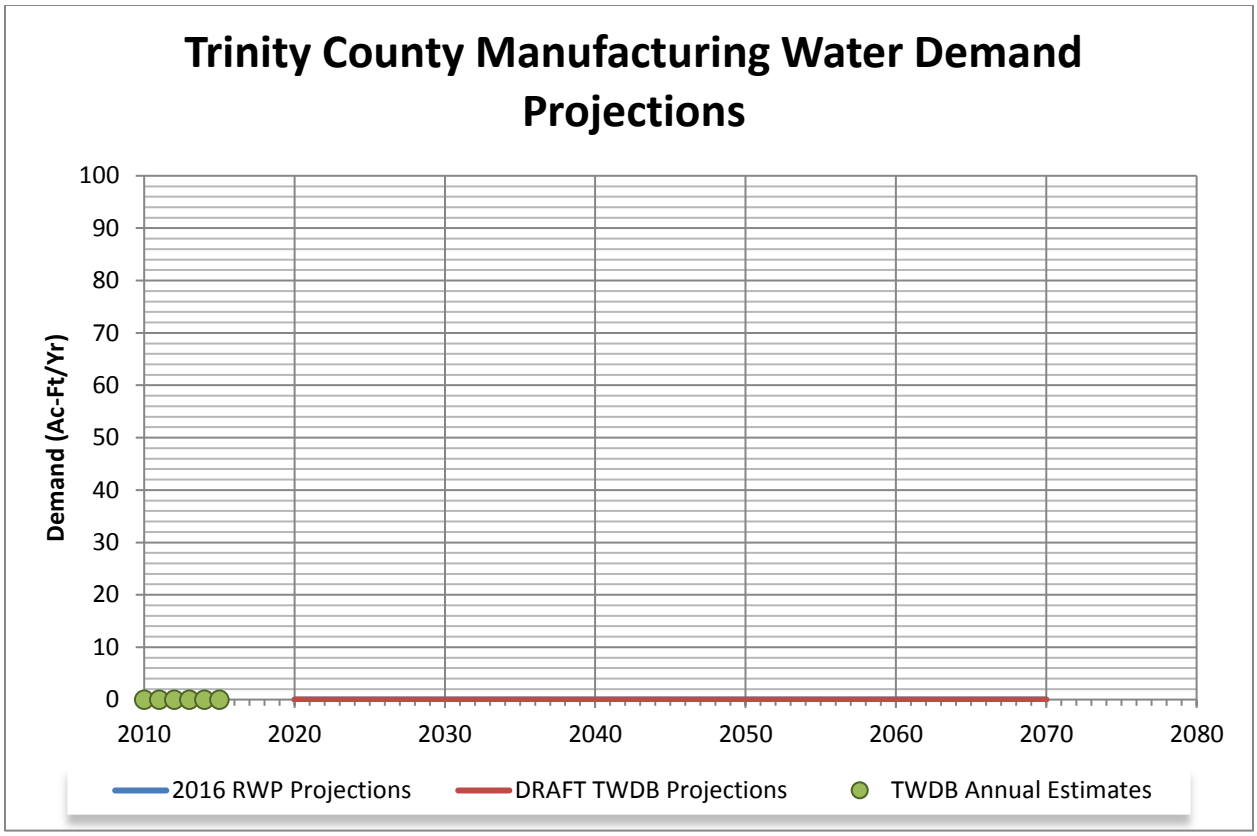


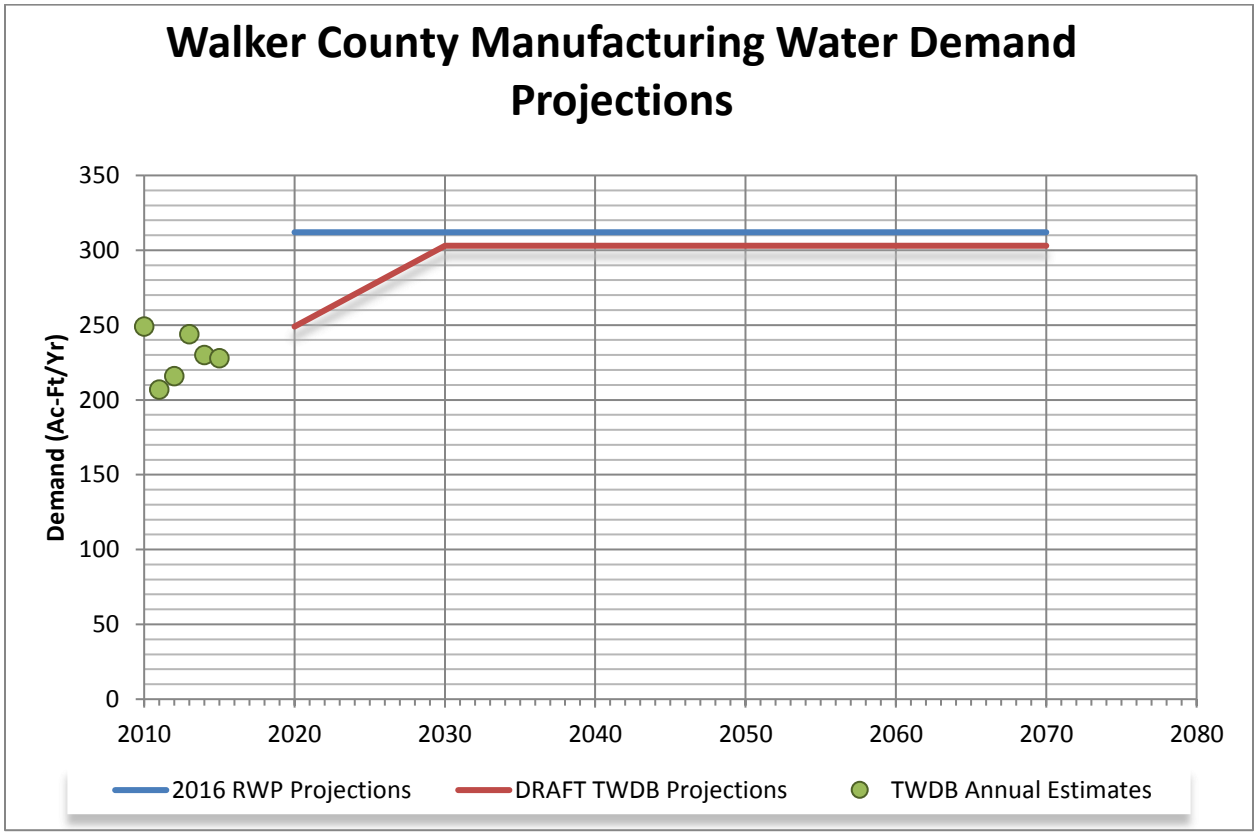
REGION H
Water Planning Group



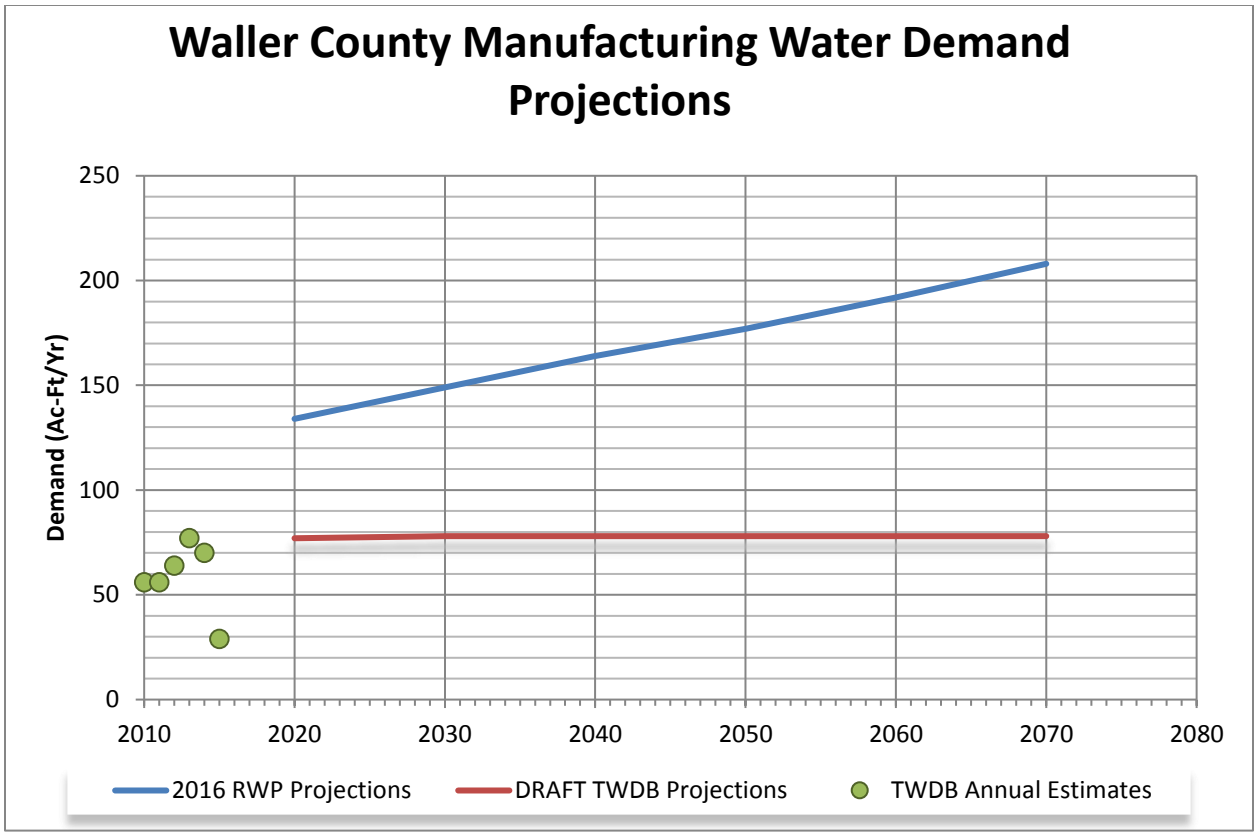


REGION H
Water Planning Group



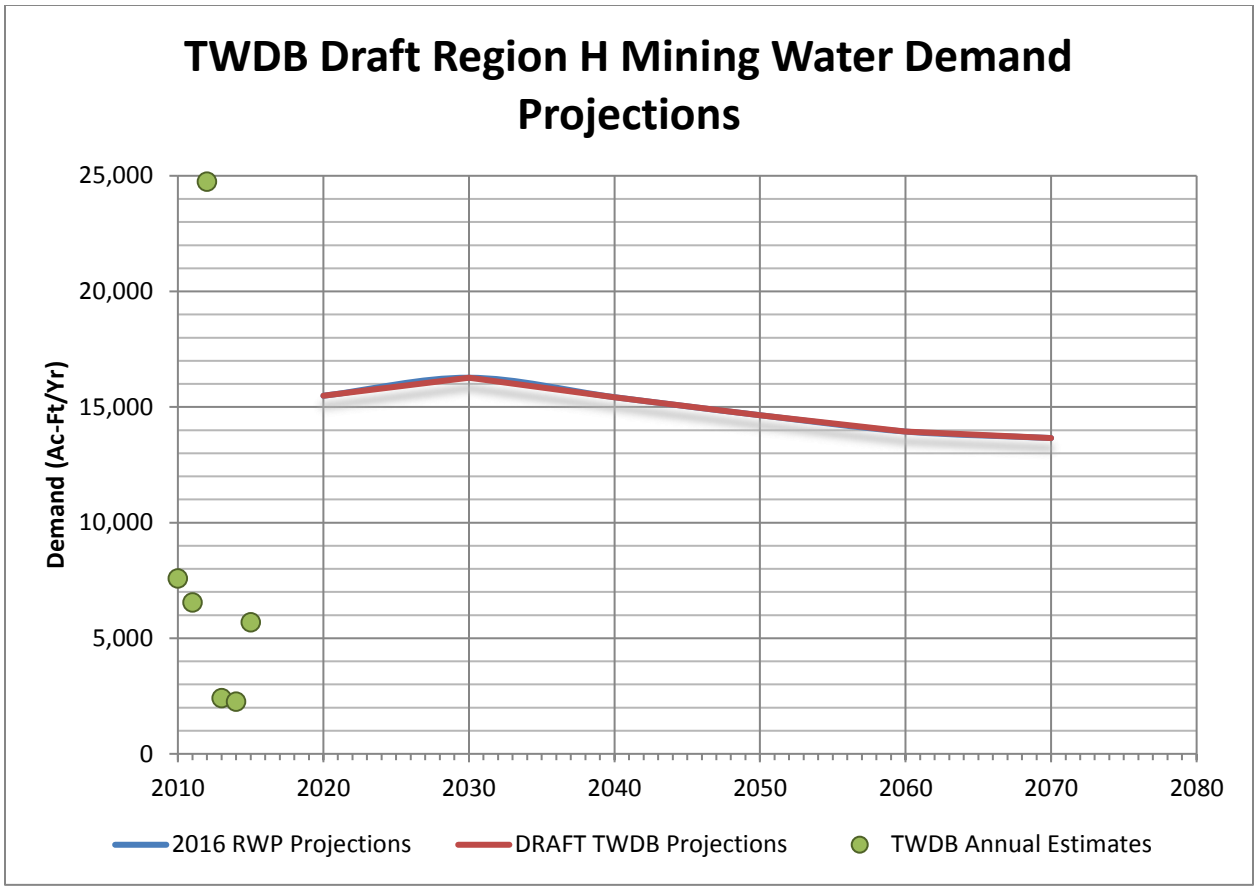


REGION H
Water Planning Group

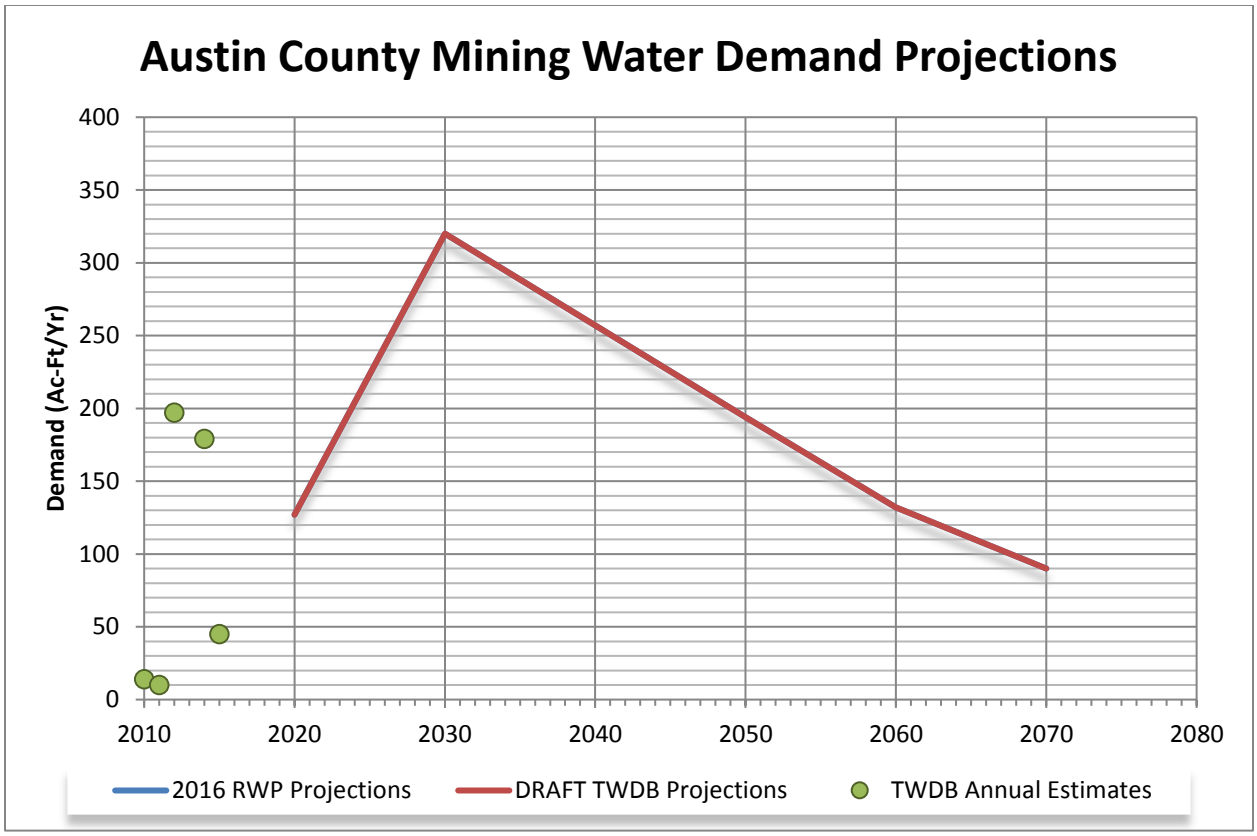

Waller County Manufacturing Water Demand Projections
Demand (Ac-Ft/Yr)
250
200
150
100
50
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

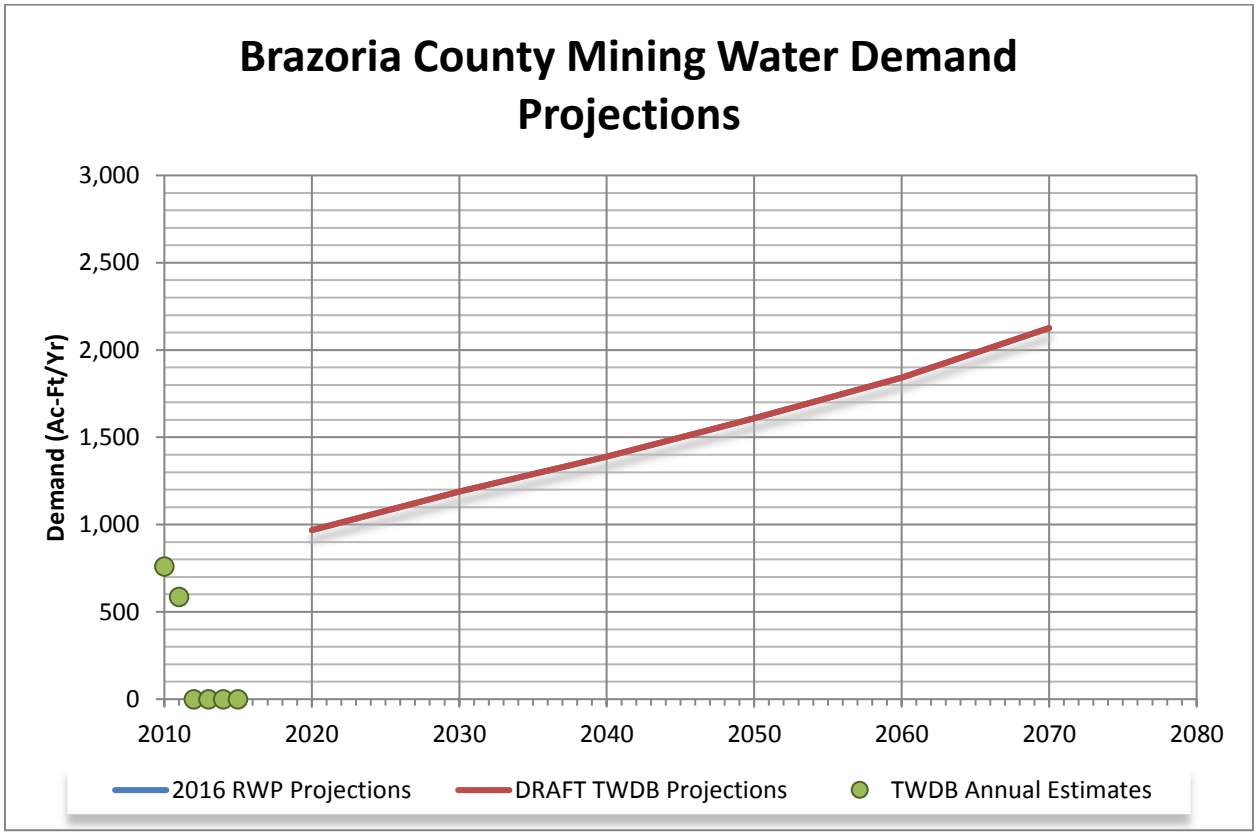
TWDB Draft 2021 RWP
Mining Water Demand
Projections for Region H

REGION H
Water Planning Group

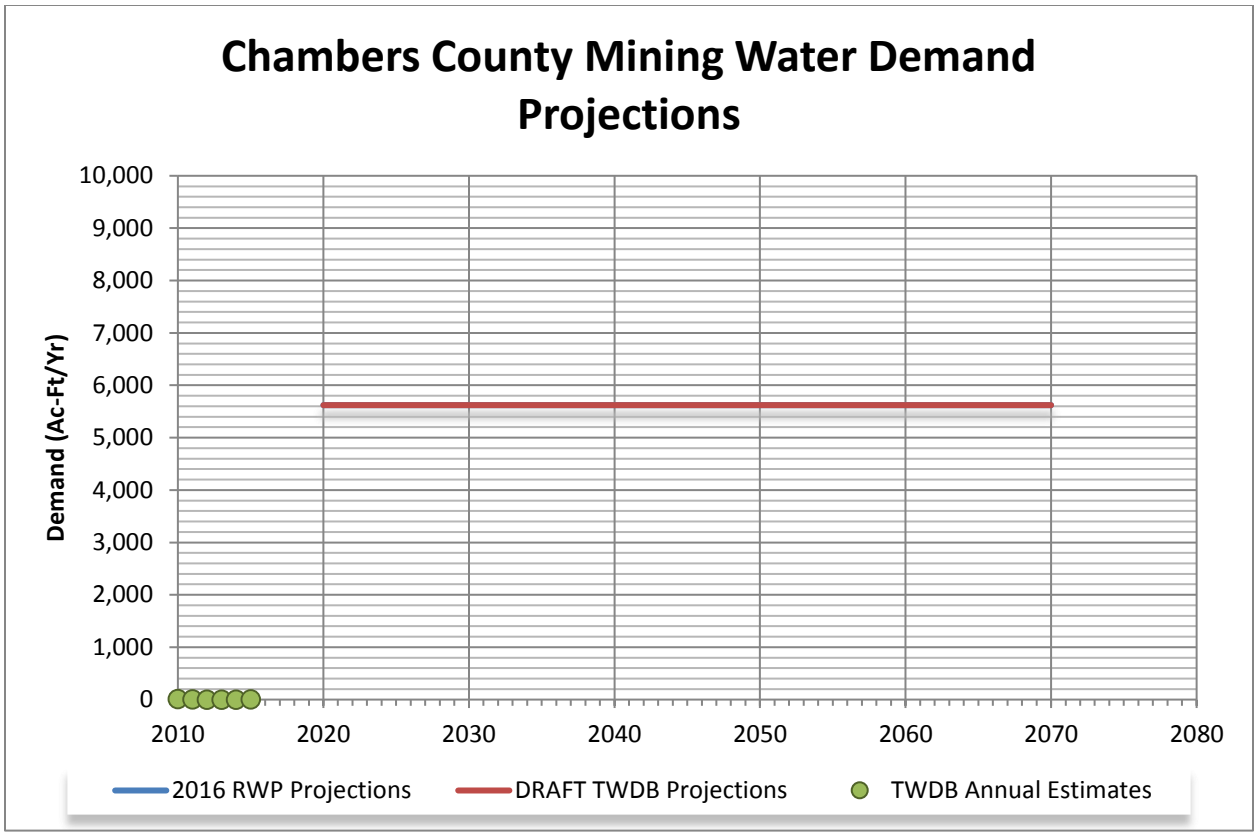


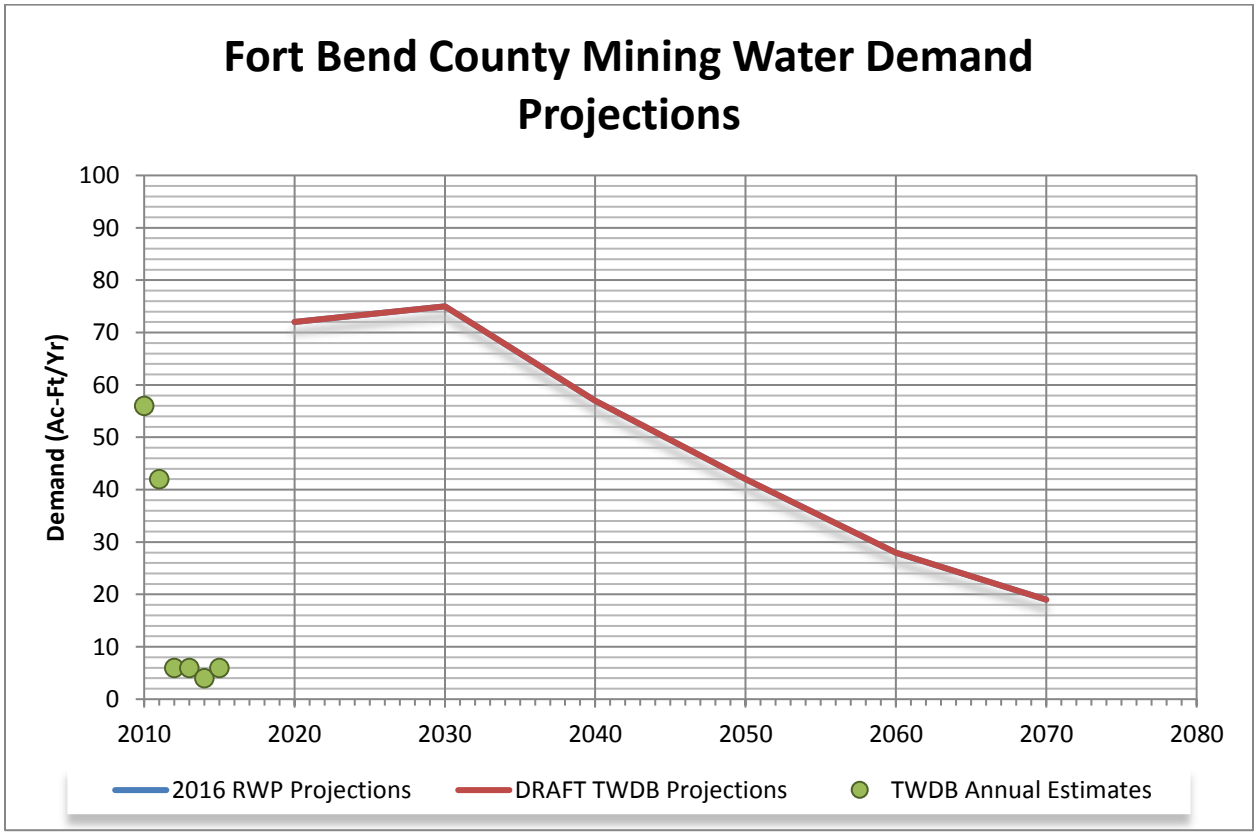
County	TWDB Draft Region H Mining Water Demand Projections (ac-ft)					
	2020	2030	2040	2050	2060	2070
Austin	127	320	257	194	132	90
Brazoria	968	1,189	1,389	1,609	1,842	2,126
Chambers	5,621	5,621	5,621	5,621	5,621	5,621
Fort Bend	72	75	57	42	28	19
Galveston	381	408	450	486	520	555
Harris	3,273	3,252	3,194	3,159	3,132	3,110
Leon	2,402	2,481	2,077	1,530	985	634
Liberty	437	457	446	468	496	539
Madison	597	972	754	538	323	194
Montgomery	1,453	1,363	1,077	921	806	728
Polk	124	98	72	46	21	9
San Jacinto	8	8	9	9	9	9
Trinity	5	5	5	5	5	5
Walker	11	11	11	11	11	11
Waller	7	7	7	7	7	7
Total	**15,486**	**16,267**	**15,426**	**14,646**	**13,938**	**13,657**

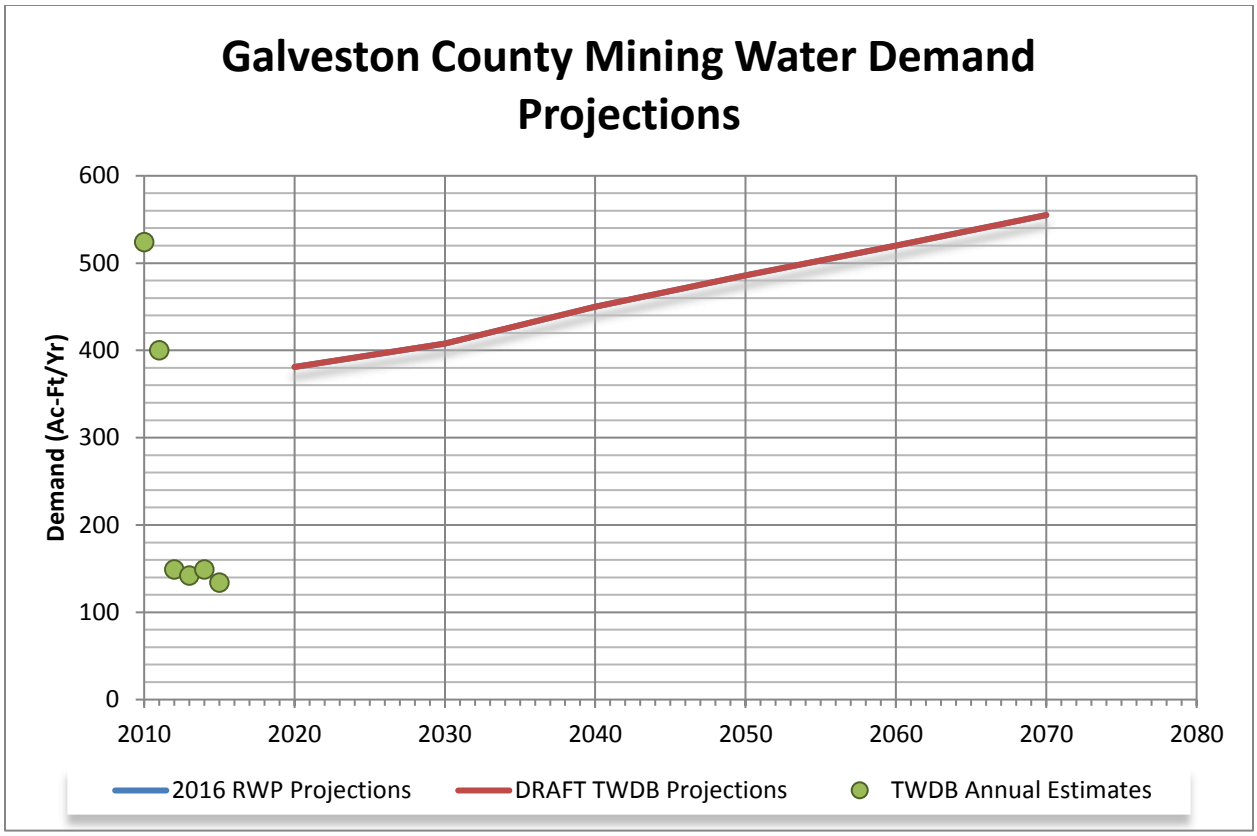


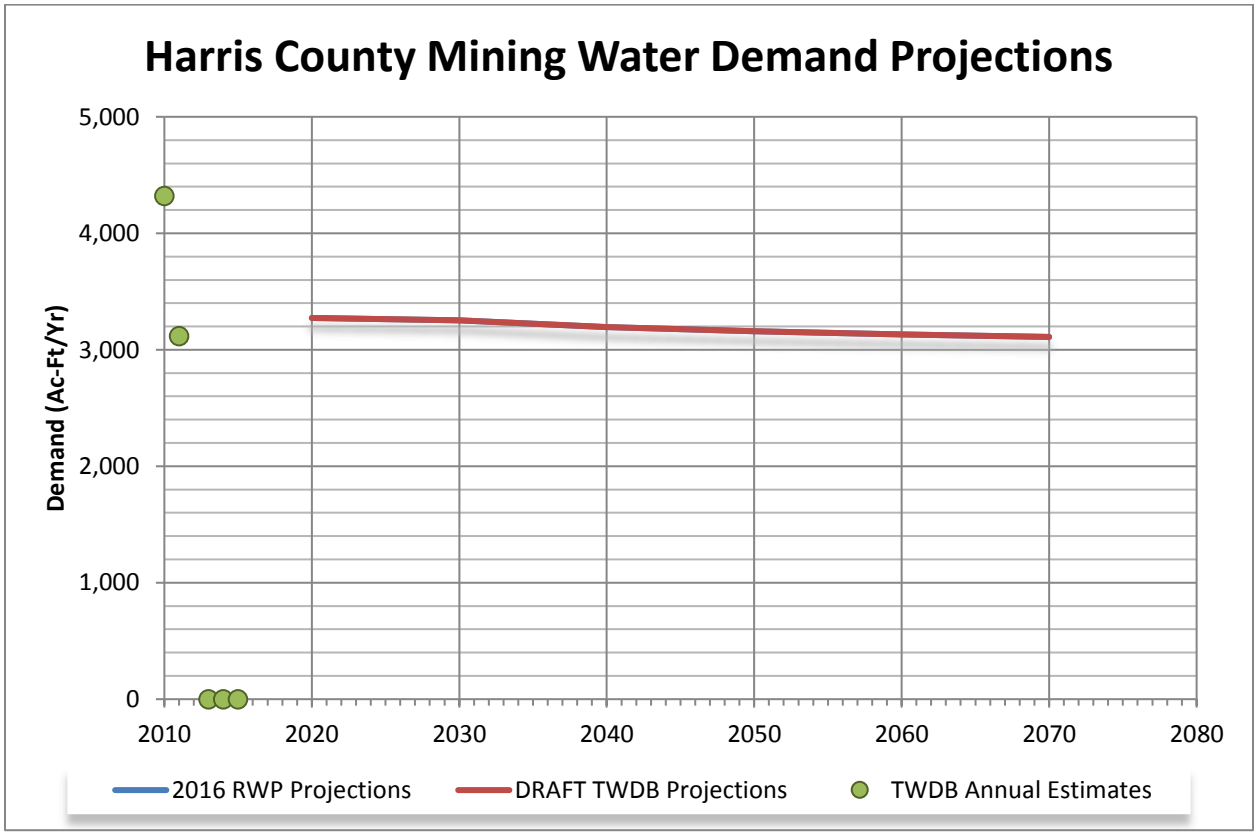


REGION H
Water Planning Group

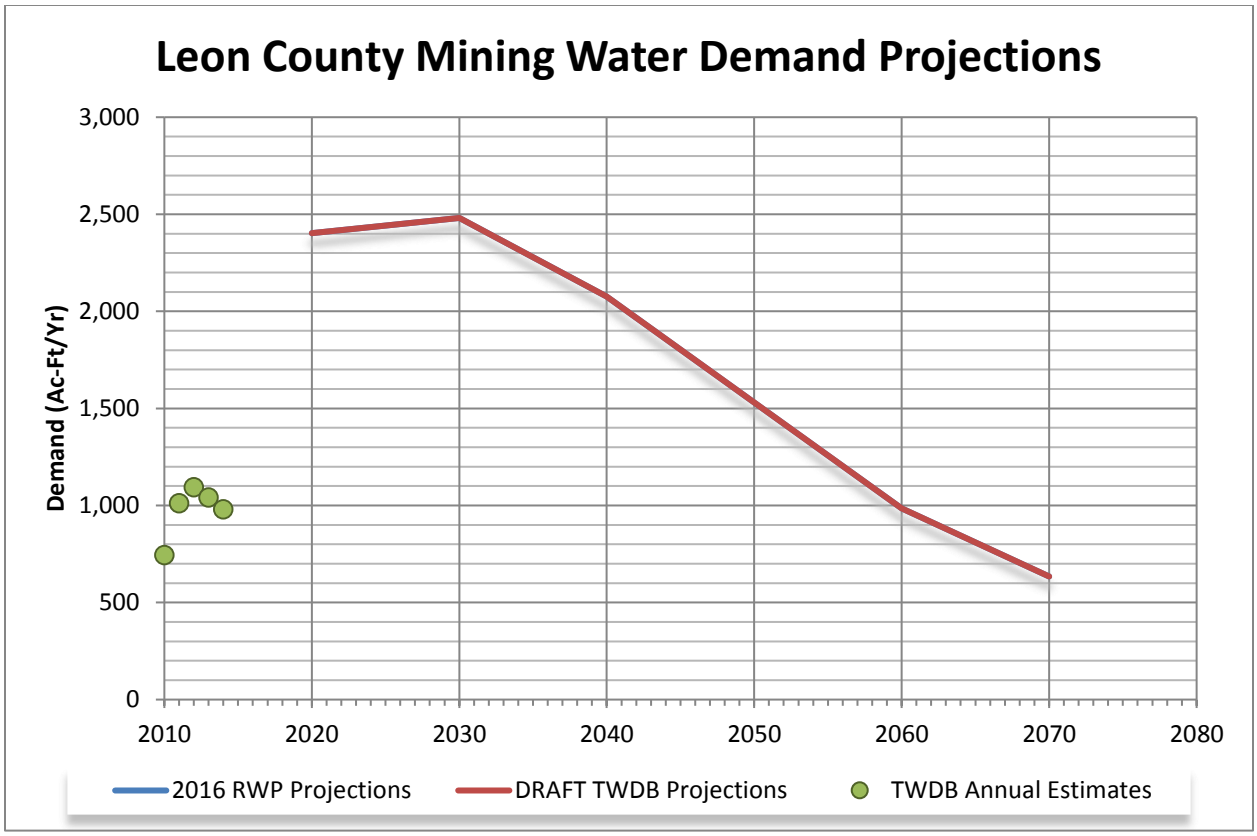

Chambers County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

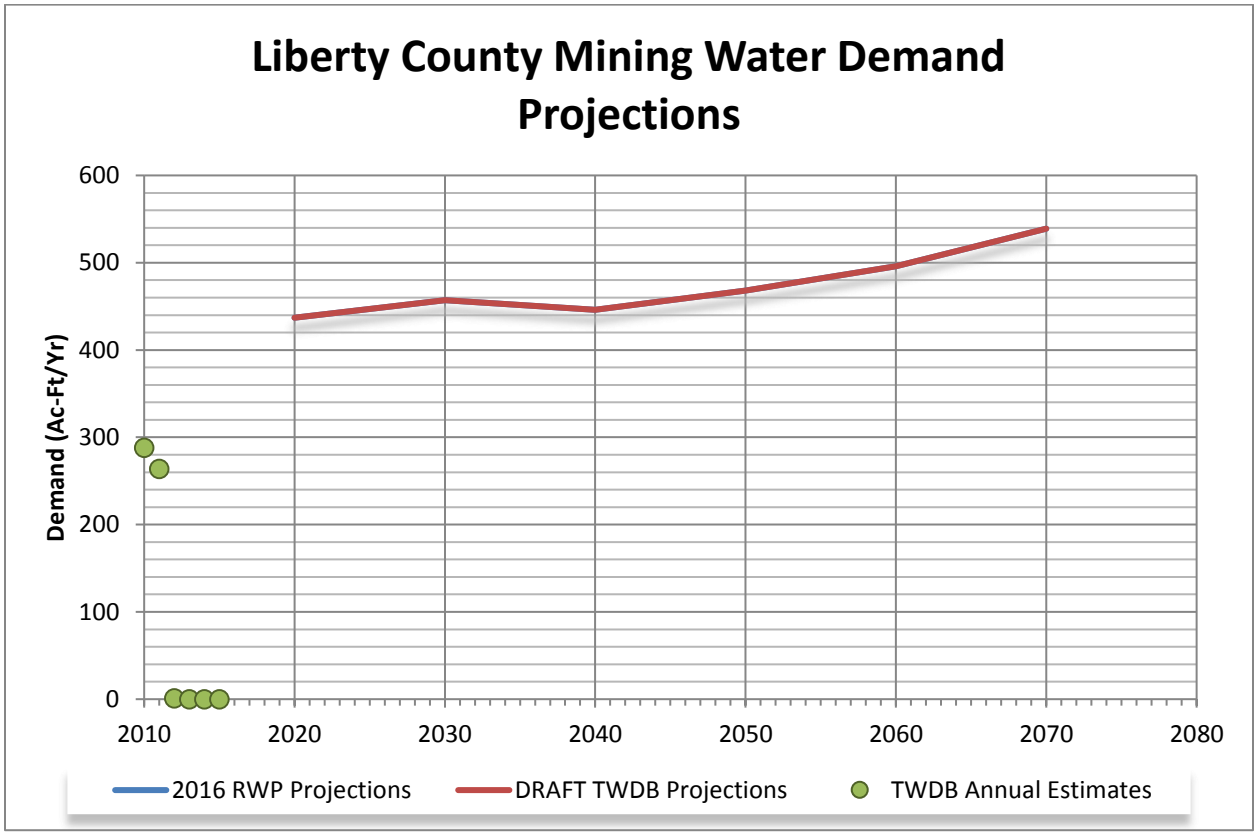

Fort Bend County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

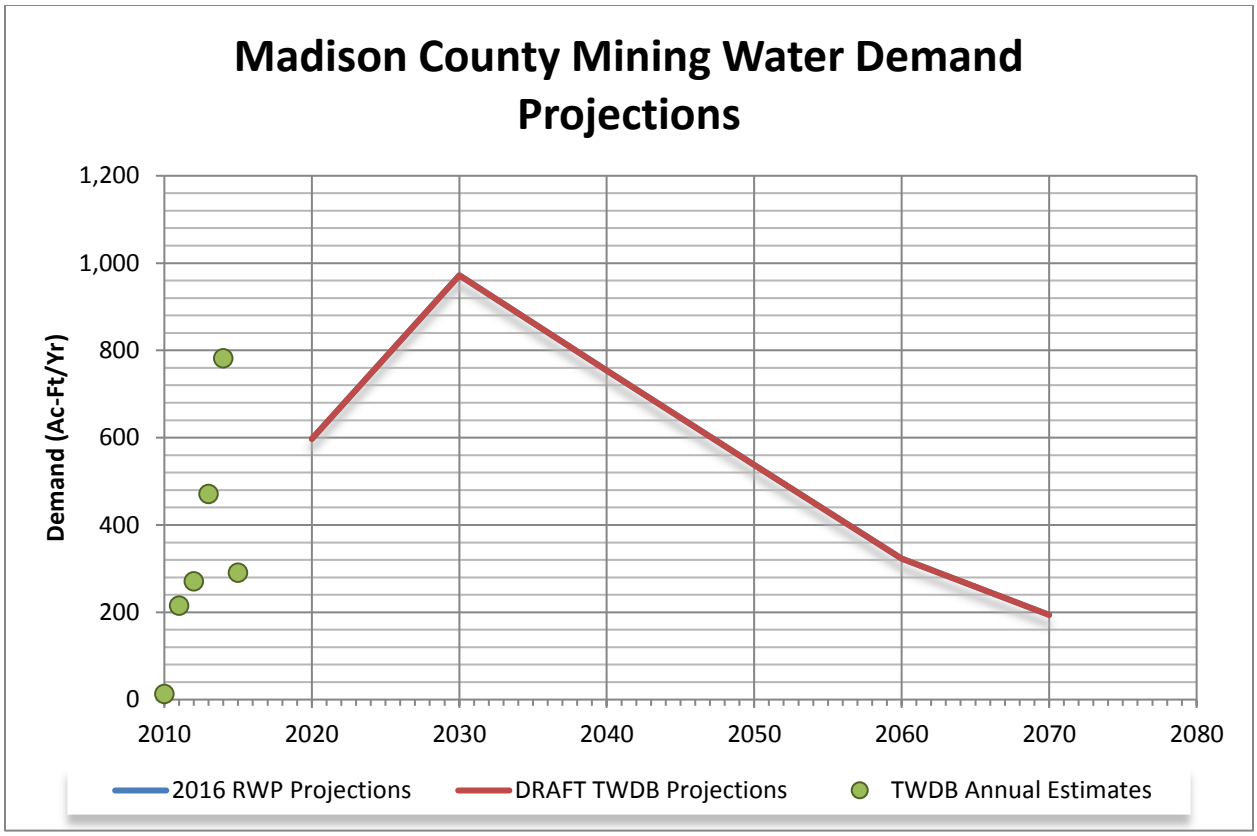


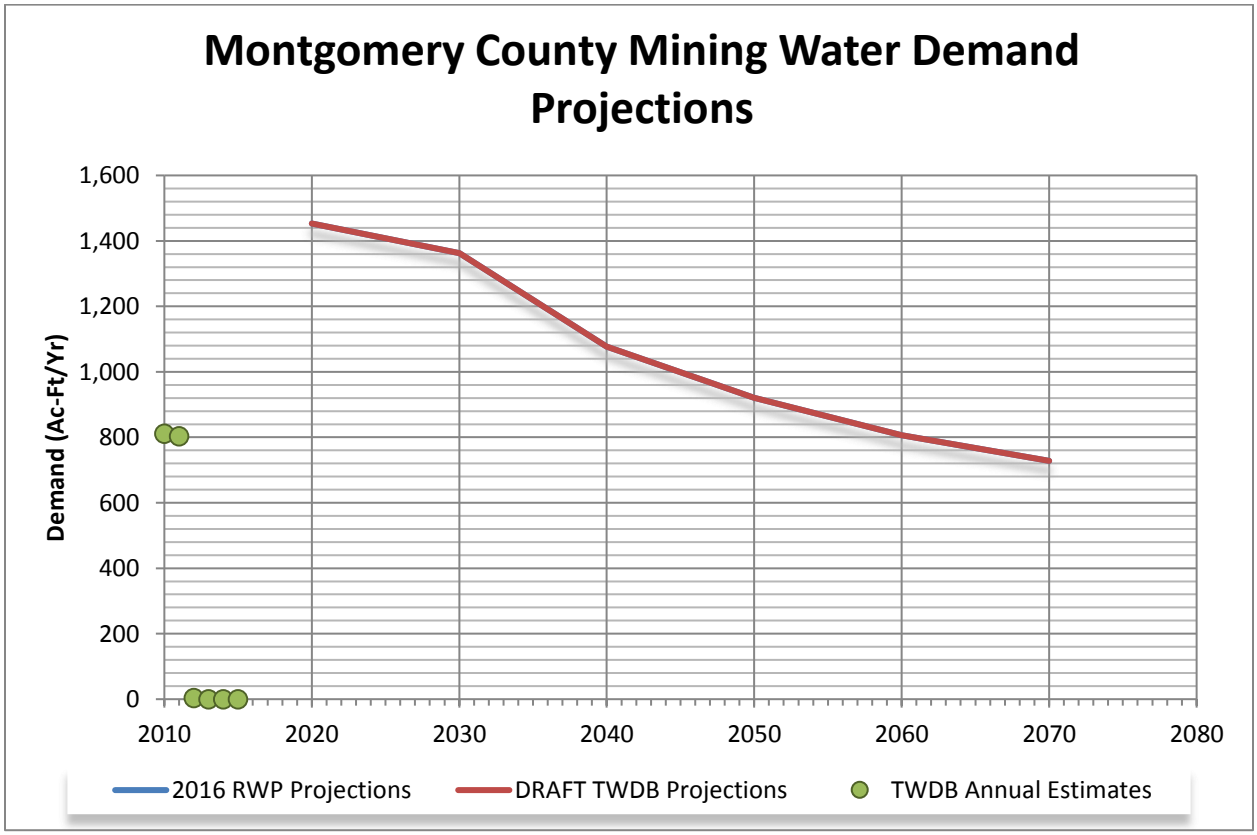


REGION H
Water Planning Group

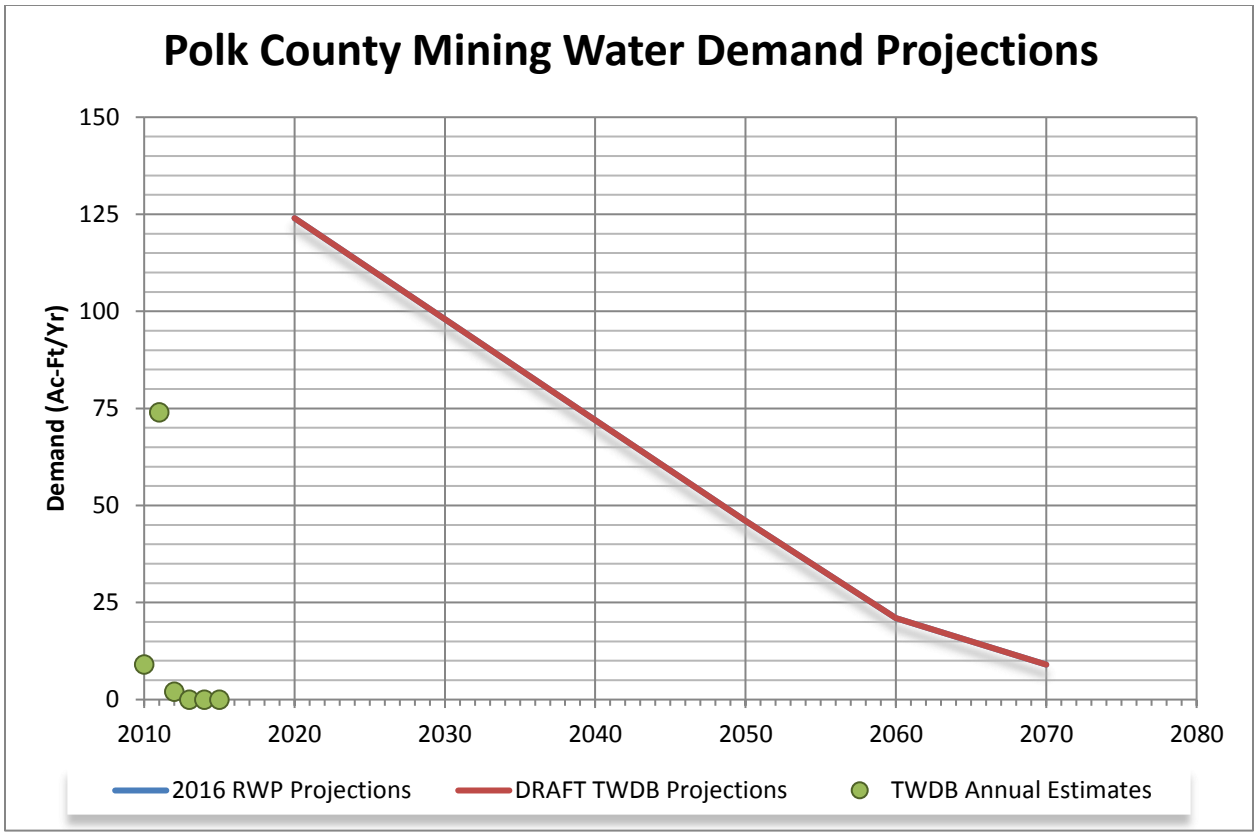

Leon County Mining Water Demand Projections
3,000
2,500
2,000
1,500
1,000
500
0
Demand (Ac-Ft/Yr)
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

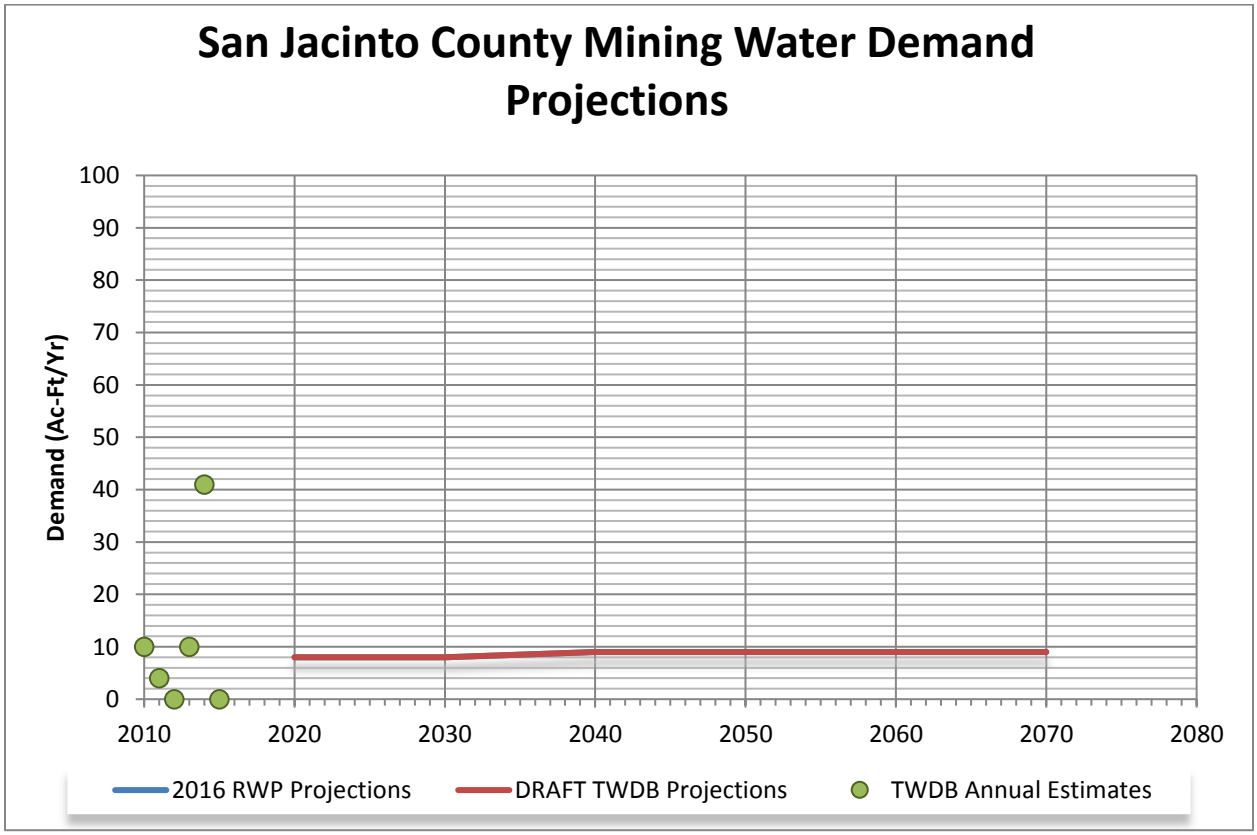

Liberty County Mining Water Demand Projections
600
500
400
300
200
100
0
Demand (Ac-Ft/Yr)
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

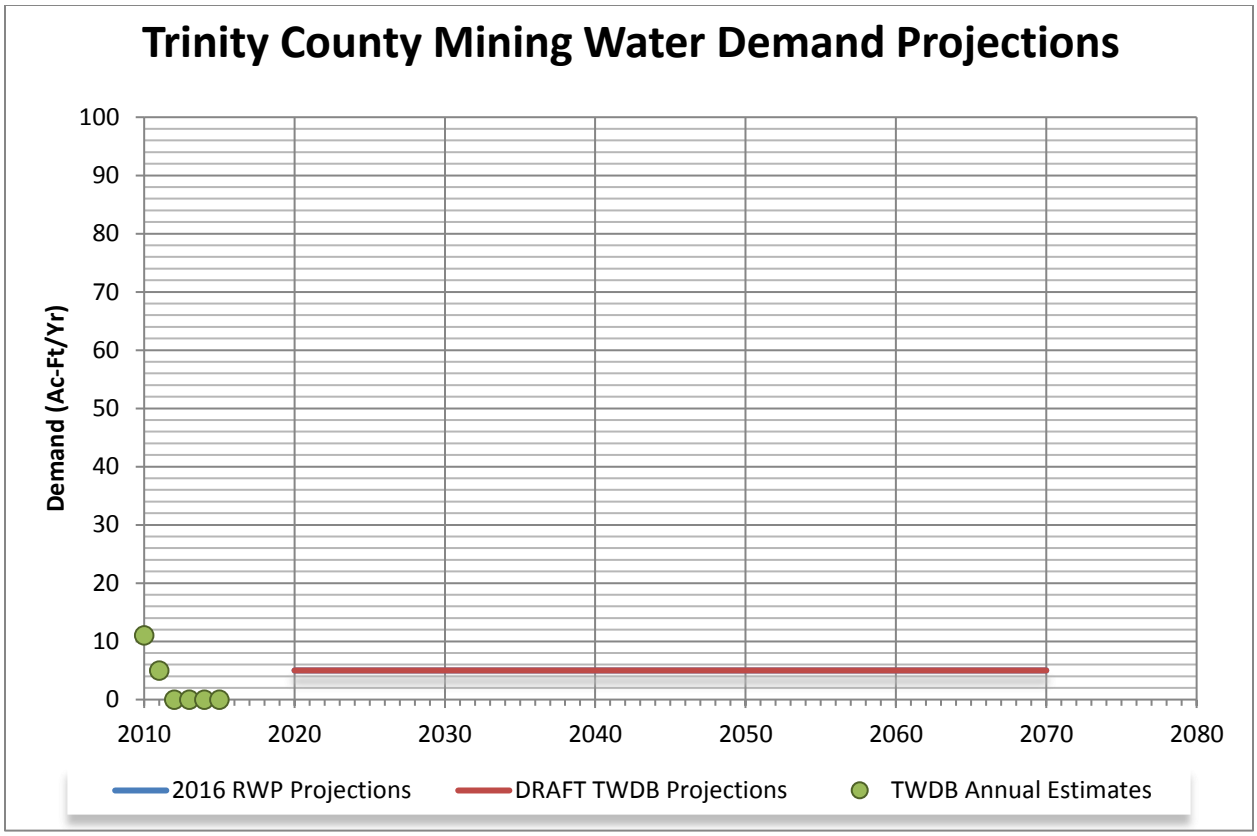


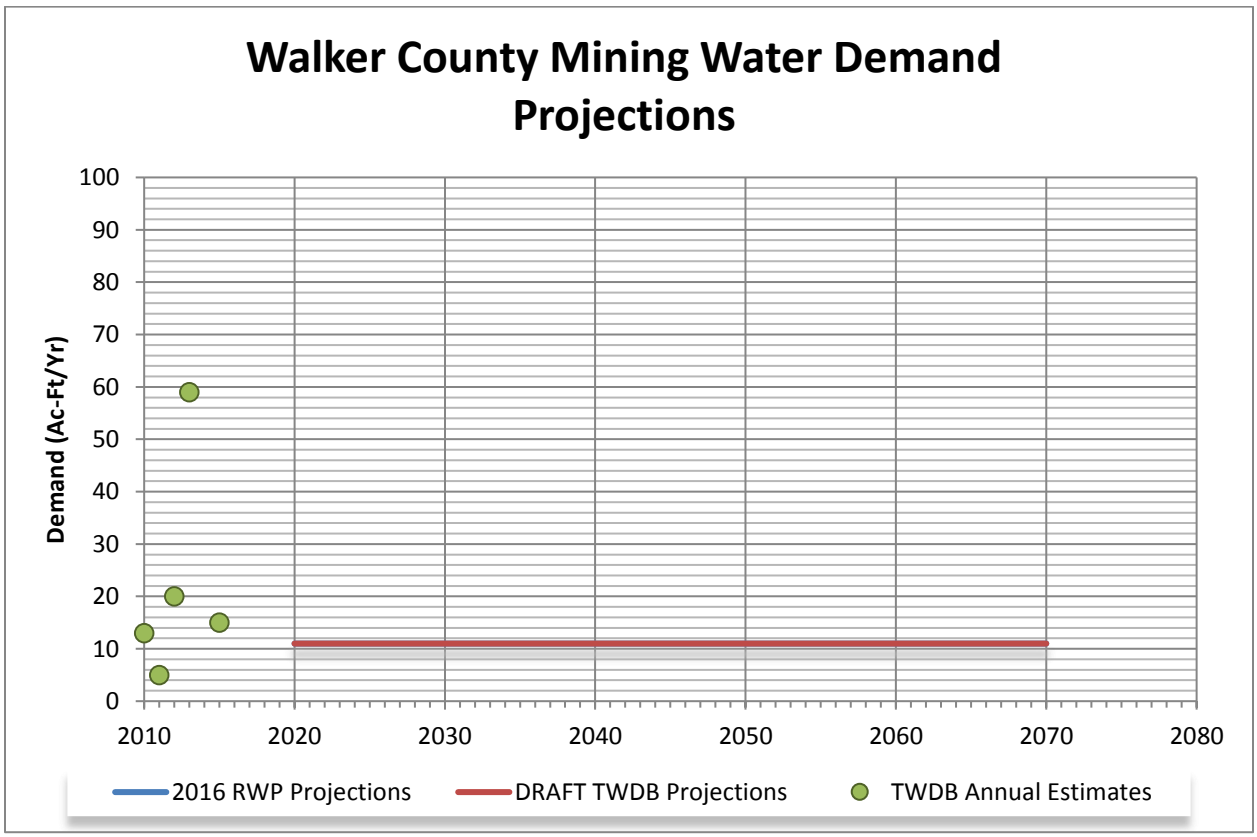


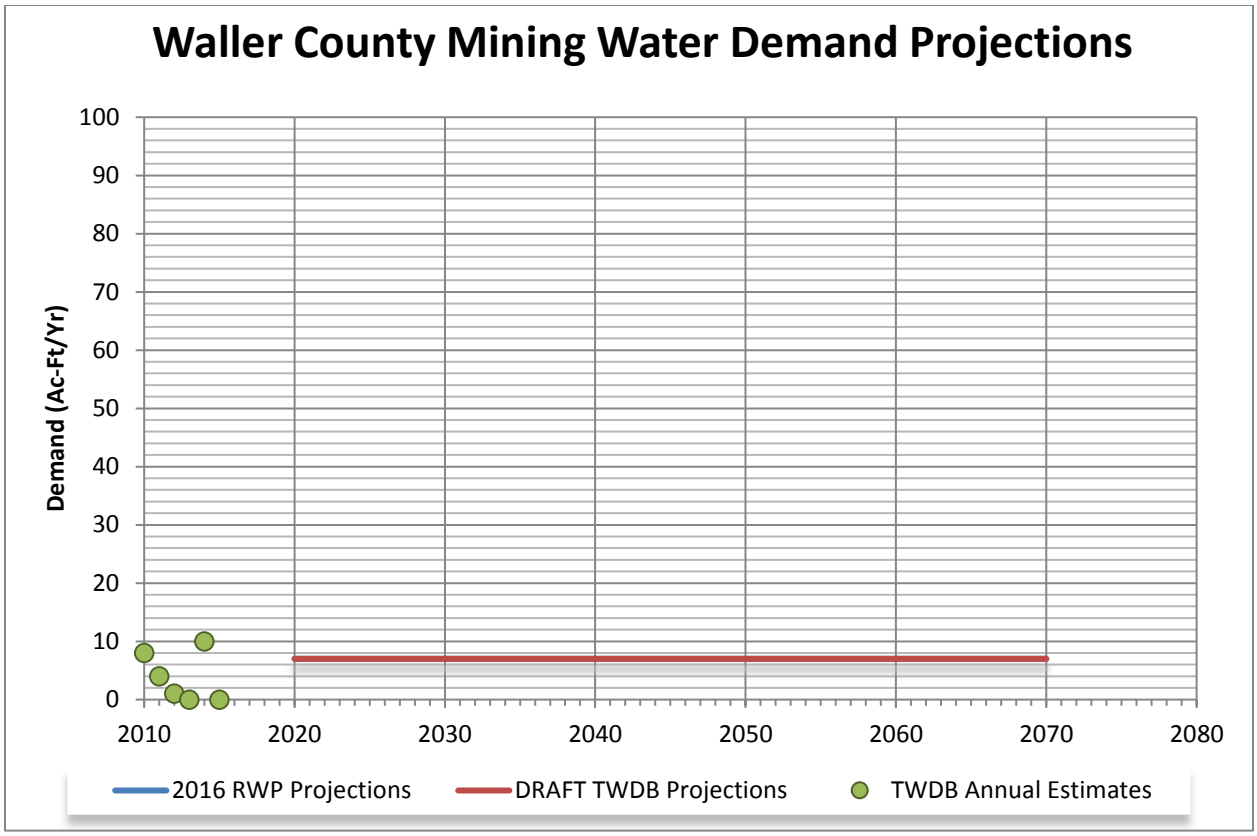
REGION H
Water Planning Group


Polk County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
150
125
100
75
50
25
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


San Jacinto County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

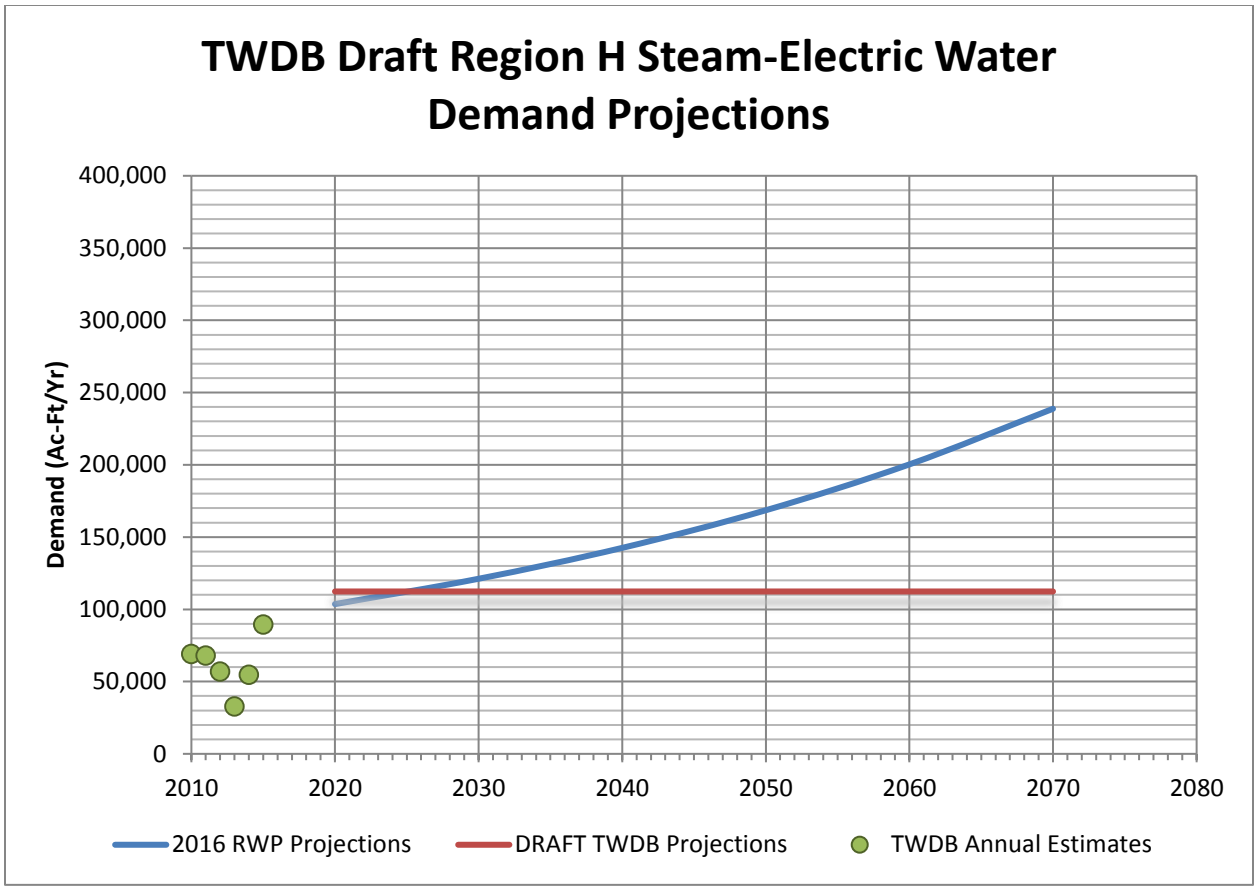

Trinity County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


Walker County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

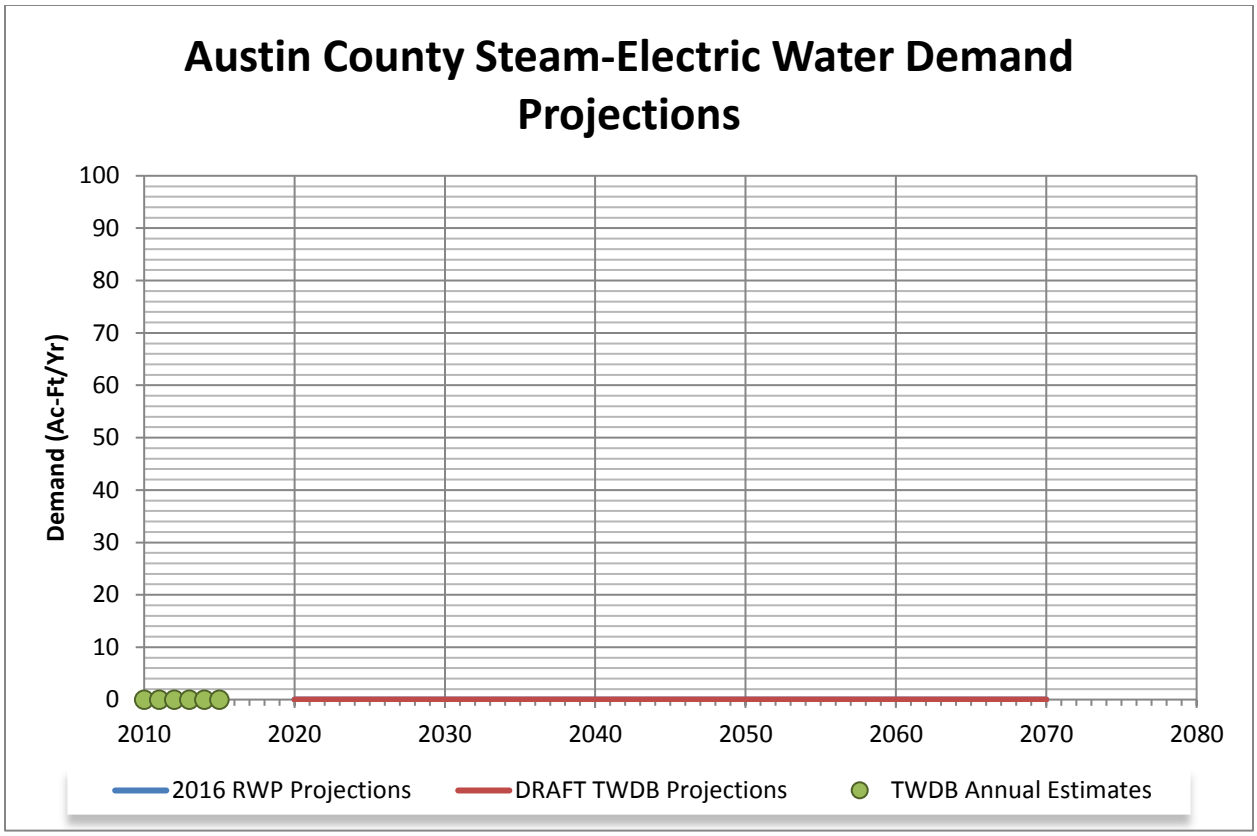

Waller County Mining Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

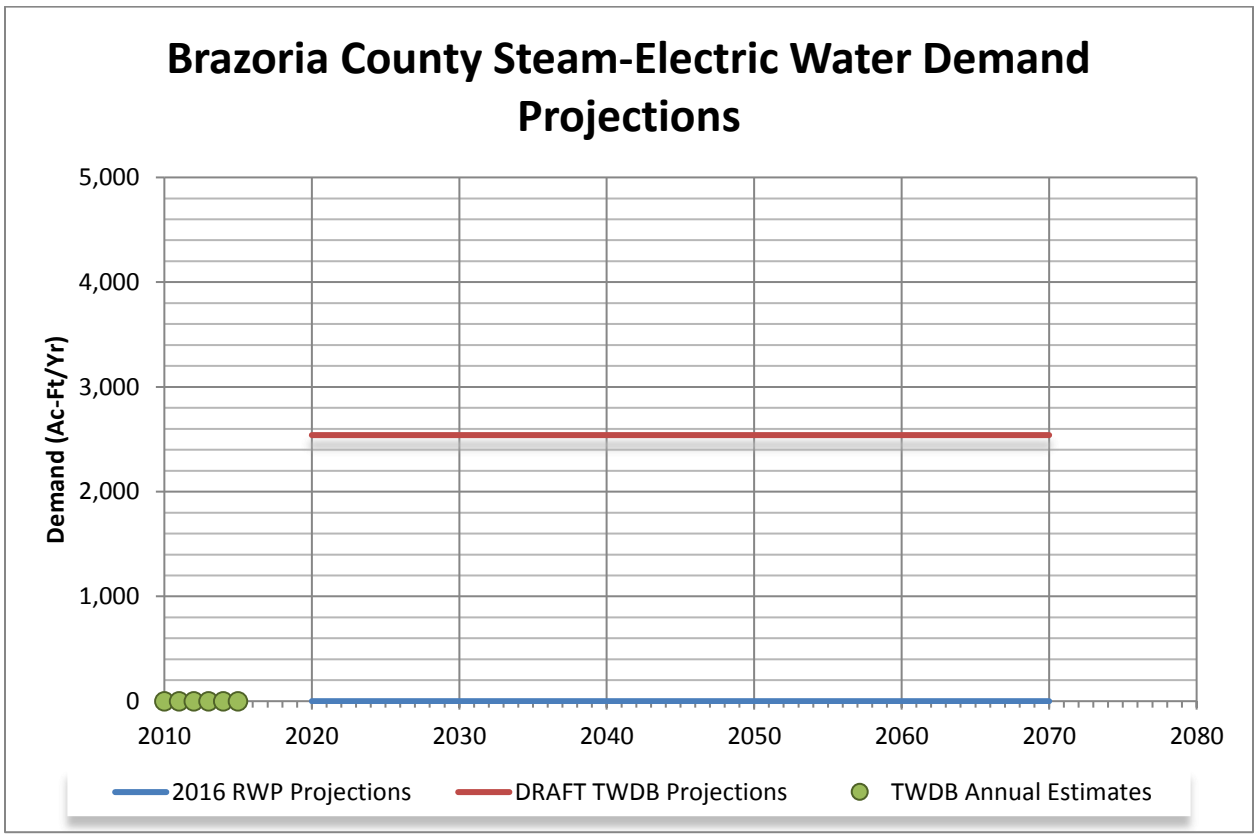
TWDB Draft 2021 RWP
Steam-Electric Power Water Demand Projections for Region H

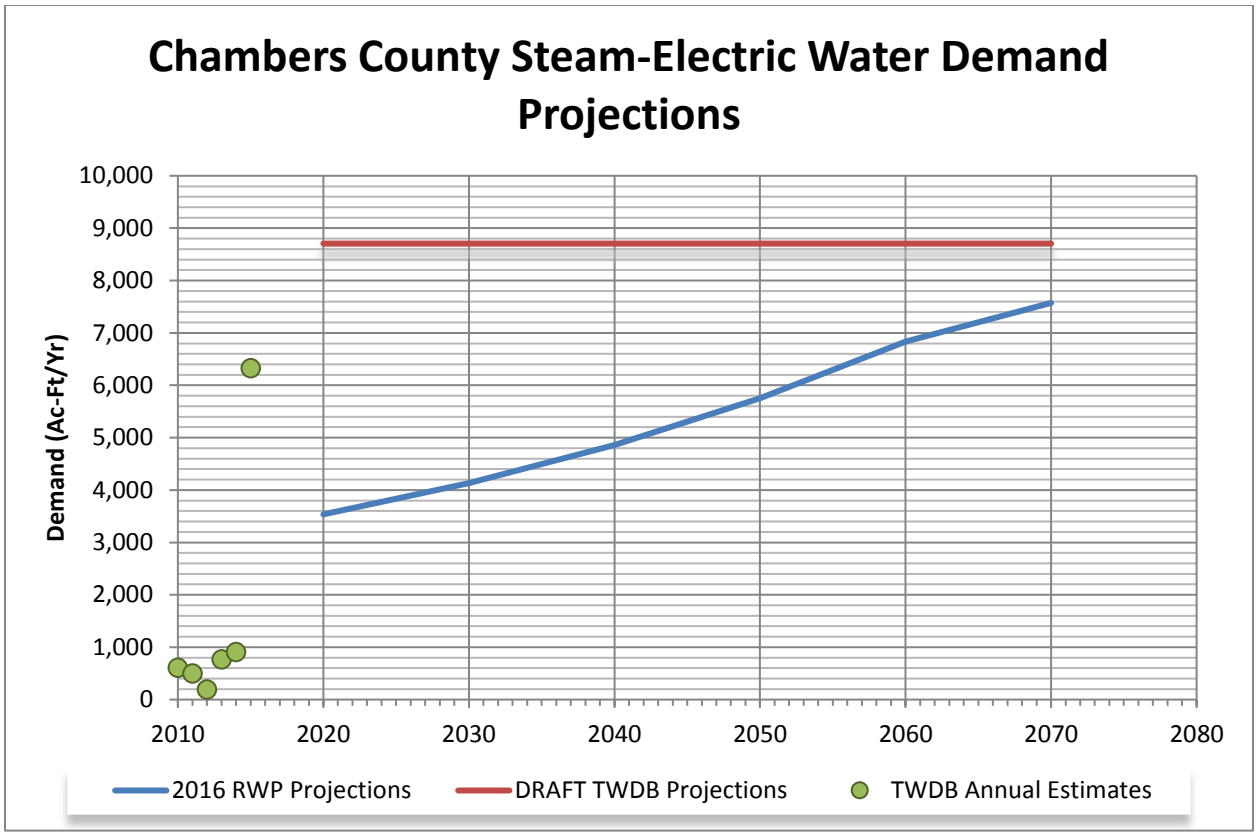
REGION H
Water Planning Group

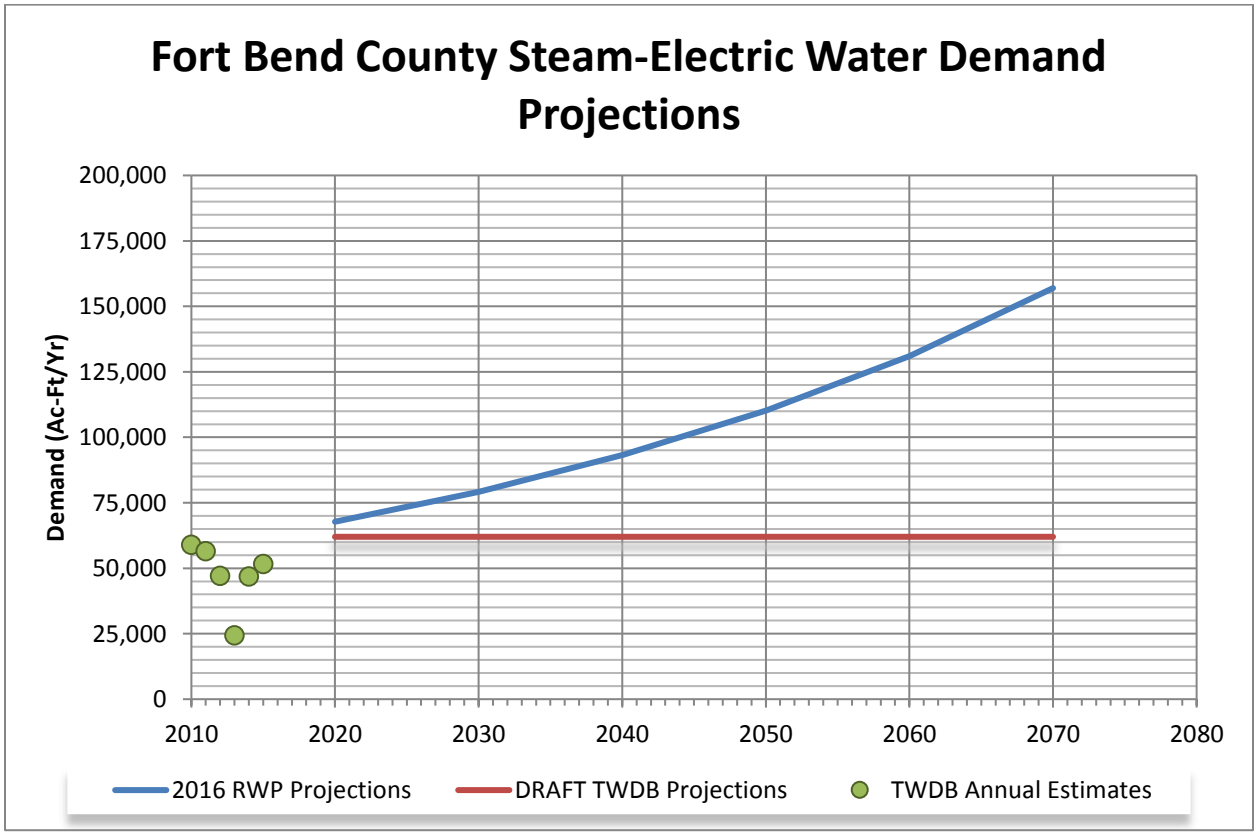


County	TWDB Draft Region H Steam-Electric Water Demand Projections (ac-ft)					
	2020	2030	2040	2050	2060	2070
Austin	-	-	-	-	-	-
Brazoria	2,540	2,540	2,540	2,540	2,540	2,540
Chambers	8,706	8,706	8,706	8,706	8,706	8,706
Fort Bend	62,017	62,017	62,017	62,017	62,017	62,017
Galveston	4,654	4,654	4,654	4,654	4,654	4,654
Harris	29,840	29,840	29,840	29,840	29,840	29,840
Leon	-	-	-	-	-	-
Liberty	-	-	-	-	-	-
Madison	-	-	-	-	-	-
Montgomery	4,597	4,597	4,597	4,597	4,597	4,597
Polk	-	-	-	-	-	-
San Jacinto	1	1	1	1	1	1
Trinity	-	-	-	-	-	-
Walker	-	-	-	-	-	-
Waller	-	-	-	-	-	-
Total	**112,355**	**112,355**	**112,355**	**112,355**	**112,355**	**112,355**

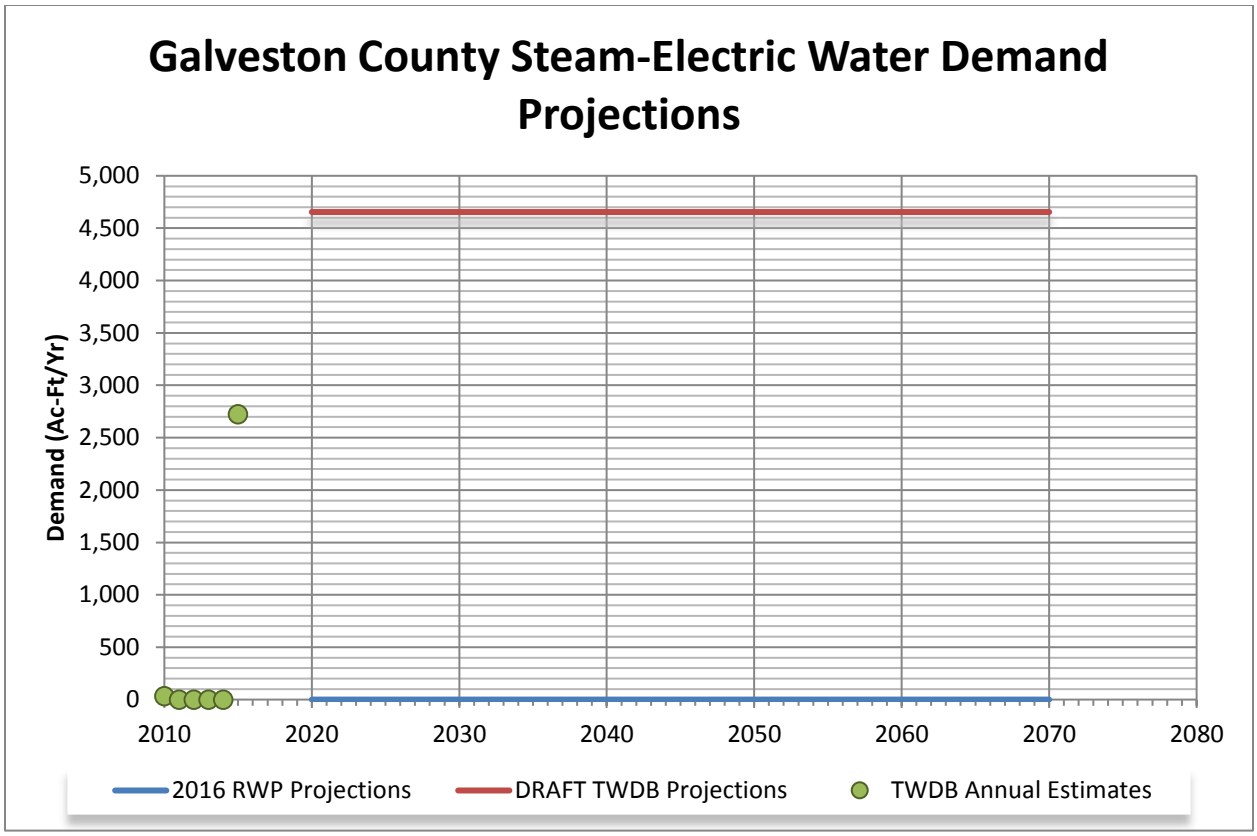

Austin County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

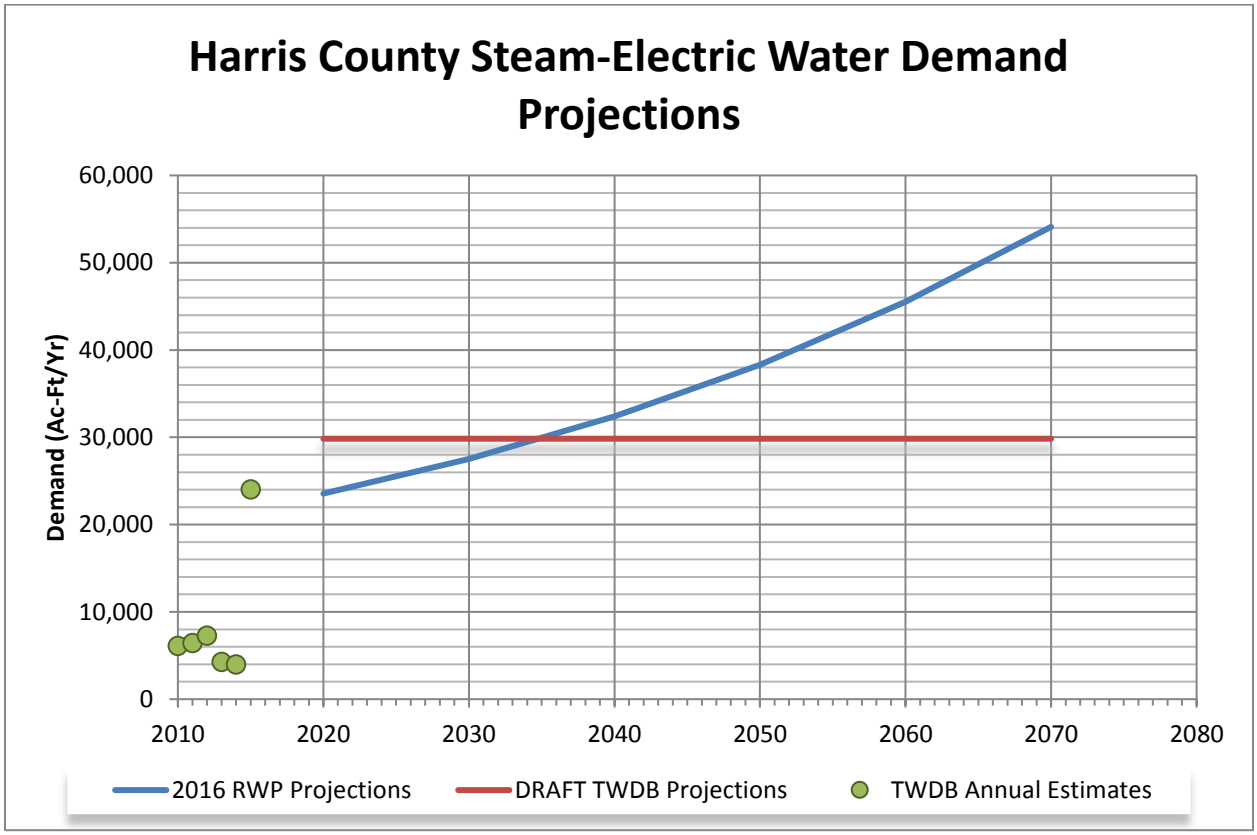

Brazoria County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
5,000
4,000
3,000
2,000
1,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates



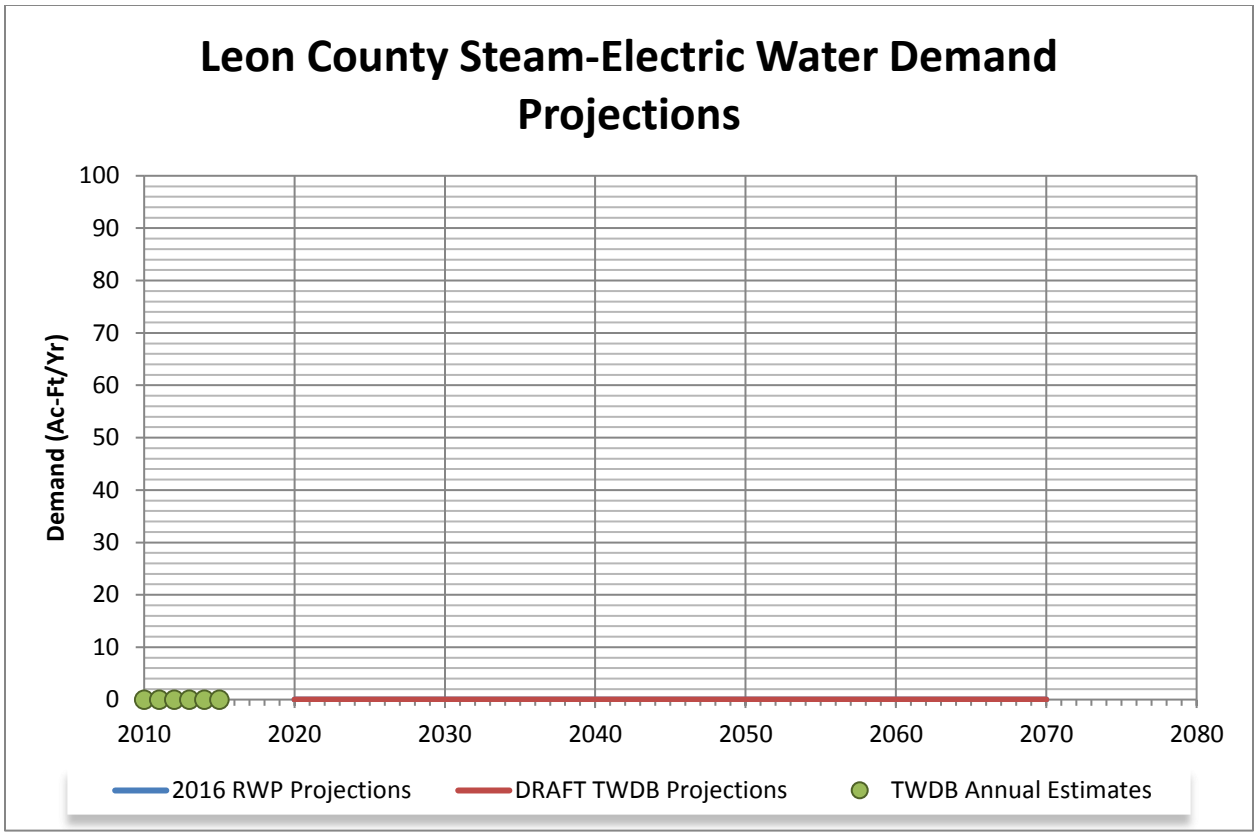


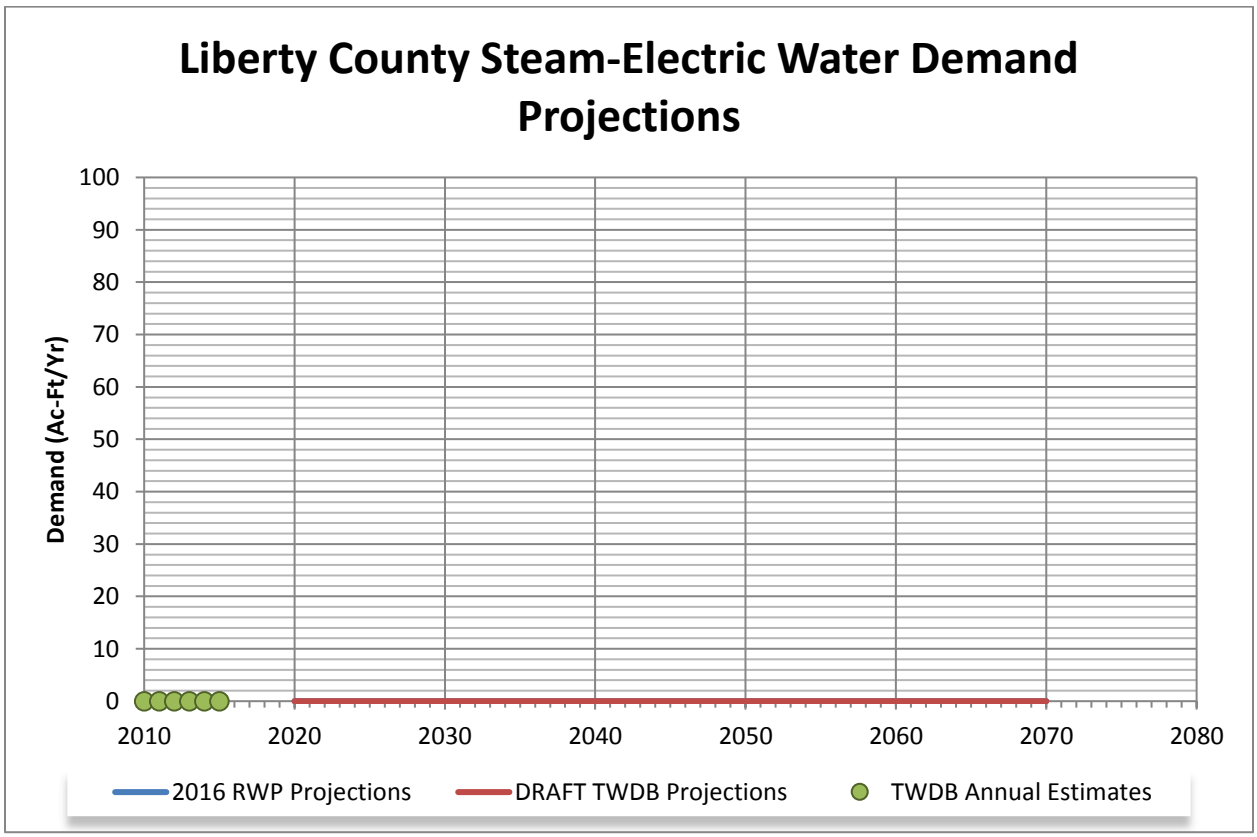
REGION H
Water Planning Group

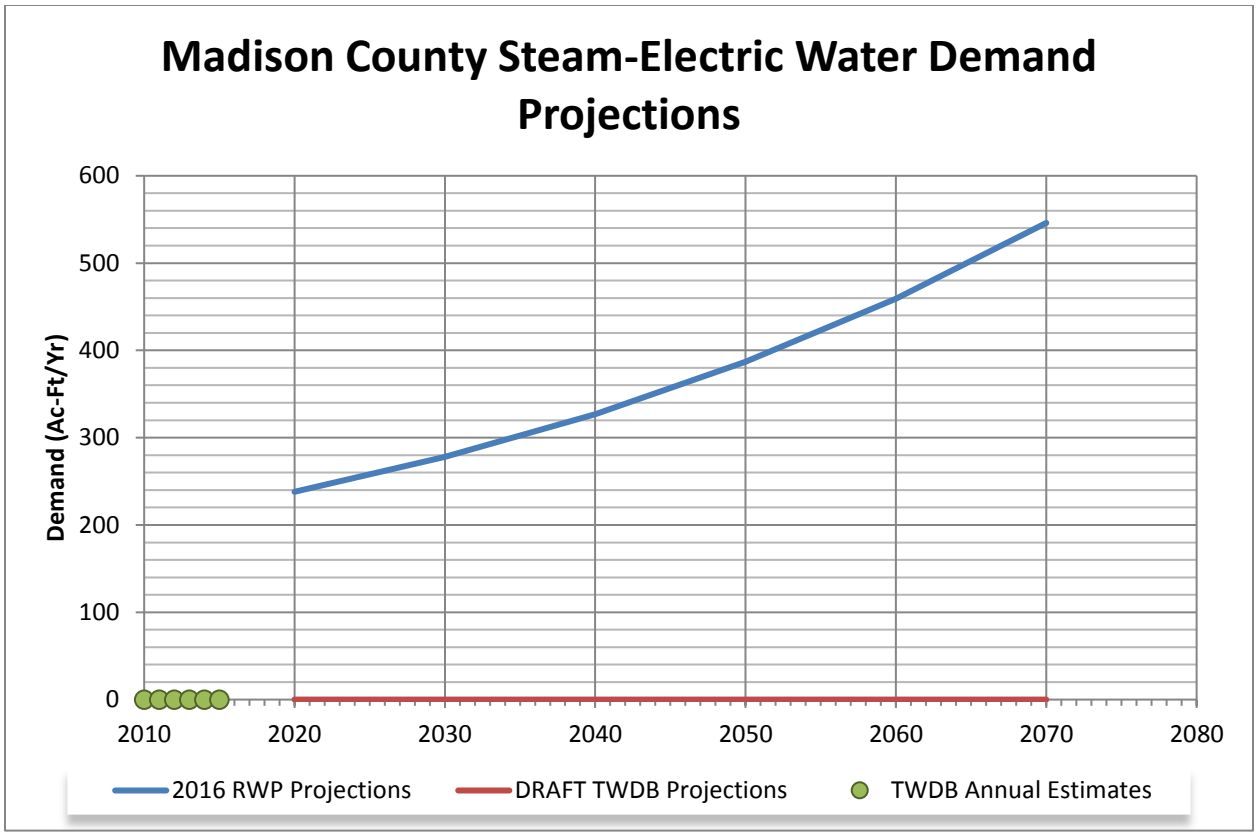


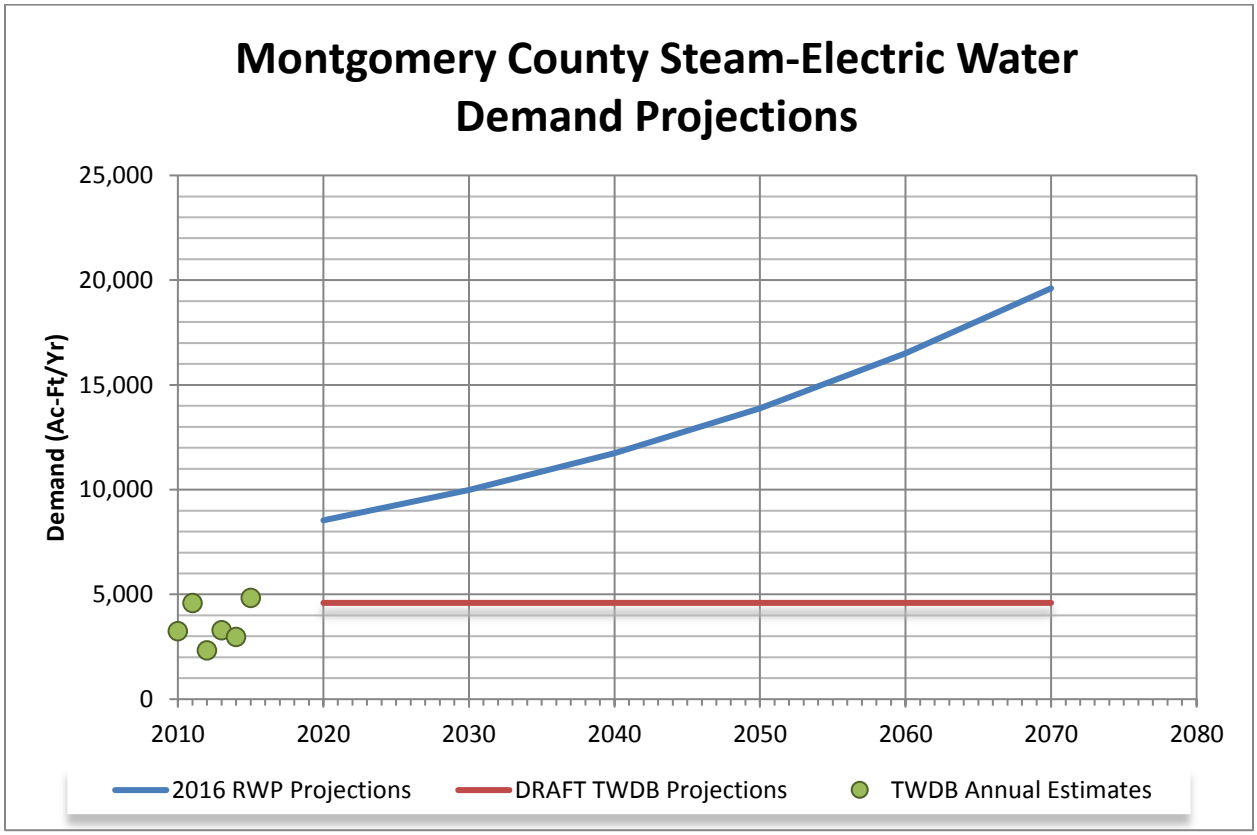


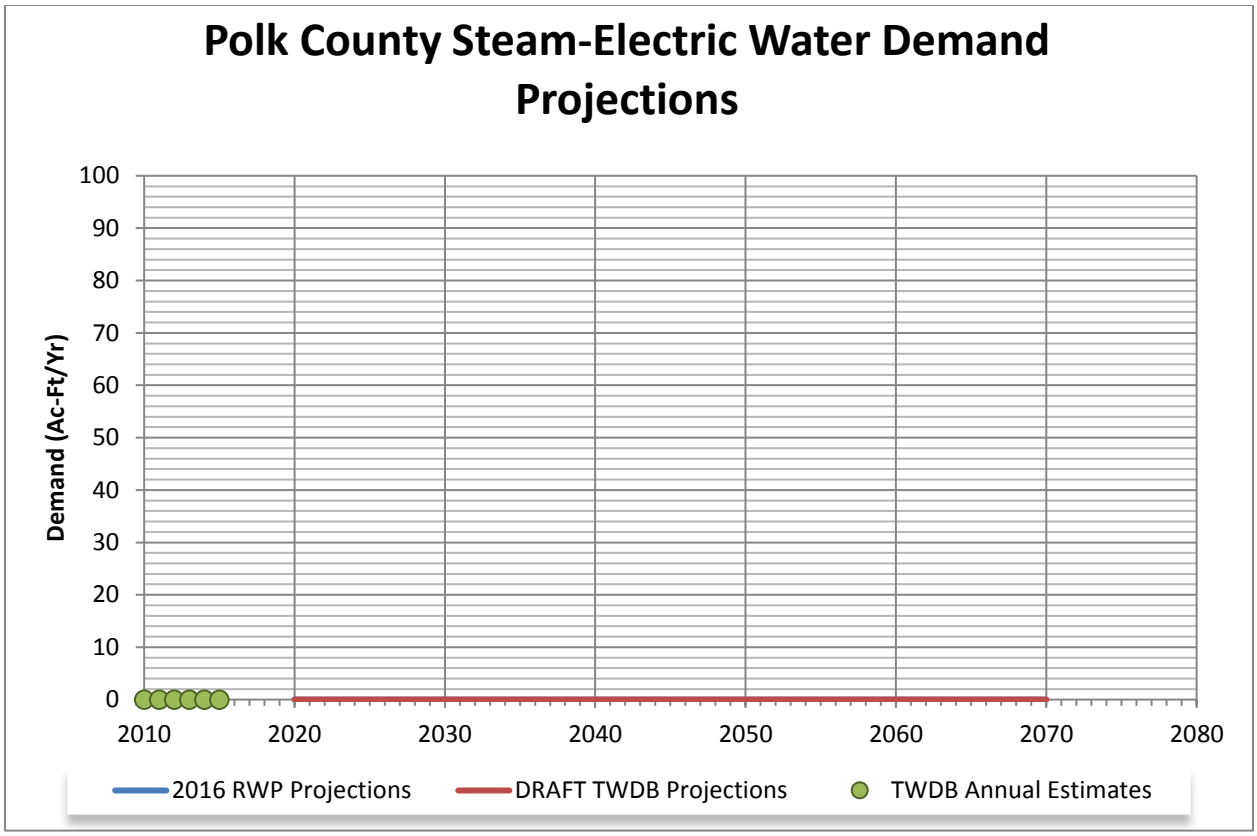
REGION H
Water Planning Group

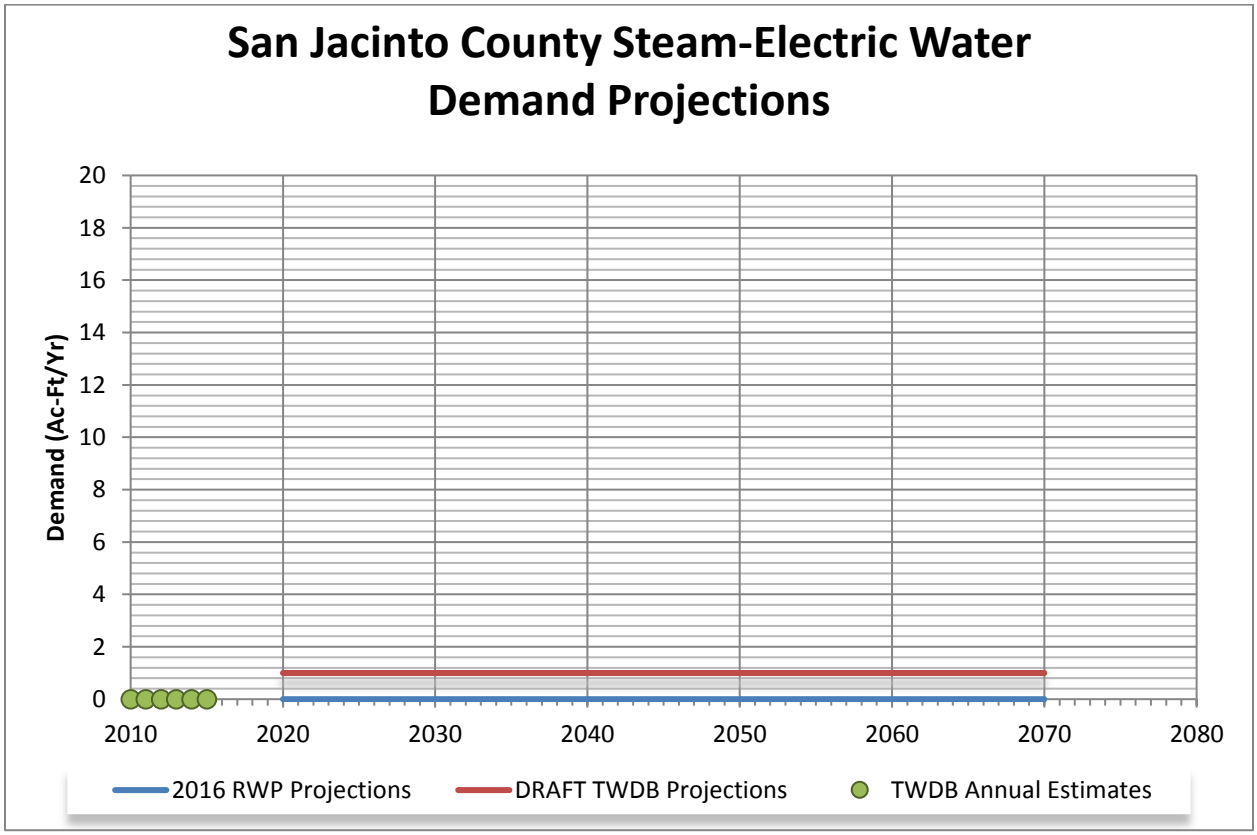

Leon County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

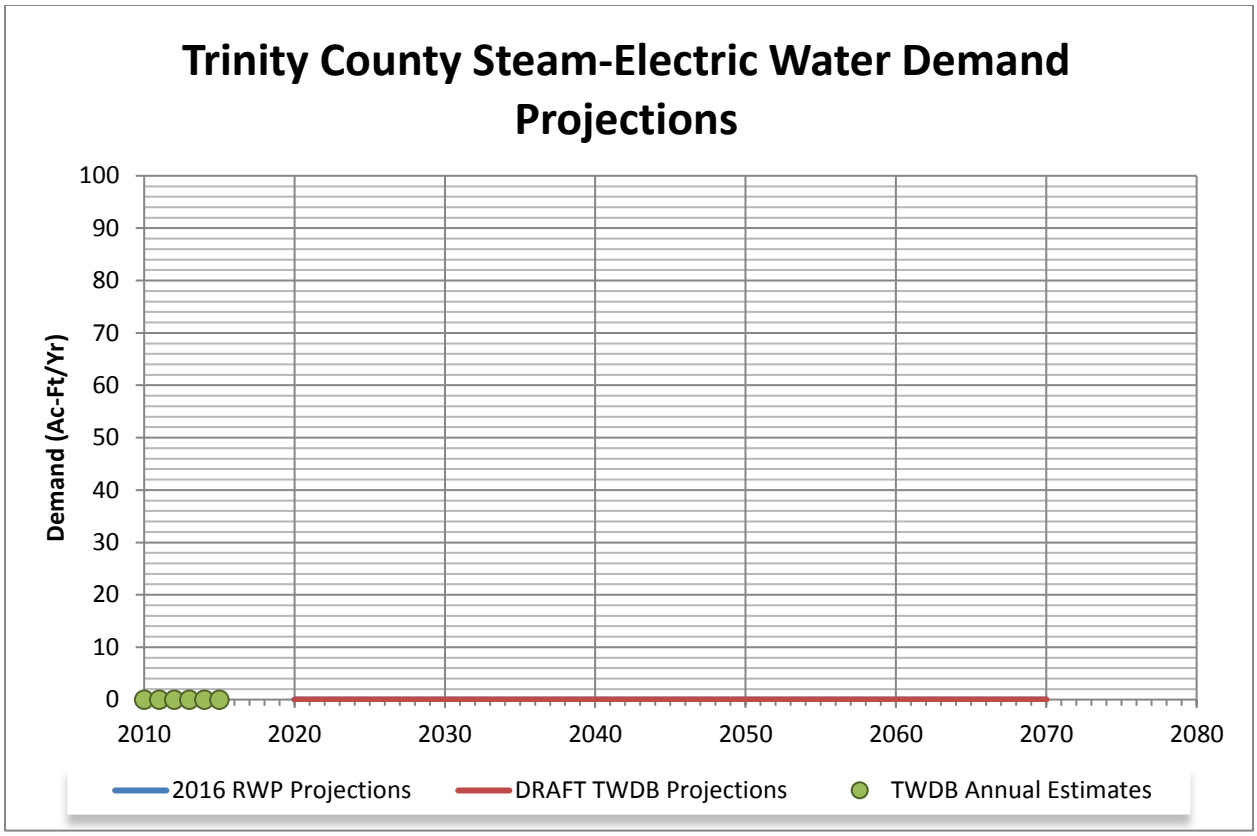

Liberty County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

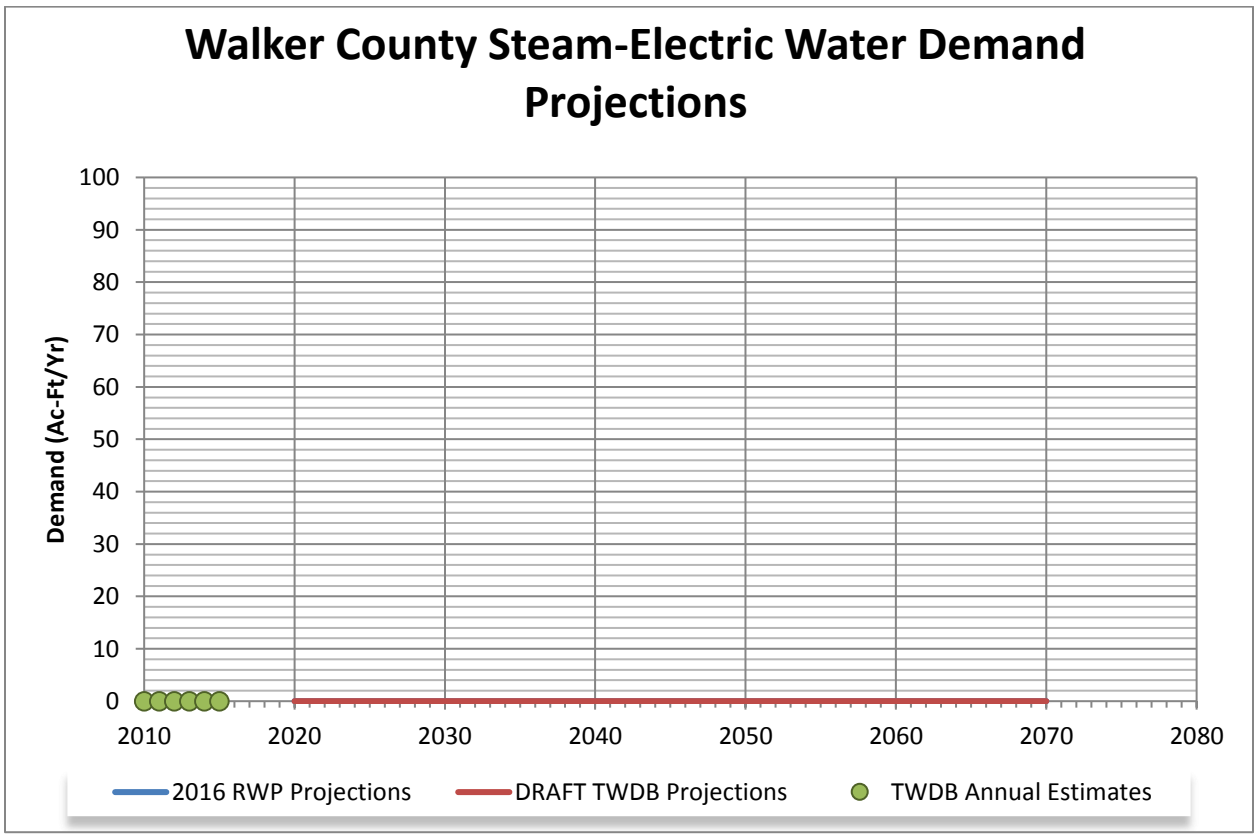

Madison County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
600
500
400
300
200
100
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

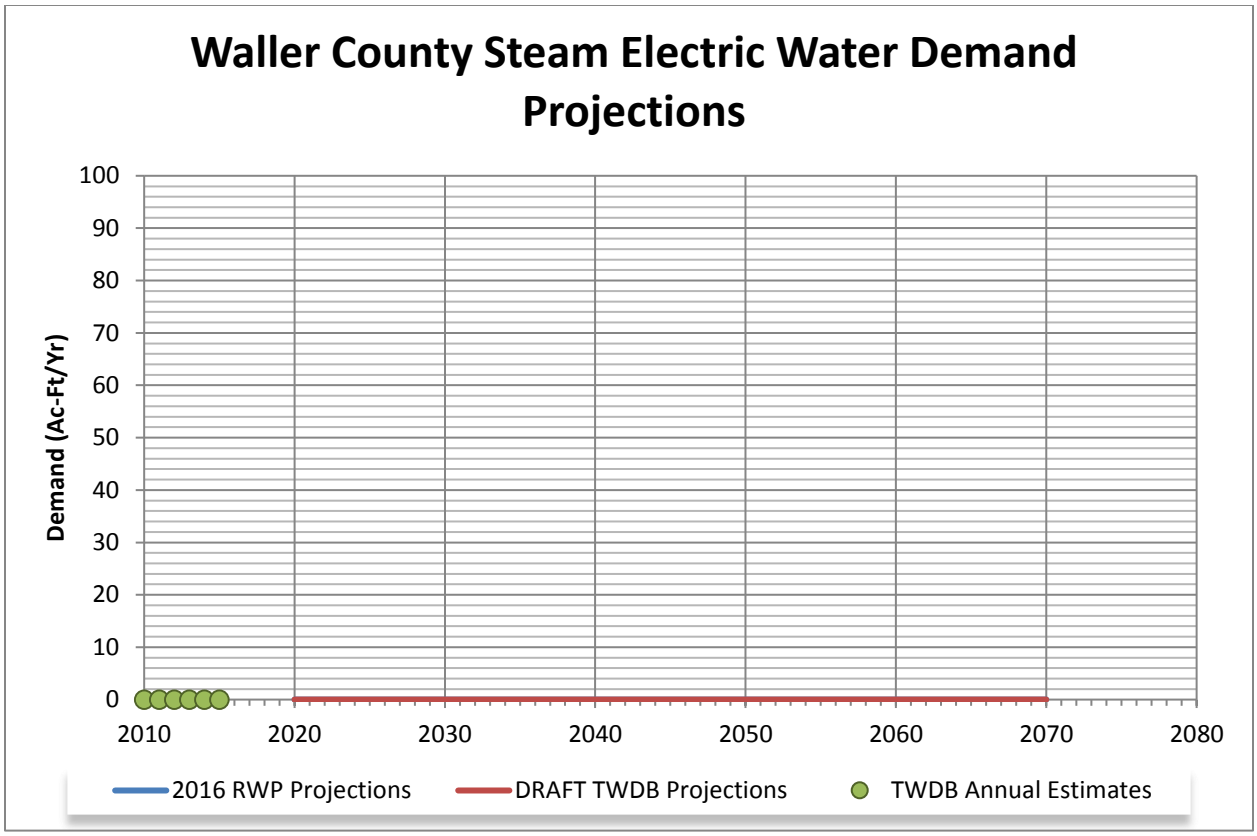

Montgomery County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
25,000
20,000
15,000
10,000
5,000
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


Polk County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


San Jacinto County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
20
18
16
14
12
10
8
6
4
2
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


Trinity County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


Walker County Steam-Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates


Waller County Steam Electric Water Demand Projections
Demand (Ac-Ft/Yr)
100
90
80
70
60
50
40
30
20
10
0
2010
2020
2030
2040
2050
2060
2070
2080
2016 RWP Projections
DRAFT TWDB Projections
TWDB Annual Estimates

Methodologies for Developing Draft Irrigation, Manufacturing, and Steam-Electric Water Demand Projections

February 2017

Texas Water Development Board

1 Summary

After the completion of the 2016 regional water plans, in late 2015, Texas Water Development Board (TWDB) staff determined that water demand projections methodologies for three of the categories – irrigation, manufacturing, and steam-electric power – should be reviewed and perhaps revised to better reflect reported historical water use. In early 2016, CDM Smith was contracted to review the projection methodologies used, provide descriptions of how such projections were developed in other state planning efforts, and recommend alternative methodologies. Throughout 2016, TWDB Water Use Projections & Planning staff discussed potential methodologies for draft water demand projections for irrigation, manufacturing, and steam-electric power with water planning stakeholders.

This document describes the general methodologies to be used in developing the draft irrigation, manufacturing, and steam-electric power water demand projections to be included in the 2021 regional water plans and the 2022 State Water Plan. Summaries of the methodologies are included below with more complete descriptions and examples in subsequent sections.

1.1 Irrigation water demand projection methodology summary

The baseline methodology for draft irrigation water demand projections is the average of the most recent five-years of water use estimates held constant between 2020 and 2070. In counties where the total groundwater availability over the planning period is projected to be less than the groundwater-portion of the baseline water demand projections, the irrigation water demand projections will begin to decline in 2030 or later, commensurate with the groundwater availability.

1.2 Manufacturing water demand projection methodology summary

The 2020 water demand projections for each county will be based on the highest county-aggregated manufacturing water use in the most recent five years of reported data from the annual water use survey. The most recent 10-year projections for employment growth from the Texas Workforce Commission will be used as proxy for growth by manufacturing sectors between 2020 and 2030. After 2030, the manufacturing water use will be held constant through 2070.

1.3 Steam-electric power water demand projection methodology summary

The 2020 water demand projections for each county will be based on the highest county-aggregated steam-electric power water use in the most recent five years of reported data from the annual water use survey. The anticipated water use of future facilities listed in state and federal reports will be added to the demand projections from the anticipated operation date to 2070. In addition, the reported water use of facilities scheduled for retirement in the state and federal reports will be subtracted from the demand projections.

Subsequent demand projections after 2020 will be held constant throughout the planning period.

2 Irrigation water demand projections

Irrigation water use accounts for 58 percent of the 2014 water use estimates and in the current state water plan, is projected to be 51 percent of the 2020 total water demand projections, while declining to 36 percent in 2070. Aside from small adjustments to water demand projections based on recent historical water use estimates, there has not been a statewide re-projection of irrigation water demand projections, and many areas of the state have not had any significant change in projected trend lines since the 1997 State Water Plan. Due to the scale of irrigation in current water use and future water demands, as well as the outdated statewide projections, TWDB staff will utilize the following methodology for developing draft irrigation water demand projections for the planning cycle cumulating in the 2021 regional water plans and the 2022 State Water Plan.

The methodology described below will produce draft water demand projections that will be reviewed by the Regional Water Planning Groups (RWPGs). The criteria for requesting changes to the draft projections will be described in the TWDB regional water planning contract, Exhibit C: General Guidelines for Fifth Cycle of Regional Water Plan Development.

2.1 Baseline default projection methodology

Future water demands for irrigation purposes are significantly impacted by commodity prices, production costs, federal agricultural policies, and federal energy policies. Any attempt to forecast such factors and their impact on water use over a 50-year period would be impractical. A more credible methodology is to focus on recent historical irrigation water use data as an indicator of future use. Therefore, the default baseline dry-year irrigation demand projection for most areas will be the average of the annual irrigation water use estimates over the most recent five years of water use data and that average volume will then be held constant over the planning period.

In previous water plans, the volumes of reuse water, such as treated effluent, used by irrigated agriculture have not been included in the historical water use estimates or the water demand projections. However, because the RWPGs are increasingly including reuse water as an available supply and viewing reuse as an important part of meeting future water demands, the draft projections for the 2021 regional water plans and the 2022 State Water Plan will be developed to include the reuse volumes used for irrigated agriculture, as reported by water utilities or groundwater conservation districts. The 2014 estimated volume of reuse water was 56,621 acre-feet, or less than one percent of the 2014 freshwater irrigation water use.

2.2 Projection methodology for areas with significant groundwater availability declines

Much of projected irrigation demands of the state are supplied by groundwater sources that are projected to decline significantly over 50 years, which has resulted in large volumes of water needs and unmet water needs in the regional and state water plans. In

the 2017 State Water Plan, irrigation water needs accounted for 41 percent of the total water needs in 2070 and accounted for 90 percent of the total water needs that were left unmet. Three quarters of such unmet irrigation needs are in counties whose irrigators primarily utilize groundwater (75 percent or more of existing sources are groundwater sources). Such figures indicate that in areas with declining groundwater availability, the options of irrigators to fund feasible water management strategies beyond conservation are limited.[1] For these reasons, the draft irrigation water demand projections in some locations will take into account significant groundwater availability declines.

While constraining water demand projections based on water resource availability would most likely occur in areas primarily utilizing groundwater, such constraints could also occur in areas with limitations of surface water rights or contracts. At this stage however, TWDB does not have sufficient information to attempt to constrain surface water demands and will defer to RWPGs to identify such instances, if appropriate.

The general determination as to whether irrigation water demand projections should be constrained by groundwater water resource availability will be as follows:

A) If the groundwater-supplied portion of the baseline irrigation demand projections, summed over the 50 year planning horizon, is less than the total groundwater availability of the county (based on the 2017 State Water Plan, a new modeled available groundwater (MAG) volume, or predictive pumping from a proposed desired future condition (DFC)), whichever is the most recent) summed over the 50 year planning period then the baseline irrigation water demand projections will not be modified to reflect declining groundwater availability.

B) If the groundwater-supplied portion of the baseline irrigation demand projections, summed over the 50 year planning horizon, is greater than the total groundwater availability of the county (based on the 2017 State Water Plan, a new MAG volume, or predictive pumping from a proposed DFC) summed over the 50 year planning period then the baseline irrigation water demand projections will be modified to reflect declining groundwater availability.

This is a relatively conservative approach to constraining water demands, in that it is based on the full groundwater availability within each county regardless of other groundwater uses in the same county.

[1] The 2006 Region A Water Plan referred to such observations in a Region A 2003 region-specific study regarding agricultural demand projections: "Documented declines in the Ogallala Aquifer suggest long-term water use in the region will fall due to availability. In the Region A Senate Bill 1 effort, it was demonstrated that irrigated crop use per unit of water pumped had by far the lowest return compared to the other sectors. Therefore, any projected declines in water use due to limited availability are expected to occur in this sector. Furthermore, any anticipated increases in water use by the other sectors, for example, livestock, are expected to come at the expense of irrigation." 2006 Region A Water Plan, Appendix N, page 18. http://www.twdb.texas.gov/waterplanning/rwp/plans/2006/A/Region_A_2006_RWP.pdf

2.2.1 Constrained water demand projections

If the baseline irrigation water demand projections associated with groundwater and summed over 50 years, exceeds the projected groundwater resource (groundwater availability or predictive pumping) summed over 50 years, then the water demand projections will reflect groundwater availability constraints as described below.

Starting at the year 2020 baseline projection, the demand volume will be held constant for at least one decade. If the annual groundwater availability is lower than the baseline projection at the beginning of the planning period (2020), then beginning in 2030, the subsequent demands will parallel the trend of the groundwater availability (MAG or predictive pumping volumes of proposed or new DFCs). See Example 1, Figure 2.1. If the annual groundwater availability equals or exceeds the default baseline annual groundwater projection (5-year water use average) at the beginning of the planning period (2020) but then falls below the baseline projection at a later point, then the irrigation water demand projections will not begin to parallel the groundwater availability until 10 years after the point at which groundwater availability has fallen below the baseline demand projections. See Example 2, Figure 2.2. This approach acknowledges:

- recent actual pumping and associated irrigation demands; and
- residual irrigation water demands that are anticipated to remain above available groundwater supplies for some period but are then anticipated to decline over time in response to persistent declining groundwater availability.

This will produce demand projections that are a constant volume above the reference groundwater availability volumes. This buffer over the groundwater availability is intended to address a number of unknowns:

- the differences between pumping values used in groundwater models and TWDB historical irrigation water use estimates,
- the variations between wet-year and dry-year pumping, and
- the scale of irrigation water needs in groundwater resource-constrained areas that can be met through recommending conservation water management strategies. See Example 1 and Figure 2.1.

The portion of the baseline irrigation water demand projection anticipated to be supplied by surface water based on recent water use data will not be constrained in these instances.

In order to address changes in irrigated agriculture and any changes in water-use patterns, the draft irrigation water demands will be developed with each planning cycle. As with any methodology applied statewide, there may be specific cases for which this general methodology is not appropriate. In such cases, TWDB staff will adjust the methodology as necessary while being consistent with the original intent.

2.3 Examples of Draft Water Demand Projections

2.3.1 Example 1 – Draft irrigation water demand projections constrained by groundwater resources

The first example of the draft irrigation water demand projections, illustrated in Figure 2.1, is of a county whose irrigation is supplied entirely by groundwater. The average water use from the most recent 5 years is 310,379 acre-feet. The baseline irrigation water demand projections for the county would be 310,379 acre-feet of water each year throughout the planning period.

The sum of the annual default water demand projections over the planning period (15.8 million acre-feet) is greater than the summed annual predictive pumping volumes for the associated aquifers that are the result of the groundwater management area's (GMA) proposed, but not yet adopted, DFCs (4.2 million acre-feet), so the irrigation water demand projections will be modified to reflect groundwater availability constraints. As the 2020 baseline projection (310,379 acre-feet) is greater than the 2020 simulated pumping (218,397 acre-feet), the constrained demand projection will start at the 2020 baseline, hold constant for one decade, and then decline commensurate with the groundwater availability declines while remaining above the groundwater availability. The groundwater-constrained irrigation demand (triangles in Figure 2.1) declines from 301,379 acre-feet in 2030 to 228,218 acre-feet in 2070.

If the county's irrigation was also supplied by surface water, then a baseline surface water demand projection (5-year average of historical water use) for the surface water would be added to the groundwater-constrained demand projection.

2.3.2 Example 2 – Draft irrigation water demand projections constrained after 2020 by groundwater resources

The second example of the draft irrigation water demand projections, illustrated in Figure 2.2, is similar to Example 1. Like the previous example, all irrigation is entirely supplied by groundwater. The 50-year sum of the annual baseline water demand projections (6.6 million acre-feet) is greater than the summed annual groundwater availability: predictive pumping volumes for the primary aquifers resulting from the GMA's proposed, but not yet adopted, DFCs (3.8 million acre-feet). For this reason, the irrigation water demand projections will reflect groundwater availability constraints. However, in this example, the 2020 predictive pumping (160,976 acre-feet) would still be greater than the baseline water demand projections based on the 5-year historical water use estimates (128,837 acre-feet), so the baseline water demand projection will be held constant until 2035 - 10 years after the point when the groundwater availability falls below the baseline demand (2025). In 2035, and throughout the rest of the planning horizon, the irrigation water demand projections will decline commensurate with the groundwater availability decline, while remaining well above the groundwater availability.

As in Example 1, if the county's irrigation was also supplied by surface water, then a baseline water demand projection (5-year average of historical water use) for the surface water would be added to the groundwater-constrained demand projection.

Figure 2.1. Potential Draft Irrigation Water Demand Projections: Declining Groundwater Example (acre-feet of water per year)

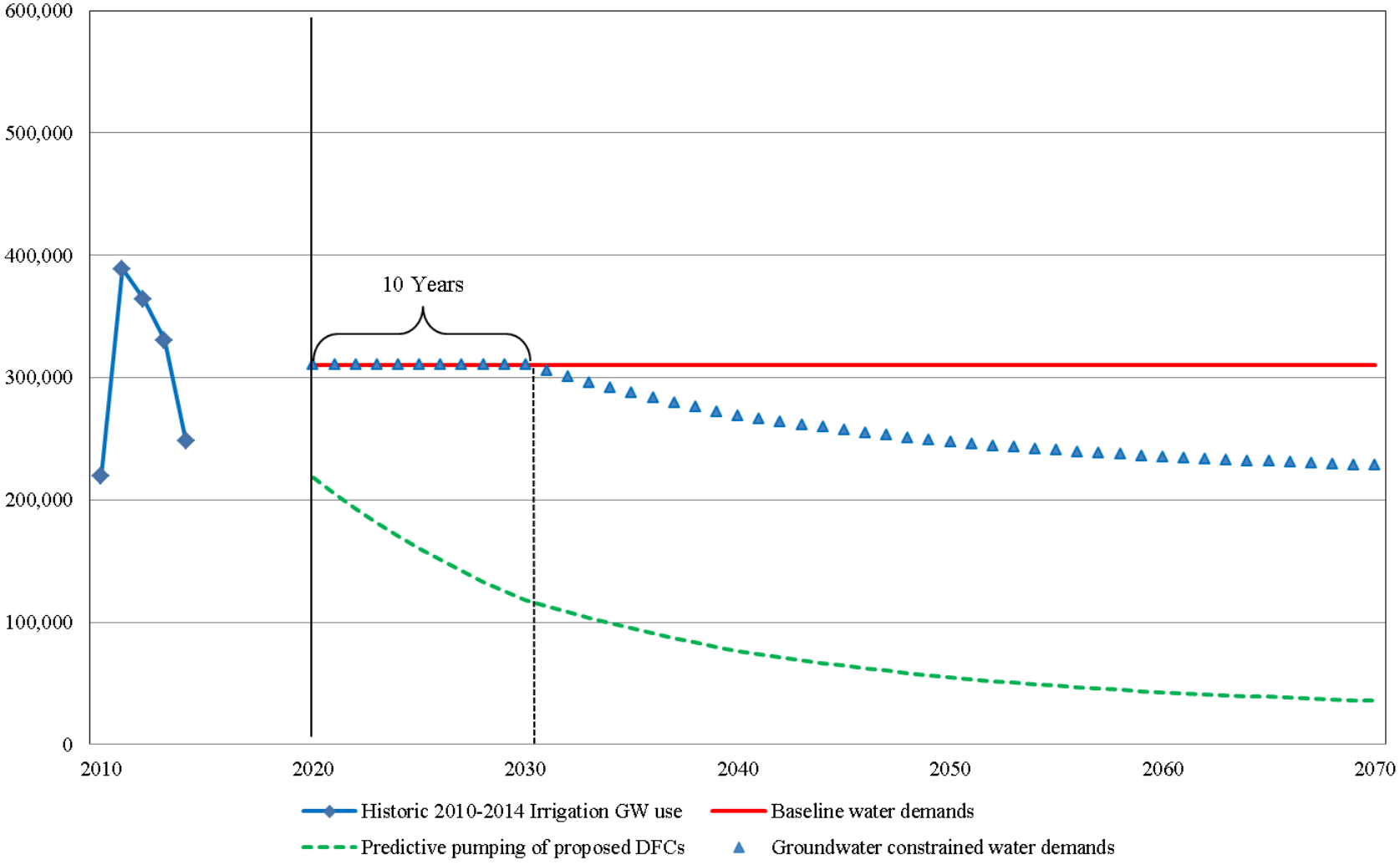
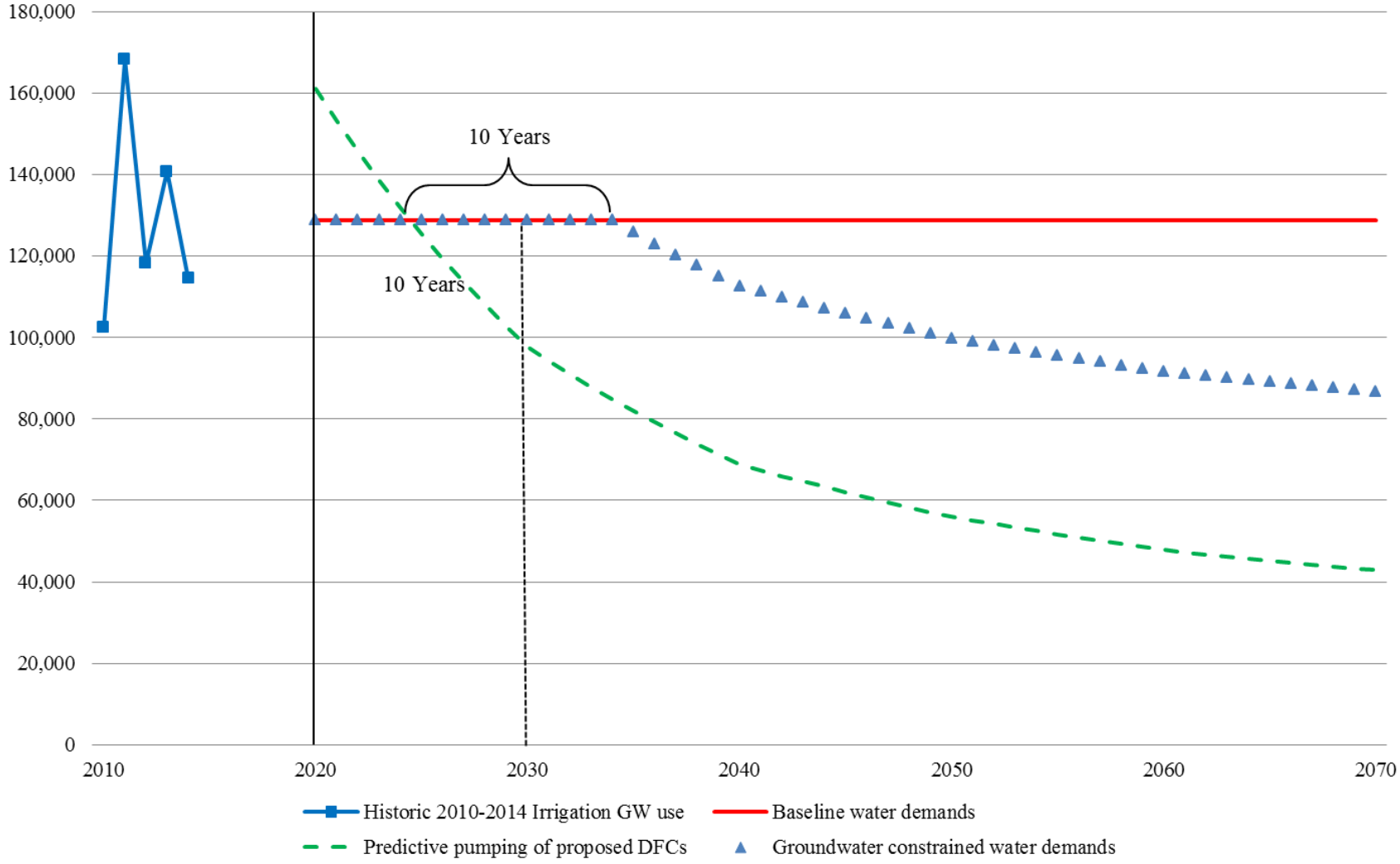


Figure 2.2. Potential Draft Irrigation Water Demand Projection: Declining Groundwater Example (acre-feet of water per year)



3 Manufacturing water demand projections

Historically, manufacturing water demands have been based upon projected levels of produced goods or economic output for individual manufacturing sectors. Unfortunately, historical and projected production data are often proprietary and not readily available. Projections of economic output often utilize complex econometric models based upon a variety of inputs such as population, sales, inflation, interest rates, oil prices and other factors.

It is important to note that the manufacturing water use category does not include the water use of all firms that might be classified as manufacturing under the North American Industrial Classification System (NAICS). In collecting manufacturing water use data, Texas Water Development Board (TWDB) staff focuses on facilities that use large volumes of water, relative to the area of the state and/or are self-supplied by groundwater or surface water. Consequently, the water demand projections in the regional and state water plans are focused on these large manufacturing water users. The smaller-use facilities that are not part of the water use survey are generally supplied by public utilities as commercial accounts, and thus, part of the municipal water demands.

The methodology described below will produce draft water demand projections that will be reviewed by the Regional Water Planning Groups (RWPGs). The criteria for requesting changes to the draft projections will be described in the TWDB regional water planning contract, Exhibit C: General Guidelines for Fifth Cycle of Regional Water Plan Development.

3.1 Baseline projection methodology

The draft 2020 manufacturing water demand projections will be based upon the highest county manufacturing water use in the most recent five years of county-aggregated data for manufacturing water users from the annual water use survey. The highest reported facility water use volumes will be subtotaled by county and three-digit NAICS categories. As part of the process, TWDB staff will conduct additional reviews of Texas Commission on Environmental Quality industrial water right usage reports and will contact wholesale water providers and groundwater conservation districts who are not otherwise surveyed to ensure that all large-water use manufacturing facilities are included in the historical estimates.

In previous water plans, the volumes of reuse water, such as treated effluent, used by manufacturing facilities have not been included in the historical water use estimates or the water demand projections. However, because the RWPGs are increasingly including reuse water as an available supply and viewing reuse as an important part of meeting future water demands, particularly industrial demands, the draft projections for the 2021 regional water plans and the 2022 State Water Plan will be developed to include the reuse volumes reported by the manufacturing facilities. The 2009-2014 average volume of reuse water reported statewide by surveyed manufacturing facilities was 21,904 acre-feet, or two percent, of the total average freshwater manufacturing water use in that same period. Similarly, any brackish or saline water use that had been omitted from water use estimates

and projections will be included in the draft projections. This does not include seawater use.

To project the draft manufacturing water demands beyond 2020, staff will utilize the most recent 10-year projections of employment from the Texas Workforce Commission (TWC) by 3-digit NAICS categories and the 28 Workforce Development Areas (WDAs) in the state[2]. The projection of employment from the TWC will be used as a proxy for growth in output and water use in a particular industrial sector and county of the state. The employment growth rate will be applied to the 2020 water demand projection (highest county use in the last five years), to develop a 10-year projection of water demand.

In cases where the employment is projected to decrease for a 3-digit NAICS sector, the water demand projection will be held constant rather than decline. This is a conservative approach that assumes that any water designated for manufacturing, whether through surface water rights, groundwater rights, or water sales from water providers will likely be utilized by other manufacturing firms.

Beyond 2030, the water demand will be held constant through 2070. Concerns were expressed during methodology development about the impression of manufacturing water use indicating that manufacturing is not thriving. TWDB staff has determined that holding manufacturing water use constant between 2030 and 2070 is the most efficient, effective, and reasonable strategy for developing draft water demand projections and planning for future manufacturing water use for the following reasons:

1) Basing projections on the highest county water use of the most recent five years of data ensures that we will be planning for water use that has already occurred in the recent past.
2) The long-term trend of manufacturing water use in Texas and in the nation has been decreasing while output has been increasing.[3] Within Texas, the statewide manufacturing water use has shown a statistically significant downward trend between 2005 and 2014. Manufacturing facilities in the state have become more and more efficient with water over the last decade, as stated by the Texas Association of Manufacturers and the Texas Oil & Gas Association.[4] Staff expects manufacturing firms to continue to increase their efficient use of water in the various processes.
3) The development of modeled projections would be complicated, expensive, and leave room for a significant amount of error due to the large range of manufacturing activities, the cost of acquiring proprietary projections of various economic outputs, and the speed at which industries shift and process technology changes.
4) While the historical trend for manufacturing water use appears to be decreasing, staff believe that to project water demands at a recent historical level, while

[2] http://www.tracer2.com/?PAGEID=67&SUBID=114
[3] Hoffman, H.W. (Bill), "Manufacturing and Electric Power Water Use in Texas, submitted to the Water Conservation Advisory Council,
http://www.savetexaswater.org/resources/doc/Hoffman_Manufacturing_2016.pdf
[4] Letters submitted to the Water Conservation Advisory Council for the August 1, 2016 meeting.
http://www.savetexaswater.org/meeting/council-meetings.asp

updating the projections in each planning cycle, is a conservative and reasonable approach to ensure that sufficient water is planned for manufacturing use.

In order to address changes in the manufacturing sectors and any changes in water-use patterns, the draft manufacturing water demands will be developed with each planning cycle. As with any methodology applied statewide, there may be specific cases for which this general methodology is not appropriate. In such cases, TWDB staff will adjust the methodology as necessary while being consistent with the original intent.

3.2 Example of baseline draft projection methodology

An example of the proposed methodology for draft manufacturing water demands focuses on Travis County and is described below. The historical manufacturing water use in Travis County is displayed in Table 3.1. Manufacturing facilities in nine 3-digit NAICS classification have been surveyed through the TWDB's annual water use survey. The highest annual county water use for the manufacturing water users in Travis County between 2010 and 2014 is 9,781 acre-feet.

Table 3.1. Historical manufacturing water use by 3-digit NAICS, Travis County, TWDB water use survey

NAICS 3-Digit Code		Net Use Summary from Water Use Survey (acre-feet per year)					
No.	Name	2010	2011	2012	2013	2014	Highest County Use (2013)
311	Food	101	101	185	402	279	402
312	Beverage and Tobacco Product	180	117	103	103	101	103
322	Paper	31	0	0	0	0	0
325	Chemical	755	678	687	739	738	739
327	Nonmetallic Mineral Product	262	258	239	236	304	236
333	Machinery	224	279	178	132	136	132
334	Computer and Electronic Product	6,016	6,843	7,991	8,163	7,640	8,163
335	Electronic Equipment, Appliance, and Component	5	0	0	0	0	0
339	Miscellaneous	7	11	6	6	6	6
	Total	7,581	8,287	9,389	9,781	9,204	9,781

The projected employment by 3-digit NAICS categories for the Capital Area WDA (Travis County only in this case) is shown in Table 3.2. Overall, the employment in the manufacturing categories are projected to grow from 32,810 to 38,020 jobs, an increase of approximately 16 percent, however the growth rate within each 3-digit NAICS category differs.

To calculate the projected manufacturing water demand, the average water use for each NAICS category is multiplied by the employment growth rate. As all NAICS sectors are projected to have population growth, no categorical water use was held constant. The calculation results in a projected manufacturing water demand of 9,781 acre-feet in 2020 and 11,348 acre-feet in 2030 (Table 3.3). Table 3.4 provides a comparison of the results of the methodology example for Travis County with the previous projections used in the 2017 State Water Plan. The resulting projection for manufacturing in Travis County is significantly lower due to the predominantly downward historical trend in the estimated water use of manufacturing facilities in the county, from a high of 22,168 acre-feet in 1998 to 9,204 acre-feet in 2014.

Table 3.2. Texas Workforce Commission projected employment by 3-digit NAICS, Travis County

NAICS 3-Digit Code		TWC Employment		
No.	**Manufacturing Category Name**	**2012**	**2022**	**10-Year Growth Rate**
311	Food	1,570	1,860	18.5%
312	Beverage and Tobacco Product	510	800	56.9%
322	Paper	10	10	0.0%
325	Chemical	1,830	1,920	4.9%
327	Nonmetallic Mineral Product	940	1,060	12.8%
333	Machinery	2,360	2,450	3.8%
334	Computer and Electronic Products	22,530	26,290	16.7%
335	Electronic and Equipment , Appliance, and Component	780	1,030	32.1%
339	Miscellaneous	2,280	2,600	14.0%
	Total	**32,810**	**38,020**	15.9%

Table 3.3. Example of draft manufacturing water demand projection, Travis County

NAICS 3-Digit Code		Water Volume (acre-feet per year)	
No.	Name	2020 Water Demand (Highest County Use)	2030 Water Demand
311	Food	402	476
312	Beverage and Tobacco Product	103	162
322	Paper	0	0
325	Chemical	739	775
327	Nonmetallic Mineral Product	236	266
333	Machinery	132	137
334	Computer and Electronic Product	8,163	9,525
335	Electronic Equipment, Appliance, and Component	0	0
339	Miscellaneous	6	7
	Total	9,781	**11,348**

Table 3.4. Comparison of projected manufacturing water demand projections by decade, Travis County (acre-feet per year)

Projection	2020	2030	2040	2050	2060	2070
Example Draft for 2021 Regional Water Plan	9,781	11,348	11,348	11,348	11,348	11,348
2017 State Water Plan	35,790	48,710	63,858	72,991	81,781	91,630

4 Steam-electric water demand projections

The water use for steam-electric power generation is influenced by a number of factors, including electricity demand, fuel prices, weather conditions, the cooling design of the facilities, and others. Historically, studies have attempted to calculate future water use of power generation by estimating future scenarios of the various factors over 50 years and then developed a most-likely calculated water use volume as a result of the contributing factors.

As part of each planning cycle, the draft steam-electric power water demand projections for each county will be developed based upon:

1) The highest county water use in the most recent five years of data for steam-electric power water users from the annual water use survey,
2) Near-term additions and retirements of generating facilities, and
3) A constant water demand volume through 2070.

The methodology described below will produce draft water demand projections that will be reviewed by the Regional Water Planning Groups (RWPGs). The proposed criteria for requesting changes to the draft projections will be described in the Texas Water

Development Board (TWDB) regional water planning contract, Exhibit C: General Guidelines for Fifth Cycle of Regional Water Plan Development.

4.1 Projection methodology for draft water demand projections

4.1.1 Historical steam-electric power water use

The TWDB annually surveys the power-generating facilities in the state to estimate the volume of water used for steam-electric power. The water use volumes posted on the TWDB website and used in the water planning process includes volumes used by large power generation plants that sell power on the open market, generally not cogeneration plants that generate power for manufacturing or mining processes. Specifically, the water use estimates are composed of the reported intake volume of groundwater pumped, purchased from a water provider, and/or withdrawn from a natural surface water source (such a river) and not returned to the source. The volume of any sales of water from the surveyed facility to other facilities or water systems is subtracted from the intake volume.

In previous water plans, the volumes of reuse water, such as treated effluent, used by generating facilities have not been included in the historical water use estimates or the water demand projections. However, because the RWPGs are increasingly including reuse water as an available supply and viewing reuse as an important part of meeting future water demands, the draft projections for the 2021 regional water plans and the 2022 State Water Plan will be developed to include the relevant reuse volumes reported by the steam-electric power facilities. The 2009-2014 average volume of reuse water reported statewide by surveyed power facilities was 31,009 acre-feet, or approximately 6 percent, of the total freshwater steam-electric power water use. Similarly, any brackish or saline water use that had been omitted from water use estimates and projections will be included in the draft projections. This does not include seawater use.

If any known power generation facility has been missed in the TWDB's annual water use survey, then that facility's water use will be obtained from the operator or estimated using average water use per kilowatt-hour output for the associated fuel-type and added to the historical highest water use for that county.

4.1.2 Near-term (2020) draft projection methodology

In addition to the historical highest county water use in the most recent five years of data, staff will identify new power plants that will come online and plants that will retire in the near-term future using the most recent Electric Reliability Council of Texas (ERCOT) Capacity, Demand, and Reserves (CDR) report[5] and the U.S. Energy Information Administration's (EIA) EIA-860 generator database. Information from power-generation representatives in the RWPGs and other stakeholders may also be utilized.

For near-term facilities identified in the reports or from other sources, staff will estimate the anticipated annual water use for future plants based upon their fuel type, generation

[5]http://www.ercot.com/gridinfo/resource

capacity, average water use information and average operational time. The average water use per kilowatt hour will be based on water demand factors presented in the contracted "Evaluation of Water Projection Methodologies & Options for Agency Consideration" (Table 4.1).[6] The average percentage of operation time for near-term future facilities will be based upon the historical equivalent forced outage rates received from ERCOT (Table 4.2).[7] Historical water use for facilities that are listed in the CDR report for retirement in the near-term, and for which there is not anticipated replacement generation capacity, will be removed from future projections.

Table 4.1. Water use factors by fuel type in Texas, 2010[8]

Fuel type[a]	Facility Count	Net Generation (TWh[b])	Volume Consumed (kaf[c])	Gallons per KWh[d]
Coal	38	150.7	248.4	0.53
Natural Gas	65	109.3	94.7	0.28
Nuclear	4	41.3	59	0.46

[a]Includes steam turbine and combined cycle generator technology and once-through and tower cooling systems. Cogeneration is not included in this analysis.

[b]Terawatt hour

[c]Thousand acre-feet of water

[d]Kilowatt hour

Table 4.2. Average percentage of operation time for near-term future facilities

Fuel and Generation Types	Average Percentage of Operation Time
Coal Steam Turbine	70%
Natural Gas Combined Cycle	59%
Natural Gas Steam Turbine	14%
Natural Gas Turbine	7%
Nuclear	85%

4.1.3 Long-term (2020 - 2070) draft projection methodology

The 2020 steam-electric power water demand projection will include the highest county water use in the most recent five years of data plus the anticipated water use of new facilities and the subtraction of retiring facilities, as described above. Beyond 2020, the draft water demand projections are held constant through 2070. Such constant projections are efficient, effective, and reasonable for the following reasons:

1) Basing projections on the highest county water use of the most recent five years of data ensures that we will be planning for water use that has already occurred in the recent past.

[6] "Evaluation of Water Projection Methodologies & Options for Agency Consideration", CDM Smith, TWDB Contract 1600011921, Table 4-7, page 4-20

[7] Email correspondence with ERCOT staff member, Pete Warnken, September 19, 2016.

[8] Evaluation of Water Demand Projection Methodologies & Options for Agency Consideration, CDM Smith in conjunction with the University of Texas, Bureau of Economic Geology, 2016, page 4-20, Table 4-7.

2) To model a projection of steam-electric power water use would require the inclusion of a multitude of potential water-use drivers – each with an individual probability of occurring and level of impact – including, but not limited to: the facility replacement schedule, anticipation of generation efficiency and cooling systems, carbon capture activities, cost of various fuels and federal environmental/regulatory policies. Such an effort is resource-prohibitive.
3) The projected increase of wind and solar generation capacity which off-set the necessity to run water-consuming facilities and may meet a significant portion of the additional water demand in the future.
4) While water-consuming coal, oil, and natural gas facilities will be required in the future, any such plants replacing an older plant will be more water efficient, either using less water or producing more power with a similar volume of water that had already been acquired at the site.
5) Any assumed increase between 2020 and 2070 would require a distribution of such additional water use to the county level. Based on discussions with power generating company contacts, this is a difficult exercise, as the locations of new facilities not listed in governmental reports cannot be identified. To distribute anticipated additional water use to counties with existing facilities will result in over-projections in most counties and under-projection in others. Any specific new facility brought forward by the RWPGs will result in the double-counting of water use to meet anticipated electrical demand, as the assumed increase had already been distributed statewide.
6) The steam-electric power water demand projections will be updated with each planning cycle with the most recent data.

In order to address changes in the power generation industry and any changes in water-use patterns, the draft steam-electric power water demands will be developed with each planning cycle. As with any methodology applied statewide, there may be specific cases for which this general methodology is not appropriate. In such cases, TWDB staff will adjust the methodology as necessary while being consistent with the original intent.

4.2 Example of baseline projection methodology

An example of the proposed steam-electric power draft water demand methodology is shown for Hood County. Currently, the county has two power-generation facilities that report water use information through the TWDB's annual water use survey (Table 4.3). Neither facility has reported the use of treated effluent in their cooling processes.

Table 4.3. Historical steam-electric power water use, Hood County, TWDB water use survey

Facility Name	Water Use (acre-feet per year)					
	2010	**2011**	**2012**	**2013**	**2014**	**Highest Use**
Luminant Generation Company LLC-DeCordova Steam Electric Station	491	449	571	514	742	742
Wolf Hollow 1 Power LLC[1]	2,441	2,232	2,838	2,555	3,131	3,131
Total	**2,932**	**2,681**	**3,409**	**3,069**	**3,873**	**3,873**

[1]The Wolf Hollow 1 generation facility first reported in the 2012 TWDB annual water use survey. ***For this example***, the 2009 – 2012 water use estimates were developed based on the 2013 reported water use and being adjusted similar to the variation of the annual use of the Luminant generation facility.

For this example, a fictional natural-gas fueled combined cycle generation facility in Hood County with a capacity of 1,077 MWh will be assumed to be listed in the most recent ERCOT CDR report. Based on average water use information of similar generation facilities in Texas, the new facility would consume 0.28 gallons per KWh (Table 4.1). Utilizing the average percentage of operation time for such a facility (Table 4.2), the new facility will use 4,783 acre-feet of water per year.

The 2020 projected steam-electric water demands for Hood County would be composed of the highest water use in the last five years of data (3,873 acre-feet) and the anticipated use of the new facility (4,783 acre-feet), for a total of 8,656 acre-feet.

Table 4.4. Draft steam-electric water demand projections by decade and 2017 State Water Plan steam-electric water demand projections, Hood County (acre-feet per year)

Projection	2020	2030	2040	2050	2060	2070
Projected historical use	*3,873*	*3,873*	*3,873*	*3,873*	*3,873*	*3,873*
New facility use	*4,783*	*4,783*	*4,783*	*4,783*	*4,783*	*4,783*
Example Draft for 2021 Regional Water Plan	**8,656**	**8,656**	**8,656**	**8,656**	**8,656**	**8,656**
2017 State Water Plan	5,814	6,796	7,995	9,456	11,238	13,354

Exhibit C

First Amended General Guidelines for Fifth Cycle of Regional Water Plan Development

April 2017

This document is subject to future revision based upon any future Legislative actions.

2.0 – Population and Water Demand Projections

TWDB staff will prepare draft population and municipal water demand projections for 2020-2070 for all population-related water user groups (WUGs) using data based on the population projections in the 2017 State Water Plan as reassembled by utility service areas. Because there will not be new decennial census data available in time to be used in the 2021 regional water plans, the emphasis of this work will be on the transition of the 2017 State Water Plan population projections and the associated water demand projections from political boundaries to utility service area boundaries and to making limited modifications based on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan.

Non-population related draft water demand projections including manufacturing, irrigation and steam-electric power generation will be developed using newly adopted methodologies and made available for review by the RWPGs. For mining and livestock categories, the same projections with minor adjustments from the 2017 State Water Plan will be proposed as draft projections for the 2021 regional water plans.

The definition of WUGs to be used in the 2021 regional water plans and the 2022 State Water Plan can be found in 31 TAC Chapter 357.10(41).

2.1 Criteria and Required Data For Requested Changes To Draft Projections and Revisions Of Approved Projections

The initial list of WUGs will be established with the input of each RWPG. The TWDB staff then will prepare draft population and water demand projections for each region. The RWPGs shall then review the draft projections and may provide input to the TWDB or request specific changes to the draft projections from the TWDB. All requests to adjust draft projections shall be submitted along with associated quantified data in an electronic format determined by the TWDB (e.g., **fixed format spreadsheets**). If adequate justification is provided by the RWPGs to the TWDB, population and/or water demand projections may be adjusted by the TWDB in consultation with Texas Department of Agriculture (TDA), Texas Commission on Environmental Quality (TCEQ), and Texas Parks and Wildlife Department (TPWD). TWDB staff will then incorporate approved adjustments to the projections prior to the Board's consideration of adoption of the population and water demand projections.

The RWPGs must use the Board-adopted projections when preparing their regional water plans. The TWDB will directly populate DB22 with all Board-adopted WUG-level projections and make any changes to DB22 if subsequent revisions are approved by the Board.

Prior to the release of the draft projections, TWDB staff analyzed the most recent population estimates from the Texas Demographic Center[1] in comparison to the 2017 State Water Plan projections to determine the maximum region-wide population changes that may be considered by the RWPGs. The maximum region-wide population data will be provided for the RWPG.

[1] Formerly known as the Texas State Data Center/Office of State Demographer, http://osd.texas.gov

2.1.1 Population Projections

2.1.1.1 County-Level Population Projections

Any adjustments to a county-total population projection due to adjustments to WUG-level projections within the county must be justified and will require a justifiable redistribution of projected county populations within the region so that the summed regional total remains the same.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the Executive Administrator (EA) for consideration of revising the county population projections:

1. The most recent county population **estimate** by the TDC is significantly different than a corresponding interpolation of the draft county's population projections. The RWPGs should compare the 2015 TDC county estimate to the trend line between the 2010 and 2020 decades in the draft projections.
2. The most recent county population **projection** by the TDC (half-migration scenario) is significantly different than the TWDB's draft county population.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the county-level population projections:

1. County population estimates and/or projections from the TDC.
2. Projected in-migration and out-migration of a county, indicating that the net migration of a county over the most recent years (2011-2015) is significantly different than the net migration rate used for the draft projections.
3. Other data that the RWPG believes is important to justify any changes to the county-level population projections.

2.1.1.2 Water User Group Population Projections

Any adjustments to a WUG population projection must involve a justifiable redistribution of projected populations within the relevant county so that the county total remains the same unless an adjustment to the county total is also justified and approved.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration in adjusting the WUG population projections:

1. The 2010 permanent population-served estimate by a WUG (utilities, public water systems, or rural area of a county) is significantly different than the 2010 baseline population estimate used in the draft projections.
2. The population growth rate for a WUG (utilities, public water systems, or rural area of a county) over the most recent five years (2011-2015) is substantially different than the growth rate between 2010 and 2020 in the draft projections.
3. Identification of growth limitations or potential build-out conditions for a WUG that would result in an expected maximum population that is different than the draft projection.
4. Updated information regarding the utility or public water system service area, or anticipated near-term changes in service area.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustment to the WUG-level population projections:

as compared to the trend line between the 2010 and 2020 projections in the 2017 State Water Plan.

1. The verified number of residential connections or permanent population of utilities or public water systems that are associated with a WUG.
2. Population estimates for cities developed and published by the TDC or by a regional council of governments will be considered for utilities serving these respective cities.
3. Documentation from an official of a city or utility that describes the conditions expected to limit population growth and estimates the maximum expected population for a utility.
4. Documentation or maps that verifies and displays changes in the utility service area.
5. Other data that the RWPG believes is important to justify any changes to the WUG-level population projections.

2.1.2 Water Demand Projections

2.1.2.1 Municipal Water Demand Projections

Dry Year Designation
Municipal water demand projections will be based upon dry-year demand conditions. The default base year that will be used to develop the draft water demand projections for the utility gallons per capita per day (GPCD) in the 2022 State Water Plan will be 2011. If a different dry-year, or a combination of dry years, was approved for use in the 2017 State Water Plan, that value will be carried forward as the default GPCD for the fifth cycle unless otherwise specifically requested. Additionally, regions may make a request to use a GPCD value from a more recent dry-year (e.g., 2012-2015) as the basis for the demand projections of certain water providers. The TWDB will consider an alternative base year only if the RWPG provides sufficient evidence that the alternative year is more representative of demands expected under dry-year conditions.

Municipal Water Use
Municipal water use includes both residential and non-residential water use. Residential use includes single and multi-family residential household water use. Non-residential use includes water used by commercial establishments, public offices, and institutions, and light industrial facilities, but does not include significant industrial water users, such as large manufacturing or power generation facilities. Residential and non-residential water uses are categorized together because they are similar types of use; both use water primarily for drinking, cleaning, sanitation, cooling, and landscape watering. Reported municipal water use data through the TWDB Water Use Survey for the designated dry year will be used to calculate the base per capita water use rate for each utility. The reported data included in the municipal draft projections includes fresh surface water and groundwater sources, but does not include brackish groundwater and reuse sources (see criteria for adjustment).

The municipal water demand projections shall incorporate anticipated future water savings due to the transition to more water-efficient plumbing fixtures and appliances, as detailed in relevant legislation and provided to the RWPGs by the TWDB. Any additional anticipated future water savings due to conservation programs undertaken by utilities or county-other WUGs should be considered as water management strategies by the RWPG. *It should be noted that municipal is the only category of water use in which a level of assumed conservation savings are embedded in the demand projections.*

Any adjustment to the population projections for a WUG will require adjustments to the municipal water demand projections.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the municipal water demand projections:

1. Evidence that per capita water use from a different year between 2012-2015 would be more appropriate because that year was more representative of dry-year conditions.
2. Evidence of errors identified in the historical water use for a utility or public water system, including evidence that volumes of reuse (treated effluent) water or brackish groundwater used for municipal purposes should be included in the draft projections.
3. Evidence that the dry year water use was abnormal due to temporary infrastructure constraints.
4. Trends indicating that per capita water use for a utility or rural area of a county have changed substantially since 2011 and evidence that these trends will continue to rise in the short-term future.
5. Evidence that the number of installations of water-efficient fixtures and appliances between 2010 and 2015 is substantially different than the TWDB estimate.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the municipal water demand projections:

1. Annual municipal water production (total surface water diversions and/or groundwater pumpage and water purchased from other entities) for a utility measured in acre-feet, between 2012 - 2015.
2. The volume of water sales by a utility to other water users (utilities, industries, public water systems, etc.) measured in acre-feet.
3. Net annual municipal water use, defined as total water production less sales to other water users (utilities, industries, public water systems, etc.) measured in acre-feet.
4. Documentation of temporary infrastructure or other water supply constraints that were in place.
5. Drought index or growing season rainfall data to document a year different than the designated dry year as a more appropriate base year for projections.
6. Documentation of the number of water-efficient fixtures replaced between 2010 and 2015.
7. To verify increasing per capita water use trends for a utility or rural area of a county and therefore revising projections of per capita water use to reflect this increasing trend, the following data should be provided with the request from the RWPG:
    a. Historical per capita water use estimates based on net annual municipal water use for a utility or rural area of a county, beginning in 2010. A trend analysis which takes into account the variation in annual rainfall.
    b. Revised projections of per capita water use for a utility or rural area of a county, that demonstrate an increasing trend of per capita water use.
    c. Growth data in the residential, commercial and/or public sectors that would justify an increase in per capita water use.
    d. Documentation of planned future growth.
8. Other data that the RWPG considers adequate to justify an adjustment to the municipal water demand projections.

2.1.2.2 Manufacturing Water Demand Projections

Manufacturing water use is defined as water used for the production of manufactured goods. Manufacturing facilities report their water use to the TWDB annually through the Water Use

Survey. Different manufacturing sectors are denoted by North American Industrial Classification System (NAICS) codes.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the manufacturing water demand projections:

1. A new or existing facility that has not been included in the TWDB water use survey.
2. An industrial facility has recently closed its operation in a county.
3. Plans for new construction or expansion of an existing industrial facility in a county at some future date.
4. Evidence of a long-term projected water demand of a facility or industry within a county that is substantially different than the draft projections.
5. Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the manufacturing water demand projections.

1. Historical water use data and the 6-digit NAICS code of a manufacturing facility.
2. Documentation and analysis that justify that the new manufacturing facility not included in the Water Use Survey database will increase the future manufacturing water demand for the county above the draft projections.
3. The 6-digit NAICS code of the industrial facility that has recently located in a county and annual water use volume.
4. Documentation of plans for a manufacturing facility to locate in a county at some future date will include the following data:
    a. The quantity of water required by the planned facility on an annual basis.
    b. The proposed construction schedule for the facility including the date the facility will become operational.
    c. The 6-digit NAICS code for the planned facility.
5. Other data that the RWPG considers adequate to justify an adjustment to the manufacturing water demand projections.

2.1.2.3 Steam-Electric Power Generation Water Demand Projections

Water use for steam-electric power generation is consumptive use reported to the TWDB through the annual Water Use Survey. Steam-electric power water demand projections do not include water used in cogeneration facilities (included in manufacturing projections), facilities which do not require water for production (wind, solar, dry-cooled generation), or hydro-electric generation facilities.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the power generation water demand projections:

1. Documentation that the TWDB draft projections have not included a facility that warrants inclusion.
2. Any local information related to new facilities or facility closures that may not have been included in Electrical Reliability Council of Texas's Capacity, Demand, and Reserves (CDR) report.
3. Evidence of a long-term projected water demand of a facility or in a county that is substantially different than the draft projections.
4. Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) water or brackish groundwater that were not included in the draft projections.

5. Evidence that a currently-operating power generation facility has experienced a higher dry-year water use beyond the most recent five years, within the most recent 10 years.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the steam-electric water demand projections.

1. Historical (2010 – 2014) water use data and description of a surveyed or future facility, including the fuel type, cooling process, capacity, average percent of time operating, and any other information necessary to estimate water use.
2. Reports describing alternative trends or anticipated water use for steam-electric power generation.
3. Specific information of an anticipated facility not listed in state or federal reports necessary to estimate the volume of water reasonably expected to be *consumed*. Such information would include generation method, cooling method, generation capacity and any additional information necessary to estimate the future water use.
4. Other data that the RWPG considers adequate to justify an adjustment to the steam electric power water demand projections.

2.1.2.4 Mining Water Demand Projections

Mining water demand includes water used for oil and gas development, as well as extraction of coal and lignite, sand aggregate, and other resources. Projections do not include water use required for the transportation or refining of materials. The TWDB's annual mining water use estimates are comprised of data from both surveyed and non-surveyed entities.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the mining water demand projections:

1. Evidence that mining water use in a county is substantially different than the draft projections. This could include trends in water use data from the FracFocus national online registry[2], the Texas Railroad Commission, or other sources.
2. Evidence of new facilities coming online, or reported closures in surveyed facilities that may impact county projections
3. Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) water or brackish groundwater that were not included in the draft projections.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the mining water demand projections.

1. Historical (2010 – 2014) water use data and description of a surveyed or future facility, and any other information necessary to estimate water use.
2. Reports describing alternative trends or anticipated water use for mining.
3. Other data that the RWPG considers adequate to justify an adjustment to the mining water demand projections.

2.1.2.5 Irrigation Water Demand Projections

Irrigation water demand projections include the water necessary for irrigation activities, primarily field crops, but also include orchards, pasture, turf grass, vineyards, self-supplied golf courses, and limited aquaculture operations. Note that for the purposes of regional water planning, irrigation demands account for the amount of water pumped for irrigation, not the water needed or used by the crop or associated with dry-land farming.

[2] https://fracfocus.org/

Criteria: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the irrigation water demand projections:

1. Evidence that irrigation water use estimates for a county from another information source or more recent modeled available groundwater volumes are more accurate than those used in the draft projections.
2. Evidence that recent (10 years or less) irrigation trends are more indicative of future trends than the draft groundwater resource-constrained water demand projections.
3. Evidence that the baseline projection is more likely as a future demand than the draft groundwater resource-constrained water demand projections.
4. Region or county-specific studies that have developed water demand projections or trends for the planning period, or part of the planning period, and are deemed more accurate than the draft projections.
5. Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the irrigation water demand projections:

1. Historical water use, diversion, or pumpage volumes for irrigation by county.
2. Acreage and water use data for irrigated crops grown in a region as published by the Texas Agricultural Statistics Service, the Texas Agricultural Extension Service, the Farm Service Agency or other sources.
3. Available economic, technical, and/or water supply-related evidence that may provide a basis for adjustments in the default baseline projection and/or the future rate of change in irrigation water demand.
4. Alternative projected water availability volumes that may constrain water demand projections.
5. Other data that the RWPG considers adequate to justify an adjustment to the irrigation water demand projections.

2.1.2.6 Livestock Water Demand Projections

Livestock water use is defined as water used in the production of livestock, both for their consumption and for cleaning and environmental purposes. TWDB staff produces annual water use estimates for livestock, based on daily water demand per head assumptions for cattle (beef and dairy), hogs, poultry, horses, sheep, and goats.

Criteria for Adjustment: One or more of the following criteria must be verified by the RWPG and the EA for consideration of revising the livestock water demand projections:

1. Evidence that livestock water use estimates for a county from another source are more accurate than those used in the draft projections.
2. Plans for the construction of a confined livestock feeding operation in a county at some future date.
3. Documentation of an existing confined livestock feeding operation not captured in the draft projections.
4. Other evidence of change in livestock inventory or water requirements that would justify an adjustment in the projected future rate of change in livestock water demand.
5. Evidence of errors identified in historical water use, including volumes of reuse (treated effluent) or brackish groundwater that were not included in the draft projections.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA for justifying any adjustments to the livestock water demand projections:

1. Documentation of plans for the construction of a confined livestock feeding facility in a county at some future date will include the following:
    a. Confirmation of land purchase or lease arrangements for the facility.
    b. The construction schedule including the date the livestock feeding facility will become operational.
    c. The daily water requirements of the planned livestock feeding facility.
2. Other evidence that would document an expected increase or decrease in the livestock inventory in the county.
3. Other data that the RWPG considers adequate to justify an adjustment to the livestock water demand projections.

2.2 The Sub-WUG Planning Option*

At the discretion of each RWPG, certain WUGs may be subdivided into 'sub-WUG' level units for purposes of doing more detailed analysis and accounting. If a RWPG chooses to do this more refined analysis, **please discuss with TWDB staff early on** to ensure compatibility with DB22 and guidance. DB22 can incorporate sub-WUG data with some limited parameters (e.g., the sum of all WUG splits including sub-WUGs should equal the original whole WUG projections provided). Although it may require additional effort, this flexibility to include higher resolution in water needs analyses may allow some RWPGs to better account for and present water supplies and needs within, for example, certain county-other WUGs of interest. To accommodate the time necessary to create identified sub-WUGs in DB22, the anticipated deadline for identifying sub-WUGs for data reporting purposes is **September 1, 2017**. This request should be accompanied by the name of the associated whole WUG (for example, County-Other, Harris County), and the geographic designation (Region/County/Basin) of the sub-WUGs. Subsequently, the sub-WUGs share of population and water demand projections developed by the RWPG and adjustments to the associated WUG splits will be required to be submitted with all other projection revision requests by **November 2017**.

*Note bolded deadlines associated with this option.

Criteria for Adjustment: A proposed sub-WUG must meet the following criteria to be included in the 2022 State Water Plan:

1. The sub-WUG(s) must be approved by the RWPG and submitted to the TWDB by September 1, 2017.
2. The sub-WUG must be an existing utility, public water system, or geographic area, within the existing WUG.
3. The RWPGs requesting the sub-WUG will develop the projections, existing supply, needs, and water management strategy(s) volumes, all of which must be less than the total volumes for the WUG. The sum of all WUG splits, including sub-WUGs, should equal the total volumes for the WUG as a whole.
4. For municipal sub-WUGs, the sub-WUG GPCD may differ from the whole County-Other WUG GPCD. However, the sum of the population and demand totals of all WUG splits including sub-WUGs should match the County-Other WUG totals. Population, demand and GPCD values in the other WUG splits may need to be adjusted to offset the sub-WUG population and demand projections submitted by the RWPG.

Data Requirements: The RWPG must provide the following data associated with the identified criteria to the EA to be included in the 2022 State Water Plan:

1. Sub-WUG(s) with the geographic designation along with a list of the utilities, public water systems, or area included in the sub-WUG(s) and the name of the associated whole WUG (by September 1, 2017).
2. Population projections and GPCDs (for municipal sub-WUGs), and water demand projections (for all sub-WUGs) for 2020-2070 presented by region, county, and basin splits where applicable.
3. The adjusted remaining values including population, GPCD and demand for the other WUG splits after identifying the sub-WUG must be submitted for consideration with the sub-WUG projections.

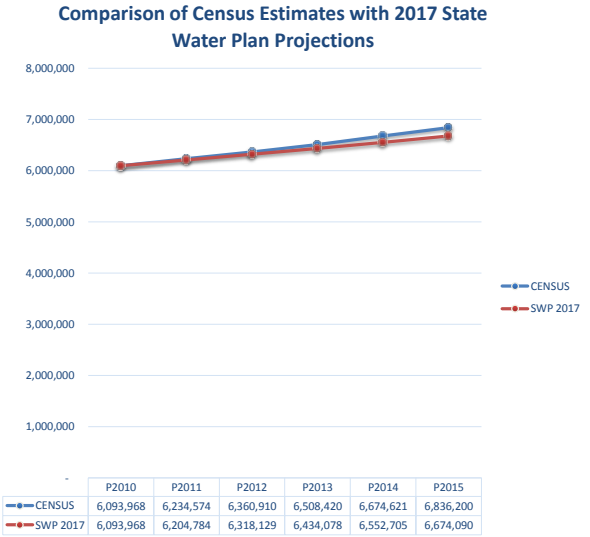
Agenda Item 8

Receive update from Consultant Team and Population Demands Committee regarding TWDB draft municipal population and water demand projections for the 2021 Region H Regional Water Plan.

REGION H
Water Planning Group

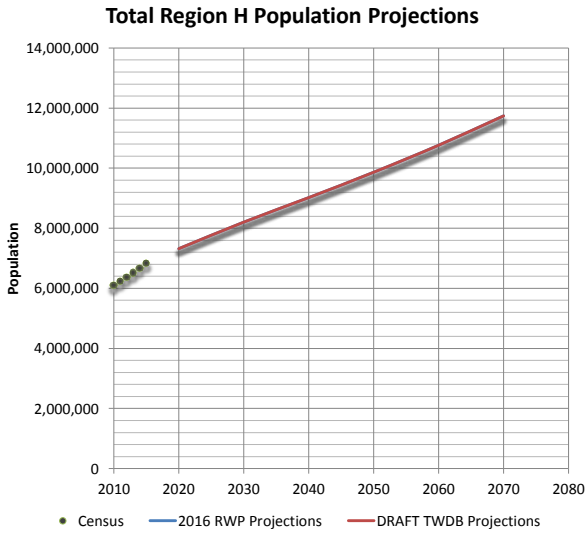
Agenda Item 8
Municipal Projections

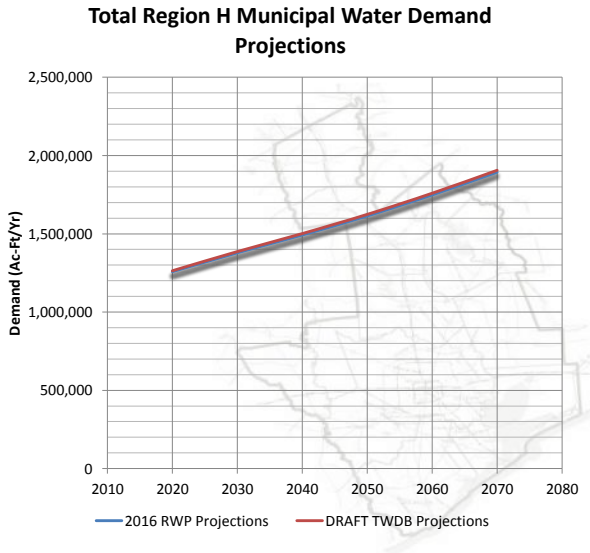
- Near-term county populations
- 2010-2015 Census
- Interpolated SWP data
- Focus on >±10%
  - Region at -2.4%
  - Counties -3.3 to 7.7%
  - Within limits



	P2010	P2011	P2012	P2013	P2014	P2015
CENSUS	6,093,968	6,234,574	6,360,910	6,508,420	6,674,621	6,836,200
SWP 2017	6,093,968	6,204,784	6,318,129	6,434,078	6,552,705	6,674,090

Agenda Item 8
Municipal Projections



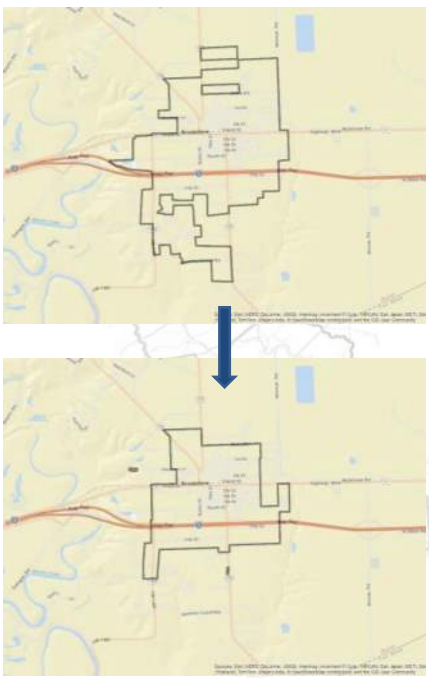


Agenda Item 8
Municipal Projections

- Draft projections from TWDB
  - 215 legacy WUGs
  - 144 new WUGs
- New utility focus
  - Retaining 2017 SWP county populations
  - Minimal change to basin splits
  - Redistributing among WUGs

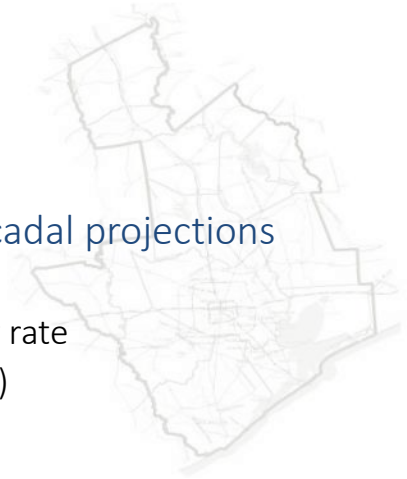
Agenda Item 8
Municipal Projections

- Major undertaking
  - Numerous WUGs
  - Variable data
  - Boundary differences
- Multiple references examined
  - Water Use Survey
  - TCEQ utility data
  - Census and State data
  - GIS
  - Others



Agenda Item 8
Municipal Projections

- Step 1 – Estimate Year 2010 population from available data
  - Water Use Survey, Census, TCEQ WUD, etc.
  - Self reported data variable
  - Multiple years examined
  - Non-populated utilities
- Step 2 – Apply a population growth rate for decadal projections
  - Generally from 2016 RWP for legacy WUGs
  - Most new WUGs at County-Other or overall county rate
  - Some from former named WUG (Missouri City, etc.)



Agenda Item 8
Municipal Projections

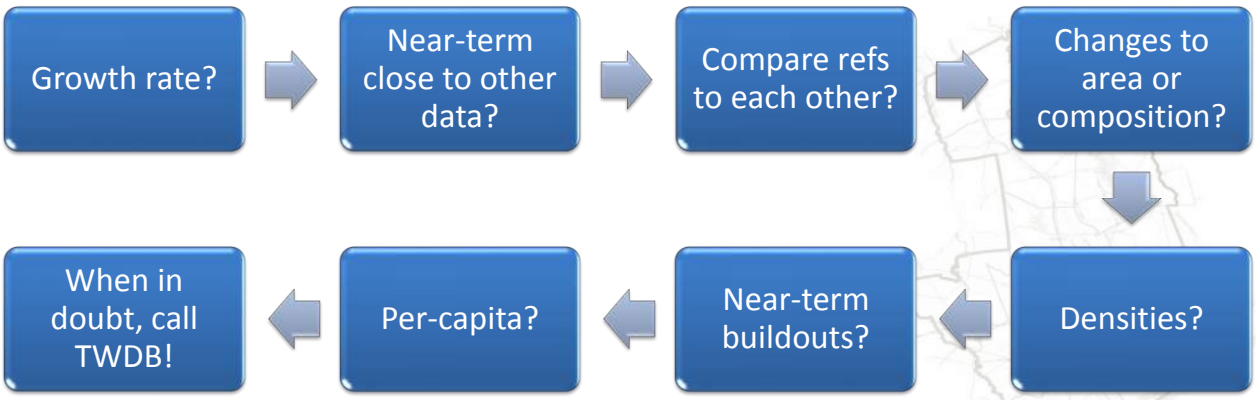
- Step 3 – Consider buildout
  - Mainly new WUGS
  - Aerial imagery
  - Judgement call
- Step 4 – Calculate demands
  - 2016 RWP per-capita for most legacy
  - 2011 or 2014 for new

Agenda Item 8
Municipal Projections

- TWDB methodology reasonable
- Still reasons for Region H review
- Major changes to WUG list and methodology
- Considerations for type

- Broad range of data
  - TWDB draft projections
  - 2016 RWP projections
  - HGSD and TWDB GIS data
  - TWDB Water Use Survey
  - TCEQ and PUC data
  - TSDC populations
  - WUG-PWS relationship tables
  - Aerial imagery
  - Stakeholder comments

Agenda Item 8
Municipal Projections



Agenda Item 8
Municipal Projections

- Projections reasonable
- TWDB reexamining several WUGs
- Need some changes to list
  - Cancellation
  - Annexation
- Stakeholder feedback

Agenda Item 8
Municipal Projections

Criteria for Adjustment

- 2010 pop. differs from baseline
- Growth rate difference
- Limitations or buildout
- Updated information or area

Data Required

- Connections or pop. number
- Estimates for cities by TDC or regional council
- Documentation from official of growth limits
- Documentation and maps for area changes
- Other data at RWPG discretion

Draft Population and Municipal Water Demand Projections Methodology for the 2021 Regional Water Plans

Previous regional and state water plans have been aligned with political boundaries, such as city limits, rather than water utility service areas. Recent TWDB rule changes now defines water user group (WUG) planning as being utility-based, and the emphasis of the development of draft projections for the 2021 regional water plans (RWPs) was on the transition of the 2017 State Water Plan (SWP) population projections and the associated water demand projections from political boundaries to utility service area boundaries.

WUG Criteria

Municipal WUGs in the 2021 RWPs are defined as:

(A) Privately-owned utilities that provide an average of more than 100 acre-feet per year for municipal use for all owned water systems;
(B) Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 acre-feet per year for municipal use;
(C) All other Retail Public Utilities not covered in paragraphs (A) and (B) that provide more than 100 acre-feet per year for municipal use;
(D) Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the RWPG; and
(E) Municipal and domestic water use, referred to as County-Other, not included in paragraphs (A)-(D) of this subsection

The list of WUGs for the 2021 RWPs was prepared based on the rules listed above and TWDB Water Use Survey data for the 2010-2014.

Population and Municipal Water Demand Projections

TWDB staff prepared draft population and municipal water demand projections for 2020-2070 for all municipal WUGs using projection trends based on the population projections in the 2017 SWP as reassembled by utility service areas. In addition, the municipal water demand projections generally utilize the base gallons per capita daily (GPCD) and water efficiency volumes from the 2017 SWP. However, a new set of 2010 population estimates for each municipal WUG were developed to reflect a utility based boundary (not political boundary) as a baseline population to be projected for the 2021 RWP.

1.1 2010 and 2011 Population Estimates for Municipal WUGs for the 2021 RWP

Multiple sources of data were used as proxies for estimating 2010 baseline population (permanent residential population) including:

- TWDB Water Use Survey population and connection data reported by Public Water Systems (PWSs);
- GIS analyses using year 2010 Census block data within known utility boundaries;
- TCEQ population and connection data for PWS; and

- 2010 Census Household Size

However, unlike the U.S. Census estimates for cities, there is no one data source that can be solely relied upon for estimating the 2010 permanent population served by water utilities because each data source has its limitations: 1) population reported in the residential Water Use Survey often includes transient population including tourists, seasonal workers or students, 2) available service area boundaries sometimes do not coincide with the actual service area, and 3) connections reported in the Water Use Survey may include commercial, institutional or multi-family housing connections. TWDB staff assembled the available data from different sources in a single spreadsheet/GIS framework as proxy to population and determined the initial 2010 baseline population estimates for the 2021 WUGs. Once the initial 2010 values were determined, they were adjusted to be reconciled with the corresponding total county population from the 2017 SWP.

Year 2011 population estimates were required to determine baseline GPCD calculations for new WUGs, and were obtained using the growth rate of population shown in the TWDB Water Use Survey based on the change in the number of connections reported from 2010 to 2011. The resulting percentage change was applied to the initial 2010 population estimate, obtained above, to determine an estimate of the 2011 WUG population.

1.2 Region and County-Level Draft Population Projections

Because there will not be new decennial census data available for use in the 2021 RWPs, the 2017 SWP region and county-level population projections were carried over and used as draft projections for the 2021 RWPs. As noted above, these county-level values were maintained for the upcoming plan, and the initial estimates of the WUG-level populations using the boundaries of the new utility-based planning unit were reconciled so that the original county totals from the 2017 SWP were maintained.

1.3 WUG-Level Draft Population Projections

The regional and state water plans require population projections for individual municipal Water Use Groups.

Below are the steps taken to develop WUG-level population projections:

1) Establish the bridge table between municipal WUG lists in the 2017 SWP and the 2021 RWP.
2) Estimate 2010 population served by a WUG based on the utility service boundary to be used as a baseline population for the 2021 RWP.
3) Use the projected trend of the corresponding WUG in the 2017 SWP and apply it to the utility-based WUG's 2010 baseline population to project the population for 2020-2070 to be used in the draft projections for the 2021 RWP. If multiple WUGs in the 2017 SWP became a utility-based WUG in the 2021 RWP, then the projected trend of the primary WUG (largest water user by volume among those WUGs) was used. For a new utility-based WUG that was included in County-Other in the 2017 SWP, draft population projections were developed by allocating growth from the county projections using the share of population and applying the WUG's 2010 share of the county population to the projected county population for 2020-2070.
4) Retain any build-out information from the 2017 SWP.
5) Apply the geographic splits based on the utilities' service area boundaries. The sum of all WUG populations within a county was then reconciled to the total county projections.

1.4 WUG-Level Demand Projections

Draft municipal water demand projections utilize the population projections and a per-person water use (GPCD) volume for each WUG. The GPCD minus the incremental water efficiency savings for each decade is multiplied by the projected draft population to develop the draft municipal projections.

Below are the steps taken to develop WUG-level demand projections in acre-feet/year:

1) Use the GPCD and water efficiency savings of the corresponding WUGs in the 2017 SWP to calculate draft water demand projections based on the draft utility-based WUG population projections for 2020-2070. If multiple WUGs in the 2017 SWP became a utility-based WUG in 2021 RWP, then a GPCD of the primary WUG (largest water user by volume among those WUGs) was used. For new WUGs that were part of County-Other WUG in the 2017 plan, the baseline GPCD was calculated based on the 2011 net water use (or 2014) reported in the Water Use Survey. The county average of water efficiency savings were used for these new WUGs.

   Demand Projection =
   Population x ((base GPCD – Water Efficiency Savings) x 365 days) / (325,851 gal/ac-ft)

2) TWDB staff applied a minimum of 60 GPCD for all WUGs which was also used as a lower bound for GPCD in the 2017 SWP.
3) For all county-other WUGs, the same GPCDs and water efficiency savings in the 2017 SWP were carried over and used to calculate draft demand projections.

Agenda Item 9

Receive update from Consultant Team and Population Demands Committee regarding the sub-WUG planning option and consider taking action to authorize the Population Demands Committee to evaluate potential sub-WUGs and submit requests for sub-WUGs to TWDB.

REGION H
Water Planning Group

Agenda Item 9
Sub-WUG Option

- Requested by a few RWPGs
- Primarily for rural areas
  - Small entities
  - Buried in County-Other
- Mainly impacts database
- Any Region can utilize, but…
- …Regions develop the data

Agenda Item 9
Sub-WUG Option

Criteria for Adjustment

- Approved by RWPG
- Due September 1, 2017
- Existing utility, PWS, or area
- RWPG develops projections, supplies, needs, WMS volumes, etc.
- Splits must roll up to WUG total
- Adjustments for other splits

Data Required

- List of sub-WUGs and utilities, PWS, or areas in each.
- Population, demand, and gpcd projections by region, county, and basin
- Any adjustments to other splits

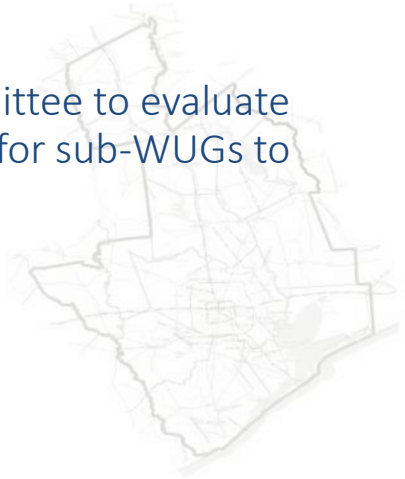
Agenda Item 9
Sub-WUG Option

- Should Region H utilize?
  - Increased detail
  - Data and schedule challenges
- Potential applications
  - Rural – H generally less issue than others
  - CRUs – Counter to purpose
  - GRP in CO – Planned for by sponsor
  - Annexations / Longer-term development

Agenda Item 9
Sub-WUG Option

Action:

Authorize the Population Demands Committee to evaluate potential sub-WUGs and submit requests for sub-WUGs to TWDB



Agenda Item 10

Receive update from Consultant Team regarding identification of Major Water Providers for Region H and consider taking action to submit a list of recommended Major Water Providers to TWDB.

REGION H
Water Planning Group

Agenda Item 10
Major Water Providers

- New concept for 5th cycle
- Largely replaces WWP role
- Broader category
  - WUG or WWP
  - Public or private
  - Any use category
- Key significance to Region's supplies
- Determined by RWPG

Agenda Item 10
Major Water Providers

- WWPs from prior RWP?
  - Baytown Area Water Authority
  - Brazos River Authority
  - Brazosport Water Authority
  - Central Harris County Regional Water Authority
  - Chambers-Liberty Counties Navigation District
  - Clear Lake City Water Authority
  - Dow Chemical USA
  - Fort Bend County WCID #2
  - Galveston
  - Galveston County WCID #1
  - Gulf Coast Water Authority
  - Houston
  - Huntsville
  - La Porte Area Water Authority
  - Lower Neches Valley Authority
  - Missouri City
  - North Channel Water Authority
  - North Fort Bend Water Authority
  - North Harris County Regional Water Authority
  - NRG
  - Pasadena
  - San Jacinto River Authority
  - Sugar Land
  - Trinity River Authority
  - West Harris County Regional Water Authority

Agenda Item 10
Major Water Providers

- Large suppliers / large GRP sponsors?
  - Brazoria County MUD #2
  - Conroe
  - Harris County MUD 106
  - Richmond
  - Rosenberg
  - Texas City
- What threshold?
- Others?
  - Industrial providers
  - Agricultural providers

Agenda Item 10
Major Water Providers

Action:

Approve list of Major Water Providers and authorize Consultant Team to submit a list of recommended Major Water Providers to TWDB.

Agenda Item 11

Receive report regarding recent and upcoming activities related to communications and outreach efforts on behalf of the Region H Planning Group.

REGION H
Water Planning Group

Agenda Item 11
Community Outreach

- Lower Brazos River Coalition
  May 31

LOWER BRAZOS RIVER
COALITION

Agenda Item 12

Agency communications and general information.

REGION H
Water Planning Group

North Harris County
REGIONAL WATER
Authority

Jimmie Schindewolf, P.E.
General Manager

February 15, 2017

Mr. Mark Evans, Chair
Region H Water Planning Group
San Jacinto River Authority
P.O. Box 329
Conroe, Texas 77305-0329

Dear Mr. Evans:

As you are aware, Mr. Jun Chang, P.E., has recently joined the North Harris County Regional Water Authority as Deputy General Manager. Please be advised that I wish to appoint Mr. Chang as my designated alternate to the Region H Water Planning Group.

My sincere thanks to Paul Nelson for having previously served as my alternate.

Sincerely,

Jimmie Schindewolf, P.E.
General Manager

JAS/lr

Cc: Jace Houston
Jason Afinowicz
Jun Chang, P.E.
Paul Nelson