TRANS-TEXAS WATER PROGRAM

PUBLIC PARTICIPATION/ STAKEHOLDER INVOLVEMENT PROCESS

West Central Study Area

INTEGRATED RESOURCE PLANNING COMMITTEE
Final Criteria Report

San Antonio River Authority

San Antonio Water System

Edwards Aquifer Authority

Guadalupe-Blanco River Authority

Lower Colorado River Authority

Bexar Metropolitan Water District

Nueces River Authority

Canyon Lake Water Supply Corporation

Bexar-Medina-Atascosa Counties Water Control and Improvement Dist. #1

Texas Water Development Board

March 1998

Robert Aguirre Consultants, L.C.
In Association With:
Katz and Associates, Inc.
Robert R. Ashcroft, AICP
Ximenes & Associates, Inc.
Nancy Scott Jones and Associates, Inc.

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Introduction

The Integrated Resource Planning Committee is a representative group of citizens from across the West Central Study Region of the Trans-Texas Water Program. Appointed in September 1997, the Committee deliberated and ultimately agreed upon the planning criteria contained in this report on page 11.

These criteria respond to the issues, concerns and considerations for water planning that these citizens believe to be of importance to their communities. A clear understanding of the interdependencies that exist among the various rivers, aquifers, bays, estuaries and other bodies of water — below and above ground — of the study region was necessary for the development of this regional criteria. The size of the study region made it necessary to resolve conflicting interests and priorities in a manner beneficial, or at least neutral, in its impact on the various areas of the region. Consequently, the criteria reflect a crucial regional perspective on water planning.

The intended audiences for these criteria are the water planners of the various agencies across the region — or other regions that may result from Senate Bill 1 — and the citizens who water agencies may involve in the planning for their area. It is the expectation of the IRPC members that these criteria will be used by water planners and citizens alike to evaluate the acceptability of various water alternatives[1].

The criteria, as they are written, provide general guidelines for measuring public acceptability across the region. Water planners, with input from their citizens, may want to indicate priorities among the various criteria by setting up a "weighting" system, giving certain criteria more importance than others. However, the IRPC members were reluctant to establish a weighting system out of respect to their successors who would actually be applying the criteria as part of the decision-making process, and because they believe all of the criteria are relevant and important.

[1] In this report, and in the deliberations of the IRPC, "alternatives" refers to any combination of water resource options.

Background

The Trans-Texas Water Program

The Trans-Texas Water Program was initiated as a regional water planning process by the Texas Water Development Board to identify the most cost-effective and environmentally sensitive strategies for meeting the current and future water needs of southeast, south-central, west-central and north-central Texas. Each of these areas was designated as a study region. This report relates to the West Central Study Area of the Trans-Texas Water Program which was formed in 1993 (see map of study region, p. 3.). The West Central Study Area comprises thirty-two (32) counties west of the Brazos River and includes the Guadalupe-Blanco, San Antonio and Lower Colorado River basins, part of the Nueces River basin, the Edwards Aquifer and part of the Carrizo-Wilcox Aquifer.

Initially, the program was to be carried out in three phases: 1) Program Initiation/Conceptual Planning; 2) Feasibility Studies; and 3) Implementation. The Senate Bill 1 process superseded the Trans-Texas Water Program process and consequently, feasibility studies and the implementation phases were not completed.

During the past four years, over 150 regional water options have been identified. They include a wide variety of strategies including conservation and reuse, desalination, ground-water recharge enhancement, conjunctive management of surface and ground water, improved systems of operation of existing reservoirs, demand management through periods of drought, and sharing of water among river basins.

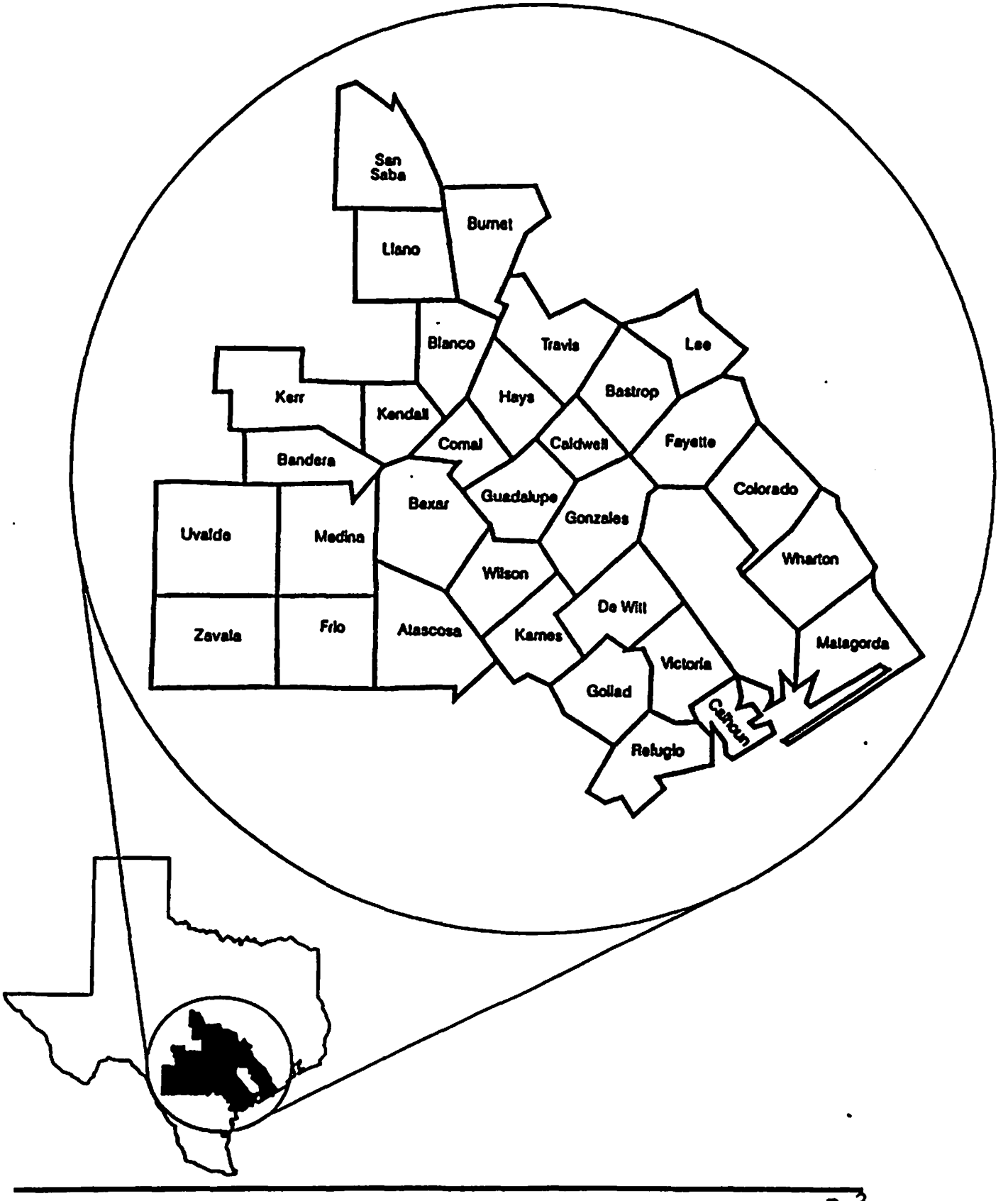
The next step of the process was to evaluate the alternatives for their public acceptability and recommend the alternatives that were both publicly acceptable and technically feasible. At this point, the decision was made that the criteria for evaluating the alternatives would be developed, but not applied, due to the Senate Bill 1 process that would commence in February 1998.

The Policy Management Committee

The Policy Management Committee (PMC) was responsible for oversight and direction of the Trans-Texas Water Program. A PMC existed at the state level as well as at the study area level.

WEST-CENTRAL STUDY AREA

TRANS-TEXAS WATER PROGRAM



The role of the state level PMC was to guide the overall process, establishing planning parameters and guidelines applied in all studies and ensuring coordination among the planning areas. The PMC at the state level was chaired by the Texas Water Development Board's Executive Administrator and included representatives from the Texas Natural Resource Conservation Commission (TNRCC), the Texas Parks and Wildlife Department (TPWD), the Coastal Coordination Council (CCC) and representatives from each of the study areas. The US Army Corps of Engineers and the Bureau of Reclamation served as advisory members.

The PMC for the West Central Study Area had thirteen members who voluntarily agreed to come together to plan for the region. The San Antonio River Authority chaired the PMC and also served as the administrative agency for the program. The other members were:

- San Antonio Water System
- Edwards Aquifer Authority
- Guadalupe-Blanco River Authority
- Lower Colorado River Authority
- Bexar Metropolitan Water District
- Nueces River Authority
- Bexar-Medina-Atascosa WCID #1
- Canyon Lake Water Supply Corporation
- Texas Water Development Board
- Texas Natural Resource Conservation Commission
- Texas Parks and Wildlife Department
- Coastal Coordination Council

Membership on the PMC consisted of water agencies who contributed funds to the program for its operation.

The PMC provided oversight of the operations of the program and made and implemented policy decisions for the study area. It will conclude its work in March 1998, shortly after the Senate bill 1 process goes into effect.

Commitment to Public Participation

At the onset of the program for the West Central Study Area, an Advisory Committee for Public and Technical Input was established. Its members were sent copies of the draft technical reports generated by the program's studies for review and comment. The group was composed primarily of

representatives of water agencies and technical experts on water issues. As the process of studying the options proceeded, the PMC realized they could not continue without getting significant public input to the process. At that point, they hired a public participation consultant, Robert Aguirre Consultants of San Antonio, to design and implement a strategic public participation process that would provide the guidance the PMC sought from the public. Shortly thereafter, the PMC adopted the Principles of Participation, formalizing a firm commitment to the ideal of public participation in the decision-making process for the West Central Study Area. (See p. 6.)

The public participation process established by the PMC for the study area consisted of the following major steps:

- a public issues survey
- an initial round of focus groups
- public workshops
- a second round of focus groups
- the appointment of the Integrated Resource Planning Committee

A full report on each of these public participation activities can be found in the Public Participation Final Report for the West Central Trans-Texas Water Program dated February 1998.

Creation of the Integrated Resource Planning Committee

In order to continue to involve those individuals who had participated in the process since its beginning, it was decided that three groups would be established, using the Advisory Committee for Public and Technical Input and the participants of the focus groups as the primary source for recruiting members. The three groups established were the Public Participation Advisory Group (PPG), the Technical Input Group (TIG) and the Integrated Resource Planning Committee (IRPC).

The IRPC was appointed by the PMC in September 1997 and began their deliberations in October 1997. The committee's membership was representative of the geographic and demographic breadth of the region as a whole and included representatives of municipalities, counties, industries, agricultural interests, environmental interests, small businesses, water districts, water utilities and the general public. (See list of committee members in Appendix 2.) Their mission was:

> To develop an informed public criteria by which

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
PUBLIC PARTICIPATION/STAKEHOLDER INVOLVEMENT
JANUARY, 1996

PRINCIPLES OF PARTICIPATION

This declaration formally expresses our commitment to a comprehensive public participation/-stakeholder involvement process in the Trans-Texas Water Program. By adopting and implementing the principles embodied in this declaration, the public's input will play a critical role in evaluating the water planning alternatives to be considered for this region.

While each participating agency is responsible to its respective constituents, our collective regional responsibility is to identify the most cost-effective and environmentally-sensitive alternatives for meeting the current and future water needs of the West Central Region. In addition, we must ensure that the public and stakeholders significantly participate in deciding which alternatives will be considered and which are the most acceptable for implementation.

By unanimous adoption of this statement, the West Central Policy Management Committee of the Trans-Texas Water Program commits itself to the following principles of public and stakeholder participation:

- The public/stakeholder's participation must be broadly based and inclusive of all study area constituencies.

- It is the responsibility of the Trans-Texas Water Program and its sponsors to be proactive in its commitment to seek public/stakeholder participation and input.

- Public/stakeholder communication must be timely, truthful, consistent, and two-way.

- The Policy Management Committee, as the responsible decision-making body, must be accountable for the integrity of the public/stakeholder participation process and the manner in which the public's input shapes the final outcomes of the program.

In this effort we recognize that the overall quality and depth of public/stakeholder participation can only be as good as our ability to effectively communicate the complex issues associated with water planning alternatives.

These Principles of Participation recognize that no present or long-term water strategy can be implemented without the general support and consent of the public and stakeholders.

The Policy Management Committee
Trans-Texas Water Program
West Central Region

regional water resource alternatives should be evaluated. The IRPC will provide its input to the West Central Trans-Texas Water Program Policy Management Committee (PMC) for dissemination to local water officials as well as the regional planning group defined by the Texas Water Development Board in conjunction with Senate Bill 1.

The PMC specified that the IRPC should use a modified Integrated Resource Planning process in order to accomplish their mission. The PMC's decision was based on the unique characteristics of the IRP process that distinguish it from traditional water planning. In addition to active public participation as an essential element of the process, the IRP process considers conservation as an integral component along with other resources, in the supply/demand equation. These unique characteristics were reflected in the establishment of the IRPC and the objectives of its deliberations.

The committee's objectives were to:

- Develop a regional understanding of water resource issues, history, and options;
- Examine interdependent relationships among water resources and facilities;
- Review and validate regional growth and water demand assumptions and projections;
- Consider the need for, and role of, conservation in reducing future water demand;
- Ensure that community values and concerns are reflected in an expressed regional planning criteria; and,
- To develop the public's regional criteria by which future water resource options should be considered.

The process the IRPC members followed in the development of their criteria consisted of seven steps:

1. Agree to a common definition of their mission and the ground rules by which they will abide.
2. Develop a regional understanding of water resource issues, history, options, and recent legislative impacts.
3. Discuss present and potential interdependent relationships among water resources and facilities in the region.
4. Develop a common definition of the problem(s) that need addressing.

5. Develop an understanding of conservation's role in reducing water demand.
6. Develop an understanding of when and where shortfalls in water supply may occur.
7. Begin a process of identifying the criteria by which water resource options should be evaluated.

Lewis Michaelson, a facilitator experienced in the development of an Integrated Resource Plan, was the IRPC facilitator and assisted the committee through its process of developing the water planning criteria.

IRPC Chronicle

The IRPC held its first meeting in October 1997 at the office of the San Antonio River Authority, a location subsequently deemed by the committee members to be of central location in the study area for the purpose of holding future IRPC meetings.

The following is a chronicle of the five meetings held by the committee from the months of October 1997 through January 1998.

October 4, 1997

The goal for the meeting was to get an overview of the Trans-Texas Water Program, receive and agree to the mission of the committee and its process for achieving the mission, and establish ground rules for the operation of the committee. Also included in the day's goal was to gain an understanding of the hydrological, economic and social interdependencies across the region as well as to discuss what the committee's vision was for regional water planning.

The charge of the IRPC as stated by Fred Pfeiffer, Chairman of the West Central PMC, was to develop regional planning criteria by which water resource alternatives should be evaluated. Ground rules were established regarding how the committee was to conduct its business. Lewis Michaelson gave an overview of the IRP process as it applies to the committee's charge, and Steve Raabe, Project Manager for the West Central Study Area, gave a history and overview of the Trans-Texas Water Program.
Mr. Raabe spoke to the interdependency issue in hydrologic, social, as well as economic terms. There was a lengthy discussion concerning the

naturally occurring interdependence among areas within the region when it came to water - such that what one area does will impact another area. Also discussed, under legislative impacts, was the fact that the region could likely be redefined by Senate Bill 1 but that the interdependencies will still exist no matter how lines were drawn on a map.

November 1, 1997

The goal for this meeting was to explore the committee's vision for regional water planning, and to receive a report from HDR Engineering regarding population growth statistics, population growth projections, historic water demand numbers, and water demand projections to the year 2050. Discussion of water conservation and how it plays a role in water planning was also included in the goal.

The committee discussed its vision for regional water planning and listed a number of items that should be elements in a regional water plan. Dr. Herb Grubb of HDR Engineering, technical consultant for the program, presented projections from across the region on population growth, water demands and historic water consumption.

The committee discussed conservation and its role in reducing water demand, but did not come to any conclusions in this meeting about the level of importance it should play in the development of criteria.

November 22, 1997

The goal for this meeting was to complete the basic orientation of the committee with the presentation of data on water supply availability and supply shortfalls, and then to further consider the water conservation issue as a necessary first step toward criteria development.

After presentation and discussion of the water supply availability and supply shortfalls data, the water conservation issue was discussed at length. The committee developed, by consensus, a series of statements on conservation. The committee indicated that these statements needed to be considered in their entirety and not taken out of context.

1. Conservation is generally supported as a cost-effective and environmentally sensitive means for addressing water demand.

2. Everyone in the region shall commit to doing conservation that is reasonable and practicable in their area.
3. Conservation has many potential advantages and disadvantages, depending on where and how it is used.
4. Conservation shall be evaluated in a context of long-term cost-effectiveness and impacts.
5. A "one size fits all" approach to conservation will not work due to sub-regional differences in: cost effectiveness, use patterns, weather/hydrology, population distribution/growth, shortfall/surplus conditions, and water quality.
6. The state, regional, and local planning entities all have a role to play in setting conservation goals. However, local control and determination is critical for obtaining stakeholder/community acceptance, commitment, and compliance.
7. Fairness is a key factor in determining which and how much conservation is practical.
8. Research on water conservation technology to lessen the inconvenience on users shall be encouraged.
9. Public education plays an important role in water conservation.
10. Cost incentives and disincentives shall be developed to promote conservation.

The issuance of an interim report on the committee's work to date was approved by the committee.

December 13, 1997

The stated goal for this meeting was to consider whether or not the committee believed it needed any other information in order to move forward, and to begin the process of criteria development.

Supply options, population growth and water demand projections, and drought information were discussed. Information on water availability specific to the Lower Colorado River basin, however, was not yet available and consequently was carried over to the next meeting.

A three-step process for developing the criteria was presented: 1) brainstorming; 2) evaluating what was brainstormed in order to select the items to focus attention upon; and 3) defining each of the items selected.

The committee then began the process of defining each of the criteria and had completed the categories of environmental, reliability, and compatibility by the end of the meeting.

January 10, 1998

The main goal for this meeting was to finish the criteria identification and definition process.

Another goal was to provide additional guidance or recommendations related to regional water planning to the PMC if the IRPC members so desired; three potential areas already identified at the fourth meeting were: the importance of public participation, the need for public education, and a need for a "balance" in terms of how the planning criteria are applied.

The committee received presentations on groundwater recharge and the water supply projections for the Lower Colorado River Basin.

The committee then completed the definitions of the remaining criteria and discussed and reached consensus on the recommendations they wanted to make to provide guidance for the application of the criteria and for water planning in general.

They approved the outline submitted for the final report and requested the report be submitted with a cover letter from the committee members.

Fred Pfeiffer informed the committee that the PMC would do all in its power to distribute the results of the committee's work to the appropriate parties.

Committee Conclusions

Water Resource Evaluation Criteria

The Water Resource Evaluation Criteria listed below were the result of the deliberations of the Integrated Resource Planning Committee over the period of its existence. As agreed to by the committee and the PMC for the West Central Study Area, these criteria will be submitted to the Texas Water Development Board as part of the record of work accomplished by the Trans-Texas Water Program for this study area. They are intended for use by water planners as they evaluate the various alternatives to meet the

water needs of their region. The criteria would be employed by asking how well an alternative achieves the following objectives:

Economic

- Facilitates economic development
- Minimizes long range negative socio-economic impacts (including loss of tax base)
- Promotes opportunities for cost sharing and economic partnership
- Provides cost effective solutions

Water Quality

- Provides and maintains appropriate water quality for the intended use

Fairness

- Maximizes efficient use of water in areas that import water
- Promotes equitable distribution of costs in meeting region's water needs

Feasibility

- Demonstrates feasibility in terms of timing, technical/scientific, economic, political, regulatory, legal, and public acceptance factors

Efficiency

- Minimizes evaporative and distribution losses
- Promotes conservation
- Promotes conjunctive use

Flexibility

- Adaptable to new and innovative technology
- Adaptable to changes in demand projections
- Adaptable to changes in law
- Adaptable to future supply options

Compatibility

- Maximizes regional compatibility with local water plans
- Minimizes negative impacts on property rights
- Maximizes consistency with local growth management plans
- Maximizes compatibility with plans from surrounding regions

Reliability

- Maximizes a sustainable (referring to yield) supply of water for short-term and long-term needs
- Minimizes interruptions to water supplies

Environment

- Minimizes short-term and long-term negative impacts on natural resources
  - Wildlife/habitat
  - Rivers
  - Bays
  - Estuaries
  - Lakes
  - Aquifers
  - Karsts[2]
  - Air quality
  - Water quality
  - Wetlands
- Minimizes short-term and long-term negative impacts to the human environment
  - Recreational
  - Cultural/historical
  - Archeological
  - Aesthetics

Recommendations

The IRPC agreed on the following recommendations with the intention of providing more guidance to water planners to assure better regional water planning. The IRPC wanted to emphasize the need for water planners to take into account the indirect impact of their actions and decisions as well as their direct impact. The recommendations were:

- Public participation and education should continue to be an integral part of a regional water planning process.
- When evaluating alternatives, ensure that indirect impacts such as growth inducing or inhibiting effects are considered.

[2] A limestone region characterized by sinkholes, underground streams, caverns and the absence of surface streams or lakes.

Appendix

Meeting Agendas and Meeting Notes

Trans-Texas Water Program - West Central Region
Integrated Resource Planning Committee (IRPC)
October 4, 1997, 9:30AM
San Antonio River Authority Board Room

AGENDA - MEETING #1

I.	Meeting is convened	Lewis Michaelson
II.	Welcome	Fred Pfeiffer
III.	Introductions	Lewis Michaelson
IV.	Review committee mission and ground rules	Lewis Michaelson
V.	Overview of the IRPC process	Lewis Michaelson
	■ The Committee's final product ■ What we need to accomplish today	
VI.	Overview of the Trans-Texas Water Program	Steven Raabe, P.E.
	■ History of planning in this region ■ Mission Statement ■ Studies Conducted ■ Principles of Participation ■ Present status	
VII.	Legislative impacts	Steven Raabe, P.E.
	■ Trans-Texas' vision for regional planning ■ What is Senate Bill 1? ■ How the IRPC product will be used	
VIII.	Interdependent relationships	Steven Raabe, P.E.
IX.	The committee's vision for regional planning	Committee Members
X.	Future meeting dates/locations	Committee Members
XI.	Public Comment	Lewis Michaelson
XII.	Adjourn	

NOTE: There will be a thirty minute lunch (provided) break for committee members. Guests in attendance will have the opportunity to purchase lunch.

MEETING NOTES
TRANS-TEXAS WATER PROGRAM
INTEGRATED RESOURCE PLANNING COMMITTEE (IRPC)
OCTOBER 4, 1997

Attending:

Richard Barton
Hank Brummett
David Carrothers
Errol Dietze
Claudia Garza
Linda Lesso
Mike Mahoney
Fran Merritt
Haskell Simon
Charles Trefny
Scott Wall
Ed White, Jr.
Evelyn Bonavita
Joe Cantu
Gary Damuth
Ranae Garcia
Donald Hoogenakker
Patsy Light
Pamela McKay
Gloria Rivera
Dede Stevenson
Brian Vauter
John Wendele
Zack Williams

Absent:

Hugh Charlton
Cameron Cornett
John Hohn
Judy McAda
Cole Rowland

Staff/Consultants Attending:

Fred Pfeiffer, Chairman, PMC
Steve Raabe, TTWP Project Manager
Robert Aguirre, Public Participation Coord.
Lewis Michaelson, IRPC Facilitator
Linda Ximenes, IRPC Coordinator

I., II., AND III CONVENING THE MEETING, WELCOME AND INTRODUCTIONS

Lewis Michaelson, the Facilitator for the IRPC, opened the meeting and asked everyone to introduce themselves by saying their names, where they were from and what their interests were. Mr. Michaelson then turned the meeting over to Fred Pfeiffer, Chairman of the Policy Management Committee of the Trans-Texas Water Program, West Central Study Area.

Mr. Pfeiffer encouraged the IRPC members to think of themselves as pioneers since this would be the first time in the state of Texas that this sort of regional planning has occurred. He stated there were some serious problems in the region and the work of the IRPC will make a significant contribution to the resolution of these problems, making what they do very important to the future of Texas and the region.

IV. Review Committee Mission and Ground Rules

Mr. Michaelson reviewed the objectives of the Committee, emphasizing the importance of the input from the members in the development of the criteria for considering future water resource options. He went on to review the ground rules and characteristics of the desired process. Mr. Michaelson reviewed the committee's mission and the process that would be used, emphasizing that it would be a collaborative, problem-solving approach that, if it is successful, will come very close to achieving consensus. In the case of not reaching complete consensus, all minority opinions will be included in the reporting process. He pointed out that the IRPC would not develop a plan, but would develop the criteria that would be used for the development of plans by the various entities of the region. He mentioned that there is a reimbursement form for mileage that should be turned in.

Technical people will be asked to present information of a technical nature. Committee members were asked to let Mr. Michaelson know if at any time there was additional information they would like to have.

At the request of a Committee member, a copy of Senate Bill 1 will be provided. It is available on the Internet at the Texas Water Development Board's (TWDB) web site: www.twdb.tx.gov.

V. Overview of the IRPC Process

Integrated Resource Planning (IRP) is a process adapted from the electric industry and has characteristics not usually found in traditional water planning. Specifically, it uses conservation as a necessary ingredient in the planning process. It also takes into consideration the resources and the facilities available to meet the water needs of the region.

"Alternatives" in this case will be defined as a combination of options that together meet the resource needs of the region. IRP is a problem-solving process, not a puzzle-solving process which has only one answer. The role of the Committee is to determine the criteria needed to evaluate the alternatives and assess the trade-offs of each one. The criteria should reflect the community values that the Committee members brought to the table for consideration when judging the various alternatives. The Committee will not be asked to judge the options that make up the alternatives, but rather to assess the trade-offs inherent in the alternatives as a combination of options.

Two criteria that have already been mentioned are cost-effectiveness and environmental impacts. These two criteria have a number of possible sub-categories that the Committee might identify, based on the values they apply to the category. For example, cost effectiveness might include the cost of the water itself, how the cost is shared, and sources of funding. For environmental impact, sub-categories might include the endangered species, the bays and estuaries, wildlife, agriculture, aquaculture. The job of the Committee will be to identify and define the criteria that should be used to evaluate the alternatives for future water resources.

VI. Overview of the Trans-Texas Water Program

Steve Raabe, Project Manager for the West Central Study Area of the Trans-Texas Water Program, began his presentation by defining the word "region," saying that it usually means a large geographic area. It can also be used to mean more than one water entity planning together. All water purveyors, agencies and municipalities are obligated to do water planning, either by statutory requirement or because of good management. Examples of regional planning he pointed to were:

- the development of the Highland Lakes in the 1930's and 40's
- LCRA's Water Management Plan in the late 70's and their Drought Management Plan in the 1980's
- GBRA's Master Plan in 1950's
- the Water Exchange Plan developed by GBRA in the 1960's and again in the 1980's with SARA
- and the State Water Plans in 1960 and again in 1969

He emphasized that there will never be a time when all the information will be available, so the decision is always based on the best available information at the time. Things change and values change so it is necessary to do planning regularly.

The Trans-Texas Water Program has several different study areas. In 1992, the Texas Water Development Board identified significant water needs in southeast and south central Texas. In 1993, the West Central Study Area was formed. It included the upper Nueces River, Guadalupe River, and Lower Colorado River basins, the Edwards Aquifer and portions of the Carrizo-Wilcox Aquifer. He reviewed the management structure of Trans-Texas and the membership of the West Central Study Area's Policy Management Committee (PMC) and explained the rationale

for its membership, pointing out that membership was voluntary and reflected a monetary contribution to the program.

Over the last three-to four years technical studies have been conducted on very specific options in the region. They all have technical information, but do not explore what the "other issues" might be. Originally it was thought that the options would be identified and then would have further study if they warranted it, but the PMC realized that they could not get adequate public input with the structure that was in place. At that point they hired Robert Aguirre Consultants to assist in the public participation process. Shortly thereafter, the Principles of Participation were adopted by the PMC, and served as the basis for the public participation process of the program. Trans-Texas was the first step in getting significant public participation in a regional water planning process.

VII. LEGISLATIVE IMPACTS

Senate bill 1 changes some of the aspects of Trans-Texas because it changes the voluntary regional planning into a mandatory process and lays out the governance of the regional planning area. The regional plans will be submitted to the State and they will develop a state plan. The regulatory agencies are then bound by the Regional and State Plans when someone requests water permits or grant funds. The goal of developing water supplies and management strategies to meet the long-term and short-term needs of the region is the same for Trans-Texas and for the Senate Bill 1 process.

The IRPC product will be used in essentially the same way as the SB 1 process because the entities will not change, only their configuration. He pointed out that the TWDB had a meeting last month to review issues inherent in SB 1, and the number one issue was overwhelmingly the acceptance and reliance on information from previous planning and study efforts; the need for them to be folded into and incorporated into the SB 1 planning process. A set of criteria developed on a regional basis will help the entities who have to do planning and make decisions while the SB 1 planning process is taking place between now and 2000 when the regional plans are due to be completed.

A committee member reported that at a meeting he was told that nothing could move forward until SB 1 was completely complied with in 2002. Mr. Raabe responded that there are certain needs like drilling wells and permit amendments on a small scale that would need to go forward in the

interim. The State Plan that was adopted in 1996 will still be in effect until the new one is adopted, so it will be used to guide the interim activities.

A question was asked about the results of the focus groups that were conducted throughout the region. The Public Participation Issues Document and the Public Participation Plan were developed and disseminated as a result of the focus groups. A copy of the document will be distributed to IRPC members.

A member noted that she had a concern that it seemed that the PMC was heavily weighted for entities representing San Antonio. Mr. Raabe explained that the membership was voluntary and the entities who provided money for the studies automatically became members of the PMC. Other entities across the region provided input through the Technical Committee.

A member asked if there was a plan to get the studies already conducted to the membership in a digestible form so they could be used in the development of the criteria. The response was that the technical studies all represent different options, and the criteria developed will be used to evaluate the various options, none of which have been eliminated at this point. A list of the studies will be provided to the Committee members. Summaries of the options are available. The issue of the information about the studies will be brought up at the next meeting after Committee members have had an opportunity to review the list of studies.

One member pointed out that the Committee was charged with developing the criteria that would be used to evaluate the options, not to discuss the options themselves. The results of the focus groups from each of the areas would be helpful so they could see what concerns were expressed in their area to determine if they coincide with their own.

A member commented that it may be necessary to understand the different individual concerns of the members to be able to understand the regional concerns and how they conflict and/or coincide. The facilitator agreed, stating that the individual concerns would emerge as part of the discussion and would need to be reconciled with the regional interests and concerns.

Another member said that in order to understand what these different interests are, it might be important to know how the new region will be drawn, since it will most likely be different with SB 1. Mr. Raabe pointed out that the physical, hydrological, and economic interdependencies among

the various river basins and water resources remain the same regardless of how the TWDB draws the line.

A question was asked about whether this process was being used in the other study areas. Mr. Raabe explained that this was the only study area that was proceeding with the public participation process as it is designed here. The intent was to move the process forward as much as possible to lay the groundwork for the transition to SB 1.

The question was asked if the criteria developed by the group could be used by other regions, and the response was that if it was done well, it should be adaptable to other regions. One member pointed out that many of the people on the IRPC would still be active and involved in the SB 1 process once it reached implementation.

When asked if the IRP process was prevalent among water planners, Mr. Michaelson responded that the scale of the process was unprecedented. Using an Integrated Resource Planning Process for water resources is relatively new, and doing it for this large a region with many entities has its own challenges.

What will keep the group from developing criteria that would conflict with the criteria developed by other regions? Mr. Raabe responded that the conflict might come with the actual alternatives that are selected for implementation, not with the criteria. As the criteria is developed, the "push and the pull" across the region will become apparent and that is part of what the exploration of the interdependencies will entail. In SB 1 planning and coordination across regions is called for, so those conflicts that occur when alternatives are selected for the regional plans will have to be worked out by the TWDB.

A member suggested that it would be necessary to take a broad look at the criteria, considering the commonalties as well as the conflicts. Mr. Michaelson pointed out that within each criteria there may be sub-categories for consideration. The question of "weighting" each of the criteria will also be of importance since it may vary from one region to another.

One member pointed out that if there is a conflict among regions that goes to adjudication, the side that has done its homework and taken the greatest number of elements into consideration is most likely to prevail.

VIII. INTERDEPENDENT RELATIONSHIPS

Mr. Raabe explained that there were some particularly unique interdependencies in the West Central Study Area and that he would be addressing two different kinds of interdependencies: 1) hydrological/ physical; and 2) economic/social. A unique characteristic of the basins is that they can be very wide, but as they move toward the coast, they become very narrow, i.e., the San Antonio River basin, Guadalupe River basin, the Colorado River basin and the Lavaca-Navidad River basin. The Edwards Aquifer covers Kinney County eastward and into Williamson and Bell Counties. In Hays County it divides and is associated with the San Marcos Springs, Comal Springs and San Pedro Springs. He pointed out the Carrizo Aquifer that extends from Winter Garden area all the way to the Louisiana border and into Louisiana and south into Mexico.

Surface water streams and the aquifer systems are laid down in bands. Water that hits the ground as rain and goes into the San Antonio, Guadalupe and Nueces River basins often goes into the Recharge Zone of the Edwards Aquifer and absorbs most of the water that comes across it, leaving very little for runoff to areas south of the Recharge Zone unless it is a significant flood. He explained that the Edwards is a limestone aquifer that is easily recharged and the Carrizo Aquifer is a sand aquifer that does not register recharge as readily.

The flow pattern of the Edwards goes from west to east so that the recharge travels through under pressure and it causes it to come out of the springs at San Pedro Springs, the San Antonio Springs, Comal Springs and San Marcos Springs. The San Pedro Springs only flow intermittently. When the spring stops flowing, it means that the water level is below the "lip" of the springs, somewhat like a bathtub where the water does not go out of the overflow drain even though there is still water in the tub. An unusual characteristic of the Edwards Aquifer is that about 70 percent of the recharge occurs in the Nueces River basin, some in the San Antonio River basin, and almost none in the Guadalupe River basin. The average recharge is about 600-650,000 acre feet per year. An acre foot is roughly equivalent to one foot of water covering an area the size of a football field.

When the springs flow, the water discharges into a river, setting up the physical interdependency between the aquifers, the springs and the river basins, all the way to the coast.

Water flows from the San Antonio to the Guadalupe River basin. The San Antonio River is a tributary of the Guadalupe River with the confluence just north of the coast. These two basins converge, making them very inter-related. For example, if conservation and recycling of water reduce the amount of water that goes into the San Antonio River, then it impacts all the way downstream to the coast on those who have historically relied on the normal discharge of these rivers. This demonstrates that any particular option does not have a simple effect, but becomes part of the "push and pull" that was mentioned earlier.

Mr. Raabe agreed to put together a map that would show the interdependencies.

The most significant feature of the Trinity Aquifer which is the next "layer up" from the Edwards Aquifer is that it is not as productive — not as much water can be taken from it — and the quality of the water is poor. It is a good example of where the resource cannot keep up with the demand.

In response to a question about which aquifers are down from the Carrizo, Mr. Raabe responded that the next aquifer after the Carrizo was the Queen City Aquifer, then the Sparta, then the Gulf Coast Aquifer. The Gulf Coast Aquifer was the source of water for Houston and they realized that the land was subsiding as much as ten feet due to the reduced water pressure.

It was pointed out by one of the Committee members that the Gulf Coast Aquifer is not one large homogeneous formation like the Edwards, but instead there are numerous variations in its composition. Care must be taken not to pump too much from it because of intrusion of saline water from the coast.

Mr. Raabe was asked if all underground water was in an aquifer. He stated that that was pretty much the case. It is a body that is of some kind of material that has water percolating through it; these can be layered one on top of another and vary in size and quality of water. Artesian aquifers are aquifers that are under pressure and the water will spout out if they are perforated.

A question was asked about why other aquifers besides the Edwards are not talked about; what are the other aquifers that this group should be concerned about? Why is the Carrizo-Wilcox named that way? It is called the Carrizo-Wilcox because there are actually two — the Carrizo and the Wilcox— but there is little distinction between them. A committee

member said that she thought the Edwards was usually mentioned more often because of the high quality of its water as well as the endangered species at the spring outlets. It is also the sole source of water for a major city.

Mr. Raabe mentioned the Oglala Aquifer in the High Plains around Lubbock as another well developed aquifer. It extends through Oklahoma and into Nebraska. That aquifer has been effectively mined and is not renewing itself at an adequate rate.

One Committee member pointed out that a unique feature of the Edwards Aquifer was its ability to recharge almost overnight. It also is not capable of storing water the way a sand aquifer like the Carrizo might.

A question was asked about the average annual rainfall. Mr. Raabe responded that the records from 1885 to 1970 show the average annual rainfall at 27 inches per year. From 1971 to 1995 it is 34 inches per year.

The economic interdependencies include those between Austin and San Antonio, Comal County and the Canyon Lake area with the surrounding counties. Many people work in Bexar County and live in neighboring counties. Fifty percent of the Wilson County population works in Bexar County. This is the case for many of the counties in metropolitan areas. What happens in one county, affects people in other counties.

The IH-35 Corridor is another economically interdependent region. That particular area traverses three river basins: San Antonio, Guadalupe and Colorado Rivers. Victoria and Seguin also exercise economic influence on the geographic areas surrounding them.

All of these characteristics play a part in the consideration of the criteria. Asking ourselves: "Is water being acquired at the right social, economic and other costs?" is of great importance when making criteria decisions.

IX. THE COMMITTEE'S VISION FOR REGIONAL PLANNING

Mr. Michaelson commended the Committee members for being willing to explore the current situation and get background information before jumping into the solution stage as is characteristic of many groups. Their willingness to invest some quality time in the problem identification phase will give them a stronger foundation for the solution phase.

He asked the Committee if they would be willing to put off the discussion of the Committee's Vision for regional water planning to the next meeting since the time was almost up, and they agreed.

The Committee members decided that future meetings would be held in San Antonio, because changing it to any other location would only mean adding time to someone's drive.

The Committee set the next meeting date for November 10 at 9:30 a.m. until 3:00 p.m. at the San Antonio River Authority office in San Antonio. Subsequent meetings will be on:

- November 22
- December 13

It was agreed that if it became necessary toward the end of the process to meet over a Saturday and Sunday, that the Committee would do that.

The meeting was adjourned at 2:10 p.m.

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE
PLANNING COMMITTEE (IRPC)

Mission Statement:

The mission of the **Integrated Resource Planning Advisory Committee (IRPC)** is to develop an informed public criteria by which regional water resource alternatives should be evaluated. The IRPC will provide its input to the West Central Trans-Texas Water Program Policy Management Committee (PMC) for dissemination to local water officials as well as the regional planing group defined by the Texas Water Development Board in conjunction with Senate Bill 1.

Membership

Dictated by the complexity of their charge, membership will be restricted to twenty five to thirty people who will be representative of the region and its interests. Membership to the IRPC will be by PMC appointment, based upon recommendations from citizens and local water and elected officials. Members will be expected to attend six scheduled meetings over a five month period. Prospective members will be interviewed in order to determine their availability and willingness to make the necessary commitment of time.

Members serve on a voluntary basis and will be reimbursed for mileage if attending meetings in their personal vehicle.

Objectives

The IRPC is charged with conducting a facilitated process of deliberations regarding regional perspectives and interests for the purpose of developing a regional criteria by which water resource options should be evaluated. To do this several objectives have been identified which further define the IRPC's mission. They objectives are:

- Develop a regional understanding of water resource issues, history, and options;
- Examine interdependent relationships among water resources and facilities;
- Review and validate regional growth and water demand assumptions and projections;
- Consider the need for, and role of, conservation in reducing future water demand;
- Ensure that community values and concerns are reflected in an expressed regional planning criteria; and,
- To develop the public's regional criteria by which future water resource options should be considered.

Participation/Expectation

Members of the IRPC will be sought based upon several qualities:

- Willingness to work cooperatively with other Committee members;
- Ability to understand the perspectives of a diverse range of interested stakeholders;
- Ability to listen courteously to other points of view;
- Ability to articulate the interests of the stakeholders they represent; and,
- Willingness to participate in a concentrated review process requiring attendance at scheduled meetings.

In order for the process to work effectively, consistent participation of committee members will be essential.

IRPC members will have six meetings over a five month period, with the first meeting scheduled for October 4, 1997 in San Antonio. Subsequent meeting dates and locations will be decided by the committee members.

Discussion Process

All stakeholder perspectives are valued. Accordingly, the committee's deliberation process is that of collaborative problem-solving. In cases of non-consensus, minority viewpoints will be preserved.

Support

Providing support to the IRPC during its deliberations will be a neutral facilitator, Trans-Texas Water Program (TTWP) support staff, and representatives from the participating regional and state agencies.

Meeting Recording

Meetings will be audio taped to assist in the preparation of meeting summaries that will be distributed to Committee members.

Observers

Observers are welcome at IRPC meetings. However, meetings are intended for the benefit of Committee members and to promote their constructive interaction. An opportunity for public comment will be provided at the end of each IRPC meeting.

Media

Media present at a meeting, if any, will be identified for the benefit of Committee members.

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION

MISSION STATEMENT

TO DETERMINE THE BEST METHODS OF MEETING THE SHORT AND LONG-TERM (50 YEAR WATER NEEDS OF THE ENTIRE STUDY AREA IN A COST-EFFECTIVE AND ENVIRONMENTALLY SENSITIVE MANNER.

October 1, 1997

To: Persons Interested in Water Supply Planning

The Texas Water Development Board invites public comment on its initial draft delineation of regional planning areas and of its initial draft of guidance relating to the state water plan, regional water plans, and use of research and planning funds for regional water plan development. This draft guidance is the initial draft of what will become board rules for these areas. The rules are being developed to fulfill the requirements of Senate Bill 1, 75th Texas Legislature, which established a new water planning process for the state.

Also enclosed is a description of how the initial draft regional water planning areas were delineated. This process involved assigning counties to areas. In many cases, there are reasons a portion of a county should be in one area and the remainder in another. Board staff invite all those entities and interested parties that will be involved in regional planning to identify which counties or portions of counties should be assigned to areas different from those in the initial draft delineation. In light of the Senate Bill 1 preference for local decision making, Board staff encourage all entities and interested parties in the area and in the area to which the area is proposed to be assigned to work together to present a consensus recommendation for regional planning area delineation changes.

Also enclosed is a schedule for public meetings to be held around the state to receive public comments on the initial regional water planning area delineations and the initial draft guidance documents.

After review of public comments, Board staff will revise these drafts, and provide second drafts for public comment on or about November 19, 1997. Public comments on the second drafts should be submitted to the Board by December 3, 1997. After reviewing this second round of comments, staff will seek Board approval on December 11, 1997 to publish rules for proposed adoption in the Texas Register.

These draft documents may be obtained:

- on the Internet at "http://www.twdb.state.tx.us/www/twdb/sb1_hp.html",
- by contacting Diane Burr at 512/475-2057, or
- writing to Texas Water Development Board , P.O. Box 13231, Austin, Texas 78711

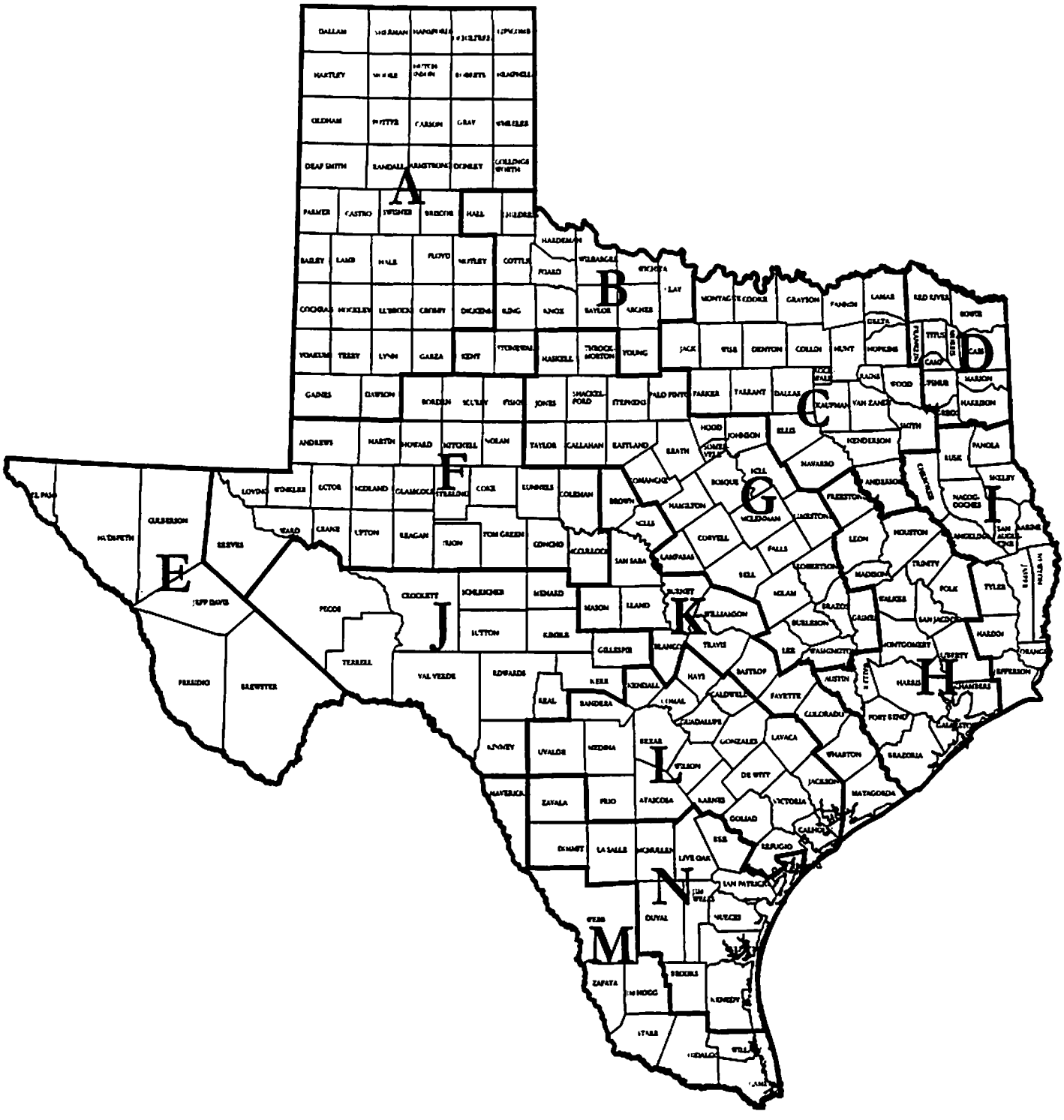
Please submit any comments as to provisions which you favor, provisions that should be changed and why, and suggested revision language. These may be provided via E-mail to "SB1@twdb.state.tx.us" or to Carolyn Brittin at the above address or by fax at 512/463-9893 by **November 3, 1997**.

Sincerely,

Tommy Knowles

Tommy Knowles
Deputy Executive Administrator for Planning

Initial Draft of Regional Water Planning Areas



October 1, 1997

S. B 1 Public Meeting Itinerary

	City	Date/Time	Location
A	Panhandle	October 28, 1997 6:30-9:00 p.m.	Carson Co. Museum, Grady Hazlewood Building
A	Plainview	October 30, 1997 6:30-9:00 p.m.	Plainview Country Club
B	Wichita Falls	October 22, 1997 6:30-9:00 p.m.	City Council Chambers
C	Denton	October 23, 1997 6:30-9:00 p.m.	City Council Chambers
G	Temple	October 21, 1997 6:30-9:00 p.m.	City Council Chambers
L	Victoria	October 20, 1997 6:30-9:00 p.m.	City Council Chambers
H	Conroe	October 21, 1997 6:30-8:45 p.m.	Montgomery County Public Library
I	Orange	October 22, 1997 6:30-9:00 p.m.	Brown Center, Lamar University (Orange)
I	Nacogdoches	October 28, 1997 6:30-9:00 p.m.	S. F. Austin State University (Lumberjack Room)
D	Daingerfield	October 27, 1997 6:30-9:00 p.m.	Morris County Community Center
N	Kingsville	October 27, 1997 6:30-9:00 p.m.	County Courthouse Annex
M	Laredo	October 28, 1997 6:30-9:00 p.m.	City Council Chambers
J	Del Rio	October 22, 1997 6:30-9-00 p.m.	Del Rio National Bank Downtown Branch
F	San Angelo	October 23, 1997 6:30-9:00 p.m.	San Angelo Convention Center
E	Alpine	October 21, 1997 6:30-9:00 p.m.	Sul Ross University
K	Austin	November 3, 1997 6:30-9:00 p.m.	SFA Building, Room 118

Trans-Texas Water Program - West Central Region
Integrated Resource Planning Committee (IRPC)
November 1, 1997, 9:30AM
San Antonio River Authority Board Room

AGENDA - MEETING #2

I.	Meeting is convened	Linda Ximenes
II.	Introductions and Notation of Absences	Linda Ximenes
III.	Review of October 4 Meeting Minutes and Follow-Up Items	Linda Ximenes
IV.	Recap of October 4 Meeting	Linda Ximenes
V.	Review of Today's Goal	Linda Ximenes
VI.	Carry-Over Item: Committee's Vision for Regional Water Planning	Steve Raabe, P.E. Linda Ximenes
VII.	Presentation by HDR Engineering on Population Growth, Water Consumption, & Water Demand Projections and Assumptions	Dr. Herb Grubb
VIII.	Statement Regarding Conservation Assumptions	All
IX.	Report of Water Availability	Dr. Herb Grubb
X.	Public Comment	Linda Ximenes
	Next Meeting - November 22, 1997	
	Adjourn	

NOTE: There will be a thirty minute lunch (provided) break for committee members. Guests in attendance will have the opportunity to purchase lunch for $5.00.

MEETING NOTES
TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE (IRPC)
MEETING #2
NOVEMBER 1, 1997

Meeting #2 of the IRPC was convened at 9:36 am by Linda Ximenes, IRPC Coordinator.

I., and II. CONVENING THE MEETING, WELCOME AND INTRODUCTIONS

Twenty-five IRP Committee members were present:

Hank Brummett	Richard Barton
John Hohn	Joe Cantu
Ed White, Jr.	Haskell Simon
Gary Damuth	Errol Dietze
Evelyn Bonavita	Judy McAda
Dede Stevenson	Claudia Garza
Donald Hoogenakker	Patsy Light
Pamela McKay	John Wendele
Hugh Charlton	David Carrothers
Gloria Rivera	Charles Trefny
Brian Vauter	Linda Lesso
Zack Williams	Renea Garcia
Fran Merritt	

Three committee members not present:

Scott Wall	Cameron Cornett
Mike Mahoney	

Staff and consultants attending were Linda Ximenes, IRPC Coordinator, Robert Aguirre, Public Participation Contractor, and Steven J. Raabe, Project Manager for the Trans-Texas Water Program - West Central Region.

Ms. Ximenes noted that committee member Cole Rowland had sent a letter of resignation to Steve Raabe. Having missed the first meeting, and after receiving the dates of meetings number two and three, Mr. Rowland stated that he would be unable to attend on those dates and that, because attendance was so critical, he felt it would be best to resign.

Ms. Ximenes explained Lewis Michaelson's (IRPC Facilitator) absence was due to an unforeseen family commitment.

All committee members were asked to introduce themselves so that everyone could get re-acquainted and for the benefit of committee members who had not attended meeting #1.

III. REVIEW OF OCTOBER 4 MEETING NOTES

Ms. Ximenes asked if anyone had any comments, suggestions, or changes with respect to the October 4 meeting notes.

Errol Dietze: With the environmental, long range economic impact must be considered as well. John Hohn: Do we really want rivers, as such, to continue to exist? We should make a conscious statement on this. Linda Lesso: That should include bays and estuaries. Ms. Light: It also should include riparian forests as exist along the San Antonio River. Evelyn Bonavita: If we are going to talk about supply, we should also talk about quality. Joe Cantu: Population growth should be considered. Ed White: A regional plan must promote action.

Mr. Damuth: Planners must consider how a plan would be enforced. Ms. Rivera: It should also take into consideration the inherent biases and attitudes of different regions. Brian Vauter: A plan must recognize that the region will have sub-regions in it as well. Dede Stevenson: Homeowners selling their homes should be made to disclose any situation of water shortage...to which Charles Trefny added: We need to add to that flood easement information. Ms. Lesso then asked for the list of the above comments to be read back.

Mr. Hoogenakker: The economic benefits of a water plan must be considered? Haskell Simon: We also need to consider the impact on 3rd parties of transfers of water. Ms. Lesso: The right of capture (its impact) needs to be addressed in any water plan. Mr. Williams: The possibility of future control of development needs to be considered. Ms. Rivera: The large number of (existing) water rights must be met. John Wendele: a plan must identify funding alternatives. Mr. Damuth: A plan must take into account the cumulative development impact on the rivering systems. Ms. Lesso: It should include regulation on building over aquifers. Mr. Trefny: Recharge dams - should be considered. Mr. Simon: Innovative approaches to enhancing the water supply should be a part of a regional water plan....conservation should be the number one issue before any other option is discussed. And since I have the floor....I feel that sometimes what we are doing is trying only to provide water to areas that are water short. Ms. Bonavita: The issue of [water] cost has not been touched upon and it should be included. Richard Barton: A priority for water use should be determined. Ms. Rivera: A plan should support and encourage agricultural water saving efforts. Mr. Hoogenakker: We should identify "panic zones" where water is needed. Mr. Barton: The plan should recognize options for moving water into an area of need.

These were the comments offered by the committee members regarding their collective vision for a successful regional water plan.

VII. PRESENTATION BY HDR ENGINEERING ON POPULATION GROWTH, WATER CONSUMPTION & WATER DEMAND PROJECTIONS AND ASSUMPTIONS

Ms. Ximenes introduced Dr. Herb Grubb of HDR Engineering who distributed a report he compiled for the IRPC. He stated that he is to speak about population growth history and projections, historic water consumption, projected water consumption, and assumptions upon which the projections are based.

Dr. Grubb explained that there are six different categories of water demand: municipal, industrial, steam electric, irrigation, mining, and livestock. These combined demands equal the total demand.

Hugh Charlton: Where is environmental water? Dr. Grubb: It is on the supply side rather than on the demand side, which is the data being presented today. Ms. Merritt: In response to Dr. Grubb's statement that the region had very little industrial users, she questioned that while there is not heavy industrial usage in some parts of the region, the Victoria area does have heavy industrial and, if we are to be talking about the ENTIRE region, this needs to be acknowledged. Dr. Grubb: "I stand corrected."

Dr. Grubb reported that the data being presented comes from the Texas Water Development Board which is gathered by them by annual survey to each user category.

- Industrial demand is projected at 130,895 acre feet in 2000, and 227,912 acre feet in 2050;
- Steam-electric power water demand is projected at 134,000 acre feet in 2000, and 208,500 acre feet in 2050;
- Irrigation is projected at 1,202,396 acre feet in 2000, and 864,139 acre feet in 2050;
- Mining is projected at 46,338 acre feet in 2000, and 41,629 acre feet in 2050;
- Livestock is projected at 40,177 acre feet in 2000, and 40,177 acre feet in 2050; and,
- Total water demand (the sum of the above) is projected at 2,203,812 acre feet in 2000, and 2,498,674 acre feet in 2050.

Ms. Rivera: What is the total percentage increase? Dr. Grubb stated that he would calculate this during the lunch break. (It was later noted that the overall increase was 13.4%.)

Dr. Grubb noted that at the next IRPC meeting he would be able to speak to the issue of water availability for each demand category.

Dr. Grubb stated that all projections and all planning efforts are based upon current laws and full recognition of existing water/property rights.

Ms. Lesso: My colleagues have indicated to me that the Trans-Texas Water Program (TTWP) included many plans for inter-basin transfers. Are these transfers taken into account in these projections. Dr. Grubb stated that there are no such plans in TTWP, as no plans of any kind had yet been developed - only a listing of options. He stated that transfers are among the options identified. Mr. Brummett: This committee is not about options - only criteria on how options are to be evaluated.

At this point the committee took a thirty minute recess for lunch.

Upon returning from lunch, Dr. Grubb explained the different water conservation assumptions and explained how each assumption impacts the water demand projections. He noted that there is a 20% difference (in water demand) between advanced conservation and no conservation. He further noted that 20% of municipal water demand is used for landscape irrigation and other non-essential residential use. Mr. Williams: What about golf course water usage? Dr. Grubb responded that golf courses are excellent opportunities for water re-use.

Dr. Grubb concluded his remarks by stating that water conservation was a key element in water planning as it directly impacted water availability.

VIII. STATEMENT REGARDING CONSERVATION ASSUMPTIONS

Ms. Ximenes stated that the committee needed to consider how it felt about what water conversation assumption should be used in conjunction with the development of regional criteria....none, expected, or advanced. She noted that since conservation impacts significantly the "water availability" issue (i.e., the more water you save the more water that is available), we can not ignore conservation as an ingredient to the criteria by which options should be evaluated. Additionally she explained that the degree of water conservation accomplished by a community may also be a factor in assessing whether or not a particular option should be considered.

The question is: What level of water conservation do you think should be considered in planning for our future water needs?

Tom Culbertson claimed that the committee was receiving erroneous information regarding the TWDB projections and the HDR Engineering graphs.

Ms. Ximenes then read a written comment received from Faye Sinkin, who had earlier left the meeting, accusing the committee of being influenced by a lobbyist by not considering aquifer preservation and enhancement.

OTHER BUSINESS

Ms. Charlton asked if the state water plan just adopted had any specific information on the west central region. Steve Raabe said he did not know, but that he would research it.

Ms. Ximenes announced that meeting #3 is scheduled for November 22, meeting #4 for December 13, and meeting #5 for January 10, 1998. These meetings would be at the offices of the San Antonio River Authority in San Antonio.

Meeting evaluation comments:

Ms. Garcia stated that it would help keep the committee focused if notes were written on the pad in greater detail. Mr. Williams asked for the meetings to be longer - considering the drive time involved for some. Mr. Rivera stated her appreciation for the way Dr. Grubb presented his data. Ms. Light asked if someone could talk to the committee about [aquifer] recharge. Mr. White stated that it would help if we gave the committee something which documented interdependent relationships when we speak about different issues.

The meeting was adjourned at 1:40 p.m..

Apparently lobbyist Bill Kaufman's arm is long enough to reach into this bill. too—
On pg 3 - line 6 when discussing Environmental criteria you mention endang. species, bays & estuaries, wildlife, agric - fisheries but no preservation of aquifers - We can enhance aquifers with ~~policies that~~ policy criteria that created Lost Canyon — & we can deplete aquifers with policy criteria such as TNREC employs to plug & dynamite sink holes & caves —

Chpt. 2 has a marvelous explanation of aquifers & their interdependent relationships — To evaluate the alternatives & asses the trade-offs, it is inconceivable to eliminate aquifers from Environmental criteria —

Fay Seiler

Oct.30,1997

Michael Feldon, Chairman
and Members of the E.A.A.
City Hall, San Antonio, Texas

Dear Mr Chairman and Members of the E.A.A.,

You must know by now that a more positive water plan must be developed, one that will respect the traditions of the past as well as the need for adjustment to modern technology. For a view of what most Texans still believe, please read the accompanying article by Kevin Johnson.

Please keep in mind that Domestic Use is given the highest priority of use by our state law; and recreation is the lowest use. The more recent legislation which presumably tried to balance these uses would make a farce out of prexisting law. And in attempting to do this it also would make a farce out of democracy and the concept of "One Man-One Vote".

There are postive means of solving water issues that must be given an opportunity; one of these is restoring the natural spring flow at Comal Springs. This flow was opened-up years ago through dynamiting. The spring should be returned to its natural condition , which also stabilized the flow downstream. This is not only an environmentaly sound option, but is the most economically realistic solution to maintaining artesian pressure and respecting downstream water users.

Another option that I may have mentioned to you before is recharging the Edwards Aquifer. With all the rain we have had,it is a shame not to have directed some of this into storage in our great Edwards Aquifer.

Sincerely,
Tom Culbertson

Tom Culbertson, Hydrologist

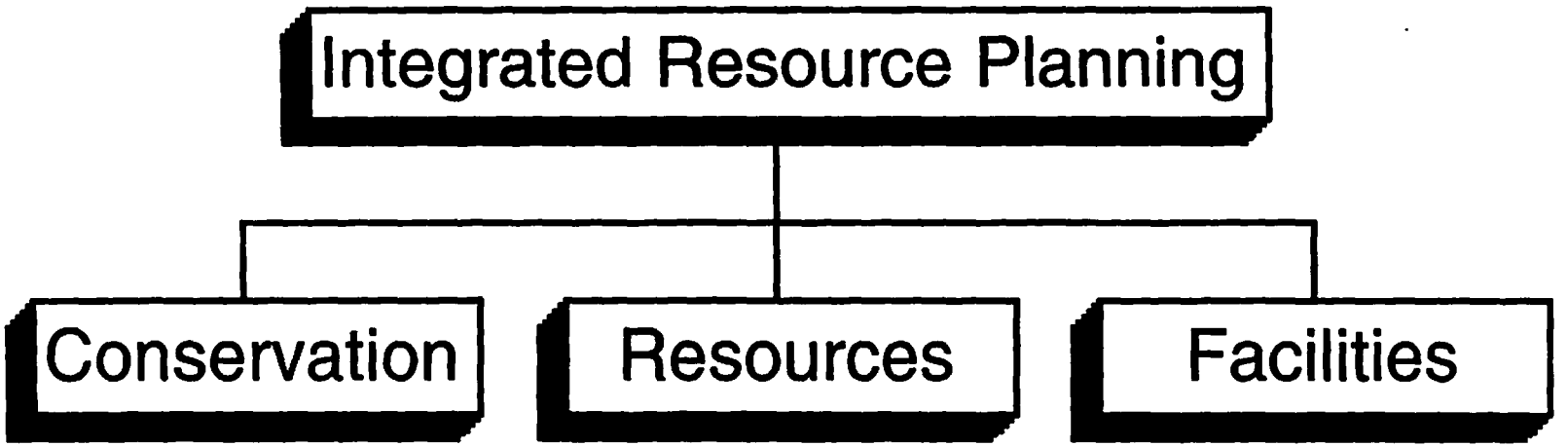
Trans Texas Water Program

Integrated Resource Planning Committee

Options

- Conservation
- Inter-basin Transfer
- Springflow Augmentation
- Recycling/Reuse
- Retention Dam
- Weather Modification
- Surface Reservoirs
- Aquifer Storage & Recovery
- Desalination

Trans Texas Water Program



IRP Alternatives

ALTERNATIVES meet regional water needs.

Option 1A + Option 2D + Option 3B = **ALTERNATIVES**

IRPC Process

- Committee members agree to a common definition of their mission and the ground rules by which they will abide.
- Committee members develop a regional understanding of water resource issues, history, options, and recent legislative impacts.
- Committee members discuss present and potential interdependent relationships among water resources and facilities in the region.
- Committee members develop a common definition of the problem(s) that needs addressing.
- Committee members develop an understanding of conservation's role in reducing water demand.
- Committee members develop an understanding of when and where shortfalls in water supply may occur.
- Committee members begin a process of identifying the criteria by which water resource options should be evaluated.

Principles of Participation

- The public/stakeholder's participation must be broadly based and inclusive of all study area constituencies.
- It is the responsibility of the Trans-Texas Water Program and its sponsors to be proactive in its commitment to seek public/ stakeholder participation and input.
- Public/stakeholder communication must be timely, truthful, consistent, and two-way.
- The Policy Management Committee, as the responsible decision-making body, must be accountable for the integrity of the public/stakeholder participation process and the manner in which the public's input shapes the final outcomes of the program.

Mission Statement

To determine the best methods of meeting the short and long-term (50 year) water needs of the entire study area in a cost-effective and environmentally sensitive manner.

TRANS-TEXAS WATER PROGRAM

PUBLIC PARTICIPATION/ STAKEHOLDER INVOLVEMENT PROCESS

West Central Study Area

Issues Document

San Antonio River Authority

San Antonio Water System

Edwards Aquifer Authority

Guadalupe-Blanco River Authority

Lower Colorado River Authority

Bexar Metropolitan Water District

Nueces River Authority

Canyon Lake Water Supply Corporation

Bexar-Medina-Atascosa Counties Water Control and Improvement Dist. #1

Texas Water Development Board

February, 1997

Robert Aguirre Consultants, L.C.
In Association With:
Katz and Associates, Inc.
Robert R. Ashcroft, AICP
Dethman and Associates, Inc.
Ximenes and Associates, Inc.
Nancy Scott Jones and Associates, Inc.

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION

PUBLIC PARTICIPATION/STAKEHOLDER INVOLVEMENT

ISSUES DOCUMENT

TABLE OF CONTENTS

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION

PUBLIC PARTICIPATION/STAKEHOLDER INVOLVEMENT

ISSUES DOCUMENT
FEBRUARY, 1997

PART I INTRODUCTION

This Issues Document is compiled in connection with the West Central Study Region's public participation/stakeholder involvement program. Its purpose is to outline the specific issues identified to date by the public in connection with water planning generally, and the Trans-Texas Water Program (TTWP) specifically. It constitutes the first documented effort of the program to solicit and to "hear" the voice of the region's constituents.

The Issues Document is a report of the general public's first formal input into the Trans-Texas Water Program. For the decision makers, it is their first opportunity to hear and understand the regional concerns over water planning and the Trans-Texas Water Program. The Issues Document, in large part, sets aside the technical and legal aspects and lays out the real, human concerns of the public it is intended to serve.

Presenting the public's issues within the formal context of this Issues Document makes explicit two important points: First, that the public's issues have been heard, understood, and accepted without question on face-value. Second, that a successful evaluation and planning outcome is predicated upon the striking of a balance of diverse objectives between that which is technically feasible, with that which is publicly acceptable.

How is the Issues Document to be Used?

The Issues Document *is not* a discussion of consequences (of issues). These discussions will appropriately come later in the listening and evaluation process to follow.

The Issues Document *is not* a response to the public's issues. It is an indication of the public's questions.

The Issues Document *is* the basis upon which the public's decision analysis criteria is outlined. The issues raised by the public in this process constitute the measure by

which a (publicly) suitable menu of water planning options are to be evaluated and by which divergent and common interests are identified and addressed.

The Issues Document *is* the basis upon which the actual public participation/stakeholder involvement plan is to be drafted. This plan will be configured to take into account these issues of public concern and to address them in a way that the public has expressed a preference for. These public preferences, centered on issues of trust, will be key to determining *who* should provide public information and *how* that information should be communicated.

To accomplish this, the Issues Document identifies the basic core issues that characterize the diverse study region. By carefully identifying these core areas of concern a public participation/stakeholder involvement program can be specifically tailored. This therefore becomes a key document, along with the Principles of Participation, in developing and guiding the initiatives of all future public participation efforts.

THE PRINCIPLES OF PARTICIPATION

This listening process began with the Principles of Participation, shown in Illustration 1, which was unanimously adopted by the Trans-Texas Water Program, West Central Region's Policy Management Committee at its meeting of January 12, 1996. With that event came a unique commitment to begin a region-wide listening process wherein those impacted by the Trans-Texas Water Program planning effort had an opportunity to be a part of not just the process and its conclusions, but to have a role in how that process will be designed and conducted.

There should be no doubt that this effort marks a dramatic paradigm change in this region as a non-traditional approach to water resource planning.

It is from these Principles of Participation that this process began. It is through these Principles that the process will be conducted, and it is by virtue of these Principles that the process is successfully concluded.

MEASURES UNDERTAKEN TO DATE

It is important to put this Issues Document in the proper context of time and events. This section is included here in order to give a summary review the major events that have led to this documentation.

The major events to date have been:

Illustration 1 - Principles of Participation

This declaration formally expresses our commitment to a comprehensive public participation/stakeholder involvement process. By adopting and implementing the principles embodied in this declaration, the public's input will play a critical role in evaluating the water planning strategies to be considered for this region.

While each participating agency is responsible to its respective constituents, our collective regional responsibility is "to identify the most cost-effective and environmentally sensitive strategies for meeting the current and future water needs of the West Central Region." In addition, we must ensure that the public and stakeholders significantly participate in deciding which strategies will be implemented.

By unanimous adoption of this statement, the West Central Policy Management Committee of the Trans-Texas Water Program commits itself to the following principles of public and stakeholder participation:

- The public/stakeholder's participation must be broadly based and inclusive of all constituencies.
- It is the responsibility of the Trans-Texas Water Program and its sponsors to be proactive in its commitment to seek public/stakeholder participation and input.
- Public/stakeholder communication must be timely, truthful, consistent, and two-way.
- The Policy Management Committee, as the responsible decision-making body, must be accountable for the integrity of the public/stakeholder participation process and the manner in which the public's input shapes the final outcomes of the project.

In this effort we recognize that the overall quality and depth of public/stakeholder participation can only be as good as our ability to effectively communicate the complex issues associated with water planning strategies.

These Principles of Participation recognize that no present or long-term water strategy can be implemented without the general support and consent of the public and stakeholders.

Policy Management Committee
Trans-Texas Water Program
West Central Region

Workshop: The process began with a two-day public participation workshop for the Policy Management Committee and their senior staff members (November, 1995). The purpose of these meetings was to ensure a common understanding of the desired outcomes of the Trans-Texas Water Program planning effort for this region, and to focus on the public participation component specifically. This was an extremely important beginning to this process from which many critical points of agreement were derived. Not the least of which was the unanimously adopted Principles of Participation discussed in the previous section.

Committee Survey: The first data gathering step undertaken was to survey the members of the Advisory Committee for Technical and Public Input in December, 1995. The purpose of the survey was to acquire a basic understanding of the issues facing the Trans-Texas Water Program effort from each committee member's perspective. Gaining their input and developing an understanding of their perspective proved to be an important first step in this process.

PMC Member Interviews: Each PMC member was privately interviewed in order to gain a better understanding of their respective issues, to identify historically active citizens/groups in their areas, to assist in identifying under represented groups, and to identify organized areas of support and adversity.

Technical Memorandum: Dated January, 1996, the Technical Memorandum summarized the steps taken to that point and their outcomes. Also included were specific goals and objectives of the project, an assessment of the major issues and problems, and issues of public perception.

Public Issues Survey: A public issues survey was conducted in April, 1996. This effort constituted the first gathering of information from the general public with respect to water, water planning/options, communication preferences, and trust issues. The survey was scientifically conducted as a random telephone survey of 500 residents within the study region and had an error factor of +/- 4.5 percent at a confidence level of 95 percent. The information proved to be most helpful in understanding and gauging public perceptions, and was used extensively in developing the agenda for the next stage of public involvement - focus groups. The results of this survey were detailed in a survey report dated September, 1996 and are summarized in Appendix A of this report.

Focus Groups - Round #1: A first round of focus groups was conducted in 32 counties from June 11 to August 15, 1996. These groups were designed to test and expound upon the data collected in the public issues surveys. Additionally they were to begin a process of direct consultation with the public as to their thoughts and wishes for how a public process should be structured and the issues and analysis criteria that was important to them.

Public Workshops: Five public workshops were held across the region from October 21 to October 29, 1996. The purpose of these workshops was to offer a participation opportunity to citizens within the study region who did not participate in the first round of focus groups. Despite these workshops being advertised throughout the region, attendance was small with a total of 35 participants.

Focus Groups - Round #2: A second round of focus groups was conducted in 8 counties from December 9, 1996, to February 3, 1997. These groups were designed to test various specific public participation models and to gain public feedback on each. Together with previously collected data this information was used to design the final public participation plan.

Stakeholder Identification: Key to the outcomes of the above steps has been the identification of stakeholder groups, including under represented groups. Understanding who these groups are and how best to bring them into the public participation picture is key to identifying the future process and to ensuring stakeholder support of the outcomes.

Target Audience Identification: As a part of the public participation goal, target audiences were identified through this effort. The key target audiences in this process will be the general public who have historically not been involved in water issues, and local elected officials.

Decision Analysis Criteria: Perhaps the most important component to be developed in this process to date has been the development of the public's decision analysis criteria. This is discussed in the following section.

PART II THE ISSUES

DECISION ANALYSIS CRITERIA

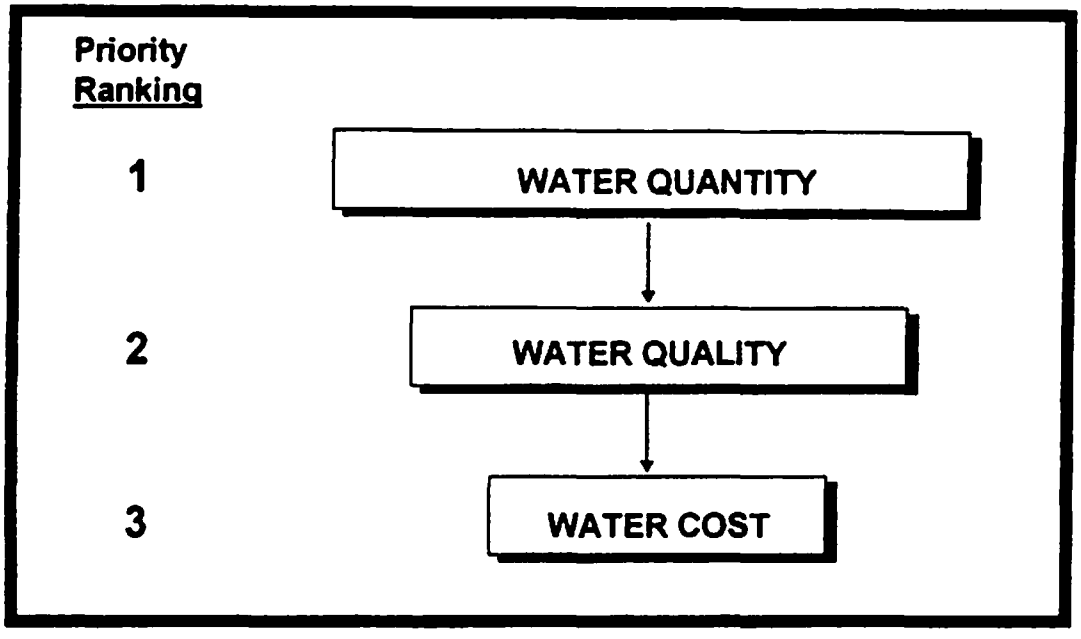
A key outcome of the public issues survey, focus groups, and public workshops has been the criteria by which the public has stated they wished water planning options to be analyzed in the decision making process. In many ways these criteria can be considered as the culmination of all the information gathered to date. Incorporating the public's analysis criteria into the decision making process is the proof that the public has been heard, and constitutes the framework for a successful public participation process.

The initial criteria that has emerged from the public is clear and undisputed. Consistently throughout this process the public has spoken in terms of these criteria in the order shown in Illustration 2 on the following page.

This ranking of analysis criteria has proven itself time and again throughout the focus groups as validation of the results of the public issues survey.

As the public participation/stakeholder involvement process continues, this is the criteria and ranking that will be used. However, this is hardly the sole criteria upon which planning options will be evaluated. Together with "publicly acceptable," there must also be the "technically feasible" criterion. The challenge of this process will be to bring both sets of essential criteria to the decision table when evaluating water planning options for the future.

Illustration 2 - Public's Decision Analysis Criteria



THE PUBLIC AND WATER PLANNING ISSUES

Water Planning Issues, Generally

No discussion of the public's issues can begin without first analyzing the data that indicates the public's level of understanding of water issues generally, and the Trans-Texas Water Program specifically.

Throughout 1996 water was in the regional news constantly. With far below average rainfalls, reduced spring flows, usage surcharges in metropolitan areas, and high profile court cases, water has held a large portion of the public's focus. In the coming year these issues will continue to be news worthy in their own right. To compound the attention in 1997, one can add water as a legislative year issue as well as an election

year issue in some parts of the study region. The new year will be pivotal for water planning efforts for the region.

It is important that a public participation plan carefully consider what the public knows, does not know, or thinks it knows with respect to water planning and water options. It is likewise important to have an understanding of the public's perception of *the need* to plan or, as the case may be, *the lack of need* to plan.

While the findings on public understanding and perceptions were detailed extensively in the Public Issues Survey Report dated September, 1996, a summary of these findings is included here for reference in Appendix A.

The public's decision analysis criteria, while clearly stated today, will likely change as the process evolves. It can be expected that, as project specific issues are entered into public debate, cost will assume a higher level of consideration.

Trans-Texas Water Program, Specifically

It is clear from the work performed to date that the general public has little understanding or awareness of what the Trans-Texas Water Program is, how it functions, or what its "end product" is supposed to be. Within the context of the focus groups and public workshops it was a constant challenge to explain the answers to these questions. This will continue to be a considerable challenge, but one that must be dealt with through aggressive public information efforts.

The intangible nature of the Trans-Texas Water Program adds to the public's confusion about the program. For example, Trans-Texas is neither an entity nor an agency. It has neither staff nor office and provides no water or service. It neither sets nor controls water rates, has no jurisdictional authority, and is neither the decider nor the implementer of any specific water planning option. Because Trans-Texas is a relatively newly-formed coalition of water agencies, it will be important to increase the public's awareness and under-standing as a necessary prerequisite to their participation and input.

The successful communication of these basic elements of Trans-Texas will be critically important to the success of this effort. While attention is often focused on informing the public at-large, we must be mindful that agencies and elected officials must likewise be educated as to these specific basic issues concerning the Trans-Texas Water Program.

IDENTIFYING SIX BASIC "MIND SETS"

From the analysis of the data there appears to be six generally defined "mind sets" that comprise the study region and which must be individually addressed. These mind sets

may not so much be driven by geography as by issues of economic, political, or environmental interest The six basic mind sets identified are:

- Agricultural
- Urban Flighters
- Metropolitan Areas
- Highland Lakes and Springs
- Downstream Interests
- Bays and Estuaries

The reader is strongly cautioned not to interpret these mind sets too literally. They are broad areas of interest that may or may not be characterized by distinctive physical boundaries. We must also recognize that a stakeholder may fit into more than one mind set and that it is up to each to determine for themselves which "mind set" is characteristic of their position.

Another point to recognize is that "mind sets" know no jurisdictional boundaries. While jurisdictions are hard realities for agencies, people concerned over issues care little about boundary lines except for knowing how such jurisdictions can advance or hinder their interests. Knowing and understanding these issues will be an important part of things to come as communication components will target each of these mind set concerns.

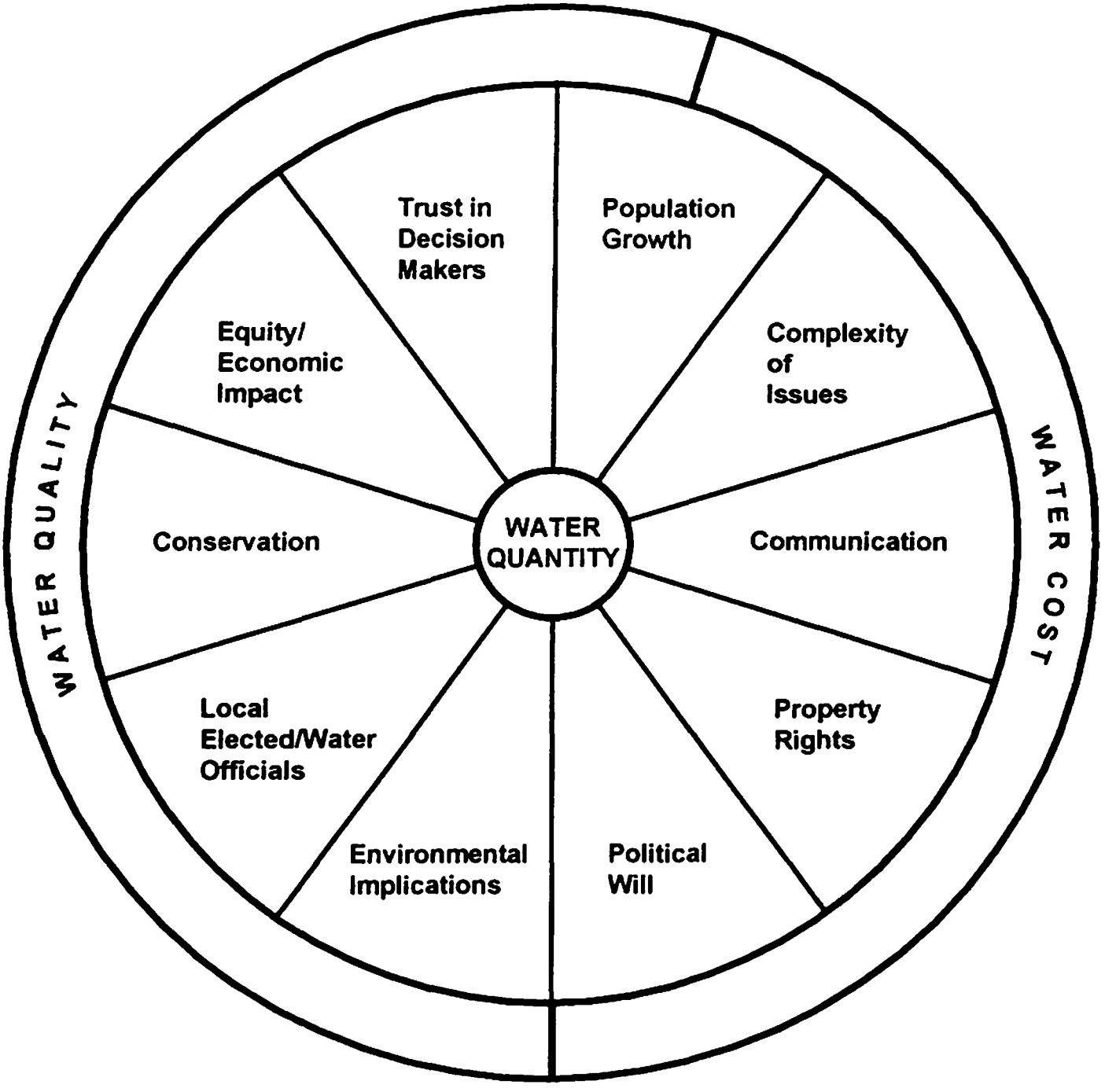
MATRIX OF CORE ISSUES

The focus groups and workshops were carefully crafted to identify and understand the public's issues. Since it is the purpose of this Issues Document to identify and categorize these issues in a way that is useful in determining the most appropriate course of action for a public participation plan, careful identification of the basic core issues is a necessity. This is the purpose of the issues matrix.

Illustration 3 sets forth the Matrix of Core Issues. Just as in the analysis of the "mind sets" above, core issues must not be considered in too literal a sense. They are only as static as the circumstances (i.e., political and economic) within which they exist in any given moment. Nonetheless, they provide a snapshot in time of the core issues that will characterize and drive the public participation process to come.

The illustration shows the public's highest priority issue, water quantity, at the center of the matrix. Surrounding the matrix are the public's second and third most important criteria, with water quality being second and water cost being third in ranking. The connecting core issues are described briefly below.

Illustration 3 - Matrix of Core Issues



Trust - As the public participation process evolves, trust will play a major role in its success. It is essential for the decision makers to trust a public process; for the public to trust its concerns will be heard and taken into account, and to trust that the decision makers indeed have the best interest of the community at heart. Trust will not come automatically. Trust will have to be earned, demonstrated, and maintained.

Equity/Economic Impact - A great deal of the water debate in the study region will be centered on equity and economic impact in its broadest sense. This includes issues such as fairness, impact on land values, water for economic growth/job creation, impacts on recreational uses and livelihoods, etc.

Complexity of the Issue - A major stumbling block is the complexity of the water issue. This complexity is multiplied by the fact that the Trans-Texas Water Program is a regional effort with diverse interests and needs. Being able to explain to the public difficult technical concepts, trade-offs, and cost-benefit relationships will be among the project's biggest challenges. The complexity issue is also fueled by the public's difficulty in understanding what Trans-Texas actually is and is not, along with its ultimate goal.

Property Rights - So much of the water debate centers on property rights. In some ways it can be argued that this is a sub-set of Economic Impact. However there are so many unique aspects to the property rights issues, including legislative aspects, that this is listed as a separate core issue.

Political Will - Some will argue that in the final analysis everything hinges on this core issue. This may not be far from the truth. It is political will that gives the public the opportunity to become informed and invited to participate, and it is political will that allows a constructive conclusion to develop. Political will is a necessary characteristic not just of the decision makers themselves, but the general public as well.

Environmental Implications - There is little argument but that environmental implications are significant factors in water resource planning. With the Endangered Species act, existing litigation, bays and estuaries, spring flows, and other issues, this will be no small concern in a public process within the region.

Local Elected/Water Officials - Local elected officials will be key to the process to come. These would include, among others, county judges, river authority/water utility directors, mayors, county commissioners, city council members, state representatives, etc. These people play key leadership roles in their local communities and have a relationship with their constituents that is important to respect and to incorporate into a public participation process.

Communication - This is closely related to the complexity issue. Communication deals with the actual methods of communication and the specific public outreach vehicles that

will be employed. People in the study region have definite ideas about the communication methods they prefer, and definite ideas about from whom they wish to receive that communication.

Conservation - Of all the water resource initiatives that exist, conservation is by far and away the most favored, and the most understood. What is more, conservation is seen by many within the region as not only the first step toward water planning, but a prerequisite to it. As such it must be among the first issues dealt with.

Population Growth - With certain rural counties realizing explosive growth over the past ten years, and with even greater growth forecasted, population growth is clearly a core issue in this effort. Closely related to the economic impact issue, population growth has its own distinctive implications in terms of public understanding and particularly in public perceptions. It therefore stands on its own as a core issue.

Overall each of these items is representative of the basic issues upon which a public participation/stakeholder involvement plan must be based. In this sense every one of the core issues plays an extremely important role in shaping the process to come.

PART III CONCLUSION AND RECOMMENDATION

CONCLUSION

The purpose of this Issues Document is to outline the specific issues identified by the public in connection with water planning generally, and the Trans-Texas Water Program specifically. It constitutes the first documented effort of the program to solicit and to *"hear"* the voice of the region's constituents, and to incorporate their input into a process design. For the decision makers, it is their first call to hear and to understand the regional concerns over water planning. To accomplish this the Issues Document has been drafted void of consideration of technical and legal aspects, but instead sets out the real, human concerns of the public it is intended to serve.

This Issues Document makes explicit two important points: First, that the public's issues have been heard, understood, and accepted without question on face-value. Second, that a successful evaluation and planning outcome is predicated upon the striking of a balance of diverse objectives between that which is technically feasible, with that which is publicly acceptable.

The *listening sessions* that were conducted as focus groups and workshops provided the study team with a unique opportunity to document the many and varied issues presented here. These issues, along with citizen participants' verbatim comments, are permanently documented on a meeting-by-meeting basis in APPENDIX B of this report. Also included for the record in this appendix are the session sign-in sheets.

The *listening sessions* also provided a unique opportunity to administer written surveys to the participants. The basic frequencies of the survey responses are documented for the record in APPENDIX C.

The Issues Document concentrates more on achieving a strong definition of the questions, rather than providing the answers to public issues concerning water. The ultimate goal of this document is to properly identify the component issues that must be addressed in a public participation plan for a regional water resource planning effort. This document sets forth those component issues as a basis upon which a plan would be designed as a continued commitment to the Principles of Participation.

RECOMMENDATION

The work that has been accomplished within this first phase of public participation/-stakeholder involvement process has been unprecedented for this region. Although generally categorized as an information-gathering period, it has already begun the process of listening and incorporating the will of the public. What is more, Trans-Texas has begun the process of establishing itself as a true regional planning coalition willing to take into account the diverse interests it must serve. This is a major accomplishment.

Where does Trans-Texas go from here?

A tremendous amount of information has been assembled from all parts of the study region. This data, while time-valued, can and should be utilized in the configuration of a public participation/stakeholder involvement plan which takes into account the highly unique aspects of the program as a true regional effort. The unique nature of the program, the diversity of the interests to be served, the data collected, and the particular circumstances which exist today, constitute a perfect stage for a regional planning solution. The facts call for a much more integrated approach to resource planning than has historically been employed.

Such an integrated approach is generally known as integrated resource planning (IRP) and it differs in many ways from traditionally applied planning methods. These main differences can be generally characterized as:

- Being highly inclusive
- Considering all reasonable options, not just "least cost"
- Treating stakeholders as participants, rather than disputants
- Taking into account multiple, often conflicting objectives of the sponsors/public
- Developing scenarios of water resource options, rather than a single option
- Being externally oriented (open to the public and flexible in nature)

- Being explicit and up-front as to trade-off issues and their consequences
- Openly admitting risks and uncertainties as issues to be analyzed and managed
- Achieving a balance between water resources, facilities, and conservation

One important characteristic which IRP *does* have in common with more traditional planning methods is who makes the decisions: The individual agencies. In the final analysis each agency and their governing boards are accountable to their respective constituencies. This is as critical a reality under an IRP approach as in any other planning effort.

In an IRP approachmore answers need to be gathered and delivered to the decision makers so that they can balance technical feasibility with public acceptability as they make final water resource decisions.

In analyzing these planning characteristics it can be said that such a process has already begun. The recommendation of the study team is to continue the integrated process as outlined in the Public Participation/Stakeholder Involvement Plan.

APPENDIX A

Executive Summary
Trans-Texas Water Issues Survey
West Central Study Area

Study Background, Purposes, and Methods

The Trans-Texas Water Program is a cooperative effort among Texas' local, regional and state water resource agencies. The overall goal of the Trans-Texas Water Program is to identify the most cost-effective and environmentally sound strategies for meeting water needs both now and for the next 50 years throughout Texas. Central to the Trans-Texas Program is a commitment to involving the public and other stakeholders in water planning efforts.

This public issues survey is part of the public participation process for the 33 county Trans-Texas West Central study area. It is overseen by the Policy Management Committee (PMC), which is made up of various local, regional, and state agencies concerned with water planning. This survey is a major component of *Task 3, Public Process Strategy Formulation*, where input from the public and stakeholders is being gathered. It helps meet the PMC's commitment to its *Principles of Participation* which state that **"no present or long-term water strategy can be implemented without the general support and consent of the public and stakeholders."**

The goals of this survey were to:

- Establish a baseline of the public's awareness, attitudes, and concerns about water issues, against which any changes can be measured
- Inform our public/stakeholder involvement efforts by obtaining insights on such questions as "what information do citizens need?" and "whom do citizens trust to tell them about water issues?"

Dethman & Associates designed the telephone survey instrument, managed the survey process, and wrote the report. ProMark Research, a San Antonio public opinion research firm, fielded the survey, translated responses into computer readable form, and provided the data tables upon which this report is based. ProMark conducted the survey in accordance with the statistical standards and methods established by the Council of American Survey Research Organizations ("CASRO").

Interviews were completed with a representative sample of 500 randomly selected households in the study area. This sample size is very reliable, and carries with it a +/ - 4.5% margin of error in 95 samples out of 100. The survey was pre-tested and fielded during April 1996.

This executive summary first lists the key findings from the survey and then discusses the implications of these findings.

Key Findings

Water Supply and Quality

- Two-thirds of residents in the study area were concerned their communities will face significant water shortages within the next five years, even though only half of all residents had actually experienced a drought.
- Still, a significant portion of residents (33%) said they were not concerned about water shortages.
- When asked why they were concerned about shortages, residents cited dwindling resources, no alternate supplies, the likelihood of droughts, and growth in their communities. Those less concerned felt that supplies are adequate or that their communities have good water management practices.
- Living through a drought, and feeling informed about water issues, were likely to make people more concerned about future water supplies.
- When asked if they were more concerned about having enough water or about the quality of their water, respondents were more likely to say they were concerned about water supply (56%) than water quality (32%).

Planning for Future Water Supplies

- Overall, both urban and rural areas received high overall ratings for managing their water resources (over 65% agreed cities and rural areas are doing a good job). And, both urban and rural residents held similar views of city water management efforts (75% of both groups thought cities were doing a good job)
- Urban and rural residents, however, rated rural water management efforts differently: 58% of urban residents, compared to 81% of rural residents, thought rural areas were doing a good job managing water resources.
- Conservation was most often mentioned as the *single most important thing to do* to ensure water for the future. Conservation was the most well known supply option and the most supported - far ahead of any other option.
- Residents appeared to support the concept of transferring water "in theory": 84% agreed that *areas of Texas with water surpluses should be willing to share their water with areas of Texas that need water, at least temporarily.* However, residents were less supportive of a prerequisite for water transfer - regional planning (68% agreed).

- Just over half of respondents did not know about water transfer; of those who did, more were negative (37%) than positive (27%) about it.
- Residents chose having a reliable supply as the highest priority, followed closely by water quality but more distantly by keeping the cost of water low, suggesting residents may feel more flexible about cost than about either reliability or quality.
- Residents thought environmental protection is also important to consider in choosing water supply options.

Making Decisions

- Three-quarters of residents in the study area strongly agreed that elected and water utility officials should involve the public in water planning issues.
- Residents most frequently said they trusted elected local/state officials (31%) and water officials (21%) to make decisions about meeting future water needs in their area. Still, 10% trusted nobody to make these decisions, and 22% did not know who to trust.
- Two-thirds of residents said they felt either very (17%) or somewhat informed (52%) about water issues facing their community. Still, one-third said they do not feel informed.
- Residents said they wanted more information on water management and supply alternatives.
- When seeking reliable information on water issues, 76% of residents said they would turn to either the local water utility/department, City or County Government, Water Districts or Authorities, or State Government.
- About one-fifth of residents (21%) said they were likely to attend a local meeting on local water issues.
- Newspapers, television, radio and mail were voted the best ways to announce such meetings.
- Sixty-five percent of survey respondents want to be added to a mailing list to notify them of meetings or inform them about water planning issues in their area.

Implications for Water Planning and Public Participation

These survey data suggest several important factors that need to be considered for water planning overall within the Trans-Texas project, and for public participation activities in particular.

1. The needs, experiences, and views of citizens about water issues within the West Central study area vary greatly. For instance, urban residents often have different views on water issues than rural ones, and those who have been through a

drought think about water supplies differently than those who have never experienced a shortage. Under these circumstances, a "cookie cutter" approach to public participation is unlikely to work effectively. In addition, reaching consensus about the best options will require a strong understanding of, and effectively listening to, the variety of viewpoints. Finally, great effort will need to be made to gather and hear from the many viewpoints.

2. Conservation was by far and away the most well known and supported management strategy for ensuring future water supplies. In response to the question: What do you think is the single most important thing to do to make sure there is enough water in your area over the next 20 years?. 59% responded conservation.

3. Except conservation, many citizens are not familiar with various water supply options, much less knowledgeable about them. Only a small portion of the citizenry said they really understand the water issues facing their communities. Thus, tremendous efforts will need to be made to inform the public about water options and issues in a clear, understandable, non-technical format. Citizens will not be able to effectively participate in decision-making unless they become more informed.

4. Study area residents are concerned about water issues and want more information. The response to a variety of survey questions indicates people will attend to water issues and recognize there are challenges ahead. Most citizens (76%) said they trusted representatives of state and local governments, water utilities, and water authorities (such as the Trans-Texas sponsors) to provide them with reliable information.

5. Respondents named the study sponsors, more than they named any other groups or individuals, as the entities they would trust for guidance and for making decisions about their water futures. Just over half (53%) said they trusted state and local officials and water officials to make decisions. However, they definitely wanted to be involved in the planning process (76% strongly agreed the public should be involved in water planning).

TRANS TEXAS WATER PROGRAM
WEST CENTRAL STUDY AREA

REPORT LIST

TECHNICAL REPORTS

PHASE 1 INTERIM REPORT VOLUMES 1 AND 2 MAY 1994

Contains tabulations of 1990 TWDB population and water demand projections for West Central study area. Includes engineering analysis of approximately 130 individual water supply options in the Nueces, San Antonio, Guadalupe, lower Colorado, Brazos and Sabine river basins.

PHASE 1 INTERIM REPORT VOLUME 3 NOV. 1994

Contains results of engineering analysis of additional water supply options in the San Antonio and Guadalupe River basins.

PHASE 1 INTERIM REPORT VOLUME 4 JAN. 1996

Contains results of engineering analysis of options to use water from the Guadalupe River basin to recharge the Edwards Aquifer and analysis of two proposed reservoirs on Cibolo Creek in the San Antonio River basin.

PHASE 1 INTERIM REPORT VOLUME 5 AUG. 1996

Contains written comments received from the West Central Advisory Committee for Public and Technical Input on the technical work presented in Volumes 1- 4.

PHASE 2 LETTER OF INTENT ANALYSIS REPORT OCT. 1996

Contains tabulations of updated 1996 TWDB population, water demand, and water supply projections for Bexar, Comal, and Guadalupe counties. Presents results of engineering analysis of water supply options which could serve Bexar, Comal, and Guadalupe counties.

PUBLIC PARTICIPATION/STAKEHOLDER INVOLVEMENT REPORTS

TECHNICAL MEMORANDUM — JAN. 1996

Documents the beginning of a public process and defines the commitment of the West Central sponsoring agencies to that process. Includes the Principles of Participation which serve as a formal expression of the West Central sponsoring agencies' commitment to the public participation/stakeholder involvement process.

WATER ISSUES SURVEY REPORT — SEPT. 1996

Contains the results of a scientific telephone survey used to establish a baseline of the public's awareness, attitudes, and concerns about water issues.

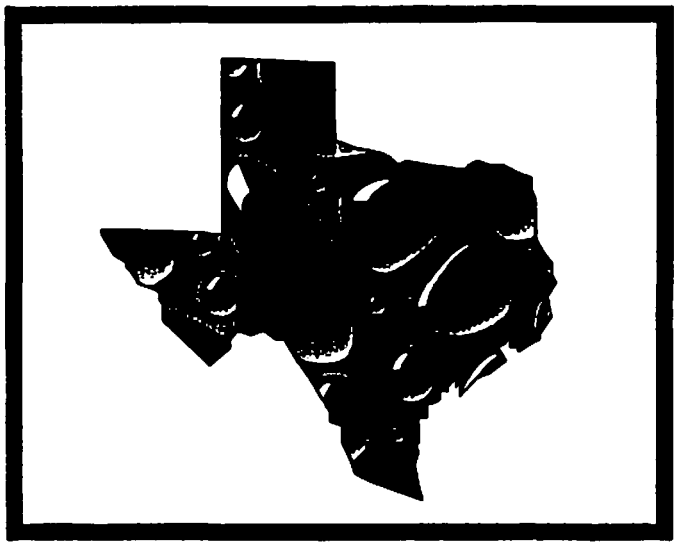
ISSUES DOCUMENT — FEB. 1997

Outlines the specific issues identified to date by the public in connection with water planning generally and the West Central Trans-Texas Water Program specifically. It constitutes the first documented effort of the program to solicit and to "hear" the voice of the region's constituents. Includes the results of focus group and public meetings held throughout the study area.

PUBLIC PARTICIPATION PLAN — FEB. 1997

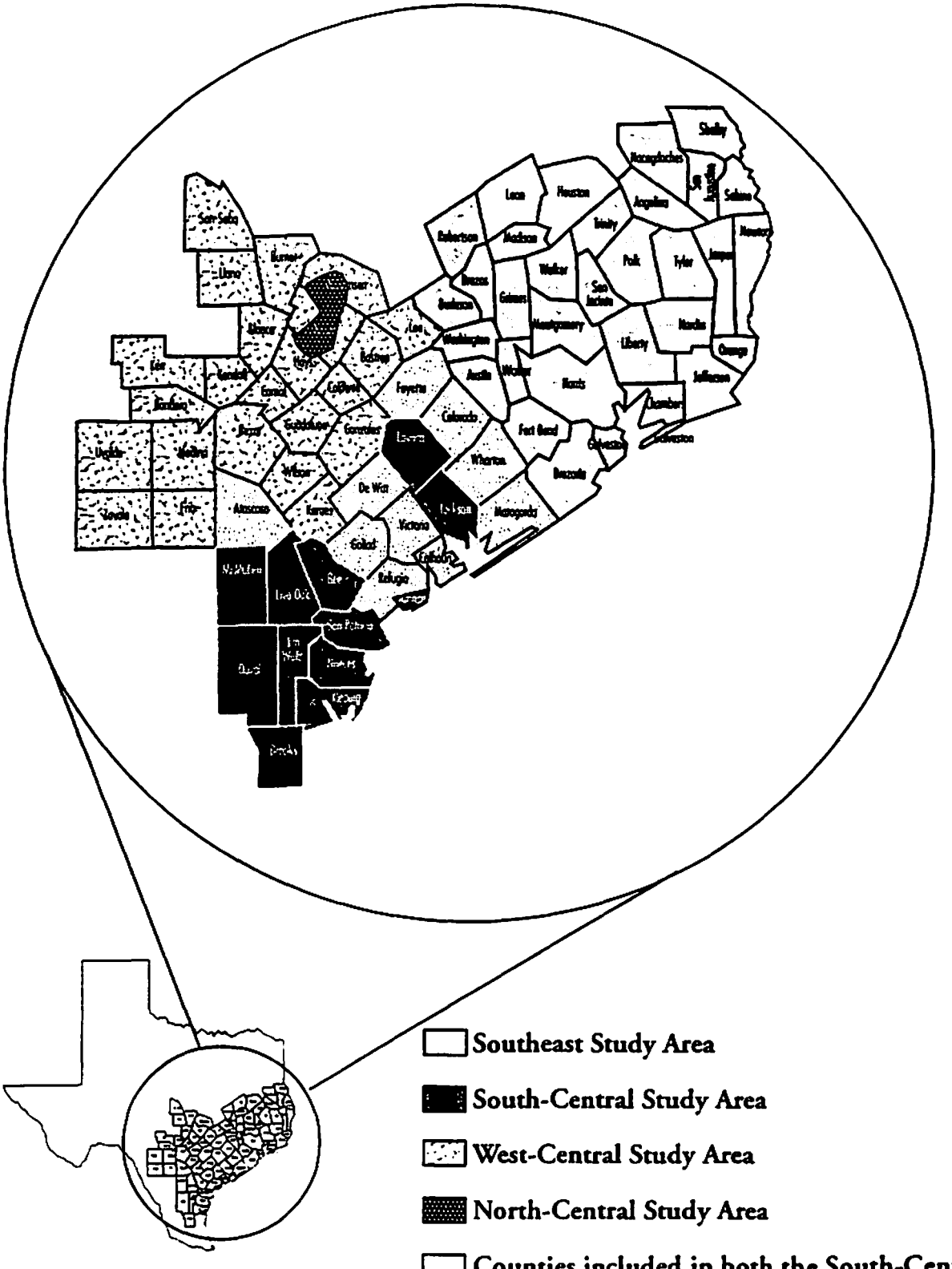
Contains the recommended design and implementation of the public participation/stakeholder involvement plan.

Trans-Texas Water Program

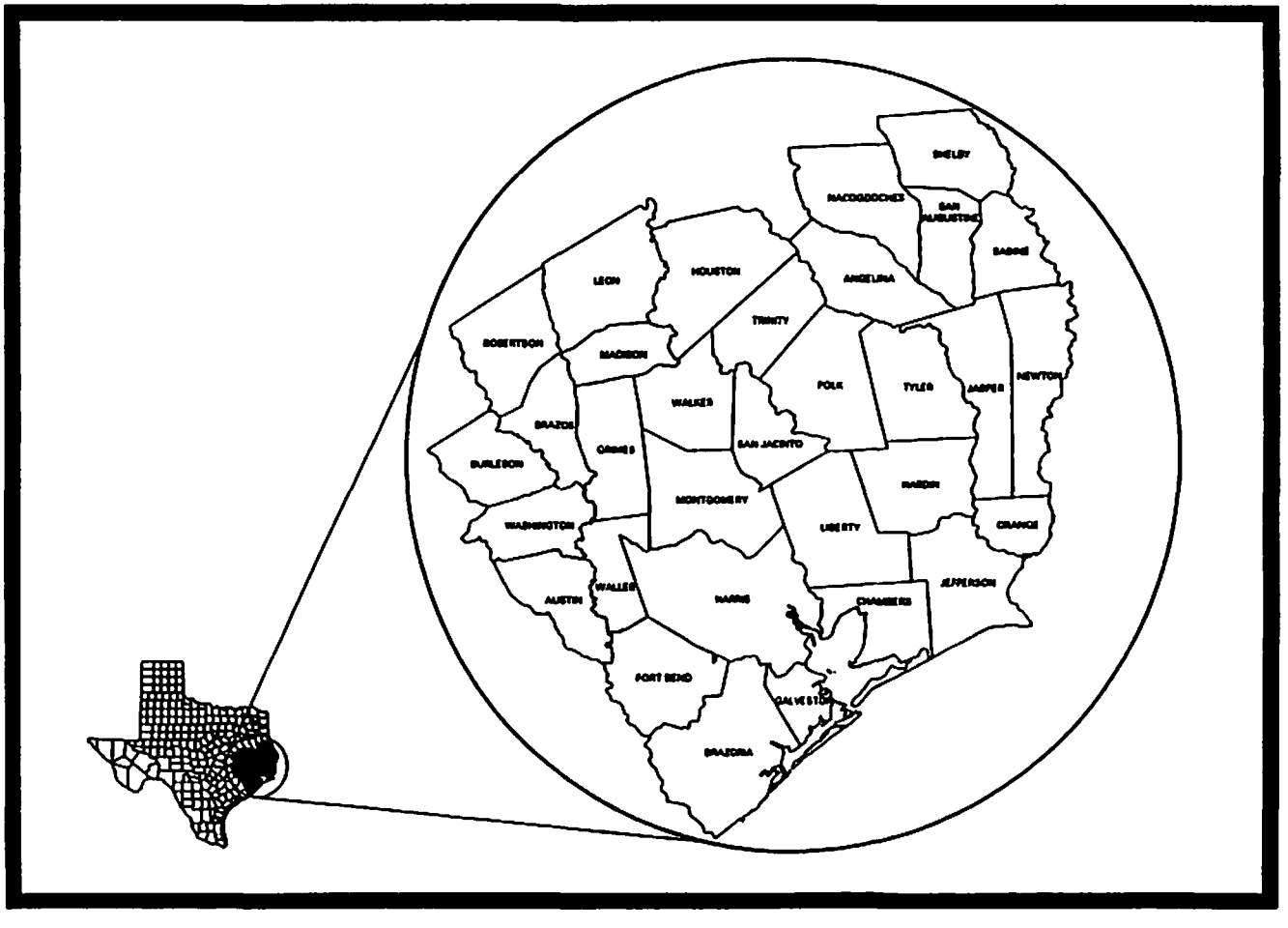


REGIONAL STUDY AREAS

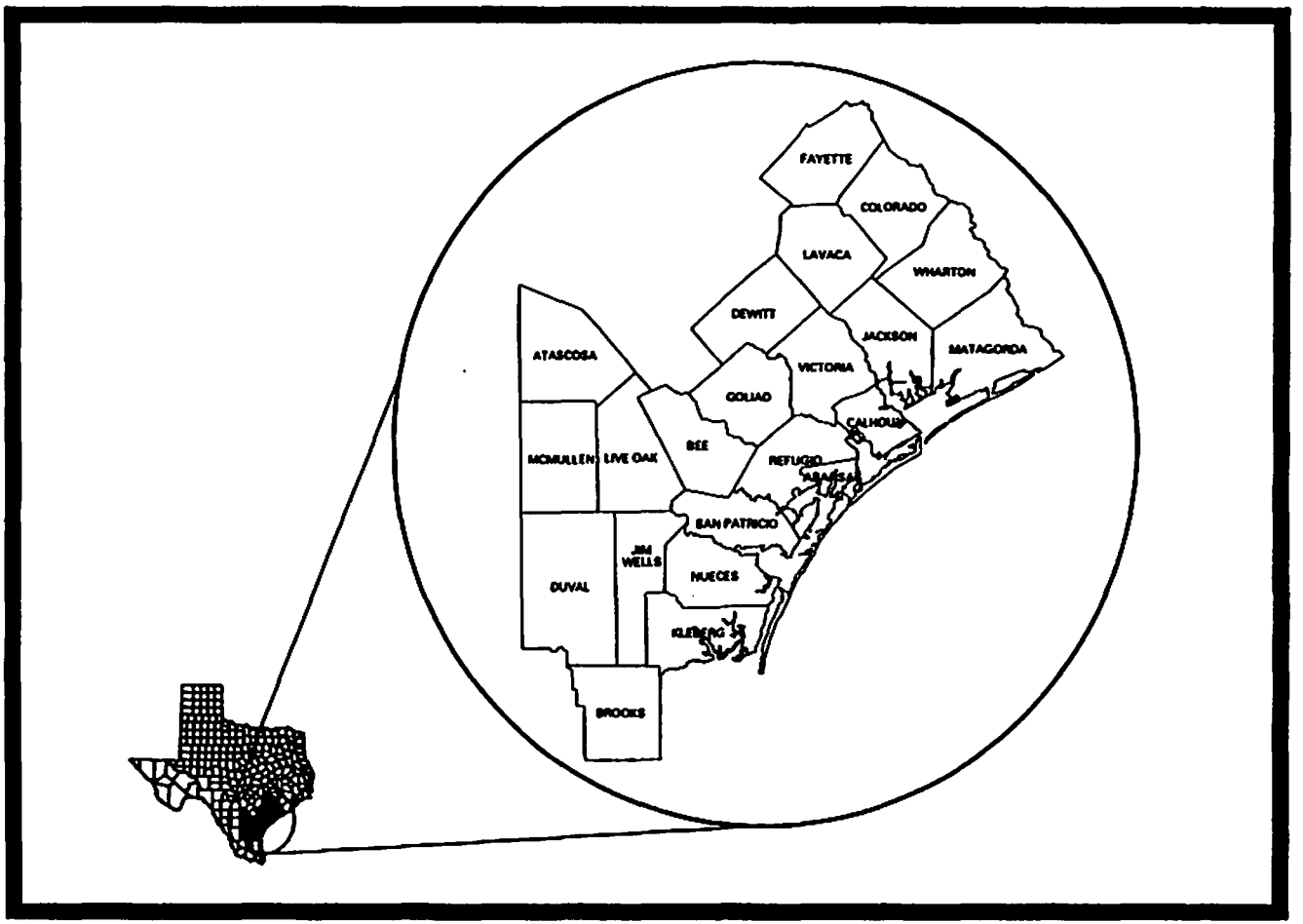
TRANS-TEXAS WATER PROGRAM



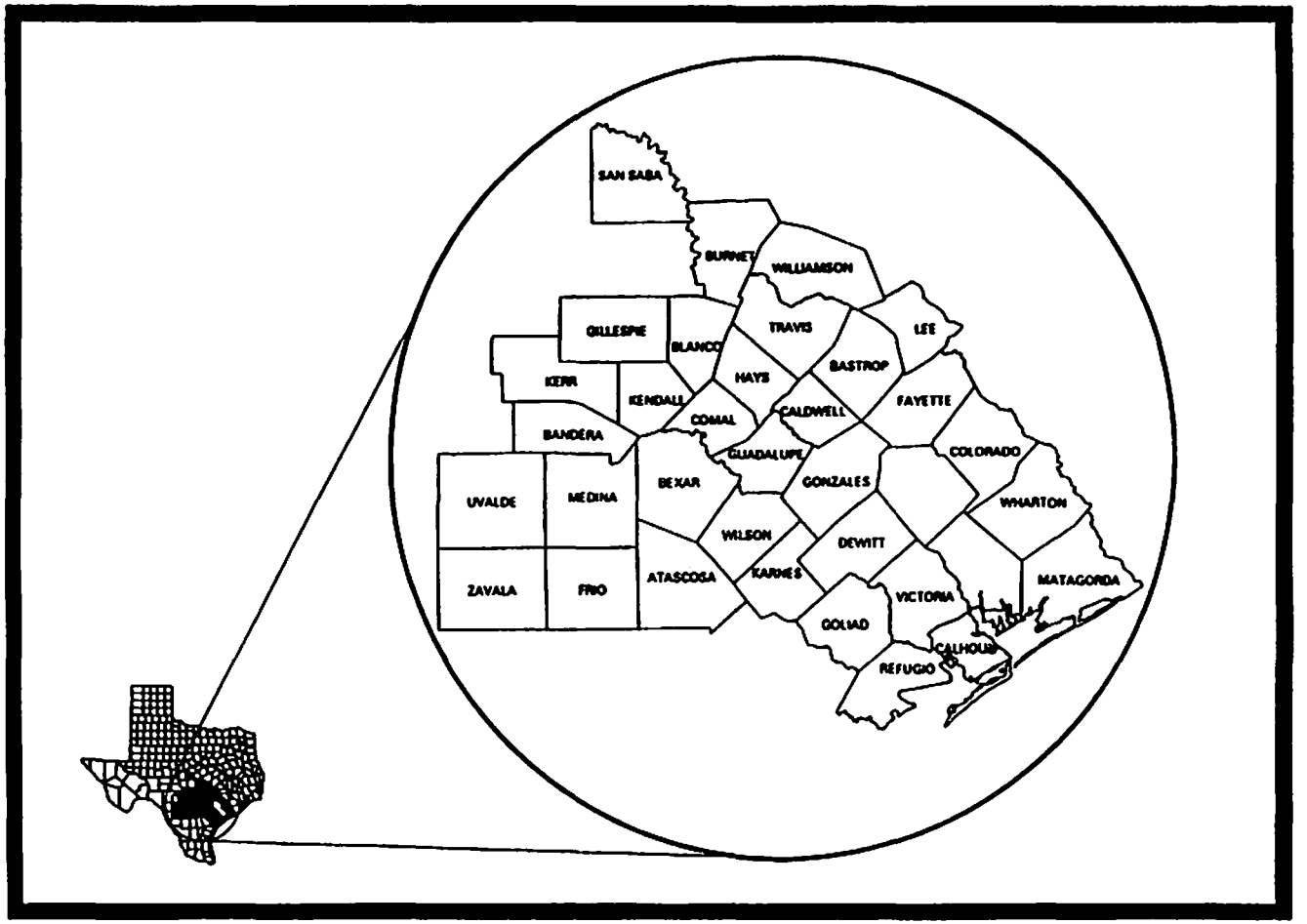
Southeast Study Area



South-Central Study Area



West-Central Study Area



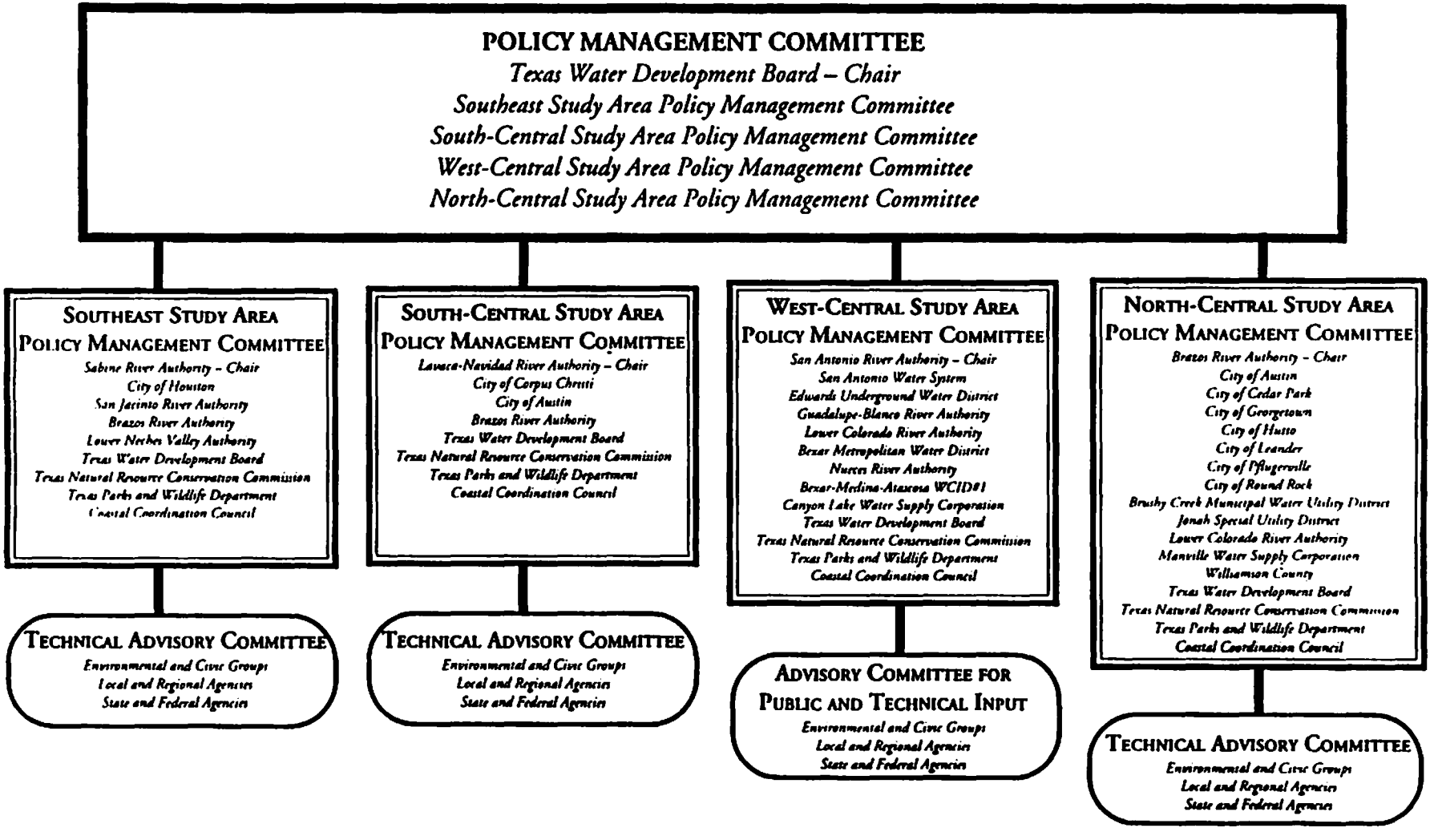
WEST CENTRAL STUDY AREA SPONSORS

REGIONAL SPONSORS:

NUECES RIVER AUTHORITY
SAN ANTONIO RIVER AUTHORITY
GUADALUPE-BLANCO RIVER AUTHORITY
LOWER COLORADO RIVER AUTHORITY
SAN ANTONIO WATER SYSTEM
BEXAR METROPOLITAN WATER DISTRICT
EDWARDS AQUIFER AUTHORITY
BEXAR-MEDINA-ATASCOSA WCID NO. 1
CANYON LAKE WATER SUPPLY CORPORATION

STATE AGENCIES:

TEXAS WATER DEVELOPMENT BOARD
TEXAS NATURAL RESOURCES CONSERVATION COMMISSION
TEXAS PARKS AND WILDLIFE DEPARTMENT
COASTAL COORDINATION COUNCIL


POLICY MANAGEMENT COMMITTEE
Texas Water Development Board – Chair
Southeast Study Area Policy Management Committee
South-Central Study Area Policy Management Committee
West-Central Study Area Policy Management Committee
North-Central Study Area Policy Management Committee
SOUTHEAST STUDY AREA POLICY MANAGEMENT COMMITTEE
Sabine River Authority – Chair
City of Houston
San Jacinto River Authority
Brazos River Authority
Lower Neches Valley Authority
Texas Water Development Board
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Coastal Coordination Council
SOUTH-CENTRAL STUDY AREA POLICY MANAGEMENT COMMITTEE
Lavaca-Navidad River Authority – Chair
City of Corpus Christi
City of Austin
Brazos River Authority
Texas Water Development Board
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Coastal Coordination Council
WEST-CENTRAL STUDY AREA POLICY MANAGEMENT COMMITTEE
San Antonio River Authority – Chair
San Antonio Water System
Edwards Underground Water District
Guadalupe-Blanco River Authority
Lower Colorado River Authority
Bexar Metropolitan Water District
Nueces River Authority
Bexar-Medina-Atascosa WCID#1
Canyon Lake Water Supply Corporation
Texas Water Development Board
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Coastal Coordination Council
NORTH-CENTRAL STUDY AREA POLICY MANAGEMENT COMMITTEE
Brazos River Authority – Chair
City of Austin
City of Cedar Park
City of Georgetown
City of Hutto
City of Leander
City of Pflugerville
City of Round Rock
Brushy Creek Municipal Water Utility District
Jonah Special Utility District
Lower Colorado River Authority
Manville Water Supply Corporation
Williamson County
Texas Water Development Board
Texas Natural Resource Conservation Commission
Texas Parks and Wildlife Department
Coastal Coordination Council
TECHNICAL ADVISORY COMMITTEE
Environmental and Civic Groups
Local and Regional Agencies
State and Federal Agencies
TECHNICAL ADVISORY COMMITTEE
Environmental and Civic Groups
Local and Regional Agencies
State and Federal Agencies
ADVISORY COMMITTEE FOR PUBLIC AND TECHNICAL INPUT
Environmental and Civic Groups
Local and Regional Agencies
State and Federal Agencies
TECHNICAL ADVISORY COMMITTEE
Environmental and Civic Groups
Local and Regional Agencies
State and Federal Agencies

Mission Statement

To determine the best methods of meeting the short and long-term (50 year) water needs of the entire study area in a cost-effective and environmentally sensitive manner.

PUBLIC PARTICIPATION / STAKEHOLDER INVOLVEMENT

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
PUBLIC PARTICIPATION/STAKEHOLDER INVOLVEMENT
JANUARY, 1996

PRINCIPLES OF PARTICIPATION

This declaration formally expresses our commitment to a comprehensive public participation/-stakeholder involvement process. By adopting and implementing the principles embodied in this declaration, the public's input will play a critical role in evaluating the water planning strategies to be considered for this region.

While each participating agency is responsible to its respective constituents, our collective regional responsibility is "to identify the most cost-effective and environmentally-sensitive strategies for meeting the current and future water needs of the West Central Region." In addition, we must ensure that the public and stakeholders significantly participate in deciding which strategies will be implemented.

By unanimous adoption of this statement, the West Central Policy Management Committee of the Trans-Texas Water Program commits itself to the following principles of public and stakeholder participation:

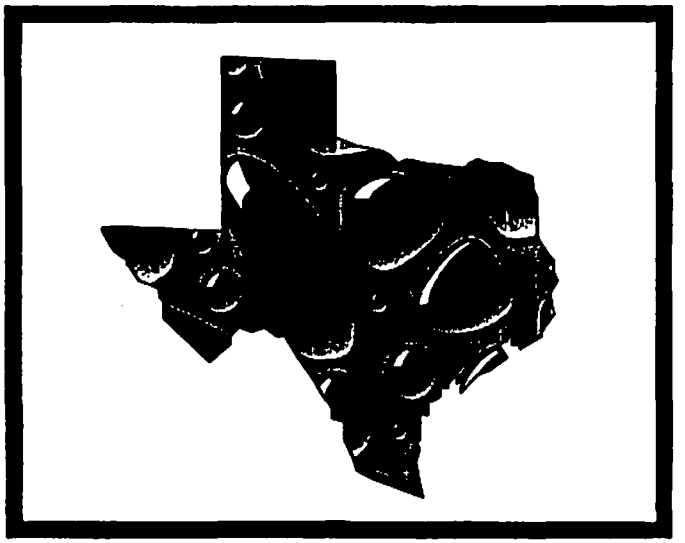
- The public/stakeholder's participation must be broadly based and inclusive of all constituencies.
- It is the responsibility of the Trans-Texas Water Program and its sponsors to be proactive in its commitment to seek public/stakeholder participation and input.
- Public/stakeholder communication must be timely, truthful, consistent, and two-way.
- The Policy Management Committee, as the responsible decision-making body, must be accountable for the integrity of the public/stakeholder participation process and the manner in which the public's input shapes the final outcomes of the project.

In this effort we recognize that the overall quality and depth of public/stakeholder participation can only be as good as our ability to effectively communicate the complex issues associated with water planning strategies.

These Principles of Participation recognize that no present or long-term water strategy can be implemented without the general support and consent of the public and stakeholders.

Policy Management Committee
Trans-Texas Water Program
West Central Region

Trans-Texas Water Program



PROJECTIONS

♦POPULATION

- STATE
- COUNTY
- CITY

♦WATER DEMANDS

- MUNICIPAL WATER DEMAND
- INDUSTRIAL WATER DEMAND
- STEAM-ELECTRIC POWER WATER DEMAND
- IRRIGATION WATER DEMAND
- MINING WATER DEMAND
- LIVESTOCK WATER DEMAND
- TOTAL WATER DEMAND

- **MUNICIPAL WATER DEMAND**

(Expressed in Acre-Feet Per Year)

(One acre-foot is 325,851 gallons)

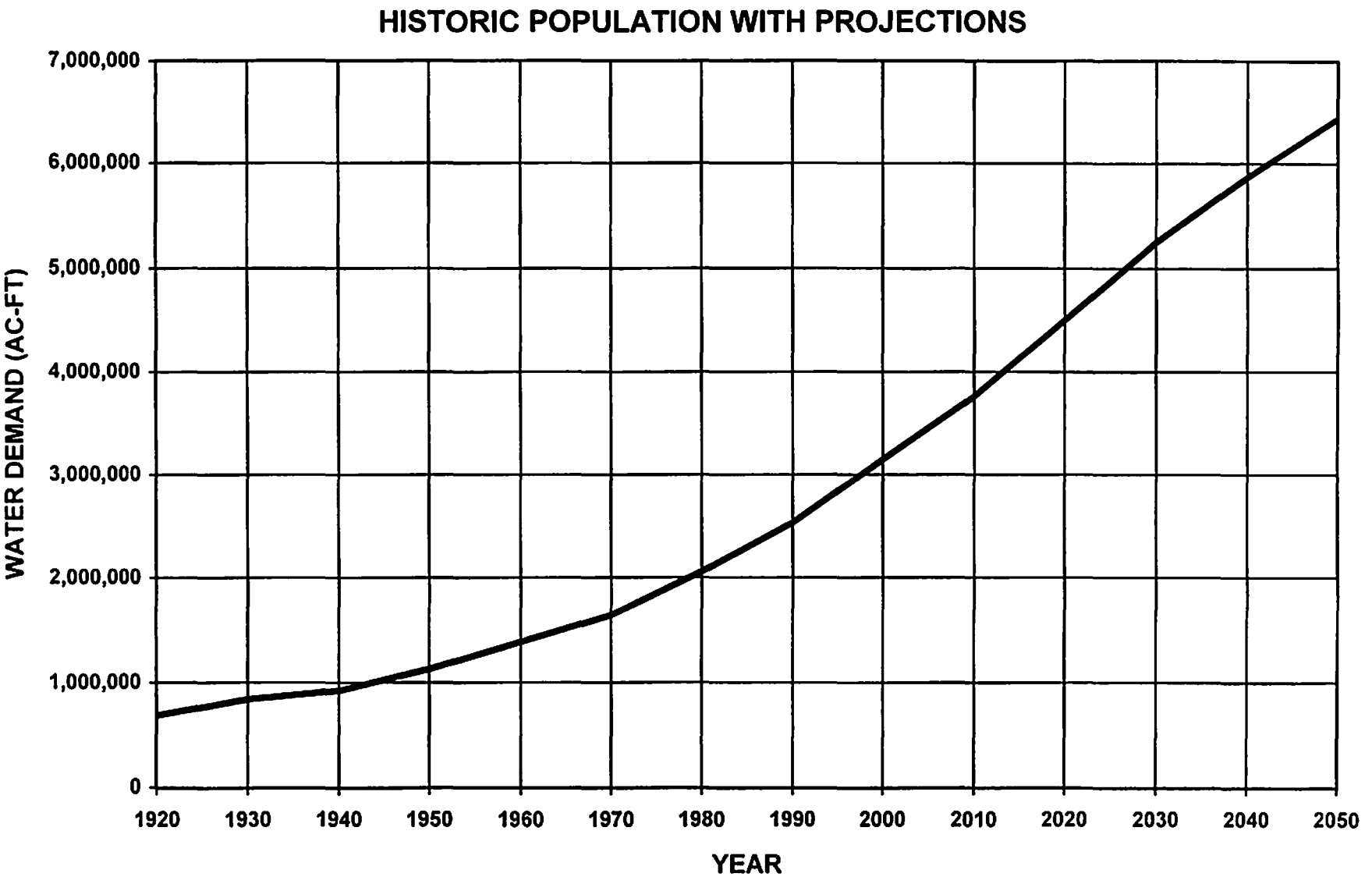
$$\frac{\text{Population X Per Capita Water Use X 365}}{325{,}851}$$

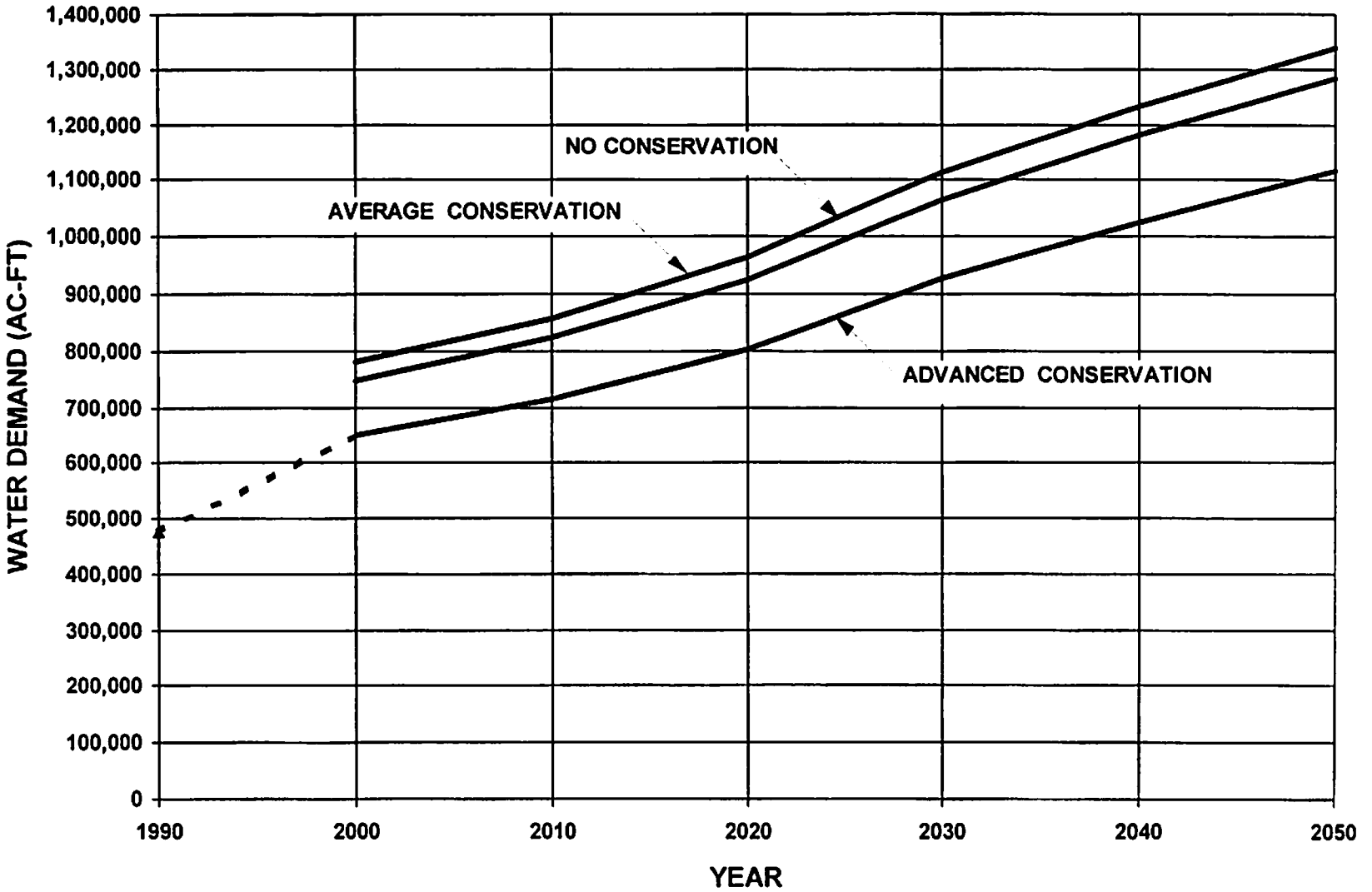
Per Capita Water Use

Average Conservation

Advanced Conservation

- **INDUSTRIAL WATER DEMAND**
- **STEAM-ELECTRIC POWER WATER DEMAND**
- **IRRIGATION WATER DEMAND**
- **MINING WATER DEMAND**
- **LIVESTOCK WATER DEMAND**
- **TOTAL WATER DEMAND**


HISTORIC POPULATION WITH PROJECTIONS
WATER DEMAND (AC-FT)
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
2050
YEAR



▲ 1990 USE

—— WATER DEMAND

HDR Engineering, Inc.

TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

MUNICIPAL WATER DEMAND PROJECTIONS/CONSERVATION EFFECTS - 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 3 A

Trans-Texas Water Program
West Central Study Area

Population and Water Demand Projections

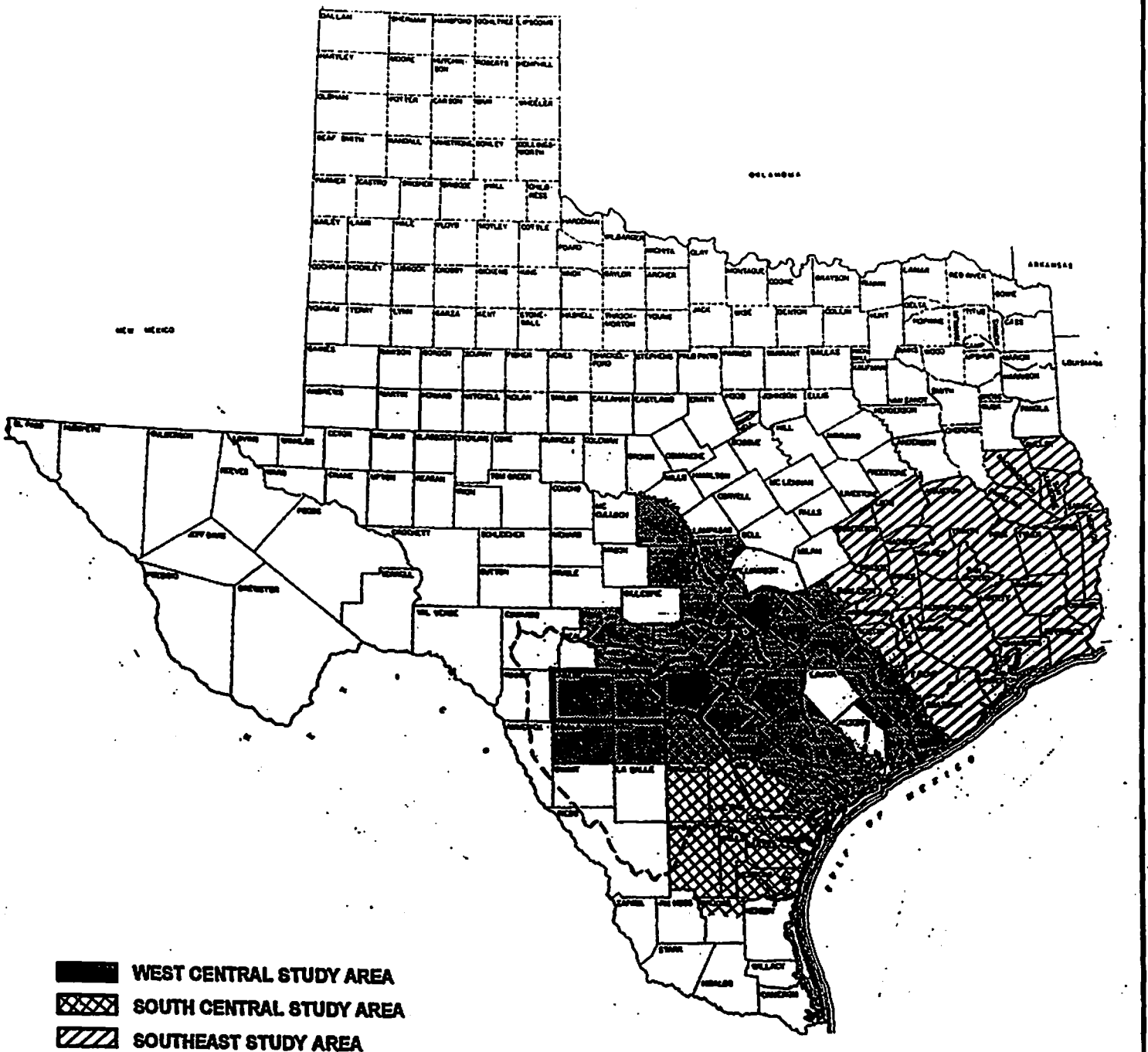
Integrated Resource Planning Committee (IRPC)

Board Room
San Antonio River Authority

November 1, 1997
San Antonio, Texas

HDR Engineering, Inc.

Contents



TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

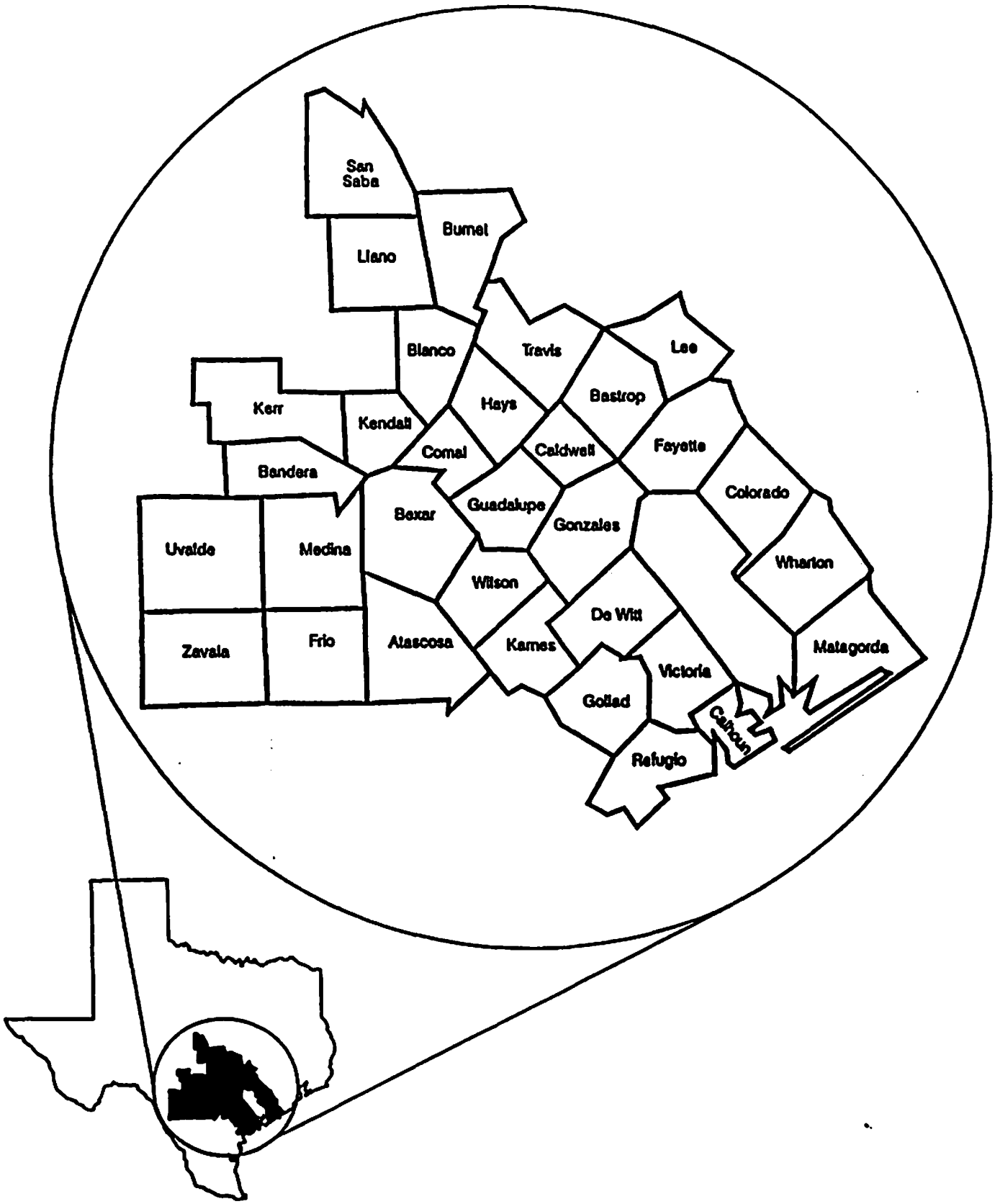
STUDY AREA

HDR

HDR Engineering, Inc.

WEST-CENTRAL STUDY AREA

TRANS-TEXAS WATER PROGRAM



Texas Water Development Board Population and Water Demand Projection Methods[1]

Municipal Water Demand: As defined by the TWDB, "for planning purposes, municipal water use includes both residential and commercial water uses. Commercial water use includes business establishments, public offices, and institutions, but does not include industrial water use. Residential and commercial uses are categorized together because they are similar types of uses, i.e., they both use water primarily for drinking, cleaning, sanitation, air conditioning, and landscape watering.

"The methodology for forecasting municipal water use relies on three primary components:

1) Population forecasts of the state, counties, cities, towns, and rural areas of counties;
2) Per capita (per person) municipal water use forecasts of cities, towns, and rural areas of counties; and,
3) Improved water use efficiency due to the implementation of conservation measures.

"Population as a Component of Municipal Water Use Projections

"The population projections methodology and procedures used in the consensus planning process provides for the estimation of alternative future populations for each specific municipality and rural area of Texas. The latest population estimates published by the U.S. Bureau of the Census indicate that Texas currently ranks as the second most-populated state in the nation, with a population of more than 18.3 million. A large and increasing population will continue to place pressure on the state's water resources to provide sufficient quantities of water to meet local and regional municipal water needs. Because population is a causal factor associated with municipal water use, the TWDB develops population projections for use in assessing potential future municipal water needs. The methodology, assumptions, scenarios, and data sources used in the development of the consensus population projections are presented below.

[1] Quoted from Texas Water Development Board's unpublished Water Planning information that is being used in development of the 1996 Texas Water Plan; Austin, Texas, 1996.

"**Population Forecasting Methodology and Key Planning Assumptions**: The technique for projecting population is a cohort-component procedure, which uses the separate cohorts (age/sex/race/ethnic groups) and components of cohort change (fertility rates, survival rates, and migration rates) to calculate future populations. Projections of each cohort are then summed to the total population. Cohorts used in the projection process are defined as single-year-of-age (0 to 75) cohorts by sex and race/ethnic groups, which include Anglo, Black, Hispanic, and Other. Anglos are defined as persons of white non-Spanish origin; Blacks are defined as persons of Black non-Spanish origin; Hispanics are defined as persons of Spanish origin of all racial and ethnic groups; and Other is defined as those persons of other race/ethnic groups of non-Spanish or non-Black origin.

"Many counties in Texas have special populations generally referred to as "institutional" populations. These are people who are assumed not to participate in the same demographic processes as the base population and generally tend to move in and out of these institutional arrangements in fixed intervals. More specifically, these groups are defined as college/university populations, military populations, prison populations, and populations in other institutional arrangements. Institutional populations are removed from the base population for computing future cohort populations, but are added back into the total projected base cohort population at the end of each projection interval.

"The components of cohort change include fertility rates, survival rates, and migration rates. Fertility rates for each female cohort are incorporated into the projection procedure for calculating the number of births anticipated to occur between each projection interval. Survival rates for each cohort are used to compute the change in the number of cohorts relating to the number of deaths anticipated to occur between each projection interval. Migration rates for each cohort are used to compute the change in each cohort due to immigration or emigration in a specific locale.

"Key assumptions used in developing the population projections are associated with the demographic components of change for each cohort and are described below:

1) Consistent with the planning information made available from the State Data Center, fertility rates for Anglo females are trended downward through the year 2010 and held constant at the 2010 rate through the year 2050; and fertility rates for Black, Hispanic, and Other females are trended downward through the year 2030 and held constant at the 2030 rate through the year 2050.
2) Survival rates are assumed to follow national trends over the projection period.
3) Migration rates are set to the 1980-1990 base period rates for each county and are varied from this base data set in accordance with the alternatively defined projection scenarios.

"The projected county population is allocated to each city of 1,000 or more population based on each city's historic share of the county population. The rural or "country-other" population is calculated as the residual of the sum of the cities' projected population and the projected county population.

"**Forecasting Scenarios**: Three population projection scenarios, based on varying the 1980-1990 migration rates, were selected to project a range of alternative future populations. The three population projection scenarios are presented below:

1) 0.0 Migration: Zero net migration over the projection period. Only the natural increase or decrease in population is assumed.
2) 0.5 Migration: One-half of the 1980-1990 migration rate is assumed to occur over the projection period.
3) 1.0 Migration: The 1980-1990 migration rate is assumed to occur over the projection period.

"From this range of population projections, consensus planning staff and the Water Demand/Drought Management TAC approved a "most likely growth" scenario for each of the 254 counties, based on recent and prospective growth trends and their combined professional opinions.

"**Data Sources**: The development of the population forecasts incorporated a number of data sources and information files based on the 1990 Census data obtained from Dr. Steve Murdock, Chief Demographer for the Texas State Data Center and Texas A&M University. These data sources included the following:

1) 1990 Population by Cohort (Age, Sex, and Race/Ethnic Groups) Modified for Age and Race/Ethnicity.
2) 1990 Institutional Populations (Prison Populations, College Populations, Military Populations, and Other Populations in Institutional Arrangements).
3) Projected Fertility Rates by Age and Race/Ethnic Groups.
4) Projected Survival Rates by Single Years of Age, Sex, and Race/Ethnic Groups.
5) 1980-1990 Migration Rates by Single-Year Estimates and Cohort.

"<u>Per Capita Water Use and Weather Influences</u>

"The quantity of water used for municipal purposes is reported to the Texas Water Development Board on an annual basis by cities and other water suppliers such as rural water supply corporations, municipal utility districts, fresh water supply districts, and other types of water suppliers. The types of information reported include ground water and/or surface water use, source of the water (aquifer, river, reservoir, or stream), water sales and water purchases to other municipalities and end-users, number of service connections, estimated population served, and other pertinent information. This information provides for the identification of the water use and water supply network for each geographical area of Texas.

"In calculating the per capita water use for a specific entity, all water sales to other municipalities, industries, or other utilities are removed from the reported total water produced (pumpage or diversions) in order to arrive at the quantity of water used for municipal purposes by that specific entity. Annual per capita water use, typically stated in gallons per capita daily

(gpcd), is then calculated by dividing the adjusted reported annual water use for a specific entity by its estimated annual population. Annual population estimates developed by the State Data Census Population Estimation Program are used for calculating city per capita water use.

"The diversity of the state with respect to climatic conditions, population density, and the availability of water is indicative of the wide range of per capita water use estimates by geographical area across the state, as well as the varying quantities of water used on an annual basis. From a climatological perspective, rainfall conditions play a major role in the quantity of water used for municipal purposes, particularly for outdoor purposes. During below-normal rainfall conditions, people tend to use more water than during normal or average weather conditions. To portray this weather-related phenomenon, two types of per capita water use estimates were calculated for use in the consensus water planning efforts. One estimate assumes below normal rainfall conditions; the other assumes normal weather conditions. These two estimates were incorporated into two separate scenarios of municipal water use forecasts.

"To better represent current-day water use as affected by existing plumbing, appliances, and conservation technology, the assumed normal weather per capita water use is based on the average per capita water use over the last five years of record (1987-1991) for each entity. The assumed below-normal rainfall condition per capita water use is based on the highest per capita water use recorded by an entity over the last ten years of record (1982-1991). For planning purposes, the assumed below-normal rainfall per capita water use variable is constrained to an upper limit of 25 percent above the calculated (five year average) normal condition per capita water use variable. This constraint was used as an adjustment for water conservation practices put in place after 1985.

"Municipal Water Conservation

"Municipal water conservation is increasingly recognized by water utilities as a very cost-effective approach for extending water supplies. In addition, many conservation strategies are simply good management alternatives. Staffs of the three agencies have estimated a likely range of water conservation savings that could be attained over the 1990-2050 planning period. These are included in alternative municipal water use forecast scenarios. These potential savings are based on assumptions regarding the rate of implementation of indoor plumbing conservation measures as well as the rates of implementation of conservation measures in seasonal, dry-year irrigation, and other municipal water uses. These four municipal use sub-categories and associated potential savings assumptions are presented below:

Components of Municipal Water Conservation Savings

Areas of Potential Municipal Water Use Savings	Expected Conservation Savings	Advanced Conservation Savings
Indoor Plumbing Savings	20.5 gallons per capita daily	21.7 gallons per capita daily
Seasonal Water Savings	7.0% of total seasonal use	20% of total seasonal use
Dry-Year Irrigation Savings	10.5% of dry-year seasonal use	20% of dry-year seasonal use
Other Municipal Savings	5% of total average yearly use	7.5% of total average year use

"A primary assumption associated with the definition of the "expected" municipal water conservation case is that these levels of savings are likely to occur from both market forces and regulatory requirements. The typical plumbing fixtures and appliances available for purchase are noticeably more water-efficient than those sold in earlier decades. The availability of water efficient landscaping in the marketplace and improved landscaping practices are changing outdoor water uses. Better public education on efficient indoor and outdoor water uses and pricing "signals" from the marketplace are also changing consumer behavior.

"In addition to the market-type forces, a driving force underlying the expected municipal water conservation savings is the likely effect produced by the State Water-Efficient Plumbing Act passed in 1991. Not only are these potential water savings from the implementation of the Act substantial, but they are also economically sound from a cost-saving perspective, do not require day-to-day behavior changes by the consumer, affect the larger year-round base water use, and will occur with a relatively high degree of predictability.

"The primary difference between the expected and advanced conservation savings scenarios is one of timing. The majority of the additional savings reflected in the advanced conservation case arises from accelerating the effect of the plumbing bill with municipal utilities engaging in active water-efficient plumbing retro-fit programs. Some additional savings are from slightly more aggressive assumptions on seasonal, dry-year urban irrigation, and other municipal uses. The advanced conservation scenario represents the maximum technical potential for water conservation savings. The expected scenario represents feasible strategies for water conservation
savings that are economically sound.

"Calculation of Municipal Water Use

"Estimates of future municipal water use are then computed by multiplying the projected population of an entity's projected per capita water use, adjusted for conservation savings. The projected municipal water use is then converted to an annual acre-foot measure."

Industrial and Steam-Electric Power Water Demands: Industrial water use is that quantity of water used in the manufacturing of products, and includes water used for product washing, production process cooling, and for mixing and incorporation into finished goods. Steam-electric power water demand is the quantity of water used in boilers for powering electricity generating machinery and for cooling the electric power production processes. The TWDB projections of industrial and steam-electric power water demands are based upon projected national growth rates for each water using industry, with adjustments for regional differences for industries located in Texas, and with water conservation effects taken into account when making projections; i.e., "most likely case, with conservation."

Irrigation Water Demand: With assistance from Texas A&M University, the TWDB developed computer models of irrigation regions of Texas. The objectives of the analyses were to select the crops, acreages of each crop, and irrigation technology that would give the maximum net farm income in each region, based upon various acreage conditions, water supplies available for irrigation, and government farm programs. In the analyses, both dryland and irrigated acreages were constrained to the largest quantity of annual acreage in production during the period 1974 through 1990. Essentially, the projections methods result in an irrigation water demand projection for each county of irrigated regions of Texas, that are based upon acreages irrigated being held constant at the maximum acreage irrigated during the period 1974 through 1990, but with expected trends in irrigation efficiency improvements to continually reduce the quantities of irrigation water needed per acre. In addition, the analyses included the condition that federal farm program payments would be reduced to 50 percent of the levels in effect in 1994, which would result in some changes in cropping patterns within the irrigated areas, giving some further changes in the quantities of irrigation water needed per acre; i.e., reduced federal farm payments would reduce the profitability of irrigation farming and thereby would reduce the quantity of irrigation water needed per acre.

Mining Water Demand: Projections of fresh water use for mineral production in Texas were developed for the categories of fuels and nonfuels. Projections of water use were based on projected future production levels for each mineral commodity. This future production was derived from both state and national historic rates, which was constrained by the accessible mineral reserves in the region.

For each category of mineral products, the requirements for mining water were determined as a function of production. Estimates of future production were calculated by analyzing both recent data, and state and national production trends. A water use coefficient, computed from data collected by the Texas Water Development Board's 1990 Water Use Survey, which reports the quantity of water used in the production of each increment of output, was applied to estimated mineral production levels. A rate of water consumption derived from U.S. Bureau of Mines data was then applied to the total water use for each mineral industry. Because projections indicated petroleum production would decline rapidly after the year 2000, estimates of water use in oil production also declined sharply. This decline is overshadowed by the increase in water use for synthetic fuels. Estimates of lignite production for synthetic fuels were distinct from lignite used as fuel in electric utilities. The distribution of estimated water use was determined on the basis of concentration and distribution of mineral reserves. These water demands were added into the fuels category starting in 2020. The estimates of water use for mining require two basic assumptions. First, it was assumed that the location of mines within the respective basins would remain constant. Second, it was assumed that each region would retain its share of state production.

Livestock Water Demand: Estimating livestock water consumption is a straightforward procedure that consists of estimating water consumption for a livestock unit and the total number of livestock. Texas A&M University Agricultural Extension Service provided information on water use rates, estimated in gallons per day per head, for each type of livestock: cattle, poultry, sheep and lambs, and hogs and pigs. The Texas Agricultural Statistics provided current and historical numbers of livestock by livestock type and county. Water use rates were

then multiplied by the number of livestock for each livestock type for each county. In counties where the number of head of livestock was unavailable, historical livestock distribution patterns were assumed. Because water used for livestock is a small proportion of total water use (less than 2 percent), livestock water use is assumed to remain constant after the year 2000.

Total Water Demand: Total water demand is the sum of all demands identified above (Municipal + Industrial + Steam-Electric Power + Irrigation + Mining + Livestock = Total Water Demand).

The projections are based upon the following conditions, assumptions, and data:

A. The TWDB 1996 consensus water planning projections to be used are:
   1. Most likely population;
   2. Most likely municipal water demand for below normal precipitation and advanced conservation;
   3. Base oil prices, with conservation for manufacturing;
   4. Series 3 irrigation (aggressive adoption of irrigation technology and a reduction in Federal Farm Programs by one-half);
   5. Steam-Electric power high series;
   6. Mining - TWDB only series;
   7. Livestock - TWDB only series;

B. Assume 450,000 acft/yr pumpage from the Edwards Aquifer for years 1997 through 2007, and 400,000 acft/yr beginning in year 2008.

C. Use TWDB groundwater information for counties of the River Absins.

D. In calculations of water supply from the Edwards Aquifer, analyses will be based on provisions of SB 1477, with pumpage set at 450,9000 acft/yr for the period 1997 through 2007, and 200,000 acft/yr beginning in 2008, and the assumption that each entity which obtained water from the Edwards Aquifer in 1990 and have its 1990 pro rata share of Edwards pumpage in future years.

Table A

Per Capita Municipal Water Demand Projections--32 county West Central Trans-Texas Study Area

Trans-Texas Water Program

County	Use in 1990 gpcd*	Projections					
		2000 gpcd*	2010 gpcd*	2020 gpcd*	2030 gpcd*	2040 gpcd*	2050 gpcd*
Atascosa	166	180	163	150	149	147	147
Bandera	122	109	96	87	85	84	83
Bastrop	146	153	138	129	127	126	125
Bexar	170	185	170	160	158	156	154
Blanco	135	137	121	109	106	104	104
Burnet	139	137	123	113	111	110	109
Caldwell	167	161	144	132	129	127	125
Calhoun	183	179	166	156	155	154	154
Colorado	142	137	125	117	116	115	115
Comal	179	209	191	177	174	172	171
DeWitt	169	160	146	136	134	133	132
Fayette	151	143	130	120	118	117	116
Frio	202	203	186	173	171	169	168
Goliad	137	129	117	108	107	105	104
Gonzales	199	194	179	167	165	163	162
Guadalupe	132	158	143	132	130	129	129
Hays	159	168	150	137	135	133	133
Karnes	157	158	144	133	131	130	128
Kendall	130	134	122	113	112	111	111
Kerr	146	168	159	148	145	142	141
Lee	208	197	182	170	168	167	166
Llano	191	194	176	160	156	155	152
Matagorda	126	127	116	107	105	103	102
Medina	172	190	171	158	156	153	151
Refugio	137	141	129	120	118	116	115
San Saba	210	260	238	220	218	215	215
Travis	178	207	192	181	180	178	178
Uvalde	202	226	212	199	201	202	204
Victoria	139	142	131	123	121	120	119
Wharton	139	137	124	115	113	112	111
Wilson	148	169	153	141	139	138	136
Zavala	172	182	165	152	150	147	143
Total	167	184	170	159	158	156	155
Dimmitt*	189	218	203	192	192	192	192
Edwards*	134	118	105	98	95	93	92
Kinney*	110	201	186	171	169	169	167
LaSalle*	210	201	184	171	168	166	165
Maverick*	110	129	117	107	106	103	103
Real*	194	207	189	179	180	181	183
Webb*	111	161	148	138	137	136	135
Total*	188	204	188	177	175	175	175
Texas State Average	167	184	179	175	171	169	168

* gpcd means gallons per person per day.

Table B
Per Capita Municipal Water Demand Projections--Selected Cities of Texas
Trans-Texas Water Program

City	Use in 1990 gpcd*	Projections					
		2000 gpcd*	2010 gpcd*	2020 gpcd*	2030 gpcd*	2040 gpcd*	2050 gpcd*
Abilene	216	201	193	184	181	178	177
Alomo Heights	303	355	330	309	307	318	304
Arlington	166	186	176	168	165	162	161
Austin	180	208	194	184	183	181	181
Bastrop	169	178	162	151	149	148	147
Bedford	159	184	173	165	161	159	158
Bridgeport	121	122	112	105	101	99	98
Burleson	111	107	98	92	89	87	86
Dripping Springs	139	127	106	89	88	87	86
Colleyville	222	214	201	192	190	189	188
Corpus Christi	232	212	203	196	192	190	189
El Paso	183	187	179	172	168	166	165
Euless	152	189	178	169	166	163	162
Fort Worth	210	202	194	187	184	181	180
Grand Prairie	154	149	141	133	130	126	126
Grapevine	167	181	171	164	161	159	158
Hereford	234	242	130	219	215	212	212
Hondo	216	258	237	220	218	217	216
Houston	157	180	172	165	162	159	158
Kerrville	179	200	190	181	178	175	174
Kingsville	169	163	154	147	144	142	141
Longview	156	181	172	165	161	158	157
Lubbock	176	168	160	152	149	146	145
Mansfield	118	171	163	155	151	148	147
Marshall	149	173	164	156	152	148	148
Midland	206	233	222	211	208	205	205
New Braunfels	204	242	225	212	210	210	209
Odessa	185	190	180	171	167	164	163
Pleasanton	181	220	202	187	186	184	184
Robstown	169	130	117	108	106	105	104
Runaway Bay	175	170	168	166	159	156	155
San Angelo	191	221	210	200	196	194	193
San Antonio	159	173	159	150	148	147	146
San Marcos	203	223	208	197	195	194	193
Seguin	171	177	162	149	147	146	145
Sinton	127	118	107	99	97	96	95
Uvalde	237	267	246	228	227	225	224
State Average	167	184	179	175	171	169	168

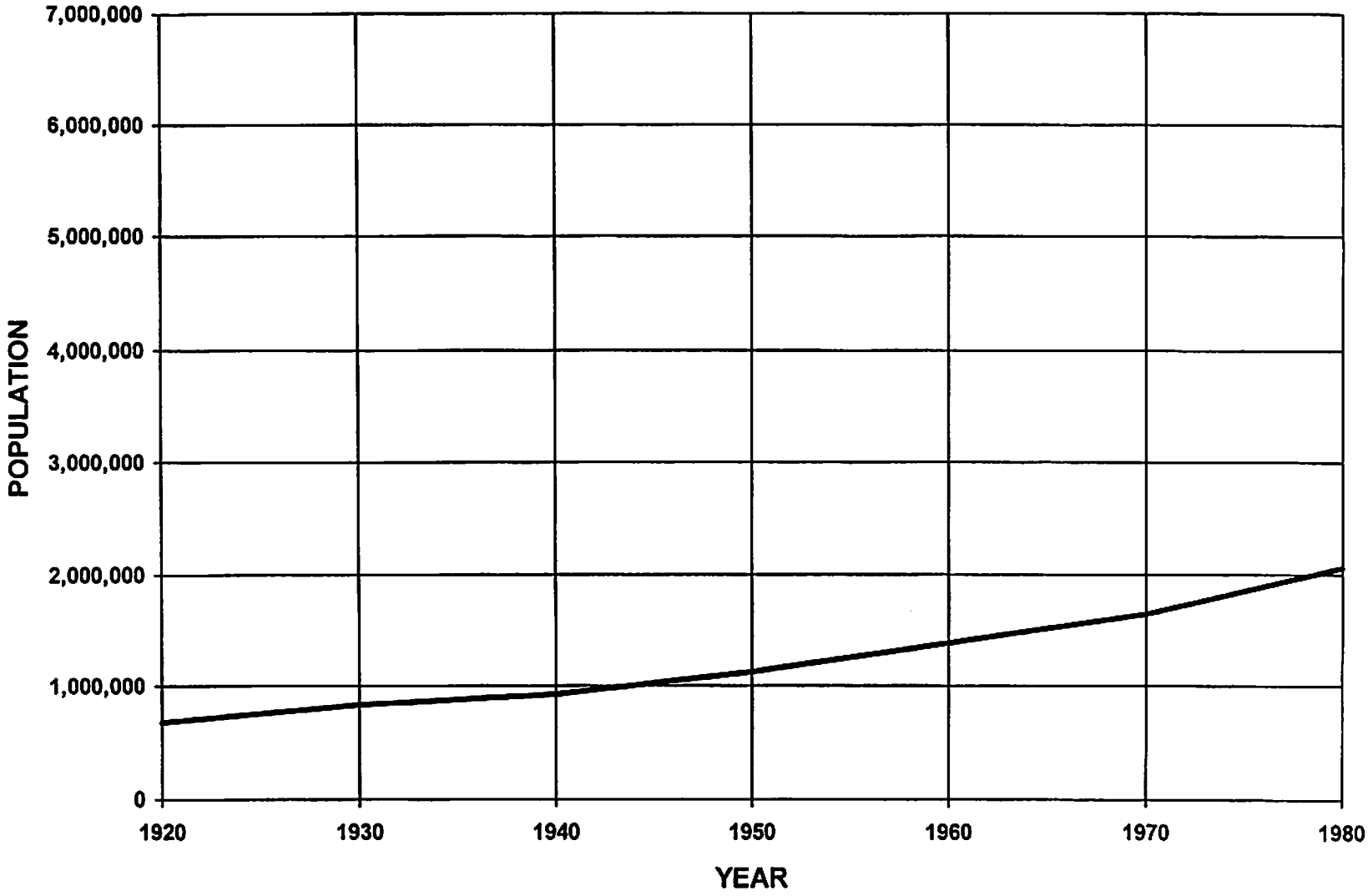
* gpcd means gallons per person per day.

Table 1
Population History--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Population							Change: 1920 to 1980	
	1920	1930	1940	1950	1960	1970	1980	Total	Percent
Atascosa	12,702	15,654	19,275	20,048	18,828	18,696	25,055	12,353	97.25
Bandera	4,001	3,784	4,234	4,410	3,892	4,747	7,084	3,083	77.06
Bastrop	26,649	23,888	21,610	19,622	16,925	17,297	24,726	-1,923	-7.22
Bexar	202,096	292,533	338,176	500,460	687,151	830,460	988,800	786,704	389.27
Blanco	4,063	3,842	4,264	3,780	3,657	3,567	4,681	618	15.21
Burnet	9,499	10,355	10,771	10,356	9,265	11,420	17,803	8,304	87.42
Caldwell	25,160	31,397	24,893	19,350	17,222	21,178	23,637	-1,523	-6.05
Calhoun	4,700	5,385	5,911	9,222	16,592	17,831	19,574	14,874	316.47
Colorado	19,013	19,129	17,812	17,576	18,463	17,638	18,823	-190	-1.00
Comal	8,824	11,984	12,321	16,357	19,844	24,165	36,446	27,622	313.03
DeWitt	27,971	27,441	24,935	22,973	20,683	18,660	18,903	-9,068	-32.42
Fayette	29,965	30,708	29,246	24,176	20,384	17,650	18,832	-11,133	-37.15
Frio	9,286	9,411	9,207	10,357	10,112	11,159	13,785	4,499	48.45
Goliad	9,348	10,093	8,798	6,219	5,429	4,869	5,193	-4,155	-44.45
Gonzales	28,438	28,337	26,075	21,164	17,845	16,375	16,883	-11,555	-40.63
Guadalupe	27,719	28,925	25,596	25,392	29,017	33,554	46,708	18,989	68.51
Hays	15,920	14,915	15,349	17,840	19,934	27,642	40,594	24,674	154.99
Karnes	19,049	23,316	19,248	17,139	14,995	13,462	13,593	-5,456	-28.64
Kendall	4,779	4,970	5,080	5,423	5,889	6,964	10,635	5,856	122.54
Kerr	5,842	10,151	11,650	14,022	16,800	19,454	28,780	22,938	392.64
Lee	14,014	13,390	12,751	10,144	8,949	8,048	10,952	-3,062	-21.85
Llano	5,360	5,538	5,996	5,377	5,240	6,979	10,144	4,784	89.25
Matagorda	16,589	17,678	20,066	21,559	25,744	27,913	37,828	21,239	128.03
Medina	11,679	13,989	16,106	17,013	18,904	20,249	23,164	11,485	98.34
Refugio	4,050	7,691	10,383	10,113	10,975	9,494	9,289	5,239	129.36
San Saba	10,045	10,273	11,012	8,666	6,381	5,540	5,693	-4,352	-43.33
Travis	57,616	77,777	111,053	160,980	212,136	295,516	419,335	361,719	627.81
Uvalde	10,769	12,945	13,246	16,015	16,814	17,348	22,441	11,672	108.39
Victoria	18,271	20,048	23,741	31,241	46,475	53,766	68,807	50,536	276.59
Wharton	24,288	29,681	36,158	36,077	38,152	36,729	40,242	15,954	65.69
Wilson	17,289	17,606	17,066	14,672	13,267	13,041	16,756	-533	-3.08
Zavala	3,108	10,349	11,603	11,201	12,696	11,370	11,666	8,558	275.35
Total	688,102	843,183	923,632	1,128,944	1,388,660	1,642,781	2,056,852	1,368,750	198.92
Dimmitt*	5,296	8,828	8,542	10,654	10,095	9,039	11,367	6,071	114.63
Edwards*	2,283	2,764	2,933	2,908	2,317	2,107	2,033	-250	-10.95
Kinney*	3,746	3,980	4,533	2,668	2,452	2,006	2,279	-1,467	-39.16
LaSalle*	4,821	8,228	8,003	7,485	5,972	5,014	5,514	693	14.37
Maverick*	7,418	6,120	10,071	12,292	14,508	18,093	31,398	23,980	323.27
Real*	1,461	2,197	2,420	2,479	2,079	2,013	2,469	1,008	68.99
Webb*	29,152	42,128	45,916	56,141	64,791	72,859	99,258	70,106	240.48
Total*	54,177	74,245	82,418	94,627	102,214	111,131	154,318	100,141	184.84

Source: U.S. Department of Commerce; Bureau of the Census.

*Not in West Central Trans-Texas study area; includes only part of county located in Nueces Basin.



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

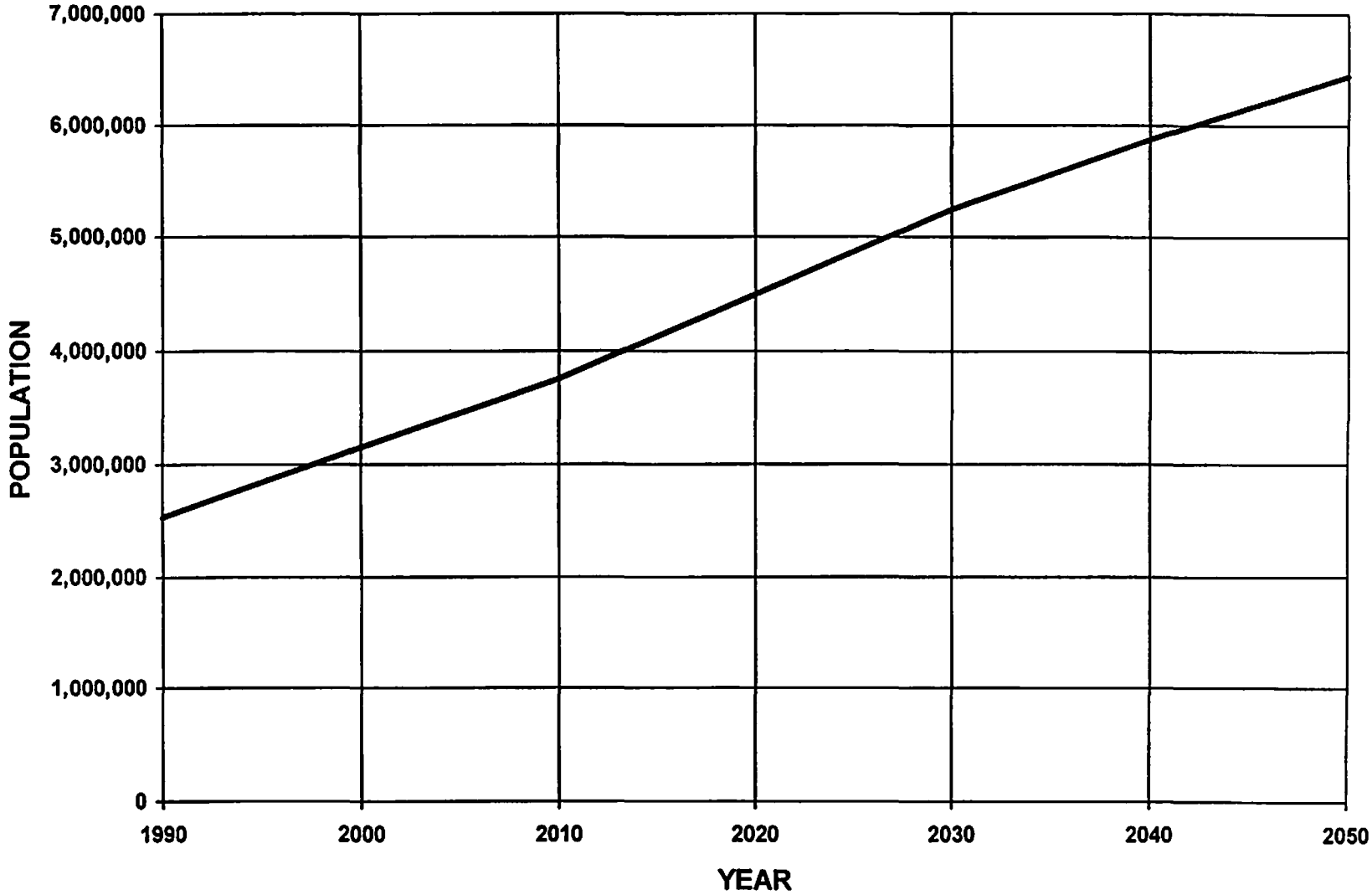
POPULATION HISTORY
32 COUNTY WEST CENTRAL
STUDY AREA

HDR Engineering, Inc.

FIGURE 1

Table 2
Population Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	1990	Projections						Change: 1990 to 2050	
		2000	2010	2020	2030	2040	2050	Total	Percent
Atascosa	30,533	35,893	41,807	47,587	52,911	57,037	59,560	29,027	95.07
Bandera	10,562	14,947	17,801	21,754	24,413	27,397	30,745	20,183	191.09
Bastrop	38,263	47,917	59,430	71,679	83,583	90,915	98,331	60,068	156.99
Bexar	1,185,394	1,474,512	1,776,965	2,130,820	2,491,291	2,817,680	3,081,381	1,895,987	159.95
Blanco	5,972	7,468	8,998	10,667	11,910	12,549	12,418	6,446	107.94
Burnet	22,677	28,055	34,010	40,536	45,936	47,834	49,810	27,133	119.65
Caldwell	26,392	32,158	37,872	43,279	47,086	47,220	47,355	20,963	79.43
Calhoun	19,053	21,893	23,809	25,968	28,180	30,504	33,255	14,202	74.54
Colorado	18,383	20,028	21,054	22,221	23,204	24,014	24,630	6,247	33.98
Comal	51,832	79,378	106,558	144,869	187,464	226,133	267,843	216,011	416.75
DeWitt	18,840	20,217	21,180	22,340	23,550	24,773	26,030	7,190	38.16
Fayette	20,095	22,611	25,213	28,714	32,190	35,847	40,437	20,342	101.23
Frio	13,472	15,421	17,356	18,993	19,918	20,733	21,343	7,871	58.42
Goliad	5,980	6,408	6,784	7,089	7,161	7,368	7,892	1,912	31.97
Gonzales	17,205	17,817	18,647	19,305	19,405	19,843	20,292	3,087	17.94
Guadalupe	64,873	86,668	111,437	140,370	176,873	203,201	235,139	170,266	262.46
Hays	65,614	88,614	117,201	145,619	180,349	219,637	250,091	184,477	281.15
Karnes	12,455	14,578	14,835	16,322	17,460	18,457	19,353	6,898	55.38
Kendall	14,589	17,129	19,752	22,435	25,007	27,906	31,140	16,551	113.45
Kerr	36,304	44,162	51,085	59,209	66,982	71,611	73,461	37,157	102.35
Lee	12,854	14,133	15,586	16,984	18,144	19,408	20,812	7,958	61.91
Llano	11,631	12,887	13,372	14,538	14,800	15,361	16,745	5,114	43.97
Matagorda	36,928	41,018	45,805	51,008	56,834	63,211	70,902	33,974	92.00
Medina	27,312	33,349	38,069	42,299	44,945	46,969	49,556	22,244	81.44
Refugio	7,976	8,421	8,844	9,110	9,081	9,020	8,896	920	11.53
San Saba	5,401	5,497	5,470	5,419	5,247	5,144	4,989	-412	-7.63
Travis	576,407	744,080	892,047	1,096,329	1,288,441	1,413,420	1,550,521	974,114	169.00
Uvalde	23,340	26,466	29,756	32,788	35,595	38,087	40,565	17,225	73.80
Victoria	74,361	81,909	89,539	96,977	104,205	111,710	120,836	46,475	62.50
Wharton	39,955	42,673	46,218	49,845	53,608	57,491	61,759	21,804	54.57
Wilson	22,650	26,578	30,757	34,597	36,953	39,332	42,972	20,322	89.72
Zavala	12,162	13,619	14,584	15,117	15,789	16,770	18,203	6,041	49.67
Total	2,529,465	3,146,504	3,761,841	4,504,787	5,248,515	5,866,582	6,437,262	3,907,797	154.49
Dimmitt*	10,385	12,023	13,874	15,738	17,844	20,049	22,478	12,093	116.45
Edwards*	704	820	914	978	1040	1082	1123	419	59.52
Kinney*	489	552	611	651	582	502	433	-56	-11.45
LaSalle*	5254	6092	6748	7285	7562	7854	8034	2,780	52.91
Maverick*	341	422	489	542	583	642	726	385	112.90
Real*	2297	2413	2475	2532	2584	2637	2690	393	17.11
Webb*	410	1337	1832	2399	3135	3311	4295	3,885	947.56
Total*	19,880	23,659	26,943	30,125	33,330	36,077	39,779	19,899	100.10
Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case.									
*Not in West Central Trans-Texas study area; includes only part of county located in Nueces Basin.									
Note: Texas population in 1990 was 16,986,510. TWDB projections of Texas population in year 2000 is 20,220,182, and in 2050 is 36,587,631 (1.287% compound annual growth rate).								19,601,121	115.39



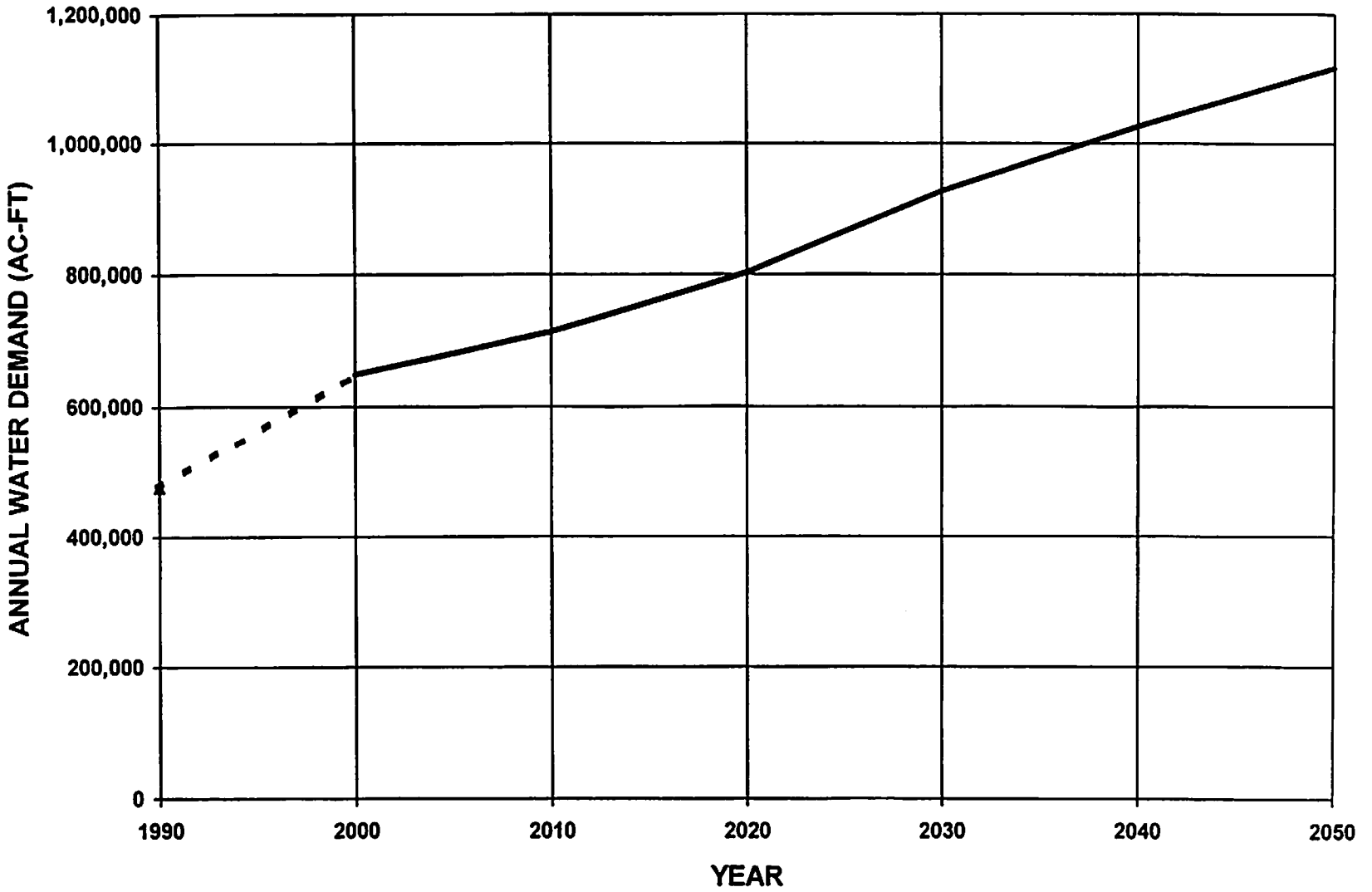
TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

**POPULATION PROJECTIONS
32 COUNTY WEST CENTRAL
STUDY AREA**

HDR Engineering, Inc.

FIGURE 2

Table 3 Municipal Water Demand Projections--32 county West Central Trans-Texas Study Area Trans-Texas Water Program							
County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	5,670	7,245	7,641	8,004	8,807	9,378	9,835
Bandera	1,445	1,830	1,911	2,108	2,332	2,576	2,848
Bastrop	6,247	8,196	9,215	10,340	11,870	12,799	13,747
Bexar	225,626	306,064	338,626	381,015	439,753	493,694	531,750
Blanco	904	1,147	1,221	1,305	1,416	1,463	1,444
Burnet	3,526	4,303	4,691	5,118	5,714	5,892	6,079
Caldwell	4,931	5,802	6,106	6,388	6,787	6,709	6,648
Calhoun	3,911	4,396	4,440	4,537	4,877	5,253	5,724
Colorado	2,927	3,072	2,958	2,911	3,015	3,099	3,172
Comal	10,415	18,587	22,780	28,687	36,569	43,590	51,227
DeWitt	3,556	3,614	3,470	3,400	3,535	3,688	3,841
Fayette	3,395	3,632	3,682	3,870	4,271	4,703	5,242
Frio	3,045	3,510	3,615	3,670	3,813	3,933	4,024
Goliad	916	928	891	858	856	868	917
Gonzales	3,832	3,879	3,729	3,613	3,589	3,628	3,684
Guadalupe	9,627	15,357	17,802	20,696	25,780	29,447	34,088
Hays	11,709	16,652	19,661	22,428	27,207	32,695	37,279
Karnes	2,187	2,586	2,401	2,436	2,564	2,682	2,776
Kendall	2,130	2,571	2,697	2,836	3,136	3,476	3,855
Kerr	5,926	8,327	9,076	9,841	10,870	11,376	11,616
Lee	2,991	3,121	3,170	3,230	3,416	3,626	3,864
Llano	2,488	2,797	2,630	2,600	2,591	2,669	2,850
Matagorda	5,225	5,852	5,927	6,105	6,661	7,317	8,091
Medina	5,254	7,112	7,312	7,467	7,832	8,074	8,398
Refugio	1,227	1,328	1,275	1,220	1,198	1,177	1,150
San Saba	1,272	1,599	1,457	1,336	1,281	1,241	1,201
Travis	114,809	172,439	191,815	222,192	259,493	281,465	308,421
Uvalde	5,278	6,710	7,074	7,317	8,019	8,618	9,271
Victoria	11,545	13,013	13,146	13,382	14,178	15,056	16,116
Wharton	6,218	6,544	6,417	6,440	6,800	7,209	7,669
Wilson	3,745	5,019	5,257	5,455	5,744	6,066	6,570
Zavala	2,349	2,774	2,694	2,574	2,652	2,753	2,920
Total	474,326	650,006	714,787	803,379	926,626	1,026,220	1,116,317
Dimmitt*	2,202	2,930	3,162	3,387	3,833	4,307	4,833
Edwards*	106	108	108	107	111	113	116
Kinney*	60	124	127	125	110	95	81
LaSalle*	1,233	1,372	1,391	1,392	1,422	1,459	1,486
Maverick*	42	61	64	65	69	74	84
Real*	500	559	525	509	521	534	551
Webb*	51	241	304	371	481	504	649
Total*	4,194	5,395	5,681	5,956	6,547	7,086	7,800
Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.							
* Not in West Central Trans-Texas study area.							
**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).							



TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

HDR Engineering, Inc.

MUNICIPAL WATER DEMAND PROJECTIONS 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 3

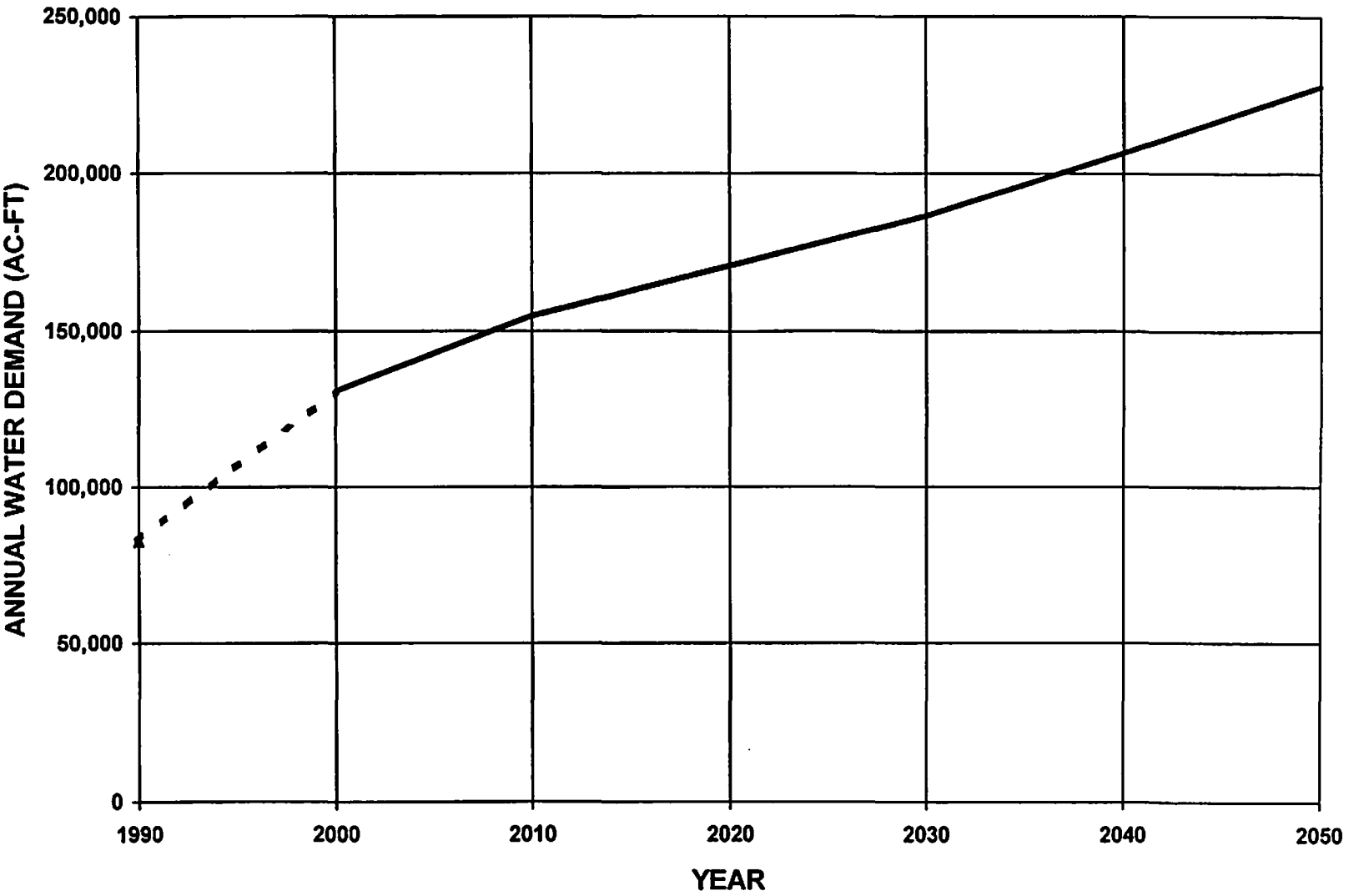
Table 4
Industrial Water Demand Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	0	0	0	0	0	0	0
Bandera	0	11	13	15	16	19	22
Bastrop	27	33	40	48	57	67	78
Bexar	14,049	16,805	19,682	22,359	24,935	28,264	31,697
Blanco	0	0	0	0	0	0	0
Burnet	1,116	1,246	1,377	1,514	1,655	1,800	1,947
Caldwell	0	0	0	0	0	0	0
Calhoun	24,539	63,026	77,588	85,949	95,240	105,236	115,958
Colorado	1,078	1,150	1,224	1,297	1,369	1,438	1,508
Comal	3,248	3,450	3,487	3,548	3,799	4,071	4,351
DeWitt	91	108	126	146	170	195	223
Fayette	32	37	44	50	55	63	71
Frio	0	0	0	0	0	0	0
Goliad	0	0	0	0	0	0	0
Gonzales	865	929	992	1,043	1,083	1,160	1,231
Guadalupe	1,661	1,883	2,102	2,248	2,385	2,590	2,797
Hays	293	381	445	507	564	620	677
Karnes	270	296	320	331	340	356	383
Kendall	2	2	3	4	4	5	6
Kerr	28	30	33	36	38	41	44
Lee	5	6	7	8	9	11	12
Llano	0	0	0	0	0	0	0
Matagorda	6,807	7,366	7,876	8,059	8,179	8,696	9,193
Medina	286	302	319	339	361	384	411
Refugio	0	0	0	0	0	0	0
San Saba	0	0	0	0	0	0	0
Travis	6,243	7,209	8,104	8,743	9,494	10,385	11,600
Uvalde	557	600	643	675	700	759	817
Victoria	20,032	24,115	28,446	31,157	33,670	37,900	42,201
Wharton	396	442	486	521	554	596	637
Wilson	50	61	72	85	99	115	134
Zavala	1,306	1,407	1,507	1,582	1,642	1,780	1,914
Total	82,981	130,895	154,936	170,264	186,418	206,551	227,912
Dimmitt*	3	11	11	12	13	14	15
Edwards*	0	0	0	0	0	0	0
Kinney*	0	0	0	0	0	0	0
LaSalle*	0	0	0	0	0	0	0
Maverick*	0	0	0	0	0	0	0
Real*	0	0	0	0	0	0	0
Webb*	0	0	0	0	0	0	0
Total	3	11	11	12	13	14	15

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

INDUSTRIAL WATER DEMAND PROJECTIONS
32 COUNTY WEST CENTRAL STUDY AREA
FIGURE 4

HDR Engineering, Inc.

Table 5

Steam-Electric Power Water Demand Projections--32 county West Central Trans-Texas Study Area

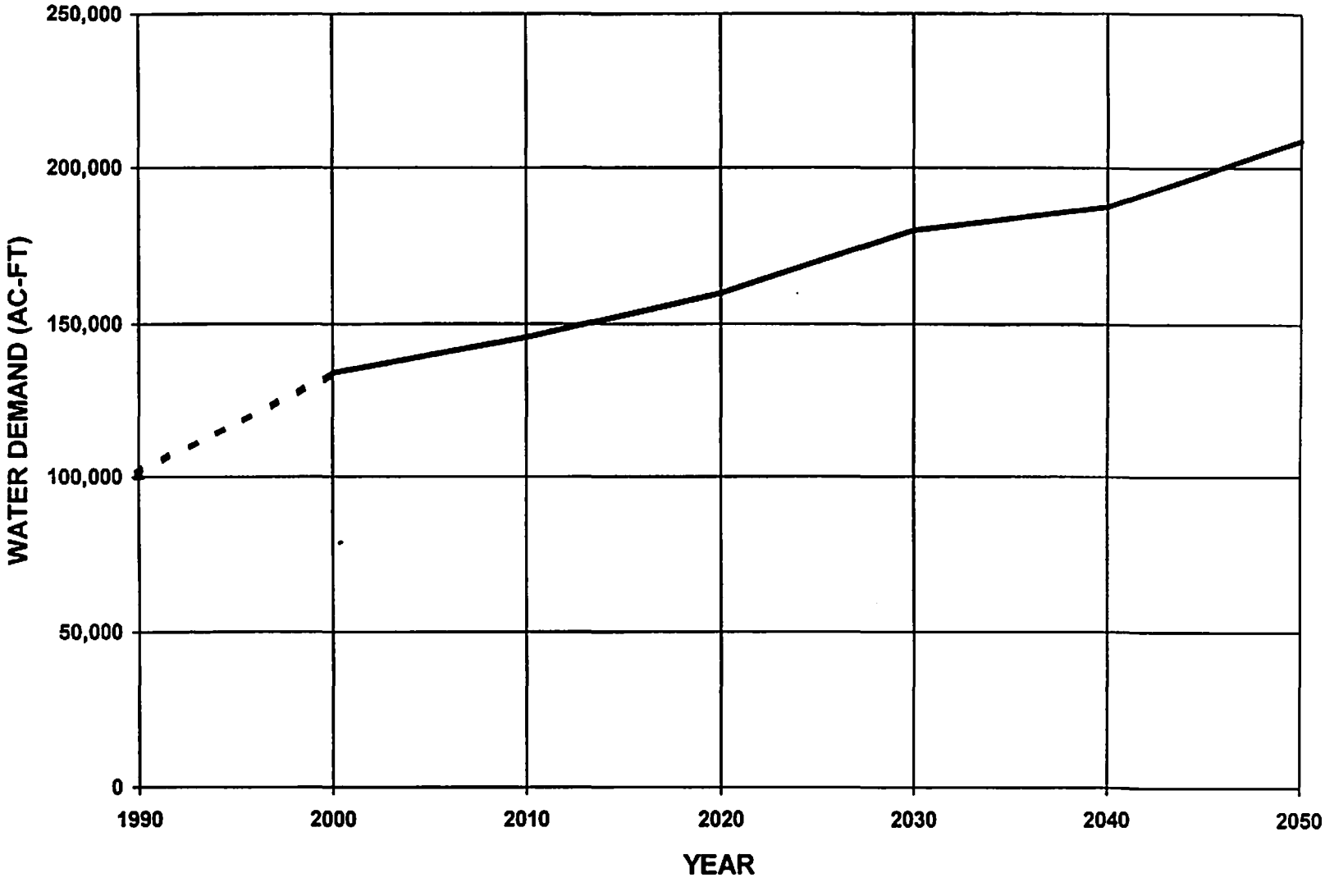
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	6,036	12,000	12,000	12,000	12,000	15,000	22,000
Bandera	0	0	0	0	0	0	0
Bastrop	2,967	4,500	8,000	8,000	8,000	8,000	8,000
Bexar	24,263	36,000	36,000	40,000	45,000	50,000	56,000
Blanco	0	0	0	0	0	0	0
Burnet	0	0	0	0	0	0	0
Caldwell	0	0	0	0	0	0	0
Calhoun	62	100	100	100	100	100	100
Colorado	0	0	0	0	0	0	0
Comal	0	0	0	0	0	0	0
DeWitt	0	0	0	0	0	0	0
Fayette	11,701	15,000	20,000	25,000	40,000	40,000	45,000
Frio	38	400	400	400	400	400	400
Goliad	12,165	15,000	15,000	20,000	20,000	20,000	20,000
Gonzales	0	0	0	0	0	0	0
Guadalupe	0	0	0	0	0	0	0
Hays	0	0	0	0	0	0	0
Karnes	0	0	0	0	0	0	0
Kendall	0	0	0	0	0	0	0
Kerr	0	0	0	0	0	0	0
Lee	0	0	0	0	0	0	0
Llano	937	1,000	2,000	2,000	2,000	2,000	2,000
Matagorda	35,915	35,000	35,000	35,000	35,000	35,000	35,000
Medina	0	0	0	0	0	0	0
Refugio	0	0	0	0	0	0	0
San Saba	0	0	0	0	0	0	0
Travis	6,198	7,000	7,000	7,000	7,000	7,000	10,000
Uvalde	0	0	0	0	0	0	0
Victoria	887	8,000	10,000	10,000	10,000	10,000	10,000
Wharton	0	0	0	0	0	0	0
Wilson	0	0	0	0	0	0	0
Zavala	0	0	0	0	0	0	0
Total	101,169	134,000	145,500	159,500	179,500	187,500	208,500
Dimmitt*	0	0	0	0	0	0	0
Edwards*	0	0	0	0	0	0	0
Kinney*	0	0	0	0	0	0	0
LaSalle*	0	0	0	0	0	0	0
Maverick*	0	0	0	0	0	0	0
Real*	0	0	0	0	0	0	0
Webb*	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

STEAM-ELECTRIC POWER WATER DEMAND PROJECTIONS 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 5

HDR Engineering, Inc.

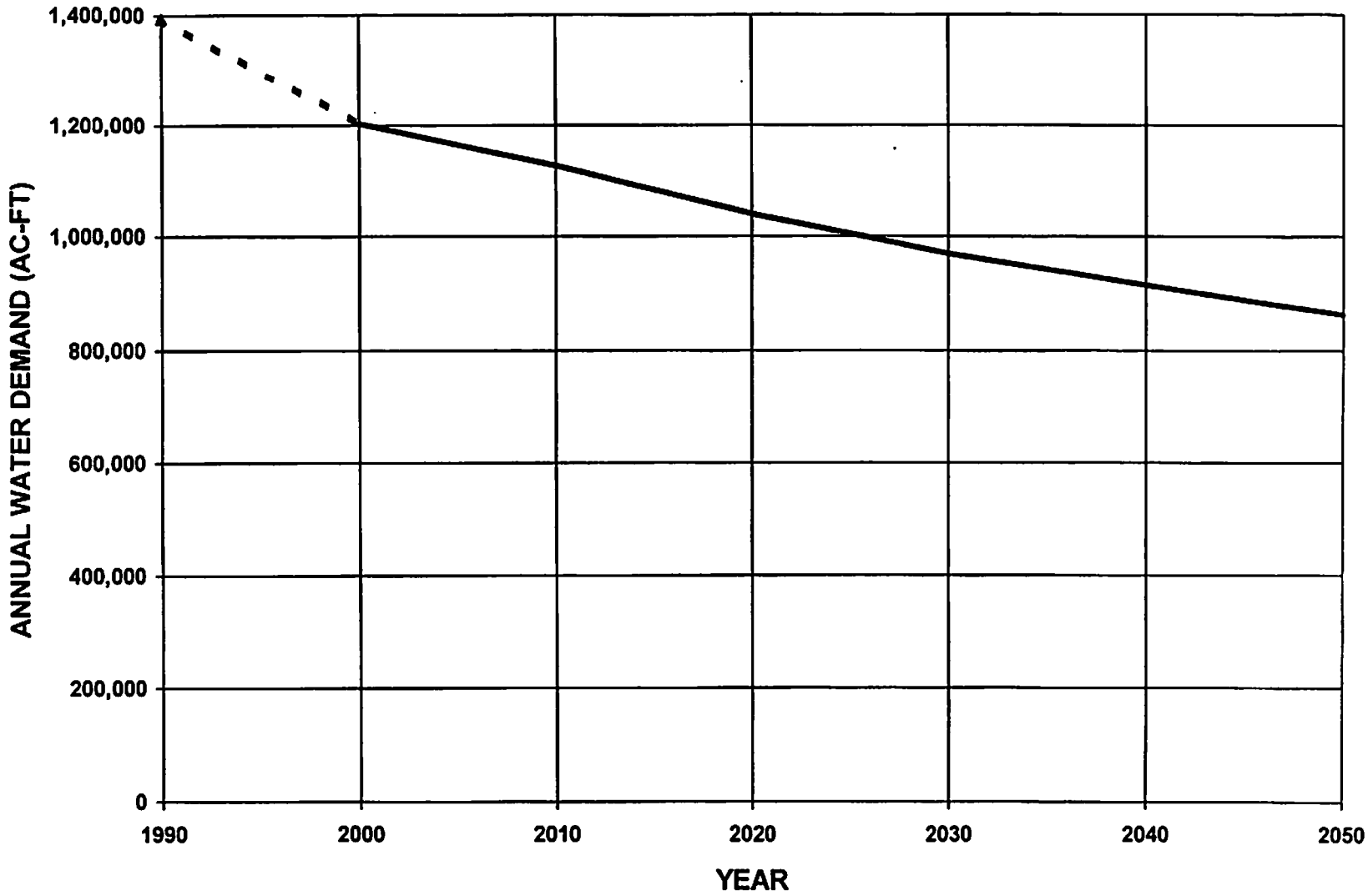
Table 6
Irrigation Water Demand Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	47,208	45,415	43,691	42,032	40,436	38,900	37,423
Bandera	290	277	265	254	243	232	222
Bastrop	645	559	484	419	363	314	272
Bexar	37,012	38,403	35,404	33,907	32,474	31,101	29,785
Blanco	483	457	432	409	387	366	346
Burnet	300	292	285	277	270	263	257
Caldwell	1,375	1,215	1,073	948	837	739	653
Calhoun	35,421	15,822	11,747	8,950	6,673	5,132	4,028
Colorado	216,480	161,335	149,929	133,416	119,106	110,685	102,862
Comal	479	459	440	421	404	387	370
DeWitt	285	256	229	206	185	166	148
Fayette	400	372	345	321	298	277	258
Frio	83,233	79,688	76,294	73,045	69,933	66,955	64,103
Goliad	685	560	458	374	306	250	205
Gonzales	3,540	3,019	2,574	2,195	1,871	1,596	1,361
Guadalupe	2,646	2,501	2,364	2,234	2,111	1,996	1,886
Hays	320	316	312	308	305	301	297
Karnes	2,034	1,818	1,624	1,451	1,297	1,159	1,035
Kendall	380	364	348	333	319	305	292
Kerr	850	822	796	770	745	721	697
Lee	283	273	264	255	246	238	230
Llano	1,122	1,092	1,064	1,036	1,008	982	956
Matagorda	195,542	146,374	136,502	121,212	110,108	102,680	95,755
Medina	157,380	154,959	144,066	137,881	131,962	126,297	120,876
Refugio	0	0	0	0	0	0	0
San Saba	5,734	5,502	5,279	5,065	4,859	4,663	4,474
Travis	800	731	667	609	557	508	464
Uvalde	140,669	135,067	129,689	124,524	119,566	114,804	110,233
Victoria	13,699	10,783	8,488	6,681	5,259	4,140	3,259
Wharton	319,209	261,733	244,166	222,845	203,803	190,123	177,363
Wilson	13,697	12,071	10,638	9,376	8,263	7,282	6,419
Zavala	110,922	119,861	115,038	110,409	105,966	101,702	97,610
Total	1,393,123	1,202,396	1,124,955	1,042,163	970,160	915,264	864,139
Dimmitt*	11,185	10,340	9,893	9,465	9,055	8,665	8,290
Edwards*	0	0	0	0	0	0	0
Kinney*	201	192	184	176	168	161	154
LaSalle*	7,292	7,063	6,841	6,626	6,418	6,217	6,021
Maverick*	5,269	5,060	4,861	4,669	4,485	4,308	4,138
Real*	872	834	798	763	729	698	667
Webb*	0	0	0	0	0	0	0
Total	24,819	23,489	22,577	21,699	20,855	20,049	19,270

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall, aggressive adoption of irrigation technology, and reduction in federal farm programs by one-half.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



HDR Engineering, Inc.

TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

IRRIGATION WATER DEMAND PROJECTIONS 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 6

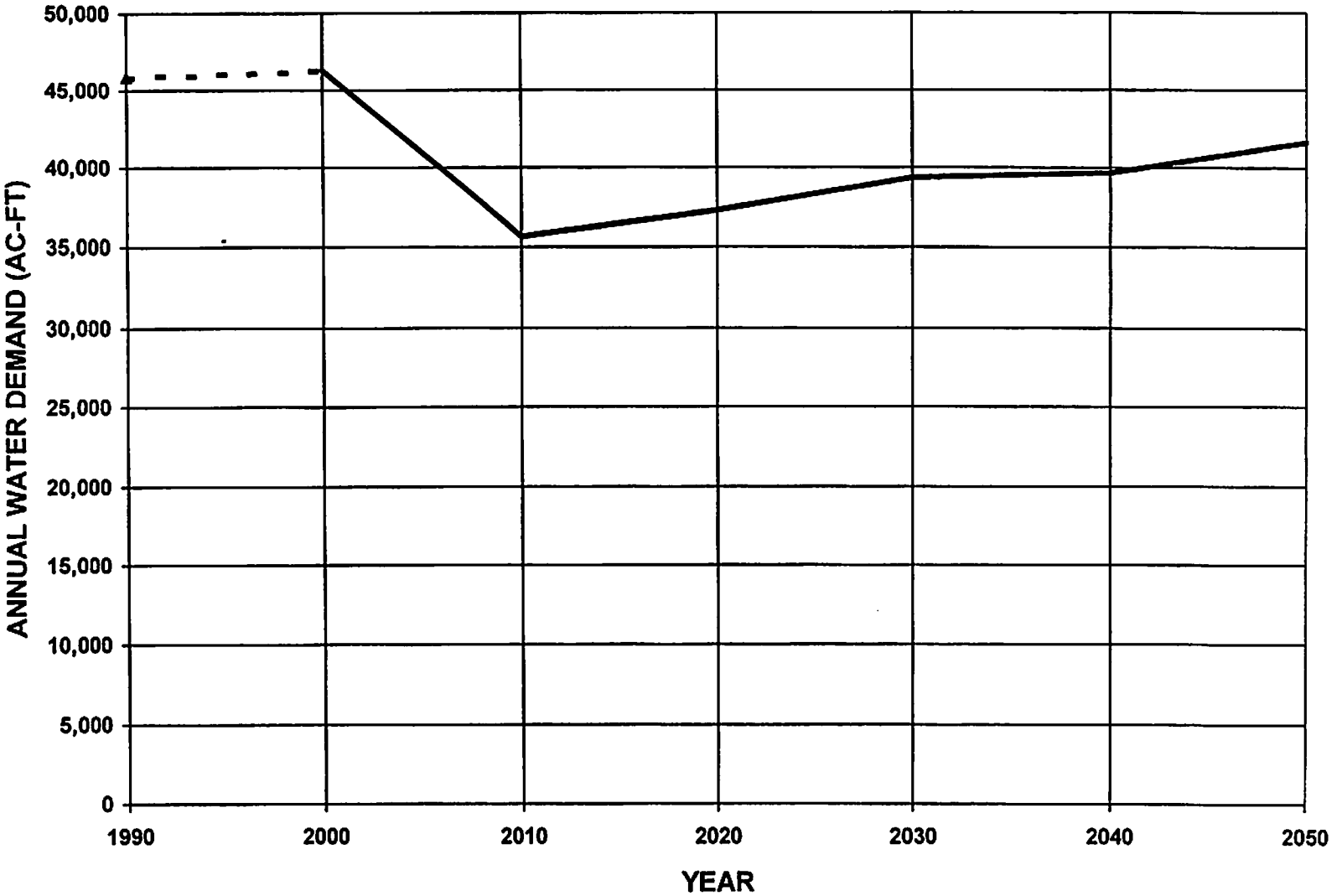
Table 7
Mining Water Demand Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	945	1,740	1,680	1,751	1,842	1,948	2,068
Bandera	20	25	25	26	27	27	27
Bastrop	16	56	46	38	33	34	43
Bexar	1,591	4,963	4,936	5,201	5,406	5,645	5,962
Blanco	0	13	9	5	1	0	0
Burnet	936	1,013	987	1,006	1,028	1,058	1,091
Caldwell	27	21	16	10	4	0	0
Calhoun	1	20	15	9	5	2	2
Colorado	31,967	20,486	11,378	12,334	13,473	14,926	16,677
Comal	946	5,570	5,464	5,628	5,796	3,590	2,224
DeWitt	129	161	106	70	50	44	44
Fayette	7	29	22	21	10	6	3
Frio	313	150	63	32	16	7	3
Goliad	0	17	12	6	3	0	0
Gonzales	21	41	37	33	29	29	30
Guadalupe	8	196	198	200	202	207	213
Hays	0	96	90	72	56	37	28
Karnes	187	155	65	27	18	10	4
Kendall	0	13	9	5	1	0	0
Kerr	73	176	122	110	103	102	105
Lee	0	30	21	13	5	1	0
Llano	65	143	112	99	95	92	95
Matagorda	250	299	256	245	242	242	249
Medina	120	143	128	128	129	132	136
Refugio	77	44	26	19	11	4	4
San Saba	86	172	133	124	123	122	126
Travis	2,288	4,880	4,746	5,246	5,791	6,407	7,116
Uvalde	399	444	428	499	576	666	777
Victoria	2,409	2,578	2,028	1,732	1,714	1,720	1,862
Wharton	2,650	2,374	2,431	2,502	2,568	2,641	2,720
Wilson	281	193	105	62	39	30	20
Zavala	116	97	42	25	8	2	0
Total	45,928	46,338	35,736	37,278	39,404	39,731	41,629
Dimmitt*	506	1,003	817	906	916	926	950
Edwards*	0	0	0	0	0	0	0
Kinney*	0	0	0	0	0	0	0
LaSalle*	0	0	0	0	0	0	0
Maverick*	184	80	40	20	10	5	3
Real*	0	0	0	0	0	0	0
Webb*	0	0	0	0	0	0	0
Total*	690	1,083	857	926	926	931	953

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall, and advanced water conservation.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

MINING WATER DEMAND PROJECTIONS
32 COUNTY WEST CENTRAL STUDY AREA
FIGURE 7

HDR Engineering, Inc.

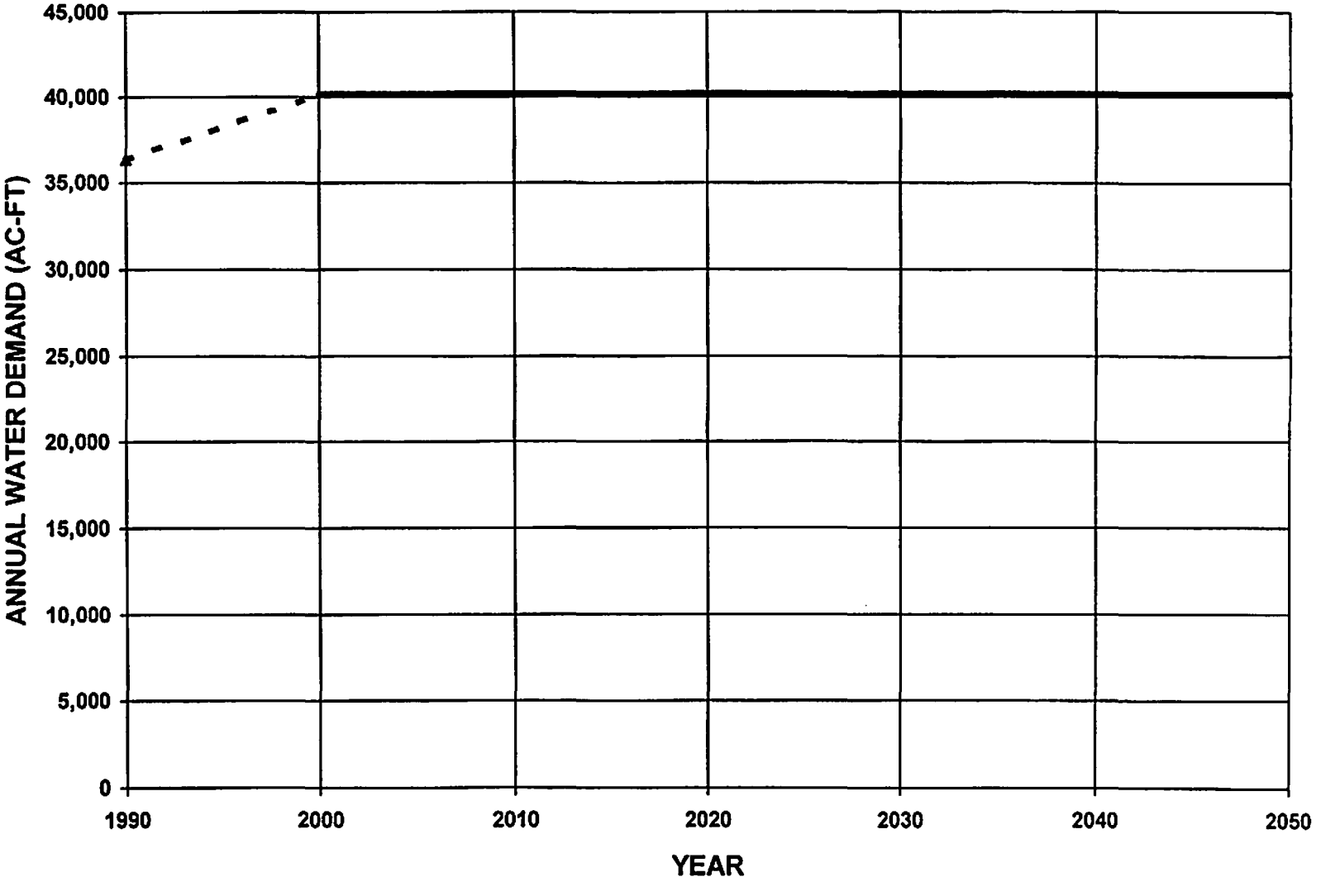
Table 8
Livestock Water Demand Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	1,613	1,808	1,808	1,808	1,808	1,808	1,808
Bandera	325	333	333	333	333	333	333
Bastrop	1,431	1,525	1,525	1,525	1,525	1,525	1,525
Bexar	1,376	1,487	1,487	1,487	1,487	1,487	1,487
Blanco	553	670	670	670	670	670	670
Burnet	820	794	794	794	794	794	794
Caldwell	816	835	835	835	835	835	835
Calhoun	291	304	304	304	304	304	304
Colorado	1,395	1,447	1,447	1,447	1,447	1,447	1,447
Comal	316	356	356	356	356	356	356
DeWitt	1,840	1,896	1,896	1,896	1,896	1,896	1,896
Fayette	2,036	2,619	2,619	2,619	2,619	2,619	2,619
Frio	1,097	1,192	1,192	1,192	1,192	1,192	1,192
Goliad	884	1,208	1,208	1,208	1,208	1,208	1,208
Gonzales	4,108	5,064	5,064	5,064	5,064	5,064	5,064
Guadalupe	1,031	1,132	1,132	1,132	1,132	1,132	1,132
Hays	676	484	484	484	484	484	484
Karnes	1,371	1,339	1,339	1,339	1,339	1,339	1,339
Kendall	389	512	512	512	512	512	512
Kerr	382	526	526	526	526	526	526
Lee	1,398	1,711	1,711	1,711	1,711	1,711	1,711
Llano	908	689	689	689	689	689	689
Matagorda	1,120	1,023	1,023	1,023	1,023	1,023	1,023
Medina	1,560	1,914	1,914	1,914	1,914	1,914	1,914
Refugio	563	407	407	407	407	407	407
San Saba	1,121	1,200	1,200	1,200	1,200	1,200	1,200
Travis	942	906	906	906	906	906	906
Uvalde	994	1,494	1,494	1,494	1,494	1,494	1,494
Victoria	1,271	1,398	1,398	1,398	1,398	1,398	1,398
Wharton	1,213	1,118	1,118	1,118	1,118	1,118	1,118
Wilson	1,813	1,905	1,905	1,905	1,905	1,905	1,905
Zavala	714	881	881	881	881	881	881
Total	36,367	40,177	40,177	40,177	40,177	40,177	40,177
Dimmitt*	795	621	621	621	621	621	621
Edwards*	228	254	254	254	254	254	254
Kinney*	261	283	283	283	283	283	283
LaSalle*	988	1,077	1,077	1,077	1,077	1,077	1,077
Maverick*	526	527	527	527	527	527	527
Real*	196	146	146	146	146	146	146
Webb*	880	477	477	477	477	477	477
Total*	3,874	3,385	3,385	3,385	3,385	3,385	3,385

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall, and advanced water conservation.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

LIVESTOCK WATER DEMAND PROJECTIONS
32 COUNTY WEST CENTRAL STUDY AREA
FIGURE 8

HDR Engineering, Inc.

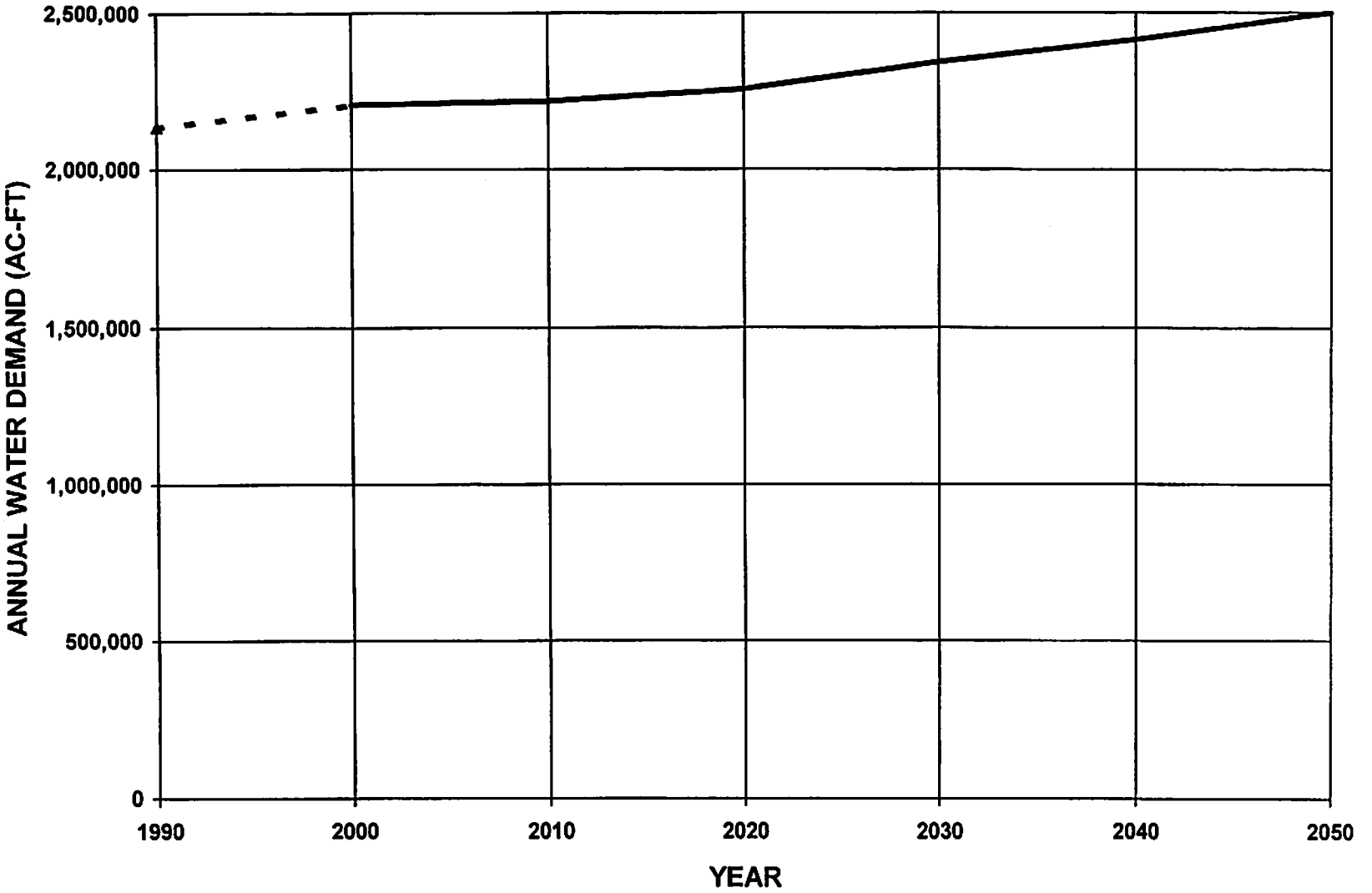
Table 9
Total Water Demand Projections--32 county West Central Trans-Texas Study Area
Trans-Texas Water Program

County	Use in 1990 acft	Projections					
		2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Atascosa	61,472	68,208	66,820	65,595	64,893	67,034	73,134
Bandera	2,080	2,476	2,547	2,736	2,951	3,187	3,452
Bastrop	11,333	14,869	19,310	20,370	21,848	22,739	23,665
Bexar	303,917	403,722	436,135	483,969	549,055	610,191	656,681
Blanco	1,940	2,287	2,332	2,389	2,474	2,499	2,460
Burnet	6,698	7,648	8,134	8,709	9,461	9,807	10,168
Caldwell	7,149	7,873	8,030	8,181	8,463	8,283	8,136
Calhoun	64,225	83,668	94,194	99,849	107,199	116,027	126,116
Colorado	253,847	187,490	166,936	151,405	138,410	131,595	125,666
Comal	15,404	28,422	32,527	38,640	46,924	51,994	58,528
DeWitt	5,901	6,035	5,827	5,718	5,836	5,989	6,152
Fayette	17,571	21,689	26,712	31,881	47,253	47,668	53,193
Frio	87,726	84,940	81,564	78,339	75,354	72,487	69,722
Goliad	14,650	17,713	17,569	22,446	22,373	22,326	22,330
Gonzales	12,366	12,932	12,396	11,948	11,636	11,477	11,370
Guadalupe	14,973	21,069	23,598	26,510	31,610	35,372	40,116
Hays	12,998	17,929	20,992	23,799	28,616	34,137	38,765
Karnes	6,049	6,194	5,749	5,584	5,558	5,546	5,537
Kendall	2,901	3,462	3,569	3,690	3,972	4,298	4,665
Kerr	7,259	9,881	10,553	11,283	12,282	12,766	12,988
Lee	4,677	5,141	5,173	5,217	5,387	5,587	5,817
Llano	5,520	5,721	6,495	6,424	6,383	6,432	6,590
Matagorda	244,859	195,914	186,584	171,644	161,213	154,958	149,311
Medina	164,600	164,430	153,739	147,729	142,198	136,801	131,735
Refugio	1,867	1,779	1,708	1,646	1,616	1,588	1,561
San Saba	8,213	8,473	8,069	7,725	7,463	7,226	7,001
Travis	131,280	193,165	213,238	244,696	283,241	306,671	338,507
Uvalde	147,897	144,315	139,328	134,509	130,355	126,341	122,592
Victoria	49,843	59,887	63,506	64,350	66,219	70,214	74,836
Wharton	329,686	272,211	254,618	233,426	214,843	201,687	189,507
Wilson	19,586	19,249	17,977	16,883	16,050	15,398	15,048
Zavala	115,407	125,020	120,162	115,471	111,149	107,118	103,325
Total	2,133,894	2,203,812	2,216,091	2,252,761	2,342,285	2,415,443	2,498,674
Dimmitt*	14,691	14,905	14,504	14,391	14,438	14,533	14,709
Edwards*	334	362	362	361	365	367	370
Kinney*	522	599	594	584	561	539	518
LaSalle*	9,513	9,512	9,309	9,095	8,917	8,753	8,584
Maverick*	6,021	5,728	5,492	5,281	5,091	4,914	4,752
Real*	1,568	1,539	1,469	1,418	1,396	1,378	1,364
Webb*	931	718	781	848	958	981	1,126
Total*	33,580	33,363	32,511	31,978	31,726	31,465	31,423

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall, and advanced water conservation.

* Not in West Central Trans-Texas study area.

**Does not include Nueces Basin Counties of South Central Trans-Texas Study Area (Duval, McMullen, Live Oak, Bee, San Patricio, Nueces, and Jim Wells).



HDR Engineering, Inc.

TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

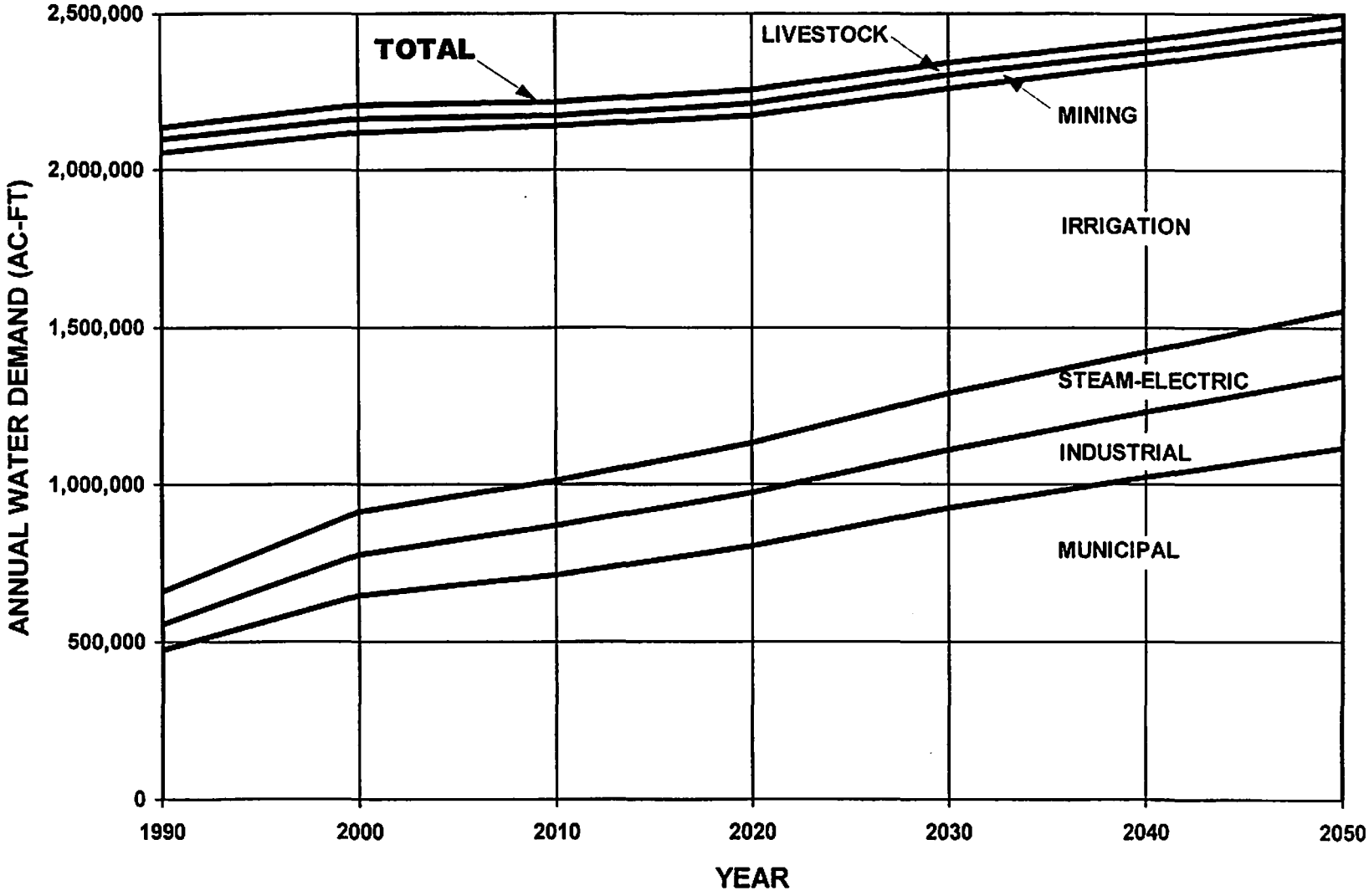
TOTAL WATER DEMAND PROJECTIONS 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 9

Table 10
Total Water Demand Projections--32 county West Central Trans-Texas Study Area
Summary By Type of Use
Trans-Texas Water Program

Type of Use	Use in 1990 acft	Projections 2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Municipal	474,326	650,006	714,787	803,379	926,626	1,026,220	1,116,317
Industrial	82,981	130,895	154,936	170,264	186,418	206,551	227,912
Steam-Electric Power	101,169	134,000	145,500	159,500	179,500	187,500	208,500
Irrigation	1,393,123	1,202,396	1,124,955	1,042,163	970,160	915,264	864,139
Mining	45,928	46,338	35,736	37,278	39,404	39,731	41,629
Livestock	36,367	40,177	40,177	40,177	40,177	40,177	40,177
Total	2,133,894	2,203,812	2,216,091	2,252,761	2,342,285	2,415,443	2,498,674

	Percent of Total						
	1990	2000	2010	2020	2030	2040	2050
Municipal	22.23%	29.49%	32.25%	35.66%	39.56%	42.49%	44.68%
Industrial	3.89%	5.94%	6.99%	7.56%	7.96%	8.55%	9.12%
Steam-Electric Power	4.74%	6.08%	6.57%	7.08%	7.66%	7.76%	8.34%
Irrigation	65.29%	54.56%	50.76%	46.26%	41.42%	37.89%	34.58%
Mining	2.15%	2.10%	1.61%	1.65%	1.68%	1.64%	1.67%
Livestock	1.70%	1.82%	1.81%	1.78%	1.72%	1.66%	1.61%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

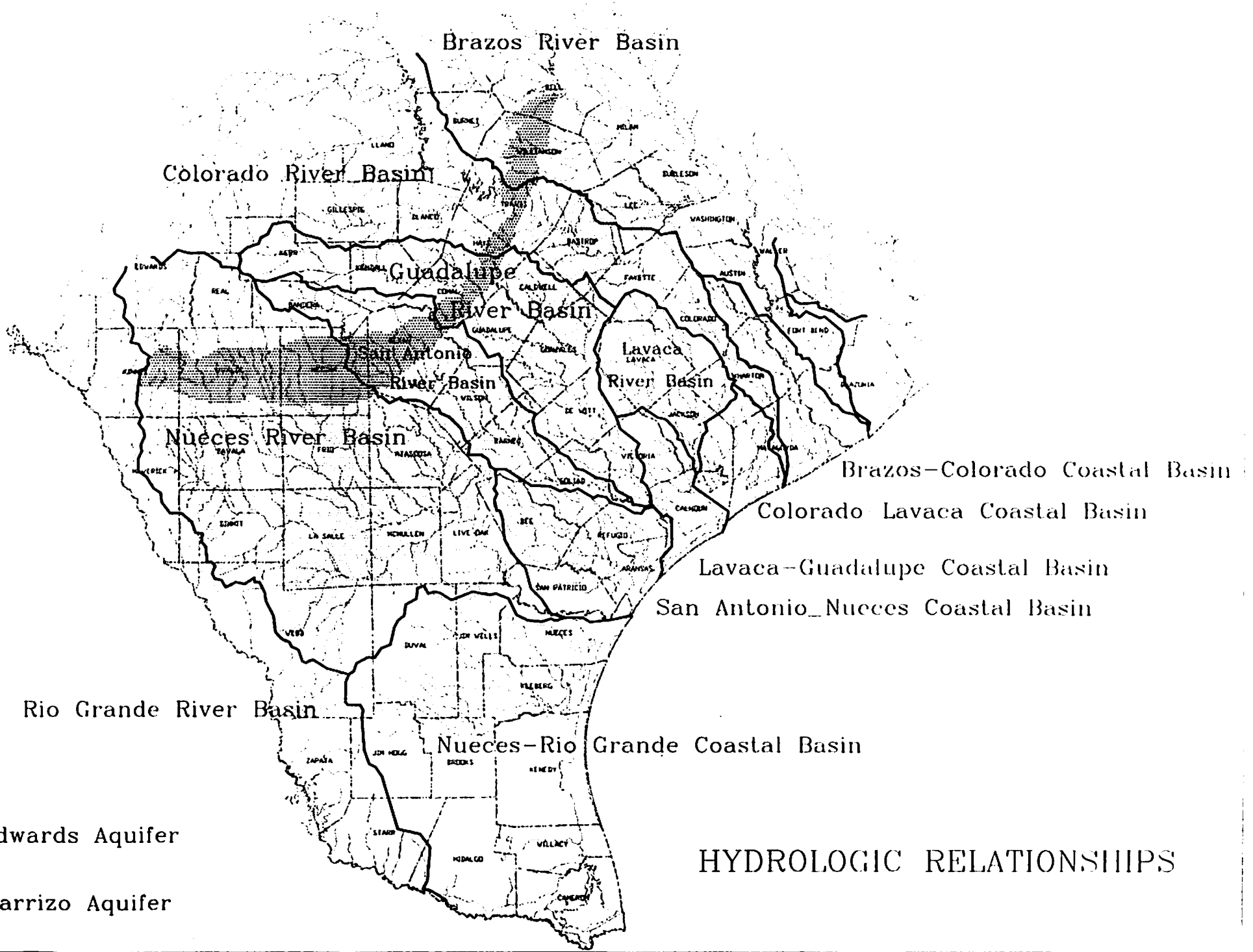


TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

HDR Engineering, Inc.

TOTAL WATER DEMAND PROJECTIONS/TYPE OF USE 32 COUNTY WEST CENTRAL STUDY AREA

FIGURE 10


Brazos River Basin
Colorado River Basin
Guadalupe River Basin
San Antonio River Basin
Lavaca River Basin
Nueces River Basin
Rio Grande River Basin
Brazos-Colorado Coastal Basin
Colorado Lavaca Coastal Basin
Lavaca-Guadalupe Coastal Basin
San Antonio_Nueces Coastal Basin
Nueces-Rio Grande Coastal Basin
Edwards Aquifer
Carrizo Aquifer
HYDROLOGIC RELATIONSHIPS

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE
MEETING #3
NOVEMBER 22, 1997
9:30 AM

AGENDA

I.	Convene meeting and Notation of Members Not Present	Lewis Michaelson
II.	Review of November 1 Meeting Notes and Format (Meeting #2)	All
III.	Brief Recap of Highlights of Meetings # 1 and 2	Lewis Michaelson
IV.	Goal for Today's Meeting	Lewis Michaelson
V.	Discussion of the IRPC's Vision for a Regional Water Plan as a Basis for Developing Criteria	Lewis Michaelson
VI.	IRPC's Statement on Water Conservation	All
VII.	Report on Water Supply Availability	Dr. Herb Grubb
VIII.	Projected Water Supply Shortfall Areas	Dr. Herb Grubb
IX.	Senate Bill 1 Update	Robert Aguirre
X.	IRPC Update Report	Linda Ximenes
XI.	Public Comment	Lewis Michaelson
XII.	Agenda for December 13 Meeting (Meeting #4)	Lewis Michaelson
	Adjourn	

MEETING NOTES
TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE (IRPC)
MEETING #3
NOVEMBER 22, 1997

Meeting #3 of the IRPC was convened at 9:40 am by Lewis Michaelson, IRPC Facilitator.

I. CONVENING THE MEETING, WELCOME AND INTRODUCTIONS

Twenty-one IRP Committee members were present:

Cameron Cornett	Joe Cantu
Haskell Simon	Gary Damuth
Errol Dietze	Evelyn Bonavita
Judy McAda	Dede Stevenson
Claudia Garza	Donald Hoogenakker
Patsy Light	Pamela McKay
John Wendele	David Carrothers
Gloria Rivera	Charles Trefny
Brian Vauter	Linda Lesso
Zack Williams	Fran Merritt
Mike Mahoney	

Seven committee members were not present:

Hugh Charlton	Scott Wall
Renea Garcia	John Hohn
Richard Barton	Hank Brummett
Ed White, Jr.	

Just prior to Lewis Michaelson convening the meeting, a citizen in attendance, Tom Culbertson, indicated he intended to address the committee immediately, regardless of the Principles of Participation that called for public comment at the end of the meeting. He was asked by Mr. Michaelson and Steve Raabe to abide by the ground rules set by the committee and to observe common courtesy. He refused to do so and proceeded to address the committee.

Mr. Michaelson apologized to the committee for the behavior of Mr. Culbertson and reminded the committee that, as facilitator, he relies on voluntary compliance with the ground rules the committee has adopted, and he has no authority to physically enforce them. He noted that he was there only to implement the wishes and direction of the committee.

Mr. Michaelson stated that a committee member had suggested that the agenda be slightly rearranged so that the discussion on water availability and shortfalls could occur before the conservation discussion. He asked that if there was no objection, this would be done. There was none.

Mr. Michaelson then asked each committee member to introduce themselves.

II. REVIEW OF NOVEMBER 1 MEETING NOTES AND FORMAT

A review of the Meeting #2 (October 26) meeting notes was initiated. Fran Merritt stated that there was more to the discussion with Dr. Grubb than was reflected on page 5 of the notes concerning all planning efforts being based upon current laws and full recognition of existing water/property rights, and those other comments should be reflected in the meeting notes. Mr. Michaelson stated that the tape will be reviewed in order to identify additional comments that could be reflected in the minutes.

With respect to the format of the meeting notes and the use of names on each comment, the following comments were made:

- I found it to be distracting
- I like the use of names
- I don't like it
- As long as the meaning of the comment is captured, a name isn't necessary
- It's basically good, but either way is fine
- If the majority preferred it, that would be okay with me
- The committee's discussions should be informal and names make that informality difficult
- I think it is our consensus that it is not a big issue
- Either way, what's most important is that we capture the meaning of the comments
- Since the notes are going to more than just the committee members, the use of names could be important to those with particular interests

At this point Mr. Michaelson suggested that if you wanted your comments recorded by name, simply state your name at the beginning of your comment.

Ms. Merritt asked what other people receive the committee meeting notes. Steve Raabe explained that the Policy Management Committee as well as the Technical Input Group and the Public Participation Work Group receive the IRPC meeting notes.

At this point a citizen in attendance, Tom Culbertson, again interrupted the meeting with a verbal outburst. Mr. Raabe asked Mr. Culbertson to abide by the rules of the committee and common courtesy and, again, Mr. Culbertson refused.

After reestablishing order, Mr. Michaelson was able to continue the meeting.

III. BRIEF RECAP OF HIGHLIGHTS OF MEETINGS # 1 AND 2

Mr. Michaelson briefly reviewed the work done so far by the committee, repeating the goal that was set for the committee by the Policy Management Committee: To develop the criteria by which regional water resource options should be evaluated. He stating that he found the visioning work they had done in meeting #2 to be very exciting, and that he had found the beginnings of criteria development in both the visioning as well as the conservation discussion.

IV. THE GOAL FOR TODAY'S MEETING

The goal for today's meeting was to complete the basic orientation of the committee with the presentation of data on water supply availability and supply shortfalls, and then to further consider the water conservation issue as a necessary first step toward criteria development.

V. DISCUSSION OF THE IRPC's VISION FOR A REGIONAL WATER PLAN AS A BASIS FOR DEVELOPING CRITERIA

After studying the meeting notes and listening to the audio tape of meeting #2, Mr. Michaelson stated that he had laid out some points in several key categories based upon the committee's discussions. Taking the committee's comments, he divided them into the following categories: options, issues, plan (characteristics), and criteria. It was noted that the criteria listing was not in priority order, simply a listing drawn from the meeting notes.

One member expressed some confusion over what "criteria" was, but stated that Mr. Michaelson's spreadsheet was helpful. Nonetheless she was still confused over what "criteria" is as it applies to what the IRPC is expected to do. Mr. Michaelson used an example of how criteria development works. Using the example of purchasing a car, he outlined a person's criteria might include such issues as: cost, looks, miles-per-gallon/maintenance, safety, etc. He then gave each criteria a ranking - each against the other - which gave them some value of importance or priority. Then he listed three makes of automobiles and began to evaluate each based upon the criteria.

As it applies to the work of the IRPC, the committee is charged with the development of the criteria by which water resource options for the region should be evaluated. Just as the criteria by which an automobile purchase should be made were listed, so too must the committee develop water resource option criteria. This criteria, he stated, will then be used by the Senate Bill 1 planning group to identify and evaluate the relative benefits of water planning alternatives.

Mr. Damuth stated that more thought needed to be put into planning, with less emphasis put on vocal groups, stating that when priorities are set, somebody is going to lose something and it was therefore important to be fair.

It was also pointed out that "renewability" should be an important criteria. Another member stated that, as in the car purchase example, it would be important to rank or weight the criteria.

One member then offered that it is important to tell the decision makers the criteria by which the problem statement is formulated. ...that a part of the committee's job of criteria development is to identify the problem statement.

VII. AND VIII. REPORT ON WATER SUPPLY AVAILABILITY AND SHORTFALL AREAS

Mr. Michaelson then called upon Dr. Herb Grubb to present information on water availability and projected shortfalls.

Dr. Grubb first distributed a corrected graph from meeting #2, noting that the correction was discussed at that meeting, but that he wanted each committee member to have the corrected graph. (The graph is entitled "Historic Population With Projections," and the error was on the labeling of the vertical axis.)

Dr. Grubb then made a presentation illustrating the data for three of the four river basins in the study region: Nueces, San Antonio, Guadalupe-Blanco. He noted that the data on the fourth basin, Lower Colorado, was not yet complete. He then presented a table showing the Nueces River Basin projected total water demand to the year 2050. He noted that as of 1990, the total demand for this basin was 558,000 ac.ft., total supply was 480,414 ac. ft., and that current shortfall was 77,834 ac. ft.. The projections for the year 2050 were: Demand - 485,209; Supply - 315,348; Shortfall - 169,861.

Dr. Grubb presented the information on The San Antonio River Basin noting that the demand curve growth is largely attributed to municipal population growth. The projected shortage, for the overall region, is projected to begin to show-up in 2010, but he cautioned that in some areas it would be earlier. Ms. Lesso wanted to clarify that the demand curves *did* include an advanced water conservation assumption and that if it were otherwise the demand curve, and hence the shortages, would be greater. Dr. Grubb stated she was exactly correct. He pointed out that the projection of the shortfall was based on water availability in a dry year, not on an average or normal year.

A clarification was requested on Dr. Grubb's statement that the projections comply with the impacts of Senate Bill 1477. He explained that this legislation limits Edwards Aquifer pumping to decreasing levels over the coming years (decreasing total Edwards pumping to 400,000 ac. ft. by 2007). The Carrizo projection of pumping reduction was then questioned. Mike Mahoney stated that his agency was instituting pumping caps in order to conserve. He stated that the goal for their area was one of sustainability, stating that overall they are continuing to see declining water levels in the Carrizo Aquifer.

A review of the Guadalupe-Blanco River Authority area projections was then reviewed. The data illustrated that the area had a surplus of 241,821 ac.ft. in 1990, and was projected to have a surplus in 2050 of 115,086.

Mr. Michaelson then asked for the committee's observations. The following comments/questions were received:

- Such a large part of the study region was in low rainfall areas

- The question was asked if Canyon Lake was the only surface water reservoir in the Guadalupe-Blanco River Basin. Dr. Grubb said that it was.
- Why aren't other surface reservoirs taken into account besides Canyon and Medina Lakes? Dr. Grubb stated that there are no other reservoirs in these river basins.
- Why was advanced conservation used in the projections? Dr. Grubb stated that that decision was made by the TWDB as a planning assumption in 1996

VI. IRPC's STATEMENT ON WATER CONSERVATION

After further discussion on water conservation and several references to the discussion in meeting #2, Mr. Michaelson asked the rhetorical question: What are the consequences of conservation? In order to explore this question he suggested that the committee consider a series of questions relative to water conservation.

First question: What might be the negative aspects of water conservation?

Comments received included:

- Inconvenience
- Cost
- Enforceability
- Ill-will
- Loss of revenue
- Low stream flows downstream
- Other undesirable/unforeseen side effects
- Lifestyle or quality of life impacts
- Community impacts

Second question: What might be the advantages of water conservation?

Comments received included:

- More supply (brought about by less demand)
- Lowest cost of providing more supply
- Species stay alive (homo sapiens)
- Preserves the environment
- Causes the building of facilities (plants, pipelines, reservoirs, etc.) that have environmental impacts to be avoided
- Builds public awareness and a sense of community

Third question: How should we deal with sub-regional differences?

Comments received included:

- Recognition of economic impacts
- Population distributions taken into account
- Acknowledge differences in population growth projections

- Differing use patterns make for differing opportunities for conservation
- Weather differences
- Differences in water quality

Fourth question: To what degree should cost effectiveness (of providing water) be considered?

Comments received included:

- Cost is very important as it is passed onto taxpayers
- Cost effectiveness will be evaluated by the public, whose support will be required

Fifth question: Who should decide what level of water conservation should be implemented?

Comments received included:

- The local constituents must determine or it will never work.
- The state has to be involved to compel action
- Local with regional input
- Everything goes back to fairness
- Local commitment to conservation will be necessary
- The conservation level in a given area will be determined by the cost of the effort (cost vs. benefit)
- Conservation should be determined at the lowest level possible
- Local control in more acceptable
- Local control is unlikely to be accomplished, and it may fall to the state
- Perhaps a target could be set at a higher governmental level, but how the target is to be reached could be determined locally.

Mr. Michaelson stated that during the lunch break he would like to attempt to develop a statement on water conservation drawn from the committee's responses to this series of questions.

After the lunch break Mr. Michaelson began to review a series a statements he extracted from committee comments in the morning session. The statements he presented were:

1. Conservation is generally supported as a cost-effective and environmentally sensitive means for addressing water demand.
2. Everyone in the region should commit to doing conservation that is reasonable and practicable in their area.
3. Conservation has many potential advantages and disadvantages, depending on where and how it is used.
4. Cost effectiveness is a key factor in determining which and how much conservation is practical.
5. A "one size fits all" approach to conservation will not work due to sub-regional differences in: cost effectiveness, use patterns, weather/hydrology, population distribution/growth, shortfall/surplus conditions, and water quality.

6. The state, regional, and local planning entities all have a role to play in setting conservation goals. However, local control and determination is critical for obtaining stakeholder/community acceptance, commitment, and compliance.

One member objected to using the word "should," since it did not seem to him to have any real meaning. Other words suggested were "will," "must," or "shall." The second statement was amended to read "shall."

A discussion was also held with respect to the term "cost-effective. " Mr. Michaelson clarified that, for purpose of this discussion, cost-effective applied to the cost of water conservation. "Long-term" cost effectiveness was added to the fourth point. However, after further discussion a new fourth point was developed:

- Conservation shall be evaluated in a context of long-term cost-effectiveness and impacts.

One member noted that the concept of "fairness," which the committee had strong feelings about, was not reflected in any of the points. An additional point was then developed:

- Fairness is a key factor in determining which and how much conservation is practical.

The members then discussed the technological advancements of water conservation. From this discussion the following statement was drafted:

- Research on water conservation technology to lessen the inconvenience on users shall be encouraged.

Ms. Merritt pointed out that to approach conservation in this way, meaning as a position statement, took the pressure off of having to commit to a certain level of conservation as discussed in meeting #2.

After some additional discussion another point was then developed:

- The public shall be educated on the responsibility for water conservation.

This point was discussed and then modified to:

- Public education plays an important role in water conservation.

Mr. Michaelson reviewed the statements developed and advised that it would be important to note that each of the statements must be considered within the context of the others, rather than as stand alone points.

During the conservation discussion, several members mentioned the role of water rates. Mr. Michaelson asked the committee if they wanted to include something in the statement on this issue. After a discussion, the following statement was developed:

- Cost incentives and disincentives shall be developed to promote conservation.

IX. SENATE BILL 1 UPDATE

Robert Aguirre, the public participation contractor for the West Central Trans-Texas Water Program, gave an update on the Senate Bill 1 process stating that the Texas Water Development Board (TWDB) had just released a revised draft of the planning region map (showing 16 regions) as well as rules and guidelines. He noted that the TWDB was continuing to take public comment on these draft documents and that another draft - which would be substantially final - would be released on December 18 for publication in the Texas Register on December 26. While there would be a final comment period, including a January 21, 1998 public hearing, no significant changes were to be expected. The final region designations, rules and guidelines, and initial planning group appointments will then be made on February 19.

Regarding the latter issue, Mr. Aguirre stated that any committee member interested in being considered for nomination by the Policy Management Committee to the TWDB for appointment to the Senate Bill 1 initial planning groups, should make their wishes known. In order to facilitate this he distributed forms for members to complete should they have such an interest. He noted that anyone was eligible to make a nomination, including self-nomination. He also noted that members of the audience who would like to place their name into consideration for nomination were also welcome to contact the TWDB directly or to complete the form he provided for this purpose.

Mr. Aguirre noted that there were three qualifications for nomination identified by the TWDB. They were: (1)willingness, (2) knowledge of water matters, and (3) commitment.

X. IRPC UPDATE REPORT

Linda Ximenes, IRPC Coordinator, discussed the submission of an update or status report to the Policy Management Committee and others in order to inform them of the progress of the IRPC. She stated that such a report, which would be 3 or 4 pages long, would include a history of the committee as well as some mention of the visioning work they had done and a statement on their work on regional water conservation.

One committee member stated that it might be premature to release any information. Another member said it was necessary to keep the PMC who appointed them, and the state who was paying for the expenses of the effort, informed of their progress. Mr. Michaelson cautioned the members that it is not unusual once a committee's conclusion is announced for the public to cry out declaring they had no idea such a process was in progress. A discussion on the need to keep others informed ensued that included comments about the need for the statement to be very general, inasmuch as the committee's work is still in development.

Committee members who volunteered to work with Ms. Ximenes on the development of an update statement will include Fran Merritt, Linda Lesso, Evelyn Bonavita, and Gloria Rivera.

A discussion then took place regarding what information the committee members thought they still needed in order to continue to discuss the development of criteria to evaluate water resource plans.

Patsy Light asked for a list of the options which had been identified in the Trans-Texas effort to date. Dede Stevenson asked for any information that might be available with respect to regional historic drought data. Mr. Raabe will respond to these and will include the information for dissemination with the meeting summary if they are available when it is sent out.

Claudia Garza pointed out she thought that there were some items still outstanding from the previous meeting, noting that there was some follow-up information still outstanding. Ms. Ximenes will review the meeting #2 notes and follow-up as necessary, with one item being immediately identified as some information requested by Ed White, Jr. regarding interdependencies.

XI. PUBLIC COMMENT

Tom Culbertson commended the committee for their work and interest, but warned them that they were being used and that no conclusion or good will come of their efforts.

Karl Wurz spoke to the committee about the extensive water conservation measures that have been undertaken by the city of San Antonio noting that there were both incentives, through retrofit and rebate programs, as well as disincentives through a four tier rate structure. San Antonio, he stated, was committed to water conservation in a big way.

The meeting adjourned at 2:40 p.m.

Trans-Texas Water Program
West Central Study Area

Summary
Water Demand
and
Water Supply
Projections

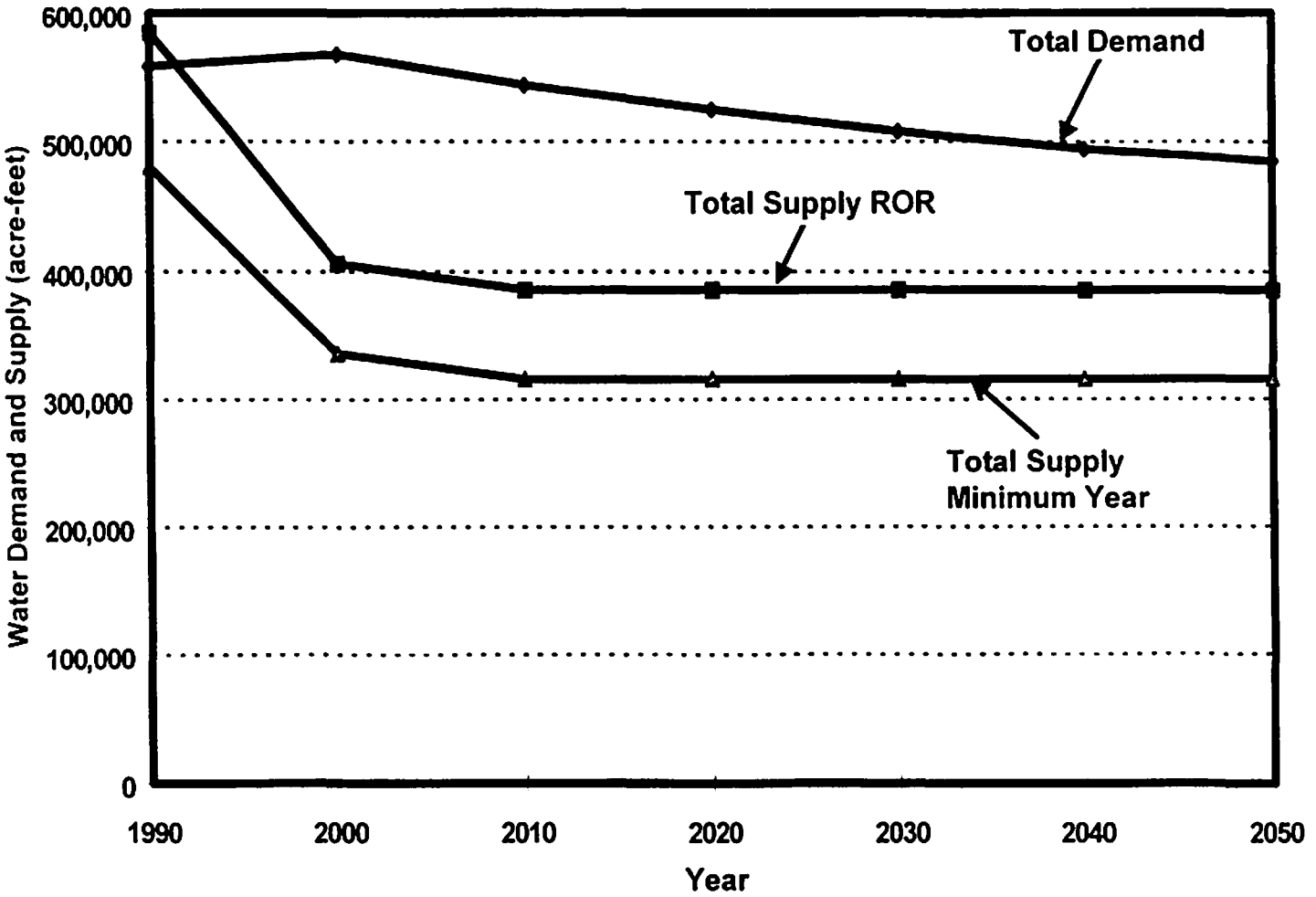
Integrated Resource Planning Committee (IRPC)

Board Room
San Antonio River Authority

November 22, 1997
San Antonio, Texas

HDR Engineering, Inc.

Table 4-1 Comparison of Water Demand and Water Supply Projections Nueces River Basin Area West Central Trans-Texas Study Area Trans-Texas Water Program									
Basin/County/City			Total Use in 1990 acft	Projections 2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Demand									
Municipal Demand			20,844	27,000	28,119	29,019	31,340	33,214	34,728
Industrial Demand			2,149	2,320	2,482	2,611	2,719	2,942	3,164
Steam-Electric Power Demand			6,074	12,400	12,400	12,400	12,400	15,400	22,400
Irrigation			521,395	515,999	490,908	470,544	451,043	432,369	414,485
Mining Demand			1,706	2,506	2,354	2,490	2,650	2,845	3,087
Livestock Demand			6,080	7,345	7,345	7,345	7,345	7,345	7,345
	Total Demand		558,248	567,570	543,608	524,409	507,497	494,115	485,209
Supply									
Groundwater/Edwards			212,132	183,647	163,243	163,243	163,243	163,243	163,243
Groundwater/Other			254,544	137,449	137,449	137,449	137,449	137,449	137,449
Local Surface&Ground			6,080	7,345	7,345	7,345	7,345	7,345	7,345
Surface Water/Streams		ROR rights	112,305	77,608	77,608	77,608	77,608	77,608	77,608
Surface Water/Streams		Ave.available	92,025	62,185	62,185	62,185	62,185	62,185	62,185
Surface Water/Streams		Ave.avail-dry	53,268	39,389	39,389	39,389	39,389	39,389	39,389
Surface Water/Streams		Min.Yr.Ava.	7,658	7,311	7,311	7,311	7,311	7,311	7,311
Total Supply		ROR rights	585,061	406,049	385,645	385,645	385,645	385,645	385,645
Total Supply		Ave.available	564,781	390,626	370,222	370,222	370,222	370,222	370,222
Total Supply		Ave.avail-dry	526,024	367,830	347,426	347,426	347,426	347,426	347,426
Total Supply		Min.Yr.Ava.	480,414	335,752	315,348	315,348	315,348	315,348	315,348
Surplus/Shortage		ROR rights	26,813	-161,521	-157,963	-138,764	-121,852	-108,470	-99,564
Surplus/Shortage		Ave.available	6,533	-176,944	-173,386	-154,187	-137,275	-123,893	-114,987
Surplus/Shortage		Ave.avail-dry	-32,224	-199,740	-196,182	-176,983	-160,071	-146,689	-137,783
Surplus/Shortage		Min.Yr.Ava.	-77,834	-231,818	-228,260	-209,061	-192,149	-178,767	-169,861
Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.									



TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

PRELIMINARY

HDR Engineering, Inc.

NUECES BASIN PROJECTIONS

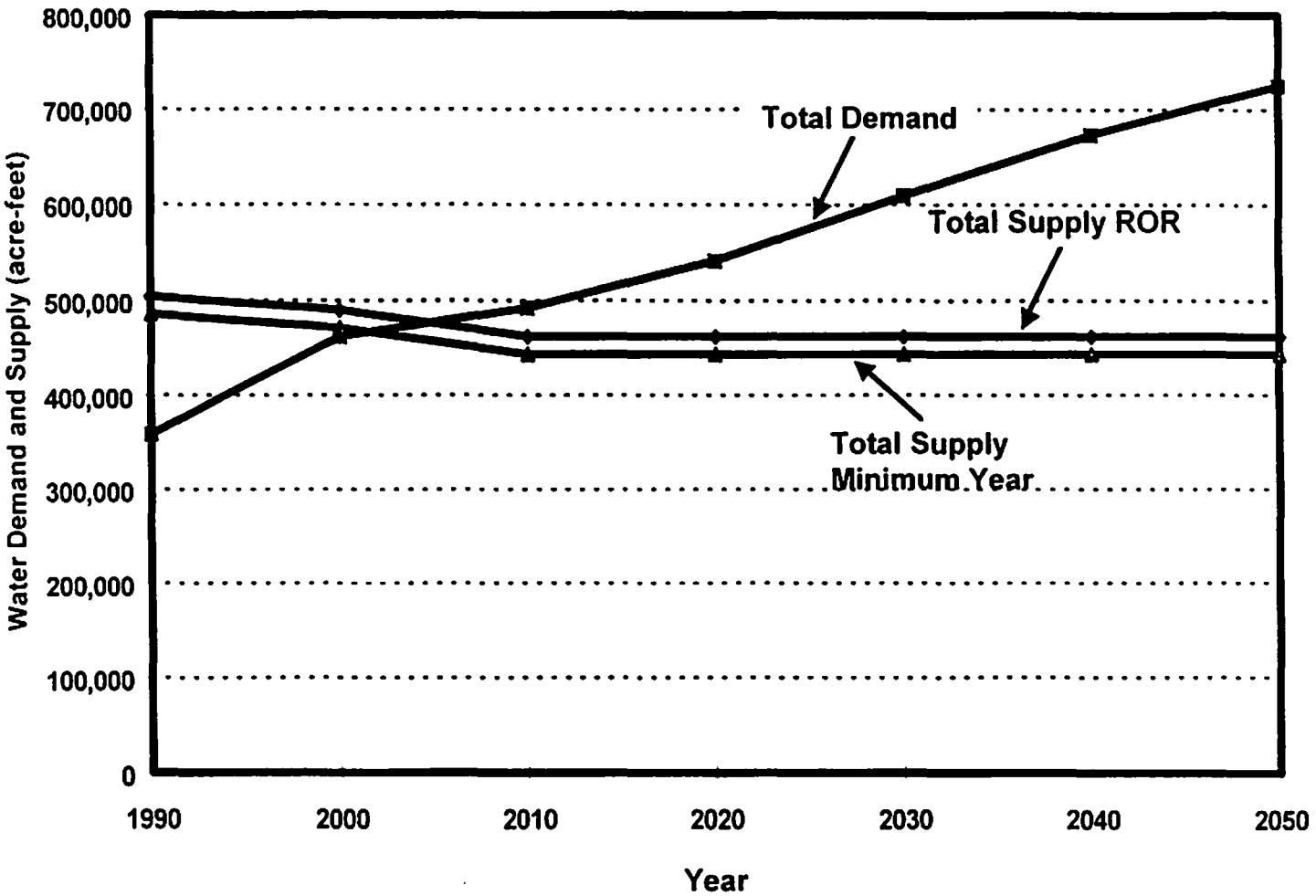
WATER DEMAND

WATER SUPPLY

Table 4-2
Comparison of Water Demand and Water Supply Projections
San Antonio River Basin Area
West Central Trans Texas Study Area
Trans-Texas Water Program

Basin/County/City		Total Use in 1990 acft	Projections 2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
San Antonio Basin								
Municipal Demand		240,233	325,199	359,369	403,907	466,116	523,715	566,696
Industrial Demand		14,323	17,105	20,008	22,698	25,283	28,630	32,092
Steam-Electric Power Demand		24,263	36,000	36,000	40,000	45,000	50,000	56,000
Irrigation		72,393	72,427	66,556	62,995	59,678	56,578	53,679
Mining Demand		1,993	5,213	5,017	5,915	7,001	8,334	10,451
Livestock Demand		5,536	5,960	5,960	5,960	5,960	5,960	5,960
Basin Total		358,741	461,904	492,910	541,475	609,038	673,217	724,878
Supply								
Groundwater/Edwards		287,947	249,283	221,585	221,585	221,585	221,585	221,585
Groundwater/Other		105,407	99,244	99,244	99,244	99,244	99,244	99,244
Local Surface&Ground		5,536	5,960	5,960	5,960	5,960	5,960	5,960
Surface/Cooling Water		49,000	49,000	49,000	49,000	49,000	49,000	49,000
Surface Water/Streams	ROR rights	56,138	56,138	56,138	56,138	56,138	56,138	56,138
Surface Water/Streams	Ave.available	53,494	53,494	53,494	53,494	53,494	53,494	53,494
Surface Water/Streams	Ave.avail-dry	48,243	48,243	48,243	48,243	48,243	48,243	48,243
Surface Water/Streams	Min.Yr.Ava.	37,624	37,624	37,624	37,624	37,624	37,624	37,624
Surface Water/Recycle		0	30,000	30,000	30,000	30,000	30,000	30,000
Total Supply	ROR rights	504,028	489,625	461,927	461,927	461,927	461,927	461,927
Total Supply	Ave.available	501,384	486,981	459,283	459,283	459,283	459,283	459,283
Total Supply	Ave.avail-dry	496,133	481,730	454,032	454,032	454,032	454,032	454,032
Total Supply	Min.Yr.Ava.	485,514	471,111	443,413	443,413	443,413	443,413	443,413
Surplus/Shortage	ROR rights	145,287	27,721	-30,983	-79,548	-147,111	-211,290	-262,951
Surplus/Shortage	Ave.available	142,643	25,077	-33,627	-82,192	-149,755	-213,934	-265,595
Surplus/Shortage	Ave.avail-dry	137,392	19,826	-38,878	-87,443	-155,006	-219,185	-270,846
Surplus/Shortage	Min.Yr.Ava.	126,773	9,207	-49,497	-98,062	-165,625	-229,804	-281,465

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.



PRELIMINARY

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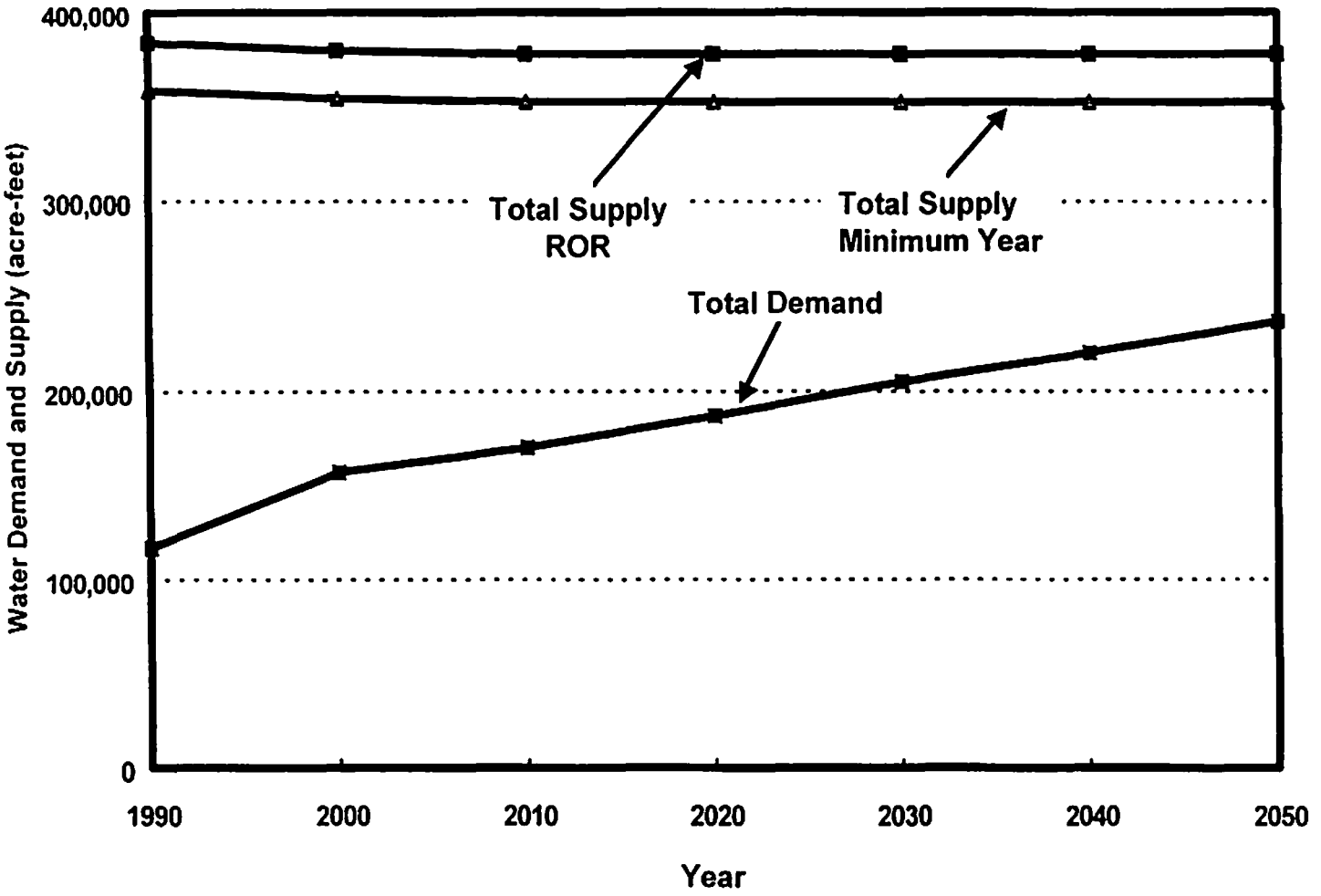
TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

SAN ANTONIO BASIN PROJECTIONS
WATER DEMAND
WATER SUPPLY

Table 4-3
Comparison of Water Demand and Water Supply Projections
Guadalupe River Basin Area
West Central Trans Texas Study Area
Trans-Texas Water Program

Basin/County/Water Utility		Total Use in 1990 acft	Projections 2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Demand								
Municipal Demand		53,104	73,273	81,591	91,834	107,944	121,433	135,352
Industrial Demand		26,263	31,086	35,853	38,923	41,970	46,871	51,855
Steam-Electric Power Demand		13,052	23,000	25,000	30,000	30,000	30,000	30,000
Irrigation		11,275	10,274	9,131	8,155	7,316	6,596	5,969
Mining Demand		3,486	8,085	7,268	6,987	6,997	4,659	3,306
Livestock Demand		9,424	10,822	10,822	10,822	10,822	10,822	10,822
Basin Total		116,604	156,540	169,665	186,721	205,049	220,381	237,304
Supply								
Groundwater/Edwards		19,717	17,070	15,173	15,173	15,173	15,173	15,173
Groundwater/Other		133,959	132,468	132,468	132,468	132,468	132,468	132,468
Surface Water/Canyon		82,627	82,627	82,627	82,627	82,627	82,627	82,627
Local Surface&Ground		10,822	10,822	10,822	10,822	10,822	10,822	10,822
Surface Water/Streams	ROR rights	136,687	136,687	136,687	136,687	136,687	136,687	136,687
Surface Water/Streams	Ave.available	133,999	133,999	133,999	133,999	133,999	133,999	133,999
Surface Water/Streams	Ave.avail-dry	126,006	126,886	126,886	126,886	126,886	126,886	126,886
Surface Water/Streams	Min.Yr.Ava.	111,300	111,300	111,300	111,300	111,300	111,300	111,300
Total Supply	ROR rights	383,812	379,674	377,777	377,777	377,777	377,777	377,777
Total Supply	Ave.available	381,124	376,986	375,089	375,089	375,089	375,089	375,089
Total Supply	Ave.avail-dry	373,131	369,873	367,976	367,976	367,976	367,976	367,976
Total Supply	Min.Yr.Ava.	358,425	354,287	352,390	352,390	352,390	352,390	352,390
Surplus/Shortage	ROR rights	267,208	223,134	208,112	191,056	172,728	157,396	140,473
Surplus/Shortage	Ave.available	264,520	220,446	205,424	188,368	170,040	154,708	137,785
Surplus/Shortage	Ave.avail-dry	256,527	213,333	198,311	181,255	162,927	147,595	130,672
Surplus/Shortage	Min.Yr.Ava.	241,821	197,747	182,726	165,669	147,341	132,009	115,086

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.



PRELIMINARY

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TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

GUADALUPE BASIN PROJECTIONS

WATER DEMAND

WATER SUPPLY

A RESOLUTION OF THE BASTROP COUNTY WATER COUNCIL IN FAVOR OF VOLUNTARY ADVANCED WATER CONSERVATION

WHEREAS, Water is one of the County's most precious resources;

NOW THEREFORE, BE IT RESOLVED BY THE BASTROP COUNTY WATER COUNCIL THAT:

1. Within the context of the Trans-Texas Water Program, and for purposes of regional water planning as mandated by Senate Bill 1, the Bastrop County Water Council is in support of voluntary advanced water conservation.

PASSED AND APPROVED this 19 day of November, 1997.

Jim Cowan

Jim Cowan, President

John Burke, Secretary

VISION FOR REGIONAL PLANNING DISCUSSION

OPTIONS	ISSUES	PLAN	CRITERIA
Recharge Dams	Enforcement	Meet needs of entire region	**Fairness**
Conservation	Real estate disclosures	Promote action	**Flexibility**
Water Transfers	Right of capture	Account for subregional differences in conditions/ attitudes	**Water Quality**
	Development controls/ cumulative impacts	Respect existing water rights	**Impacts to Third Parties**
	Building over aquifers/ recharge zones	Identify funding alternatives	**Economic:** **- Benefits** **- Long-range impacts** **- Cost**
		Establish priority of water uses	**Environmental:** **- Long-term impacts** **- Impacts on:** **Rivers** **Bays** **Estuaries** **Riparian forests**
		Identify areas of near-term/long-term shortfalls	
		Be innovative	
		Be sensitive to supplying basins	

Trans-Texas Water Program
West Central Region

If you are interested in being nominated as a member of the "initial coordinating body for planning" called for under Senate Bill 1, please complete this form.

Please print clearly.

NAME	
ADDRESS	
PHONE	( )
FAX	( )

If you were to be appointed to the "initial coordinating body for planning," which of the following stakeholder areas would you feel you would be representing?

(Check all that apply.)

- ❑ The General Public
- ❑ Small Businesses
- ❑ Counties
- ❑ Electrical Generating Utilities
- ❑ Municipalities
- ❑ River Authorities
- ❑ Industries
- ❑ Water Districts
- ❑ Agricultural Interests
- ❑ Water Utilities
- ❑ Environmental Interests
- ❑ Other (*please specify below*)

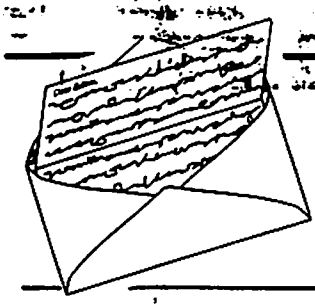
Other: _____

_____

_____

NIONS

Water planning committee member seeks input from Guadalupe County residents



LETTERS TO THE EDITOR

To the Editor:

To residents in Seguin and Guadalupe County, your ideas, suggestions and concerns are of value to me as I attempt to represent adequately the interests of the county in the discussions of the Trans-Texas Water Program, West Central Study Region, Integrated Resource Planning Committee (to which I have been appointed).

A goal of mine is to achieve a thorough and broad-based knowledge of the numerous, multi-faceted regional issues related to water in Seguin, Guadalupe County, and the West central Texas Region.

Such knowledge is important to me, as I desire to have a sound basis basis for analysis, opinions and participation in the deliberations of the 32 county regional committee meeting in San Antonio, as well as the local Seguin committee.

As to my 'water' qualifications, may I mention that I hold a Master of Science degree in Engineering, and that in the past I developed a computerized model to yield optimal water management for a three basin, ten plant hydroelectric generation system at the electric utility service for a city population of one million.

It is my hope that with your input, my participation can in a small measure benefit our Seguin area, as well as Guadalupe County. I will endeavor to do research on the topics that you bring to my attention. I can be reached at 303-4764.

Gloria Rivera

Celebrating Seguin through positive eyes

To the Editor:

I don't believe my last letter

Call me a dumb blonde.

I can take it. El Ranchito is a

a beautiful two-town at Humphrey and Austin. Not be-

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE
MEETING #4
DECEMBER 13, 1997
9:30 AM

AGENDA

I. Convene Meeting

II. Review of Public Comment Procedures

III. Review Meeting Notes of November 22

IV. Goal for Today's Meeting

V. Response to Follow-up Requests

- Supply Options
- Review Population Growth and Water Demand Projections
- Drought Information

VI. Development of Criteria

- Brainstorming
- Evaluating
- Defining

VII. Public Comment

Adjourn

MEETING NOTES
TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE (IRPC)
MEETING #4
DECEMBER 13, 1997

Meeting #4 of the IRPC was convened at 9:35am by Lewis Michaelson, IRPC Facilitator.

I. CONVENING THE MEETING

Twenty-one IRPC Committee members were present:

Cameron Cornett	Haskell Simon
Errol Dietze	Evelyn Bonavita
Dede Stevenson	Claudia Garza
Donald Hoogenakker	Patsy Light
David Carrothers	Gloria Rivera
Brian Vauter	Linda Lesso
Zack Williams	Fran Merritt
Mike Mahoney	Charles Trefny
Hugh Charlton	Richard Barton
Hank Brummett	Pamela McKay
Judy McAda	Ed White

Seven committee members were not present:

Joe Cantu	John Hohn
Renea Garcia	Scott Wall
John Wendele	Gary Damuth

II. Review of Public Comment Procedures

Mr. Michaelson stated that he had had conversations with several committee members about the possibility of having public comment both at the beginning and at the end of the meeting. After a brief discussion which included a suggestion to limit the length of such public comment, it was agreed that it would be limited to four minutes per person and would be allowed at the beginning and at the end of each meeting.

At this time Mr. Michaelson called for public comment. Tom Culbertson spoke to the committee stating that he was very supportive of the public involvement and participation efforts of the committee. He stated that the committee's discussion on conservation was very important and urged them to consider evaporation as one of the criteria for determining levels of conservation. Karl Wurz stated that his comment, as reflected in the minutes of the November 22 meeting, was not accurate. He stated that two important words in his statement were omitted in the final sentence of his statement as reflected. He said that it should have read: The San Antonio ***business community*** was committed to water conservation in a big way.

III. Review of Meeting Notes of November 22, 1997

Mr. Michaelson called for any comments or changes with respect to the November 22 meeting. None were noted.

IV. Goal for Today's Meeting

The stated goal for this meeting, said Mr. Michaelson, was to respond to three follow-up request items from the November 22 meeting, to consider whether or not the committee felt it needed any other information in order to move forward, and to begin the process of criteria development.

V. Response to Follow-Up Requests

A. Supply Options:

Mr. Michaelson stated that the list of options that was requested at the last meeting was distributed, and asked if there were any questions. Patsy Light stated that she had also asked, at the November 1 meeting, for a presentation on aquifer recharge and that this was never done. Mr. Michaelson said that this could be done, if not in this meeting, the next. Steve Raabe indicated he would provide general information on the subject to the committee. One committee member questioned why information on a particular option would be necessary if the committee's discussion was to be limited to the development of criteria. Ms. Light stated that she felt she needed more information on the types of options, if not the specific projects, before she could work on the development of criteria.

A question was asked as to how the committee could develop criteria if the Senate Bill 1 region maps were going to be different from the Trans-Texas map. Steve Raabe responded that, no matter how the Texas Water Development Board decided to draw planning region lines on a map, it would have no impact on the realties of the hydrologic and economic interdependencies which this committee has been discussing.

Mr. Michaelson then stated that he was concerned that there still seemed to be some confusion as to some of the basic issues and assumptions which were discussed in meetings #1 and #2. He expressed his concern that unless these underlying assumptions were understood, it would not be possible to move forward with the committee's agenda. He stated that he understood everyone's interest and concern over the new legislation and the desire to learn more about water options and regions. However, he reminded the committee that the goal assigned to them was for the development of regional criteria by which water resource alternatives should be evaluated, and that since time was getting short, they needed to focus on the committee's agreed-to mission.

This was followed by a discussion by the committee with one person suggesting that other members could likely find a great deal of information on supply options and other issues at their local city hall. Another member noted that county clerks might also have specific water planning information for those interested.

B. Review Population growth and water demand projections:

Linda Lesso stated that she had expected to receive today a presentation from HDR on water availability in the Colorado River Basin. Mr. Raabe stated that he had met with HDR this week on this issue and that the work was not yet complete. Ms. Lesso stated that this information was particularly important to her and asked if it could be provided just as soon as it was available. Other members also expressed interest in this data. Mr. Raabe stated that it would be distributed to everyone as soon as it was complete.

Mr. Michaelson asked if anyone felt that any additional information was needed besides the Colorado River Basin data. While no additional information was cited, one member wished to re-emphasize that the water demand projections were based upon "advanced conservation." The committee generally agreed that this was an important fact to keep in mind when considering the data.

One committee member noted that much of the data on population growth and water demand projections can be accessed on the Texas Water Development Board's world- wide-web page.

C. Drought Information:

Mr. Michaelson noted that drought information for this region had been distributed at the request of a committee member and that Mr. Raabe had some further comment and explanation.

Mr. Raabe explained some of the data which appeared in the hand out (Texas Drought: Its Recent History, 1931-1985) and noted that history showed definite cycles. What was certain, he said, was that there would be droughts in our future, but that the unknowns were extent, duration, and time of occurrence. He also explained the different type of droughts:

Meteorologic - a lack of rain
Hydrologic - a lack of runoff into streams
Reservoir Storage - when water coming out of a reservoir exceeds the amount going into it
Ground Water - a shortage of water in aquifers

A brief discussion followed Mr. Raabe's comments.

VI. Development of Criteria

Mr. Michaelson explained the process of criteria development by saying that the first step was "brainstorming," the second step was "evaluating," and the third step was "defining." Brainstorming, he stated, had certain ground rules. The first is that anyone can throw out any thought without comment or explanation; the second was that no one may comment on another person's statement; and the third rule was that we would write each of the comments down as stated and that they would be discussed and refined only after the brainstorming session was completed.

At this point the committee was asked to begin a brainstorming session with respect to the elements of a regional water resource evaluation criteria. The initial criteria brainstorming points were:

- Credibility - public acceptance
- Availability of project
- Viability
- Efficiency
- Implementation time
- Cultural and historical resources
- Environmental impact on endangered species
- The true cost of water i.e. impact on economy/mitigation required
- Political feasibility
- Inter-regional coordination/communication
- Financial aid - meets funding criteria
- Surface water and ground water
- Economic impact upon an area not receiving benefit, i.e. loss of tax base near/on development of a project
- Regional progression
- Level of conservation in area receiving water

- Surface water/ground water interaction
- Legality
- Flexibility
- Renewability/sustainability
- Support for conjunctive use
- Promote economic development
- Technical feasibility
- Well balanced
- Flexibility:
  - To use /adopt new research as it comes availab~~ility~~ ls
  - Ability to respond to changes in demand projections
- Use of established technology/science
- Respect for property rights
- Growth management
- Impact of "no action"
- Validation of need
- Quality of life
- Open process of public participation
- Timing requirements/window of opportunity/phasing/sequencing
- Public education and notification

At this point it was suggested by a member that Mr. Michaelson review the list.

After the review additional criteria suggested included:

- Wildlife/habitat
- Homosapiens
- Stakeholder buy-in
- Intra-regional communication/coordination
- Drinking Water

One committee member suggested that it might be a better use of the committee's time for Mr. Michaelson to take the list and order/categorize it. Mr. Michaelson stated that he would do this at the lunch break. A committee member then suggested a five minute break.

After the break additional criteria were:

- Local Commitment
- Compatibility with existing plans

In an item that was brought up earlier but deferred to this point, Pam McKay stated that we should explore the issue of where we are going with our water resource versus where we are going with our growth. Her questions were: Are we obligated to accept growth projections? Should we control growth by water resource planning?

After some initial discussion it was suggested that this issue could be interpreted into a criteria as:

- Growth inducing impacts (which could be a positive or a negative criteria value)

Mr. Michaelson stated that it was a common question which every growth area struggles with, which generally translates to: What is the role of water and water planners when it comes to growth? Some further discussion ensued which resulted in adding:

- Political acceptability

In some further discussion it was noted that the issue of growth was a very key and important issue. One member pointed out that it was easy for the population centers to be heard, but asked: How can we (rural area) be heard?

One important aspect of growth, pointed out by Brian Vauter, was transient growth such as the growth in tourism. As the state's third largest industry, he said, this needs to be included in any growth discussion.

In response to the initial question, however, Mr. Michaelson stated that in his experiences water planners never consider it their job to make the political policy decisions with respect to growth. Water planners believe those decisions are properly left to the elected and other public officials in terms of the setting of policy. The role of water planners was to follow the policy set for them. As an analogy to this he cited the military, noting that they fight the wars, but they don't decide which wars to fight nor do they set foreign policy. These issues are left up to the civilian leaders who have that responsibility.

On a pragmatic note, he stated that there appeared to be few examples where water planning has been used effectively to control growth. At this point the brainstorming session was concluded.

After the group took its lunch break, Mr. Michaelson presented the criteria categorization he had written from the morning work notes stating that this was the "evaluating" step in the process. These were shown as:

I. Economic
    - Benefits - Economic Development
    - Long range impacts
    - Cost -regional
    - Socio-economic +/-
    - Mitigation
    - Available funds (may belong in Feasibility category)
    - Meets funding criteria (may belong in Feasibility category)

II. Environmental
    - Quality of life
    - Long term impacts
    - Surface and ground water interaction
    - Impacts on:
        - Wildlife/Habitat
        - Rivers
        - Bays
        - Estuaries
        - Homosapiens
        - Riparian forests

Endangered species
Cultural/historical impacts
Effects on aquifers
Aesthetics

III. Water Quality
Surface water
Ground water
Drinking water
Cost effectiveness

IV. Renewability
Sustainability

V. Fairness
Respect for property rights
Stakeholder buy-in
Conservation in area receiving water
Encourage through public participation

VI. Impacts to Third Parties
Lost economic/tax benefits near/on development of project
Property rights

VII. Feasibility
Temporal or timing
Technical
Economic
Political
Regulatory/legal
Public acceptance
Established science
Proven technology
Available funds
Meets funding criteria

VIII. Compatibility
Maximize regional compatibility with local plans
Regional progression
Maximize consistency with local growth management plans
Conjunctive use
Minimize negative impacts on property rights

IX. Efficiency
Evaporative loss

X. Flexibility
Adaptable to new technology/opportunities
Adaptable to changes in demand projections

XI. Reliability
Timing
Short term versus long term

Mr. Michaelson noted that there were still a number of items listed in the morning session that were not included in these groupings, since he was not sure whether or not they were actually criteria items or if they were, how to express them and in which category to put them.

Among the major items discussed was where and how, in criteria terms, should public participation be included. After much discussion Linda Lesso stated that, considering the importance of public participation, the committee might present its thoughts on an adjunct basis, as an additional result of its work. Mr. Michaelson emphasized that while public participation is important and necessary, it is not a characteristic of an alternative and therefore not measurable in terms of criteria development. It is, he stated, more a matter of *the process* of developing or adopting alternatives rather than a characteristic of an alternative.

The collective concern expressed by the committee was that there be some assurance that public participation would be a part of the Senate Bill 1 process. Errol Dietze pointed out that public participation has, in fact, already begun....and it has begun with the work of this group.

Mr. Michaelson noted that the committee seemed to be in agreement on the need for, and the importance of, public participation and suggested that the discussion move on to see how the issue plays out in the development of criteria. In the meantime "public participation" was added to the Compatibility group as well as to a new category of items called "Recommendations."

A question of cost was raised and the following was added to the Fairness category: Distribution of cost.

A category of Recommendations was developed for items which the committee felt were critically important, but did not necessarily constitute criteria in and of itself. These items were:

- Public participation
- Public education
- Balance

Sustainability was moved under Reliability and the Renewability category was eliminated.

To the Flexibility category was added: Adaptable to changes in the law

To the Efficiency category was added: Cost effectiveness.

The final criteria categories reflecting the results of this discussion are appended to the meeting notes.

A member then asked which of the criteria would be considered to be the most important. Mr. Michaelson stated that the answer to that question was not a part of the committee's mission. To this, a member added that they should not want to assign a ranking because then someone could later dismiss the "less important" ones. Another member stated that the ranking of criteria may be different for different projects, sub-regions, people, etc.

At this point in the meeting Mr. Michaelson discussed the setting of a tentative meeting #6 date, stating that the target date was February 14. He stated that the main purpose of the meeting would be to offer comments on the draft report which would be written after meeting #5 (January 10). Two members stated that they could not make the February 14 date. In an effort to accommodate these members other potential dates were discussed including the possibility of a Sunday or a weekday meeting. In each case someone was unable to make it. After further discussion it was

decided that the subject would be tabled for now in order to give Mr. Michaelson an opportunity to determine whether or not he could move a February 7 commitment on his calendar.

The final item of business for the day was to begin the process of developing a "definition" of the criteria elements which have been categorized. Stating that we would not have the time to finish this today, he asked the committee if they would like to conclude the meeting at this point or if they wanted to continue. The committee asked to continue.

Mr. Michaelson asked the committee to select a category to begin this process in the time remaining. The committee selected Environment, and after discussion, agreed to the following definitions:

Environment

Minimize short-term and long-term negative impacts on natural resources
- Wildlife/habitat
- Rivers
- Bays
- Estuaries
- Riparian forests
- Endangered species
- Aquifers
- Air quality
- Wetlands

Minimize short-term and long-term negative impact to the human environment
- Recreational
- Cultural/historical
- Archeological
- Aesthetics

The next item selected for definition was compatibility. After discussion, the committee agreed to the following elements and definitions:

Compatibility
- Maximize regional compatibility with local water plans
- Minimize negative impacts on property rights
- Maximize consistency with local growth management plans

The next item selected for definition was reliability. The committee settled on the following:

Reliability

Maximize a sustainable (referring to yield) supply of water for short-term and long-term needs
Minimize interruptions to water supplies

With that, Mr. Michaelson noted that we were out of time and that we would pick up on the definition process at the January 10 IRPC meeting.

Prior to taking public comment, Linda Lesso wished to announce that a permit application has been made by LCRA for dams on the Colorado River, and that interested parties should contact Andy Rooke the Lower Colorado River Authority at 1-512- 473-3200, Ext. 7945 (or at 1-800-776-5272) for more information.

VII. Public Comment

Karl Wurz addressed the committee concerning the bad water line stating that in his opinion the money being spent by the San Antonio Water System was not a good use of funds. He also urged the committee to be innovative in their thinking with respect to alternative water resource options, particularly the use of lower quality sources for non-potable uses.

The meeting was adjourned at 2:46pm.

IRPC Meeting #4 - Attachment to Meeting Minutes
December 12, 1997
Final Criteria Categorization List
After Changes From Discussion

I) Economic

- Benefits/Economic Development
- Long-range impacts
- Cost -regional
- Socioeconomic +/-
- Mitigation
- Available funds
- Meets funding criteria

II). Environmental

- Quality of life
- Long-term impacts
- Surface ground and water interaction
- Impacts on:
  - Wildlife/Habitat
  - Rivers
  - Bays
  - Estuaries
  - Homosapiens
  - Riparian forests
  - Endangered species
  - Cultural/historical impacts
  - Effects on the aquifer
  - Aesthetics

III). Water Quality

- Surface water
- Ground water
- Drinking water

IV) Fairness

- Respect for property rights
- Stakeholder buy-in
- Conservation in water receiving area
- Distribution of Cost

V) Impacts to Third Parties

- Lost Economic/tax benefits near/or on development or project
- Property Rights

VI) **Feasibility**

- Temporal or timing
- Technical
- Economic
- Political
- Regulatory/legal
- Public acceptance
- Established science
- Proven technology

VII). **Compatibility**

- Local plans
- Regional progression
- Growth management
- Conjunctive use
- Property rights

VIII). **Efficiency**

- Evaporative loss
- Conservation
- Cost-effectiveness

IX) **Flexibility**

- Adaptable to new technology/opportunities
- Adaptable to changes in demand projections
- Adaptable to changes in law

X). **Reliability**

- Timing
- Short term versus long term
- Sustainability

Recommendations

Consider developing additional suggestions or guidance for regional water planning on the following subjects:

- Public Participation
- Public Education
- Balance

Information Requested

- Recharge - Natural Enhancement (Patsy Light)
- Colorado River Basin Information on Demand (Linda Lesso)

TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE
MEETING #5
JANUARY 10, 1998
9:30 AM

AGENDA

I.	Convene meeting	Lewis Michaelson
II.	Public Comment	Lewis Michaelson
III.	Review of December 13 Meeting Notes (Meeting #4)	All
IV.	Recap of Meetings # 4	Lewis Michaelson
V.	Goal for Today's Meeting	Lewis Michaelson
VI.	Discussion of Follow-Up Items From IRPC#4	Lewis Michaelson Steven Raabe
VII.	Finalize, List, and Define Criteria	All
VIII.	Discuss Potential Recommendations	All
IX.	Review Proposed Outline for Committee's Report	All
X.	Public Comment	Lewis Michaelson
	Adjourn	

MEETING NOTES
TRANS-TEXAS WATER PROGRAM
WEST CENTRAL REGION
INTEGRATED RESOURCE PLANNING COMMITTEE (IRPC)
MEETING #5
JANUARY 10, 1998

Meeting #5 of the IRPC was convened at 9:35 am by Lewis Michaelson, IRPC Facilitator.

I. CONVENING THE MEETING

Twenty-one IRP Committee members were present:

Haskell Simon	Hank Brummett
Errol Dietze	Evelyn Bonavita
Dede Stevenson	Claudia Garza
Donald Hoogenakker	Patsy Light
David Carrothers	Gloria Rivera
Brian Vauter	Zack Williams
Mike Mahoney	Charles Trefny
Richard Barton	Scott Wall
Ed White, Jr.	Gary Damuth
Judy McAda	Fran Merritt
John Wendele	

Seven committee members were not present:

Pamela McKay	Hugh Charlton
Cameron Cornett	Linda Lesso
Joe Cantu	John Hohn
Renea Garcia	

II. Public Comment

Karl Wurz addressed the committee concerning the Applewhite Reservoir project and noted that the San Antonio citizens' water committee had not accurately analyzed the characteristics of the project and that he was one of the citizens who opposed the project. He urged the committee to be very specific in their instructions, cautioning them that their work can get lost. Mr. Wurz also distributed a memo to the committee members (Attachment 1).

III. Review of December 13 Meeting Notes

Prior to reviewing the meeting notes Mr. Michaelson informed the committee that the Texas Water Development Board held a public meeting in New Braunfels on January 7 regarding Senate Bill 1. That meeting was attended by Steve Raabe, Trans-Texas Water Program - West Central Region Project Manager, and Robert Aguirre, Public Participation Contractor. He also noted that IRPC members, David Carrrothers, Hank Brummett, and Mike Mahony were present. He called upon the three committee members to give a report on this meeting.

Mr. Mahony reported that the SB1 planning process was on schedule and that the planning regions, initial appointments to the regional planning groups, and the rules will all be finalized once adopted by the TWDB board on February 19. He also noted that nominations to the planning group must be submitted to the TWDB by January 16. Haskell Simon added that anyone can make

a nomination and that the more nominations someone can get the better chance they have of being considered.

David Carrothers noted that the entire SB1 process will be a grass-roots effort and encouraged everyone to participate in the process even if they did not get one of the original appointments. Hank Brummett noted these selected planning groups will be the utilizing what the IRPC has developed.

With respect to the minutes, Mr. Michaelson distributed a letter from Linda Lesso which offered a correction to her comments from the December 13 meeting (Attachment 2). Her changes are being accepted for the record. No other comments were received.

IV. Recap of Meeting #4

Mr. Michaelson stated that in meeting #4 the committee "brainstormed" a long list of criteria issues and that, after discussion and analysis, developed a more focused list of criteria by category. The committee then began the process of defining each of the criterion and had completed the categories of environmental, reliability, and compatibility by the end of that meeting.

V. Goal for Today's Meeting

Mr. Michaelson noted that the goal for today was to "be done." By this he meant that the committee must complete the criteria definitions in order to be specific about what the committee means by each criterion item.

He also stated that there may be additional guidance or recommendations related to regional water planning that they wanted to provide to the PMC, and that the three potential areas already identified at the fourth meeting were: The importance of public participation, the need for public education, and a need for a "balance" in planning in terms of how the criteria are applied.

VI. Discussion of Follow-up Items

In response to a request from Patsy Light Steve Raabe spoke to the committee concerning ground water re-charge. He stated that there are four major aquifer systems in the study area and that re-charge can be applied to any of them, but in different ways. He noted that each aquifer has different characteristics and hence recharge initiatives would be different.

He spoke about some of the various aquifer studies currently in progress, and as an example distributed to the committee an illustration that showed potential recharge enhancement projects for the Edwards Aquifer (Attachment 3).

Dr. Herb Grubb then addressed the committee on the water supply projections just completed this week on the Lower Colorado River Basin (Attachment 4). He emphasized that the projected demands are based upon an assumption of advanced water conservation in all demand categories (i.e., municipal, agricultural, industrial, etc.)

He noted that total basin demand, assuming advanced conservation, is projected to decline slightly from 1,043,323 acre feet in 1990 to 1,038,987 acft in 2050. He indicated that the almost flat line demand projection was the result of the net effect between a significant decline in agricultural use and a significant increase in municipal and industrial use.

He also presented water supply projection calculations based upon varying weather conditions. The 2050 projection showed the following surplus water levels based upon advanced conservation:

Run of the river rights	933,136 acre feet
Average available	460,390 acre feet
Average Dry-Year	353,319 acre feet
Minimum Year Average (drought)	201,265 acre feet

Mr. Michaelson noted that, in Linda Lesso's absence, he would ask the following:
Are the declines in agricultural demand due to conservation or reduced acreage under cultivation?
Dr. Grubb indicated the declines were based largely on conservation assumptions.

Mr. Michaelson then asked: What would happen to the relatively flat demand curve shown in the chart if the advanced level of conservation for agriculture were not achieved? Dr. Grubb replied that the demand would be greater than "drought year" availability, but less than "average year" availability.

VII. Finalize, List, and Define Criteria

Mr. Michaelson stated that the entire process the committee began in October came down to the work to be completed today.

Mr. Michaelson referred the committee to the flip chart sheets they developed in meeting #4, noting that the write-up of the sheets, which appeared as an attachment to the meeting #4 minutes, inadvertently omitted a few items. In order to make sure that the committee worked from their own final work product from meeting #4, he suggested that the committee work off of the original flip chart sheets which he had been put on the wall for this purpose.

Mr. Michaelson indicated that he would not consider the committee's deliberation on an individual criterion finished until everyone present was satisfied with the language used to define it, i.e., until no one had an objection to the adopted language. He indicated that it was important to achieve this consensus since everyone on the committee was representative of important perspectives and interests within the region. If someone on the committee had a concern about the definition of a criterion, it was not just that one person but all the people who shared that perspective in the region that the committee needed to try and satisfy.

Over the next two and a half hours, the committee took the remaining seven categories of criteria left over from the fourth meeting and proceeded to define them. This process resulted in the fresh discussion of each issue, leading to the addition of several items as well as the elimination of duplication among the categories whenever possible. The deliberation process for this work was open discussion and consensus-seeking which considered many varying points of view.

At the end of this process, the committee produced the following consensus on the set of criteria they would recommend to the Policy Management Committee and the Texas Water Development Board be used by the follow-on regional planning group to be created by Senate Bill 1.

It was agreed that the criteria definitions being developed and presented were done so in no particular order of importance.

The recommended evaluation criteria for regional water plans consists of:

Economic

- Facilitates economic development
- Minimizes long range negative socio-economic impacts
- Promotes opportunities for cost sharing and economic partnership
- Provides cost effective solutions

Water Quality
Provides and maintains appropriate water quality for the intended use

Fairness
Maximizes efficient use of water in areas that import water
Promotes equitable distribution of costs in meeting region's water needs

Feasibility
Demonstrates feasibility in terms of timing, technical/scientific, economic, political, regulatory, legal, and public acceptance factors

Efficiency
Minimizes evaporative and distribution losses
Promotes conservation
Promotes conjunctive use

Flexibility
Adaptable to new and innovative technology
Adaptable to changes in demand projections
Adaptable to changes in law
Adaptable to future supply options

Compatibility
Maximize regional compatibility with local water plans
Minimize negative impacts on property rights
Maximize consistency with local growth management plans

Reliability
Maximizes a sustainable (referring to yield) supply of water for short-term and long-term needs
Minimize interruptions to water supplies

Environment
Minimize short-term and long-term negative impacts on natural resources
- Wildlife/habitat
- Rivers
- Bays
- Estuaries
- Air quality
- Wet lands
- Lakes

aquifer ?
water quality

Minimize short-term and long-term negative impact to the human environment
- Recreational
- Cultural/historical
- Archeological
- Aesthetics

~~Maximize water quality~~ ~~[illegible]~~

From the above discussion, "water quality" was added to the list of defining items for the "environment" criterion developed in meeting #4. Also, "lakes" were added to the "Rivers, bays, and estuaries" environmental definition line item.

VIII. Discussion of Potential Recommendations

The committee's attention then turned to the list of recommendation items. Mr. Michaelson noted that these were items to be provided to the public and decision makers for further guidance and clarification for an effective regional water planning process. The possible areas of recommendations which had been identified at the fourth meeting were: The need for continued public participation, the need for public education, and the need to balance the effects of applying the evaluation criteria.

From their discussion, the committee added growth-inducing impacts as a potential recommendation issue. The committee decided that public participation and education could be combined. They also decided that a statement on achieving balance among the criteria could be misinterpreted as an invitation to weight some criteria more heavily than others and therefore the committee decided that no statement to that effect could actually made the criteria stronger.

The committee members generally agreed that the inclusion of growth-inducing impacts was an example of their desire to ensure that water planners and decision makers take into account the indirect as well as the direct impacts of their actions.

The final results of this discussion were two recommendations to be included along with the evaluation criteria, as follows:

Public participation and education should continue to be an integral part of a regional water planning process.

When evaluating alternatives, ensure that indirect impacts such as growth inducing or inhibiting effects are considered.

IX. Review Proposed Outline for Committee's Report

Robert Aguirre presented a proposed outline for a committee report which was developed by Lewis Michaelson and himself (Attachment 5). After review and discussion, it was decided that a fourth major heading would be added which would list the recipients of the report and a contact person/office for additional copies. Among those currently scheduled to receive the IRPC report are:

The Policy Management Committee
The Trans-Texas report distribution data base (about 130 people)
The Trans-Texas Technical Input Group (86 members)
The Trans-Texas Public Participation Work Group (63 members)
The Texas Water Development Board
The Texas State Archives
Various public libraries in the study region
The Senate Bill 1 Initial Planning Groups

The committee asked if it would be possible to transmit the IRPC report to the Texas Water Development Board with a cover letter from the IRPC that would stress the labor intensive, grassroots citizens' nature of the committee's process, noting that it represents a broad cross-section of the various stakeholder categories within the region. The committee directed Mr. Aguirre to look into this question and, if permissible, prepare a draft transmittal letter to this effect for committee review.

Mr. Michaelson indicated that the review process for the draft report was being taken in two steps. The first was to distribute this meeting's notes within the next few days so that both present and absent members of the committee could review the criteria and recommendations before they were incorporated into the draft committee report. He asked that if anyone has a question or concern

about the criteria or recommendations, they are to contact Robert Aguirre (210-299-1171) and not wait until the draft report is distributed. He also indicated that it was his and Mr. Aguirre's job to make sure that the draft report reflected, as accurately and faithfully as possible, the deliberations and conclusions of the committee without additional comment or elaboration. Assuming that was accomplished, Mr. Michaelson assumed that the committee would be able to review and approve the report with minor suggestions for form or language without substantive change. If however, any of the committee members requested significant, substantive changes to the draft report, there would be an attempt to accommodate them, but that depending on how significant they were, it could necessitate the need for a sixth meeting. If this proved to be necessary, it would be held on February 14 at the usual time and place.

At this point The Policy Management Committee chairman, Fred Pfeiffer, addressed the committee. He began by thanking the committee for taking on the huge task of developing a criteria by which water resource options could be evaluated. He noted that what made this particular effort so unique was that it was designed to develop a criteria to meet the water needs of the entire region in a way which would earn approval of the public. He commented on the historical nature of the committee's work and assured them that every effort would be made by the Policy Management Committee to distribute their results, including providing the IRPC's report to the soon-to-be appointed members of the regional planning groups.

X. Public Comment

Mr. Michaelson then called for public comment.

Having none, the meeting was adjourned at 2:25 pm.

ATTACHMENTS to IRPC #5

Attachment #1	Karl Wurz letter
Attachment #2	Linda Lesso's letter
Attachment #3	Potential Recharge Enhancement Projects - Edwards Aquifer
Attachment #4	HDR Report on Water Demand and Supply Projections
Attachment #5	Proposed Outline for Committee Report

January 4, 1998

Trans-Texas Water Program
Integrated Resource Planning Committee
c/o 1121 Broadway
San Antonio, Texas 78215

Dear IRPC Members:

I regret that I am not able to attend our meeting on January 10, 1998. Please consider some input to formulate a criterion for evaluating water supply options. I believe this concept would be appropriately placed in the "Feasibility" category.

> Whenever appropriate, options must employ non-traditional and innovative methods and technologies for water supplies and uses.
> Some examples: catchment must be employed as a source of water; aquifer recharge zones must be protected and where degraded be restored; non-potable water must be used for swimming pools, landscaping, et cetera; reused water, i.e. from treatment plants must be used to serve power plants; desalination of sea water must be employed for regions located on the coast (perhaps some of the natural gas being burned off of oil wells in Corpus Christie could be used to fuel such plants).

Concerning our last meeting, a correction to the minutes should be as follows: I did not say that the LCRA had made an application for a permit for dams. I said that permits for dams would be applied for over the next eighteen months and the feasibility study could be obtained from Steve Rooke of the LCRA. Also, I have still not received HDR's report on water availability in the Colorado River Basin.

For those of you who are interested in the LCRA's proposed channel dams, I have provided a copy of a letter to Mark Rose, General Manager of the LCRA, from David Todd of the Wray Ranch in Columbus.

Thank you for your attention to these matters.

Respectfully,

Linda J. Lesso

enclosure
cc: file

DAVID A. TODD
WRAY RANCH
RR 3596
COLUMBUS, TX 78934
409-732-3416

22 December 1997

Mark Rose, Director
Lower Colorado River Authority
P.O. Box 220
Austin, TX 78767-0220

RE: Proposal for Lower Colorado River Channel Dams

Dear Mr. Rose,

Andy Rooke, an LCRA engineer, kindly provided me with a copy of the report, "Lower Colorado River Channel Dams - Feasibility Study - October 1997". I appreciate his and other LCRA staff's willingness to explore, document and disclose the effects of the nine proposed channel dams on the lower reaches of the Colorado River. I am sure that the ecological and hydrologic research that went into the Study will help us all understand and value the River all the more.

I am, however, very concerned about the dams proposed in the Feasibility Study. I believe that there would be serious economic and environmental drawbacks from their construction. Further, since I am a partner in a fourth generation land and cattle operation in the Colorado River basin, within the proposed project area for one of the dams (Columbus), I and my family have a direct stake in the outcome of the LCRA's proposals. I urge you to drop further pursuit of a first dam at Altair, or any of the subsequent dams envisioned in the Study.

There are a number of risks and costs to these dams' construction which are already identified in the Feasibility Study. I urge you and your staff to continue to examine the topics that you have already mentioned in the Study, and also to look more closely at the issues described below. In the end, I also hope that they and other issues persuade you to forego building the dams.

WATER SUPPLY PROBLEMS

- Flooding 70 miles, or a full quarter of the lower Colorado, with nine dams would only give a very slight increase (1.9-2.8%) in available water, both from improved firm yield and efficiency. This seems to be a wildly **disproportionate tradeoff**. Even the more moderate proposal to initially build three dams is a poor bargain, since the yield and efficiency increases are yet smaller.

- Given that these proposed reservoirs will have quite small storage levels relative to inflow and release rates, the yield estimates are highly sensitive to **operational plans**. I think that there should be a more complete discussion of the operational assumptions that underlie the yield figures.

- As shallow reservoirs, these proposed lakes would likely have significant per acre-foot **evaporation losses**, which did not appear to be discussed in the Study, and which should be investigated more thoroughly in future reviews.

- Since the Colorado is a popular site for sand and gravel mining, there should be thorough percolation testing and documentation of the proposed dam sites. If there are sand and gravel deposits nearby, **reservoir seepage losses** could be a significant problem and should be accounted for in any planning for reservoirs in this area.

WATER DEMAND CONCERNS

• Given the sizeable financial and environmental costs of dam construction, together with the very limited yield and efficiency improvements of these channel dams, I think it would be productive to compare these improvements in yield and efficiency with other options that would produce the same changes. I would think that a variety of **demand-side efforts** would be far more cost-effective, as well as more flexibly-sized and rapidly implemented. These potential water conservation measures should be fully described and compared in the Study, using similar dollar per acre-foot figures as those presented in cost estimates for the reservoirs.

• As you are certainly aware, substantial amounts of water are held by rights that are seldom if ever exercised, despite evolving and competing water needs. Since this is the case in many parts of Texas, not just on the Colorado, it seems reasonable to expect that policymakers in the state might approve markets in the near future that would allow rights to be traded, increasing water prices, releasing currently hoarded water rights, and obviating the needs for many reservoirs. I believe that the LCRA should thoroughly discuss and disclose the potential for such **water markets** to resolve any perceived water supply shortages.

• I believe that Colorado River **water rights** have been adjudicated and are quite nearly fully allocated. I did not see a full discussion in the Feasibility Study as to how the LCRA would secure rights for the contemplated dams, how much the Authority would estimate paying for these rights, nor how these expenses would affect the total amortized cost of the dams.

• If the dams are being built to serve agricultural demand, particularly for **rice irrigation**, I think that the LCRA needs to look more carefully at those demand projections. As you likely know, the rice industry is struggling in Texas, and it seems questionable to build dams for more storage or more efficient delivery of irrigation water for downstream rice farms. For instance, Steve Balas of the Texas Rice Producers Board estimates that there were 249,000 acres of rice land in production during 1996, down significantly from the 500,000 acres in cultivation during the 1980s. With the phase-out of rice subsidies in the most recent federal Farm Bill, it is likely that the rice industry will continue to decline in Texas. I do not believe that other agricultural uses will make up for the shortfalls in rice water demands: the Texas Water Development Board predicts that irrigation use overall will decline 25% from 1990 to 2040.

• If the dams are being built to provide municipal water, I believe that the LCRA would need to look mostly to out-of-basin demand centers. Yet, in that case, it appears that the **inter-basin transfer restrictions** imposed by SB 1 and the LCRA's own policies would make such transfers quite difficult. In my view, it is very hard to conclusively prove that all long-range water needs are satisfied in a basin such as the lower Colorado, where there are few if any available water rights and where need predictions are often inaccurate.

ECONOMIC ISSUES

• The reservoirs would contribute to a significant rise in the near-surface water table along the main stem of the river. Given that this is the heart of many pecan orchards and in view of pecans' sensitivity to long-term inundation, the reservoirs could reduce growth rates, harvest levels, or general **pecan tree health and productivity**. Since the pecan industry is a critical part of the agricultural industry in the lower Colorado River basin, this issue deserves more attention in any reservoir planning.

• As the LCRA has bought up irrigation company infrastructure and water rights over the years, there is the increasing risk that additional water supply projects, such as the channel dams envisioned here, could eventually lead to a closed, **non-competitive water market** within the Colorado basin. As a quasi-governmental body that the public expects fair dealing from, it is important that the LCRA disclose the effects of the dams on the number and size of water vendors, expected pricing, and overall competitive pressure.

ENVIRONMENTAL EFFECTS

• Since the proposed reservoirs will be quite shallow, **high temperatures** and **low dissolved oxygen** concentrations could cause difficulties for aquatic life. Future assessments of dam impacts should cover temperature and oxygen issues in more detail.

• I failed to find a full discussion of the effects of the in-channel dams beyond the those affecting the main stem of the Colorado. Yet, given the area's mild slopes, there could be significant **backwater effects on tributaries**, some of which are remarkably rich ecologically and archeologically. Harvey's Creek, located to the west of the Colorado and within the Columbus dam reach, is an example of the tributaries that could be put at risk by the proposed dams.

• The dams would block **upstream estuarine fish migration**, a poorly understood but apparently important event, given that over 90% of commercial fisheries are dependent on species that spend some portion of their lives in freshwater.

• Migratory and wintering **bald eagles**, a threatened species, are found within the proposed project area. With the planned reservoirs' periodic inundation of rocks and riffles, prime fish habitat, there could be impacts on the eagles' food supply. This needs to be investigated and mitigated if a problem is identified.

• Along with risks to the commercial pecan orchards discussed above, there are risks to the well-developed forest of **bottomland hardwoods** that lines the Colorado River in the reaches proposed for inundation. It is unclear what the effect of long-duration flooding of the channel might be on these stands of hardwoods, which have both commercial and habitat value. However, it is certain that the dams would change the historic water levels and inundation patterns under which these forests originally grew. Also, it is clear that bottomland hardwoods are the most diverse Texas ecosystems and one of the systems that has suffered most in this century (Texas has lost 10.1 million acres of its original hardwood corridors, a 63% loss). Their protection deserves further study.

• There appeared to be inadequate discussion of the proposed dams' effects on **freshwater wetlands**. Learning that Texas has lost 60% of its inland wetlands, the Legislature set a no-net-loss wetlands policy for state-owned lands, such as the riverbottoms, in 1991. With this historical perspective and state policy in mind, it is critical that LCRA planners look closely at the dredge, fill, and inundation wetland effects of the proposed dams.

RECREATIONAL IMPACTS

• I understand that some of the interest in developing these channel dams, particularly at the Wharton site, lies in the ambition to have an urban amenity like Austin's Town Lake and Lake Austin or similar to San Antonio's Riverwalk. It is important that such dam proponents, as well as the general public, understand that these popular water bodies benefit from a constant water level, unlike that anticipated for the lower Colorado's proposed channel dams. With the planned **reservoirs' fluctuating water levels**, there will likely be odors from anaerobic sediments, rotting aquatic vegetation, as well as unsightly trash on the river shoulders and bed, that would become apparent as the reservoirs were periodically drained. As well, a variable-level lake would be less attractive for fixed infrastructure, either private or public, including piers, boathouses, decks, trails, etc.

• **Aquatic weeds**, such as water hyacinth, duckweed, and alligatorweed, have become problems in a number of shallow, poorly flushed, warm-water reservoirs. There should be more exploration of the risk of these weeds infesting any proposed reservoirs and limiting recreational and wildlife use.

• Since World War II, over 4000 major reservoirs have been built in Texas, greatly increasing the amount of fresh flat water in the state. At the same time, long runs of flowing water have become much scarcer. With time, it is likely that the **recreation value, appreciation and use of free-flowing rivers** will become much greater, just as they beome ever rarer. Kayaking, canoeing, and other riverine sports are enjoying a boom in popularity that the lower Colorado, thanks to the LCRA's prescient investments in river parks, is ideally qualified for. The LCRA should thoroughly investigate the potential for further developing the free-flowing aspects of the river, before foreclosing those options with dam construction.

• There are persistent rumors that the pressures for these proposed dams come from Lake Travis residents and operators of marinas and shoreline restaurants who object to the fluctuations in water levels. As you may have heard, many of them attribute the changes in water levels to releases from Lake Travis for downstream uses. It is important that the LCRA discuss the effect that the additional storage and delivery efficiency linked to the proposed channel dams would have on **Lake Travis' water level changes**. Given that the channel dams' additional storage and efficiency would be so small relative to the volume of Lake Travis, I doubt that the proposed dams could do much to mitigate shifts in Lake Travis' level, but that should be calculated and disclosed.

SUMMARY ISSUES

• Since the decision to proceed or hold back on the proposed dams ultimately turns on final numeric cost/benefit ratios, the LCRA needs to include some **confidence levels or error bars** for these figures, especially given that the cost/benefit ratios are generally so low, and several curiously close to, but just above, 1. With the multiple assumptions that underlie these cost/benefit ratios and the importance of the final numbers, it is important that the public have an idea of their true precision.

• For such a large project with wide effects, it is critical that **public input** be invited and incorporated in a timely and comprehensive way. Future work needs to be done to show how and when public notice, hearing and comment processes will be conducted.

• Most important, though, I urge that the impacts of these reservoirs be looked at in total, and not segmented by individual reservoir. I am concerned that the current permitting plan proposes independent, individually considered permits for each dam - potentially ignoring cumulative impacts from the whole 9-dam system. **Cumulative, comprehensive impacts of the entire system of dams** could be far different, and potentially much more severe, than the sum of the individual dams' effects. They certainly need to be understood and disclosed.

I urge the LCRA to fully explore all these issues, together with the many others that might be identified by the Texas Parks and Wildlife Department, Texas Natural Resources Conservation Commission, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, non-governmental agencies, and other citizens, before progressing farther with the reservoir plans. These issues all involve economic and environmental questions that involve high stakes but have not yet been fully researched and resolved.

Thank you for considering my views. I would be glad to visit with you if you have any questions about my comments or concerns. Likewise, I would appreciate it if you would keep me informed of any future developments regarding the proposed dams.

Respectfully yours,

David Todd
Partner, Wray Ranch, SWT Cattle

cc: Honorable Ken Armbrister, Texas Senate, District 18
Jim Blackburn, Blackburn & Carter
Janice Bezanson, Texas Committee on Natural Resources, National Wildlife Federation
Honorable Robert Cook, Texas House of Representatives, District 28
Pete Emerson, Environmental Defense Fund, Texas Office
Scott Faber, American Rivers
Mary Kelly, Texas Center for Policy Studies
Ken Kramer, Sierra Club, Lone Star Chapter
✓Ann Mesrobian, Bastrop County Environmental Network
Dan Pearson, Texas Natural Resources Conservation Commission
Colonel Potts, U.S. Army Corps of Engineers, Galveston District
Andy Rooke, Lower Colorado River Authority
Andy Sansom, Texas Parks and Wildlife Department
Joe Swick, U.S. Environmental Protection Agency, Region VI
Charles Trefney, Fayette Colorado River Association

Karl Wurz
820 Florida
San Antonio, Tex.
Dec. 13, 1997

to Integrated Resource Planning Committee

Trans-Texas Water Program
West Central Region

This panel has indicated elements of a good water plan. One specific element being innovative, that is the introduction of something new or different. (dictionary) Hold on to that thought.

There exists a long list of possible water projects composed mainly of constructing water supply pipelines - these lie outside of the realm of innovation. You may believe that the alternatives were totally discussed and exhausted. I think you may not be serving the region as you should if you don't insist that all possible alternatives be given serious consideration. Serious is the key here - that could include potential sources of water.

A specific water source would be that water lying south of the fresh water interface line of the Edwards Aquifer. HDR and SARA - some engineers - have turned thumbs down on it. SAWS SAn AntonioWater System has chosen to spend millions to drill monitor wells and monitor the possible movement over the next fifty years. I don't believe that is money well spent.

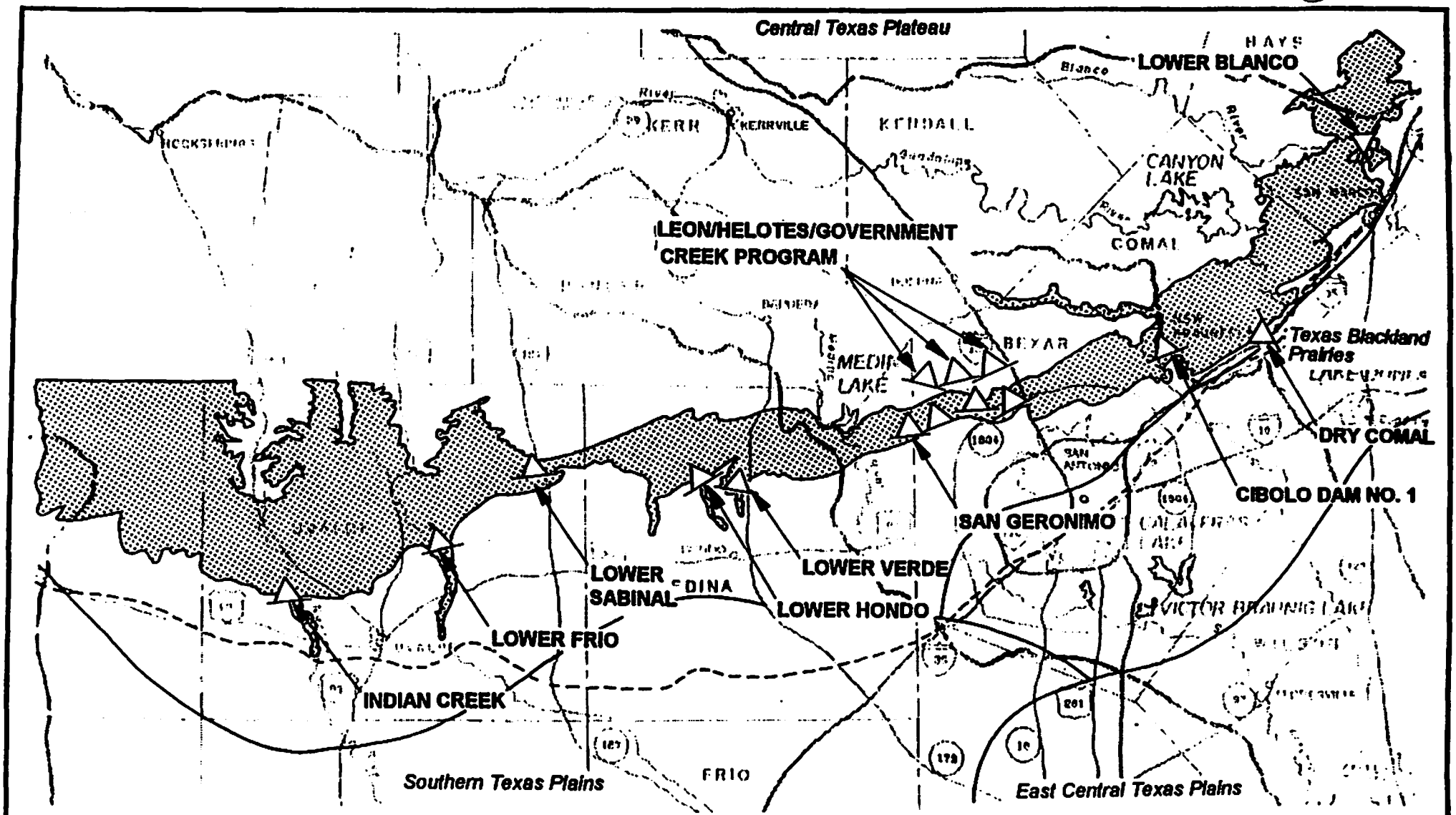
Remember you have indicated a good water plan requires: Innovation, Promotion of Action. Impact of No Action, Economics, Availability. And other cornerstones. (refer to tape.)

Planners should not automatically or prematurely foreclose options. They should open up alternative options. One example: the Edwards Aquifer below the fresh water line contains mineralized water that exceeds Federal Drinking Standards.

As a Source it was tossed out, as I recall, in the Trans-Texas Process. There exists an estimated 2,000,000 acre-feet which can be put to many uses without building an expensive treatment plant.

Note: The above was presented from a rough draft. I also mentioned in ad libs that I participated in the Trans*Texas process. Also that Mayor Bill Thornton's water committee somehow (see above)it got away from them. I mentioned some uses it could be put to and indicated that each member of the IRPC could think of at least one use.

Karl Wurz



TRANS TEXAS WATER PROGRAM / WEST CENTRAL STUDY AREA

HDR

HDR Engineering, Inc.

TYPE-2 POTENTIAL RECHARGE ENHANCEMENT PROJECTS ALTERNATIVE L-18

FIGURE 9-

PRELIMINARY
DATE 1-8-98

Table 4-4
Comparison of Water Demand and Water Supply Projections
Lower Colorado River and Adjacent Coastal Basins Area
West Central Trans-Texas Study Area
Trans-Texas Water Program

Basin and Adjacent Areas		Total Use in 1990 acft	Projections 2000 acft	2010 acft	2020 acft	2030 acft	2040 acft	2050 acft
Demand								
Municipal Demand		148,325	210,947	232,048	264,719	306,406	332,133	362,739
Industrial Demand		15,657	17,462	19,151	20,255	21,410	23,112	25,124
Steam-Electric Power Demand		57,718	62,500	72,000	77,000	92,000	92,000	100,000
Irrigation Demand		740,655	725,192	675,887	608,759	552,487	514,968	480,018
Mining Demand		38,248	29,449	20,103	21,603	23,344	25,508	28,100
Livestock Demand		10,920	11,200	11,200	11,200	11,200	11,200	11,200
In-Stream Flows		31,800	31,801	31,802	31,803	31,804	31,805	31,806
Basin Total Demand		1,043,323	1,088,551	1,062,191	1,035,339	1,038,651	1,030,726	1,038,987
Supply								
Groundwater		419,314	313,606	313,606	313,606	313,606	313,606	313,606
Surface Water/HLakes/In-Basin/Firm*		403,766	403,766	403,766	403,766	403,766	403,766	403,766
Local Surface&Ground		10,920	11,200	11,200	11,200	11,200	11,200	11,200
Surface Water/HLakes/In-Stream/Firm*		31,800	31,800	31,800	31,800	31,800	31,800	31,800
Surface Water/Streams	Lavaca Basin ROR rights	33,355	33,355	33,355	33,355	33,355	33,355	33,355
Surface Water/Streams	Ave.available(60%)4 LB	20,013	20,013	20,013	20,013	20,013	20,013	20,013
Surface Water/Streams	Ave.avali-dry(51%) LB	17,011	17,011	17,011	17,011	17,011	17,011	17,011
Surface Water/Streams	Min.Yr.Ave. (46%) LB	15,343	15,343	15,343	15,343	15,343	15,343	15,343
Surface Water/Streams	ROR rightsFrom Colo	1,178,396	1,178,396	1,178,396	1,178,396	1,178,396	1,178,396	1,178,396
Surface Water/Streams	Ave.available	718,981	718,983	718,984	718,986	718,988	718,990	718,992
Surface Water/Streams	Ave.avali-dry	614,912	614,914	614,915	614,917	614,919	614,921	614,923
Surface Water/Streams	Min.Yr.Ave.	464,527	464,528	464,530	464,532	464,533	464,535	464,536
Total Supply	ROR rights	2,077,551	1,972,123	1,972,123	1,972,123	1,972,123	1,972,123	1,972,123
Total Supply	Ave.available	1,604,794	1,499,368	1,499,369	1,499,371	1,499,373	1,499,375	1,499,377
Total Supply	Ave.avali-dry	1,497,723	1,392,297	1,392,299	1,392,300	1,392,302	1,392,304	1,392,306
Total Supply	Min.Yr.Ave.	1,345,670	1,240,244	1,240,245	1,240,247	1,240,248	1,240,250	1,240,252
Surplus/Shortage	ROR rights	1,034,228	883,572	909,932	936,784	933,472	941,397	933,136
Surplus/Shortage	Ave.available	561,471	410,816	437,178	464,032	460,722	468,648	460,390
Surplus/Shortage	Ave.avali-dry	454,400	303,745	330,107	356,961	353,651	361,577	353,319
Surplus/Shortage	Min.Yr.Ave.	302,347	151,692	178,054	204,908	201,597	209,524	201,265
Lower Colorado Basin Water Supply Summary								
Surface Water/HLakes/In-Basin/Firm*		403,766	403,766	403,766	403,766	403,766	403,766	403,766
Surface Water/HLakes/In-Stream/Firm*		31,800	31,800	31,800	31,800	31,800	31,800	31,800
Surface Water/HLakes/Out-Basin/Firm*8		9,700	9,700	9,700	9,700	9,700	9,700	9,700
Surface Water/HLakes/Firm*		445,266	445,266	445,266	445,266	445,266	445,266	445,266
Surface Water/Streams/In-Basin/ROR rights*		679,246	679,246	679,246	679,246	679,246	679,246	679,246
Surface Water/Streams/Out of Basin/RORrights*9		499,150	499,150	499,150	499,150	499,150	499,150	499,150
Surface Water/Streams/ROR rights*		1,178,396	1,178,396	1,178,396	1,178,396	1,178,396	1,178,396	1,178,396
See footnotes on next page.								

Source: Texas Water Development Board; 1996 Consensus Water Plan, Most Likely Case, below normal rainfall and advanced water conservation.

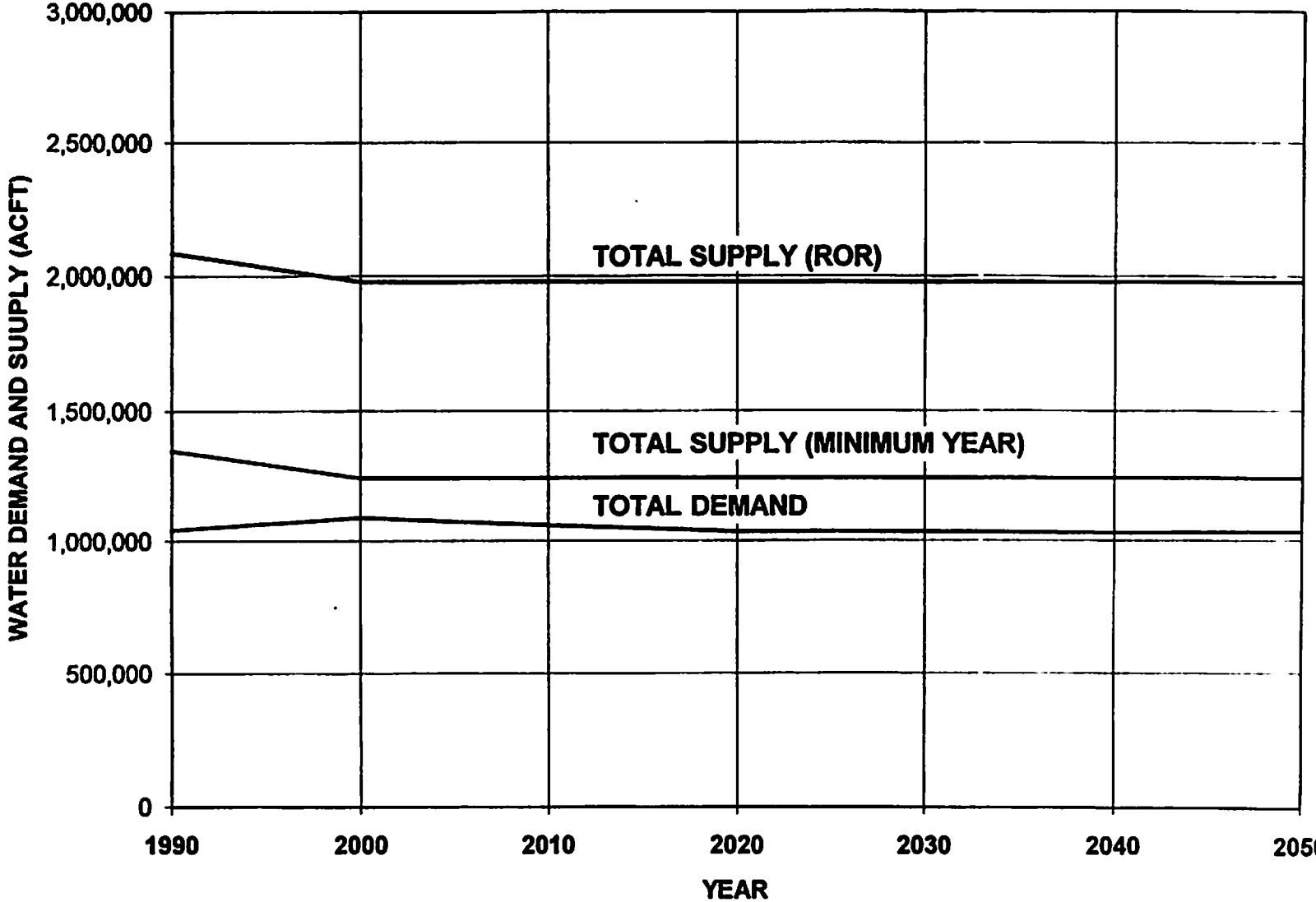
irm Supply from Highland Lakes; with ROR meaning run-of river diversion rights.

. Sales of Highland Lakes Firm Yield to neighboring cities in Williamson County (Cedar Park and Leander).

2 Run of River Rights which are diverted into neighboring coastal basins.

PRELIMINARY
DATE 1-9-98

<><><>



PRELIMINARY
DATE 1-8-98

TRANS TEXAS WATER PROGRAM /
WEST CENTRAL STUDY AREA

LOWER COLORADO AND ADJACENT COASTAL BASINS WATER DEMAND/SUPPLY PROJECTIONS

FIGURE

HDR Engineering, Inc.

Roster of Integrated Resource Planning Committee Members

TRANS TEXAS WATER PROGRAM

Integrated Resource Planning Committee
List of Members

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