STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION COMMISSION

BEFORE THE OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

Submitted by: Goodnight Midstream Permian, LLC

Hearing Date: February 24, 2025

Case Nos. 23614-23617, 23775, 24018 – 24020, 24025, 24123

WHITE TESTIMONY AND REBUTTAL EXHIBIT PACKET

PART 2

STATE OF NEW MEXICO
DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES
OIL CONSERVATION DIVISION

APPLICATIONS OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF SALTWATER DISPOSAL WELLS LEA COUNTY, NEW MEXICO

CASE NOS. 23614-23617

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN LLC TO AMEND ORDER R-22026/SWD-2403 TO INCREASE THE APPROVED INJECTION RATE LEA COUNTY NEW MEXICO

CASE NO. 23775

APPLICATION OF EMPIRE NEW MEXICO LLC TO REVOKE INJECTION AUTHORITY, LEA COUNTY, NEW MEXICO

CASE NOS. 24018-24020, 24025

APPLICATION OF GOODNIGHT MIDSTREAM PERMIAN, LLC FOR APPROVAL OF A SALTWATER DISPOSAL WELL, LEA COUNTY, NEW MEXICO

DIVISION CASE NO. 22626
ORDER R-22869-A
COMMISSION CASE NO. 24123

SELF-AFFIRMED REBUTTAL STATEMENT OF DAVID A. WHITE

1. My name is David A. White, P.G., and I am employed by Geolex, Inc., as Vice President and Senior Geologist. Geolex has been retained by Goodnight Midstream Permian, LLC ("Goodnight Midstream") to provide geologic consulting services in these consolidated cases.

2. I have previously testified before the New Mexico Oil Conservation Commission as an expert witness in saltwater disposal ("SWD") and acid gas injection ("AGI") well permitting

BEFORE THE OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Rebuttal Exhibit No. I
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and design, petroleum geology, seismic interpretation, and fault-slip probability modeling. My credentials have been accepted and made a matter of record. A current copy of my curriculum vitae (CV) is included in Attachment 1.

3. I am familiar with the applications filed by Goodnight Midstream in this case and the status of the lands in the subject area. At my direction and supervision, my team and I have conducted an independent review of the geology and stratigraphy in the area of the Goodnight Midstream's active injection well project area (the "project area" or "study area") and the formations which comprise Permian section stratigraphy. Specifically, we investigate the relationship between the San Andres Formation (which is the saline aquifer that is the disposal zone for Goodnight's injection wells) and the geologic formations adjacent to and overlying the San Andres Formation. Additionally, we have completed a peer review of Goodnight's methodology for verifying available groundwater analytical data, which have been utilized by Goodnight to prepare an updated regional evaluation of San Andres Formation groundwater characteristics and incorporates additional groundwater data not reflected or compiled in previous studies. In association with these investigations, we have prepared testimony and exhibits in response to the New Mexico Oil Conservation Division's ("OCD") position that the San Andres Formation disposal zone may be geologically and hydraulically connected to the Capitan Reef and/or Goat Seep complex.

BACKGROUND

4. In this case, recommendation has been made by the OCD that the Operators and the OCD develop and implement a monitoring plan for ground water between the Capitan Reef and the San Andres Formation and that a comprehensive investigation characterizing local hydrology be completed to support application for Aquifer Exemption. This recommendation is

made based on the interpretation that there is evidence, specifically work completed by Hiss (1975), which interprets hydraulic connection between the San Andres Formation disposal zone and the Capitan Reef and/or Goat Seep complex.

5. Recognizing that limited groundwater data has been available, historically, and that with limited ground water data, OCD has proposed a monitoring and sampling program to (1) investigate hydraulic relationships between the interval of the Capitan Reef through the San Andres disposal reservoir, (2) assess any potential impacts to water quality if active communication between the Capitan Reef and San Andres disposal zone were confirmed, and (3) to evaluate the Capitan Reef to determine its status as a protectable water resource, and as relevant, establish a continued management plan or seek aquifer exemption, in accordance with the results of ground water monitoring and sampling.

SUMMARY OF OPINIONS

6. Goodnight's existing and proposed SWD wells, which are the subject of this matter, are located at the western edge of the Central Basin Platform, which transitions to the Delaware Basin further west (i.e., basinward). The Capitan Reef Complex, which is comprised of the lower Goat Seep Reef and overlying Capitan Reef, is not present at any of Goodnight's active SWD well locations, but rather, is located west of the project area.

7. The San Andres Formation ("San Andres") is the basal shelf unit of the Guadalupian Series (i.e., Middle Permian) that is coeval with (i.e., equivalent age and stratigraphic position) the upper part of the Brushy Canyon and lower part of the Cherry Canyon members of the Delaware Mountain Group (Delaware basin equivalent strata).

San Andres strata reflect a system of shallow marine shelf carbonate banks and fore-slope carbonate mudstones that were cyclically deposited during repeated sea level changes. Towards the Delaware Basin (i.e., west of the Goodnight project area), San Andres Formation carbonates grade into the deeper basin to fine-grain, low porosity and low permeability slope carbonates and to the two members of the Delaware Mountain Group (i.e., Brushy Canyon and Cherry Canyon members), which are comprised of carbonate and clastic debris slope sediments near the San Andres shelf edge, and to tighter siltstones, shale, and fine-grained sandstones further away from the shelf edge. While the San Andres Formation is a suitable disposal interval within the shelf area where Goodnight SWD operations are occurring, reservoir attributes of porosity and permeability, and the resultant potential for lateral hydraulic connection, diminishes in the basinward direction (i.e., west of the project area) as the shelf carbonate system transitions to tight slope and Delaware Basin equivalent strata.

8. The San Andres Formation is directly overlain by the Grayburg Formation, which is also characterized by the cyclic deposition of marine shelf carbonates. Grayburg Formation strata reflect a prograding system with a shelf edge extending further basinward (i.e., westward within the project area) relative to the San Andres shelf edge. The lower Grayburg Formation grades abruptly into the Bell Canyon Member of the Delaware Mountain Group and the upper Grayburg into the overlying Goat Seep (i.e., lower Capitan Reef Complex). Overlying the Grayburg Formation, the remaining Guadalupian formations (i.e., Queen, Seven Rivers, Yates, and Tansill) progressively prograde over the Grayburg and grade into the Capitan Reef, further basinward of the Grayburg shelf edge.

9. Both the San Andres and Grayburg formations preserve cyclic carbonate deposits with primarily thin- to moderately thick-bedded zones of porosity. Locally, occurrences of thicker-bedded, discontinuous karst-related porosity may be present. Porosity development is primarily facies specific, diminishes basinwards in association with the transition to slope and fore-slope environments that lack significant subaerial exposure history, and is preserved as a relatively tortuous system of porous and non-porous carbonates.

10. Laterally, there is no connection between the San Andres Formation and the temporally and stratigraphically distinct Capitan Reef Complex. As shown by recent stratigraphic models, and stratigraphy within the project area, the San Andres Formation does not grade into the reef complex, but rather into Delaware Mountain Group facies (i.e., Brushy Canyon and Cherry Canyon members), stratigraphically underlying and temporally preceding the Capitan Reef Complex.

11. The stratigraphic relationships (demonstrated regionally and locally) between the San Andres and its coeval basinal facies, its temporal and stratigraphic non-equivalence to the Capitan Reef Complex (demonstrated regionally and locally), and the cyclic, discrete, and often discontinuous nature of porosity zones within all the Guadalupian formations create a limited and discontinuous network of porosity often intraformationally isolated by tight non-porous carbonates, which vertically and laterally separate the San Andres Formation and the Capitan Reef Complex. In the area of Goodnight's injection well activities, the Capitan Reef is laterally separated from the San Andres Formation by greater than two (2) miles. San Andres stratigraphically and temporally equivalent units (i.e., Brushy Canyon and Cherry Canyon members) underlie

the Capitan Reef Complex and are vertically separated by the Bell Canyon, Cherry Canyon, and Brushy Canyon members of the Delaware Mountain Group, which contain interbedded intervals of vertically restrictive shale and siltstone strata.

12. Based on our stratigraphical analysis, which demonstrates that the San Andres Formation is not stratigraphically or temporally equivalent to the Capitan Reef Complex, the probability of contamination of Capitan Reef waters by injection of saltwater into the San Andres Formation is, consequently, extremely remote at this location, based on stratigraphic relationships and reservoir characteristics and structure.

13. As part of their on-going investigation of the project area, Goodnight has completed a review of available groundwater data, for the purpose of developing a more thorough spatial assessment of regional groundwater characteristics and building upon the work of prior investigators. In support of this investigation, Goodnight has compiled, incorporated, and verified data from multiple sources, including the United States Geological Survey (USGS) Produced Water Database (Briet and Otton, 2002; NATCARB National Energy Technology Laboratory, 2013), New Mexico Water and Infrastructure Data System (GoTech), reported data of Strickland et al., 1996 (*Utilization of Geological Mapping Techniques to Tracking Scaling Tendencies in the Eunice Monument South Unit Waterflood, Lea County, New Mexico)*, and from SWD wells they operate.

14. In completing their review, which included multiple datasets, all sample data were scrutinized to ensure accuracy in their regional interpretation. Specifically, available well records and commercially and publicly available well log and test data were utilized to confirm well drilling and testing activities were in agreement with reported sampling intervals and formations and groundwater chemistry data.

Additionally, publications, supplemental materials, and data tables were utilized, as available, to further confirm accuracy of sample sources. Only those data in which the sampling formation and/or depth interval could be reasonably confirmed were included as datapoints in their interpretation of regional groundwater characteristics. All unverified samples were omitted in order to ensure all water quality data were accurately represented in accordance with their verified collection interval.

15. As part of our retention, Geolex completed a peer review of Goodnight Midstream's methodology for the verification of groundwater chemistry data. This included an independent assessment of relevant well regulatory documents and reports, testing data and perforation records, and geophysical log analysis to confirm formation and depth interval interpretations. Groundwater data verified by Goodnight Midstream, and independently verified by Geolex, includes a geographic area of 14 contiguous townships in the area of Hobbs, New Mexico. With respect to the area reviewed, Geolex agrees with Goodnight Midstream's assignment of the collection intervals and geologic formations for reported groundwater data.

16. While stratigraphic relationships demonstrate the lack of equivalence between the San Andres Formation disposal zone and the Capitan Reef Complex, and isolation of these geologic units by low permeability barriers, it is also important to note that, in Lea County, New Mexico, Capitan Reef groundwater resources do not play a current or significant role in existing domestic water supplies. In the vicinity of the study area, the cities of Hobbs and Eunice both utilize shallow groundwater wells extracting water from the Ogallala Aquifer as their primary source of municipal water. Furthermore, the Office of the State Engineer, in their Lea County Regional Water Plan (2016) notes

the overall poor quality of the Capitan Reef Aquifer in the area of Lea County, New Mexico, specifically stating that "the groundwater quality of the Capitan in Lea County is very poor, with total dissolved solids (TDS) ranging from 10,065 to 165,000 mg/L", which exceeds criteria for USDW water quality standards and significantly exceeds the threshold to be considered "brackish" water.

METHOD OF STUDY

17. The stratigraphy of the area in the vicinity of Goodnight Midstream's active and proposed saltwater disposal (SWD) wells (located in Townships 21 and 22, Range 36E, in Lea County, NM)) was evaluated through the use of down-hole well logs coupled with regional published models of the Guadalupian Series formations, which are the refined product of work over the last 10 to 30 years. These models (Kerans – UT Austin, Melim and Scholle, 1999) were developed from detailed field outcrop studies, subsurface well log analyses, core and sample evaluations, groundwater chemical analysis, and seismic stratigraphy.

18. For the area of study, a series of geologic cross sections were generated to evaluate the near-shelf margin of the San Andres Formation (where Goodnight Midstream's active SWD wells are located) to the San Andres equivalent basinal facies (i.e., Brushy Canyon and Cherry Canyon members of the Delaware Mountain Group) into the adjacent Delaware Basin. An additional cross section incorporates Goodnight Midstream SWD wells closest to the San Andres shelf margin and back-reef margin of the Capitan Reef Complex. Formation tops of Permian units from the Bone Spring up to and including the Salado formations were correlated based on locally accepted tops and

consistent with formation tops presented by Goodnight Midstream in prior testimony related to this case.

19. The E-W cross sections were constructed to illustrate the locations of key shelf-to-basin characteristics, including (1) the location of shelf edges of the San Andres and Grayburg formations, (2) the up-dip limits of the Capitan Reef Complex, and (3) critical facies transitions between the shelf and basinal facies of the Guadalupian. Porosity and/or resistivity logs were used to identify tight facies in each of the wells through the San Andres, Grayburg, and their basinal-equivalent facies (i.e., Delaware Mountain Group), in order to document the tortuous nature of porosity pathways through these formations.

STRATIGRAPHY AND LATERAL FACIES CHANGE IN THE GUADALUPIAN SECTION

20. **EXHIBIT 1** includes the stratigraphic model of the Permian System from the Central Basin Platform (east) into the Delaware Basin (west), compiled by Kerans et al. This model was developed from numerous surface outcrop and subsurface studies in the Guadalupe Mountains and elsewhere along the Central Basin Platform and Northwest Shelf in southeastern New Mexico. The model has been presented at numerous conferences and is generally accepted as the definitive model of Permian stratigraphy in the subsurface of the Permian Basin in southeastern New Mexico. As shown, facies transitions, from shelf to basin, in the San Andres Formation are distinct and not connected to those of the overlying Grayburg, which prograded (i.e., advanced basinward) farther westward than the underlying San Andres Formation. The basin equivalent strata of the San Andres Formation include the Brushy Canyon and Cherry

Canyon members of the Delaware Mountain Group, both of which, underly the Capitan Reef Complex.

21. **EXHIBIT 2** includes an alternative stratigraphic model, originally published by Melim and Scholle (1999), which illustrates a more simplified cross section of the Guadalupian section. This model was utilized to illustrate Guadalupian stratigraphy in the Texas Water Development Board report dated September 2009 and entitled "*Capitan Reef Complex Structure and Stratigraphy*". The cross section clearly illustrates the stratigraphic relationship of the Grayburg Formation (adjacent to the Goat Seep) and Cherry Canyon Tongue (i.e., San Andres fore-slope facies), which underly the Capitan Reef. The original figure was modified slightly to include the San Andres Formation.

22. The stratigraphic models of Kerans et al. and Melim and Scholle (1999) clearly indicate that the San Andres Formation is not coeval with the Capitan Reef Complex. When combined with local mapping of the study area, the San Andres shelf edge is located greater than two miles and stratigraphically lower than the first back-reef occurrence of the Capitan Reef Complex. Furthermore, lateral facies transitions from the San Andres Formation to the Brushy Canyon and Cherry Canyon members of the DMG are distinct from those of the Grayburg Formation, which transitions to the Getaway Bank-Bell Canyon Member of the DMG and the Goat Seep Reef. In summary, the San Andres Formation is stratigraphically older than the Grayburg-Goat Seep, is not temporally part of the Capitan Reef Complex, and is separated from the Capitan Reef by tighter facies of the Delaware Mountain Group.

23. **EXHIBIT 3** includes a map of the area near the active Goodnight

Midstream SWD wells (green map symbols) in Townships 21-22S, Range 36E. Additional wells shown include those drilled to a depth sufficient to reach the top of the Grayburg Formation (i.e., 4,000 feet, or deeper). The map includes lines illustrating the well control points for cross sections T1-T1', E1-W1, E2-W2, and SW1-SW1'.

24. **EXHIBIT 4** includes the type cross section T1-T1', which utilizes all available wells penetrating through the San Andres Formation and equivalent basinal facies. Wells comprising the cross section are spaced such that facies transitions in the San Andres interval, as well as those in the overlying Grayburg, Queen, and Seven Rivers sequence can be accurately correlated. As shown, the relationships and stratigraphic equivalencies published in the Kerans and Melim and Scholle regional stratigraphic models are demonstrated in the local Goodnight Midstream study area. The primary disposal zone in the area is within the San Andres Formation. Light brown shading in the log tracks of each well represent low permeability or tight facies.

25. The San Andres shelf margin along cross section T1-T1' is approximately 2.6 miles east of the margin of the Capitan Reef Complex. Upper San Andres shelf carbonates are interbedded with and grade basinward (i.e., westward) into the Cherry Canyon Tongue (i.e., fore-slope deposits off the San Andres shelf edge) and the deeper basin Cherry Canyon muddy and detrital limestone, siltstones, shales, and fine-grained sandstones further basinward. The lower San Andres Formation grades into the underlying Brushy Canyon Member of the DMG, comprised primarily of fine-grained sandstone, siltstone, and shale. Where the edge of the reef complex is encountered along this cross section (at 2.6 miles from the San Andres shelf edge), the Cherry Canyon is overlain by the Bell Canyon Member of the DMG, which is comprised of primarily fine-

grained clastic and tight carbonate facies underlying the Goat Seep Reef. The Grayburg Formation progrades further westward over the San Andres and its equivalent basinal facies and grades into a tight clastic unit of the Bell Canyon Member of the DMG (i.e., the Getaway Bank). The San Andres and its coeval Delaware Basin equivalent facies are not part of the Capitan Reef Complex but are temporally and stratigraphically older.

26. The Grayburg and San Andres formations include alternating intervals of tight facies and thin- to moderately bedded porous facies, which results from the cyclic nature of deposition of the Grayburg and San Andres carbonates and is typical of these formations basin wide. Fore-slope deposits of the San Andres Formation, Grayburg Formation, and the basinal Delaware Mountain Group members generally exhibit low permeability close to their shelf margins.

27. **EXHIBIT 5** includes a schematic profile of the facies tracts commonly found in the Grayburg and San Andres carbonates throughout the Permian Basin, along with a schematic model of the upper San Andres developed from original work in the Penwell Field in Ector County, Texas. Depositional sequences within these units have been confirmed in the field and subsurface (e.g., Hinrichs, Lucia, and Mathis, 1986 PBS-SEPM Publication 86-25) and produce a vertical patchwork of offsetting and overlapping sequences. Porosity development is most commonly associated with oolitic grainstone and skeletal grainstone facies, in isolated sections subaerially exposed, and less commonly in lagoonal and burrowed wackestone/mudstone facies.

28. The map view of this exhibit shows that the facies tracts are aligned along depositional strike (i.e., generally parallel to shelf margins), which in the Goodnight study area is in an approximate north-south direction. As such, porous zones would also

generally align along strike, and the superposition of porous facies with non-porous facies provides a vertical seal to upward or downward migration of fluids. More widespread lateral and vertical permeability and porosity development may be present from karst processes; however, this would be less common basinward as the potential for subaerial exposure is reduced in deeper environments. Generally, the superposition of alternating depositional facies creates a compartmentalized reservoir system of interbedded tight and porous strata that prevents the effective transmission of fluids over great distances. Despite compartmentalization of porosity within the San Andres, the interval remains a high-performing disposal zone as SWD wells, including those of Goodnight Midstream, inject over hundreds of feet of San Andres Formation strata and access the numerous repeated porous facies tracts within the formation.

29. **EXHIBIT 6** is an east-west cross section (E1-W1) that includes three of the Goodnight Midstream active SWD wells (i.e., Penroc State Tr 27 #2, Ryno SWD #1, and the Sosa SA 17 SWD #2). Stratigraphic correlations of the San Andres Fm., Grayburg Fm., and their basinal coeval sediments follows that of cross section T1-T1' and the regional stratigraphic models of Kerans and Melim and Scholle. The San Andres shelf edge was estimated relative to the margin on cross section T1-T1', as local well control was not sufficient to identify precisely the San Andres shelf edge. As estimated, the San Andres shelf edge underlies and is no less than two miles from the Goat Seep margin.

30. Cross section E1-W1 shows the San Andres Formation grading into the Cherry Canyon starting at the Goodnight Sosa 17 SWD #2, where two intervals of Cherry Canyon Tongue sediments are present within the middle San Andres Formation. These sediments further grade into the fine-grained, generally low-permeability Cherry Canyon

basinal clastics down-slope of the Merchant #1 well and the Yo State SWD #1 well. The top of the Cherry Canyon is time-equivalent to the top of the San Andres on the shelf and is older and stratigraphically lower than the base of the Capitan Reef Complex. Between the San Andres shelf margin and the upper edge of the Goat Seep Reef, the Grayburg Formation becomes fine-grained (i.e., muddy) and tight, and the underlying Bell Canyon and Cherry Canyon sediments form a barrier of generally low permeability strata. Furthermore, the base of the Goat Seep Reef at this location is generally tight.

31. This cross section confirms that any fluid migration from the San Andres Formation down-dip towards the basin would encounter tight, low-permeability barriers that would prevent migration into the Capitan Reef Complex. Low permeability layers between the San Andres and the Grayburg are present in all wells where the San Andres is present and the tight Grayburg and Grayburg shelf edge would further hinder flow into the Goat Seep. This is further supported by prior testimony in this case by Dr. Robert F. Lindsay (OCD Reference 23614-17 01611). In his testimony Dr. Lindsay concluded that "*a key feature is that the Upper San Andres Formation composite sequence boundary that separates the upper San Andres Formation porous dolostones from the overlying Grayburg Formation porous dolostones forms a significant barrier (aquiclude) to fluid flow*", and "*it has been found that the composite sequence boundary at the top of the Upper San Andres Formation acts as a reservoir seal and does not allow fluids to communicate with Grayburg Formation fluids*". It is expected that this is also applicable to many other composite sequence boundaries found throughout the San Andres Formation, as they compartmentalize porous and non-porous intervals within the formation.

32. **EXHIBIT 7** includes cross section E2-W2, which represents the southernmost cross section line across the study area. The San Andres shelf margin at this location is approximately 2.1 miles east of the upper margin of the Goat Seep Reef. Basinward, the Grayburg Formation deepens rapidly between the Atlantic State #1 and the Eumont State #1, suggesting proximity to the Grayburg shelf edge. The underlying Cherry Canyon Tongue (i.e., San Andres fore-slope deposits) grade into a thick, tight section of Cherry Canyon clastics in the EOG Treat ASJ State #1 well, in which the first section of Goat Seep Reef sediments are found overlying the Getaway Bank-Bell Canyon sediments and the low permeability Cherry Canyon clastics. This section shows the Goat Seep prograding basinward into the Bell Canyon Member of the DMG, and the Capitan Reef building up westward as the Seven Rivers, Yates, and Tansil transition from the east.

33. Similar to other locations within the study area, cross section E2-W2 demonstrates a significant permeability barrier between the San Andres shelf edge and the younger Capitan Reef Complex in the form of intervening tight DMG sediments, vertical permeability barriers in the upper San Andres and lower Grayburg, and temporal non-equivalence between the San Andres Formation and the Capitan Reef Complex.

34. **EXHIBIT 8** includes the north-south cross section SW1-SW1’, which reflects Goodnight Midstream SWD wells in close proximity to the San Andres shelf margin. This cross section illustrates the variable vertical porosity distribution within the San Andres Formation, and the fact that the nearest well to the San Andres shelf margin displays the tightest geologic section overall.

35. **EXHIBIT 9** includes a summary map and diagrammatic cross section that

depicts the lateral relationship between the location of the Upper San Andres shelf edge and the back margin of the Capitan Reef Complex. The lateral distance between the Upper San Andres shelf edge and the back margin of the Capitan Reef Complex ranges from approximately 2 to 2.6 miles, and never do the margins overlap. Furthermore, and as shown in the included cross section, the two margins are not stratigraphically or temporally equivalent. San Andres basinal equivalent facies are vertically separated from the base of the Goat Seep (i.e., Capitan Reef Complex) by tight DMG sediments, and laterally by the tight carbonate facies of the San Andres and Grayburg shelf edges. In addition, intraformational vertical permeability profiles of both the San Andres and Grayburg inhibit vertical fluid flow between the San Andres, it's basinal equivalent facies, and the Capitan Reef Complex.

GROUNDWATER QUALITY REVIEW AND DATA VERIFICATION

36. **EXHIBIT 10** includes the results of San Andres Formation groundwater data verification. As previously described, Geolex has provided a peer review of Goodnight Midstream's data verification process and reviewed relevant well documents and test data, published literature and supplemental materials, and publicly and commercially available well log data. Data illustrated in the Exhibit 10 map include the verified data points from multiple data sources, including USGS, NATCARB, GoTech, Hiss (1975), Strickland et al. (1996), and laboratory reports from samples collected at Goodnight Midstream operated wells. All data points have been annotated with their corresponding values of total dissolved solids (TDS), a common metric for evaluating groundwater quality.

37. Goodnight Midstream's data verification process included a detailed review of regulatory documents, subsurface data, and well log interpretation, in an attempt to verify the sample collection interval or geologic formation for each sample and include only confidently verified data in their regional analysis of groundwater quality. For each verified data point, sufficient well drilling and testing information was available to confirm sample collection solely from the San Andres Formation. Data that were found to be commingled with other intervals, or wells physically incapable of sampling the San Andres Formation (i.e., wells not drilled to a sufficient depth to penetrate the San Andres Formation), were excluded from Goodnight Midstream's regional analysis of groundwater quality. As part of Geolex's retention, Goodnight Midstream provided the results of their data quality analysis for peer review and mutual agreement of the verified results. With respect to the area reviewed, Geolex agrees with Goodnight Midstream's assignment of the collection intervals and geologic formations for reported groundwater data.

38. Concurrent with Geolex's peer review of Goodnight Midstream's data verification process, Goodnight Midstream has proceeded with the compilation of regional groundwater data, for relevant depth intervals of the Capitan Reef, Artesia Group geologic units, and the San Andres and Delaware Mountain Group (to be presented in testimony by Goodnight Midstream). Geolex has been provided these regional groundwater TDS maps and confirm that data presented in regional mapping is in agreement and accurately represented in accordance with the results of our peer review.

39. In addition to providing a review of Goodnight Midstream's data verification process, Geolex has also reviewed publicly available data relating to Capitan

Reef groundwater quality and public water sources in the area of Goodnight Midstream's injection well activities. **EXHIBIT 11** includes a report developed by the New Mexico Office of the State Engineer, titled "*Lea County Regional Water Plan"* which describes the overall quality of Capitan Reef groundwater in Lea County as very poor. Additionally, the report summarizes the typical range of TDS values characterizing Capitan Reef groundwater, which routinely exceeds common thresholds to be considered "brackish". Additionally, a review of municipal water sources shows that the nearest communities (i.e., the cities of Hobbs and Eunice, New Mexico) rely solely on shallow groundwater resources within the Ogallala Aquifer for their municipal water services and have no reliance on Capitan Reef groundwater. **EXHIBITS 12-13** include relevant reports from the Eunice Water Supply System and Hobbs Municipal Water Supply, which report their sole use of shallow groundwater from the Ogallala Aquifer.

CONCLUSIONS

40. Industry-accepted stratigraphic models and facies transitions within the Guadalupian (Permian) depositional system, which includes the shelf formations of the San Andres, Grayburg, Queen, Seven Rivers, Yates, and Tansill, the shelf margin formations of the Capitan Reef Complex, and basinal equivalent facies of the DMG were adopted to produce a series of cross sections representative of the area near Goodnight Midstream's active SWD operations.

41. These data demonstrate that local stratigraphic relationships are in agreement with published regional models which demonstrate the San Andres Formation is not temporally or stratigraphically equivalent (i.e., not connected to) the Capitan Reef

Complex. Spatially, the San Andres Formation pinches out as a reservoir unit no less than two miles east of the up-dip reef margin and grades into the Delaware Basin into low-permeability fore-slope carbonates and basinal clastics of the Brushy Canyon and Cherry Canyon members of the DMG, which stratigraphically underlie the Capitan Reef Complex.

42. Cyclic deposition of the San Andres formation carbonates created up to 1,000 feet of depositional sequences comprised of vertically and laterally compartmentalized porous reservoir. This reservoir creates tortuous lateral and vertical permeability pathways that impede fluid migration across facies barriers. Tight depositional sequences at the top of the San Andres Formation, and throughout the entire San Andres interval at its shelf edge, further impede fluid flow westward and up-section into the Capitan Reef Complex.

43. Based on our stratigraphic analysis and subsurface data review, the porosity-permeability distribution within the San Andres and the permeability barriers within the coeval Delaware Mountain Group basinal sediments that intervene between the San Andres shelf edge and the up-dip margin of the Capitan Reef Complex, will severely impede, if not prevent, saltwater injected into the San Andres from migrating towards and up-section into the Capitan Reef Complex.

44. With respect to our independent peer review of Goodnight Midstream's groundwater data verification procedure, we agree with the assignment of collection intervals and geologic formations determined by Goodnight Midstream. Furthermore, we have reviewed regional groundwater quality (i.e., TDS) maps developed by Goodnight Midstream and confirm that data represented are in agreement with the results of

Goodnight Midstream's verification efforts and our independent peer review.

45. In the general area of Goodnight Midstream injection activities, the municipal water sources for the cities of Eunice and Hobbs, New Mexico have no reliance on Capitan Reef groundwater resources. As demonstrated by relevant water quality reports, each of these municipalities utilize shallow groundwater within the Ogallala Aquifer for the provision of their municipal services. We have not identified any reference to potential use or reliance on the Capitan Reef as a future USDW. Furthermore, groundwater quality reports published by the New Mexico Office of the State Engineer confirm that the Capitan Reef groundwater quality in Lea County, New Mexico, is very poor, with TDS values routinely exceeding values above and significantly above 10,000 mg/L.

46. I affirm under penalty of perjury under the laws of the State of New Mexico that the foregoing statements are true and correct. I understand that this self-affirmed statement will be used as written testimony in this case. This statement is made on the date next to my signature below.

David A. White	February 10, 2025 Date

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ATTACHMENT 1

CURRICULUM VITAE
(DAVID A. WHITE, P.G.)

GEOLEX INCORPORATED

CURRICULUM VITAE
David Allen White, P.G.

PERSONAL

Name:	David Allen White
Birth date:	October 11, 1981
Birthplace:	Oscoda, Michigan
Citizenship:	United States
Languages:	English

SPECIALIZATION

Acid gas injection (AGI) project management and development including well design, drilling and completion, and long-term operational monitoring; injection well permitting and regulatory compliance; acid gas injection system due diligence evaluation; geologic site characterization modeling and simulation; seismic interpretation, induced-seismicity modeling, and seismic monitoring station design and deployment; expert witness testimony; environmental site assessment and environmental litigation support; sedimentology and stratigraphy; geochemistry and geochemical lab analysis; geotechnical writing; graphics design and development; data analysis; Arc*GIS* analysis and map development.

EDUCATION

University of New Mexico
Master of Science – Geology

University of Tennessee
Bachelor of Science – Geology (Summa cum laude)

PROFESSIONAL REGISTRATION

Licensed Professional Geologist – State of Texas #15257
Professional Geologist – National Association of State Boards of Geology

ORGANIZATIONS

American Association of Petroleum Geologists
American Institute of Professional Geologists
Geological Society of America
National Ground Water Association

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Santa Fe, New Mexico
Rebuttal Exhibit No. I-1
Submitted by: Goodnight Midstream Permian, LLC
Hearing Date: February 24, 2025
Case Nos. 23614-23617, 23775,
24018 – 24020, 24025, 24123

GEOLEX INCORPORATED

New Mexico Geological Society
Society for Sedimentary Geology – Permian Basin Section
West Texas Geological Society

HONORS AND AWARDS

Graduate Teaching Assistantship – University of New Mexico
Alexander and Geraldine Wanek Graduate Scholarship – University of New Mexico
Albert M. Kudo Outstanding Teaching Assistant – University of New Mexico
Jerry Harbour Memorial Endowed Scholarship – University of New Mexico
Geological Society of America Student Research Grant
Graduate and Professional Student Association Grant – University of New Mexico
Otto Kopp Undergraduate Research Award – University of Tennessee
Jimmy Walls Award for Excellence in Introductory Geology – University of Tennessee

PUBLICATIONS, PRESENTATIONS, AND PANEL DISCUSSIONS

White, D.A., 2024, Corrosion Resistant Alloys CCUS Industry Discussion Forum – The Ideal CCUS Well Design and CCUS Challenges & Collaborative Solutions, Brenham, Texas.

White, D.A., Flores, S., Gutiérrez, A.A., Flores, K., and Robin, G., 2023 A Practical Approach to Estimating Reservoir Performance Duration at Existing Injection Sites, Acid Gas Injection Symposium IX, Calgary, Alberta, Canada

White, D.A., 2023, Carbon Strategic Conclave – Barriers and Solutions to Carbon Capture and Storage Execution in the United States, Houston Strategy Forum, Houston, Texas.

White, D.A., Elrick, M., Romaniello, S., and Zhang, F., 2018, Global seawater redox trends during the Late Devonian mass extinction detected using U isotopes of marine carbonates, Earth and Planetary Science Letters, v. 503, p. 68-77, doi:10.1016/j.epsl.2018.09.020.

White, D.A., 2018. Global seawater redox trends during the Late Devonian mass extinction detected using U isotopes of marine carbonates. University of New Mexico Digital Repository, https://digitalrepository.unm.edu/eps_etds/227.

White, D.A., Elrick, M., Romaniello, S., and Zhang, F., 2017, Tracking global seawater redox trends during the Late Devonian extinction using U isotopes of Upper Devonian marine carbonates, Geological Society of America Annual Meeting, Seattle, Washington.

White, D.A., Elrick, M., Romaniello, S., and Zhang, F., 2016, Multiple, short-lived ocean anoxic events across the Late Devonian mass extinction detected using uranium isotopes of marine carbonates, Geological Society of America Annual Meeting, Denver, Colorado.

GEOLEX INCORPORATED

Gutiérrez, A., and White, D.A., 2019, Updates on seismic analysis for AGI siting and injection data analysis for AGI well condition and reservoir monitoring, Acid Gas Injection Symposium VIII, Calgary, Alberta, Canada.

Elrick, M., White, D., Bartlett, R., and Romaniello, S., 2018, Do uranium isotopes of marine limestones provide evidence for seawater anoxia as a common driver for Phanerozoic mass extinctions? Goldschmidt Abstracts, 2018.

Elrick, M., White, D.A., Algeo, T.J., and Romaniello, S., 2018, Do uranium isotopes of marine limestones provide evidence for seawater anoxia as a common driver for Phanerozoic mass extinctions?, Geological Society of America *Abstracts with Programs,* v. 50, no. 6, doi: 10.1130/abs/2018-318936.

CERTIFICATIONS AND TRAINING

2018 – 2025	Hydrogen Sulfide Safety Awareness Certification
2023	Petroleum Remediation Principles and Technologies for Soil, Vapor, and Groundwater (Training Course)
2022	PFAS Transport, Fate, and Remediation (Training Course)
2022	Understanding Induced Seismicity – Earthquake Monitoring, Seismic Analysis, Geological Characterization, Mechanistic Analysis (Short Course)
2021	Principles of Contaminant Transport and Fate in Soil and Groundwater (Training Course)

EXPERIENCE

August 2018 – Present
Geolex, Inc. ® - Vice President and Senior Geologist
500 Marquette Avenue NW, Suite 1350
Albuquerque, NM 87102

Duties, Accomplishments, Responsibilities:

1. Project manager, as general contractor, for the drilling and completion of acid gas injection wells in the San Juan Basin of New Mexico and the Permian Basin of New

Mexico and Texas. Responsibilities included providing general project oversight, coordination, and management, on-site general supervision of daily activities, geological supervision, regulatory and safety compliance support, and project budget management.

2. Provide support duties associated with the drilling, completion, commissioning, and general operation of acid gas injection and saltwater disposal (SWD) wells. These duties include on-site geological support and supervision, evaluation and interpretation of geologic data, post-installation regulatory compliance and testing, and acid gas injection well maintenance and operational support.

3. Permit application development for acid gas injection and saltwater disposal wells through the following agencies: Bureau of Land Management, New Mexico Oil Conservation Division, Railroad Commission of Texas, Utah Department of Natural Resources, and the Environmental Protection Agency.

4. Geologic site assessment and mapping, reservoir characterization, static geologic model construction, and dynamic model simulation to assess impacts of AGI, CCS/CCUS, and third-party injection operations utilizing industry standard modeling and simulation platforms.

5. Completion of Induced-Seismicity Risk Assessments to support injection-permit applications, with assessments based on a detailed review of seismic survey data to identify subsurface features and model-simulation results to predict the associated fault-slip probability for a proposed injection scenario.

6. Support client asset acquisition processes through completion of due diligence investigations for acid gas injection and saltwater disposal well systems. Investigations identify issues relating to regulatory compliance, suitability of injection well design and construction, long-term reservoir sustainability, historic environmental violations and on-going obligations, and other related issues.

7. Design and administer comprehensive training sessions for gas-processing and gas-treatment plant operators on the general operation, monitoring, and maintenance of acid gas injection well systems.

8. Geologic sequestration project planning including AGI and SWD well design, geological assessment, procurement of injection equipment, and project budget management.

9. Development of procedures suitable for addressing well-testing, maintenance, or remedial needs and provide supervision for associated on-site operations.

10. Provide expert witness testimony supporting injection well applications before the NM Oil Conservation Division, NM Oil Conservation Commission, and the Railroad Commission of Texas (recognized as an expert in AGI and SWD well permitting and design, petroleum geology, seismic interpretation, reservoir characterization modeling and simulation, and fault-slip probability modeling).

11. Investigations and analyses to support environmental litigation matters and the development of Rule 26 expert reports to assist clients in dispute resolution concerning claims of soil and groundwater contamination, correlative rights and trespass issues, and claims resulting from oil and gas activities (litigation support). Subject matter experience spans numerous groundwater contaminants and industrial activities with environmental impact potential.

12. Completion of comprehensive environmental site assessments, as required by various state and federal agency programs and financial institutions to ensure program compliance and identify potential environmental impact.

13. Assist operators in AGI/SWD protest resolution by addressing project concerns of operators, regulatory agencies, and other interested parties.

14. Design and deployment of seismic monitoring stations to monitor and assess seismic activity in the area of active AGI and SWD injection wells.

15. Development of comprehensive seismic monitoring plans and earthquake response plans for operators, as required by regulatory agencies in areas of concern for induced seismicity.

16. Utilization of Arc*GIS*, GeoGraphix, and Spotfire software for geospatial and operational analyses and map development.

August 2014 – May 2017
Graduate Teaching Assistant
Department of Earth and Planetary Sciences
Northrop Hall, 221 Yale Blvd NE
University of New Mexico
Albuquerque, NM 87131

Duties, Accomplishments, Responsibilities:

1. Prepared lectures and designed curriculum to engage and develop both students pursuing Earth and Planetary Science degrees, as well as those fulfilling general

education requirements. Courses taught include Sedimentology & Stratigraphy, Earth History, Physical Geology, and Introductory Environmental Science.

2. Supervised and conducted laboratory activities and field exercises while maintaining a safe and productive environment.

3. Evaluated student performance and provided mentorship and guidance to ensure student success and educational growth.

4. Assisted in a summer field methods course, which required the application of lecture content in the field while ensuring students understood and maintained safe fieldwork practices.

January 2013 – May 2014
Research Lab Assistant and Departmental Tutor
Department of Earth and Planetary Sciences
University of Tennessee
Knoxville, TN 87120

Duties, Accomplishments, Responsibilities:

1. Responsible for the preparation of samples for geochemical and isotopic analysis for faculty and graduate students at the University of Tennessee.

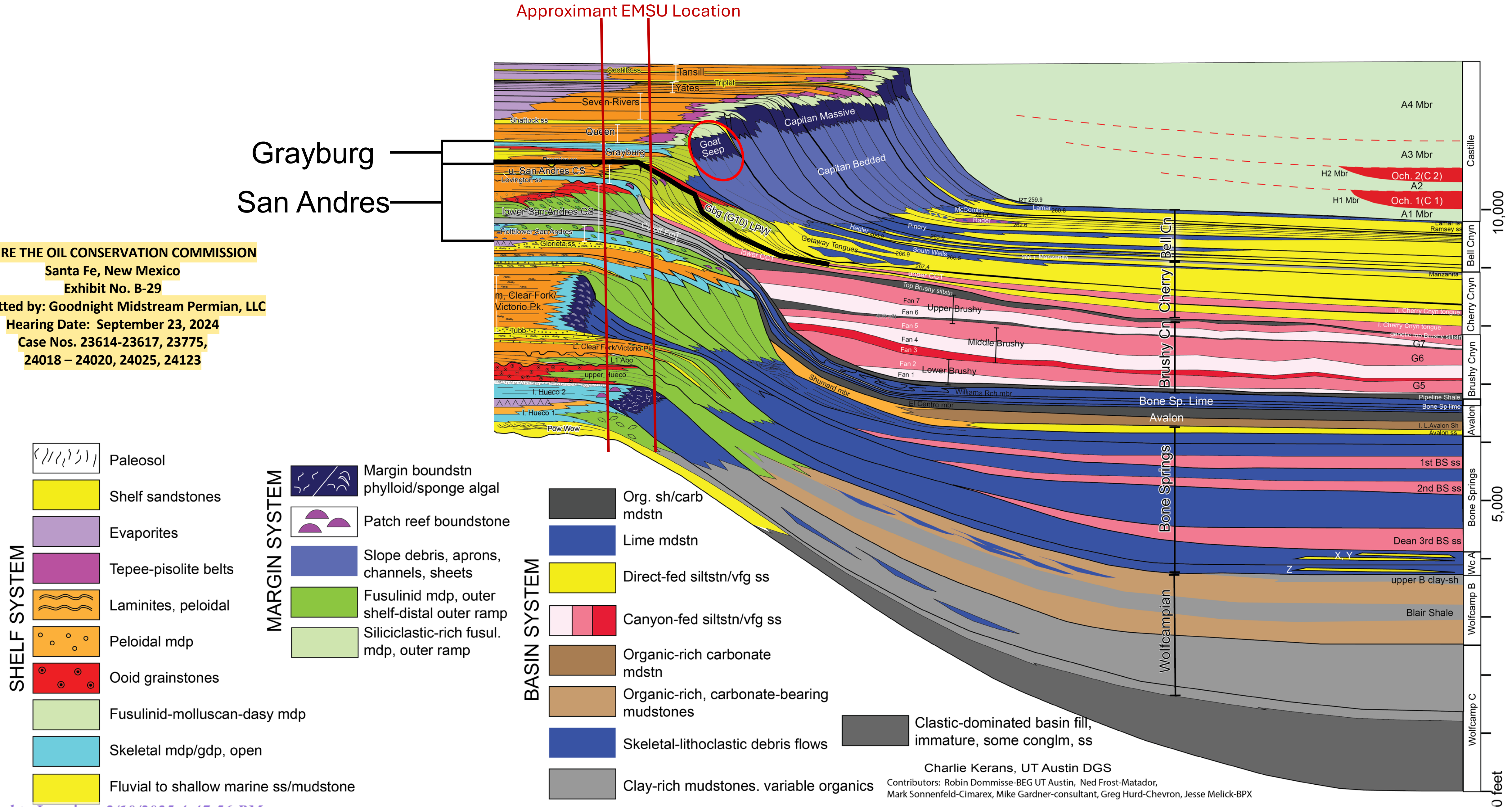
2. Conducted individualized tutoring sessions for students enrolled in Earth & Planetary Science courses.

EXHIBITS

(DAVID A. WHITE, P.G.)

GEOLEX EXHIBIT 1

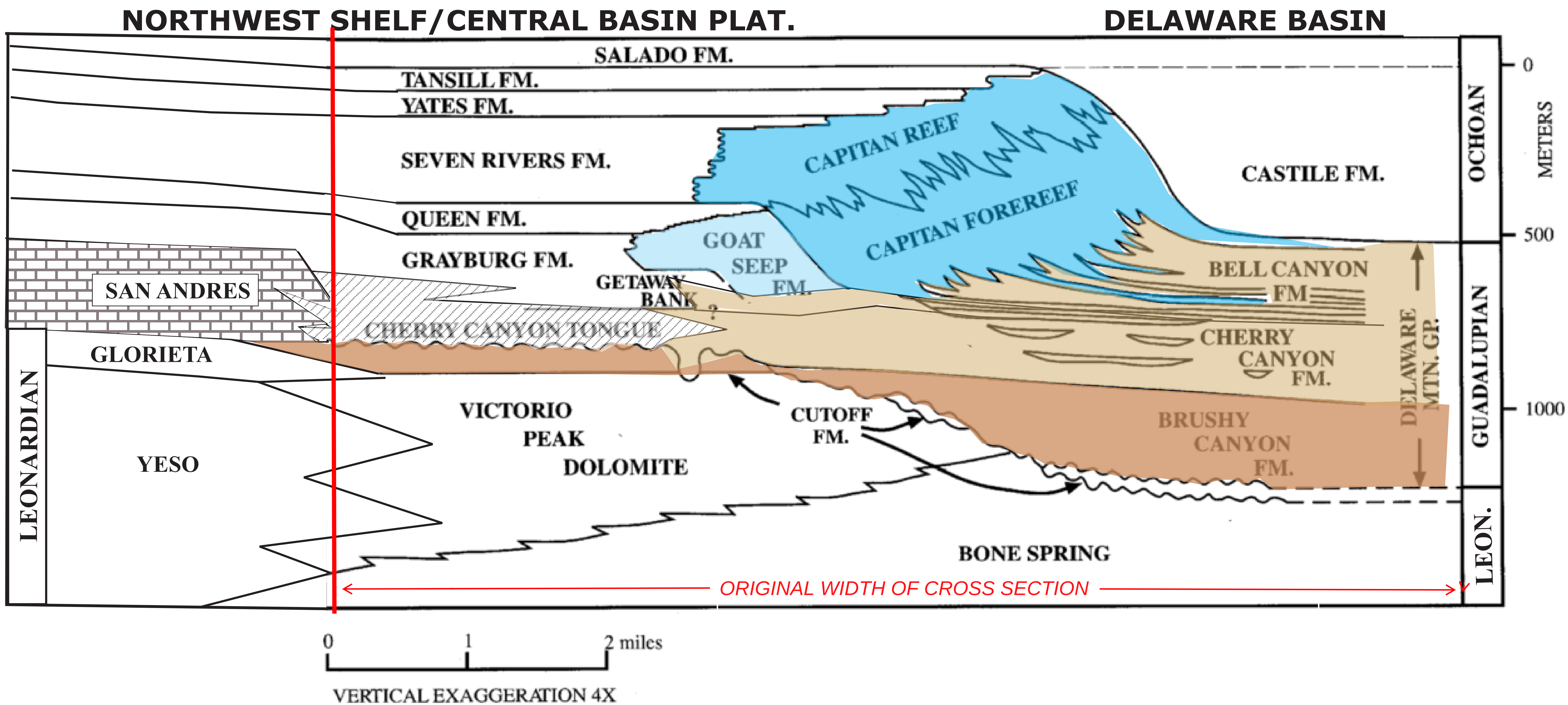
UT-BEG Central Basin Platform to Delaware Basin Stratigraphic Model



BEFORE THE OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Exhibit No. B-29
Submitted by: Goodnight Midstream Permian, LLC
Hearing Date: September 23, 2024
Case Nos. 23614-23617, 23775,
24018 – 24020, 24025, 24123

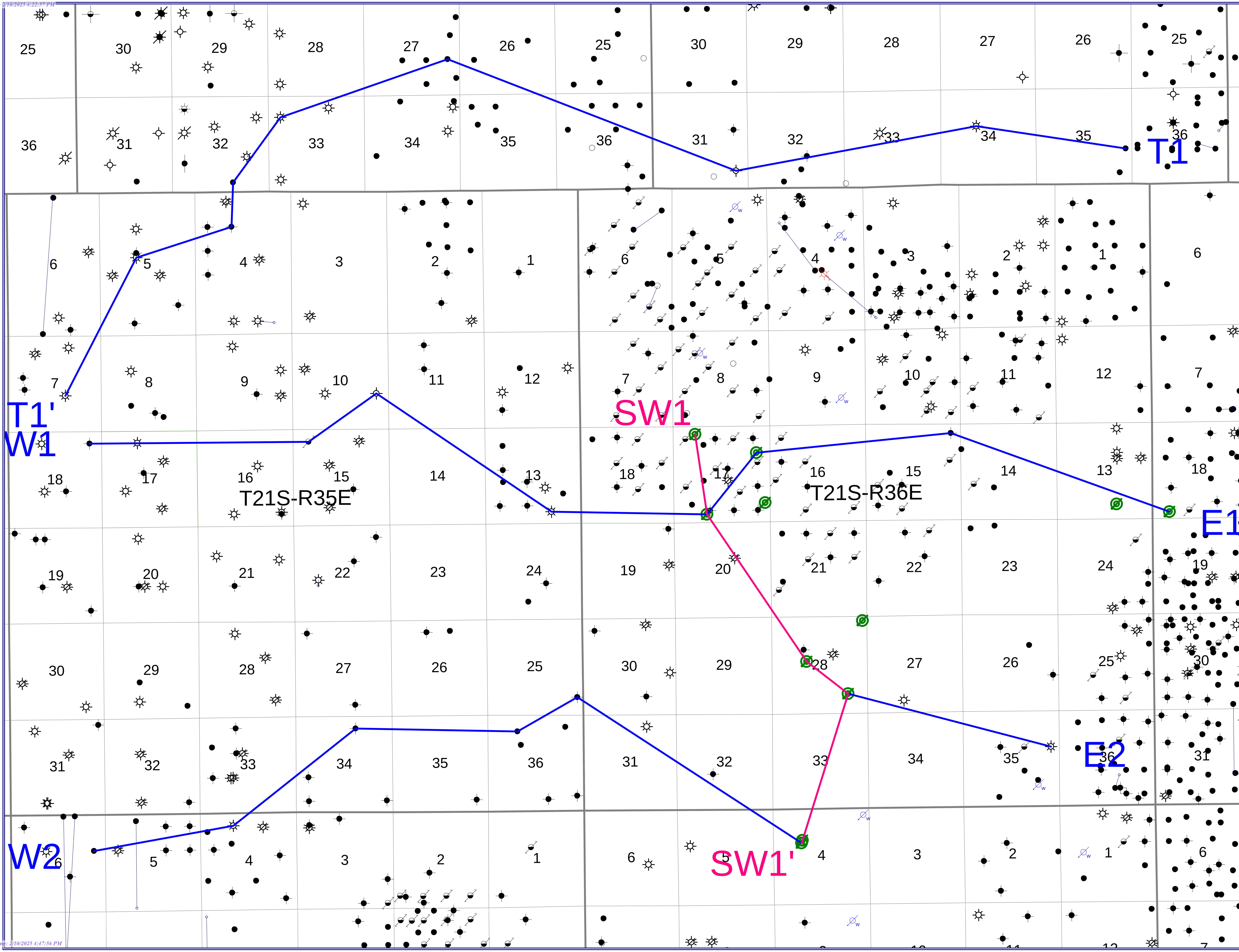
GEOLEX EXHIBIT 2

SIMPLIFIED STRATIGRAPHIC SECTION, SHELF-TO-BASIN LEONARDIAN THROUGH OCHOAN SERIES



Modified after

Melim, L. A. and Scholle P. A., 1999, Diagenesis of the Capitan Formation fore-reef facies (Permian, West Texas and New Mexico): *in* Geologic framework of the Capitan Reef: Society for Sedimentary Geology (SEPM) Special publication No. 65, p. 193-210.



GEOLEX EXHIBIT 3

GEOLEX INCORPORATED

GOODNIGHT MIDSTREAM PERMIAN

LEA COUNTY SALTWATER DISPOSAL WELLS

Twp. 21-22S, Rge. 36E

CROSS-SECTION INDEX MAP SHOWING

WELLS >4000 FEET DEEP

REMARKS

Active Goodnight Midstream disposal wells (SWDW) are shown by green symbols. Wells >4000 feet will have penetrated at least to the top of the Grayburg, where present.

0 1
MILES

January 30, 2025

GEOLEX INCORPORATED GOODNIGHT MIDSTREAM

LEA COUNTY SALTWATER DISPOSAL WELLS

Twp. 21-22S- Rge. 36E Area

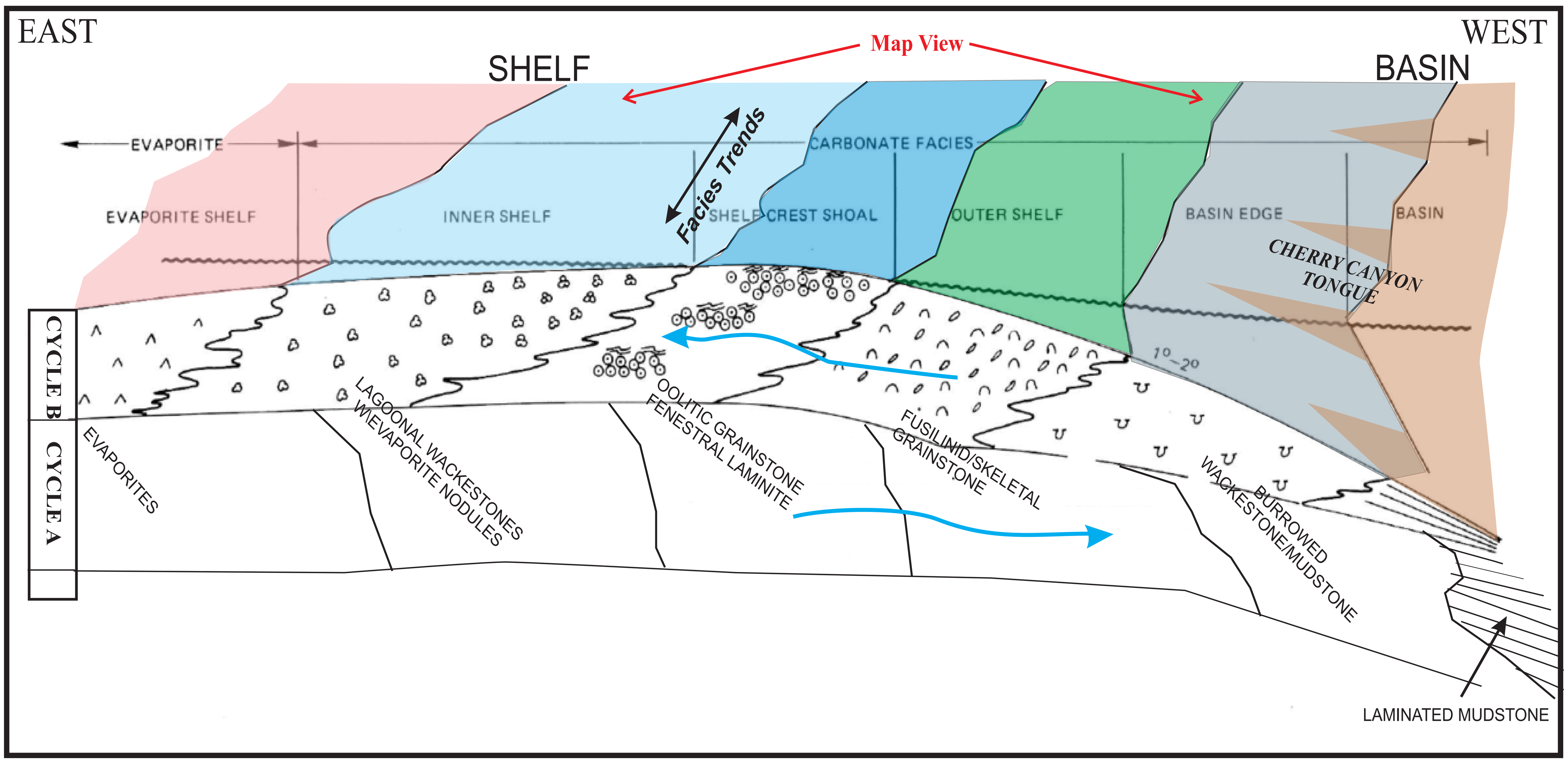
TYPE GUADALUPIAN SECTION T1-T1'

Horizontal Scale = 475.0
Vertical Scale = 50.0
Vertical Exaggeration = 9.5x

Low K/Tight facies in the Grayburg, Goat Seep (greenish), San Andres, Bell Canyon and Cherry Canyon shown in light brown.

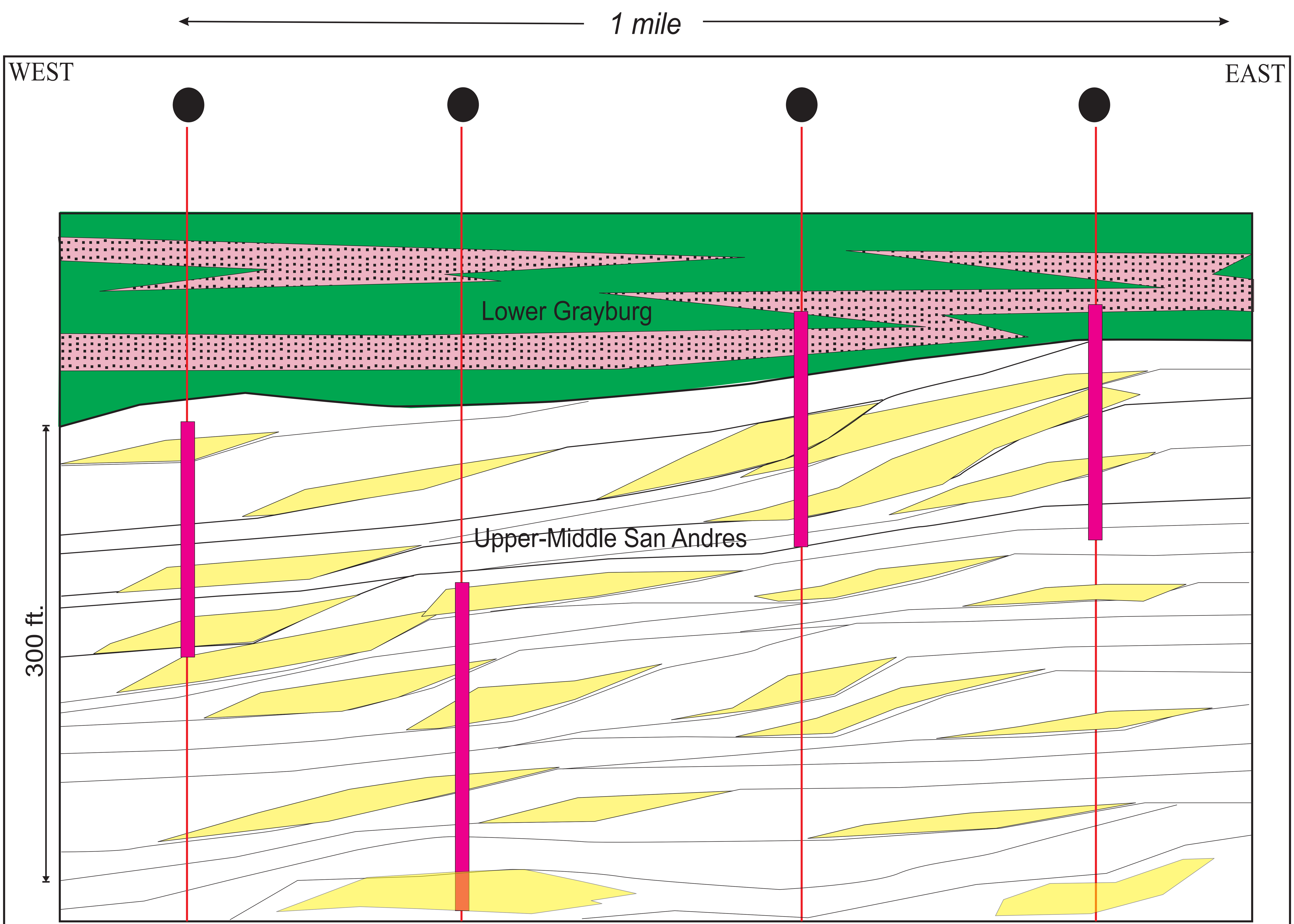
14:16

GEOLEX EXHIBIT 4



Morphologic profile of San Andres/Grayburg banks, and a schematic representation of the facies tracts of the various shelf and basin edge environments. The widths of the facies bands and slopes are not to scale. An example of the cyclicity of deposition in these two formations is shown by two cycles (A and B), cycle A being transgressive relative to cycle B (blue arrows). The San Andres-Grayburg sequence is made up of very many such cycles, whose scales range from inches to tens of feet, creating vertically offset parallel facies bands throughout the section. Lateral porosity trends developed in some (not all) of the facies tracts tend to align in the strike direction, shown by the double black arrow.

(Modified after Sarg and Lehman, 1986, Lower-Middle Guadalupian facies and stratigraphy San Andres/Grayburg Formations, Permian Basin, Guadalupian Mountains, New Mexico; in Lower and Middle Guadalupian facies, stratigraphy, and reservoir geometries, Pernain Basin Section SEPM, Publ. 86-25, pp.1-8.)



PENWELL FIELD MODEL

GEOLEX EXHIBIT 5

GEOLEX INCORPORATED GOODNIGHT MIDSTREAM

GEOLEX EXHIBIT 6

LEA COUNTY SALTWATER DISPOSAL WELLS

Twp. 21-22S- Rge. 36E Area

GUADALUPIAN SECTION E1-W1

THROUGH GOODNIGHT SWD WELLS

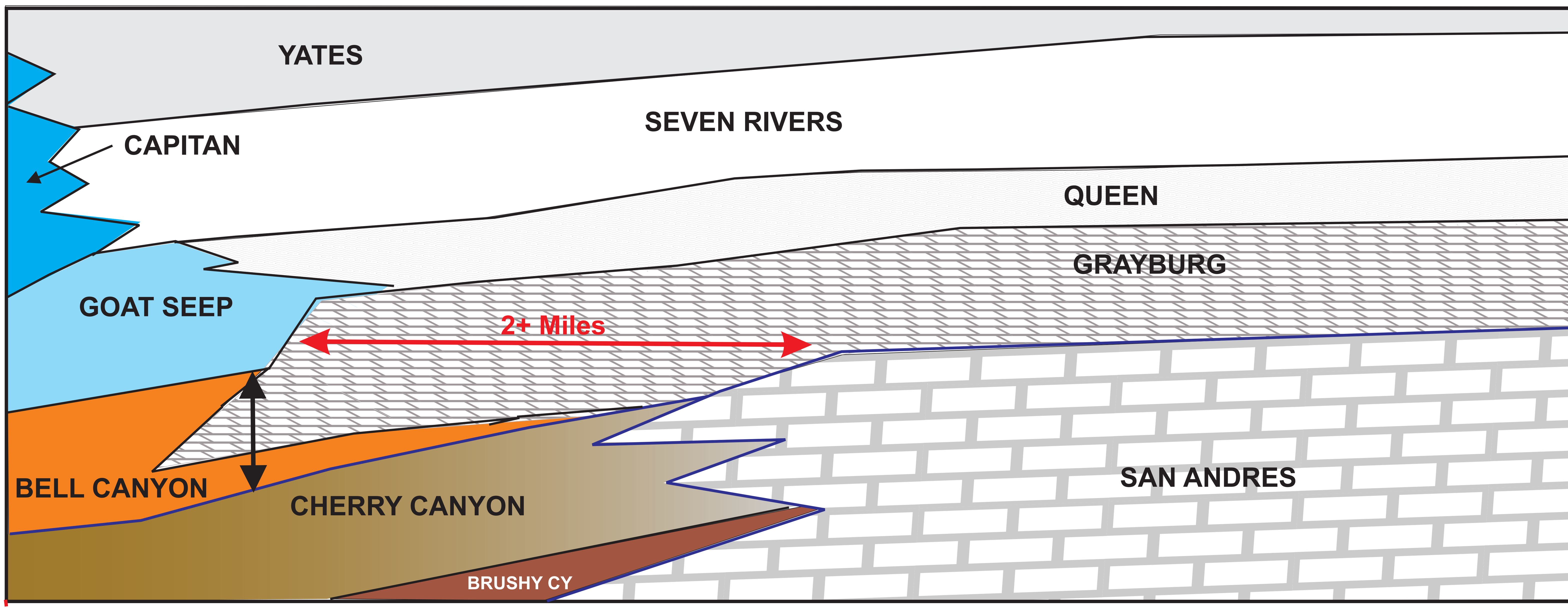
Horizontal Scale = 350.0
Vertical Scale = 50.0
Vertical Exaggeration = 7.0x

Low K/Tight facies in the Grayburg, Goat Seep (greenish), San Andres, Bell Canyon and Cherry Canyon shown in light brown.

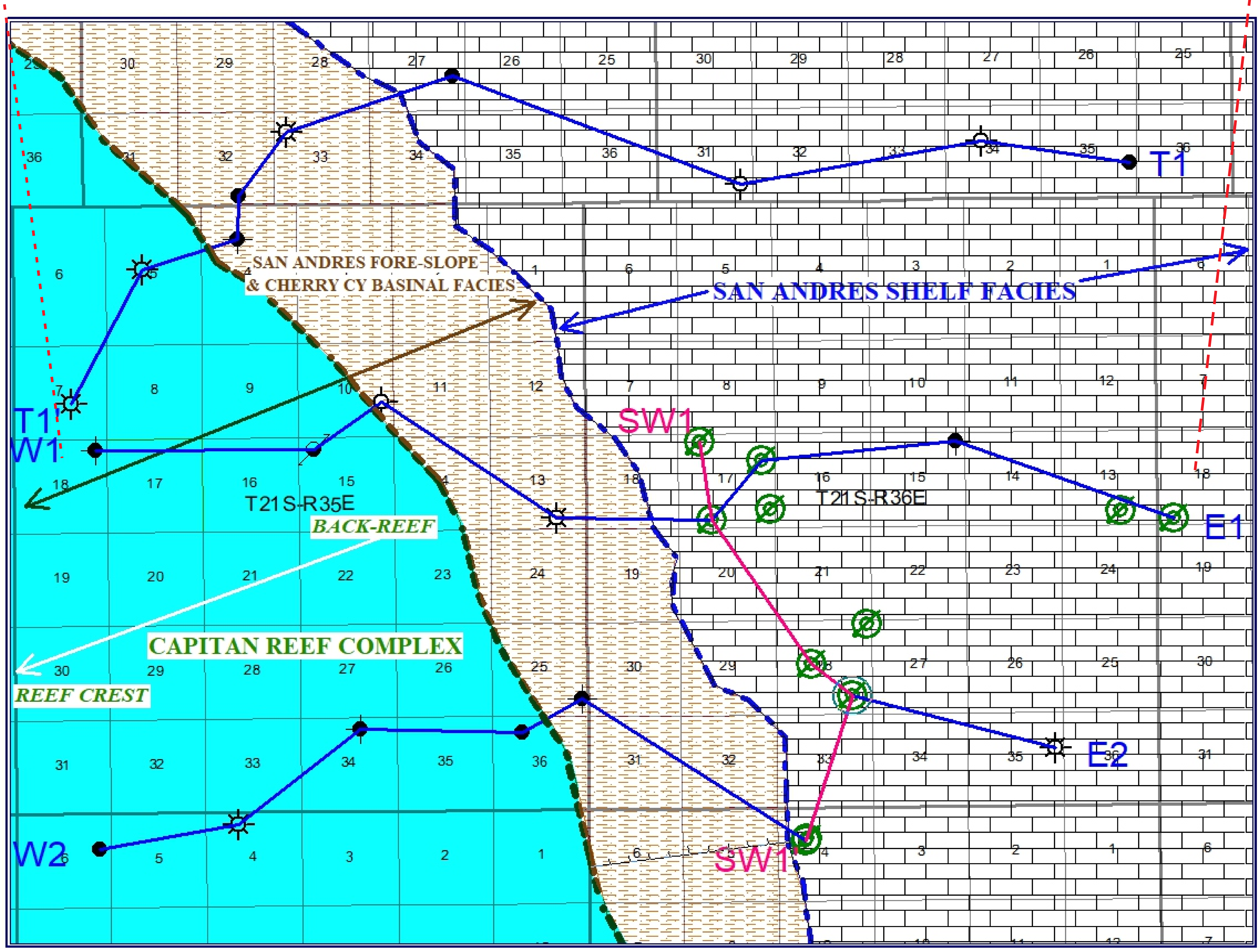
15:04

GEOLEX EXHIBIT 7

GEOLEX EXHIBIT 8



Double black arrow indicates temporal non-equivalance



GEOLEX INCORPORATED — GOODNIGHT MIDSTREAM PERMIAN

LEA COUNTY SALTWATER DISPOSAL WELLS

Twp. 21-22S, Rge. 36E

CROSS-SECTION INDEX MAP SHOWING

MARGINS OF SAN ANDRES & CAPITAN REEFS

REMARKS

Active Goodnight Midstream disposal wells (SWDW) are shown by green symbols. Only cross-section wells and SWDW wells shown, for clarity. Schematic cross-section shows relative stratigraphic positions of the San Andres system (San Andres-to basinal Delaware units) to the Capitan Reef Complex (double arrow).

0 2 4
MILES

February 1, 2025

GEOLEX EXHIBIT 9

GEOLEX EXHIBIT 10

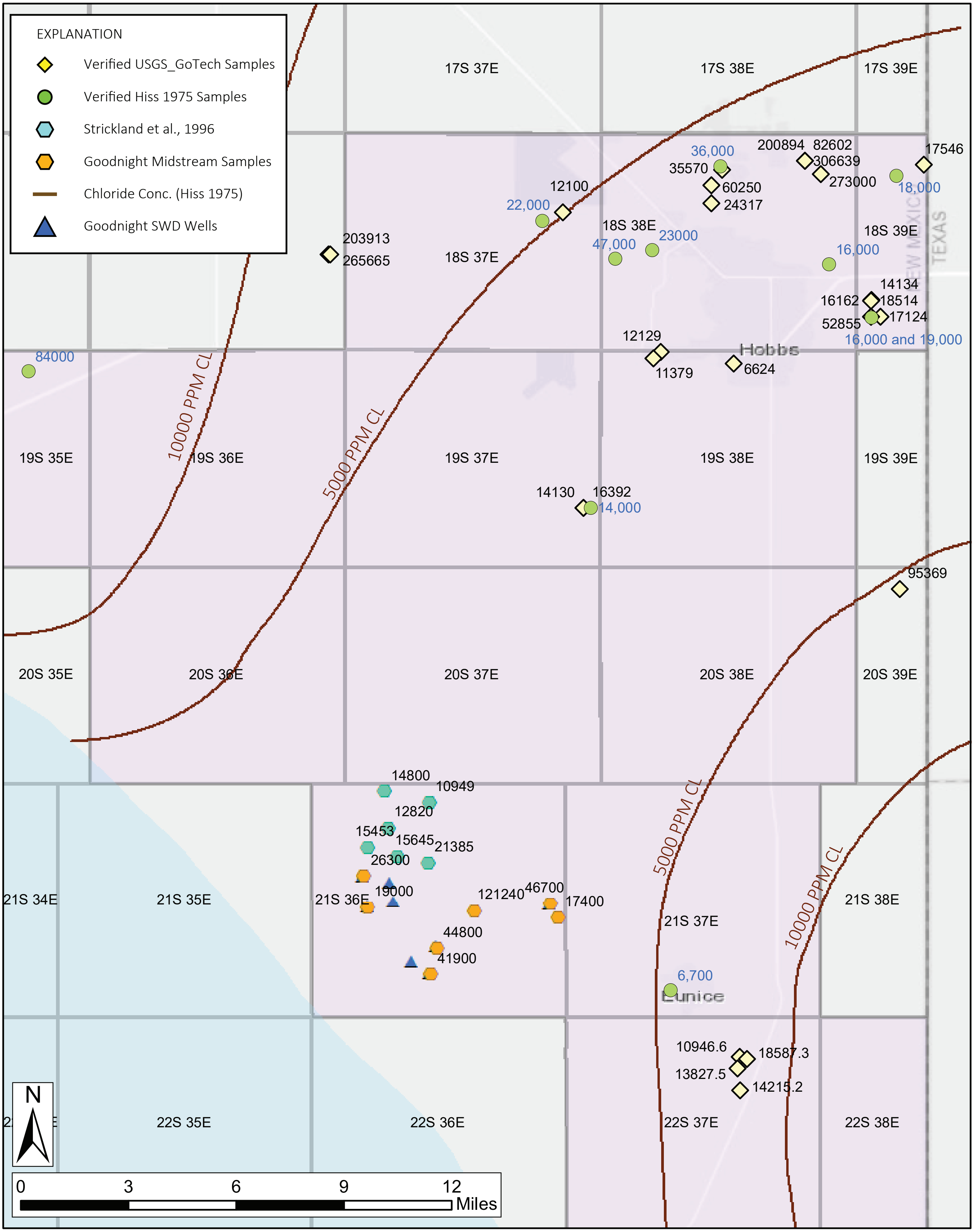
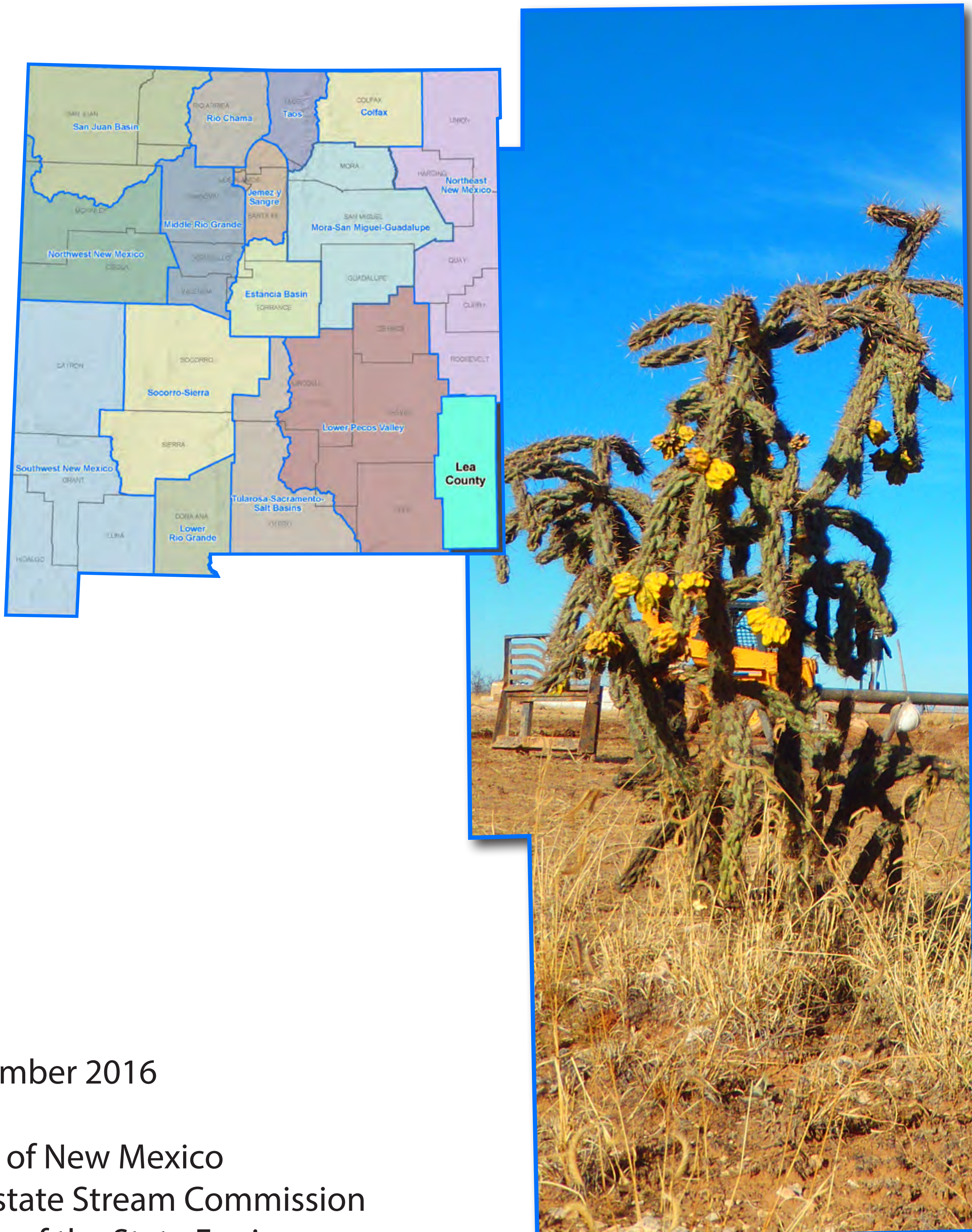


EXHIBIT 10. Mapped summary of verified SADR water chemistry data from USGS, NATCARB, GoTech, and Hiss 1975 datasets. Verified data points are annotated with their reported values for total dissolved solids (TDS) a common metric for evaluating groundwater quality. Additionally published data from Strickland et al. and Goodnight Midstream wells are included.

Lea County Regional Water Plan



December 2016

State of New Mexico
Interstate Stream Commission
Office of the State Engineer

Cover photograph: Cholla near Lovington, New Mexico

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Note: Appendix designations indicate corresponding section in plan

.

List of Acronyms

ac-ft/yr	acre-feet per year
AMO	Atlantic multidecadal oscillation
AWRM	Active Water Resource Management
BBER	Bureau of Business and Economic Research
BLM	Bureau of Land Management
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CID	Carlsbad Irrigation District
CWA	Clean Water Act
DBS&A	Daniel B. Stephens & Associates, Inc.
DWS	Domestic Well Statute
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ft amsl	feet above mean sea level
FY	fiscal year
GIS	geographic information system
gpcd	gallons per capita per day
GWQB	Ground Water Quality Bureau [New Mexico Environment Department]
ICIP	Infrastructure Capital Improvement Plan
IPCC	Intergovernmental Panel on Climate Change
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MSGP	Multi-Sector General Permit
NASS	National Agricultural Statistics Service
NCDC	National Climatic Data Center
NMAC	New Mexico Administrative Code
NMBGMR	New Mexico Bureau of Geology & Mineral Resources
NMED	New Mexico Environment Department
NMG&F	New Mexico Department of Game and Fish
NMISC	New Mexico Interstate Stream Commission
NMOSE	New Mexico Office of the State Engineer
NMSA	New Mexico Statutes Annotated
NMSU	New Mexico State University

NMWQCC	New Mexico Water Quality Control Commission
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRCS	Natural Resources Conservation Service
NWS	National Weather Service
PDO	Pacific decadal oscillation
PDSI	Palmer Drought Severity Index
PPP	project, program, and policy
PSTB	Petroleum Storage Tank Bureau (NMED)
PVACD	Pecos Valley Artesian Conservancy District
RWP	regional water plan
SDWA	Safe Drinking Water Act
SNOTEL	snowpack telemetry
SWCD	soil and water conservation district
TDS	total dissolved solids
TMDL	total maximum daily load
U.S. EPA	U.S. Environmental Protection Agency
USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Change Research Program
USGS	U.S. Geological Survey
UST	underground storage tank
UWB	underground water basin
WQA	Water Quality Act (New Mexico)
WRCC	Western Regional Climate Center
WSD	water and sanitation district
WUA	water users association

Executive Summary

The Lea County Water Planning Region, which consists of Lea County (Figure ES-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary purpose being to protect New Mexico water resources and to ensure that each region is prepared to meet future water demands. Between 1987 and 2008, each of the 16 planning regions, with funding and oversight from the New Mexico Interstate Stream Commission (NMISC), developed a plan to meet regional water needs over the ensuing 40 years. The Lea County Regional Water Plan was completed and accepted by the NMISC in 2000.

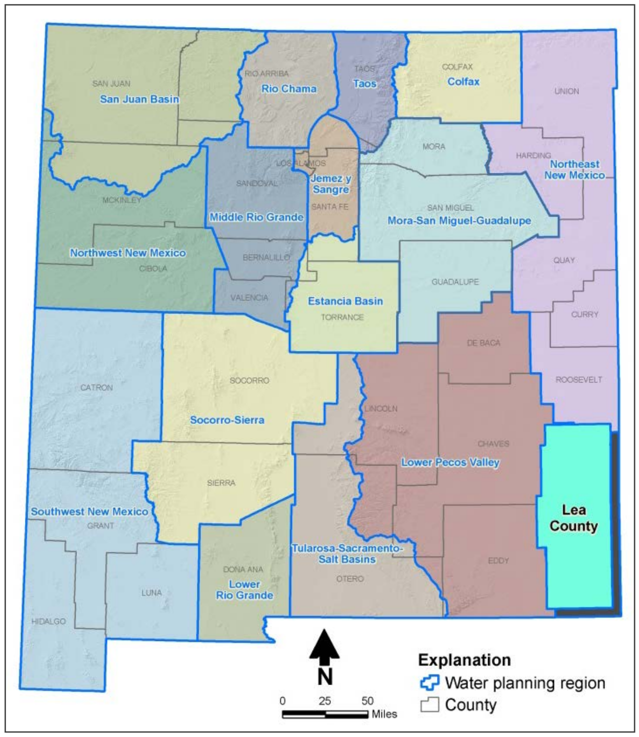


Figure ES-1. Lea County Water Planning Region

The purpose of this document is to provide new and changed information related to water planning in the Lea County region and to evaluate projections of future water supply and demand for the region using a common technical approach applied to all 16 planning regions statewide. Accordingly, this regional water plan (RWP) update summarizes key information in the 2000 plan and provides updated information regarding changed conditions and additional data that have become available.

Based on updated water use (Figure ES-2) data from 2010, Figure ES-3 illustrates the total projected regional water demand under high and low demand scenarios, and also shows the administrative water supply and the drought-adjusted water supply. The administrative water supply is based on 2010 withdrawals of water and is an estimate of future water supplies that considers both physical availability and compliance with water rights policies. Due to an anticipated declining economy, future water demand projections for Lea County do not reflect substantial growth. Even without significant growth, the potential shortage in 2060 during a prolonged drought and due to declining water levels is estimated to range between 54,000 and 78,000 acre-feet, which is 29 to 37 percent of the predicted demand or about 66 percent of the 2010 administrative supply. Lea County depends entirely on groundwater from aquifers in which significant declines in water levels are projected even in non-drought conditions. Therefore, the region is focused on increased understanding and tracking the state of the aquifer and available water supply, especially in the areas near large production well fields. Strategies that the region identified to address water level declines and drought shortages include groundwater management, monitoring and aquifer mapping, conservation, treatment and reuse of produced water and wastewater effluent, and linking economic development and water use. The region also identified drinking water infrastructure upgrades and improvements as a key implementation issue.

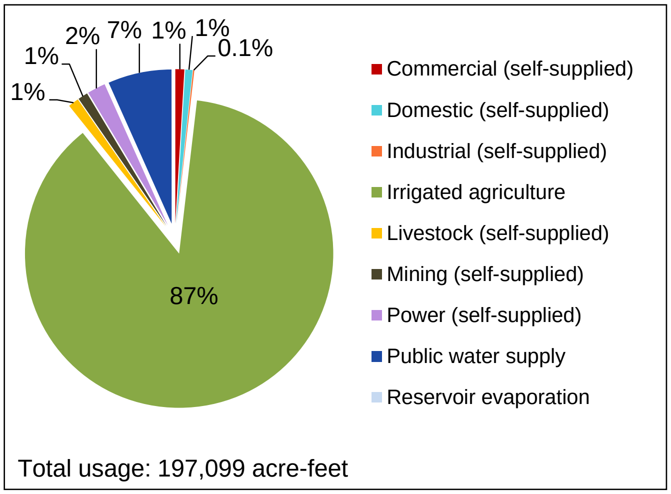


Figure ES-2. Total Regional Water Use, 2010

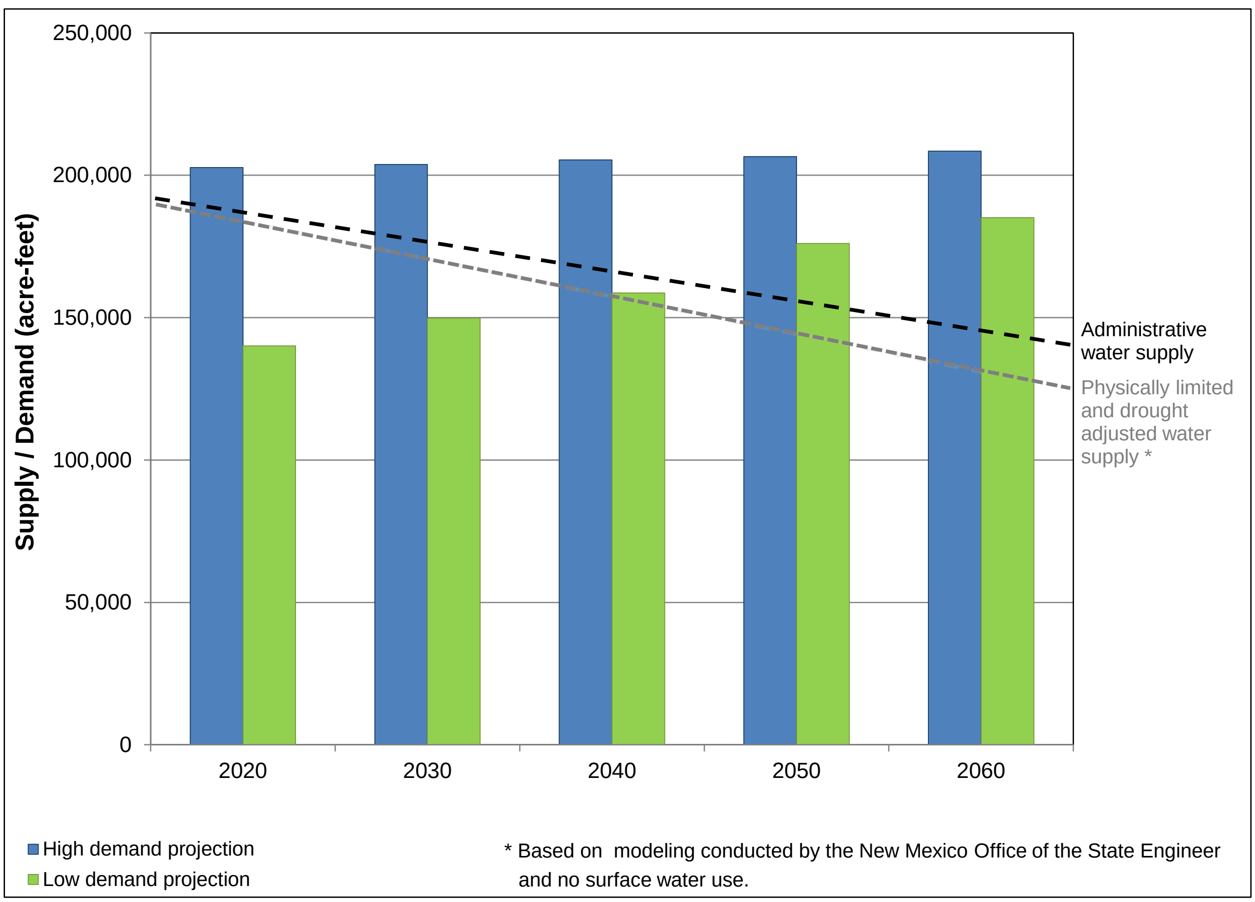


Figure ES-3. Available Supply and Projected Demand

Planning Method

For this RWP, water supply and demand information was assessed in accordance with a common technical approach, as identified in the *Updated Regional Water Planning Handbook: Guidelines to Preparing Updates to New Mexico Regional Water Plans* (where it is referred to as a common technical *platform*) (Handbook). This common technical approach outlines the basis for defining the available water supply and specifies methods for estimating future demand in all categories of water use:

- The method to estimate supply (referred to as the *administrative water supply* in the Handbook) is based on withdrawals of water as reported in the *New Mexico Water Use by Categories 2010* report prepared by the New Mexico Office of the State Engineer (NMOSE). Use of the 2010 data provides a measure of supply that considers both physical supply and legal restrictions (i.e., water is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region.
- An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts, modeling, and physical limitations based on future groundwater level declines from ongoing pumping.
- Projections of future demand in nine water use categories are based on demographic and economic trends and population projections. Consistent methods and assumptions for each category of water use are applied.

Common Technical Approach

To prepare both the regional water plans and the state water plan, the State has developed a set of methods for assessing the available supply and projected demand that can be used consistently in all 16 planning regions in New Mexico. The objective of applying this common technical approach is to be able to efficiently develop a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the State's pressing water issues.

Public Involvement

The updated Handbook specifies that the RWP update process "shall be guided by participation of a representative group of stakeholders," referred to as the steering committee. Steering committee members provided direction for the public involvement process and relayed information about the planning effort to the water user groups they represent and other concerned or interested individuals.

In addition to the steering committee, the water planning effort included developing a master stakeholder list of organizations and individuals interested in the water planning update. This list was developed from the previous round of water planning and then expanded through efforts to identify representatives from water user groups and other stakeholders. Organizations and individuals on the master stakeholder list were sent announcements of meetings and the RWP update process and progress.

Over the two-year update process, eight meetings were held in the Lea County region. These meetings identified the program objectives, presented draft supply and demand calculations for discussion and to guide strategy development, and provided an opportunity for stakeholders to provide input on the strategies that they would like to see implemented. All steering committee meetings were open to the public and interested stakeholders, and participation from all meeting attendees was encouraged.

Key Water Issues

The key water supply updates and issues currently impacting the Lea County region include the following:

- The primary source of water is the Ogallala Aquifer, which is being rapidly depleted in certain areas. In Lea County, groundwater levels have declined 50 to 100 feet, with rates of decline up to 4 feet per year and averaging 0.59 foot per year for wells in Lea County.
- The High Plains Aquifer extends into Texas, which has a different approach for managing this aquifer than New Mexico's. Interstate cooperation would improve monitoring and research and possibly address aquifer decline.
- The alluvial sediments in the Jal Underground Water Basin (UWB) also extend into Texas. The City of Midland, Texas obtains some of its water supply from the T-Bar Ranch well field, which is just south of the New Mexico-Texas boundary near the Jal UWB. This well field is capable of delivering about 20 million gallons per day (22,400 acre-feet per year), although the city reported pumped only 6,831 acre-feet in 2014 from the well field. Water level declines in the southern portion of the Jal UWB have increased from a maximum of 2.4 feet per year before construction of the well field to about 6.6 feet per year currently.
- Due to the limited and diminishing groundwater supply within the Lea County and Jal UWBs, the NMOSE is no longer accepting applications for new appropriations except for domestic, stock, and temporary construction applications filed under Section 72-12-1 NMSA. NMOSE is accepting applications for new appropriations in the Capitan and Carlsbad UWBs in Lea County.
- The many small rural drinking water systems within the region face challenges in financing infrastructure maintenance and upgrades and complying with water quality monitoring and training standards. Though the source water for these systems is

generally good-quality groundwater, the maintenance, upgrades, training, operation, and monitoring that is required to ensure delivery of water that meets drinking water quality standards is a financial and logistical challenge for these small systems.

- Significant pumping of water from the Lea County UWB is currently taking place. The City of Carlsbad, in the Lower Pecos Valley Water Planning Region, has water rights of more than 18,000 acre-feet per year from the Lea County UWB for consumption in Eddy County; this water is pumped out of the Double Eagle well field in Lea County and delivered by pipeline to industrial and commercial customers.

- Lea County residents are concerned that permitted water rights that may have not been put to beneficial use for many years are being transferred from agriculture use to oil and gas production utilizing the Water Use Leasing Act and other statutory water transfer emergency procedures (NMSA 1978, Sections72-6-1 to 72-6-7 and the emergency/ temporary water permit process (NMSA 1978, Section 72-5-25). There is also concern that water permitted under this provision is being used outside the region. By using these statutes, the applicant moving the water rights from agricultural use to oil and gas production does not go through the usual statutory process of changing the place and purpose of use of a water right, which would allow for a public protest and a full hearing if necessary before pumping of the water. Rather, after a preliminary assessment by the State Engineer that the water use will not impair any existing right to a greater degree than the original use and is not contrary to conservation, the applicant can pump the water immediately without publication of the transfer and going through the full hearing process.

- Water rights in the planning region have not yet been adjudicated.

- Water availability in the formations beneath the High Plains Aquifer is poorly understood and more study is needed. For the most part, aquifers immediately below the High Plains Aquifer are expected to have relatively low yields and poor water quality. Deep water pumping may provide an alternative supply but could cause depletions of the High Plains Aquifer.

- More than 19,000 active oil and gas wells produce from numerous oil fields throughout Lea County. Concerns have been raised over water quality impacts and the use of high quality fresh water for hydraulic fracturing and other commercial and industrial operations.

Strategies to Meet Future Water Demand

An important focus of the RWP update process is to both identify strategies and processes for meeting future water demand and consider their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2000 Lea County Regional Water Plan recommended the following strategies for meeting future water demand:

- Municipal water conservation
  - Urban/suburban landscaping
  - Indoor residential
  - Auditing, reuse infrastructure, and inclining-block rates and conservation incentives for large water users
- Agricultural water conservation
  - Use low-energy, precision application attachments on center pivots
  - Monitor soil moisture so that water is applied only when needed
  - Use tillage methods which promote soil water retention
  - Use crop types compatible with the climate and soil type
  - Encourage dryland farming
- Development of deep aquifers
- Treatment of lower quality water
- Water importation
- Aquifer recharge
- Cloud seeding
- Water management
- Interstate alternatives: Regional management plan with neighboring counties in Texas
- State involvement
  - Effective administration of the Basin by the NMOSE
  - Close Basin to new groundwater appropriations
- County-wide programs
  - Aquifer monitoring
  - Groundwater flow modeling
  - Well inventory and sealing

  - Irrigation efficiency
  - Public information/education

- Municipal management
  - Water pricing
  - Reducing system losses
  - Wastewater reuse

The steering committee reviewed each of the strategies and indicated that they are all still relevant, though some are being refocused as new recommended strategies.

During the two-year update process the Lea County Steering Committee and stakeholders identified projects, programs, and policies (PPPs) to address their water issues. Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan, Water Trust Board, and Capital Outlay funding processes; these projects are also included in a comprehensive table of PPP needs. The information was not ranked or prioritized; it is an inclusive table of all of the PPPs that regional stakeholders are interested in pursuing. In the Lea County region, projects identified on the PPP table are primarily groundwater monitoring and mapping, conservation, and reuse projects as well as water system infrastructure upgrades.

At steering committee meetings held in 2015 and 2016, the group discussed projects that would have a larger regional or sub-regional impact and for which there is interest in collaboration to seek funding and for implementation. The following key collaborative projects were identified by the steering committee and Lea County region stakeholders:

- *Groundwater management, monitoring, and aquifer mapping.* Collect information to assess groundwater resources on a regional scale using recent data and focusing on the Ogallala, Capitan, and Jal basins. This study should enhance understanding of recharge areas and location and quality of water resources in the region. Identify remaining groundwater (saturated thickness) in New Mexico Office of the State Engineer (NMOSE) administrative model cells surrounding key water supplies in the region. Increased data collection and metering will improve the accuracy of the administrative model.

- *Municipal and agricultural conservation.* Developing a County-wide conservation program that targets mainly municipal and industrial uses is one aspect of this initiative. The region identified the importance of using public service announcements to promote water conservation to the public. The Lea County Soil and Water Conservation District implements multiple agricultural water conservation efforts in the region. One area where additional support is needed is funding for using satellite imagery technology to evaluate soil types for agricultural efficiency and water conservation.

- *Link economic development to water*. Encourage low water use industries and businesses. Identify appropriate low water use industries for Lea County and for New Mexico.

- *Treatment and use of produced water*. A significant amount of water is pumped from the aquifer to supply oil and gas production. Simultaneously, oil and gas drilling results in produced water, which if treated, could be used to meet certain future demands. Continued support of technology research efforts to develop pilot projects for treating and using produced water are the main components of this strategy. However, identifying users who are willing to purchase this water rather than continue pumping from the aquifer to meet their needs is a challenge due to the cost of the treating produced water.

- *Treatment and use of wastewater effluent.* Outdoor irrigation doesn't require the use of potable water. By switching to effluent reuse, water suppliers and irrigators can help preserve potable groundwater supplies. This strategy focuses first on identifying effluent reuse opportunities in Lea County and then on design and construction of systems to deliver the treated water.

- *Water system upgrade and improvements.* Many water suppliers in the region require funding for water system improvements, upgrades, and well drilling. As water levels decline, suppliers will need to deepen their wells or drill additional wells to meet future demand.

The 2016 Regional Water Plan characterizes supply and demand issues and identifies strategies to meet the projected gaps between water supply and demand. This plan should be added to, updated, and revised to reflect implementation of strategies, address changing conditions, and continue to inform water managers and other stakeholders of important water issues affecting the region.

1. Introduction

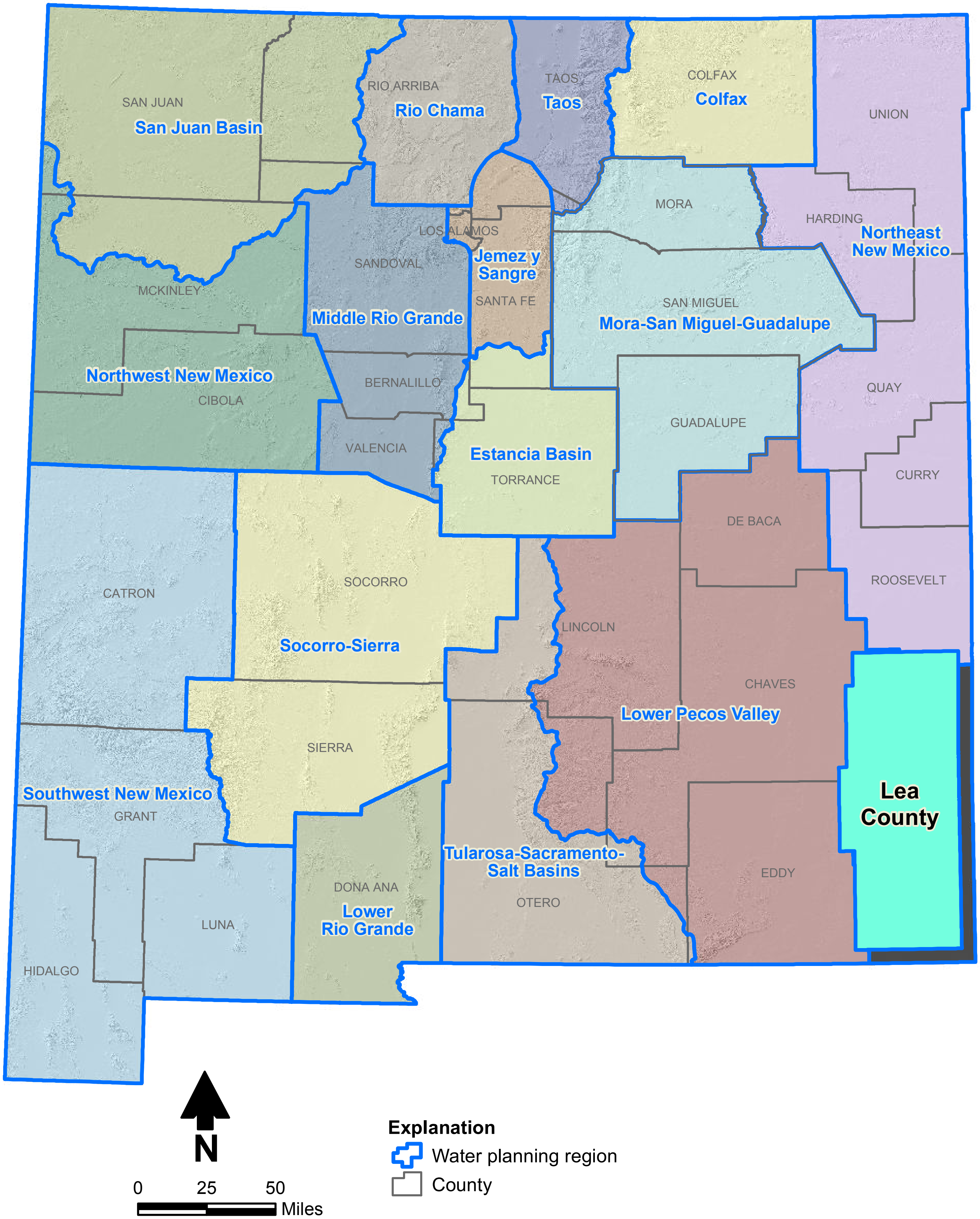
The Lea County Water Planning Region, which includes all of Lea County (Figure 1-1), is one of 16 water planning regions in the State of New Mexico. Regional water planning was initiated in New Mexico in 1987, its primary purpose being to protect New Mexico water resources and to ensure that each region is prepared to meet future water demands. Between 1987 and 2008, each of the 16 planning regions, with funding and oversight from the New Mexico Interstate Stream Commission (NMISC), developed a plan to meet regional water needs over the ensuing 40 years. The *Lea County Regional Water Plan* was completed in 2000 and accepted by the NMISC (Leedshill-Herkenhoff, Inc. et al., 2000).

The purpose of this document is to provide new and changed information related to water planning in the Lea County region, as listed in the bullets below, and to evaluate projections of future water supply and demand for the region using a common technical approach applied to all 16 planning regions statewide. Accordingly, the following sections summarize key information in the 2000 plan and provide updated information regarding changed conditions and additional data that have become available. Specifically, this update:

- Identifies significant new research or data that provide a better understanding of current water supplies and demands in the Lea County region.
- Presents recent water use information and develops updated projections of future water demand using the common technical approach developed by the NMISC, in order to facilitate incorporation into the New Mexico State Water Plan.
- Identifies strategies, including infrastructure projects, conservation programs, watershed management policies, or other types of strategies that will help to balance supplies and projected demands and address the Lea County region's future water management needs and goals.
- Discusses other goals or priorities as identified by stakeholders in the region.

The water supply and demand information in this regional water plan (RWP) is based on current published studies and data and information supplied by water stakeholders in the region. The organization of this update follows the template provided in the *Updated Regional Water Planning Handbook: Guidelines to Preparing Updates to New Mexico Regional Water Plans* (NMISC, 2013) (referred to herein as the Handbook):

- Information regarding the public involvement process followed during development of this RWP update and entities involved in the planning process is provided in Section 2.
- Section 3 provides background information regarding the characteristics of the Lea County planning region, including an overview of updated population and economic data.



LEA COUNTY REGIONAL WATER PLAN 2016

Location of Lea County Water Planning Region

Figure 1-1

- The legal framework and constraints that affect the availability of water are briefly summarized in Section 4, with recent developments and any new issues discussed in more detail.

- The physical availability of surface water and groundwater and water quality constraints was discussed in detail in the 2000 RWP; key information from that plan is summarized in Section 5, with new information that has become available since 2000 incorporated as applicable. In addition, Section 5 presents updated monitoring data for temperature, precipitation, drought indices, groundwater levels, and water quality, and an estimate of the administrative water supply including an estimate of drought supply.

- The information regarding historical water demand in the planning region, projected population and economic growth, and projected future water demand was discussed in detail in the 2000 RWP. Section 6 provides updated population and water use data, which are then used to develop updated projections of future water demand.

- Based on the current water supply and demand information discussed in Sections 5 and 6, Section 7 updates the projected gap between supply and demand of the planning region.

- Section 8 outlines new strategies (water programs, projects, or policies) identified by the region as part of this update, including additional water conservation measures.

Common Technical Approach

To prepare both the regional water plans and the state water plan, the State has developed a set of methods for assessing the available supply and projected demand that can be used consistently in all 16 planning regions in New Mexico. This common technical approach outlines the basis for defining the available water supply and specifies methods for estimating future demand in all categories of water use:

- The method to estimate the available supply (referred to as the *administrative water supply* in the Handbook) is based on withdrawals of water as reported in the *NMOSE Water Use by Categories 2010* report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the diversion is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region. An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts.
- Projections of future demands in nine categories of water use are based on demographic and economic trends and population projections. Consistent methods and assumptions for each category of water use are applied across all planning regions.

The objective of applying this common technical approach is to be able to efficiently develop a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the State's pressing water issues.

Water supply and demand information (Sections 5 through 7) is assessed in accordance with a common technical approach, as identified in the Handbook (NMISC, 2013) (where it is referred to as a common technical *platform*). This common technical approach is a simple methodology that can be used consistently across all regions to assess supply and demand, with the objective of efficiently developing a statewide overview of the balance between supply and demand for planning purposes.

Four terms frequently used when discussing water throughout this plan have specific definitions related to this RWP:

- *Water use* is water withdrawn from a surface or groundwater source for a specific use. In New Mexico water is accounted for as one of the nine categories of use in the *New Mexico Water Use by Categories 2010* report prepared by the New Mexico Office of the State Engineer (NMOSE).
- *Water withdrawal* is water diverted or removed from a surface or groundwater source for use.
- *Administrative water supply* is based on the amount of water withdrawals in 2010 as outlined in the *New Mexico Water Use by Categories 2010* report.
- *Water demand* is the amount of water needed at a specified time.

2. Public Involvement in the Planning Process

During the past two years, the regional water planning steering committees, interested stakeholders, NMISC, and consultants to the NMISC have worked together to develop regional water plan updates. The purpose of this section is to describe public involvement activities during the regional water plan update process, guided by the Handbook, which outlined a public involvement process that allowed for broad general public participation combined with leadership from key water user groups.

2.1 The New Mexico Interstate Stream Commission's Role in Public Involvement in the Regional Water Plan Update Process

The NMISC participated in the public involvement process through a team of contractors and NMISC staff that assisted the regions in conducting public outreach. The NMISC's role in this process consisted of certain key elements:

- Setting up and facilitating meetings to carry out the regional water plan update process.
- Working with local representatives to encourage broad public involvement and participation in the planning process.

- Working to re-establish steering committees in regions that no longer had active steering committees.
- Supporting the steering committees once they were established.
- Facilitating input from the stakeholders and steering committees in the form of compiling comments to the technical sections drafted by the State and developing draft lists of projects, programs, and policies (PPPs) based on meeting input, with an emphasis on projects that could be implemented.
- Finalizing Section 8, Implementation of Strategies to Meet Future Water Demand, by writing a narrative that describes the key collaborative strategies based on steering committee direction.

This approach represents a change in the State's role from the initial round of regional water planning, beginning in the1990s through 2008, when the original regional water plans were developed. During that phase of planning, the NMISC granted regions funding to form their own regional steering committees and hire consultants to write the regional water plans, but NMISC staff were not directly involved in the process. Over time, many of the regional steering committees established for the purpose of developing a region's water plan disbanded. Funding for regional planning decreased significantly, and regions were not meeting to keep their plans current.

In accordance with the updated Handbook (NMISC, 2013), the NMISC re-established the regional planning effort in 2014 by working with existing local and regional stakeholders and organizations, such as regional councils of government, water providers, water user organizations, and elected officials. The NMISC initiated the process by hosting and facilitating meetings in all 16 regions between February and August of 2014. During these first months, through its team of consultants and working with contacts in the regions, the NMISC prepared "master stakeholder" lists, comprised of water providers and managers, local government representatives, and members of the public with a general interest in water, and assisted in developing updated steering committees based on criteria from the Handbook and recommendations from the stakeholders. (The steering committee and master stakeholder lists for the Lea County region are provided in Section 2.2.1 and Appendix 2-A, respectively.) These individuals were identified through research, communication with other water user group representatives in the region, contacting local organizations and entities, and making phone calls. Steering committee members represent the different water users groups identified in the Handbook and have water management expertise and responsibilities.

The steering committee was tasked with four main responsibilities:

- Provide input to the water user groups they represent and ensure that other concerned or interested individuals receive information about the water planning process and meetings.
- Provide direction on the public involvement process, including setting meeting times and locations and promoting outreach.
- Identify water-related PPPs needed to address water management challenges in the region and future water needs.
- Comment on the draft *Lea County Regional Water Plan 2016*, as well as gather public comments. (Appendix 2-B includes a summary of comments on the technical and legal sections of the document that were prepared by the NMISC [Sections 1, 3, 4, 5, 6, and 7].)

In 2016, the NMISC continued to support regional steering committees by facilitating three additional steering committee meetings open to the public in each of the 16 regions. The purpose of these meetings was to provide the regions with their draft technical sections that the NMISC had developed and for the regions to further refine their strategies for meeting future water challenges.

Throughout the regional water planning process all meetings were open to the public. Members of the public who have an interest in water were invited directly or indirectly through a steering committee representative to participate in the regional water planning process

Section 2.2 provides additional detail regarding the public involvement process for the Lea County 2016 regional water plan.

2.2 Public Involvement in the Lea County Planning Process

This section documents the steering committee and public involvement process used in updating the plan and documenting ideas generated by the region for future public involvement in the implementation of the plan.

2.2.1 Identification of Regional Steering Committee Members

The Handbook (NMISC, 2013) specifies that the steering committee membership include representatives from multiple water user groups. Some of the categories may not be applicable to a specific region, and the regions could add other categories as appropriate to their specific region. The steering committee representation listed in the Handbook includes:

- Agricultural – surface water user
- Agricultural – groundwater user
- Municipal government
- Rural water provider
- Extractive industry
- Environmental interest
- County government
- Local (retail) business
- Tribal entity
- Watershed interest
- Federal agency
- Other groups as identified by the steering committee

Steering committee members were identified and asked to participate through interviews, public meetings, recommendations, and outreach to specific interests. Through this outreach, the Lea County Water Planning Region established a representative steering committee, the members of which are listed in Table 2-1.

The steering committee includes several state and federal agency representatives who participate as technical resources to the region. These individuals are generally knowledgeable about water issues in the region and are involved with many of the PPPs related to water management in the region. The list also includes non-profit groups who are involved in local water-related initiatives and/or have expertise such as watershed restoration or mutual domestic concerns and issues. The steering committee identified Mike Gallagher, Lea County Manager, as chair.

The steering committee discussed the value of developing subcommittees, but decided that subcommittees weren't necessary.

2.2.2 Regional Water Plan Update Meetings

All steering committee meetings and NMISC-facilitated water planning meetings were open to the public and interested stakeholders. Meetings were announced to the master stakeholder list by e-mail, and participation from all meeting attendees was encouraged. Steering committee members served as a conduit of information to others and, through their own organizational communications with other agencies, encouraged participation in the process. Steering committee members were also asked to share information about the process with other stakeholders in the region. Generally, steering committee members ensured that other concerned or interested individuals received the announcements and recommended key contacts to add to the master stakeholder list throughout the planning process.

Table 2-1. Steering Committee Members, Lea County Water Planning Region

Water User Group	Name	Organization / Representation
Agricultural – groundwater Acequias	Buster Goff	Chairman, Lea County Water Users Association
Agricultural – surface water user Acequias	NA	No surface water irrigation use reported in the region
Rural water provider	Marilyn Burns	Mayor, Tatum
County government	Jim Britton	Lea County; Lea County Water Users Association
	Greg Fulfer	Lea County; Lea County Water Users Association
	Mike Gallagher	Manager, Lea County
	Bruce Reid	Planner, Lea County
Municipal government	Alan Eades	Hobbs; Lea County Water Users Association
	Scotty Gandy	Commission Member, City of Lovington; Lea County Water Users Association
	James Williams	City Manager, Lovington
	Wyatt Duncan	City of Lovington
	Cheryl Chance	Mayor, Jal
	Sam Cobb	Mayor, Hobbs
	Van Myrick	City of Jal, Public Works Director
	Matt White	Mayor, City of Eunice; Vice-Chair, Lea County Water Users Association
	Tim Woomer	City of Hobbs; Lea County Water Users Association
Tribal government	NA	No tribal use reported in the region
Environmental interest	Shay Hager	Lea County Soil and Water Conservation District
Extractive industry (identified as technical support to the region)	Larry Scott	Lynx Petroleum Consultants
Federal agency (technical support to the region)		USGS, New Mexico Water Sciences Center
State agency (identified as technical support to the region)	Brandi Garcia	New Mexico Environment Department
Local (retail) business	Steve Verrick	President & CEO, Lea County Economic Development Corporation
	Elyce Gobat	Lea County Economic Development Corporation
	Daniel Johncox	Young's Factory Built Homes
	Lindsay Chism McCarter	Interim Director, Chamber of Commerce, City of Hobbs
Other groups as identified by the steering committee	Dean Kinsolving	Rancher
	Paul A. Herrera	Tatum
Other groups as identified by the steering committee as technical support to the region	Hubert Quintana	Southeast New Mexico Economic Development District
Watershed interest	John Norris	Lea County Soil and Water Conservation District

The steering committee discussed and made the following recommendations regarding meeting times and locations that would maximize public involvement:

- The steering committee agreed that weekday mornings would be the best time for scheduling meetings.
- Mike Gallagher from Lea County and Monica Russell from the Lea County Water Users Association agreed to serve as key contacts for the region.
- Steering committee members will continue to assist with outreach.

Over the two-year update process, nine meetings were held in the Lea County region. A summary of each of the meetings is provided in Table 2-2.

2.2.3 Current and Future Ideas for Public Outreach during Implementation of the Regional Water Plan Update

The steering committee stated that they would be interested in ongoing support for future regional water planning efforts. In particular, the steering committee would like technical experts to present information on water planning issues identified in the 2016 Lea County Regional Water Plan.

3. Description of the Planning Region

This section provides a general overview of the Lea County Water Planning Region. Detailed information, including maps illustrating the land use and general features of the region, was provided in the 2000 RWP; that information is briefly summarized and updated as appropriate here. Additional detail on the climate, water resources, and demographics of the region is provided in Sections 5 and 6.

3.1 General Description of the Planning Region

The Lea County Water Planning Region is located in the southeastern corner of New Mexico and consists entirely of Lea County. The region is bounded on the north primarily by Roosevelt County, on the west by Chaves and Eddy counties, and on the south and east by the Texas state line (Figure 1-1). The total area of the planning region is 4,393 square miles. Elevations range from 4,400 feet above mean sea level (ft amsl) in the northwest portion of the region to 2,900 ft amsl in the southeast. While no perennial streams are present in the region, surface runoff south and west of the Mescalero ridge flows to the Pecos River; to the northeast of the ridge, water flows to the Texas Gulf Basin. The communities of Tatum, Lovington, Hobbs, and Jal are economic centers for the agricultural and oil and gas industries in the region.

Table 2-2. Lea County Region Public Meetings
Page 1 of 3

Date	Location	Purpose	Meeting Summary
FY 2014			
5/8/2014	Lovington, NM	Kickoff meeting: Present the regional water planning update process to the region and continue to conduct outreach to begin building the steering committee.	Representatives from many of the water user groups attended the meeting and were instrumental in identifying other individuals as potential representatives for a particular group. Many of the meeting attendees were not on the master stakeholder list, and those individuals were added to the list.
FY 2015			
2/12/2015	Hobbs, NM	Present the technical data compiled and synthesized for the region.	Data presented included population and economic trends through a series of tables, the administrative water supply, the projected future water demand, and the gap between supply and demand for both normal and drought years. In addition, the presentation reaffirmed the development of a steering committee to guide the process as outlined in the Handbook.
2/26/2015	Lea County Events Center, Hobbs, NM	Review the update process, technical data, and the timeline for completing the regional water plan (RWP) update.	The group discussed new information from the region and/or the projects, policies, programs (PPPs) that had been implemented since the 2000 plan. The steering committee membership and leadership were affirmed, with alternates named as appropriate. The group further discussed where future meetings would be held and the time that worked the best for getting the most attendance. A date was set for the next meeting and a summary of the discussion was sent to the master stakeholder list with information about the next meeting including agenda items, location, date and time, and next steps.

Table 2-2. Lea County Region Public Meetings
Page 2 of 3

Date	Location	Purpose	Meeting Summary
4/22/2015	Troy Harris Center at the Lovington Chamber of Commerce, Lovington, NM	Review projects completed since submission of the accepted plan and provide additional input. Discuss potential collaborative projects.	Matt Ely with USGS gave a presentation about the past and current state of water levels in the Ogallala aquifer in Lea County and discussed the role of the USGS in Lea County. For new people who had not attended meetings before, the group reviewed the update process, technical data, and the timeline for completing the RWP update. The steering committee membership and leadership were discussed and affirmed, with alternates named as appropriate. The group reviewed projects completed since submission of the accepted plan and provided additional input. The group further discussed potential collaborative projects such as agriculture projects, regional groundwater modeling, water treatment and reuse of produced water, water system regionalization/cooperation, monitoring/data collection, drought contingency planning, municipal conservation and reuse, local and state water policy recommendations, and water quality protection.
5/21/2015	City Hall Annex, Hobbs, New Mexico	Discuss elements that would be included in the public involvement chapter and ideas for FY 2015-2016 outreach. Review and discuss future project checklist discussed at previous meeting and sent to stakeholders.	The group reviewed the potential collaborative projects that were discussed at the previous meeting. The future project checklist was reviewed and discussed, and a deadline for sending information to the consultants was confirmed. The group participated in a brainstorming activity that helped to identify regional projects that held the potential for the greatest collaboration and effort, discussing and ranking the level of interest. The consultants affirmed the next steps for the RWP update effort and a general idea for meeting again in FY 2015-2016.

Table 2-2. Lea County Region Public Meetings
Page 3 of 3

Date	Location	Purpose	Meeting Summary
FY 2016			
2/26/2016	City Hall Annex, Hobbs, New Mexico	Review steering committee membership and leadership. Focus on the PPPs to be included in the update and the process for submitting comments to the draft RWP.	The group reviewed the steering committee membership and suggested additional members to fill vacancies and decided that steering committee leadership would continue to be Mike Gallagher, Lea County Manager. The group also suggested new members for the steering committee to replace those who had left. The steering committee and interested stakeholders present participated in a brainstorming activity that helped to identify and rank (although ranking of projects for funding priority is not part of the regional water planning update process) regional projects that held the potential for the greatest collaboration and effort. The consultants affirmed the next steps for the RWP update effort and scheduled the next meeting for Tuesday, March 29 at 9:30 a.m.
3/29/2016	City Hall Annex, Hobbs, New Mexico	Refine the key collaborative PPP recommendations specific to Section 8.	The group identified a number of projects that would potentially have greater interest and benefit to multiple stakeholders and identified key program and policy recommendations during group discussion. The final meeting was scheduled for May 5, 2016.
5/5/2016	City Hall Annex, Hobbs, New Mexico	Review the public involvement section (2) and the Section 8 key strategies and PPP list.	The steering committee approved the press release and agreed to hold an additional meeting June 21, 2016. The Steering Committee provided edits and additions to the public involvement and key strategies for implementation sections of the plan.
6/21/2016	City Hall Annex, Hobbs, New Mexico	Finalize public involvement section (2) and the Section 8 key strategies and PPP list. Review comments received from the public (if any).	The steering committee reviewed the updated drafts of Sections 2 and 8 as well as the single comment document. Final edits will be incorporated by DBS&A prior to submission of these sections to the NMISC on June 30.

3.2 Climate

Lea County's semiarid climate averages about 12 to 18 inches of rain annually; year to year precipitation varies from extremes of less than an inch to more than 36 inches. Most of the precipitation (80 percent) falls during the warmest 6 months of the year, from May through October. Average annual snowfall is about 3 inches. On rare occasions, a tropical hurricane may cause heavy rain in eastern and central New Mexico as it moves inland from the western part of the Gulf of Mexico. Pan evaporation averages 110 inches in southeastern valleys of New Mexico (WRCC, 2015).

3.3 Major Surface Water and Groundwater Sources

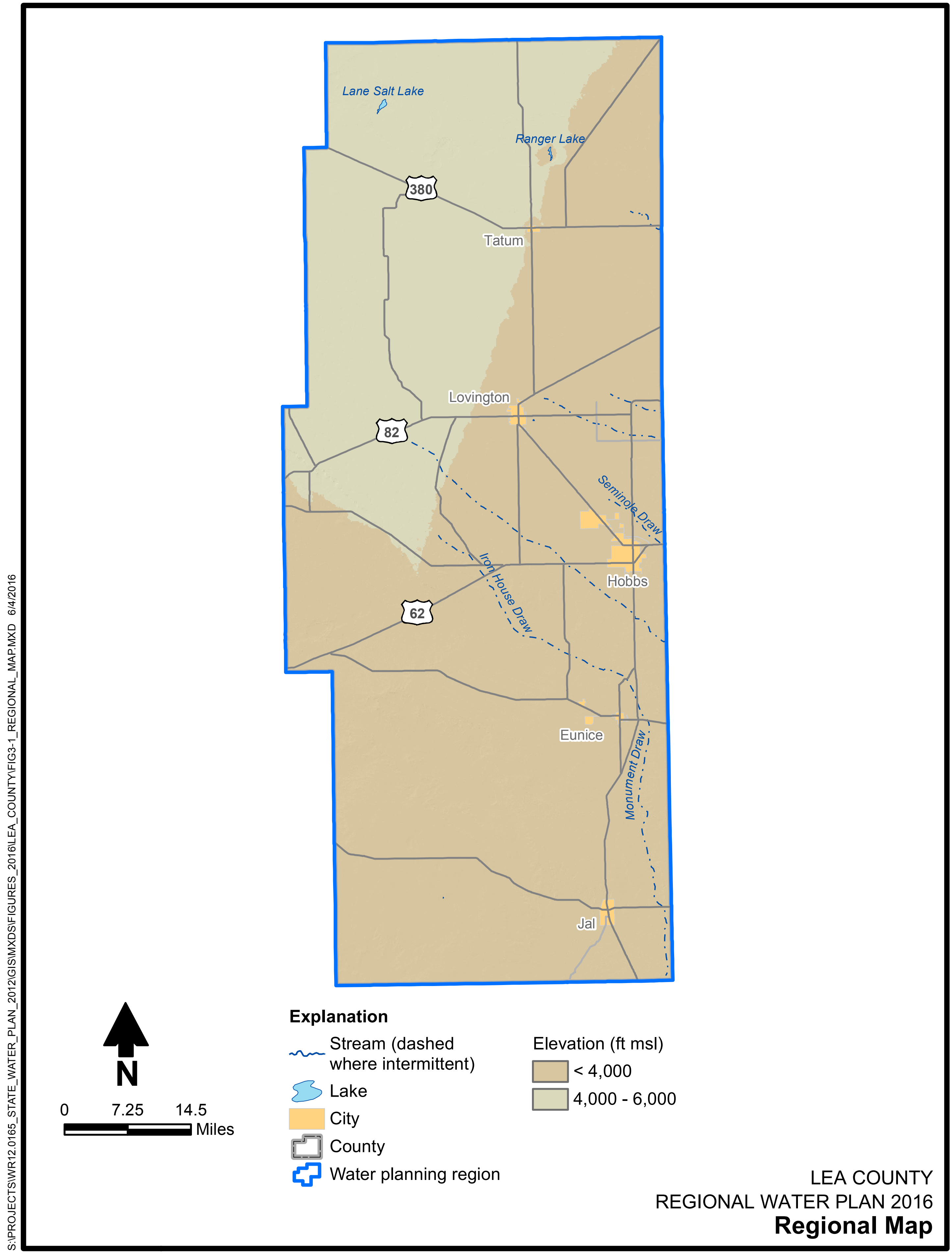
No major surface water supplies are available in Lea County, only intermittent streams, lakes, stock ponds, and small playas that collect runoff during thunderstorms (Figure 3-1). The quality of surface water is adequate for livestock uses, which is its primary use in the basin.

Groundwater is provided primarily by the High Plains Aquifer composed of the Ogallala Formation. Cretaceous and Triassic rocks underlying the Ogallala Formation limit downward percolation from the Ogallala Aquifer. The region includes portions of five declared underground water basins (UWBs): Capitan, Carlsbad, Jal, Lea County, and Roswell. (A declared UWB is an area of the state proclaimed by the State Engineer to be underlain by a groundwater source having reasonably ascertainable boundaries. By such proclamation the State Engineer assumes jurisdiction over the appropriation and use of groundwater from the source.) The Jal UWB falls entirely within the Lea County region, but the other four are shared with the Lower Pecos Valley region, although only a small portion of the Lea County UWB extends into the Lower Pecos Valley region, and Lea County overlies only a small extension of the Roswell Basin. A map showing the UWBs in the region is provided in Section 4.1.2.2.

Additional information on administrative basins and surface and groundwater resources of the region is included in Section 4 and Sections 5.2 and 5.3, respectively.

3.4 Demographics, Economic Overview, and Land Use

The total 2013 population of Lea County (and thus the Lea County Water Planning Region) was 68,062 (U.S. Census Bureau, 2014a), an increase of 5.7 percent from the 2010 population, making it the fastest growing county in New Mexico. Increased oil and gas production from the numerous Permian Basin oil and gas fields drove this population growth.



LEA COUNTY
REGIONAL WATER PLAN 2016
Regional Map

Figure 3-1

Land in the Lea County water planning region is owned by various federal, state, and private entities (no tribal land is present in the region), as illustrated on Figure 3-2 and outlined below:

- Federal agencies: 659.1 square miles
- State agencies: 1,485.5 square miles
- Private entities: 2,248.1 square miles

Current statistics on the economy and land use in each county, compiled from the U.S. Census Bureau and the New Mexico Department of Workforce Solutions, are summarized in Table 3-1. Additional detail on demographics and economics within the region is provided in Section 6.

4. Legal Issues

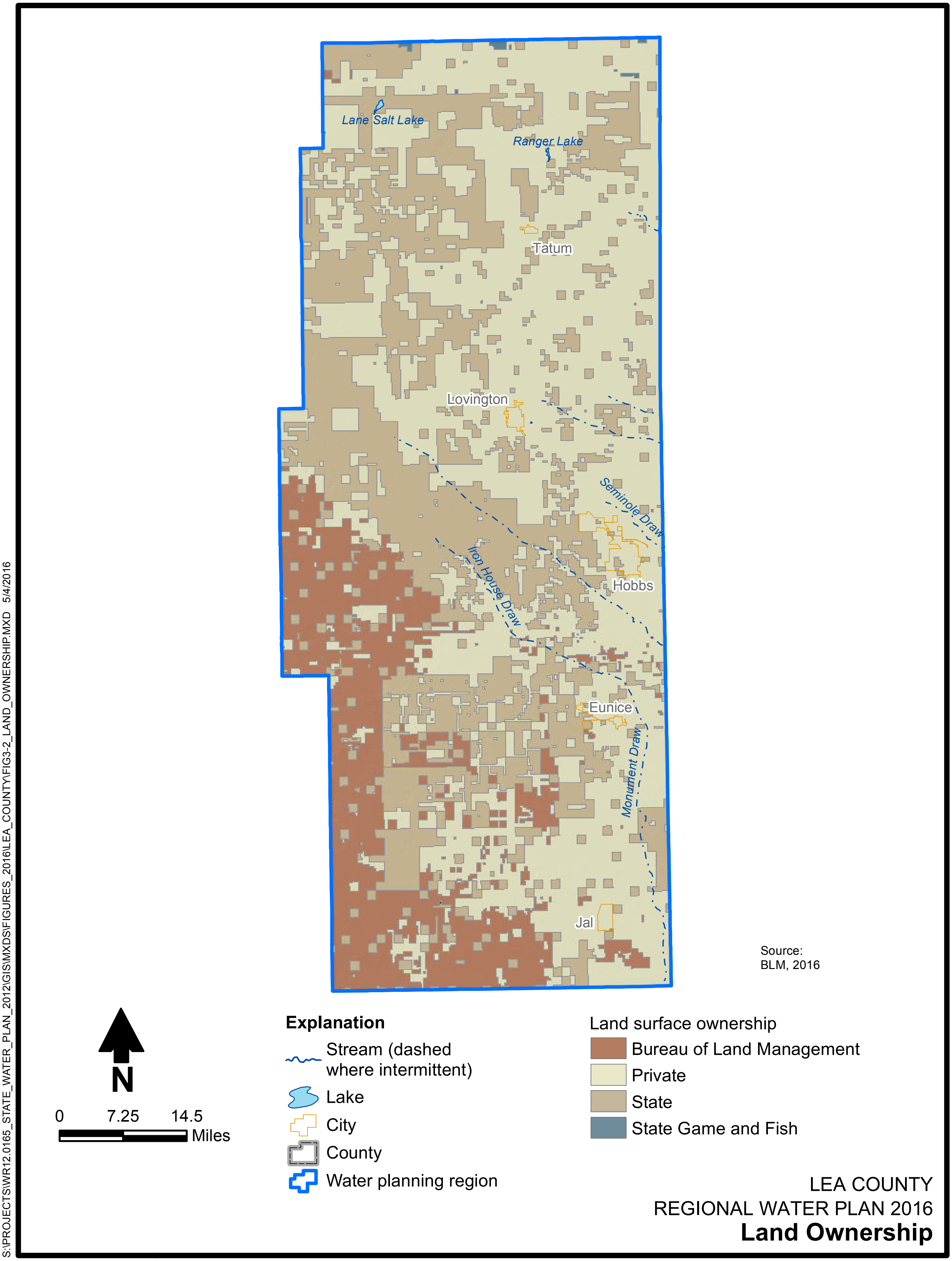
4.1 Relevant Water Law

4.1.1 State of New Mexico Law

Since the accepted regional water plan for the Lea County Water Planning Region was published in 2000, there have been significant changes in New Mexico water law through case law, statutes, and regulations. These changes address statewide issues including, but not limited to, domestic well permitting, the State Engineer's authority to regulate water rights, administrative and legal review of water rights matters, use of settlements to allocate water resources, the rights appurtenant to a water right, and acequia water rights. New law has also been enacted to address water project financing and to establish a new strategic water reserve. These general state law changes are addressed by topic area below. State law more specific to the Lea County region is discussed in Section 4.1.2.

4.1.1.1 Regulatory Powers of the NMOSE

Several cases have addressed the regulatory powers of the Office of the State Engineer. In 2003, the New Mexico Legislature enacted NMSA 1978, § 72-2-9.1, relating to the administration of water rights by priority date. The legislature recognized that "the adjudication process is slow, the need for water administration is urgent, compliance with interstate compacts is imperative and the state engineer has authority to administer water allocations in accordance with the water right priorities recorded with or declared or otherwise available to the state engineer." Section 72-2-9.1(A). The statute authorized the State Engineer to adopt rules for priority administration in a manner that does not interfere with future or pending adjudications, creates no impairment of water rights other than what is required to enforce priorities, and creates no increased depletions.



LEA COUNTY
REGIONAL WATER PLAN 2016
Land Ownership

Figure 3-2

Table 3-1. Summary of Demographic and Economic Statistics for the Lea County Water Planning Region

a. Population

County	2000	2010	2013
Lea	55,511	64,727	68,062
Total Region	55,511	64,727	68,062

Source: U.S. Census Bureau, 2014a, unless otherwise noted.

b. Income and Employment

County	2008-2012 Income [a]		Labor Force Annual Average 2013 [b]		
	Per Capita ($)	Percentage of State Average	Number of Workers	Number Employed	Unemployment Rate (%)
Lea	22,484	94.6	31,631	30,326	4.1

[a] U.S. Census Bureau, 2014c, American Community Survey 5-Year Estimate
[b] NM Department of Workforce Solutions, 2014

c. Business Environment

County	Industry	Number Employed	Number of Businesses
	2008-2012 [a]		*2012* [b]
Lea	Agriculture, mining Education services, healthcare Retail trade Construction Arts, entertainment, recreation, accommodation, food service	5,827 4,801 2,513 2,285 1,855	1,683

[a] U.S. Census Bureau, 2014b

d. Agriculture

County	Farms / Ranches [a]			Most Valuable Agricultural Commodities [b]
	Number	Acreage: Total	Acreage: Average	
Lea	460	1,981,988	4,309	Milk from cows Cattle, calves Cotton, cottonseed Other crops and hay

[a] USDA NASS, 2014, Table 1
[b] USDA NASS, 2014, Table 2

Based on Section 72-2-9.1, the State Engineer promulgated the Active Water Resource Management (AWRM) regulations in December 2004. The regulation's stated purpose is to establish the framework for the State Engineer "to carry out his responsibility to supervise the physical distribution of water to protect senior water right owners, to assure compliance with interstate stream compacts and to prevent waste by administration of water rights." 19.25. 13.6 NMAC. In order to carry out this purpose, the AWRM regulations provide the framework for the promulgation of specific water master district rules and regulations. No district-specific AWRM regulations have been promulgated in the Lea County region at the time of writing.

The general AWRM regulations set forth the duties of a water master to administer water rights in the specific district under the water master's control. Before the water master can take steps to manage the district, AWRM requires the NMOSE to determine the "administrable water rights" for purposes of priority administration. The State Engineer determines the elements, including priority date, of each user's administrable water right using a hierarchy of the best available evidence, in the following order: (A) a final decree or partial final decree from an adjudication, (B) a subfile order from an adjudication, (C) an offer of judgment from an adjudication, (D) a hydrographic survey, (E) a license issued by the State Engineer, (F) a permit issued by the State Engineer along with proof of beneficial use, and (G) a determination by the State Engineer using "the best available evidence" of historical beneficial use. Once determined, this list of administrable water rights is published and subject to appeal, 19.25.13.27 NMAC, and once the list is finalized, the water master may evaluate the available water supply in the district and manage that supply according to users' priority dates.

The general AWRM regulations also allow for the use of replacement plans to offset the depletions caused by out-of-priority water use. The development, review, and approval of replacement plans will be based on a generalized hydrologic analysis developed by the State Engineer.

The general AWRM regulations were unsuccessfully challenged in court in *Tri-State Generation and Transmission Ass'n, Inc. v. D'Antonio*, 2012-NMSC-039. In this case, the New Mexico Supreme Court analyzed whether Section 72–2–9.1 provided the State Engineer with the authority to adopt regulations allowing it to administer water rights according to interim priority determinations developed by the NMOSE.

In *Tri-State* the Court held that (1) the Legislature delegated lawful authority to the State Engineer to promulgate the AWRM regulations, and (2) the regulations are not unconstitutional on separation of powers, due process, or vagueness grounds. Specifically, the Court found that establishing such regulations does not violate the constitutional separation of powers because AWRM regulations do not go beyond the broad powers vested in the State Engineer, including the authority vested by Section 72–2–9.1. The Court further found that the AWRM regulations did not violate the separation of powers between the executive and the judiciary despite the fact that the regulations allow priorities to be administered prior to an *inter se* adjudication of priority. Rather, the Legislature chose to grant quasi-judicial authority in administering priorities prior to final adjudication to the NMOSE, which was well within its discretion to do.

The Court further held that the AWRM regulations do not violate constitutional due process because they do not deprive the party challenging the regulations of a property right. As explained by the Court, a water right is a limited, usufructuary right providing only a right to use a certain amount of water established through beneficial use. As such, based on the long-standing principle that a water right entitles its holder to the use of water according to priority, regulation of that use by the State does not amount to a deprivation of a property right.

In addition to *Tri-State*, several cases that address other aspects of the regulatory powers of the NMOSE have been decided recently. Priority administration was addressed in a case concerning the settlement agreement entered into by the United States, New Mexico (State), the Carlsbad Irrigation District (CID), and the Pecos Valley Artesian Conservancy District (PVACD) related to the use of the waters of the Pecos River. *State ex rel. Office of the State Engineer v. Lewis*, 2007-NMCA-008, 140 N.M. 1. The issues in the case revolved around (1) the competing claims of downstream, senior surface water users in the Carlsbad area and upstream, junior groundwater users in the Roswell Artesian Basin and (2) the competing claims of New Mexico and Texas users. Through the settlement agreement, the parties sought to resolve these issues through public funding, without offending the doctrine of prior appropriation and without resorting to a priority call. The settlement agreement was, in essence, a water conservation plan designed to augment the surface flows of the lower Pecos River in order to (1) secure the delivery of water within the CID, (2) meet the State's obligations to Texas under the 1948 Pecos River Compact (Compact) and the 1988 United States Supreme Court Decree, and (3) limit the circumstances under which the United States and CID would be entitled to make a call for the administration of water right priorities. The agreement included the development of a well field to facilitate the physical delivery of groundwater directly into the Pecos River under certain conditions, the purchase and transfer to the well field of existing groundwater rights in the Roswell UWB by the State, and the purchase and retirement of irrigated land within PVACD and CID.

The Court of Appeals framed the issue as whether the priority call procedure is the exclusive means under the doctrine of prior appropriation to resolve existing and projected future water shortage issues. The Court held that Article XVI, Section 2 of the Constitution, which states that "[p]riority of appropriation shall give the better right," and Article IX of the Compact, which states that "[i]n maintaining the flows at the New Mexico-Texas state line required by this compact, New Mexico shall in all instances apply the principle of prior appropriation within New Mexico," do not require a priority call as the sole response to water shortage concerns. The Court found it reasonable to construe these provisions to permit flexibility within the prior appropriation doctrine in attempting to resolve longstanding water issues. Thus, the more flexible approach pursued by the settling parties through the settlement agreement was not ruled out in the Constitution, the Compact, or case precedent.

In relation to the NMOSE's regulatory authority over supplemental wells, in *Herrington v. State of New Mexico ex rel. State Engineer*, 2006-NMSC-014, 139 N.M. 368, the New Mexico Supreme Court clarified certain aspects of the *Templeton* doctrine. The *Templeton* doctrine allows senior surface water appropriators impaired by junior wells to drill a supplemental well to offset the impact to their water right. *See Templeton v. Pecos Valley Artesian Conservancy District*, 1958-NMSC-131, 65 N.M. 59. According to *Templeton*, drilling the supplemental well allows the senior surface right owner to keep their surface water right whole by drawing upon groundwater that originally fed the surface water supply. Although the New Mexico prior appropriation doctrine theoretically does not allow for sharing of water shortages, the *Templeton* doctrine permits both the aggrieved senior surface appropriator and the junior user to divert their full share of water. The requirements for a successful *Templeton* supplemental well include (1) a valid surface water right, (2) surface water fed in part by groundwater (baseflow), (3) junior appropriators intercepting that groundwater by pumping, and (4) a proposed well that taps the same groundwater source of the applicant's original appropriation.

In *Herrington* the Court clarified that the well at issue would meet the *Templeton* requirements if it was dug into the same aquifer that fed the surface water. The Court also clarified whether a *Templeton* well could be drilled upstream of the surface point of diversion. The Court determined that the proper placement of a *Templeton* well must be considered on a case-by-case basis, and that these supplemental wells are not necessarily required to be upstream in all cases.

Lastly, the Court addressed the difference between a *Templeton* supplemental well and a statutory supplemental well drilled under NMSA 1978, Sections 72–5–23, -24 (1985). The Court found that a statutory transfer must occur within a continuous hydrologic unit, which differs from the narrow *Templeton* same-source requirement. Although surface to groundwater transfers require a hydrologic connection, this may be a more general determination than the *Templeton* baseflow source requirement. Further, *Templeton* supplemental wells service the original parcel, while statutory transfers may apply to new uses of the water, over significant distances.

Also related to the NMOSE's regulatory authority, the Court of Appeals addressed unperfected water rights in *Hanson v. Turney*, 2004-NMCA-069, 136 N.M. 1. In *Hanson*, a water rights permit holder who had not yet applied the water to beneficial use sought to transfer her unperfected water right from irrigation to subdivision use. The State Engineer denied the application because the water had not been put to beneficial use. The permit holder argued that pursuant to NMSA 1978, Section 72-12-7(A) (1985), which allows the owner of a "water right" to change the use of the water upon application to the State Engineer, the State Engineer had wrongly rejected her application. The Court upheld the denial of the application, finding that under western water law the term "water right" does not include a permit to appropriate water when no water has been put to beneficial use. Accordingly, as used in Section 72-12-7(A) the term "water right" requires the perfection of a water right through beneficial use before a transfer can be allowed.

4.1.1.2 Legal Review of NMOSE Determinations

In *Lion's Gate Water v. D'Antonio*, 2009-NMSC-057, 147 N.M. 523, the Supreme Court addressed the scope of the district court's review of the State Engineer's determination that no water is available for appropriation. In *Lion's Gate*, the applicant filed a water rights application, which the State Engineer rejected without publishing notice of the application or holding a hearing, finding that no water was available for appropriation. The rejected application was subsequently reviewed in an administrative proceeding before the State Engineer's hearing examiner. The hearing examiner upheld the State Engineer's decision on the grounds that there was no unappropriated water available for appropriation.

This ruling was appealed to the district court, which determined that it had jurisdiction to hear all matters either presented or that might have been presented to the State Engineer, as well as new evidence developed since the administrative hearing. The NMOSE disagreed, arguing that only the issue of whether there was water available for appropriation was properly before the district court. The Supreme Court agreed with the NMOSE. The Court found that the comprehensive nature of the water code's administrative process, its mandate that a hearing must be held prior to any appeal to district court, and the broad powers granted to the State Engineer clearly express the Legislature's intent that the water code provide a complete and exclusive means to acquire water rights. Accordingly, the NMOSE was correct that the district court's *de novo* review of the application was limited to what the State Engineer had already addressed administratively, in this case whether unappropriated water was available.

The Court also held that the water code does not require publication of an application for a permit to appropriate if the State Engineer determines no water is available for appropriation, because no third-party rights are implicated unless water is available. If water is deemed to be available, the State Engineer must order notice by publication in the appropriate form.

Based in large part on the holding in *Lion's Gate*, the New Mexico Court of Appeals in *Headon v. D'Antonio*, 2011-NMCA-058, 149 N.M. 667, held that a water rights applicant is required to proceed through the administrative process when challenging a decision of the State Engineer. In *Headon* the applicant challenged the NMOSE's determination that his water rights were forfeited. To do so, he filed a petition seeking declaratory judgment as to the validity of his water rights in district court, circumventing the NMOSE administrative hearing process. 2011-NMCA-058, ¶¶ 2-3. The Court held that the applicant must proceed with the administrative hearing, along with its *de novo* review in district court, to challenge the findings of the NMOSE.

Legal review of NMOSE determinations was also an issue in *D'Antonio v. Garcia*, 2008-NMCA-139,145 N.M. 95, where the Court of Appeals made several findings related to NMOSE administrative review of water rights matters. *Garcia* involved an NMOSE petition to the district court for enforcement of a compliance order after the NMOSE hearing examiner had granted a motion for summary judgment affirming the compliance order. 2008-NMCA-139, ¶¶ 2-5. The Court first found that the right to a hearing granted in NMSA 1978, § 72-2-16

(1973), did not create an absolute right to an administrative hearing. Rather, the NMOSE hearing contemplated in Section 72-2-16 could be waived if a party did not timely request such a hearing. *Id*. ¶ 9. In *Garcia* the defendant had not made such a timely request and therefore was not entitled to a full administrative hearing prior to issuance of an order by the district court.

The Court also examined the regulatory powers of the NMOSE hearings examiner, specifically, whether 19.25.2.32 NMAC allows the hearing examiner to issue a final order without the express written consent of the State Engineer. *Id*. ¶¶ 11-15. The Court held that the regulation allowed the hearing examiner to dismiss a case without the express approval of the State Engineer. *Id*. ¶ 14. Finally, the Court held that the NMOSE hearing examiner may dismiss a case without full hearing when a party willfully fails to comply with the hearing examiner's orders. *Id*. ¶¶ 17-18. Accordingly, the Court in *Garcia* upheld the NMOSE hearing examiner's action to issue a compliance order without a full administrative hearing or final approval by the State Engineer. As such, the district court had the authority to enforce that compliance order.

4.1.1.3 Beneficial Use of Water – Non-Consumptive Use

Carangelo v. Albuquerque-Bernalillo County Water Utility Authority, 2014-NMCA-032, addressed whether a non-consumptive use of water qualifies as a beneficial use under New Mexico law and, accordingly, can be the basis for an appropriation of such water. In *Carangelo*, the NMOSE granted the Albuquerque-Bernalillo County Water Utility Authority's (Authority's) application to divert approximately 45,000 acre-feet per year of Rio Grande surface water, to which the Authority had no appropriative right. The Authority intended to use the water for the non-consumptive purpose of "carrying" the Authority's own San Juan-Chama Project water, Colorado River Basin water to which the Authority had contracted for use of, to a water treatment plant for drinking water purposes. The Court of Appeals found the NMOSE erred in granting the application because the application failed to seek a new appropriation. The Authority's application sought to divert water, to which the Authority asserted no prior appropriative right, which required a new appropriation. Moreover, the Authority affirmatively asserted no beneficial use of the water. The Court remanded the matter to the NMOSE to issue a corrected permit.

The Court's decision included the following legal conclusions:

- A new non-consumptive use of surface water in a fully appropriated system requires a new appropriation of water. A "non-consumptive use" is a type of water use where either there is no diversion from a source body or there is no diminishment of the source. Neither the New Mexico Constitution nor statutes governing the appropriation of water distinguish between diversion of water for consumptive and non-consumptive uses. Because both can be beneficial uses, New Mexico's water law applies equally to either.

- The Authority did not need to file for a change in place or purpose of use for the diversion of its San Juan-Chama Project water. The Court stated that the San Juan-Chama Project water does not come from the Rio Grande Basin, and the Authority's entitlement to its beneficial use is not within the administrative scope of the Rio Grande Basin. Accordingly, the Authority already had an appropriative right to that water and did not need to file an application with the NMOSE for its use.

4.1.1.4 Impairment

Montgomery v. Lomos Altos, Inc., 2007-NMSC-002, 141 N.M. 21, involved applications to transfer surface water rights to groundwater points of diversion in the fully appropriated Rio Grande stream system. In order for a transfer to be approved, an applicant must show, among other factors, that the transfer will not impair existing water uses at the move-to location. In *Lomos Altos*, several parties protested the NMOSE's granting of the applications, arguing that surface depletions at the move-to location caused by the applications should be considered *per se* impairment of existing rights. The Court found that questions of impairment are factual and cannot be decided as a matter of law, but must be determined on a case-by-case basis. In doing so, the Court held that surface depletions in a fully appropriated stream system do not result in *per se* impairment, but the Court noted that under some circumstances, even *de minimis* depletions can lead to a finding of impairment. The Court further found that in order to determine impairment, all existing water rights at the "move-to" location must be considered.

4.1.1.5 Rights Appurtenant to Water Rights

The New Mexico Supreme Court has issued three recent opinions dealing with appurtenancy. *Hydro Resources Corp. v. Gray*, 2007-NMSC-061, 143 N.M. 142, involved a dispute over ownership of water rights developed by a mining lessee in connection with certain mining claims owned by the lessor. The Supreme Court held that under most circumstances, including mining, water rights are not considered appurtenant to land under a lease. The sole exception to the general rule that water rights are separate and distinct from the land is water used for irrigation. Therefore, a lessee can acquire water rights on leased land by appropriating water and placing it to beneficial use. Those developed rights remain the property of the lessee, not the lessor, unless stipulated otherwise in an agreement.

In a case examining whether irrigation water rights were conveyed with the sale of land or severed prior to the sale (*Turner v. Bassett*, 2005-NMSC-009, 137 N.M. 381), the Supreme Court examined New Mexico's transfer statute, NMSA 1978, Section 72-5-23 (1941), along with the NMOSE regulations addressing the change of place or purpose of use of a water right, 19.26.2.11(B) NMAC. The Court found that the statute, coupled with the applicable regulations and NMOSE practice, requires consent of the landowner and approval of the transfer application by the State Engineer for severance to occur. The issuance of a permit gives rise to a presumption that the water rights are no longer appurtenant to the land. A landowner who holds water rights and follows the statutory and administrative procedures to effect a severance and initiate a transfer may convey the land severed from its former water rights, without necessarily reserving those water rights in the conveyance documents.

In *Walker v. United States,* 2007-NMSC-038, 142 N.M. 45, the New Mexico Supreme Court examined the issue of whether a water right includes an implicit right to graze. After the U.S. Forest Service canceled the Walkers' grazing permits, the Walkers filed a complaint arguing that the United States had taken their property without just compensation in violation of the Fifth Amendment to the United States Constitution. The Walkers asserted a property right to the allotments under New Mexico state law. Specifically, the Walkers argued that the revocation of the federal permit resulted in the loss of "water, forage, and grazing" rights based on New Mexico state law and deprived them of all economically viable use of their cattle ranch.

The Court found that a stock watering right does not include an appurtenant grazing right. In doing so, the Court addressed in depth the long understood principle in western water law that water rights, unless utilized for irrigation, are not appurtenant to the land on which they are used. The Court also clarified that the beneficial use for which a water right is established does not guarantee the water right owner an interminable right to continue that same beneficial use. The Walkers could have transferred their water right to another location or another use if they could not continue with the original uses. For these reasons, the Court rejected the Walkers attempt to make an interest in land incident or appurtenant to a water right.

4.1.1.6 Deep, Non-Potable Aquifers

In 2009 the New Mexico Legislature amended NMSA 1978, §72-12-25 (2009), to provide for administrative regulation of deep, non-potable aquifers. These groundwater basins are greater than 2,500 deep and contain greater than 1,000 parts per million of total dissolved solids. Drilling wells into such basins had previously been unregulated. The amendment requires the NMOSE to conduct hydrologic analysis on well drilling in these basins. The type of analysis required by the NMOSE depends on the use for the water.

4.1.1.7 Domestic Wells

New Mexico courts have recently decided several significant cases addressing domestic well permitting, and the NMOSE also recently amended its regulations governing domestic wells.

In *Bounds v. State ex. rel D'Antonio,* 2013-NMSC-037, the New Mexico Supreme Court upheld the constitutionality of New Mexico's Domestic Well Statute (DWS), NMSA 1978, Section 72–12–1.1 (2003). Bounds, a rancher and farmer in the fully appropriated and adjudicated Mimbres basin, and the New Mexico Farm and Livestock Bureau (Petitioners), argued that the DWS was facially unconstitutional. The DWS states that the NMOSE "shall issue" domestic well permits, without determining the availability of unappropriated water or providing other water rights owners in the area the ability to protest the well. The Petitioners argued that this practice violated the New Mexico constitutional doctrine of prior appropriation to the detriment of senior water users, as well as due process of law. The Court held that the DWS does not violate the doctrine of prior appropriation set forth in the New Mexico Constitution. The Court also held that Petitioners failed to adequately demonstrate any violation of their due process rights.

In addressing the facial constitutional challenge, the Court rejected the Petitioners' argument that the New Mexico Constitution mandates that the statutory requirements of notice, opportunity to be heard, and a prior determination of unappropriated waters or lack of impairment be applied to the domestic well application and permitting process. The Court reasoned that the DWS creates a different and more expedient permitting procedure for domestic wells and the constitution does not require a particular permitting process, or identical permitting procedures, for all appropriations. While holding that the DWS was valid in not requiring the same notice, protest, and water availability requirements as other water rights applications, the court confirmed that domestic well permits can be administered in the same way as all other water rights. In other words, domestic wells do not require the same rigors as other water rights when permitted but, when domestic wells are administered, constitutionally mandated priority administration still applies. Thus the DWS, which deals solely with permitting and not with administration, does not conflict with the priority administration provisions of the New Mexico Constitution.

The Court also found that the Petitioners failed to prove a due process violation because they did not demonstrate how the DWS deprived them of their water rights. Specifically, Bounds failed to show any actual impairment, or imminent future impairment, of his water rights. Bounds asserted that any new appropriations must necessarily cause impairment in a closed and fully appropriated basin, and therefore, granting any domestic well permit had the potential to impair his rights. The Court rejected this argument, finding that impairment must be proven using scientific analysis, not simply conclusory statements based on a bright line rule that impairment always occurs when new water rights are permitted in fully appropriated basins.

Two other significant domestic well decisions addressed domestic well use within municipalities. In *Smith v. City of Santa Fe*, 2007-NMSC-055, 142 N.M. 786, the Supreme Court examined the authority of the City of Santa Fe to enact an ordinance restricting the drilling of domestic wells. The Court held that under the City's home rule powers, it had authority to prohibit the drilling of a domestic well within the municipal boundaries and that this authority was not preempted by existing state law.

Then in *Stennis v. City of Santa Fe,* 2008-NMSC-008, 143 N.M. 320, Santa Fe's domestic well ordinance was tested when a homeowner (Stennis) applied for a domestic well permit with the NMOSE, but did not apply for a permit from the City. In examining the statute allowing municipalities to restrict the drilling of domestic wells, the Court found that municipalities must strictly comply with NMSA 1978, Section 3–53–1.1(D) (2001), which requires cities to file their ordinances restricting the drilling of domestic water wells with the NMOSE. On remand, the

Court of Appeals held that Section 3-53-1.1(D) does not allow for *substantial* compliance. *Stennis v. City of Santa Fe*, 2010-NMCA-108, 149 N.M. 92. Rather, strict compliance is required and the City must have actually filed a copy of the ordinance with the NMOSE.

In addition to the cases addressing domestic wells, the regulations governing the use of groundwater for domestic use were substantially amended in 2006 to clarify domestic well use pursuant to NMSA 1978, Section 72-12-1.1. 19.27.5.1 et seq. NMAC. The regulations:

1. Limit the amount of water that can be used pursuant to a domestic well permit to:

    - 1.0 acre feet per year (ac-ft/yr) for a single household use (can be increased to up to 3.0 ac-ft/yr if the applicant can show that the combined diversion from domestic wells will not impair existing water rights).
    - 1.0 ac-ft/yr for each household served by a well serving more than one household, with a cap of 3.0 ac-ft/yr if the well serves three or more households.
    - 1.0 ac-ft/yr for drinking and sanitary purposes incidental to the operations of a governmental, commercial, or non-profit facility as long as no other water source is available. The amount of water so permitted is subject to further limitations imposed by a court or a municipal or county ordinance.

    The amount of water that can be diverted from a domestic well can also be increased by transferring an existing water right to the well. 19.27.5.9 NMAC.

2. Require mandatory metering of all new domestic wells under certain conditions, such as when wells are permitted within a domestic well management area, when a court imposes a metering requirement, when the water use is incidental to the operations of a governmental, commercial, or non-profit facility, and when the well serves multiple households. 19.27.5.13(C) NMAC.

3. Allow for the declaration of domestic well management areas when hydrologic conditions require added protections to prevent impairment to valid, existing surface water rights. In such areas, the maximum diversion from a new domestic well cannot exceed, and may be less than, 0.25 ac-ft/yr for a single household and up to 3.0 ac-ft/yr for a multiple household well, with each household limited to 0.25 ac-ft/yr. The State Engineer has not declared any domestic well management areas in the planning region.

4.1.1.8 Water Project Financing

The Water Project Finance Act, Chapter 72, Article 4A NMSA 1978, outlines different mechanisms for funding water projects in water planning regions. The purpose of the Act is to provide for water use efficiency, resource conservation, and the protection, fair distribution, and allocation of New Mexico's scarce water resources for beneficial purposes of use within the state. The Water Project Finance Act creates two funds: the Water Project Fund, NMSA 1978, Section 72-4A-9 (2005), and the Acequia Project Fund, NMSA 1978, Section 72-4A-9.1 (2004). Both funds are administered by the New Mexico Finance Authority. The Water Trust Board recommends projects to the Legislature to be funded from the Water Project Fund.

The Water Project Fund may be used to make loans or grants to qualified entities (broadly defined to include public entities and Indian tribes and pueblos). To qualify for funding, the project must be approved by the Water Trust Board for one of the following purposes: (1) storage, conveyance or delivery of water to end users, (2) implementation of federal Endangered Species Act of 1973 collaborative programs, (3) restoration and management of watersheds, (4) flood prevention, or (5) water conservation or recycling, treatment, or reuse of water as provided by law. NMSA 1978, § 72-4A-5(B) (2011). The Water Trust Board must give priority to projects that (1) have been identified as being urgent to meet the needs of a regional water planning area that has a completed regional water plan accepted by the NMISC, (2) have matching contributions from federal or local funding sources, and (3) have obtained all requisite state and federal permits and authorizations necessary to initiate the project. NMSA 1978, § 72-4A-5.

The Acequia Project Fund may be used to make grants to acequias for any project approved by the Legislature.

The Water Project Finance Act directed the Water Trust Board to adopt regulations governing the terms and conditions of grants and loans recommended by the Board for appropriation by the Legislature from the Water Project Fund. The Board promulgated implementing regulations, 19.25.10.1 et seq. NMAC, in 2008. The regulations set forth the procedures to be followed by the Board and New Mexico Finance Authority for identifying projects to recommend to the Legislature for funding. The regulations also require that financial assistance be made only to entities that agree to certain conditions set forth in the regulations.

4.1.1.9 The Strategic Water Reserve

In 2005, the New Mexico Legislature enacted legislation to establish a Strategic Water Reserve, NMSA 1978, Section 72-14-3.3 (2007). Regulations implementing the Strategic Water Reserve statute were also implemented in 2005. 19.25.14.1 et seq. NMAC.

The statute authorizes the Commission to acquire water rights or storage rights to compose the reserve. Section 72-14-3.3(A). Water in the Strategic Water Reserve can be used for two purposes: (1) to comply with interstate stream compacts and (2) to manage water for the benefit of endangered or threatened species or to avoid additional listing of species. Section 72-14-3.3(B). The NMISC may only acquire water rights that have sufficient seniority and consistent, historical beneficial use to effectively contribute to the purpose of the Reserve. The NMISC must annually develop river reach or groundwater basin priorities for the acquisition of water rights for the Strategic Water Reserve.

4.1.1.10 Water Conservation

Guidelines for drafting and implementing water conservation plans are set forth in NMSA 1978, Section 72-14-3.2 (2003). By statute, neither the Water Trust Board nor the New Mexico Finance Authority may accept an application from a covered entity (defined as municipalities, counties, and any other entities that supply at least 500 acre-feet per annum of water to its customers, but excluding tribes and pueblos) for financial assistance to construct any water diversion, storage, conveyance, water treatment, or wastewater treatment facility unless the entity includes a copy of its water conservation plan.

The water conservation statute primarily supplies guidance to covered entities, as opposed to mandating any particular action. For example, the statute provides that the covered entity determines the manner in which it will develop, adopt, and implement a water conservation plan. The statute further states that a covered entity "shall consider" either adopting ordinances or codes to encourage conservation, or otherwise "shall consider" incentives to encourage voluntary compliance with conservation guidelines. The statute then states that covered entities "shall consider, and incorporate in its plan if appropriate, . . . a variety of conservation measures," including, in part, water-efficient fixtures and appliances, water reuse, leak repairs, and water rate structures encouraging efficiency and reuse. Section 72-14-3.2(D). Also, pursuant to NMSA 1978, §§ 72-5-28(G) (2002) and 72-12-8(D) (2002), when water rights are placed in a State Engineer-approved water conservation program, periods of nonuse of the rights covered in the plan do not count toward the four-year forfeiture period.

4.1.1.11 Municipal Condemnation

NMSA 1978, Section 3-27-2 (2009) was amended in 2009 to prohibit municipalities from condemning water sources used by, water stored for use by, or water rights owned or served by an acequia, community ditch, irrigation district, conservancy district, or political subdivision of the state.

4.1.1.12 Subdivision Act

The Subdivision Act, NMSA 1978, Section 47-6-11.2 (2013), was amended in 2013 to require proof of water availability prior to final approval of a subdivision plat. Specifically, the subdivider must (1) present the county with NMOSE-issued water use permits for the subdivision or (2) prove that the development will hook up to a water provider along with an opinion from the State Engineer that the subdivider can fulfill the water use requirements of the Subdivision Act. Previously the county had discretion to approve subdivision plats without such proof that the water rights needed for the subdivision were readily available. These water use requirements apply to all subdivisions of ten or more lots. The Act was also amended to prohibit approval of a subdivision permit if the water source for the subdivision is domestic wells.

4.1.2 State Water Laws and Administrative Policies Affecting the Region

In New Mexico, water is administered generally by the State Engineer, who has the "general supervision of waters of the state and of the measurement, appropriation, distribution thereof and such other duties as required." NMSA 1978, § 72-2-1 (1982). To administer water throughout the state the State Engineer has several tools at its disposal, including designation of water masters, declaration of UWBs, and use of the AWRM rules, all of which are discussed below, along with other tools used to manage water within regions.

In the Lea County planning region the water supply is primarily groundwater. There are no perennial streams in the County and surface water is limited to stockponds, playas, and ephemeral drainages lying outside of the State Engineer's jurisdiction.

4.1.2.1 Water Masters

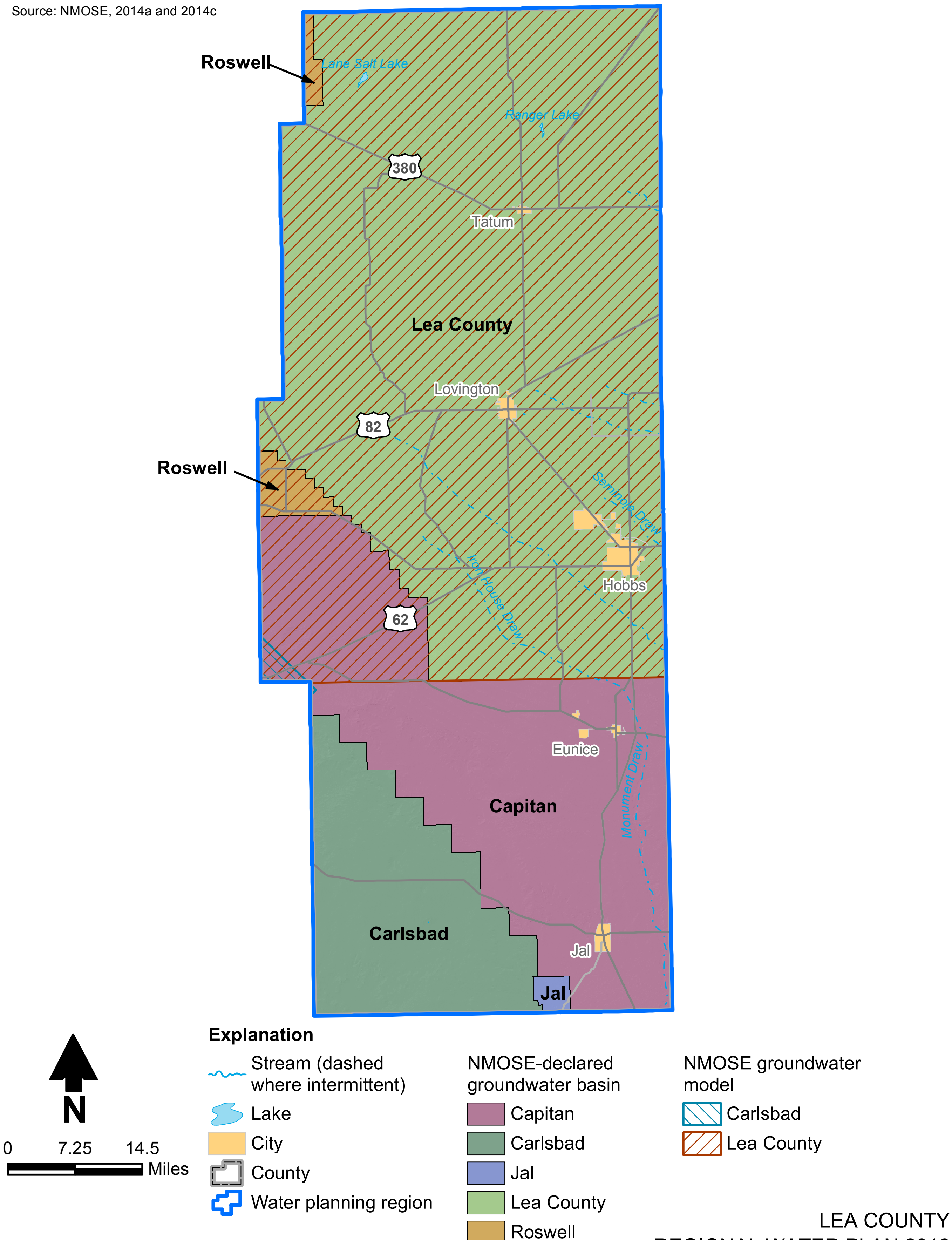
Not applicable.

4.1.2.2 Groundwater Basin Guidelines

The NMOSE has declared UWBs and implements guidelines in those basins for the purpose of carrying out the provisions of the statutes governing underground waters. *See* NMAC 19.27.48.6. In the planning region there are server UWBs): Lea County UWB, Capitan UWB, Carlsbad UWB, Jal UWB, and a very small portion of the Roswell UWB (Figure 4-1). These UWBs are discussed in depth in the 2000 Plan, Section 5.3.2. Recent actions by the State Engineer regarding the UWBs in the planning region include:

- *Jal UWB:* On January 25, 2013 the State Engineer closed the Jal UWB to all new appropriations of groundwater. The Order stated that the basin was being closed for an indefinite period of time. The Order required that any new application for appropriation of underground water within the basin be rejected.

- *Lea County UWB:* In 2005 the Lea County UWB was extended by an order of the State Engineer. State Engineer Order 166, September 23, 2005. In 2009, the State Engineer closed the High Plains aquifer within the limits of the Lea County UWB to applications for new water appropriations. State Engineer Order, September 14, 2009. The review of water right applications are governed by the *Lea County Underground Water Basin Guidelines for Review of Water Right Applications* (NMOSE, 2014e). The guidelines were issued to replace the administrative procedures adopted in the 1950s to describe the review procedures for applications proposing to divert from the High Plains aquifer, the primary water supply source in the Lea County UWB. Under the guidelines, applications for new water appropriations from the High Plains aquifer will be denied by the State Engineer. The guidelines define the criteria for designating critical management areas and prohibit any applications for appropriation within such areas. The guidelines also mandate the metering of non-domestic/livestock water wells.



LEA COUNTY
REGIONAL WATER PLAN 2016

NMOSE-Declared Groundwater Basins and Groundwater Models

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Figure 4-1

- *Roswell UWB:* In 2005 the State Engineer issued the *Roswell Basin Guidelines for Review of Water Right Applications* (NMOSE, 2005). The guidelines set forth general procedures for processing water rights applications within the Roswell UWB. Under the guidelines, the following applications will be denied: those to appropriate groundwater within areas closed to such appropriations, those to appropriate surface water, and those to increase diversions from a critical management area. The guidelines define the criteria for designating critical management areas and mandate the metering of non-domestic/livestock water wells.

4.1.2.3 AWRM Implementation in the Basin

Not applicable.

4.1.2.4 Special Districts in the Basin

Special districts are various districts within the region having legal control over the use of water in that district. All are subject to specific statutes or other laws concerning their organization and operation, found in Chapter 73 of the New Mexico Statutes. In the Lea County region, special districts include the Lea Soil and Water Conservation District (SWCD), which is governed by NMSA 1978, Sections 73-20-25 through 48..

4.1.2.5 State Court Adjudications in the Basin

Not applicable.

4.1.2.6 Pending State Actions

Currently pending before the State Engineer are two applications regarding the appropriation and transfer of large amounts of water in the region. Each application has numerous protestants. The outcome of the applications may affect water management in the Region. The applications are:

- *In the Matter of the Applications by Lea County for Permit to Appropriate Groundwater in the Lea County Underground Water Basin* (HU No. 14-082 to 14-124)

- *In the Matter of the Application by Eloy C. Ramirez for Permit to Change Place of Use of Groundwater within the Lea County Basin* (HU No. 15-020)

4.1.3 Federal Water Laws

The law of water appropriation has been developed primarily through decisions made by state courts. Since the accepted plan was published in 2000 several federal cases have been decided examining various water law questions. These cases are too voluminous to include here, and many of the issues in the cases will not apply directly to the region. However, New Mexico is a party to one original jurisdiction case in the U.S. Supreme Court involving the Rio Grande Compact and waters of the Lower Rio Grande. Because of its importance to the entire state it is included here.

In *Texas v. New Mexico and Colorado*, No. 141 Original (U.S. Supreme Court, 2014), Texas alleges that New Mexico has violated the Rio Grande Compact by intercepting water Texas is entitled to under the Compact through groundwater pumping and surface diversions downstream of Elephant Butte Reservoir but upstream of the New Mexico-Texas state line. Colorado is also a defendant in the lawsuit as it is a signatory to the Rio Grande Compact. The United States has intervened as a Plaintiff in the case. Elephant Butte Irrigation District and El Paso County Water Improvement District Number One have both sought to intervene in the case as well, claiming that their interests are not fully represented by the named parties. The motions to intervene along with a motion to dismiss filed by New Mexico are currently pending.

4.1.3.1 Federal Reservations

Not applicable.

4.1.3.2 Interstate Stream Compacts

Interstate compacts become federal law once ratified by Congress. The Pecos River Compact governs water use on the Pecos River. Information regarding this compact and its relation to the groundwater sources in the region is provided in the 2000 plan, Section 5.2.2.

4.1.3.3 Treaties

Not applicable.

4.1.3.4 Federal Water Projects

Not applicable.

4.1.3.5 Federal Adjudications in the Basin

Not applicable.

4.1.4 Tribal Law

Not applicable.

4.1.5 Local Law

Local laws addressing water use have been implemented by both municipalities and counties within the planning region.

4.1.5.1 Lea County

Water use in Lea County is governed by the *Lea County Comprehensive Plan* (Lea County, 2005) and by the Lea County Subdivision Regulations.

Section 6 of the *Lea County Comprehensive Plan* addresses water resources. It notes that water demand in the County has been increasing over the past several decades and sets forth the County's goal of having enough water resources to sustain present and future residents for generations to come. The plan sets forth several objectives to meet that goal, including water conservation measures, protection of water quality, and implementation of a drought management plan.

The Lea County Subdivision Regulations, Ordinance No. 35, book 799, p. 388 (May 20, 1997), places several water requirements on new developments. It requires the developer to submit a preliminary plan to both the NMOSE and the NMED for a determination whether water is of sufficient quantity and quality for the development. Id. § 4.2.1(A), (B). The developer must then demonstrate that there is water in sufficient quantity to fulfill the maximum amount of water required for the subdivision, and that the water is of sufficient quality for human consumption. Id. § 4.5.1(A), (B). The developer must also submit a water supply plan that addresses water quantity demand, water conservation, and water quality. Id. § 4.5.2(A). The regulations set forth recommended guidelines for water conservation, id. § 16.3.1; specific requirements for quantifying the annual water requirement, id. § 16.3.2; permitting requirements, id. § 16.3.3; and requirements for a community water system, id. § 16.3.4. The regulations also set forth the requirements for documenting water quality. Id. § 16.4.2.

4.1.5.2 City of Eunice

Water use in the City of Eunice is regulated through its Code of Ordinances, Supp. 2 (Feb. 8, 2012), which include several provisions relating to water conservation for users of water supplied by the City. The Code prohibits the wasting of water, meaning allowing substantial amounts of water to run off during outdoor watering, watering sidewalks, driveways, or other non-permeable surfaces, or allowing water to escape through leaks in plumbing. *Id.* § 98-61. The Code sets criteria for five increasingly severe levels of drought and imposes water use restrictions based on the drought level, *id.* § 98-62, and it allows water rationing if the water shortage conditions threaten public health, safety, and welfare, *id.* § 98-63.

4.1.5.3 City of Hobbs

Water use in the City of Hobbs is guided by its *Comprehensive Community Development Plan* (WSA and SWPM, 2004), and it is regulated by City ordinance.

The *Comprehensive Community Development Plan* sets as policies the reuse of municipal wastewater effluent for irrigation, the expansion of water production capacity through well field development, the implementation of water conservation measures, the securing of a long-term water supply, and water supply planning.

The City of Hobbs Code of Ordinances, Supp. 5 (May 29, 2015), regulates water use in several ways to promote water conservation. It places restrictions on outdoor water use during the summer months from May 15 through September 15. *Id.* § 13.20.010. It also prohibits the wasting of water, which is defined to include allowing water to escape the premises, allowing water to pond at a depth of greater than ½ inch, washing vehicles, structures, sidewalks, driveways, or other impermeable surfaces with an open hose, and failure to repair controllable leaks. *Id.* § 13.20.020.

4.1.5.4 City of Jal

There is no ordinance relating to water use for the City of Jal. However, water use in Jal is guided by the *City of Jal, New Mexico Public Water System Water Conservation Plan* (SMA, 2015a). Section 3 of the conservation plan sets forth the water conservation goals of Jal, including reducing wasted water, setting and maintaining or lowering per capita water use, and other conservation measures. The plan also addresses public outreach and implementing best management practices in regard to water use. Section 5 of the plan then lays out, in depth, the water conservation program adopted by Jal, including costs and implementation deadlines.

4.1.5.5 City of Lovington

Water use in the City of Lovington is guided by the *City of Lovington, New Mexico Comprehensive Plan 2015* (City of Lovington, 2015) and regulated by City ordinances.

Section VII of the comprehensive plan addresses water issues. It projects that water demand will increase in coming decades. It observes that the Ogallala Aquifer, the southwest edge of which underlies Lovington, is declining. It also observes that groundwater quality in the Lovington area is threatened by dairy and feed lot operations and by oil and gas drilling. Further, the plan sets as policies increasing the long-range reliability of the City's water supply, acquiring additional water rights, improving the efficiency of the water system, and promoting water conservation measures and water harvesting.

The City of Lovington's Code of Ordinances, Supp. 15 (2015) governs water services. It prohibits the waste of water. *Id.* § 13.04.080. It also provides that in the event of a water emergency, during which City water service is interrupted or impeded due to climate conditions, plant breakdown, capacity of the water treatment plant, or otherwise, the City may establish restrictions or prohibitions on water use. *Id.* § 13.06.010.

4.1.5.6 Town of Tatum

The Code of the Town of Tatum regulates water use, though not extensively. The Code prohibits the waste of water, and it prohibits the unnecessary running of water from hydrants, home faucets, and other water outlets. Code of the Town of Tatum § 243.7.

4.2 Relevant Environmental Law

4.2.1 Species Protection Laws

4.2.1.1 Federal Endangered Species Act

The Endangered Species Act (ESA) can have a tremendous influence on the allocation of water, especially of stream and river flows. 16 U.S.C. §§ 1531 to 1544. The ESA was enacted in 1973 and, with limited exceptions, has remained in its current form since then. The goal of the Act is to protect threatened and endangered species and the habitat on which they depend. 16 U.S.C. § 1531(b). The Act's ultimate goal is to "recover" species so that they no longer need protection under the Act.

The ESA provides several mechanisms for accomplishing these goals. It authorizes the U.S. Fish and Wildlife Service (USFWS) to list "threatened" or "endangered" species, which are then protected under the Act, and to designate "critical habitat" for those species. The Act makes it unlawful for anyone to "take" a listed species unless an "incidental take" permit or statement is first obtained from the Department of the Interior. 16 U.S.C. §§ 1538, 1539. To "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct." 16 U.S.C. § 1532(19).

In addition, federal agencies must use their authority to conserve listed species. 16 U.S.C. § 1536(a)(1). They must make sure, in consultation with USFWS, that their actions do not jeopardize the continued existence of listed species or destroy or harm habitat that has been designated as critical for such species. 16 U.S.C. § 1536(a)(2). This requirement applies whenever a private or public entity undertakes an action that is "authorized, funded, or carried out," wholly or in part by a federal agency. *Id.* As part of the consultation process, federal agencies must usually prepare a biological assessment to identify endangered or threatened species and determine the likely effect of the federal action on those species and their critical habitat. 16 U.S.C. § 1536(c). At the end of the consultation process, the USFWS prepares a biological opinion stating whether the proposed action will jeopardize the species or destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(c)(4). USFWS may also recommend reasonable alternatives that do not jeopardize the species. *Id.*

Currently there are no species listed for protection under the ESA in Lea County. However, species are listed on an ongoing basis and if a future listing includes a species that relies on riparian habitat, such listing in the future may impact the region's water resource development.

4.2.1.2 New Mexico Wildlife Conservation Act

The New Mexico Wildlife Conservation Act, enacted in 1974, provides for the listing and protection of threatened and endangered wildlife species in the state. NMSA 1978, §§ 17-2-37 to 17-2-46. In enacting the law, the Legislature found that indigenous New Mexico species that are threatened or endangered "should be managed to maintain and, to the extent possible, enhance their numbers within the carrying capacity of the habitat." NMSA 1978, § 17-2-39(A).

The Act authorizes the New Mexico Department of Game and Fish to conduct investigations of indigenous New Mexico wildlife species suspected of being threatened or endangered to determine if they should be listed. NMSA 1978, § 17-2-40(A). Based on the investigation, the director then makes listing recommendations to the Game and Fish Commission. *Id.* The Act authorizes the Commission to issue regulations listing wildlife species as threatened or endangered based on the investigation and recommendations of the Department. NMSA 1978, § 17-2-41(A). Once a species is listed, the Department of Game and Fish, "to the extent practicable," is to develop a recovery plan for that species. NMSA 1978, § 17-2-40.1. The Act makes it illegal to "take, possess, transport, export, process, sell or offer for sale[,] or ship" any listed endangered wildlife species. NMSA 1978, § 17-2-41(C).

Pursuant to the Act, the Commission has listed over 100 wildlife species—mammals, birds, fish, reptiles, amphibians, crustaceans, and mollusks—as endangered or threatened. 19.33.6.8 NMAC. As of August 2014, 62 species were listed as threatened, and 56 species were listed as endangered. *Id.* In the Lea County Water Planning Region, many species are protected also under the New Mexico Act. However, most do not rely on riparian habitat are therefore will not impact water planning in the region.

4.2.2 Water Quality Laws

4.2.2.1 Federal Clean Water Act

The most significant federal law addressing water quality is the Clean Water Act (CWA), 33 U.S.C. §§ 1251 to 1387, which Congress enacted in its modern form in 1972, overriding President Nixon's veto. The stated objective of the CWA is to "restore and maintain the chemical, physical and biological integrity" of the waters of the United States. 33 U.S.C. § 1251(a).

4.2.2.1.1 NPDES Permit Program (Section 402)

The CWA makes it unlawful for any person to discharge any pollutant into waters of the United States without a permit. 33 U.S.C. § 1311(a). Generally, a "water of the United States" is a navigable water, a tributary to a navigable water, or an adjacent wetland, although the scope of the term has been the subject of considerable controversy as described below.

The heart of the CWA regulatory regime is the National Pollutant Discharge Elimination System (NPDES) permitting program under Section 402 of the Act. Any person—including a corporation, partnership, state, municipality, or other entity—that discharges a pollutant into waters of the United States from a point source must obtain an NPDES permit from the U.S. Environmental Protection Agency (EPA) or a delegated state. 33 U.S.C. § 1342. A point source is defined as "any discernible, confined, and discrete conveyance," such as a pipe, ditch, or conduit. 33 U.S.C. § 1362(14). NPDES permits include conditions setting effluent limitations based on available technology and, if needed, effluent limitations based on water quality.

The CWA provides that each NPDES permit issued for a point source must impose effluent limitations based on application of the best practicable, and in some cases the best available, pollution control technology. 33 U.S.C. § 1311(b). The Act also requires more stringent effluent limitations for newly constructed point sources, called new source performance standards. 33 U.S.C. § 1316(b). EPA has promulgated technology-based effluent limitations for dozens of categories of new and existing industrial point source dischargers. 40 C.F.R. pts. 405-471. These regulations set limits on the amount of specific pollutants that a permittee may discharge from a point source.

The CWA requires the states to develop water quality standards for individual segments of surface waters. 33 U.S.C. § 1313. Water quality standards have three components. First, states must specify designated uses for each body of water, such as public recreation, wildlife habitat, water supply, fish propagation, or agriculture. 40 C.F.R. § 131.10. Second, they must establish water quality criteria for each body of water, which set a limit on the level of various pollutants that may be present without impairing the designated use of the water body. *Id.* § 131.11. And third, states must adopt an antidegradation policy designed to prevent the water body from becoming impaired such that it cannot sustain its designated use. *Id.* § 131.12.

Surface water segments that do not meet the water quality criteria for the designated uses must be listed as "impaired waters." 33 U.S.C. § 1313(d)(l)(C). For each impaired water segment, states must establish "total maximum daily loads" (TMDLs) for those pollutants causing the water to be impaired, allowing a margin of safety. 33 U.S.C. § 1313(d)(1). The states must submit to EPA for approval the list of impaired waters and associated TMDLs. 33 U.S.C. § 1313(d)(2). The TMDL process, in effect, establishes a basin-wide budget for pollutant influx to a surface water. The states must then develop a continuing planning process to attain the standards, including effluent limitations for individual point sources. 33 U.S.C. § 1313(e).

New Mexico has taken steps to implement these CWA requirements. As discussed in Section 4.2.2.3, the New Mexico Water Quality Control Commission has adopted water quality standards for surface waters. The standards include designated uses for specific bodies of water, water quality criteria, and an antidegradation policy. 20.6.4 NMAC. The New Mexico Environment Department (NMED) has prepared a report listing impaired surface waters throughout the state. *State of New Mexico Clean Water Act Section 303(d)/Section 305(b) Integrated Report – 2014-2016* (Nov. 18, 2014). There are no waters listed as impaired located in Lea County.

EPA can delegate the administration of the NPDES program to individual states. 33 U.S.C. § 1251(b). New Mexico is one of only a handful of states that has neither sought nor received delegation to administer the NPDES permit program. Accordingly, EPA administers the NPDES program in New Mexico.

4.2.2.1.2 Dredge and Fill Permit Program (Section 404)

The CWA establishes a second important permitting program under Section 404, regulating discharges of "dredged or fill material" into waters of the United States. 33 U.S.C. § 1344. Although the permit requirement applies to discharges of such material into all waters of the United States, most permits are issued for the filling of wetlands. The program is administered primarily by the Army Corps of Engineers, although EPA has the authority to veto permits and it shares enforcement authority with the Corps.

Like the Section 402 NPDES permit program, the CWA allows the Section 404 permit program to be delegated to states. 33 U.S.C. § 1344(g). Again, New Mexico has not received such delegation, and the program is implemented in New Mexico by the Corps and EPA.

4.2.2.1.3 Waters of the United States

The term "waters of the United States" delineates the scope of CWA jurisdiction, both for the Section 402 NPDES permit program, and for the Section 404 dredge and fill permit program. The term is not defined in the CWA, but is derived from the definition of "navigable waters," which means "waters of the United States including the territorial seas." 33 U.S.C. § 1362(7). In 1979, EPA promulgated regulations defining the term "waters of the United States." *See* 40 C.F.R. § 230.3(s) (2014) (between 1979 and 2014, the term remained substantially the same). This definition, interpreted and implemented by both EPA and the Corps, remained settled for many years.

In 2001, however, the Supreme Court began to cast doubt on the validity of the definition as interpreted by EPA and the Corps. The Court took up a case in which the Corps had asserted CWA jurisdiction over an isolated wetland used by migratory birds, applying the Migratory Bird Rule. The Court ruled that the Corps had no jurisdiction under the CWA, emphasizing that the CWA refers to "navigable waters," and that the isolated wetland had no nexus to any navigable-in-fact water. *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers,* 531 U.S.159 (2001).

The Court muddied the waters further in its 2006 decision in *Rapanos v. United States*, 547 U.S. 715 (2006) (consolidated with *Carabell v. U.S. Army Corps of Engineers*). Both these cases challenged the Corps' assertion of CWA jurisdiction over wetlands separated from traditional navigable waters by a man-made ditch. In a fractured 4-1-4 decision, the Court ruled that the Corps did not have CWA authority to regulate these wetlands. The plurality opinion, authored by Justice Scalia, held that CWA jurisdiction extends only to relatively permanent standing or flowing bodies of water that constitute rivers, streams, oceans, and lakes. *Id.* at 739. Nevertheless, jurisdiction extends to streams or lakes that occasionally dry up, and to streams that flow only seasonally. *Id.* at 732, n.3. And jurisdiction extends to wetlands with a continuous surface connection to such water bodies. *Id.* at 742. The concurring opinion, written by Justice Kennedy, stated that CWA jurisdiction extends to waters having a "significant nexus" to a navigable water, but the Corps had failed to show such nexus in either case. *Id.* at 779-80. In dissent, Justice Stevens would have found CWA jurisdiction in both cases. *Id.* at 787.

There has been considerable confusion over the proper application of these opinions. Based on this confusion, EPA and the Corps recently amended the regulatory definition of "waters of the United States" to conform to the *Northern Cook County* and *Rapanos* decisions. Final Rule, 80 Fed. Reg. 37054 (June 29, 2015) codified at 33 C.F.R. pt 328; 40 C.F.R. pts 110, 112, 116, 117, 122, 230, 232, 300, 302, and 401. The new definition covers (1) waters used for interstate or foreign commerce, (2) interstate waters, (3) the territorial seas, (4) impounded waters otherwise meeting the definition, (5) tributaries of the foregoing waters, (6) waters, including wetlands, adjacent to the foregoing waters, (7) certain specified wetlands having a significant nexus to the foregoing waters, and (8) waters in the 100-year floodplain of the foregoing waters. 40 C.F.R. § 302.3.

Several states and industry groups have challenged the new definition in federal district courts and courts of appeal. In one such challenge, the district court granted a preliminary injunction temporarily staying the rule. *North Dakota v. EPA*, 127 F. Supp. 3d 1047 (D.N.D. 2015). Because the NMED and the NMOSE are plaintiffs in this case, the stay is effective—and the new definition does not now apply—in New Mexico. The United States has filed a motion asking the district court to dissolve the injunction and dismiss the case. This case is likely to be appealed.

4.2.2.2 Federal Safe Drinking Water Act

Enacted in 1974, the Safe Drinking Water Act (SDWA) regulates the provision of drinking water in the United States. 42 U.S.C. §§ 300f to 300j-26. The act's overriding purpose is "to insure the quality of publicly supplied water." *Arco Oil & Gas Co. v. EPA*, 14 F.3d 1431, 1436 (10th Cir. 1993). The SDWA requires EPA to promulgate national primary drinking water standards for protection of public health and national secondary drinking water standards for protection of public welfare. 42 U.S.C. § 300g-1. To provide this protection, the SDWA requires EPA, as part of the national primary drinking water regulations, to establish maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for drinking water contaminants. 42 U.S.C. § 300g-1(b)(1). The regulations apply to all "public water systems." 42 U.S.C. § 300g.

EPA has promulgated primary and secondary drinking water regulations. 40 C.F.R. pts. 141, 143. Most significantly, the agency has set MCLGs and MCLs for a number of drinking water contaminants, including 16 inorganic chemicals, 53 organic chemicals, turbidity, 6 microorganisms, 7 disinfectants and disinfection byproducts, and 4 radionuclides. 40 C.F.R.

§§ 141.11, 141.13, 141.61-66. As noted above, New Mexico has incorporated these primary and secondary regulations into the state regulations. 20.7.10.100 NMAC, 20.7.10.101 NMAC.

4.2.2.3 Federal Comprehensive Environmental Response, Compensation, and Liability Act

Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or the "Superfund" law, in 1980 to address the burgeoning problem of uncontrolled hazardous waste sites. 42 U.S.C. §§ 9601 to 9675. CERCLA authorizes EPA to prioritize hazardous waste sites according to the degree of threat they pose to human health and the environment, including surface water and groundwater. EPA places the most serious sites on the National Priorities List (NPL). 42 U.S.C. § 9605. Sites on the NPL are eligible for federal funds for long-term remediation, which most often includes groundwater remediation.

4.2.2.4 New Mexico Water Quality Act

The most important New Mexico law addressing water quality is the New Mexico Water Quality Act (WQA), NMSA 1978, §§ 74-6-1 to 74-6-17. The New Mexico Legislature enacted the WQA in 1967. The purpose of the WQA is "to abate and prevent water pollution." *Bokum Res. Corp. v. N.M. Water Quality Control Comm'n*, 93 N.M. 546, 555, 603 P.2d 285, 294 (1979).

The WQA created the Water Quality Control Commission to implement many of its provisions. NMSA 1978, § 74-6-3. The WQA authorizes the Commission to adopt state water quality standards for surface and groundwaters and to adopt regulations to prevent or abate water pollution. NMSA 1978, § 74-6-4(C) and (D). The WQA also authorizes the Commission to adopt regulations requiring persons to obtain from the NMED a permit for the discharge into groundwater of any water contaminant. NMSA 1978, § 74-6-5(A). The Department must deny a discharge permit if the discharge would cause or contribute to contaminant levels in excess of water quality standards "at any place of withdrawal of water for present or reasonably foreseeable future use." NMSA 1978, § 74-6-5(E)(3). The WQA also authorizes the Commission to adopt regulations relating to monitoring and sampling, record keeping, and Department notification regarding the permit. NMSA 1978, § 74-6-5(I). Permit terms are generally limited to five years. NMSA 1978, § 74-6-5(H).

Accordingly, the Commission has adopted groundwater quality standards, regulations requiring discharge permits, and regulations requiring abatement of groundwater contamination. 20.6.2 NMAC. The water quality standards for groundwater are published at Sections 20.6.2.3100 through 3114 NMAC, and the regulations for discharge permits are published at Sections 20.6.2.3101 to 3114 NMAC.

An important part of these regulations are those addressing abatement. 20.6.2.4101 - .4115 NMAC. The purpose of the abatement regulations is to "[a]bate pollution of subsurface water so that all groundwater of the State of New Mexico which has a background concentration of 10,000 milligrams per liter or less total dissolved solids is either remediated or protected for use as domestic or agricultural water supply." 20.6.2.4101.A(1) NMAC. The regulations require that groundwater pollution must be abated to conform to the water quality standards. 20.6.2.4103.B NMAC. Abatement must be conducted pursuant to an abatement plan approved by the Department, 20.6.2.4104.A NMAC, or pursuant to a discharge permit, 20.6.2.3109.E NMAC.

In addition, the Commission has adopted standards for surface water. 20.6.1 NMAC. The objective of these standards, consistent with the federal Clean Water Act (Section 4.2.2.1) is "to establish water quality standards that consist of the designated use or uses of surface waters of the [S]tate, the water quality criteria necessary to protect the use or uses[,] and an antidegradation policy." 20.6.4.6.A NMAC. The standards include designated uses for specific bodies of water within the state, 20.6.4.50 to 20.6.4.806 NMAC; general water quality criteria, 20.6.4.13 NMAC; water quality criteria for specific designated uses, 20.6.4.900 NMAC; and water quality criteria for specific bodies of water, 20.6.4.50 to 20.6.4.806 NMAC. The standards also include an antidegradation policy, applicable to all surface waters of the state, to protect and maintain water quality. 20.6.4.8 NMAC. The antidegradation policy sets three levels of protection, closely matched to the federal regulations.

Lastly, the Commission has also adopted regulations limiting the discharge of pollutants into surface waters. 20.6.2.2100 to 2202 NMAC.

4.2.2.5 New Mexico Drinking Water Standards

The New Mexico Environmental Improvement Act created an Environmental Improvement Board, and it authorizes the Board to promulgate rules and standards for water supply. NMSA 1978, § 74-1-8(A)(2). The Board has accordingly adopted state drinking water standards for all public water systems. 20.7.10 NMAC. The state regulations incorporate by reference the federal primary and secondary drinking water standards, 40 C.F.R. parts 141 and 143, established by the EPA under the Safe Drinking Water Act (Section 4.2.2.2). 20.7.10.100 NMAC, 20.7.10.101 NMAC.

4.3 Legal Issues Unique to the Region and Local Conflicts Needing Resolution

Several legal issues are unique to the Lea County planning region. First, Texas irrigators immediately across the state line—relying on the rule of capture, which applies under Texas state law—are removing water underlying land in New Mexico to draw water for irrigation into Texas. Second, the City of Midland, Texas's construction of a well field on the Texas-New Mexico border to appropriate and pipe groundwater from the Jal Basin to Midland prompted the State Engineer's closure of the Jal Basin to new appropriations on the New Mexico side of the basin. Finally, the potential of groundwater contamination through oil and gas operations is of concern in the region.

5. Water Supply

This section provides an overview of the water supply in the Lea County Water Planning Region, including climate conditions (Section 5.1), surface water and groundwater resources (Sections 5.2 and 5.3), water quality (Section 5.4), and the administrative water supply used for planning purposes in this regional water plan update (Section 5.5). Additional quantitative assessment of water supplies is included in Section 7, Identified Gaps between Supply and Demand.

The Handbook specifies that each of the 16 regional water plans briefly summarize water supply information from the previously accepted plan and provide key new or revised information that has become available since submittal of the accepted regional water plan. The information in this section regarding surface and groundwater supply and water quality is thus drawn largely from the accepted *Lea County Regional Water Plan* (Leedshill-Herkenhoff, Inc. et al., 2000) and where appropriate, updated with more recent information and data from a number of sources, as referenced throughout this section.

Currently some of key water supply updates and issues impacting the Lea County region are:

- The primary source of water is the Ogallala Aquifer, which is being rapidly depleted in certain areas. Before intense groundwater pumping began, groundwater in the High Plains Aquifer generally flowed to the southeast. Due to intensive groundwater pumping in both New Mexico and Texas, water levels have declined and the direction of groundwater flow has shifted. In Lea County, groundwater levels have declined 50 to 100 feet (McGuire, 2014), with rates of decline up to 4 feet per year and averaging 0.59 feet per year for wells in Lea County (USGS, 2013).

- The High Plains Aquifer extends into Texas, which has a different approach for managing this aquifer than New Mexico's. Interstate cooperation would improve monitoring and research and possibly address aquifer decline.

- The alluvial sediments in the Jal UWB also extend into Texas. The City of Midland, Texas constructed the T-Bar Ranch well field just south of the New Mexico-Texas boundary near the Jal UWB. The well field includes 45 wells capable of delivering about 20 million gallons per day (22,400 acre-feet per year). According to the Texas Water Development Board website, the city pumped 6,831 acre-fee in 2014 from its T-Bar Ranch well field. Concerns have been raised about the impacts of these diversions. Whereas water level declines in the basin prior to the pumping of the T-Bar well field ranged up to 2.4 feet per year, U.S. Geological Survey (USGS) measurements in 2014 indicate that water levels are declining about 6.6 feet per year in the southern portion of the Jal UWB.

- Due to the limited and diminishing groundwater supply within the Lea County and Jal UWBs, the NMOSE is no longer accepting applications for new appropriations except for domestic, stock, and temporary construction applications filed under Section 72-12-1 NMSA. NMOSE is accepting applications for new appropriations in the Capitan and Carlsbad UWBs in Lea County.

- The many small rural drinking water systems within the region face challenges in financing infrastructure maintenance and upgrades and complying with water quality monitoring and training standards. Though the source water for these systems is generally good-quality groundwater, the maintenance, upgrades, training, operation, and monitoring that is required to ensure delivery of water that meets drinking water quality standards is a financial and logistical challenge for these small systems.

- Significant pumping of water from the Lea County UWB is currently taking place. The City of Carlsbad, in the Lower Pecos Valley Water Planning Region, has water rights of more than 18,000 acre-feet per year from the Lea County UWB for consumption in Eddy County; this water is pumped out of the Double Eagle well field in Lea County and delivered by pipeline to industrial and commercial customers.

- Lea County residents are concerned that permitted water rights that may have not been put to beneficial use for many years are being transferred from agriculture use to oil and gas production utilizing the Water Use Leasing Act and other statutory water transfer emergency procedures (NMSA 1978, Sections72-6-1 to 72-6-7 and the emergency/temporary water permit process (NMSA 1978, Section 72-5-25). There is also concern that water permitted under this provision is being used outside the region. By using these statutes, the applicant moving the water rights from agricultural use to oil and gas production does not go through the usual statutory process of changing the place and purpose of use of a water right, which would allow for a public protest and a full hearing if necessary before pumping of the water. Rather, after a preliminary assessment by the State Engineer that the water use will not impair any existing right to a greater degree than the original use and is not contrary to conservation, the applicant can pump the water immediately without publication of the transfer and going through the full hearing process.

- Water rights in the planning region have not yet been adjudicated.

- Water availability in the formations beneath the High Plains Aquifer is poorly understood and more study is needed. For the most part, aquifers immediately below the High Plains Aquifer are expected to have relatively low yields and poor water quality. Deep water pumping may provide an alternative supply but could cause depletions of the High Plains Aquifer.

- More than 19,000 active oil and gas wells produce from numerous oil fields throughout Lea County (OCD, 2015). Concerns have been raised over water quality impacts and the use of high quality fresh water for hydraulic fracturing and other commercial and industrial operations.

5.1 Summary of Climate Conditions

The accepted regional water plan (Leedshill-Herkenhoff, Inc. et al., 2000) included an analysis of historical temperature and precipitation in the region. This section provides an updated summary of temperature, precipitation, snowpack conditions, and drought indices pertinent to the region (Section 5.1.1). Studies relevant to climate change and its potential impacts to water resources in New Mexico and the Lea County region are discussed in Section 5.1.2.

5.1.1 Temperature, Precipitation, and Drought Indices

Table 5-1 lists the periods of record for weather stations in Lea County and identifies two stations that were used for analysis of weather trends. These stations were selected based on location, how well they represented conditions in their respective counties, and completeness of their historical records. The locations of the climate stations for which additional data were analyzed are shown in Figure 5-1.

Long-term minimum, maximum, and average temperatures for the two representative climate stations are detailed in Table 5-2, and average summer and winter temperatures for each year of record are shown on Figure 5-2.

The average precipitation distribution across the entire region is shown on Figure 5-3, and Table 5-2 lists the minimum, maximum, and long-term average annual precipitation (rainfall and snowmelt) at the two representative stations in the planning region. Total annual precipitation for the selected climate stations is shown in Figure 5-4. Average annual precipitation is greater in the northern two-thirds of the region, ranging from 14 to 18 inches, compared to the averages of 12 to 14 inches in the southern third.

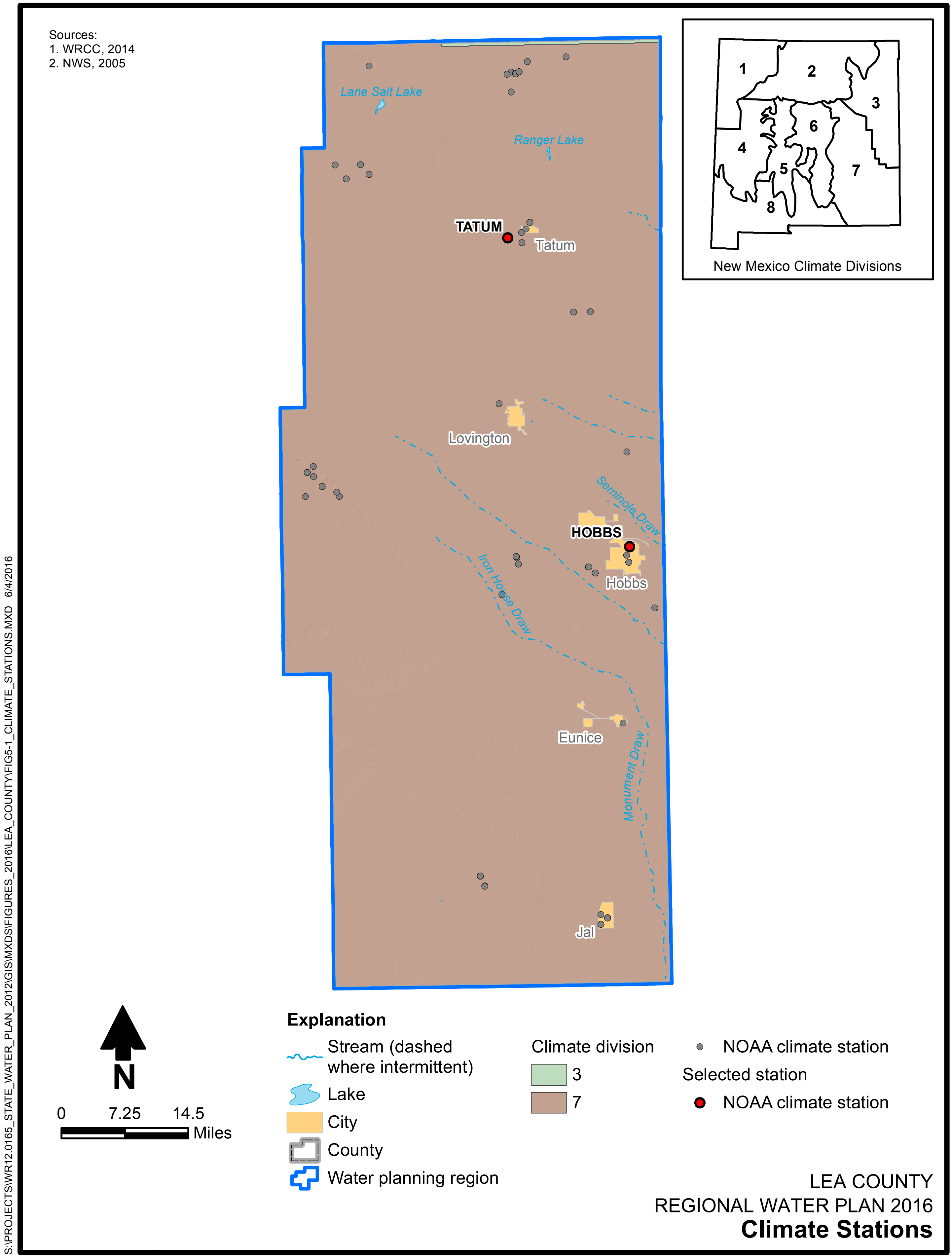
Another way to review long-term variations in climate conditions is through drought indices. A drought index consists of a ranking system derived from the assimilation of data—including rainfall, snowpack, streamflow, and other water supply indicators—for a given region. The Palmer Drought Severity Index (PDSI) was created by W.C. Palmer (1965) to measure the variations in the moisture supply and is calculated using precipitation and temperature data as well as the available water content of the soil. Because it provides a standard measure that allows comparisons among different locations and months, the index is widely used to assess the weather during any time period relative to historical conditions. The PDSI classifications for dry to wet periods are provided in Table 5-3.

Table 5-1. Lea County Climate Stations

Climate Stations [a]	Latitude	Longitude	Elevation	Precipitation		Temperature	
				Data Start	Data End	Data Start	Data End
Lea County							
Crossroads #2	33.52	–103.35	4,151	5/1/1929	5/31/2001	4/30/1958	10/31/2000
Hobbs	32.73	–103.13	3,660	1/1/1912	Present	1/1/1912	Present
Hobbs FAA Airport	32.69	–103.21	3,655	5/1/1948	Present	5/1/1948	Present
Jal	32.11	–103.19	3,054	3/1/1919	Present	3/1/1919	Present
Lovington 2 WNW	32.97	–103.38	3,904	1/1/1919	3/31/1967	1/1/1919	3/31/1967
Maljamar 4 SE	32.82	–103.70	4,000	10/1/1942	7/31/2012	7/1/1932	5/31/2011
Ochoa	32.17	–103.43	3,398	3/1/1942	Present	5/1/1991	Present
Pearl	32.65	–103.38	3,800	1/1/1906	7/31/1996	1/1/1906	7/31/1996
Prairieview	33.12	–103.20	4,003	6/1/1911	1/31/1950	6/1/1911	10/31/1918
Tatum	33.24	–103.36	4,012	6/1/1919	Present	6/1/1919	Present

Source: WRCC, 2014

[a] Stations in **bold** type were selected for detailed analysis.



LEA COUNTY
REGIONAL WATER PLAN 2016
Climate Stations

Figure 5-1

Table 5-2. Temperature and Precipitation for Selected Climate Stations Lea County Water Planning Region

Station Name	Precipitation (inches)				Temperature			
					Average (°F)			
	Average Annual [a]	Minimum [b]	Maximum [b]	% of Possible Observations [c]	Annual [d]	Minimum [e]	Maximum [e]	% of Possible Observations [c]
Hobbs	15.75	1.85	32.19	91.6	61.9	47.4	76.3	74.2
Tatum	15.98	6.94	36.49	90.3	58.4	42.2	74.7	74.4

Source: Statistics computed by Western Regional Climate Center (2014)

ft amsl = Feet above mean sea level

°F = Degrees Fahrenheit

[a] Average of annual precipitation totals for the period of record at each station.

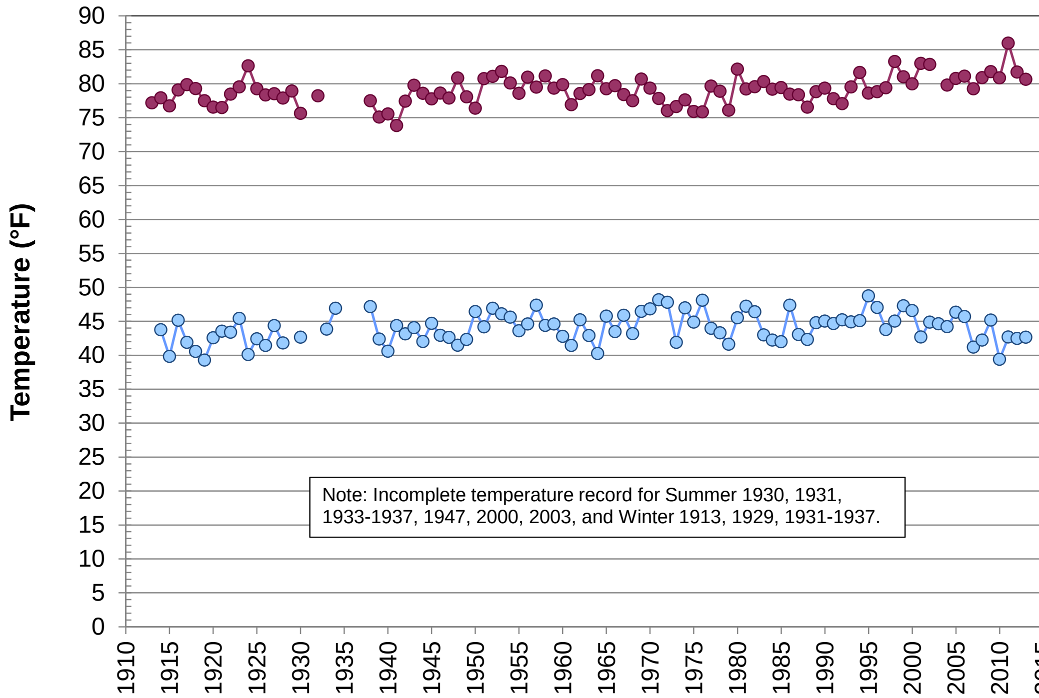
[b] Minimum and maximum recorded annual precipitation amounts for each station.

[c] Amount of completeness in the daily data set that was recorded at each station (e.g., 99% complete means there is a 1% data gap).

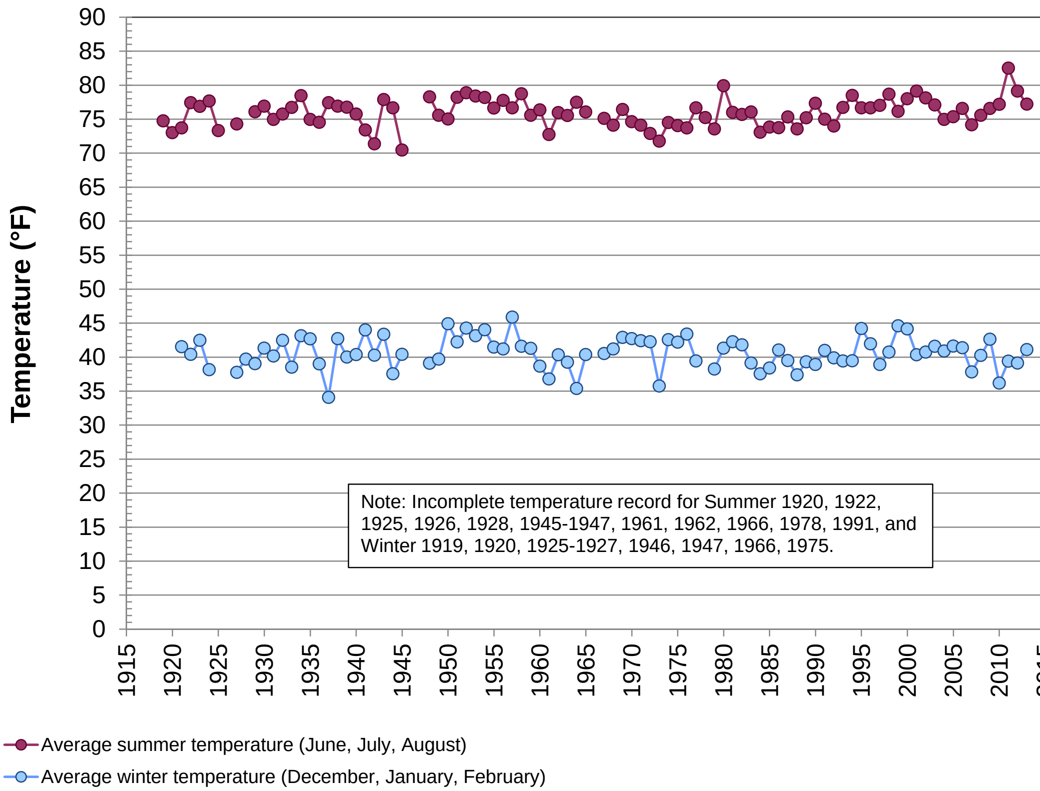
[d] Average of the daily average temperatures calculated for each station.

[e] Average of the daily minimum (or maximum) temperature recorded daily for each station.

Hobbs



Tatum



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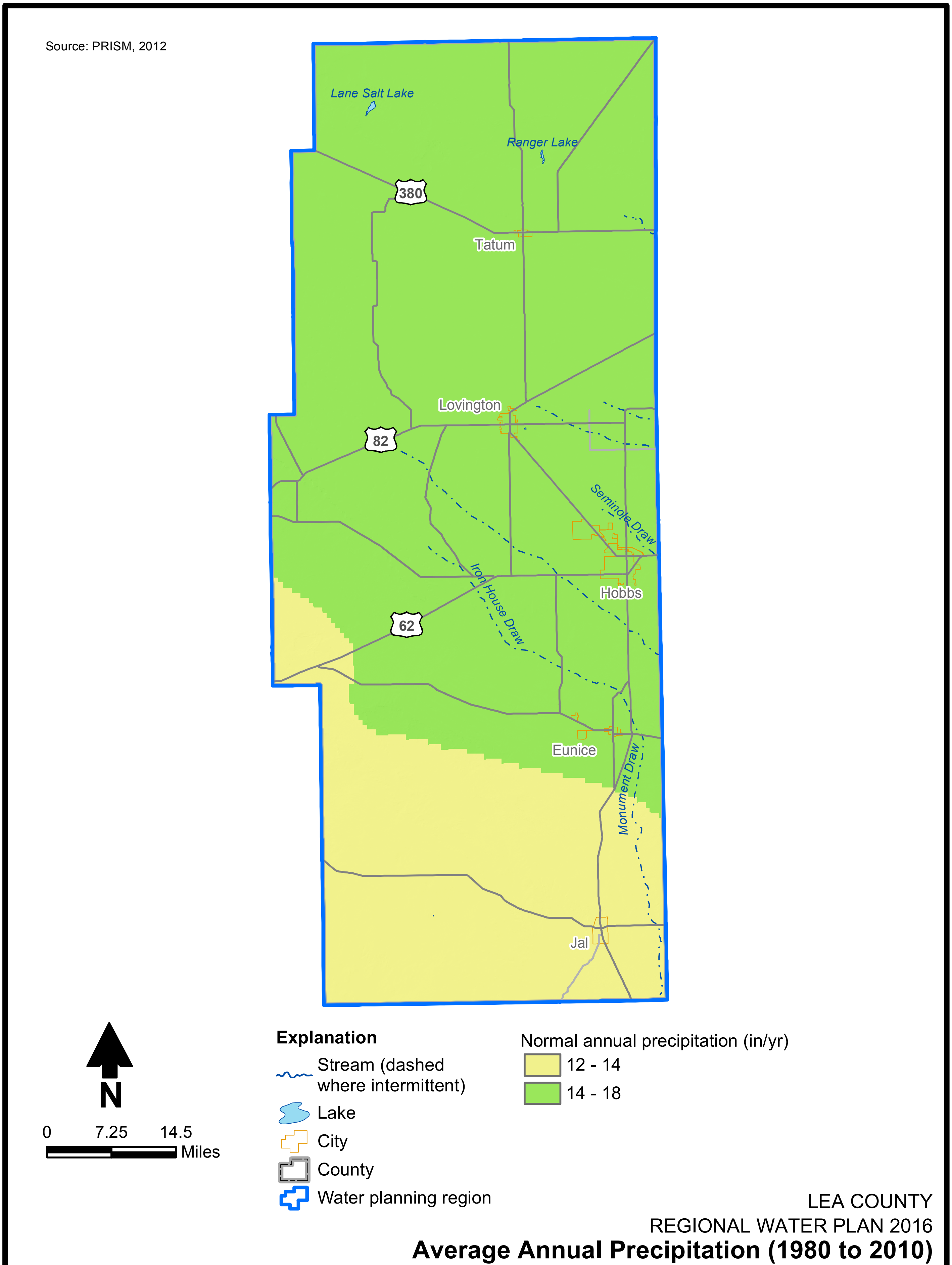
LEA COUNTY
REGIONAL WATER PLAN 2016

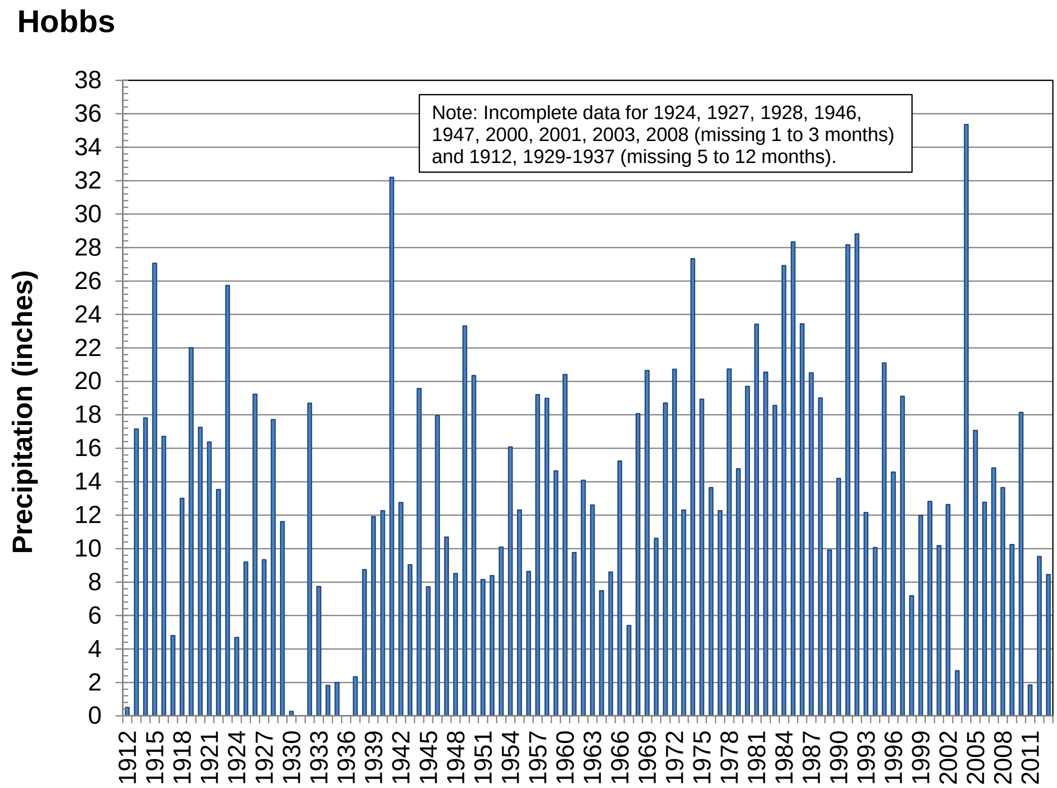
Average Temperature
Hobbs and Tatum Climate Stations

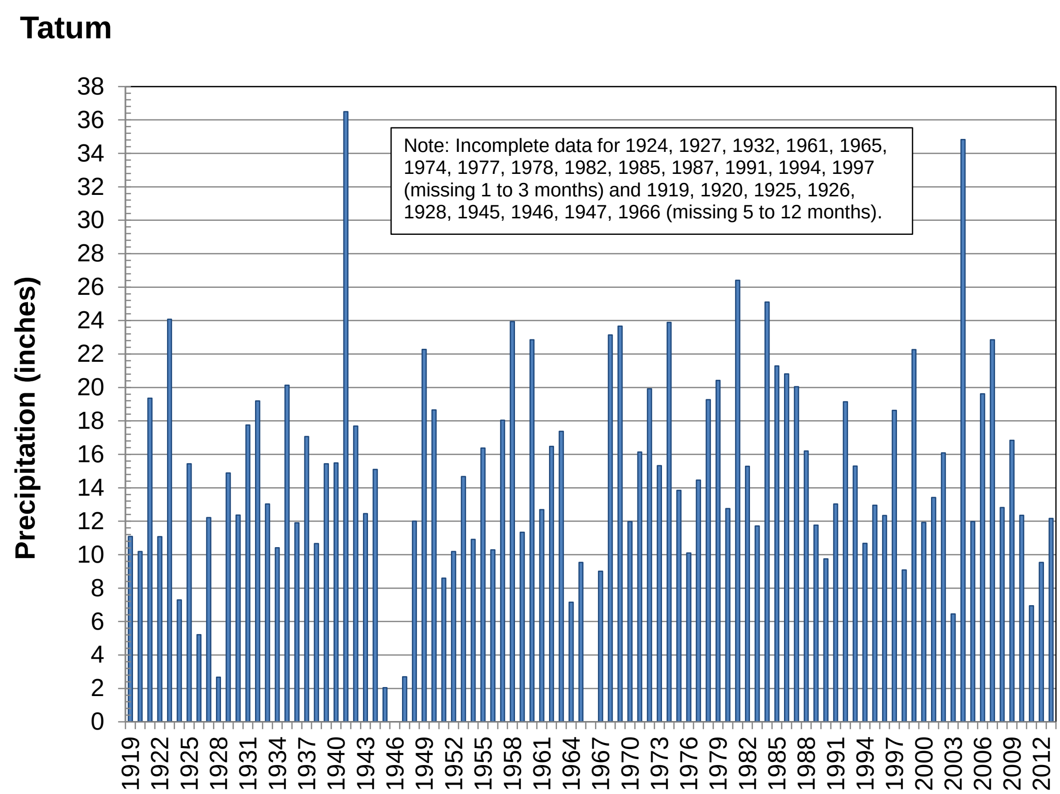
Figure 5-2



LEA COUNTY
REGIONAL WATER PLAN 2016
Average Annual Precipitation (1980 to 2010)

Figure 5-3





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LEA COUNTY
REGIONAL WATER PLAN 2016

Annual Precipitation
Hobbs and Tatum Climate Stations

Figure 5-4

Table 5-3. Palmer Drought Severity Index Classifications

PDSI Classification	Description
+ 4.00 or more	Extremely wet
+3.00 to +3.99	Very wet
+2.00 to +2.99	Moderately wet
+1.00 to +1.99	Slightly wet
+0.50 to +0.99	Incipient wet spell
+0.49 to –0.49	Near normal
–0.50 to –0.99	Incipient dry spell
–1.00 to –1.99	Mild drought
–2.00 to –2.99	Moderate drought
–3.00 to –3.99	Severe drought
–4.00 or less	Extreme drought

There are considerable limitations when using the PDSI, as it may not describe rainfall and runoff that varies from location to location within a climate division and may also lag in indicating emerging droughts by several months. Also, the PDSI does not consider groundwater or reservoir storage, which can affect the availability of water supplies during drought conditions. However, even with its limitations, many states incorporate the PDSI into their drought monitoring systems, and it provides a good indication of long-term relative variations in drought conditions, as PDSI records are available for more than 100 years.

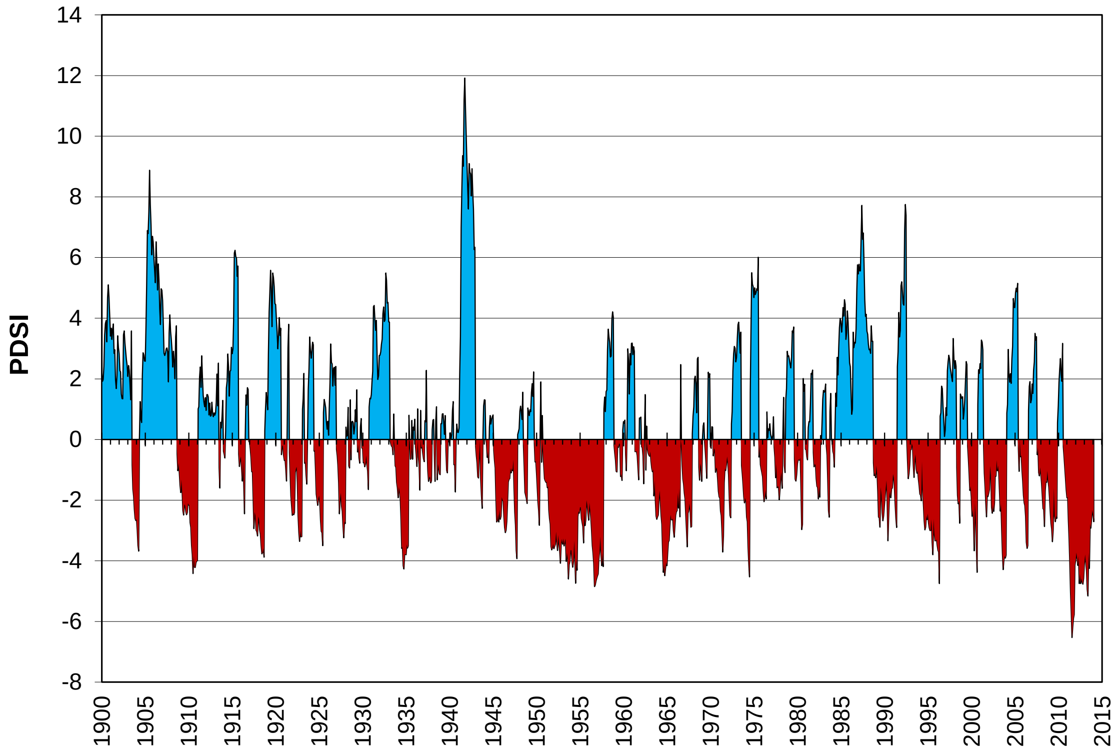
The PDSI is calculated for climate divisions throughout the United States. Lea County falls almost entirely within New Mexico Climate Division 7 (the Southeastern Plains Climate Division) with the exception of a small strip of Climate Division 3 in the northern portion of Lea County (Figure 5-1). Figure 5-6 shows the long-term PDSI for this division. Of interest are the large variations from year to year and the extremely dry conditions in recent years.

The chronological history of drought, as illustrated by the PDSI, indicates that the most severe droughts in the last century occurred in the early 1900s, the 1930’s, the 1950s, the early 2000s, and in recent years (2011 to 2013) (Figure 5-6).

The likelihood of drought conditions developing in New Mexico is influenced by several weather patterns:

- *El Niño/La Niña:* El Niño and La Niña are characterized by a periodic warming and cooling, respectively, of sea surface temperatures across the central and east-central equatorial Pacific. Years in which El Niño is present are more likely to be wetter than average in New Mexico, and years with La Niña conditions are more likely to be drier than average, particularly during the cool seasons of winter and spring.

Climate Division 7



Note: Blue indicates wetter than average conditions and red indicates drier than average conditions, as described on Table 5-3.

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LEA COUNTY
REGIONAL WATER PLAN 2016

Palmer Drought Severity Index
New Mexico Climate Division 7

Figure 5-6

- *The Pacific Decadal Oscillation (PDO):* The PDO is a multi-decadal pattern of climate variability caused by shifting sea surface temperatures between the eastern and western Pacific Ocean that cycle approximately every 20 to 30 years. Warm phases of the PDO (shown as positive numbers on the PDO index) correspond to El Niño-like temperature and precipitation anomalies (i.e., wetter than average), while cool phases of the PDO (shown as negative numbers on the PDO index) correspond to La Niña-like climate patterns (drier than average). It is believed that since 1999 the planning region has been in the cool phase of the PDO.

- *The Atlantic Multidecadal Oscillation (AMO):* The AMO refers to variations in surface temperatures of the Atlantic Ocean which, similarly to the PDO, cycle on a multi-decade frequency. The pairing of a cool phase of the PDO with the warm phase of the AMO is typical of drought in the southwestern United States (McCabe et al., 2004; Stewart, 2009). The AMO has been in a warm phase since 1995. It is possible that the AMO may be shifting to a cool phase but the data are not yet conclusive.

- *The North American Monsoon* is characterized by a shift in wind patterns in summer, which occurs as Mexico and the southwest U.S. warm under intense solar heating. As this happens, the flow reverses from dryland areas to moist ocean areas. Low-level moisture is transported into the region primarily from the Gulf of California and eastern Pacific. Upper-level moisture is transported into the region from the Gulf of Mexico by easterly winds aloft. Once the forests of the Sierra Madre Occidental green up from the initial monsoon rains, evaporation and plant transpiration can add additional moisture to the atmosphere that will then flow into the region. If the Southern Plains of the U.S. are unusually wet and green during the early summer months, that area can also serve as a moisture source. This combination causes a distinct rainy season over large portions of western North America (NWS, 2015).

5.1.2 Recent Climate Studies

New Mexico’s climate has historically exhibited a high range of variability. Periods of extended drought, interspersed with relatively short-term, wetter periods, are common. Historical periods of high temperature and low precipitation have resulted in high demands for irrigation water and higher open water evaporation and riparian evapotranspiration. In addition to natural climatic cycles (i.e., El Niño/La Niña, PDO, AMO [Section 5.1.1]) that affect precipitation patterns in the southwestern United States, there has been considerable recent research on potential climate change scenarios and their impact on the Southwest and New Mexico in particular.

Climate variability has a significant impact on the Ogallala Aquifer. Age dating for water in the aquifer indicates that much of the water originally entered the aquifer during a wetter climate during the last ice age (McMahon, 2007). Thus, the more recent precipitation (in the last few thousand years) is not resulting in significant recharge to the aquifer. With higher temperatures and longer growing seasons, the amount of precipitation that can result in recharge will be even less than the recent past.

The consensus on global climate conditions is represented internationally by the work of the Intergovernmental Panel on Climate Change (IPCC), whose Fifth Assessment Report, released in September 2013, states, “Warming of the climate system is unequivocal, and since the 1950s many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased” (IPCC, 2013). Atmospheric concentrations of greenhouse gases are rising so quickly that all current climate models project significant warming trends over continental areas in the 21st century.

In the United States, regional assessments conducted by the U.S. Global Change Research Program (USGCRP) have found that temperatures in the southwestern United States have increased and are predicted to continue to increase, and serious water supply challenges are expected. Water supplies are projected to become increasingly scarce, calling for trade-offs among competing uses and potentially leading to conflict (USGCRP, 2009).

Although there is consensus among climate scientists that global temperatures are warming, there is considerable uncertainty regarding the specific spatial and temporal impacts that can be expected. To assess climate trends in New Mexico, the NMOSE and NMISC (2006) conducted a study of observed climate conditions over the past century and found that observed wintertime average temperatures had increased statewide by about 1.5°F since the 1950s. Predictions of annual precipitation are subject to greater uncertainty “given poor representation of the North American monsoon processes in most climate models” (NMOSE/NMISC, 2006).

A number of other studies predict temperature increases in New Mexico from 5° to 10°F by the end of the century (Forest Guild, 2008; Hurd and Coonrod, 2008; USBR, 2011). Predictions of annual precipitation are subject to greater uncertainty, particularly regarding precipitation during the summer monsoon season in the southwestern U.S.

Based on these studies, the effects of climate change that are likely to occur in New Mexico and the planning region include (NMOSE/NMISC, 2006):

- Temperature is expected to continue to rise.
- Higher temperatures will result in a longer and warmer growing season, resulting in increased water demand on irrigated lands and increased evapotranspiration from riparian areas, grasslands and forests, and thus less recharge to aquifers.
- Reservoir and other open water evaporation are expected to increase. Soil evaporation will also increase.

- Precipitation is expected to be more concentrated and intense, leading to increased projected frequency and severity of flooding.

To minimize the impact of these changes, it is imperative that New Mexico plan for variable water supplies, including focusing on drought planning and being prepared to maximize storage from extreme precipitation events while minimizing their adverse impacts.

5.2 Surface Water Resources

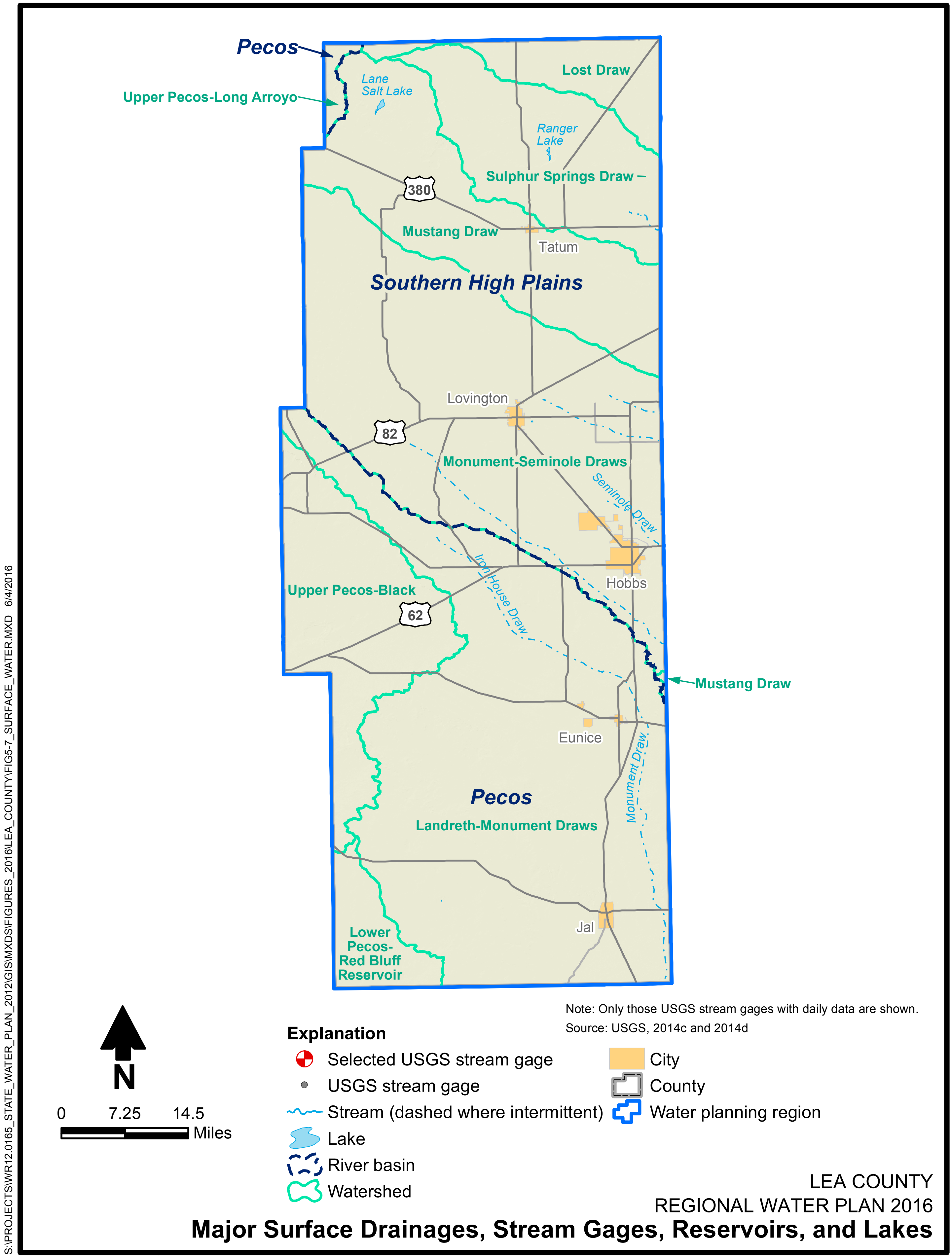
Surface water supplies only 0.04 percent of the water currently diverted in the Lea County Water Planning Region, with its primary use being for livestock watering. No major surface water supplies are available in Lea County, only intermittent streams, lakes, stock ponds, and small playas that collect runoff during thunderstorms. Intermittent streams that channel runoff include Lost Draw, Sulfur Springs Draw, and Monument-Seminole Draw in the northern half of Lea County, which is part of the Texas Gulf Basin, and Landreth-Monument Draw in the southern portion of the county, which flows to the Pecos River. The very western edge of the county also lies within the Pecos River drainage. The intermittent surface drainages, lakes, and watersheds in the planning region are shown on Figure 5-7.

Although no permanent stream gages are operated by USGS in Lea County, periodic measurements of peak flow rates at Monument Draw near Monument and Antelope Draw near Jal yield significant runoff:

- The accepted RWP (Leedshill-Herkenhoff, Inc. et al., 2000) reported historical peak flows of 1,280 cubic feet per second (cfs) on Monument Draw in June of 1972, but no additional measurements have made since 1982 (USGS, 2015).
- In 2001, recorded peak flow reached 686 cfs on Antelope Draw, far exceeding the previous high reported in the 2000 RWP of 53 cfs in 1994.

These flows indicate the magnitude of runoff that can occur in all intermittent streams in Lea County. The water is held in stock ponds throughout Lea County from these intermittent flows, and the quality is adequate for livestock uses, which is its primary use in the basin.

No lakes and reservoirs with storage capacities greater than 5,000 acre-feet, as reported in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013), are present in the planning region. Several smaller lakes and reservoirs are present in the region; information on these smaller reservoirs was included in the accepted plan (Leedshill-Herkenhoff, Inc. et al., 2000).



LEA COUNTY
REGIONAL WATER PLAN 2016

Major Surface Drainages, Stream Gages, Reservoirs, and Lakes

Figure 5-7

5.3 Groundwater Resources

Groundwater accounted for 99.96 percent of all water diversions in the year 2010 (Longworth et al., 2013). The primary source of supply is the High Plains Aquifer, which extends north to Wyoming, Colorado, Nebraska, Kansas, Oklahoma, and Texas. In New Mexico, the High Plains aquifer includes the Tertiary-age Ogallala Formation and unconsolidated alluvial and terrace deposits of Quaternary age. These units are discussed in Sections 5.3.1 and 5.3.2.

5.3.1 Regional Hydrogeology

The geology that controls groundwater occurrence and movement within the planning region was described in the accepted *Lea County Regional Water Plan* (Leedshill-Herkenhoff, Inc. et al., 2000), based on numerous studies, including early studies by Nye (1930), Nicholson and Clebsch (1961), and Hart and McAda (1985). A map illustrating the surface geology of the planning region, derived from a geologic map of the entire state of New Mexico by the New Mexico Bureau of Geology & Mineral Resources (2003), is included as Figure 5-10.

Two physiographic regions exist within the planning region. From the west to the east, these are:

- Great Plains (Lower Pecos Valley Subsection)
- Great Plains (Llano Estacado)

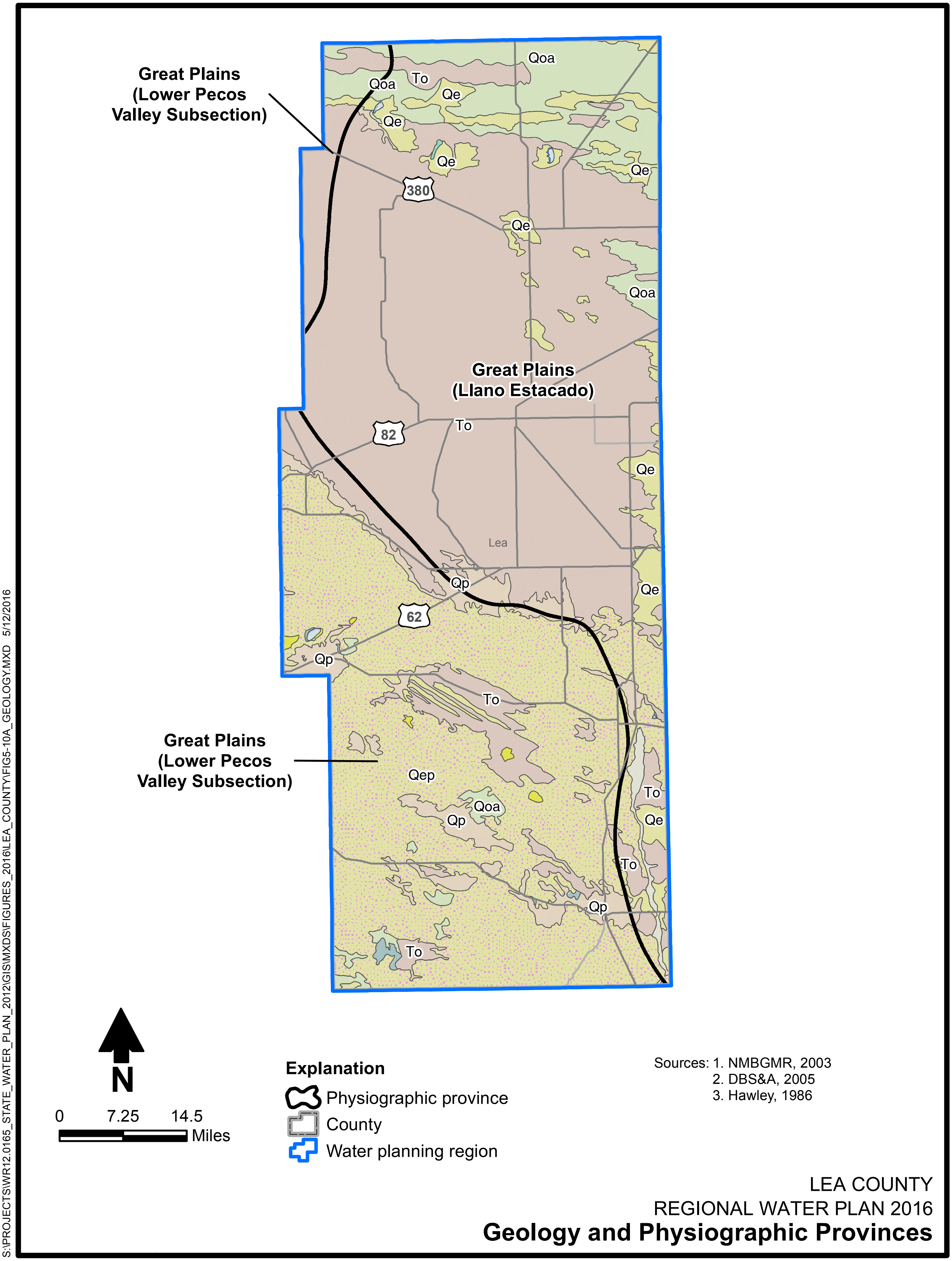
Figure 5-10 shows the approximate extents of these areas within the planning region.

Geologic strata exposed in the planning region consist primarily of the Ogallala Formation and alluvial, aeolian, and piedmont deposits. The geologic formations present in the planning region include (from oldest to youngest):

- Triassic-age rock including the Upper Chinle Group, Garita Creek through Redonda Formations
- Tertiary- age rock of the Ogallala Formation
- Quaternary-age rock including alluvium, aeolian and piedmont deposits and lacustrine and playa deposits

The major and minor aquifers in the planning region consist of:

- The High Plains Aquifer in the northern half of the planning region is comprised of the Ogallala Formation and unconsolidated Quaternary deposits of sand, silt, and gravel. The High Plains Aquifer extends northward into eastern parts of New Mexico and Colorado and toward the east into Texas. The western portion of the Capitan UWB was found to contain isolated areas of saturated Ogallala Formation (up to 50 feet thick) in 1960 (Nicholson and Clebsch, 1961); these areas are not formally included in the High Plains Aquifer.



LEA COUNTY
REGIONAL WATER PLAN 2016
Geology and Physiographic Provinces

Figure 5-10a

Geology Explanation

- Kl - Lower Cretaceous, undivided
- Playa - Playa deposits
- Qa - Alluvium
- Qe - Eolian deposits
- Qep - Eolian and piedmont deposits
- Qoa - Older alluvial deposits of upland plains and piedmont areas, and calcic soils and eolian cover sediments of High Plains region
- Qp - Piedmont alluvial deposits
- Qpl - Lacustrine and playa deposits
- To - Ogallala Formation
- Water - Water
- TRcu - Upper Chinle Group, Garita Creek through Redonda Formations, undivided

Source: NMBGMR, 2003

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LEA COUNTY
REGIONAL WATER PLAN 2016
Geology Explanation

Figure 5-10b

- The alluvial aquifer consists of discontinuous and unconfined saturated alluvial and aeolian deposits along intermittent streams in southern Lea County, such as Monument Draw, Querecho Plains, San Simon Swale, and Dogie Draw, and along the Mescalero Ridge. Alluvial sediments are also present in the Jal UWB, which provides water to the city of Jal, where the saturated thickness in their well field is between 200 to 300 feet and declining (Hoines, 2004) Significant groundwater pumping occurs across the border in Texas, and drawdowns of 6.6 feet per year have been observed in the Jal UWB (Myers, 2015).

- Dockum Group aquifers exist throughout Lea County with potential sources of groundwater that are mostly undeveloped due to the high cost of producing the deep water. The development that has occurred is limited specifically to the Santa Rosa Sandstone unit in the southwestern portion of the County; it was the principal aquifer for the City of Jal before 1954 (Leedshill-Herkenhoff, Inc. et al., 2000) and is currently used for domestic, livestock, and commercial purposes for oil and gas development.

- The Tucumcari Formation exists in a limited area of northeastern Lea County. Lithologically, the Tucumcari is characterized as a shale with lesser limestone and sandstone beds. Basal sandstone beds provide limited amounts of water from within the Tucumcari Formation, but only limited exploration of the unit's groundwater has occurred (Leedshill-Herkenhoff, Inc. et al., 2000).

- The Rustler Formation is believed to underlie all of Lea County at depth and produces brackish to saline water that is primarily used for stock watering and secondary recovery of oil.

- The Capitan Aquifer is part of the Capitan Reef Complex, an ancient reef of dolomite and limestone strata. The aquifer is relatively deep and the groundwater quality of the Capitan in Lea County is very poor.

5.3.2 Aquifer Conditions

As reported in the accepted regional water plan (Leedshill-Herkenhoff, Inc. et al., 2000), by far the most important aquifer is the High Plains Aquifer; this aquifer is within the Lea County UWB, which is a mined basin (i.e., a basin with declining water levels). The Ogallala Formation portion of the aquifer has been relied upon for most of the groundwater used in the basin; however, there are areas where it is not present or where the saturated thickness is too small to support large-scale groundwater production.

Other geologic units directly underlying the High Plains Aquifer in certain areas may contain some coarse-grained beds that are productive, and these have been used for irrigated agriculture, particularly in areas where the High Plains Aquifer is thin or non-existent. Although the

NMOSE is limiting new appropriations within the the Lea County UWB to domestic, stock, and temporary construction applications, it is accepting applications to appropriate groundwater from the formations beneath the High Plains Aquifer. However, these units are relatively deep and the groundwater typically has high concentrations of dissolved solids.

Before intense groundwater pumping began, groundwater in the High Plains Aquifer generally flowed to the southeast. Due to intensive groundwater pumping in both New Mexico and Texas, water levels have declined and the direction of groundwater flow has shifted. In Lea County, groundwater levels have declined 50 to 100 feet (McGuire, 2014), with rates of decline up to 4 feet per year and averaging 0.59 feet per year (USGS, 2013). Presently, the saturated thickness ranges from zero along the western fringes of the basin to about 200 feet (Fischer et al., 2000; USGS, 2013).

Most water pumped from wells in the High Plains Aquifer is of good quality. Where problems with groundwater contamination exist, they are generally associated with one or more of the following: leaking underground storage tanks, nitrate from agricultural activities, dairy operations, septic tanks, public and private sewage treatment plants, and oil- and gas-field operations. Groundwater from the deeper formations is expected to be of poorer quality compared to the water from the High Plains Aquifer.

As stated above, the only applications for new appropriations accepted by NMOSE within the Lea County UWB are for domestic, stock, and temporary construction applications filed under Section 72-12-1 NMSA. NMOSE accepts applications for transfers, replacement, and supplemental wells, but these are not new appropriations. The Lea Basin administrative guidelines adopted in 2009 provide consistent review procedures and are intended to prolong aquifer life and protect existing wells (Section 4). A drawdown allowance is provided in the guidelines and serves as a benchmark for evaluating well impacts from proposed water rights transfers. For regional-scale assessments, the effects predicted for each model cell are compared to the allowance established. In areas of the Lea County UWB that are predicted to have less than a 40-year supply, a drawdown allowance of 0.05 foot per year is being used when evaluating transfers (NMOSE, 2014b).

The other three UWBs in the planning region that contain groundwater supplies of any significance are:

- The *Capitan UWB* covers approximately 731,500 acres in the south-central portion of Lea County. It is located within a geologic province known as the Delaware Basin, a subdivision of the Permian Basin. The Capitan UWB is oriented in a northwest-southeast alignment above an arc-shaped section of a formation known as the Capitan Reef Complex. The Capitan aquifer occurs within dolomite and limestone strata deposited as an ancient reef. The groundwater quality of the Capitan in Lea County is very poor, with total dissolved solids (TDS) ranging from 10,065 to 165,000 mg/L (Leedshill-

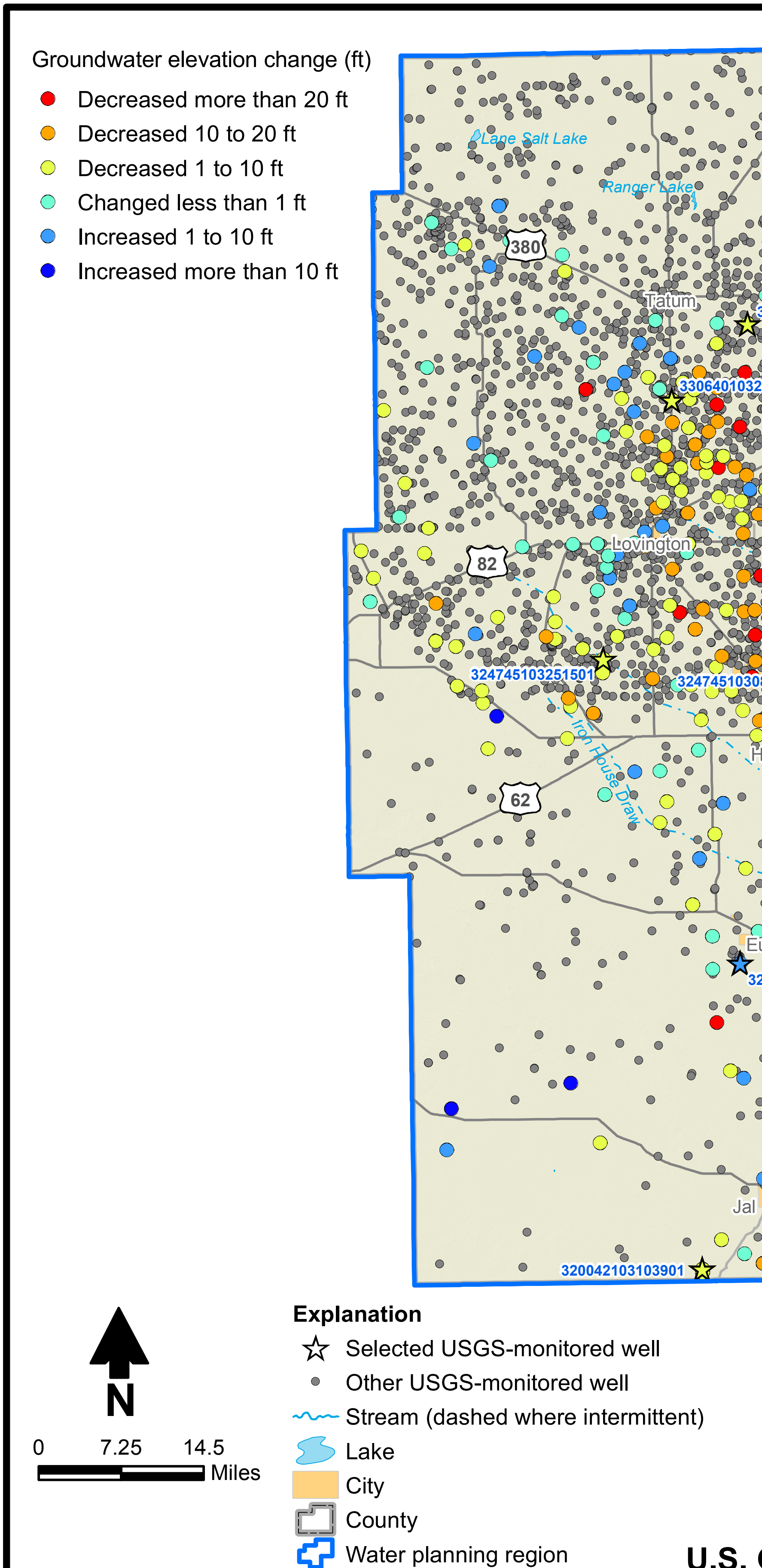
Herkenhoff, Inc. et al., 2000). Other aquifers in the Capitan UWB are found in the overlying Rustler Formation, Santa Rosa Sandstone, Ogallala Formation, and Cenozoic alluvium and are important sources of groundwater in the Capitan UWB. The depth to the top of the Rustler Formation ranges from 900 to 1,100 feet (Leedshill-Herkenhoff, Inc. et al., 2000). Applications for new appropriations in the Capitan UWB are accepted by the NMOSE, although the high TDS and depth to water have restricted the use of the water.

- The *Jal UWB* is a mined basin of approximately 9,400 acres and is located in the southern part of Lea County between the Capitan and Carlsbad UWBs. The Cenozoic-aged alluvium is the primary source of groundwater in the Jal UWB. Triassic rocks underlie the alluvium and may be a source of groundwater supply. The Santa Rosa Sandstone is the principal producer of this unit and is present at a depth of approximately 900 feet near the well field owned by the City of Jal (SMA, 2015b). Two wells with available water level information in the NMOSE WATERS database have a water column of 286 and 390 feet, with an average of 338 feet (NMOSE, 2015). Water level declines for some of the wells owned by the City of Jal range from 0.8 to 2.4 feet per year with an average decline of 1.4 feet (Hoines, 2004). Recent increases in pumping in Texas adjacent to the Jal UWB are resulting in steep water level declines, up to 6.6 feet per year over an 18-month period (2014-2015). If the higher pumping rates continue, 100 percent of the wells will be impacted before 2060, and thus no groundwater will be available for the region. The NMOSE has determined that there is no groundwater available for appropriation and has closed the basin to new appropriations other than domestic, livestock, and temporary construction wells.

- The portion of the *Carlsbad UWB* located in southwestern Lea County is approximately 325,400 acres. The principal aquifer in the Carlsbad UWB is in the Santa Rosa Sandstone, which is approximately 200 feet thick in this area. In general, groundwater in the Carlsbad UWB flows in a southerly direction. Alluvial sediments serve as the principal aquifer for a number of wells in the Carlsbad UWB.

In order to evaluate changes in water levels over time, the USGS monitors groundwater wells throughout New Mexico (Figure 5-11). In 1986, Congress directed the USGS to measure water levels in the High Plains Aquifer every two years to track water level declines. Hydrographs illustrating groundwater levels versus time, as compiled by the USGS (2014b), were selected for six monitor wells with longer periods of record and are shown on Figure 5-12.

The median water column is estimated to be about 100 feet for more than 350 wells in the High Plains Aquifer in Lea County, based on water level data since 1998 listed in the NMOSE Waters database (NMOSE, 2015).



Note: Groundwater elevation change calculated by comparing median measurements for each well from the time period 1985 through 1995 with those from 2005 through 2014.

Source: USGS, 2014b

LEA COUNTY
REGIONAL WATER PLAN 2016

U.S. Geological Survey Wells and Recent Groundwater Elevation Change

Figure 5-11

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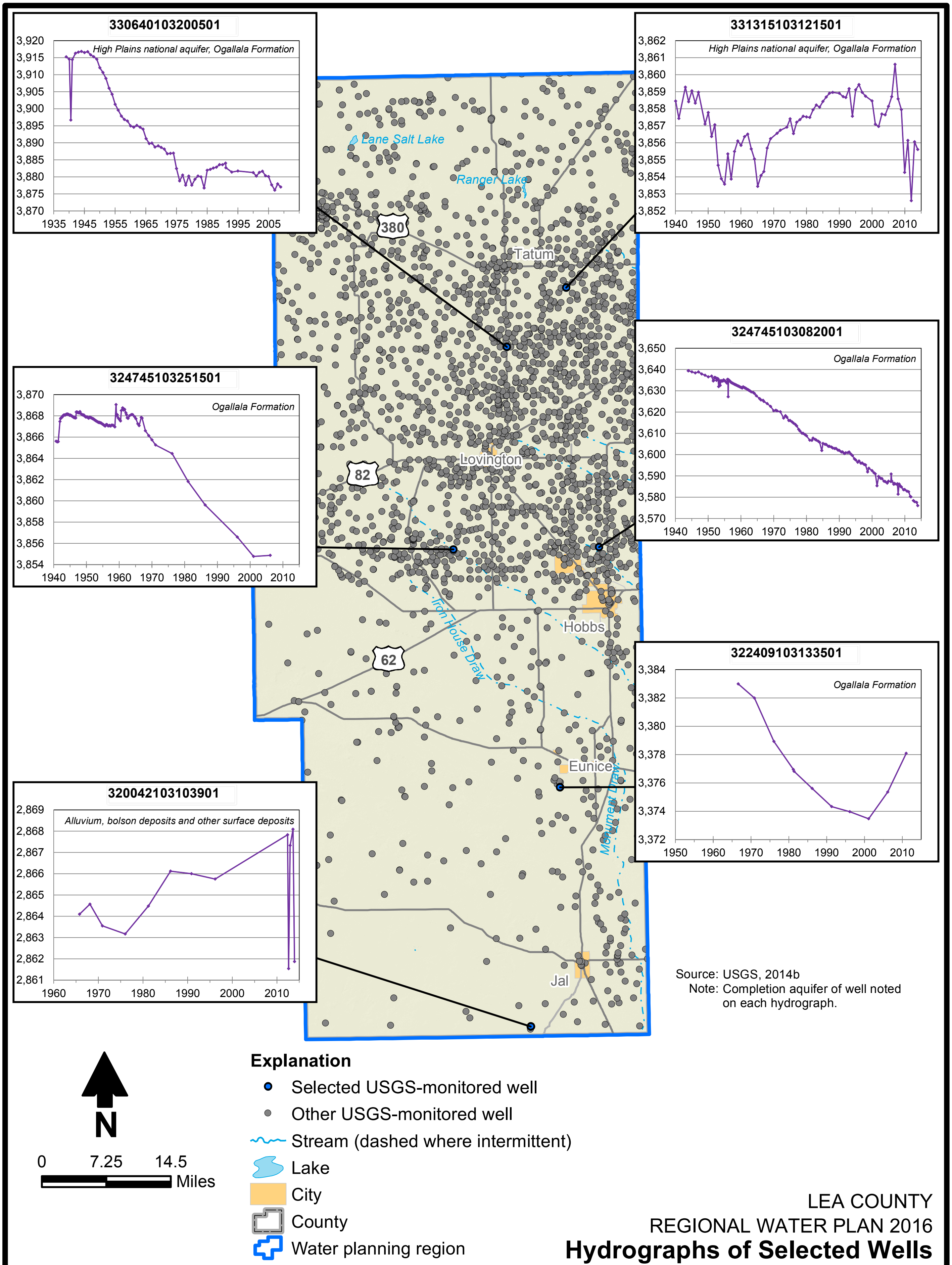


S:\PROJECTS\WR12.0165_STATE_WATER_PLAN_2012\GIS\MXDS\FIGURES_2016\LEA_COUNTY\FIG5-12_USGS_WELLS_HYDROGRAPHS.MXD 6/4/2016

Figure 5-12

The aquifers in the planning region are generally recharged through seepage from ephemeral streams and arroyos and water retained in playas and lakes that infiltrates into the subsurface. Recharge rates vary with changes in precipitation, soil type, and the hydraulic properties of underlying sediments and rocks. Additional recharge can be expected from precipitation falling on small areas of the Llano Estacado outside County boundaries to the north and west. Also, a small amount of groundwater in the Ogallala Formation in adjacent parts of Roosevelt and Chaves counties flows southeasterly, and likely enters the area along the planning region's northern border.

The accepted regional water plan (Leedshill-Herkenhoff, Inc. et al., 2000) provided two published estimates of recharge in the region:

- 37,500 to 75,000 acre-feet per year, on average, to the Ogallala Aquifer in Lea County
- 29,000 to 58,000 acre-feet, on average, to the Lea County UWB

The major well fields in the planning region, along with the basins they draw from, are:

- Hobbs Municipal Water System (Lea County UWB)
- Lovington (Lea County UWB)
- Eunice Water Supply System (Lea County and Capitan UWBs)
- Jal (Jal UWB)

The City of Carlsbad, in the Lower Pecos Valley Water Planning Region, has water rights of more than 18,000 acre-feet per year from the Lea County UWB for consumption in Eddy County. In addition, 2 percent of the city's water comes from the city-owned and operated Double Eagle Water System, which obtains its water from the Ogallala Formation (City of Carlsbad, 2015). The accepted RWP (Leedshill-Herkenhoff, Inc. et al., 2000) reported that 1,600 acre-feet per year were diverted for the City of Carlsbad, but none is shown in the NMOSE's 2010 water use report.

5.4 Water Quality

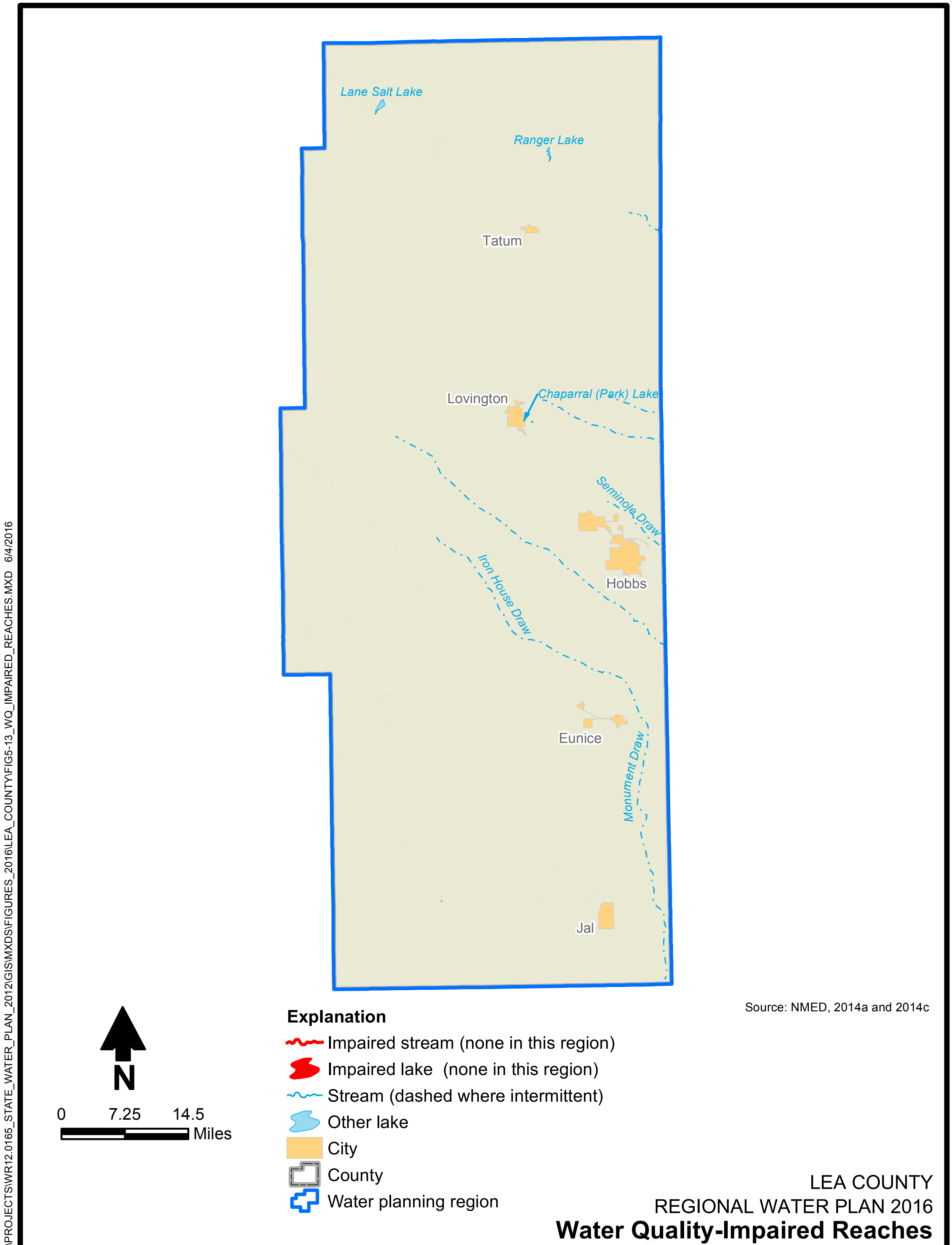
Assurance of ability to meet future water demands requires not only water in sufficient quantity, but also water that is of sufficient quality for the intended use. This section summarizes the water quality assessment that was provided in the accepted regional water plan and updates it to reflect new studies of surface and groundwater quality and current databases of contaminant sources. The identified water quality concerns should be a consideration in the selection of potential projects, programs, and policies to address the region's water resource issues.

Surface water quality in the Lea County Water Planning Region is evaluated through periodic monitoring and comparison of sample results to pertinent water quality standards. In general, surface water quality is suitable for its only use in the region, livestock watering. No reaches within Lea County have been listed on the 2014-2016 New Mexico 303(d) list (NMED, 2014a). This list is prepared every two years by NMED and approved by the New Mexico Water Quality Control Commission (NMWQCC) to comply with Section 303(d) of the federal Clean Water Act, which requires each state to identify surface waters within its boundaries that do not meet water quality standards (see Section 4.2.2.1.1).

Section 303(d) further requires the states to prioritize their listed waters for development of total maximum daily load (TMDL) management plans, which document the amount of a pollutant a waterbody can assimilate without violating a state water quality standard and allocates that load capacity to known point sources and nonpoint sources at a given flow. Figure 5-13 shows the locations of lakes and stream reaches that may be assessed in the future. Table 5-8 provides details regarding those reaches.

Generally the quality of groundwater in the planning region was excellent in the Ogallala and alluvial aquifers, but of poor quality in other geologic formations due to the presence of salt, gypsum, and other evaporite deposits. Oil and gas production in the region and past disposal practices have resulted in contamination of the aquifers. The presence of shallow saline water in Lea County prompted the New Mexico Oil Conservation Commission’s Order No. R-3221, banning the surface disposal of produced water into unlined pits within the state (OCC, 1968). Lining of pits and better management of leaking oil and gas wells has improved the quality of water (Leedshill-Herkenhoff, Inc. et al., 2000).

On May 9, 2008, the New Mexico's Oil Conservation Division (OCD) signed an oil and gas waste pit rule that further strengthened the protection of groundwater by reinforcing the unlined pits ban, setting pit liner requirements, requiring closed loop (with no pit) operations when close to water resources and homes, and requiring permits from the OCD for all pits. The 2008 pit rule was overturned in 2012 to allow for the disposal of “low chloride” waste fluids (i.e., fluid containing 15,000 mg/L of salts and typically containing high concentrations of toxic chemicals such as benzene and arsenic) within 100 feet of perennial water courses, 200 feet from a lake, 300 feet from a residence or school, and 200 feet from a spring or water well. The 2008 pit rule generally required setbacks ranging from 500 to 1,000 feet and required wastes that exceeded New Mexico’s health-based groundwater standards to be hauled to a properly licensed and monitored facility. Under the 2012 pit rules, oil and gas operators can now bury waste with very high concentrations of benzene, salt, arsenic, and mercury at almost any drill site. The new pit rule also no longer requires an operator to collect site-specific groundwater, surface water, or soil quality data before a pit is dug; thus it will be difficult to prove that contamination came from the pit (NMELC, 2013).



LEA COUNTY
REGIONAL WATER PLAN 2016
Water Quality-Impaired Reaches

Figure 5-13

Table 5-8. Total Maximum Daily Load Status of Streams in the Lea County Water Planning Region

Waterbody Name [a] (basin, segment)	Assessment Unit ID	Affected Reach (acres)	Probable Sources of Pollutant	Uses Not Fully Supported	Specific Pollutant	IR Category [b]
Lea County						
Chaparral (Park) Lake	NM-9000.B_028	10	Not assessed	—	—	3/3A
Eunice Lake	NM-9000.B_043	4	Not assessed	—	—	3/3A
Green Meadows Lake	NM-9000.B_047	14	Not assessed	—	—	3/3A
Jal Lake	NM-9000.B_052	10	Not assessed	—	—	3/3A
Laguna Gatuna	NM-9000.B_055	294.76	Not assessed	—	—	3/3A
Lane Salt Lake	NM-9000.B_072	400	Not assessed	—	—	3/3A
Lea County Lake	NM-9000.B_073	2	Not assessed	—	—	3/3A
Middle Lake	NM-9000.B_084	40	Not assessed	—	—	3/3A
Williams Sink (Eddy)	NM-9000.B_109	210.21	Not assessed	—	—	3/3A

Source: NMED, 2014a

[a] Only waterbodies assigned to IR categories 3 and above are included.

[b] Impairment (IR) categories are determined for each assessment unit (AU) by combining individual designated use support decisions. The applicable unique assessment categories for New Mexico (NMED, 2013b) are described as follows:

Category 3: No reliable monitored data and/or information to determine if any designated or existing use is attained. AUs are listed in this category where data to support an attainment determination for any use are not available, consistent with requirements of the assessment and listing methodology.

Category 3A: Limited data (n = 0 to 1) available, no exceedences. AUs are listed in this subcategory when there are no exceedences in the limited data set. These are considered low priority for follow up monitoring (NMED, 2013).

— = No information provided (reach was not assessed).

Several types and sources of contaminants that have the potential to impact either surface or groundwater quality are discussed below. Sources of contamination are considered as one of two types: (1) point sources, if they originate from a single location, or (2) nonpoint sources, if they originate over a more widespread or unspecified location. Information on both types of sources is provided below.

5.4.1 Potential Sources of Contamination to Surface and Groundwater

Specific sources that have the potential to impact either surface or groundwater quality in the future are discussed below. These include municipal and industrial sources, leaking underground storage tanks, landfills, and nonpoint sources.

5.4.1.1 Municipal and Industrial Sources

As discussed in Section 4.2.2, a person or facility that discharges a pollutant from a point source to a surface water that is a water of the United States must obtain an NPDES permit. An NPDES permit must assure compliance with the New Mexico Water Quality Standards. A person or facility that discharges contaminants that may move into groundwater must obtain a groundwater discharge permit from the New Mexico Environment Department. A groundwater discharge permit ensures compliance with New Mexico groundwater quality standards. The NMWQCC regulations also require abatement of groundwater contamination that exceeds standards.

No NPDES permits have been issued in Lea County, and therefore Table 5-9 is not included in this RWP. Details regarding NPDES permits in New Mexico are available on the NMED's website (http://www.nmenv.state.nm.us/swqb/Permits/).

A summary list of current groundwater discharge permits in the planning region is provided in Table 5-10; their locations are shown in Figure 5-14. Details indicating the status, waste type, and treatment for discharge permits for industrial and domestic waste can be obtained from the NMED Ground Water Quality Bureau website (https://www.env.nm.gov/gwb/NMED-GWQB-PollutionPrevention.htm#PPSlist).

5.4.1.2 Remediation Sites

The accepted regional water plan (Leedshill-Herkenhoff, Inc. et al., 2000) identified two sites in the planning region that were listed by the U.S. EPA as Superfund sites. No sites in Lea County are currently listed as Superfund sites (U.S. EPA, 2014); therefore this updated RWP doesn't include Table 5-11 listing Superfund sites.

Sites undergoing investigation or cleanup pursuant to other federal authorities or state authority can be found on the EPA website (https://www.epa.gov/superfund/national-priorities-list-npl-sites-state#NM).

Table 5-10. Groundwater Discharge Permits in the Lea County Water Planning Region
Page 1 of 2

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Lea	Beetstra Family Dairy	DP-461	Active	40,000
	Bos Dairy LLC - South	DP-1135	Active	120,000
	Boyd Brothers Inc Dairy	DP-988	Active	3,000
	Brand West Dairy 2	DP-1323	Active	99,900
	Country Cottage Care & Rehabilitation Center	DP-657	Active	8,000
	Cunningham Station Power Plant	DP-1429	Active	3,500,000
	Doldersum Lovington LLC, dba Land Mark Dairy	DP-1025	Active	40,000
	Eldorado Biofuels Jal Facility	DP-1781	Active	216,000
	Eunice (City of) - Wastewater Treatment Plant	DP-1612	Active	400,000
	Goff Dairy LLC	DP-1168	Active	160,000
	Hid-Away RV Park	DP-1812	Pending	—
	High Lonesome Dairy	DP-762	Active	60,000
	Hobbs (City of) - Wastewater Reclamation Facility	DP-37	Active	7,200,000
	Hobbs Generating Station	DP-1620	Active	5,000,000
	Intercontinental Potash Corp	DP-1786	Pending	144,000
	Jal (Town of) - Wastewater Treatment Facility	DP-1802	Active	755,500
	Jal (Town of) - Wastewater Treatment Facility	DP-59	Active	400,000
	JUT Demo - JUT Demonstration Plant	DP-1796	Active	7,279,811
	Lea County Septic Tank Service	DP-884	Active	300

Source: NMED, 2014b, 2016b, NMED et al., 2016
[a] Names appear as listed in the NMED database.
[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

gpd = Gallons per day
— = Not listed on GWQB web site

Table 5-10. Groundwater Discharge Permits in the Lea County Water Planning Region
Page 2 of 2

County	Facility Name [a]	Permit No.	Status [b]	Permitted Discharge Amount (gpd)
Lea (cont.)	Llano Estacado Dairy	DP-699	Active	15,000
	Lovington (City of) Wastewater Treatment Facility	DP-87	Active	2,700,000
	Maddox Station	DP-1688	Active	2,120,000
	National Enrichment Facility	DP-1481	Active	19,743,000
	Outlook Dairy	DP-1302	Active	65,000
	Perry Federal #1 - Intrepid Potash	DP-1662	Active	864,000
	Rhino Oilfield Disposal - Hobbs	DP-619	Active	10,000
	Rockview Dairy	DP-259	Active	27,500
	Rocky Top Dairy	DP-1559	Active	60,000
	S&H Enterprises, Inc.	DP-875	Active	3,600,000
	Shows Mobile Home Park	DP-1581	Pending	—
	Tatum (Town of) - Wastewater Treatment Plant	DP-617	Active	86,000
	Tee Vee Dairy	DP-909	Active	48,000
	Tyrone Mine	DP-166	Active	35,000,000
	Waste Control Specialists	DP-1817	Active	170,500,000

Source: NMED, 2014b, 2016b, NMED et al., 2016

[a] Names appear as listed in the NMED database.

[b] Facilities with an NMED designated status of active or pending are shown. Inactive facilities are not included; they can be identified on the NMED website.

gpd = Gallons per day

— = Not listed on GWQB web site

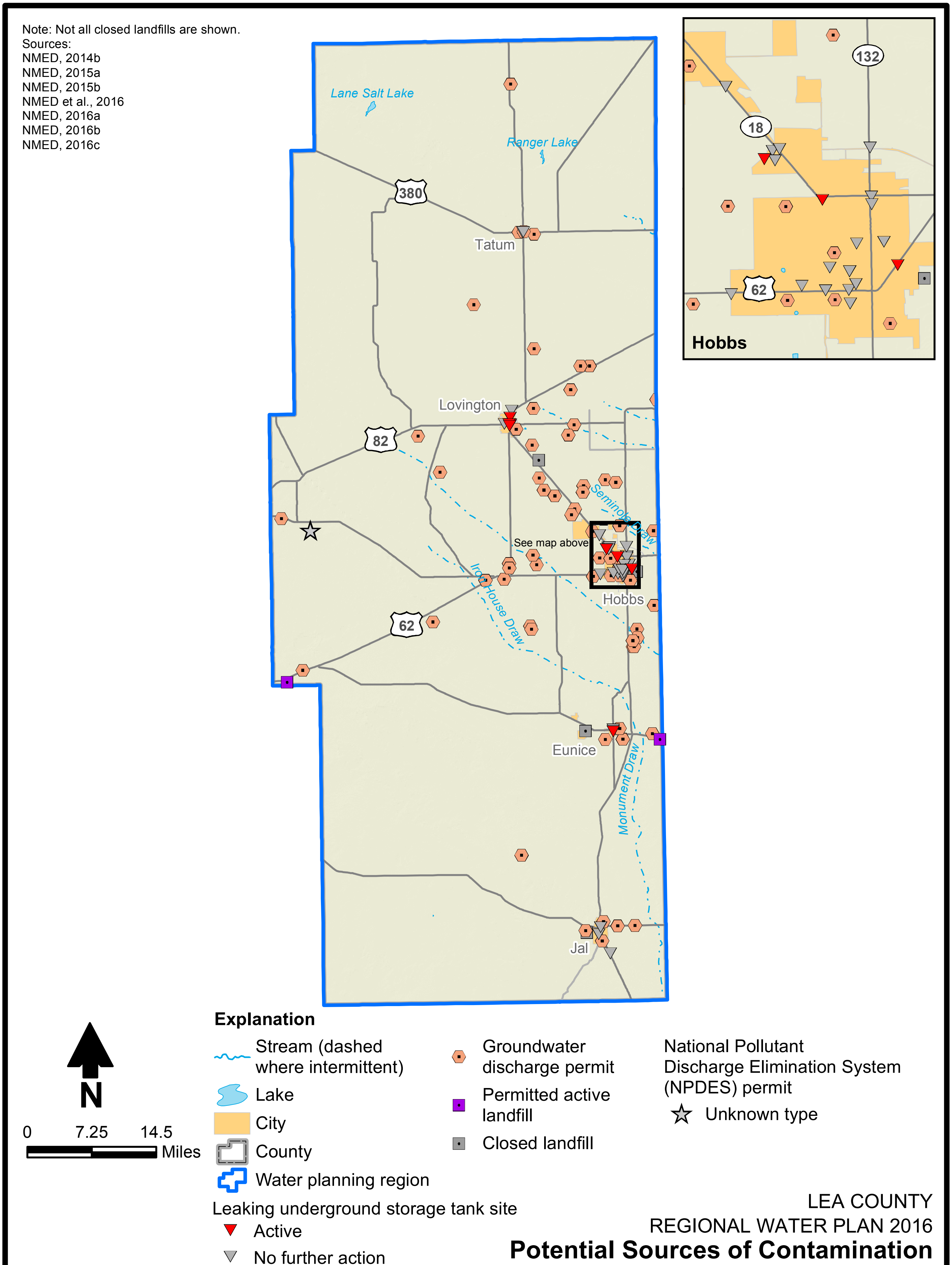


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Figure 5-14

5.4.1.3 Leaking Underground Storage Tanks

Leaking underground storage tank (UST) sites present a potential threat to groundwater, and the NMED maintains a database of registered USTs. Many of the facilities included in the UST database are not leaking, and even leaking USTs may not necessarily have resulted in groundwater contamination or water supply well impacts. These USTs could, however, potentially impact groundwater quality in and near the population centers in the future. UST sites in the Lea County region are identified on Figure 5-14. Many of the UST sites listed in the NMED database require no further action and are not likely to pose a water quality threat. Sites that are being investigated or cleaned up by the state or a responsible party, as identified on Table 5-12, should be monitored for their potential impact on water resources. Additional details regarding any groundwater impacts and the status of site investigation and cleanup efforts for individual sites can be obtained from the NMED database, which is accessible on the NMED website (https://www.env.nm.gov/ust/lists.html).

5.4.1.4 Landfills

Landfills used for disposal of municipal and industrial solid waste often contain a variety of potential contaminants that may impact groundwater quality. Landfills operated since 1989 are regulated under the New Mexico Solid Waste Management Regulations. Many small landfills throughout New Mexico, including landfills in the planning region, closed before the1989 regulatory enactment to avoid more stringent final closure requirements. Other landfills have closed as new solid waste regulations became effective in 1991 and 1995. Within the planning region, there are six closed landfills and one operating landfill (Table 5-13, Figure 5-14).

5.4.1.5 Nonpoint Sources

A potential primary water quality concern in the planning region is groundwater contamination due to septic tanks. In areas with shallow water tables or in karst terrain, septic system discharges can percolate rapidly to the underlying aquifer and increase concentrations of (NMWQCC, 2002):

- Total dissolved solids (TDS)
- Iron, manganese, and sulfides (anoxic contamination)
- Nitrate
- Potentially toxic organic chemicals
- Bacteria, viruses, and parasites (microbiological contamination)

Because septic systems are generally spread out over rural areas, they are considered a nonpoint source. Collectively, septic tanks and other on-site domestic wastewater disposal systems constitute the single largest known source of groundwater contamination in New Mexico (NMWQCC, 2002), with many of these occurrences in areas with shallow water tables.

Table 5-12. Leaking Underground Storage Tank Sites in the Lea County Water Planning Region
Page 1 of 3

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Lea County					
Tatum	Chevron Tatum	296	31018	203 W Broadway	Aggr Cleanup Completed, Resp Party
	J & S Auto	373	29926	1 W Broadway	Aggr Cleanup Completed, St Lead, CAF
	Lils Food and Fuel	4092	6775	Hwy 380 W	Cleanup, Responsible Party
	Parsons Welding Shop	2553	29861	Hwy 380 W	Cleanup, Responsible Party
	Public Schools Tatum	403	7796	203 West Third	Investigation, Responsible Party
Lovington	Allsups – No. 109, Allsups 19	1943	890	503 S Main	Cleanup, Responsible Party
	Fina 12/Deep Ro	1815	28020	101 W Ave D	Aggr Cleanup Completed, Resp Party
	Lea County Elect Coop, Lovington	4435	29060	2517 Power Plant Lane	Cleanup, Responsible Party
	Lovington 66	1182	1489	424 S Main	Cleanup, Responsible Party
	Stripes 125, Town & Country 125	2073	1931	702 N Main	Aggr Cleanup Completed, Resp Party
	Western Petroleum #8860, Lovington Bulk Plant SFS	4037	29174	720 S Main	Cleanup, Responsible Party
Hobbs	Allsups #142	4640	26534	316 N Marland Blvd	Investigation, Responsible Party
	Badger Welding	265	26829	810 W Broadway	Cleanup, Responsible Party
	Eddins Walcher	522	27853	1400 Broadway	Investigation, Responsible Party
	Eddins Walcher #2	1198	27853	1400 Broadway	Investigation, Responsible Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

[d] Pre-Investigation, Suspected Release: Release not confirmed by definition
Pre-Investigation, Confirmed Release: Confirmed release as by definition
Investigation: Ongoing assessment of environmental impact
Cleanup: Physical removal of contamination ongoing
CAF: Corrective action fund
Aggressive Cleanup Completed (Aggr Cleanup Completed): Effective removal of contamination complete
No Further Action: Release considered mitigated at this time
Responsible Party (Resp Party): Owner/Operator responsible for mitigation of release
State Lead: State has assumed responsibility for mitigation of release

Table 5-12. Leaking Underground Storage Tank Sites in the Lea County Water Planning Region
Page 2 of 3

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Lea County (cont.)					
Hobbs (cont.)	Fina 1 A	3308	1240	2902 W Marland	Cleanup, Responsible Party
	Handy Shell, Hines Spr Shell	23	1391	2208 N Turner	Referred to GWQB
	Keeling Petroleum Co	2521	1441	2900 W Marland	Referred to GWQB
	Lovington Hiway GW	4464	53751	Unknown	Cleanup, State Lead With CAF
	Marshall Aviation	219	26365	Hobbs Lea County Airport	Cleanup, Responsible Party
	Marvin L Smith	1584	30644	1021 E Bender	Cleanup, Responsible Party
	Maypole Packers	1803	29305	1203 W Dunham	Investigation, Responsible Party
	Morris Oil	385	1836	1214 E Bender	Aggr Cleanup Completed, St Lead, CAF
	Professional Testers Inc	1801	30058	800 S Houston	Cleanup, Responsible Party
	Thomas Petroleum	4718	54562	3307 W County Rd	Pre-Investigation, Confirmed Release
	Todd Aircraft Inc	3236	27608	Hobbs Lea County Airport	Aggr Cleanup Completed, Resp Party
	United Fuel & Energy Corp Blk Plt 51708	4635	51708	403 Leech St	Pre-Investigation, Confirmed Release
	Western Petroleum #9020, Eddins Walcher Co Security	3403	27853	1400 Broadway	Pre-Investigation, Confirmed Release
	Western Petroleum #9021	4706	27853	1400 Broadway	Pre-Investigation, Confirmed Release
	Zia Drill	218	29468	901 W Marland	Cleanup, Responsible Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

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State Lead: State has assumed responsibility for mitigation of release

Table 5-12. Leaking Underground Storage Tank Sites in the Lea County Water Planning Region
Page 3 of 3

City [a]	Release/Facility Name [b,c]	Release ID	Facility ID	Physical Address [c]	Status [d]
Lea County (cont.)					
Monument	Hobbs #2/Enron	1589	28557	Rte A	Referred to Oil Conservation Division
Eunice	Enron/Hobbs #1	1588	28548	W of Eunice 4 miles	Referred To Oil Conservation Division
	JD's Service Station	4713	28727	1204 N Main	Pre-Investigation, Confirmed Release
	Mohammed Yamin	1644	29442	216 Texas Avenue	Cleanup, Responsible Party
	Western Auto Tint	1500	30420	1215 Texas Ave	Investigation, Responsible Party
Jal	Tivo's Gas Station	2454	31135	319 Main	Investigation, Responsible Party

Source: NMED, 2014b, 2016a; NMED et al., 2016

[a] Determined according to latitude/longitude information in NMED database. In some cases this information was inconsistent with the facility address, and where such an inconsistency was identified, county and city were instead determined based on the facility address.

[b] Sites with No Further Action status (release considered mitigated) are not included. Information regarding such sites can be found on the NMED website (http://www.nmenv.state.nm.us/ust/lists.html

[c] Information appears as listed in the NMED database.

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Aggressive Cleanup Completed (Aggr Cleanup Completed): Effective removal of contamination complete
No Further Action: Release considered mitigated at this time
Responsible Party (Resp Party): Owner/Operator responsible for mitigation of release
State Lead: State has assumed responsibility for mitigation of release

Table 5-13. Landfills in the Lea County Water Planning Region

County	Landfill Name [a]	Landfill Operating Status	Landfill Closure Date
Lea	City of Tatum	Closed	—
	Eunice Landfill	Closed	1992
	Hobbs Landfill	Closed	1999
	Jal Landfill	Closed	1991
	Lea County Regional Landfill	Open	NA
	Lea Land Industries	Open	NA
	Lovington Sanitary Landfill	Closed	1992
	Old Hobbs Landfill	Closed	1972

Sources: Leedshill-Herkenhoff, Inc., et al., 2000
NMED, 2014b, 2015a, 2015b

[a] Names appear as listed in the NMED database.

NA = Not applicable
— = Information not available

Other nonpoint sources of pollutants that are of concern for surface water quality in the planning region include irrigated agriculture and oil and gas wells. A recent study by (McMahon et al., 2007) showed that irrigated cropland over the High Plains Aquifer was a direct or indirect source of nitrate, salts, and pesticides over the past five decades. This study explains how conversion of rangeland to irrigated cropland has the potential to mobilize salts in the unsaturated zone. In Lea County, nearly 49,000 acres were irrigated in 2010 (Longworth et al., 2013).

5.5 Administrative Water Supply

The *Handbook* describes a common technical approach (referred to there as a *platform)* for analyzing the water supply in all 16 water planning regions in a consistent manner. As discussed in the Handbook (NMISC, 2013), many methods can be used to account for supply and demand, but some of the tools for implementing these analyses are available for only parts of New Mexico, and resources for developing them for all regions are not currently available. Therefore, the State has developed a simple method that can be used consistently across all regions to assess supply and demand for planning purposes. The use of this consistent method will facilitate efficient development of a statewide overview of the balance between supply and demand in both normal and drought conditions, so that the State can move forward with planning and funding water projects and programs that will address the regions' and State's pressing water issues.

The method to estimate the available supply, referred to as the administrative water supply in the Handbook, is based on withdrawals of water as reported in the *New Mexico Water Use by*

Categories 2010 report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the water is physically available, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region. An estimate of supply during future droughts is also developed by adjusting the 2010 withdrawal data based on physical supplies available during historical droughts, as discussed in Section 5.5.2.

5.5.1 2010 and 2060 Administrative Water Supply

The administrative water supply (i.e., total withdrawals) in 2010 for the Lea County region, as reported in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013), was 197,099 acre-feet. Of this total, 75 acre-feet were surface water withdrawals and 197,024 acre-feet were groundwater. Groundwater withdrawals were estimated to be 195,007 acre-feet per year in the Lea County UWB and 692 acre-feet per year in the Jal UWB (Longworth et al., 2008). The breakdown of these withdrawals among the various categories of use detailed in the *New Mexico Water Use by Categories 2010 report* is discussed in Section 6.1.

However, for regions such as the Lea County planning region, where the aquifers (such as those in the Lea County and Jal UWBs) are being depleted, the administrative water supply may not be sustainable in the future. For the High Plains aquifer in the Lea County and Jal UWBs, the future available supply was estimated as described in the following subsections.

5.5.1.1 Model Predicted Decline

Non-stream connected groundwater basins with available NMOSE administrative models were used to predict the water level declines in the year 2060 based on estimated groundwater diversions. These declines were compared to the available water column to assess the potential impact on future pumping as outlined in Table 5-14a. The predicted drawdown in 2060 from a model cell in a heavily stressed area was selected and compared to the available water column in existing wells to calculate the percentage of wells impacted by the drawdown. This percentage of impacted wells was assumed to reflect a percentage reduction in the available supply.

Using this method, the administrative supply for the Lea County UWB in Lea County in decade 2060 was calculated to be about 143,700 acre-feet per year in a normal (i.e., no drought) year, or 74 percent of the 2010 supply.

5.5.1.2 Observed Rate of Decline

Another method to predict the future decline of the saturated thickness and thus available supply is to use existing wells with water level hydrographs and compare the predicted decline from those hydrographs with the available water column in existing wells.

Table 5-14a. Water Supply in the Lea County Underground Water Basin in 2060 Based on Modeled Drawdown

Row	Calculation Step	Lea County UWB	Explanation/Source
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	195,007	Longworth et al., 2013
2	Modeled pumping in future decades (ac-ft/yr)	259,252	Musharrafieh, 2015b
3	Ratio of administrative supply to modeled pumping	0.75	Row 1 divided by Row 2
4	Median water column (feet)	108	Difference between water level in the well and total depth of the well, based on 368 wells from WATERS database with post-1997 water level data
5	Available water column (feet)	75.6	NMISC Handbook (2013) guideline (70% of median water column)
6	Predicted drawdown from model into 2060 (feet)	52.9	Greatest decline in the modeled area (Musharrafieh, 2015a)
7	Adjusted model-predicted drawdown in 2060 (feet)	39.8	Row 3 times Row 6
8	Percentage of wells impacted (percentage reduction in supply)	26%	Row 7 divided by Row 5 times 50%
9	Revised supply by 2060 due to continued pumping (ac-ft/yr)	143,688	Row 1 reduced by Row 8

ac-ft/yr = Acre-feet per year
UWB = Underground water basin

- Using the average rate of water level decline calculated from USGS monitor wells within the non-stream connected groundwater and assuming that this rate will continue, the water level decline to 2060 was predicted as shown in Table 5-14b.
- The percentage of impacted wells was estimated by comparing the predicted drawdown to the available water column in existing wells, and the percentage of impacted wells was assumed to represent the reduction in supply by 2060.

The predicted water level decline in the High Plains Aquifer of the Lea County UWB is about 30 feet in 2060, assuming an average water level decline rate of 0.59 feet per year. A decline of 30 feet would impact about 20 percent of the wells. Assuming that the 20 percent of impacted wells results in an equal impact on water supply, then the estimated supply in 2060 is 156,960 acre-feet per year, about 10 percent more than the model-estimated method. In the Jal UWB, the predicted decline is 70 feet, impacting about 23 percent of the wells.

5.5.1.3 Other Considerations

Both of these approaches represent an approximation of the impact on existing wells by 2060. Factors that may affect the accuracy of these predictions include:

- The water columns may not represent the available supply because some existing wells could possibly be drilled deeper.
- The shallowest wells that are most impacted may not proportionally represent the distribution of pumping (the deeper wells most likely pump more than the shallow wells).
- New wells could be drilled in other parts of the aquifer, although doing so would require a water right permit.

The NMOSE's Lea County UWB model of the High Plains aquifer could be used to determine when specific water supply wells will lose the capacity to produce the projected demand for that community. Different scenarios could be run to optimize well field production and pumping schedules to produce the necessary quantities of water needed in the future. Individual water suppliers will need to develop options to address modeled shortages.

5.5.2 Drought Supply

The variability in surface water supply from year to year is an important factor in long-term planning for most of the regions in New Mexico, but in non-stream connected basins, the change in recharge during a drought may be more important. To estimate the vulnerability of the closed basins within a planning region to a prolonged drought, groundwater models are used, where available, to predict the potential impact by 2060 of a 20-year drought.

Table 5-14b. Water Supply in the Lea County Underground Water Basin in 2060 Based on Observed Rate of Decline

Row	Calculation Step	UWB		Explanation/Source
		Lea County	Jal	
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	195,007	692	Longworth et al., 2013 for Lea County and Longworth et al., 2008 for Jal (based on Morrison, 2012)
2	Median water column (feet)	108	221	Difference between water level at the top of the well and total depth of the well, based on 368 wells in the Lea County UWB from WATERS database with post-1997 water level and 5 wells in the Jal UWB Morrison, 2012
3	Available water column	75.6	155	NMISC Handbook (2013) guideline (70% of median water column)
4	Rate of water level decline (ft/yr)	0.59	1.4	Using the water level data for USGS monitor wells within the non-stream connected groundwater basin with decreasing water levels (Figure 5-11), the change in water level from the 1980s to the most recent measurement date was calculated and divided by the elapsed time. The results were averaged to determine a single rate. For Jal UWB the rate of decline was obtained from Hoines, 2004.
5	Estimated decline in 50 years (feet)	29.5	70.0	The average rate of water level decline was multiplied by 50 years to predict the average drawdown by 2060.
6	Percentage of wells impacted	20%	23%	Row 5 divided by Row 3 and multiplied by 50%
7	Groundwater supply from mined sub-basins in 2060 (ac-ft/yr)	156,960	535	Row 1 reduced by Row 6

ac-ft/yr = Acre-feet per year
UWB = Underground water basin

As discussed in Section 5.1.1, the PDSI is an indicator of whether drought conditions exist and if so, what the relative severity of those conditions is. For the climate division (7) present in the Lea County region, the PDSI classifications for 2010 were near normal (Figure 5-6).

There is no established method or single correct way of quantifying a drought supply given the complexity associated with varying levels of drought and constantly fluctuating water supplies. For purposes of having an estimate of drought supplies for regional and statewide water planning, the State has developed and applied a method for regions with both stream-connected and non-stream-connected aquifers. The method adopted for non-stream-connected aquifers is described below:

- The drought adjustment is applied only to the portion of the administrative water supply that derives water from the mined aquifer.
- In basins for which NMOSE has an administrative model, the simulation period is from 2010 to 2060 as described above, with no recharge from 2020 to 2040.
- For a conservative approximation, the drawdown predicted during the drought period is derived from a model cell in a heavily stressed area at the end of the simulation period (2060) to represent the water column that will be lost due to drought and pumping (Table 5-15). For those basins where no model is available or model results were not available, a drought adjustment of 12 percent was used, based on the average of the modeled drawdown from all the NMOSE administrative models for other regions of the state.
- This adjusted predicted drawdown is then compared to the median available water column in 2010 (as described in Section 5.5.1.1) to determine the percentage of wells that are impacted by the 20-year drought and continued pumping.
- This percentage represents the reduction in supply due to drought. The drought supply is estimated by multiplying the percentage by the 2010 administrative supply.

For the Lea County and Jal UWBs, the estimated reduction in administrative supply due to continued pumping *and* one 20-year drought with no recharge over the 50-year planning period is as follows:

- In the High Plains Aquifer the adjusted predicted drawdown without the drought is 40 feet, and the additional drawdown due to drought is 11 feet, for a total decline of 51 feet. Comparing the predicted drawdown during a drought to the median available water column of 75 feet shows that the 34 percent of wells would be impacted (7 percent from the drought alone). Thus, the water supply in 2060 is estimated to be 34 percent less than the 2010 water use, or 128,860 acre-feet per year for the Lea County UWB (Table 5-15).

Table 5-15. Drought Water Supply in the Lea County Underground Water Basin in 2060 Based on NMOSE Modeled Drawdown

Row	Calculation Step	UWB		Explanation/Source
		Lea County	Jal	
1	Estimated groundwater diversions in 2010 (ac-ft/yr)	195,007	692	Longworth et al., 2013
2	Modeled pumping (ac-ft/yr)	259,252	—	Musharrafieh, 2015b
3	Ratio of administrative supply to modeled pumping	0.75	—	Row 1 divided by Row 2
4	Available water column (feet)	75.6	155	NMISC Handbook (2013) guideline (70% of median water column)
5	Predicted additional drawdown from 20 year drought (feet)	15.0	—	Musharrafieh, 2015a
6	Adjusted predicted drawdown in 2060 due to drought (feet)	11.3	—	Row 5 times Row 3
7	Total drawdown due to pumping and drought	51.1	—	Row 6 plus Row 7 from Table 5-14a
8	Reduction in supply due to drought and pumping	34%	23% + 7% = 30%	Row 7 divided by Row 4 times 50% for Lea County UWB. For the non-modeled Jal UWB, the estimated increase from modeled drought (7%) is added to the predicted water level decline rate (Row 6 of Table 5-14b).
9	Revised supply by 2060 with 20-year drought (ac-ft/yr)	129,136	484	Row 1 reduced by the Row 8 total percentage

ac-ft/yr = Acre-feet per year
UWB = Underground water basin
— = Not applicable

- The water availability in the Jal UWB in 2060 with a 20-year drought is estimated using the modeled impact on the Lea County UWB of 7 percent, resulting in a supply of 484 acre-feet per year, a 30 percent decline over the 2010 water use.

Outside of the Lea County and Jal UWBs, but within the Lea County planning region, 1,325 acre-feet are pumped and assumed to be unaffected by drought. Combined with the impacts of drought on surface water supplies, which are projected to be zero during a drought, the water supply for the Lea County planning region in 2060 is estimated to be 34 percent less than the 2010 water use, or 130,945 acre-feet per year.

6. Water Demand

To effectively plan for meeting future water resource needs, it is important to understand current use trends as well as future changes that may be anticipated. This section includes a summary of current water use by category (Section 6.1), an evaluation of population and economic trends and projections of future population (Sections 6.2 and 6.3), a discussion of the approach used to incorporate water conservation in projecting future demand (Section 6.4), and projections of future water demand (Section 6.5).

Four terms frequently used when discussing water throughout this plan have specific definitions related to this RWP:

- *Water use* is water withdrawn from a surface or groundwater source for a specific use. In New Mexico water is accounted for as one of the nine categories of use in the *New Mexico Water Use by Categories 2010* report prepared by the NMOSE.
- *Water withdrawal* is water diverted or removed from a surface or groundwater source for use.
- *Administrative water supply* is based on the amount of water withdrawals in 2010 as outlined in the *New Mexico Water Use by Categories 2010* report.
- *Water demand* is the amount of water needed at a specified time.

6.1 Present Uses

The most recent assessment of water use in the region was compiled by NMOSE for 2010, as discussed in Section 5.5. The *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) provides information on total withdrawals for nine categories of water use:

- Public water supply
- Domestic (self-supplied)

- Irrigated agriculture
- Livestock (self-supplied)
- Commercial (self-supplied)
- Industrial (self-supplied)
- Mining (self-supplied)
- Power (self-supplied)
- Reservoir evaporation

The total surface water and groundwater withdrawals in 2010 for each category of use, for each county, and for the entire region, are shown on Table 6-1 and Figure 6-1. The predominant water use in 2010 in the Lea County region was for irrigated agriculture.

Groundwater also supplies public water system, commercial, industrial, mining, power, and domestic uses. Almost all (99.96 percent) of the total withdrawals in the region are supplied by groundwater. Groundwater points of diversion are shown in Figure 6-2.

The categories included in the *New Mexico Water Use by Categories 2010* report and shown on Figure 6-1 and Table 6-1 represent the total withdrawals in the planning region. There are also some unquantified additional categories of water use, including riparian evapotranspiration and instream flow; however, neither of those is applicable to the Lea County Water Planning Region.

The data provided in the *New Mexico Water Use by Categories 2010* report are available for withdrawals only; depletions have not been quantified. In many cases, some portion of diverted water returns to surface or groundwater, for example from agricultural runoff or seepage or discharge from a wastewater treatment plant. In those locations where there is such return flow, the use of withdrawal data for planning purposes will add a margin of safety; thus the use of withdrawal data is a conservative approach for planning purposes.

6.2 Demographic and Economic Trends

To project future water demands in the region, it is important to first understand demographics, including population growth and economic and land use trends as detailed below. This section provides specific information regarding the population and economic trends in the Lea County Water Planning Region. The information was obtained primarily from telephone interviews with government officials and other parties with knowledge of demographic and economic trends in Lea County; the list of interviewees is provided in Appendix 6-A. This information was used to project population, economic growth, and future water demand, as presented in Sections 6.3 and 6.5.

Table 6-1. Total Withdrawals in the Lea County Water Planning Region in 2010

Water Use Category	Withdrawals (acre-feet)		
	Surface Water	Groundwater	Total
Commercial (self-supplied)	0	1,866	1,866
Domestic (self-supplied)	0	1,498	1,498
Industrial (self-supplied)	0	270	270
Irrigated agriculture	0	172,297	172,297
Livestock (self-supplied)	75	2,111	2,186
Mining (self-supplied)	0	2,006	2,006
Power (self-supplied)	0	3,781	3,781
Public water supply	0	13,195	13,195
Reservoir evaporation	0	0	0
Total	75	197,024	197,099

Source: Longworth et al., 2013

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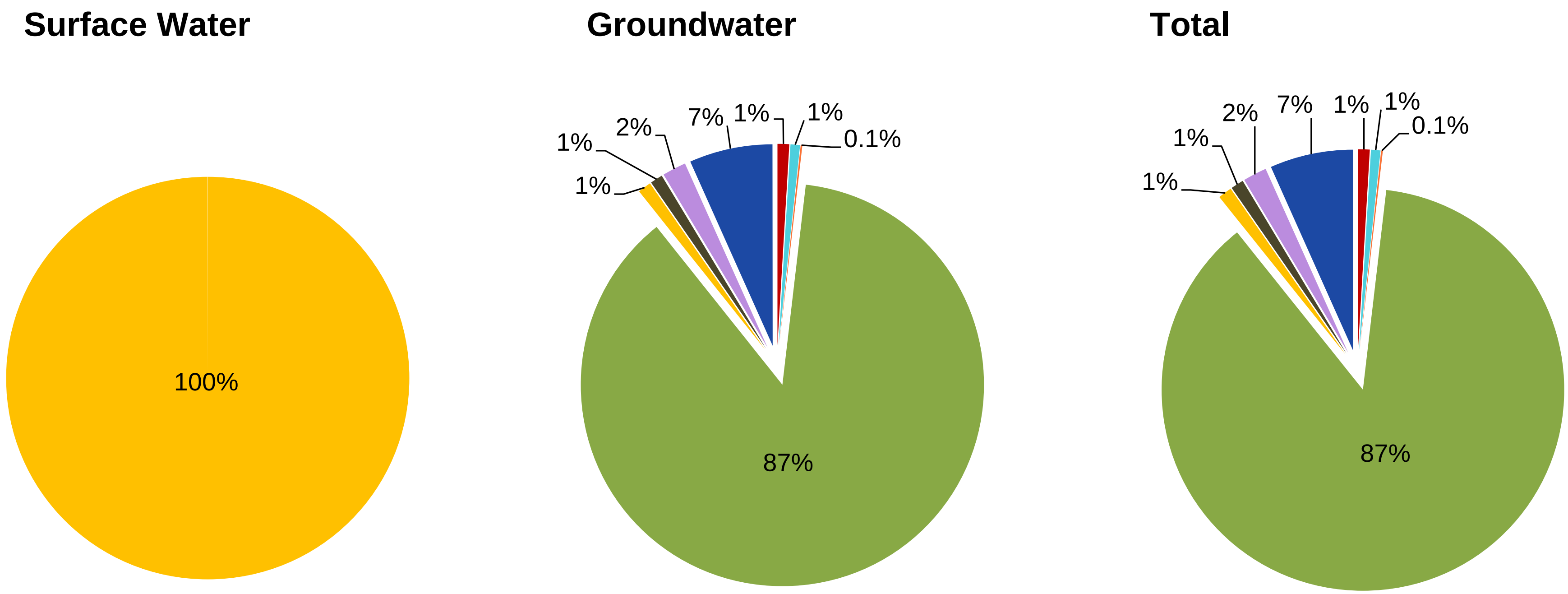


Total usage: 75 acre-feet

Total usage: 197,024 acre-feet

Total usage: 197,099 acre-feet

Explanation

- Commercial (self-supplied)
- Domestic (self-supplied)
- Industrial (self-supplied)
- Irrigated agriculture
- Livestock (self-supplied)
- Mining (self-supplied)
- Power (self-supplied)
- Public water supply
- Reservoir evaporation

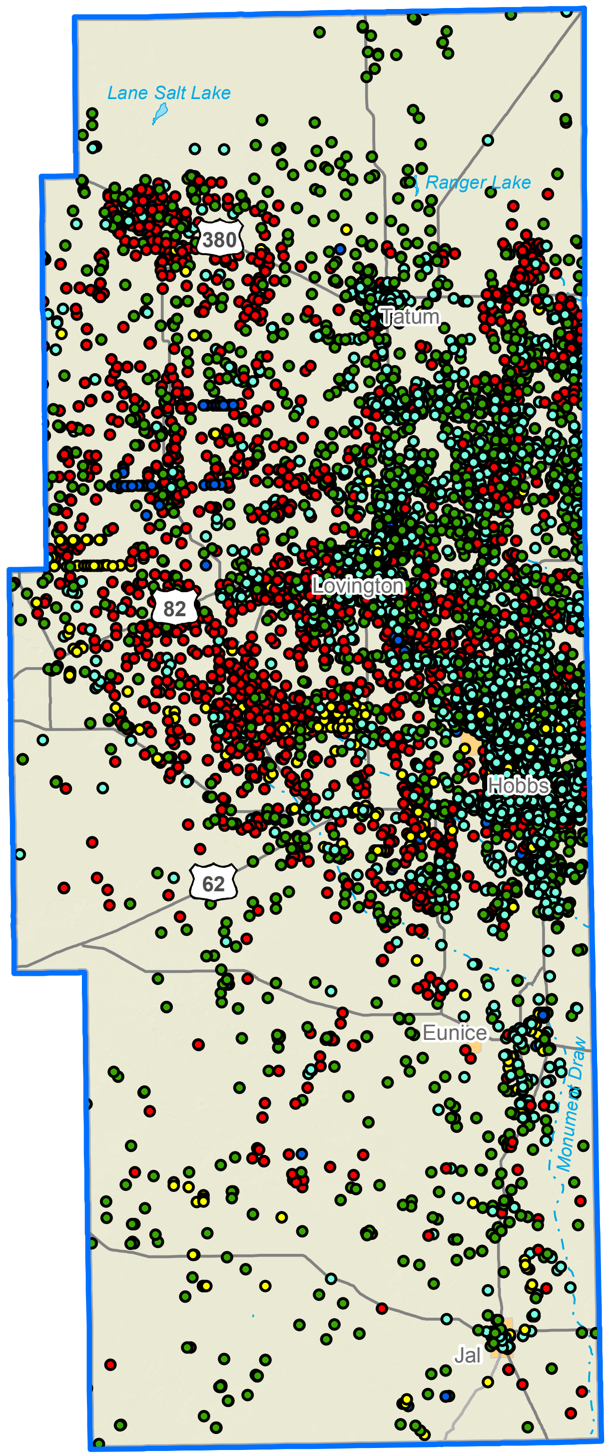
Source: Longworth et al., 2013

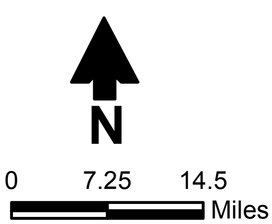
Note: Only categories with usage above 0.1% are shown.

LEA COUNTY
REGIONAL WATER PLAN 2016

Total Regional Water Demand by Sector, 2010

Figure 6-1





Explanation

- Stream (dashed where intermittent)
- Lake
- City
- County
- Water planning region

Well (use)

- Agriculture/irrigation
- Commercial/industrial/recreation
- Domestic
- Mining/oil/gas
- Public water supply

Source: NMOSE, 2014d

LEA COUNTY
REGIONAL WATER PLAN 2016
Groundwater Points of Diversion

Figure 6-2

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As shown in Table 3-1a, between 2010 and 2013 the population of Lea County grew from 64,727 to 68,062 (U.S. Census Bureau, 2014a), an increase of 5.7 percent. The City of Hobbs, with a 2013 population of 36,041, comprises 53 percent of the total County population, and the City's population grew 5.2 percent between 2010 and 2013. Lea County has a younger population profile than most other counties in the state; 30 percent of the population was under the age of 18 in 2013, compared with 24.3 percent for the state. It also has a lower percentage of people over 65 years of age than the state, 10.6 percent vs. 14.7 percent.

The Lea County economy is heavily dependent on the oil industry, which has provided the impetus for the rapid population growth. The largest operators in Lea County are Apache with 1,622 active wells, Chevron with 1,151 active wells, and Conoco Phillips with 1,073 active wells. The region has 12,278 currently producing wells and 34,581 wells on file, 253 currently producing operators, and 3,900 currently producing leases and 9,633 leases on file (Drilling Edge, 2015).

The most experienced oil industry workers are from Texas, mostly Midland and Lubbock, and the oil companies are actively recruiting them. Demand for experienced workers exceeds supply and the oil companies are paying $25 to $30 an hour for jobs that usually pay $18. All the major oil companies also offer in-house training programs. Many oil industry workers live in motels, RV parks, or impromptu camper settlements that are springing up all around the county because of a housing shortage. Many workers commute from Eddy or Chaves counties because of the lack of housing.

Housing prices have increased 6 percent a year over the past three years. Most buyers are from out-of-state and work in the oil and gas industry. New single-family houses are being built, but not to the extent one would expect in a booming area. To meet the demand of the temporary workforce (workers do not know how long they will be in the area due to the volatile nature of the oil and gas industry), most construction is multi-family, in the form of large apartment complexes with 120 to 300 units.

One problem hindering future construction is that a good deal of land is subdivided for industrial use but the need is for commercial and residential. Land in Lea County has reportedly become so expensive that developers cannot afford to buy it. In addition, there is a shortage of construction workers because the oil industry is luring away construction laborers with higher wages; however, construction workers from Las Cruces are moving to Lea County for the available construction jobs. Due to these factors the cost of building housing is very high and developers worry about the "boom and bust" nature of the oil and gas industry. Both the County and the City of Hobbs are providing incentives to developers to build.

Financing is available, and most bank loans are for residential purposes. Yet although many people are pre-approved for mortgages, they are waiting for homes to become available. Fewer than 200 existing homes are on the market at any one time. Almost all commercial loans are related to the oil industry, mainly in transportation.

Economic development in Lea County is not limited to oil and gas. International Isotopes Inc. has selected a site in Lea County, about 15 miles west of Hobbs, for the construction of a depleted uranium hexafluoride de-conversion and fluorine extraction process facility, the first commercial facility of its kind in the United States. It will have 120 full-time employees. IC Potash Corp. will be opening a new potash mine in phases. When built out, it will employ about 400 employees. The company is looking to use brackish water because the water supply from the Capitan aquifer may not be adequate.

The City of Hobbs has an unemployment rate under 3 percent and a major housing crisis, with people living in motels and RVs. Hotel and motel construction is proceeding at a robust pace but still cannot keep up with demand. Three new hotels a year are being built, adding 1,300 new rooms each year. The City is struggling to provide infrastructure such as parks to keep up with growth as well as hiring new public safety employees. The increased traffic, especially from trucks and tankers, has put a strain on rural roads in the region; these roads need repair and widening, and it is not clear where funding will come from.

The Hobbs Municipal School District is building two new elementary schools and is now the largest employer in the County. A new health clinic was recently constructed in Hobbs, and a new hospital was built in Lovington. The County is having a hard time attracting health care professionals and has a shortage of personnel in that industry.

It is difficult to fill professional jobs with long-term residents, as Lea County has a much lower percentage of people with bachelor's or advanced degrees than the state average (13.3 percent vs. 25.8 percent) (U.S. Census Bureau, 2013). It also lags the state in high school graduation rates. Therefore the community must rely on recruiting individuals from outside of the County. An impediment in attracting people is the quality of life issue: the area lacks amenities and social activities that appeal to professionals. The City is attracting people in their 20s and 30s, and Hobbs is now getting restaurants and coffee shops such as Starbucks that appeal to this demographic. A new recreational facility was also recently built, but it will take time for Lea County to offer cultural and recreational activities that would appeal to professionals currently living in urban areas.

The oil and gas industry has made Hobbs, even with a population of only about 36,000, the second highest gross receipts generator in the state. Only Albuquerque takes in more tax revenue. For October 2014, the New Mexico Department of Taxation and Revenue paid Hobbs a record $8.7 million in gross receipts revenue.

The City of Lovington has not experienced the same growth spurt as Hobbs but is starting to see some new development. After no new housing construction for 20 years, Lovington saw its first new single-family project in 2013. A 64-unit apartment complex is also under construction. The City would need to acquire 640 acre-feet of additional water to accommodate additional growth by 2020. Gross receipts are increasing slowly. The city has one motel, and another is being built. New retail establishments such as parts suppliers and trucking supplies focus on the oil industry. School enrollment is increasing, and a shortage of teachers exists. Prices on almost everything are increasing, and there is a wage war brought on by high-paying oil companies.

Agriculture in Lea County has been overshadowed by oil and gas production as a major contributor to the economy. There were 13 dairies operating in Lea County in 2011 according to the NMSU Dairy Extension, while the 2012 U.S. Census of Agriculture puts the number at 11. The number of beef cows in the County declined by 25.5 percent between 2007 and 2012, while the number of dairy cows increased by 58 percent according to the 2012 Census of Agriculture (USDA NASS, 2014). More recently beef herds are reportedly down by 50 percent. Milk from cows is the main generator of agricultural revenue, and cotton is the top revenue-producing field crop; the acreage devoted to it grew 62 percent between 2007 and 2012. Cotton farmers in Lea County rely solely on irrigation supplied by groundwater.

In 2012 there were 460 farms and ranches in Lea County, a 20 percent decrease from the 572 in 2007. However, from 2007 to 2012 irrigated acreage increased by 32 percent, from 39,078 acres to 51,581 acres (USDA NASS, 2014).

6.3 Projected Population Growth

Population projections in the 2000 RWP were prepared by the Bureau of Business and Economic Research (BBER) for the Lea County Water Users Association. Those projections did not anticipate the oil boom and therefore have proven to be low: the 2010 population projected in the 2000 plan was 58,891, compared to the U.S. Census figure of 64,727 (Table 6-2; U.S. Census Bureau, 2014a).

Table 6-2. Comparison of Projected and Actual 2010 Population

County	2000 Regional Water Plan Projected Population [a]	Actual Population 2010 U.S. Census [b]
Lea	58,891	64,727
Total Region	58,891	64,727

[a] Leedshill-Herkenhoff, Inc. et al., 2000
[b] U.S. Census Bureau, 2014a

In 2012 the BBER prepared county-level population forecasts through 2040 using data and historical trends from 1960 through to the 2000 Census (Appendix 6-B). At that time the serious shortage of permanent housing and the number of transient workers and commuters was not yet apparent, and the BBER's projections did not incorporate the resulting dampening of population growth that is currently anticipated to occur between now and 2020. These factors are incorporated into the 2020 projections made for this RWP update.

The population projections through 2060 shown in Table 6-3 include two forecasts: one based on continued high growth rates (similar to the BBER forecast) and a lower one that reflects the short-term effects of the housing shortage and the volatility of the oil and gas industry. At present, oil and gas prices are at low levels, a fact that makes continued exploration and drilling very precarious. Therefore, it is assumed for the projections that after 2030, fewer new wells will be drilled and by 2040 no new wells will be drilled.

Table 6–3. Lea County Population Projections July 1, 2010 to July 1, 2060

a. Annual Growth Rate

County	Projection	Growth Rate (%)				
		2010-2020	2020-2030	2030-2040	2040-2050	2050-2060
Lea	High	1.88	1.72	1.45	1.14	0.98
	Low	1.28	1.36	0.56	0.42	0.36

b. Projected Population

County	Projection	Population					
		2010	2020	2030	2040	2050	2060
Lea	High	64,727	77,955	92,443	106,784	119,656	131,875
	Low	64,727	73,540	84,175	89,020	92,805	96,180

Source: Poster Enterprises, 2014

Nevertheless, the population of the County is projected to grow in both the high and low scenarios through 2060 (Table 6-3). The high growth projections are predicated on continuing activity in the oil and gas industries. Under this scenario, the population is projected to more than double from 2010 to 2060, from 64,727 to 131,875. The low scenario anticipates that in-migration will decline as new oil and gas well drilling slows, with the population projected to reach 96,180 by 2060.

6.4 Water Conservation

Water conservation is often a cost-effective and easily implementable measure that a region may use to help balance supplies with demands. The State of New Mexico is committed to water conservation programs that encourage wise use of limited water resources. The Water Use and Conservation Bureau of the NMOSE developed the *New Mexico Water Conservation Planning Guide for Public Water Suppliers*. When evaluating water rights transfers or 40-year water development plans that hold water rights for future use, the NMOSE considers whether adequate conservation measures are in place. However, the 40 year water development plans are not incorporated into the RWP updates, as the resources needed to complete this work are not currently available. It is therefore important when planning for meeting future water demand to consider the potential for conservation.

To develop demand projections for the region, some simplifying assumptions regarding conservation have been made. These assumptions were made only for the purpose of developing an overview of the future supply-demand balance in the region and are not intended to guide policy regarding conservation for individual water users. The approach to considering conservation in each category of water use for developing water demand projections is discussed below. Specific recommendations for conservation programs and policies for the Lea County region, as identified by the regional steering committee, are provided in Section 8.

Public water supply. Public water suppliers that have large per capita usage have a greater potential for conservation than those that are already using water more efficiently. Through a cooperative effort with seven public water suppliers, the NMOSE developed a GPCD (gallons per capita per day) calculation to be used statewide, thereby standardizing the methods for calculating populations, defining categories of use, and analyzing use within these categories. The GPCD calculator was used to arrive at the per capita uses for public water systems in the region, shown in Table 6-4. These rates are provided to assist the regional steering committee in considering specific conservation measures.

The system-wide per capita usage for each water supplier includes uses such as golf courses, parks, and commercial enterprises that are supplied by the system. Hence there can be large variability among the systems. For purposes of developing projections, a county-wide per capita rate was calculated as the total public supply use in the county divided by the total county population (or portion of the county within the region), excluding those served by domestic wells. For future projections (Section 6.5), a consistent method is being used statewide that assumes that conservation would reduce future per capita use in each county by the following amounts:

Table 6-4. 2010 Water Withdrawals for Drinking Water Supply Systems and Rural Self-Supplied Homes

OSE Declared Groundwater Basin(s) [a]	Water Supplier [b]	Population	Per Capita Use (gpcd)	Withdrawals (acre-feet)	
				Surface Water	Groundwater
Lea County					
Capitan Lea County	Monument WUA	150	728	0	122
Jal	Jal Water Supply System	1,996	100	0	224
Lea County	Country Cottage Care And Rehabilitation	75	52	0	4
	Eunice Water Supply System	2,922	423	0	1,385
	Hobbs Municipal Water Supply	34,122	218	0	8,334
	Lovington Municipal Water Supply	11,009	235	0	2,904
	Rancho Dal Paso, LLC DBA Adobe Village	75	45	0	4
	Tatum Water System	798	207	0	185
	Triple J Trailer Park--Hobbs	105	190	0	22
Lea County Roswell	Mescalero Ridge Water Co-Op	50	100	0	6
NA	Maljamar Water	50	101	0	6
	Lea County public water supply totals	51,352		0	13,195
	County-wide public water supply per capita use [c]		230		
Capitan Carlsbad Jal Lea County Roswell	Rural self-supplied homes (Pecos)	1,335	100	0	149
Lea County	Rural self-supplied homes (Southern High Plains)	12,040	100	0	1,349
	Lea County domestic self-supplied totals	13,375		0	1,498
	County-wide domestic self-supplied per capita use [c]		100		

Source: Longworth et al., 2013, unless otherwise noted.

[a] Determined based on NMED Drinking Water Bureau water supply source locations (NMOSE water use database doesn't distinguish groundwater basin).

[b] Rural self-supplied homes are shown for specified surface water basin in parenthesis.

[c] County-wide per capita use, calculated as the total population divided by total withdrawals

gpcd = Gallons per capita per day
NA = Information not available

- For current average per capita use greater than 300 gpcd, assume a reduction in future per capita use to 180 gpcd.
- For current average per capita use between 200 and 300 gpcd, assume a reduction in future per capita use to 150 gpcd.
- For current average per capita use between 130 and 200 gpcd, assume a reduction in future per capita use to 130 gpcd.
- For current average per capita use less than 130 gpcd, no reduction in future per capita use is assumed.

For the Lea County region, current per capita use is between 200 and 300 gpcd (Table 6-4), so the future per capita use is assumed to be reduced to 150 gpcd. In the projections, these reductions are phased in over time.

Self-supplied domestic. Homeowners with private wells can achieve water savings through household conservation measures. These wells are not metered, and current water use estimates were developed based on a relatively low per capita use assumption (Table 6-4; Longworth et al., 2013). Therefore, no additional conservation savings were assumed in developing the water demand projections. For purposes of developing projections, a county-wide per capita rate was calculated as the total self-supplied domestic use in the county divided by the total county population (or portion of the county within the region), excluding those served by a public water system.

Irrigated agriculture. As the largest water use in the region, conservation in this sector may be beneficial. However, when considering the potential for improved efficiency in agricultural irrigation systems, it is important to consider how potential conservation measures may affect the region's water supply.

Withdrawals in both surface and groundwater irrigation systems include both consumptive and non-consumptive uses and incidental losses:

- Consumptive use occurs when water is permanently removed from the system due to crop evapotranspiration (i.e., evaporation and transpiration). Evapotranspiration is determined by factors that include crop and soil type, climate and growing season, on-farm management, and irrigation practices.
- Non-consumptive use occurs when water is temporarily removed from the stream system for conveyance requirements and is returned to the surface or groundwater system from which it was withdrawn.

- Incidental losses from irrigation are irrecoverable losses due to seepage and evapotranspiration during conveyance that are not directly attributable to crop consumptive use.
    - Seepage losses occur when water leaks through the conveyance channel or below the root zone after application to the field and is either lost to the atmosphere or remains bound in the soil column.
    - Evapotranspiration occurs as a result of (1) evaporation during water conveyance in canals or with some irrigation methods (e.g., flood, spray irrigation) and (2) transpiration by ditch-side vegetation.

Some agricultural water use efficiency improvements (commonly referred to as agricultural water conservation) reduce the amount of water diverted, but may not reduce depletions or may even have the effect of increasing consumptive use per acre on farms (Brinegar and Ward, 2009; Ward and Pulido-Velazquez, 2008). These efforts can result in economic benefits, such as increased crop yield, but may have the adverse effect of reducing return flows and therefore downstream water supply. For example, methods such as canal lining or piping may result in reduction of seepage losses associated with conveyance, but that seepage will no longer provide return flow to other users. Other techniques such as drip irrigation and center pivots may reduce the amount of water diverted, but if the water saved from such reductions is applied to on-farm crop demands, water supplies for downstream uses will be reduced.

Due to the complexities in agricultural irrigation efficiency, no quantitative estimates of savings are included in the projections. However, the regions are encouraged to explore strategies for agricultural conservation, especially those that result in consumptive use savings through changes in crop type or fallowing of land while concentrating limited supplies for greater economic value on smaller parcels. Section 8 outlines strategies developed by the Lea County steering committee to achieve savings in agricultural water use within the region.

Self-supplied commercial, industrial, livestock, mining, and power. Conservation programs can be applicable to these sectors, but since uses are very low in these categories within the region, no additional conservation savings are assumed in the water demand projections.

In many parts of New Mexico, *reservoir evaporation* is one of the highest consumptive water uses, but in the Lea County region, it is an insignificant water demand.

6.5 Projections of Future Water Demand for the Planning Horizon

To develop projections of future water demand a consistent method was used statewide. Section 6.5.1 provides a comprehensive discussion of the methods applied consistently throughout the state to project water demand in all the categories reported in the *New Mexico Water Use by Categories* reports, and some of the categories may not be applicable to the Lea

County region. The projections of future water demand determined using this consistent method, as applicable, for the Lea County region are discussed in Section 6.5.2.

6.5.1 Water Demand Projection Methods

The Handbook provides the time frame for the projections; that is, they should begin with 2010 data and be developed in 10-year increments (2020, 2030, 2040, 2050, and 2060). Projections will be for withdrawals in each of the nine categories included in the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) and listed in Section 6.1.

To assist in bracketing the uncertainty of the projections, low- and high-water demand estimates were developed for each category in which growth is anticipated, based on demographic and economic trends (Section 6.2) and population projections (Section 6.3), unless otherwise noted. The projected growth in population and economic trends will affect water demand in eight of the nine water use categories; the reservoir evaporation water use category is not driven by these factors.

The 2010 administrative water supply (Section 5.5.1) was used as a base supply from which water demand was projected forward. As discussed in Section 5.5, the administrative water supply is based on withdrawals of water as reported in the *New Mexico Water Use by Categories 2010* report, which provide a measure of supply that considers both physical supply and legal restrictions (i.e., the water is physically available for withdrawal, and its use is in compliance with water rights policies) and thus reflects the amount of water available for use by a region.

The assumptions and methods used statewide to develop the demand projections for each water use category follow. Not all of these categories are applicable to every planning region. The specific methods applied in the Lea County region are discussed in Section 6.5.2.

Public water supply includes community water systems that rely on surface water and groundwater diversions other than from domestic wells permitted under 72-12-1.1 NMSA 1978 and that consist of common collection, treatment, storage, and distribution facilities operated for the delivery of water to multiple service connections. This definition includes municipalities (which may serve residential, commercial, and industrial water users), mutual domestic water user associations, prisons, residential and mixed-use subdivisions, and mobile home parks.

For regions with anticipated population increases, the increase in projected population (high and low) was multiplied by the per capita use from the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) (reduced for conservation as specified above), times the portion of the population that was publicly supplied in 2010 (calculated from Longworth et al., 2013); the resulting value was then added to the 2010 public water supply withdrawal amount. Current surface water withdrawals were not allowed to increase above the 2010 withdrawal amount unless there is a new source of available supply (i.e., water project or settlement). Both the high and low projections incorporated conservation for counties with per capita use above 130 gpcd, as discussed in Section 6.4, on the assumption that some of the new demand would be met through reduction of per capita use.

For planning purposes, in counties where a decline in population is anticipated (in either the high or low scenario or both), as a conservative approach it was assumed that public water supply would remain constant at 2010 withdrawal levels based on the 2010 administrative water supply (the water is physically available for withdrawal, and its use is in compliance with water rights policies). Likewise, in regions where the population growth is initially positive but later shows a decline, the water demand projection was kept at the higher rate for the remainder of the planning period.

The *domestic (self-supplied)* category includes self-supplied residences with well permits issued by the NMOSE under 72-12-1.1 NMSA 1978 (Longworth et al., 2013). Such residences may be single-family or multi-family dwellings. High and low projections were calculated as the 2010 domestic withdrawal amount plus a value determined by multiplying the projected change in population (high and low) times the domestic self-supplied per capita use from the *New Mexico Water Use by Categories 2010* report (Longworth et al., 2013) times the calculated proportion of the population that was self-supplied in 2010 (calculated from Longworth et al., 2013). In counties where the high and/or low projected growth rate is negative, the projection was set equal to the 2010 domestic withdrawal amount. This allows for continuing use of existing domestic wells, which is anticipated, even when there are population declines in a county. In regions where the population growth is initially positive but later shows a decline, the water demand projection was kept at the higher level for the remainder of the planning period, based on the assumption that domestic wells will continue to be used, even if there are later population declines.

The *irrigated agriculture* category includes all withdrawals of water for the irrigation of crops grown on farms, ranches, and wildlife refuges (Longworth et al., 2013). To understand trends in the agricultural sector, interviews were held with farmers, farm agency employees, and others with extensive knowledge of agriculture practices and trends in each county. Additionally, the New Mexico agriculture census data for 2007 and 2012 were reviewed and provided helpful agricultural data such as principal crops, irrigated acreage, farm size, farm subsidies, and age of farmers (USDA NASS, 2014). Comparison of the two data sets shows a downward trend in the agricultural sector across New Mexico. This decline was in all likelihood related at least in part to the lack of precipitation in 2012: in most of New Mexico 2007 was a near normal precipitation year (ranging from mild drought to incipient wet spell across the state), while in 2012 the PDSI for all New Mexico climate divisions indicated extreme to severe drought conditions. Based on the interviews, economic factors are also thought to be a cause of the decline as aquifers go dry.

In much of the state, recent drought and recession are thought to be driving a decline in agricultural production. However, that does not necessarily indicate that there is less demand for water. In areas where irrigation is supplied by surface water, there are frequent supply limitations, with many ditches having no or limited supply later in the season.

In regions that use surface water for agriculture withdrawals, the 2010 administrative water supply used as the starting point for the projections reflects a near normal water year for the region. For the 2020 through 2060 projections, therefore, it was generally assumed that the surface water demand is equal to the 2010 administrative water supply for both the high and low scenarios.

In areas where 10 percent or more of groundwater withdrawals are for agriculture and there are projected declines in agricultural acreage, the low projection assumes that there will be a reduced demand in this sector. The amount of decline projected is based on interviews with individuals knowledgeable about the agricultural economy in each county (Section 6.2). Even in areas where the data indicate a decline in the agricultural economy, the high projection assumes that overall water demand will remain at the 2010 administrative water supply levels since water rights have economic value and will continue to be used.

The *livestock* category includes water used to raise livestock, maintain self-supplied livestock facilities, and support on-farm processing of poultry and dairy products (Longworth et al., 2013). High and low projections for percentage growth or declines in the livestock sector were developed based on interviews with ranchers, farm agency employees, and others with extensive knowledge of livestock trends in each county (Section 6.2). The growth or decline rates were then multiplied by the 2010 water use to calculate future water demand.

The *commercial (self-supplied)* category includes self-supplied businesses (e.g., motels, restaurants, recreational resorts, and campgrounds) and public and private institutions (e.g., public and private schools and hospitals) involved in the trade of goods or provision of services (Longworth et al., 2013). This category pertains only to commercial enterprises that supply their own water; commercial businesses that receive water through a public water system are not included. To develop the commercial self-supplied projections, it was assumed that commercial development is proportional to other growth, and the high and low projections were calculated as the 2010 commercial water use multiplied by the projected high and low population growth rates. In regions where the growth rate is negative, both the high and low projections were assumed to stay at the 2010 administrative supply water level, based on water rights having economic value. In regions where the population growth is initially positive but later shows a decline, the water demand projection will remain at the higher level for the remainder of the planning period, again based on the administrative water supply and the value of water rights. This method may be modified in some regions to consider specific information regarding plans for large commercial development or increased use by existing commercial water users.

The *industrial (self-supplied)* category includes self-supplied water used by enterprises that process raw materials or manufacture durable or nondurable goods and water used for the construction of highways, subdivisions, and other construction projects (Longworth et al., 2013). To collect information on factors affecting potential future water demand, economists conducted interviews with industrial users and used information from the New Mexico Department of Workforce Solutions (2014) to determine if growth is expected in this sector. Based on these interviews and information, high and low scenarios were developed to reflect ranges of possible growth. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

The *mining* category includes self-supplied enterprises that extract minerals occurring naturally in the earth's crust, including solids (e.g., potash, coal, and smelting ores), liquids (e.g., crude petroleum), and gases (e.g., natural gas). Anticipated changes in water use in this category were based on interviews with individuals involved in or knowledgeable about the mining sector. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

The *power* category includes all self-supplied power generating facilities and water used in conjunction with coal-mining operations that are directly associated with a power generating facility that owns and/or operates the coal mines. Anticipated changes in water use in this category were based on interviews with individuals involved in or knowledgeable about the power sector. If water use in this category is low and limited additional use is expected, both the high and low projections are the same.

Reservoir evaporation includes estimates of open water evaporation from man-made reservoirs with a storage capacity of approximately 5,000 acre-feet or more. No reservoirs of this size exist in the planning region. The amount of reservoir evaporation is dependent on the surface area of the reservoir as well as the rate of evaporation. Evaporation rates are partially dependent on temperature and humidity; that is, when it is hotter and drier, evaporation rates increase. Surface areas of reservoirs are variable, and during extreme drought years, the low surface areas contribute to lower total evaporation, even though the rate of evaporation may be high.

6.5.2 Lea County Projected Water Demand

Table 6-5 summarizes the projected water demands in Lea County for each water use category, which were developed by applying the methods discussed in Section 6.5.1. As discussed in Section 6.3, population is projected to increase under both the high and low scenarios. The total projected water demand in the county in 2060 ranges from185,125 to 208,490 acre-feet per year. Surface water supplies may be considerably lower in drought years, as discussed in Section 5.5.2, but the demand for water does not necessarily decrease when the supply is diminished.

Table 6-5. Projected Water Demand, 2020 through 2060 Lea County Water Planning Region

Use Sector	Projection	Water Demand (acre-feet)					
		2010 [a]	2020	2030	2040	2050	2060
Lea County							
Public water supply	High	13,195	15,659	17,867	19,542	20,514	22,142
	Low	13,195	14,836	16,473	16,861	16,937	17,386
Domestic (self-supplied)	High	1,498	1,804	2,140	2,472	2,770	3,052
	Low	1,498	1,702	1,948	2,060	2,148	2,226
Irrigated agriculture	High	172,297	172,297	172,297	172,297	172,297	172,297
	Low	172,297	111,993	120,608	129,223	146,452	155,067
Livestock (self-supplied)	High	2,186	1,421	1,530	1,749	1,858	1,967
	Low	2,186	1,202	1,421	1,530	1,640	1,749
Commercial (self-supplied)	High	1,866	4,960	3,288	2,755	2,655	2,545
	Low	1,866	3,850	2,745	2,408	2,380	2,210
Industrial (self-supplied)	Low/High	270	280	290	290	290	290
Mining (self-supplied)	Low/High	2,006	2,477	2,570	2,500	2,415	2,415
Power (self-supplied)	Low/High	3,781	3,781	3,781	3,781	3,781	3,781
Reservoir evaporation	Low/High	0	0	0	0	0	0
Total regional demand	High	197,099	202,679	203,763	205,385	206,580	208,490
	Low	197,099	140,122	149,837	158,654	176,043	185,125

[a] Actual withdrawals (Longworth et al., 2013)

Demand in the *public water supply* category is projected to increase in Lea County under both the low and high scenarios, proportional to the increasing population projections.

Projected water demand in the *domestic* category is assumed to be proportional to the population growth rates, which are anticipated to increase.

Water use in Lea County occurs primarily in the *agricultural* category, and interviews (Section 6.2) indicated a declining trend in this category. The amount of water devoted to irrigated agriculture in the county is projected to remain at the 2010 level under the high scenario. However, the low scenario anticipates a drop in groundwater use to 65 percent of the 2010 level in 2020, with a rebound to 90 percent by 2060.

The low scenario agricultural projections are based on anticipated growth in the water-intensive hydraulic fracturing technique (commonly referred to as fracking), which has grown substantially in Eddy County, triggering the permanent sale of water rights from agricultural producers to oil companies. Such sales would permanently lower the amount of groundwater available to the agricultural sector, especially for field crops, which are becoming more expensive to grow. The oil and gas industry is also obtaining temporary water through NMOSE 72-12-1.3 permits, which allow up to 3 acre-feet per year per well three times a year for three separate uses.

While some of the irrigation water will go to oil companies for fracking, other water rights are likely to go unused because of the increased cost of pumping well water due to lowering aquifer levels (Section 6.2), which results in the cost of crop production exceeding the sales price. Most of the oil well drilling is anticipated to take place between 2015 and 2025. After that, the sale of 9 acre-feet per year per producer is assumed to fall off and revert to agricultural use.

Livestock is projected to consume 65 percent of the 2010 level in 2020 under the high scenario and 55 percent under the low scenario. By 2060, the usage is projected to recover to 90 percent in the high projection and 80 percent in the low projection. It is contemplated that fewer people will make a living in ranching in Lea County as better paying jobs lure younger people away.

The *commercial* category now includes oil exploration using the water-intensive hydraulic fracturing technique (previously, all oil and gas drilling was categorized by NMOSE as either mining or industrial use). The inclusion of water used for fracking in this category will substantially increase the amount of commercial water withdrawals. If the price of oil stays above $60 a barrel, the Permian Basin (covering both Eddy and Lea counties) could support 2,000 new oil wells per year between now and 2020, with each new well requiring 3 acre-feet of water to drill. The projected water demand shown in Table 6-5 includes a high and low projection to accommodate the volatile nature of the oil drilling industry. The projections include the sale of the 9 acre-feet that NMOSE allows per year per water rights holder, which is not a permanent transfer. By 2030, drilling is projected to level off, as most wells are expected to be drilled by 2025, even if the price of oil recovers between now and 2025, and to decline for the remainder of the forecast period.

Industrial water demand is projected to increase slightly through 2060.

The *mining* category is projected to experience a decrease in water usage as oil company water use is moved to the commercial category. However, the new potash mine being built will add to the water usage in this category. Therefore an increase in this category is projected for 2020 that will eventually level off.

Xcel Energy, the main *power* plant water user does not expect any changes in water usage through 2060, so use in this category is projected to remain at the 2010 amount for the entire projection period.

In Lea County *reservoir evaporation* is insignificant; therefore no water use is projected for this category.

There is significant oil and gas development in the region and *produced water* for oil and gas development is not included in the NMOSE water use by category report. However, the New Mexico Bureau of Geology tracks produced water in Lea and Eddy County. In 2015, there were 32,878 acre-feet of produced water in Lea County (NMWRRI, 2016). Produced water is generally high in total dissolved solids and as part of the oil and gas extraction process, is withdrawn from formations that are deeper than those that supply groundwater. Approximately 8 to 10 barrels of water are produced for every barrel of oil produced (Otton, 2006). The produced water is generally treated and re-injected or discharged to the surface. Since this water is not applied to beneficial use, it is not considered part of the administrative water supply.

7. Identified Gaps between Supply and Demand

Estimating the balance between supply and demand requires consideration of several complex issues, including:

- Both supplies and demands vary considerably over time, and although long-term balanced supplies may be in place, the potential for drought or, conversely, high flows and flooding must be considered. In general, storage, including the capture of extreme flows for future use, is an important aspect of allowing surface water supplies to be used when needed to meet demand during drought periods (i.e., reservoir releases may sustain supplies during times when surface water supplies are inadequate).

- Supplies in one part of the region may not necessarily be available to meet demands in other areas, particularly in the absence of expensive infrastructure projects. Therefore comparing the supplies to the demands for the entire region without considering local issues provides only a general picture of the balance.

- As discussed in Section 4, there are considerable legal limitations on the development of new surface and groundwater resources, given groundwater supplies are fully appropriated in the Lea County and Jal UWBs, which affects the ability in these basins to prepare for shortages by developing new supplies.

- Besides quantitative estimates of supply and demand, numerous other challenges affect the ability of a region to have adequate water supplies in place. Water supply challenges include the need for adequate funding and resources for infrastructure projects, water quality issues, location and access to water resources, limited productivity of certain aquifers, and protection of source water.

Despite these limitations, it is useful to have a general understanding of the overall balance of the supply and demand. Figure 7-1 illustrates the total projected regional water demand under the high and low demand scenarios, and also shows the administrative water supply that takes into account the declining water supply and the drought-adjusted water supply.

As discussed in Section 6.5, the water level decline rates were examined to estimate the future supply with and without a 20-year drought where no recharge occurs in the mined basins. Table 7-1 summarizes the estimated water demand by subregion and the projected availability. The potential shortage in 2060 during a prolonged drought and due to declining water levels is estimated to range between 54,000 and 78,000 acre-feet, which is 29 to 37 percent of the predicted demand or about 66 percent of the 2010 administrative supply.

Table 7-1. Water Use and Estimated Availability in the Lea County Water Planning Region

Source	Basin	2010 Estimated Water Use (ac-ft/yr)	2060 Estimated Water Availability (ac-ft/yr)	
			No Drought	One 20-Year Drought
Non-stream connected groundwater	Lea Co UWB	195,007	143,688	129,136
	Jal UWB	692	535	484
Surface water	—	75	75	0
Stream connected groundwater	—	1,325	1,325	1,325
	Total	197,099	145,623	130,945
Water use as a percentage of 2010 use			74%	66%

ac-ft/yr = Acre-feet per year
UWB = Underground water basin
— = Not applicable

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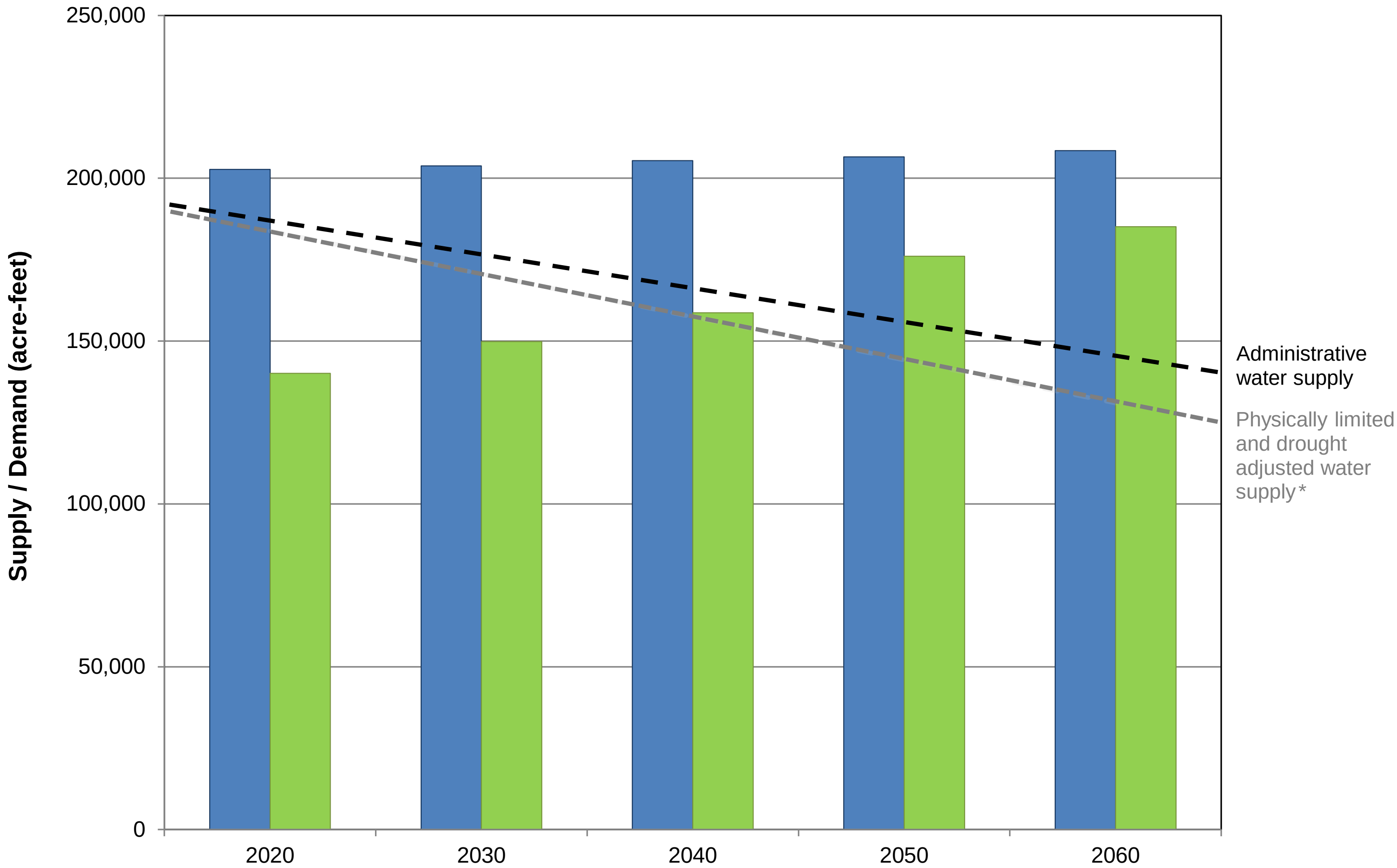

High demand projection
Low demand projection

* Based on modeling conducted by the New Mexico Office of the State Engineer and no surface water use.

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Available Supply and Projected Demand

Figure 7-1

However, even without significant growth in demand, supply shortages, as discussed in Section 5.5, are predicted because of the region's reliance on a mined groundwater basin with declining supplies. The Capitan and Carlsbad UWBs may be a source of future water supply, but further investigation is required to determine the extent of the potential supply

8. Implementation of Strategies to Meet Future Water Demand

An objective of the regional water planning update process is to identify strategies that will help the region prepare to balance the gap between supply and demand and address other future water management challenges, including infrastructure needs, protection of existing resources and water quality, and the need to maximize limited resources through water conservation and reuse. The Lea County region considered a variety of strategies for addressing these water management challenges. As discussed in Sections 5 and 7, the Lea County region relies entirely on groundwater supplies and water suppliers must contend with significant water level declines as the aquifer is depleted. Consequently, the Lea County effort focused on improving aquifer mapping and gaining a better understanding of water supply availability at the local scale. Opportunities to use lower quality water for uses that do not require high quality potable supplies and continued conservation planning are important strategies for this region.

This RWP is building on the 2000 water plan and is considering strategies that will enhance and update, rather than replace, the strategies identified in the accepted water plan. The status of strategies from the previous regional water plan is assessed in Section 8.1. Additional strategies recommended in this RWP update—including a comprehensive table of projects, programs, and policies, key collaborative projects, and recommendations for the state water plan —are discussed in Section 8.3

8.1 Implementation of Strategies Identified in Previously Accepted Regional Water Plan

An important focus of the RWP update process is to both identify strategies and processes and consider their implementation. To help address the implementation of new strategies, a review of the implementation of previous strategies was first completed.

The 2000 Lea County Regional Water Plan recommended the following strategies for meeting future water demand:

- Municipal water conservation
    - Urban/suburban landscaping
    - Indoor residential
    - Auditing, reuse infrastructure, and inclining-block rates and conservation incentives for large water users

- Reducing system losses
- Public education and information

- Agricultural water conservation
  - Use low energy precision application (LEPA) attachments on center pivots
  - Monitor soil moisture so that water is applied only when needed
  - Use tillage methods which promote soil water retention
  - Use crop types compatible with the climate and soil type
  - Encourage dryland farming
  - Irrigation efficiency

- Development of deep aquifers

- Treatment of lower quality water

- Water importation

- Aquifer recharge

- Cloud seeding / Weather modification

- Interstate alternatives: Regional management plan with neighboring counties in Texas

- Effective administration of the Basin by the NMOSE

- Close Basin to new groundwater appropriations

- County-wide programs
  - Aquifer monitoring
  - Groundwater flow modeling
  - Well inventory and sealing

- Wastewater reuse

The steering committee reviewed each of the strategies and indicated that they are all still relevant, though some are being refocused as new recommended strategies (Appendix 8-A). Actions that have been completed in order to implement the strategies identified in the 2000 plan are summarized on Table 8-1.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Lea County Water Planning Region
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Strategy	Status
Municipal water conservation • Urban/suburban landscaping • Indoor residential • Auditing, reuse infrastructure, and inclining-block rates and conservation incentives for large water users • Reducing system losses • Public education and information	Several municipalities have implemented 40-year water plans and conservation plans that include these types of conservation measures. The State of New Mexico now requires municipalities to use water auditing software to evaluate system losses as part of their conservation plan development.
Agricultural water conservation • Use LEPA attachments on center pivots • Monitor soil moisture so that water is applied only when needed • Use tillage methods which promote soil water retention • Use crop types compatible with the climate and soil type • Encourage dryland farming • Irrigation efficiency	The County Extension Agent and the Soil and Water Conservation District provide educational support for the agricultural water use sector to promote these types of conservation activities. Many agricultural water users have implemented conservation measures and plans.
Development of deep aquifers	The Office of the State Engineer drilled exploratory wells into the deeper aquifer without producing good results. Further study was not pursued.
Treatment of lower quality water	• No brackish water development and treatment projects have been implemented. • The study of produced water treatment technology had been undertaken by Lea County and the Lea County Soil and Water Conservation District. Ongoing studies are anticipated. Implementation is challenging due to cost and market limitations.
Water importation	No water importation projects have been implemented.
Aquifer recharge	The City of Hobbs has completed a preliminary engineering report for recharging the aquifer with treated effluent.
Cloud seeding / Weather modification	Several legislative initiatives have been unsuccessful in securing funding for cloud seeding.
Interstate alternatives: Regional management plan with neighboring counties in Texas	The region has worked with the state officials to initiate dialogue with the State of Texas regarding shared aquifers. These efforts have not resulted in improved shared aquifer management.

Table 8-1. Implementation Status of Strategies Identified in Accepted Plan Lea County Water Planning Region
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Strategy	Status
Effective administration of the Basin by the New Mexico Office of the State Engineer (NMOSE)	• The NMOSE has issued administrative criteria for the Lea County underground basin to improve administration of the Basin. • Several critical management areas are identified in the criteria.
Close Basin to new groundwater appropriations	Both the Jal and the Lea County underground water basins have been closed to new appropriations.
County-wide programs	Lea County has dedicated resources for increasing groundwater level monitoring in the County and evaluating treatment of produced water.
• Aquifer monitoring	• USGS continues to evaluate groundwater levels in the region. • Additional wells have been added to the program with funding from Lea County.
• Groundwater flow modeling	The OSE has updated the groundwater model used for administering water rights in County.
• Well inventory and sealing	No county-wide program has been implemented.
Wastewater reuse	• Several municipalities use treated effluent to water city parks. • The City of Hobbs has an effluent reuse project that includes aquifer recharge.

8.2 Water Conservation

Municipal water use is somewhat high for certain municipal water users in the Lea County Water Planning Region. Many water providers have begun developing water conservation plans and/or water conservation programs targeting high water use sectors; therefore, ongoing support for water conservation projects and programs are included in this RWP update. Water providers in the region will continue to implement their existing water conservation programs.

8.3 Proposed Strategies (Water Programs, Projects, or Policies)

In addition to continuing with strategies from the previous plan, the Lea County region discussed and compiled new project, program, and policy (PPP) information, identified key collaborative projects, and provided recommendations for the state water plan. The recommendations included in this section were prepared by the Lea County Regional Water Planning Steering Committee and other stakeholders and reflect their interest and intent. The recommendations made by the steering committee and other stakeholders have not been evaluated or approved by NMISC. Regardless of the NMISC's acceptance of this RWP, inclusion of these recommendations in the plan shall not be deemed to indicate NMISC support for, acceptance of, or approval of any of the recommendations, PPP information, and collaborative strategies included by the regional steering committee and other stakeholders.

8.3.1 Comprehensive Table of Projects, Programs and Policies

Over the two-year update process, nine meetings were held with stakeholders in the Lea County region. These meetings identified the program objectives, presented draft supply and demand calculations for discussion and to guide strategy development, and provided an opportunity for stakeholders to provide input on the PPPs that they would like to see implemented (Section 2). A summary of the PPP information, obtained primarily from input supplied directly by stakeholders, is included in Appendix 8-A. Information was requested during several open meetings, and requests for input were also e-mailed to all stakeholders that had expressed interest in the regional water planning process.

Some water projects were already identified through the State of New Mexico Infrastructure Capital Improvement Plan (ICIP), Water Trust Board, and Capital Outlay funding processes, and those projects are also included in the Lea County PPP table. The projects included are from the 2017-2021 ICIP list (http://nmdfa.state.nm.us/ICIP.aspx, accessed March 2016), which is updated on an annual basis. Therefore, other infrastructure projects that are important to the region may be identified before this RWP is updated again. In general, the region is supportive of water and wastewater other water-related infrastructure projects.

The information in Appendix 8-A has not been ranked or prioritized; it is an inclusive table of all of the PPPs that regional stakeholders are interested in pursuing. It includes projects both regional in nature (designated R in Appendix 8-A) and those that are specific to one system (designated SS in Appendix 8-A). The table identifies each PPP by category, including water and wastewater system infrastructure, water conservation, watershed restoration, flood prevention, water reuse, water rights, water quality, and data collection.

In the Lea County region, projects identified on the PPP table are primarily water system infrastructure and irrigation system upgrades as well as projects to improve understanding and mapping of the aquifers in Lea County.

8.3.2 Key Projects for Regional Collaboration

Prioritizing projects for funding is done by each funding agency/program, based on their current criteria, and projects are reviewed in comparison to projects from other parts of the state. Consequently, the regional water planning update program did not attempt to rank or prioritize projects that are identified in Appendix 8-A. However, identifying larger regional collaborative projects is helpful to successful implementation of the regional plan. At steering committee meetings held in 2015 and 2016, the group discussed projects that would have a larger regional impact and for which there is interest in collaboration among steering committee members and stakeholders to seek funding and for implementation.

The group used an informal process of discussing and refining the definition of potential collaborative projects and determining the projects of greatest interest. Key collaborative projects identified by the steering committee and Lea County region stakeholders are shown on Table 8-2.

In order to move forward with implementing the key collaborative projects, additional technical, legal, financial, and political feasibility assessments may be required. A detailed feasibility assessment was beyond the scope and resources for this RWP update.

8.3.3 Key Program and Policy Recommendations

The legislation authorizing the state water plan was passed in 2003. This legislation requires that the state plan shall "integrate regional water plans into the state water plan as appropriate and consistent with state water plan policies and strategies" (§ 72-14-3.1(C) (10)). For future updates of the state water plan, NMISC has asked the regions to provide recommendations for larger programs and policies that would be implemented on a state level. These are distinct from the regional collaborative projects listed in Table 8-2 and the PPPs listed in Appendix 8-A in that they would be implemented on a state rather than a regional or system-specific level. The State will consider the recommendations from all of the regions, in conjunction with state-level goals, when updating the state water plan.

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Lea County Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Groundwater management, monitoring and aquifer mapping					
Collect information to assess groundwater resources on a regional scale using recent data and focusing on the Ogallala, Capitan, and Jal basins. Study should enhance understanding of recharge areas and location and quality of water resources in the region.	Lea County	• New Mexico Tech • U.S. Geological Survey (USGS) • Lea County Water Users Association and other water users in the region • Lea County Soil and Water Conservation District (SWCD)	• USGS • Lea County and State funds (Capital Outlay and/or Water Trust Board).	$50,000-$500,000 depending on the number of basins included in the study.	USGS budget limitations and staff availability. Study may take several years to complete.
Identify remaining groundwater (saturated thickness) in New Mexico Office of the State Engineer (NMOSE) administrative model cells surrounding key water supplies in the region. • Digitize existing NMOSE data. • Identify agricultural well metering status and data used in administrative model.	Lea County will take the lead in drafting a letter to the NMOSE to request these tasks.	• Lea County • Lea County Water Users Association members and other water users in the region	State funds allocated to the NMOSE to complete this task	Requires staff time rather than a grant.	NMOSE staff availability is limited.
Hire a County hydrologist.	Lea County		County budget FY 2018 or FY 2019.	1 full-time-equivalent staff person	Budget limitations due to decreased revenues may delay implementation.

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Lea County Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Water conservation					
Support agricultural water conservation efforts of the Lea County SWCD. Identify funding for topographic mapping.	Lea County SWCD	• Lea County • Lea County Water Users Association	• Annual SWCD budget • Grant funding request	1 full-time-equivalent staff person	Staff availability
Use public service announcements to promote water conservation to the public.	• Water providers in the region • Lea County	• Lea County Water Users Association • NMOSE	Local government budgets	$200-$1,000 to develop and disseminate public announcements	Would require assistance from the NMOSE Water Use and Conservation Bureau. Staff availability is limited.
Develop County-wide conservation program (municipal and industrial).	• Lea County • Water suppliers throughout the region	Lea County Water Users Association	Capital Outlay or Water Trust Board request	$30,000 or one quarter part-time-equivalent staff person	• Funding will cover meetings, education, and outreach. • Implementation of conservation measures by water providers and users would require additional funding. • County program will not provide funding for conservation projects.

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Lea County Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Link economic development to water					
Encourage low water use industries and businesses. Identify appropriate low water use industries for Lea County and for New Mexico	• Lea County Economic Development Corporation • Lea County	• Municipal chambers of commerce • Southeastern New Mexico Economic Development District • New Mexico Economic Development Department • New Mexico Partnership	Economic Development Administration Grant	$20,000	
Reuse of produced water					
Participate in ongoing efforts in Lea and Eddy counties	Lea County	• Lea County SWCD • Lea County Water Users Association • Agricultural water users • Lea County Economic Development Corporation	Staff time, local budgets		Implementation. Many studies have been completed. Viable treatment methods and technologies have been developed. Cost of this treated produced water is higher than costs for pumping out of the aquifer.
Support technology research and develop pilot projects for treating and using produced water	• Lea County • Lea County Water Users Association	New Horizons Resources Foundation	• State funding • Public private partnership	$100,000-$200,000	

Table 8-2. Key Collaborative Programs, Projects, and Policies
2016 Lea County Regional Water Plan
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Project Description	Project Lead	Project Partners	Probable Funding Source(s)	Cost Range	Major Implementation Issues
Implement effluent reuse, to preserve more potable water for other needs					
• Identify effluent reuse opportunities in Lea County. • Design and construct effluent delivery system.	Municipal water suppliers with centralized wastewater treatment facilities	Bureau of Reclamation WaterSMART Program	Local budgets	• $20,000 • Several million dollars per project	Cost to construct and implement reuse projects.
Water system upgrades, improvements, and well development					
Many water suppliers in the region require funding for water system improvements, upgrades, and well drilling. As water levels decline, suppliers will need additional wells to meet future demand. Specific projects are identified in Appendix 8-A.	• Water suppliers throughout the region • City of Hobbs • Tatum • Jal • Eunice • Lovington	• Rural Community Assistance Corporation • U.S. Environmental Protection Agency • New Mexico Finance Authority • New Mexico Environment Department • New Mexico Rural Water Association • U.S. Department of Agriculture (USDA) • Southeast New Mexico Council of Governments	• New Mexico Capital Outlay Request • Water Trust Board • Drinking Water Revolving Loan Fund • U.S. Department of Agriculture	Several million dollars	Funding limitations are the main obstacle to implementation. The water providers in Lea County are actively planning for future infrastructure needs.

After group discussion, Lea County region identified the following recommendations for policies and programs to be considered in the state water plan:

- Develop and implement a statewide policy and program for weather modification initiatives to increase precipitation as supported by scientific study and previous projects implemented in New Mexico.
- Protect water rights by ensuring proper use of the Water Use Leasing Act (72-6-1 to 72-6-7 NMSA 1978) and the emergency / temporary water permit process (72-5-25 NMSA 1978).
- Include wastewater planning and reuse as part of future regional water planning efforts.
- Fully fund aquifer mapping in non-stream-connected, mined aquifers to increase understanding of the longevity of these resources.
- Support efforts to enhance reuse of produced water. Technologies to treat produced water are well known. The legal status of the ownership of produced water needs clarification.
- Evaluate mechanisms that affect the market for produced water. Provide incentives for use of produced water.
- Fund data collection and updates of NMOSE water models to ensure full calibration and accuracy of models in non-stream connected, mined aquifers.
- Continue funding for the regional water planning effort so that the regions continue to receive support for meetings and for working together on implementation.

The 2016 Regional Water Plan characterizes supply and demand issues and identifies strategies to meet the projected gaps between water supply and demand. This plan should be added to, updated, and revised to reflect implementation of strategies, address changing conditions, and continue to inform water managers and other stakeholders of important water issues affecting the region.

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Appendix 2-A

Master Stakeholder List

Lea County Region 10 RWP Master Stakeholder List

Updated May 2, 2016

Last	First	Affiliation/Category
Henslee	Gale	Principal Environmental Analyst, Xcel Energy
Hicks	Tres	Pettigrew & Associates
Jackson	Kimberly	Mescalero Ridge Water Co-Op
Johncox	Becky	Triple J Trailer Park--Hobbs
Johncox	Daniel	Young’s Factory Built Homes
Kinsolving	Dean	Rancher, Oil & gas
Moore	Martin	City of Eunice;
Morley	Andy	OSE Roswell District II, Manager
Murphy	JJ	City Manager, Hobbs
Murphy	Mark	Realtor, Newman & Company
Myers	Pam	Rancho Dal Paso
Myrick	Van	Public Works Director, City of Jal
Newman	Marshall	City of Hobbs; Lea County Water Users Association
Norris	John	Lovington; Lea County Water Users Association
Quintana	Hubert	SE NM Economic Development District
Rambo	Sharon	Tatum Water System
Randall	Todd	City of Hobbs
Reid	Bruce	Lea County
Rubin	Norm	Rancho Dal Paso, LLC DBA Adobe Village
Russell	Monica	Lea County Water Users Association
Samberson	Gene	
Stokes	Len	Consultant
Taylor	Grant	CEO Chamber of Commerce
Van Dyke	Brent	
Wall	Dicky	Chief Credit Officer, Lea County State Bank
Ward	Ryan	New Mexico Department of Agriculture
Westerman	Cindy	Country Cottage Care And Rehabilitation
White	Matt	Mayor, City of Eunice; Vice-Chair, Lea County Water Users Association
Wilcox	James	NMISC Commissioner
Williams	James	City Manager, City of Lovington
Woomer	Tim	City of Hobbs; Lea County Water Users Association
		Maljamar Water

Note: Those interested in developing collaborative projects or ongoing planning efforts may contact the NMISC Regional Water Planning Manager for further information about the region’s stakeholders.

Appendix 2-B

Summary of Comments on Technical and Legal Sections: Single Comment Document

Lea County Regional Water Plan Compilation of Comments on the Draft Plan			
NO.	Comment Source	Location (Section/ Page/ Paragraph)	COMMENTS
1	May 5, 2016 Meeting	Section 4	Include reference to Lovington Comprehensive Plan.
2	May 5, 2016 Meeting	Section 4	Include reference to Jal Conservation Plan.
3	May 5, 2016 Meeting	Bullet to add to Section 5	Permitted water rights that have not been put to beneficial use for many years are being transferred from agriculture use to oil and gas production under emergency procedures. (Water Use Leasing Act (72-6-1 to 72-6-7 NMSA 1978) and the emergency / temporary water permit process (72-5-25 NMSA 1978). This process circumvents the normal process for changing the place and purpose of use of a water right, which allows for a protest and evaluation of the transfer before pumping of the water. The emergency process allows the applicant to pump the water immediately with little to no evaluation of the impacts or long-term implications of this pumping.
4	May 5, 2016 Meeting	Bullet to add to Section 5	Add bullet that quantifies the amount of water being exported from Lea Basin to other regions via pipeline. Discuss the fact that oil and gas producers fill up trucks and take the water outside the Lea County.
5	May 5, 2016 Meeting	Table 6.4	Add footnote to the table that shows the amount of water pumped from Lea County that is used outside the planning region

Appendix 6-A

List of Individuals Interviewed

Appendix 6-A. List of Individuals Interviewed Lea County Water Planning Region

Name	Title	Organization	City
Melinda Allen	President & CEO	Economic Development Corporation of Lea County	Hobbs
JJ Murphy	City Manager	City of Hobbs	Hobbs
Philip Carter	District Conservationist	USDA - NRCS	Lovington
Grant Taylor	CEO	Hobbs Chamber of Commerce	Hobbs
Mark Murphy	Realtor	Newman & Company	Hobbs
Dicky Wall	Chief Credit Officer	Lea County State Bank	Hobbs
David Gasch	Planner	Lea County	Lovington
James Williams	City Manager	City of Lovington	Lovington
Mike Gallagher	County Manager	Lea County	Lovington
Bill Duemling	Engineer Specialist Supervisor	OSE District II	Roswell
Gale Henslee	Principal Environmental Analyst	Xcel Energy	Amarillo

Appendix 6-B

Projected Population Growth Rates, 2010 to 2040

Appendix 6-B. BBER Projected Five-Year Population Growth Rates, 2010 to 2040 Lea County Water Planning Region

County	Five-Year Growth Rate (%)					
	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Lea	10.41	9.71	9.39	9.26	8.94	8.40

Source: New Mexico County Population Projections, July 1, 2010 to July 1, 2040.
Geospatial and Population Studies Group, Bureau of Business & Economic Research,
University of New Mexico. Released November 2012.

Appendix 8-A

Recommended Projects, Programs, and Policies

Regional Water Planning Update
Projects, Programs, and Policies
Water Planning Region 16: Lea County

Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
R	Policy	Data Collection and Evaluation	Regional Aquifers Mapping and modeling	Steering Committee Meeting	Conduct an interpretive study using existing USGS groundwater data. Focus on understanding the Ogallala, Capitan and Jal basins. Develop updated map of the aquifer to better understand remaining saturated thickness in the region's aquifers. For the OSE groundwater model for Lea County, Lea County would like to see every model cell show how much saturated thickness is left.	Lea County	USGS		Planning Phase		Declining groundwater levels in the region's aquifers are a concern.	
R	Policy	Develop a policy to prevent local water from being exported or used by inchoate rights users.	Water Use Limitation Policy	Steering Committee Meeting	Develop a policy that will prevent water from being misused by inchoate water right users or from being exported. A policy may include raising fees for certain uses.	Lea County			Initial phase		To protect existing water rights for local communities	
R	Policy	Local policy to limit economic development of big water users and focus on uses of non-potable water.	Economic Development Policy for Water Conservation	Steering Committee Meeting	Develop economic development policy that would focus development on industries that are not big water users and provide alternative sources of water (brackish and non-potable).	Lea County	Lea County Economic Development Corporation		Initial Phase		To preserve existing fresh water supplies.	
R	Policy	Planning	Low water use industry economic development	Steering Committee Meeting	Encourage economic development with low water use industry	Lea County	Lea County Economic Development Corporation					
R	Program	Water conservation	Municipal and industrial conservation strategies	Included in the 1999 accepted regional water plan and the 2015 Steering Committee Meeting	Develop a County wide conservation program. Promote conservation strategies as applicable to municipal and industrial uses. Coordinate with water providers who already have conservation plans in place	Lea County	Multiple municipalities in the region				This will update the 1999 regional water plan for the evaluation of urban/suburban landscaping (including a discussion of inclining block water rate structures), indoor residential, and large user substrategies as ways to conserve water.	
R	Program	Water Conservation	Encourage Conservation	Steering Committee Meeting	Encourage water conservation within county, including issuing public service announcements	Lea County						
R	Project	Data Collection	Continued Groundwater Monitoring	Steering Committee Meeting	Continue groundwater monitoring by the USGS. Expand monitoring events and locations as needed to support aquifer mapping.	Lea County	USGS				Groundwater monitoring is ongoing and the region supports increased monitoring events and locations. This should be developed in conjunction with the aquifer mapping study.	
R	Project	Data collection	Digitize existing OSE data	Steering Committee Meeting		Lea County						
R	Project	Data collection	Low quality water resources study	Steering Committee Meeting	Understand quantity and quality of low quality water resources	Lea County						
R	Project	Planning	Membrane Technology Study for reuse of produced water.	Steering Committee Meeting	The study looks at ways to recycle and reuse produced water.	Lea County	DOE		Second phase of reuse study	$3,500,000	This study will continue with a DOE funded study of reuse water. The first phase has been completed. Lea County will continue to work on this project, recycling of produced water from the oil and potash industries. Brent Vandyke- SWCD is also working on another initiative looking into recycling of produced water.	
R	Project	Planning	Inventory of Completed Water Conservation plans in Lea County	Regional water planning meeting, May 2015	Inventory water conservation plans within the County and show what is being done in each of the plans. This is necessary to help develop a regional conservation program.	Lea County					May contribute to creating a county-wide plan.	
R	Project	Water Conservation	Implement agricultural water conservation	Steering Committee Meeting		Lea County SWCD	Agricultural water users					

Regional Water Planning Update
Projects, Programs, and Policies
Water Planning Region 16: Lea County

Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
R	Project	Water Supply	Weather Modification, Cloud Seeding	Included in the 1999 accepted regional water plan and the Steering Committee Meeting	Implementation of a cloud seeding project in Roosevelt and Lea Counties	Lea County SWCD	ISC	2016-2017		$150,000	Of several strategies evaluated in the 1999 regional water plan, one was a cloud seeding project.	The 1999 regional water plan evaluated development of deep aquifers, treatment of lower quality water, importing water, aquifer storage, and cloud seeding projects. Importing water is not thought to be a feasible alternative, but the other substrategies will be re-evaluated as a part of the regional water plan update. At the February 2015 meeting, the regional water planning group discussed cloud seeding, and wanted to keep it on the list of projects going forward.
R	Program	Planning	Water Banking	Steering Committee Meeting	To allow historical water resources to be set aside and re-allocated for a planned purpose.	Lea County Water Users Association			Initial Phase		To preserve existing water supplies by planning for resourceful water use.	
R	Project	Data Collection and evaluation	GIS-based Produced Water Reuse Study	Steering Committee Meeting	A study will be conducted utilizing Geographic Information System (GIS) to determine where treated produced water could be reused. Develop GIS data set of produced water locations and amounts as a basis for further evaluation of potential treatment and reuse of produced water.	New Mexico Department of Energy and Minerals	Lea County, Lea County Water Users					New Mexico Department of Energy and Minerals is undertaking a study on produced water in Lea and Eddy Counties. GIS mapping data may become available from this study
R	Project	Planning	Capitan Underground Water Basin (UWB) Closure	Steering Committee Meeting	Evaluate whether this groundwater basin should be closed to new appropirations	OSE			Initial		The 1999 regional water plan evaluated (closing the Lea County underground water basin [UWB]). The Lea County UWB was closed on March 10, 2009. At the February 2015 meeting, the regional water planning group discussed the possibility of requesting that the New Mexico Office of the State Engineer also close the Capitan UWB.	
R	Policy	Planning	Statewide weather modification	Steering Committee Meeting	Statewide weather modification - SWCD is working on an initiative for all counties in NM	State of New Mexico						
R	Policy	Planning	Groundwater compacts with neighboring states	Steering Committee Meeting	Develop groundwater compacts with neighboring states with shared aquifers	State of New Mexico						
R	Program	Water Conservation	Support SWCD in Conservation projects/education	Steering Committee Meeting		SWCD	Lea County					
R	Project	Planning	Water Reuse	Steering Committee Meeting	Reusing produced water for agriculture (blending, as necessary), and the use of non-potable water by the potash industry.	Various			Initial		Assist in agricultural water conservation through reuse	
R	Project	Water Conservation	Meter agricultural irrigation wells	Steering Committee Meeting								
SS	Project	Water System Infrastructure (M)	Bennett Colonia/Jal	Colonias Infrastructure Board	Plan and Design replacement of older asbestos and transite water lines and increase line size from 2" line.	Bennett Colonia	Colonias Infrastructure Board	2014		$1,568,652	System is connected to the City of Jal and has very low water pressure and interruptions	State is sharing in cost (match amount: $156,865; approved funding: $320,602)
SS	Project	Planning	Golf Course Water System Preliminary Engineering Report	Matt White, Mayor, City of Eunice	Municipal golf course, residential, industrial and commercial developers, water loading stations supporting oil field activities	Eunice	Louisiana Energy Services National Enrichment Facility		0			Feasibility study completed
SS	Project	Planning	Water Conservation Plan	Matt White, Mayor, City of Eunice	The Water Conservation Plan will provide a comprehensive review of the City's current water use and projected water demands, and identify areas where conservation measures may be implemented to reduce water use. As part of the Conservation Plan, NMOSE requires completion of an AWWA water system audit and a gallons per capita per day (GPCD) calculator and a public involvement component.	Eunice			In progress	$32,500	The resulting document will be useful for the City's planning purposes for reducing water loss and use and improving overall water efficiency.	Self funded (City)

Regional Water Planning Update
Projects, Programs, and Policies
Water Planning Region 16: Lea County

Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
SS	Project	Planning	40 Year Water Development Plan	Matt White, Mayor, City of Eunice	The 40-Year Water Development Plan will be prepared to document existing water use, estimate future demands, and compare it with the City's water rights to ensure adequate water resources are available for future growth and development. The document will be prepared in accordance with the requirements of the NM Office of the State Engineer (NMOSE).	Eunice			Under development	30,000		Self funded (City)
SS	Project	Planning	Well Field Sustainability Study	Matt White, Mayor, City of Eunice	A well field sustainability study is needed to project the life of the City's well fields and ground water supplies. This effort would entail assessing existing hydrogeologic models, organizing existing data, constructing a solids model, developing a ground water model, running historic simulations, calibrating the model, and running future scenarios (likely from the 40-yr plan). All of this information would then be captured in a report for documentation purposes.	Eunice			Project identified, no planning has taken place	200,000		Self-funded (City) The City is making improvements in their data collection & is assembling their GPCD calculator. When adequate data exists, they will proceed with the 40 year plan
SS	Project	Stormwater system infrastructure	Storm Drainage	ICIP		Eunice		2015-2017		$1,150,000		
SS	Project	Wastewater system infrastructure	Eunice Sewer & Water Infra Improve	Capital Outlay		Eunice		2015		$115,000		State funded
SS	Project	Wastewater system infrastructure	Replace Sewer and Water Utility Lines	ICIP		Eunice		2015-2019		$15,450,000		
SS	Project	Wastewater System Infrastructure	Collection System Preliminary Engineering Report	Matt White, Mayor, City of Eunice	PER effort: a field investigation; condition assessment; and survey of the existing collection system. A hydraulic model will be developed which will assist with identifying problem areas and alternatives for improvements; and an evaluation of the City's existing lift stations with recommendations for upgrades or replacements will be conducted.	Eunice	n/a	2016 (1 year)	Initial planning has started.	$225,000 Self funded	The majority of the city's existing sewer collection system consists of clay pipe and brick manholes which have design, capacity and condition deficiencies.	
SS	Project	Water reuse	Beneficial Effluent Reuse	Matt White, Mayor, City of Eunice	This project involves additional treatment of effluent from the City's existing wastewater treatment plant (WWTP) to Class 1A standards and conveyance of the reclaimed water to the Eunice Municipal Recreation Area located west of the City for irrigation of landscaped areas and the golf course.	Eunice	n/a	Planning: 1 yr; Design: 1 yr; Construction: 2 yrs; 2016-2020 implementation	Initial planning in progress. Technical memo evaluation of treatment technologies in progress.	Design & construction: $3.5 million; Planning: $150,000; Total est. cost: $3.65 million		Funding Request: Capital outlay, CWSRF, WTB 2016-2017
SS	Project		Stephens Park/Lake	ICIP		Eunice		2015-2018		$3,625,000		
SS	Project	Water Rights	Water Rights Acquisition	ICIP		Hobbs		2015-2019		$750,000		
SS	Program	Water System Infrastructure	Water Wells Program	ICIP		Hobbs		2015-2018		$2,270,000		Listed in 2017-2021 Infrastructure Capital Improvement Plan (ID 25061)
SS	Project	Planning	Drainage Master Plan	ICIP		Hobbs		2015-2019		$9,845,000		
SS	Project	Planning	FEMA Map Update	ICIP		Hobbs		2015-2019		$200,000		
SS	Project	Stormwater system infrastructure	East Hobbs Drainage	ICIP		Hobbs		2015-2016		$750,000		
SS	Project	Wastewater infrastructure (A)	Hobbs Effluent Pipeline Hydrants/Irrigation	Capital Outlay		Hobbs		2015		$100,000		State funded
SS	Project	Wastewater infrastructure (M)	Hobbs Rockwind Golf Course Effluent Pipelines	Capital Outlay		Hobbs		2015		$350,000		State funded
SS	Project	Wastewater system infrastructure	WWTP Effluent Discharge System	ICIP		Hobbs		2015-2017		$17,287,420		
SS	Project	Wastewater system infrastructure	Sewer Main Replacement	ICIP		Hobbs		2015-2016		$19,500,000		
SS	Project	Wastewater system infrastructure	HIAP Sewer Extension	ICIP		Hobbs		2015-2017		$3,500,000		

Regional Water Planning Update
Projects, Programs, and Policies
Water Planning Region 16: Lea County

Regional or System Specific	Strategy Type (Project, Program or Policy)	Category	Project Name	Source of Project Information	Description	Project Lead (Entity or Organization)	Partners (Other Entities or Participants)	Timeframe (Fiscal Year)	Planning Phase	Cost	Need or Reason for the Project, Program, or Policy	Comments
SS	Project	Wastewater system infrastructure	City of Hobbs Effluent Reuse Project	DWSRLF Comprehensive Priority List (SFY15 Quarter 4)	Expansion of the reclaimed water infrastructure system to include ground water (ASAR) augmentation	Hobbs			Implementation of plan	Estimated construction cost: $5.2M Estimated construction cost for underground storage of excess reclaimed water via surface infiltration	The City of Hobbs Effluent Reuse Project is a local water reuse/water conservation plan that utilizes reclaimed water from the community's treatment facility for irrigation, construction, fire-fighting, and other beneficial reuse purposes.	An updated Professional Engineering Report has been completed to establish current/future effluent water balances, future storage requirements, and the feasibility of aquifer storage/aquifer recovery (ASAR). Planning documents, regulatory permitting, and pilot testing of an ASAR facility is projected to occur within the next five years. $840,000 recommended for funding by Water Trust Board
SS	Project	Water System Infrastructure	Water System Improvements (North Reservoir)	ICIP		Hobbs		2018		$5,000,000		Listed in 2017-2021 Infrastructure Capital Improvement Plan (ID 15692)
SS	Project	Water System Infrastructure	New Elevated Water Storage	ICIP		Hobbs		2018		$3,000,000		Listed in 2017-2021 Infrastructure Capital Improvement Plan (ID 16997)
SS	Project	Water system infrastructure (M)	Hobbs Water Distribution Extend	NMFA and Capital Outlay		Hobbs		2016	In progress	$714,000		State is sharing in cost; partial funding in place. NMFA-funded cost is 476,000; cost funded through capital outlay is $238,000
SS	Project	Water system infrastructure (M)	Jal SCADA System Upgrade	Capital Outlay		Jal		2016	In progress	$25,000		State funded
SS	Project	Water system infrastructure (M)	Jal Well	Capital Outlay		Jal		2016	In progress	$178,000		State funded
SS	Project	Water system infrastructure (M)	Jal Water System Improve	Capital Outlay		Jal		2015		$240,000		State funded
SS	Project	Water system infrastructure (M)	Water Distribution System	2017-2021 ICIP new projects	To get an RFP for an Engineer to plan and Design and then go out for bid for construction to replace all water line with C- 900 pipe in General Camp, replace 3000 feet of line from the transmission line at Westfield with 16"40 PVC poly, and replace water lines throughout the City with C=900 poly to provide adequate flow for fire protection.	Jal		2017-2021	In progress	11,300,000	To provide adequate flow for fire protection	The City of Jal received a grant and loan from the USDA for $11,300,000 on Aug. 1, 2015.
SS	Project	Water system infrastructure (M)	Water Production and Transmission System	2017-2021 ICIP new projects	To plan, design, bid and construct water well and transmission system improvements including design phase services (design plans, specifications, cost estimates and contract documents), bid phase services, construction phase services and construction.	Jal		2017-2021		1,704,200	The City of Jal operates four water production wells, which are 12 to 54 years old. Two of the wells were installed in the 1960s. The production capacity of the wells have progressively declined in water production capacity from 1,135 gpm	This project benefits the communities of Jal and Bennett by providing a safe and reliable water supply for the next 20 years. WTB recommended for funding in 2017 for $876,000.
SS	Policy/Project	Water System Infrastructure	Water Rights/Well Construction	ICIP		Lovington		2015		$6,100,000		Listed in 2017-2021 Infrastructure Capital Improvement Plan (ID 25554)
SS	Project	Wastewater system infrastructure	Replace Wastewater SCADA System	ICIP		Lovington		2015		$110,000		
SS	Project	Wastewater system infrastructure	Wastewater Front End Loader	ICIP		Lovington		2015		$250,000		
SS	Project	Water System Infrastructure	Replace Water Meters	ICIP		Lovington		2015		$1,300,000		
SS	Project	Water System Infrastructure	Remodel Water Office Building	ICIP		Lovington		2015		$280,000		Listed in 2017-2021 Infrastructure Capital Improvement Plan (ID 25561)
SS	Project	Water System Infrastructure	Build 3m/gal Water Storage Tank	ICIP		Lovington		2016		$3,535,000		
SS	Project	Water System Infrastructure	Screw Press for Sludge	ICIP		Lovington		2016		$270,000		
SS	Project	Water System Infrastructure	Wastewater Treatment Plant Addition	ICIP		Lovington		2018		$65,000		
SS	Project	Water System Infrastructure	Rebuild Lift Stations #3 and #5	ICIP		Lovington		2019		$67,000		
SS	Project	Water system infrastructure (M)	Lovington Water Meters & Equip	NMFA and Capital Outlay		Lovington		2016	In progress	375000		State is sharing in cost (NMFA: $250,000; Capital Outlay: $125,000)

2023 Annual Water Quality Report

City of Eunice

New Mexico

Water Supply System

Spanish (Espanol)
Este informe contiene informacion muy importante sobre la calidad de su agua beber. Traduscalo o hable con alguien que lo entienda bien.

Is my water safe?
We are pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. We are committed to providing you with information because informed customers are our best allies.

Do I need to take special precautions?
Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

Where does my water come from?
Drinking water for the City of Eunice comes from 7 groundwater wells located southwest of Hobbs, NM.

Source water assessment and its availability

Our sole source of drinking water is ground water from the Ogallala Aquifer. The aquifer is approximately 80 feet below ground surface. While this water source is readily available, it is in limited supply. Together with the New Mexico Environmental Department (NMED), a source water assessment was completed to analysis the susceptibility of our water supply to potential sources of contamination, including system operations and management. The susceptibility ranking of the Eunice Water Supply System is considered High. A copy of this report may be obtained from the State of New Mexico Environment Department, Drinking Water Bureau at (505) 476-8620 or, toll free at (1-877-654-8720).

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791). The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity: microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming; pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; and radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

How can I get involved?

The City of Eunice Council meets at the City of Eunice City Hall every second Monday at 6:00 p.m. If you would like to learn more or need additional information, please contact the City of Eunice at (575)394-2576 or visit our website at www.cityofeunice.org.

Description of Water Treatment Process

Your water is treated by disinfection. Disinfection involves the addition of chlorine or other disinfectant to kill dangerous bacteria and microorganisms that may be in the water. Disinfection is considered to be one of the major public health advances of the 20th century.

Additional Information for Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. City of Eunice is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Additional Information for Arsenic

While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Water Quality Data Table

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of our data, though representative, may be more than one year old. In this table you will find terms and abbreviations that might not be familiar to you. To help you better understand these terms, we have provided the definitions below the table.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products								
(There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Chlorine (as Cl2) (ppm)	4	4	0.78	0.54	1.1	2023	No	Water additive used to control microbes
TTHMs [Total Trihalomethanes] (ug/l)	NA	80	25.8	4.12	25.8	2023	No	By-product of drinking water disinfection
Haloacetic Acids (HAA5) (ug/l)	NA	60	5.96	0	5.96	2023	No	By-product of drinking water disinfection
Inorganic Contaminants								
Arsenic (ppb)	0	10	9	9	9	2023	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2	2	0.064	0.064	0.064	2023	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Fluoride (ppm)	4	4	1.11	1.11	1.11	2023	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Asbestos (MFL)	7	7	1.8	1.8	1.8	2020	No	Decay of Asbestos cement water mains; Erosion of natural deposit
Nitrate [measured as Nitrogen] (ppm)	10	10	2.0	2.0	2.0	2023	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Microbiological Contaminants								
Total Coliform	0	1 positive sample/month	0	NA	NA	2023	No	Naturally present in the environment
Fecal Coliform or *E. Coli* bacteria	0	1 positive sample/month	0	NA	NA	2023	No	Naturally present in the environment
Radioactive Contaminants								
Alpha emitters (pCi/L)	0	15	2.8	2.8	2.8	2023	No	Erosion of natural deposits
Radium (combined 226/228) (pCi/L)	0	5	0.31	0.31	0.31	2023	No	Erosion of natural deposits
Uranium (ug/L)	0	30	0	0	0	2023	No	Erosion of natural deposits

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							
Copper - action level at consumer taps (ppm)	1.3	1.3	0.1	2021	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Inorganic Contaminants							
Lead - action level at consumer taps (ppb)	0	15	1.7	2021	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

Unit Descriptions	
Term	**Definition**
ug/L	ug/L : Number of micrograms of substance in one liter of water
ppm	ppm: parts per million, or milligrams per liter (mg/L)
ppb	ppb: parts per billion, or micrograms per liter (µg/L)
pCi/L	pCi/L: picocuries per liter (a measure of radioactivity)
positive samples/month	positive samples/month: Number of samples taken monthly that were found to be positive
NA	NA: not applicable
ND	ND: Not detected
NR	NR: Monitoring not required, but recommended.

Important Drinking Water Definitions	
Term	**Definition**
MCLG	MCLG: Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
MCL	MCL: Maximum Contaminant Level: The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
TT	TT: Treatment Technique: A required process intended to reduce the level of a contaminant in drinking water.
AL	AL: Action Level: The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Variances and Exemptions	Variances and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.
MRDLG	MRDLG: Maximum residual disinfection level goal. The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
MRDL	MRDL: Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	MNR: Monitored Not Regulated
MPL	MPL: State Assigned Maximum Permissible Level

For more information please contact:

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2023 Consumer Confidence Report

Is my water safe?

We are pleased to present this year's Annual Water Quality Report (Consumer Confidence Report) as required by the Safe Drinking Water Act (SDWA). This report is designed to provide details about where your water comes from, what it contains, and how it compares to standards set by regulatory agencies. This report is a snapshot of last year's water quality. We are committed to providing you with information because informed customers are our best allies.

Do I need to take special precautions?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Water Drinking Hotline (800-426-4791).

Where does my water come from?

The City of Hobbs' only water source is the Ogallala Aquifer. This underground aquifer is located approximately 80 feet beneath our community. To draw water from the Ogallala Aquifer, the City of Hobbs operates 33 water wells. The only treatment this high quality drinking water requires before delivery to your tap is chlorination. While this water source is readily available, it is limited in supply and it is important we take effective water conservation steps

Source water assessment and its availability

The City of Hobbs worked with the New Mexico Environment Department (NMED) to complete a Source Water Assessment. The susceptibility analysis of the City of Hobbs water supply system reveals that the system is well maintained and the source of drinking water is protected from potential sources of contamination. The Susceptibility Rank of the City of Hobbs water system is Moderately Low. A copy of this report may be obtained from the State of New Mexico Environment Department, Drinking Water Bureau. Consumers can contact David Torres to obtain a copy of the report at 505-259-5048 David.Torres@env.nm.gov

Why are there contaminants in my drinking water?

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's (EPA) Safe Drinking Water Hotline (800-426-4791). The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity:
microbial contaminants, such as viruses and bacteria, that may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife; inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, or farming; pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses; organic Chemical Contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems; and radioactive contaminants, which can be naturally occurring or be the result of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

How can I get involved?

The City of Hobbs Utilities Board meets on the first Thursday of each quarter (January, April, July, October) at 5:00 p.m. at the City of Hobbs Wastewater Reclamation Facility.

Additional Information for Lead

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. City of Hobbs is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Additional Information for Arsenic

While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

Additional Information for Nitrate

Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask for advice from your health care provider.

Water Quality Data Table

In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of contaminants in water provided by public water systems. The table below lists all of the drinking water contaminants that we detected during the calendar year of this report. Although many more contaminants were tested, only those substances listed below were found in your water. All sources of drinking water contain some naturally occurring contaminants. At low levels, these substances are generally not harmful in our drinking water. Removing all contaminants would be extremely expensive, and in most cases, would not provide increased protection of public health. A few naturally occurring minerals may actually improve the taste of drinking water and have nutritional value at low levels. Unless otherwise noted, the data presented in this table is from testing done in the calendar year of the report. The EPA or the State requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants do not vary significantly from year to year, or the system is not considered vulnerable to this type of contamination. As such, some of our data, though representative, may be more than one year old. In this table you will find terms and abbreviations that might not be familiar to you. To help you better understand these terms, we have provided the definitions below the table.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Disinfectants & Disinfection By-Products								
(There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants)								
Chlorine (as Cl2) (ppm)	4	4	.82	.11	.82	2023	No	Chlorine Gas Disinfectant added to the water for protection against Microbial Contaminants
Haloacetic Acids (HAA5) (ppb)	NA	60	7.4	3.6	7.4	2023	No	By-product of drinking water chlorination
TTHMs [Total Trihalomethanes] (ppb)	NA	80	28	18	28	2023	No	By-product of drinking water disinfection
Inorganic Contaminants								
Nickel (ppm)	.1	.1	.012	0	.012	2023	No	Discharge from metal water pipes; Erosion of natural deposits
Arsenic (ppb)	0	10	7	5	7	2023	No	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes
Barium (ppm)	2	2	.067	.035	.067	2023	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Detect In Your Water	Range		Sample Date	Violation	Typical Source
				Low	High			
Chromium (ppb)	100	100	6	0	6	2023	No	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride (ppm)	4	4	1.1	.74	1.1	2023	No	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories
Nitrate [measured as Nitrogen] (ppm)	10	10	5.62	3.45	5.62	2023	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Selenium (ppb)	50	50	11	7	11	2023	No	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines
Radioactive Contaminants								
Alpha emitters (pCi/L)	0	15	3.6	1.1	3.6	2023	No	Erosion of natural deposits
Beta/photon emitters (pCi/L)	0	50	9.7	2	9.7	2023	No	Decay of natural and man-made deposits. The EPA considers 50 pCi/L to be the level of concern for Beta particles.
Radium (combined 226/228) (pCi/L)	0	5	.05	.08	.05	2023	No	Erosion of natural deposits
Uranium (ug/L)	0	30	8	3	8	2023	No	Erosion of natural deposits
Volatile Organic Contaminants								
1,1-Dichloroethylene (ppb)	7	7	.81	0	.81	2023	No	Discharge from industrial chemical factories

Contaminants	MCLG	AL	Your Water	Sample Date	# Samples Exceeding AL	Exceeds AL	Typical Source
Inorganic Contaminants							
Copper - action level at consumer taps (ppm)	1.3	1.3	.37	2023	0	No	Corrosion of household plumbing systems; Erosion of natural deposits
Lead - action level at consumer taps (ppb)	0	15	1.1	2023	0	No	Corrosion of household plumbing systems; Erosion of natural deposits

Undetected Contaminants

The following contaminants were monitored for, but not detected, in your water.

Contaminants	MCLG or MRDLG	MCL, TT, or MRDL	Your Water	Violation	Typical Source
Asbestos (MFL)	7	7	ND	No	Decay of asbestos cement water mains; Erosion of natural deposits

Additional Monitoring

As part of an on-going evaluation program the EPA has required us to monitor some additional contaminants/chemicals. Information collected through the monitoring of these contaminants/chemicals will help to ensure that future decisions on drinking water standards are based on sound science.

Name	Reported Level	Range	
		Low	High
Perfluoroheptanoic acid (PFHpA) (ppb)	.0051	.0045	.0051
Perfluorooctanoic acid (PFOA) (ppb)	.0053		.0053
Perfluorobutanoic acid (PFBA) (ppb)	.0064	.0051	.0064
Perfluorohexanoic acid (PFHxA) (ppb)	.0095	.0072	.0095
Perfluoropentanoic acid (PFPeA) (ppb)	.0162	.0032	.0162
Lithium (ppb)	53.1	22.2	53.1

Unit Descriptions	
Term	**Definition**
ug/L	ug/L : Number of micrograms of substance in one liter of water
ppm	ppm: parts per million, or milligrams per liter (mg/L)
ppb	ppb: parts per billion, or micrograms per liter (µg/L)
pCi/L	pCi/L: picocuries per liter (a measure of radioactivity)
MFL	MFL: million fibers per liter, used to measure asbestos concentration
NA	NA: not applicable
ND	ND: Not detected
NR	NR: Monitoring not required, but recommended.

Important Drinking Water Definitions	
Term	**Definition**
MCLG	MCLG: Maximum Contaminant Level Goal: The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
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MRDL	MRDL: Maximum residual disinfectant level. The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
MNR	MNR: Monitored Not Regulated
MPL	MPL: State Assigned Maximum Permissible Level

Water Conservation Period, Please water "Responsibly"!

Regulations for the City of Hobbs Annual Water Conservation Period

The City of Hobbs has established a designated period of city wide water conservation that begins May 15th and continues through September 15th of each year. No domestic or commercial water shall be used for garden, lawn, or other exterior watering or sprinkling application, except from the water mains of and upon the premises having an even street address on even calendar dates and having an odd street address on odd calendar dates. In case of corner buildings having both odd and even address numbers, the address listed on the consumer's account with the City's Utilities Department shall control. On the thirty-first day of months that have thirty-one days, no watering shall be allowed.

Chapter 13.20 of the City of Hobbs Municipal Code.

The City of Hobbs Annual Water Conservation Period is in affect from May 15th through September 15th of each year.

Outdoor watering shall only occur once per day during one of the following time periods on your designated even or odd calendar dates:

You may water your lawn either:

Between the Hours of

4: 00 am and 8:00 am

OR

Between the Hours of

7:00 pm and 11:00 pm

SAVE THE DATE

FROM MAY 15th THROUGH SEPTEMBER 15th OF EACH YEAR

ODD ADDRESSES MAY ONLY WATER ON ODD DATES

EVEN ADDRESSES MAY ONLY WATER ON EVEN DATES

Important Phone Numbers:

Billing & Customer Service

575-397-9216

For Emergency, Weekend, Holiday and After Hours Service

575-397-9315

For more information contact:

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