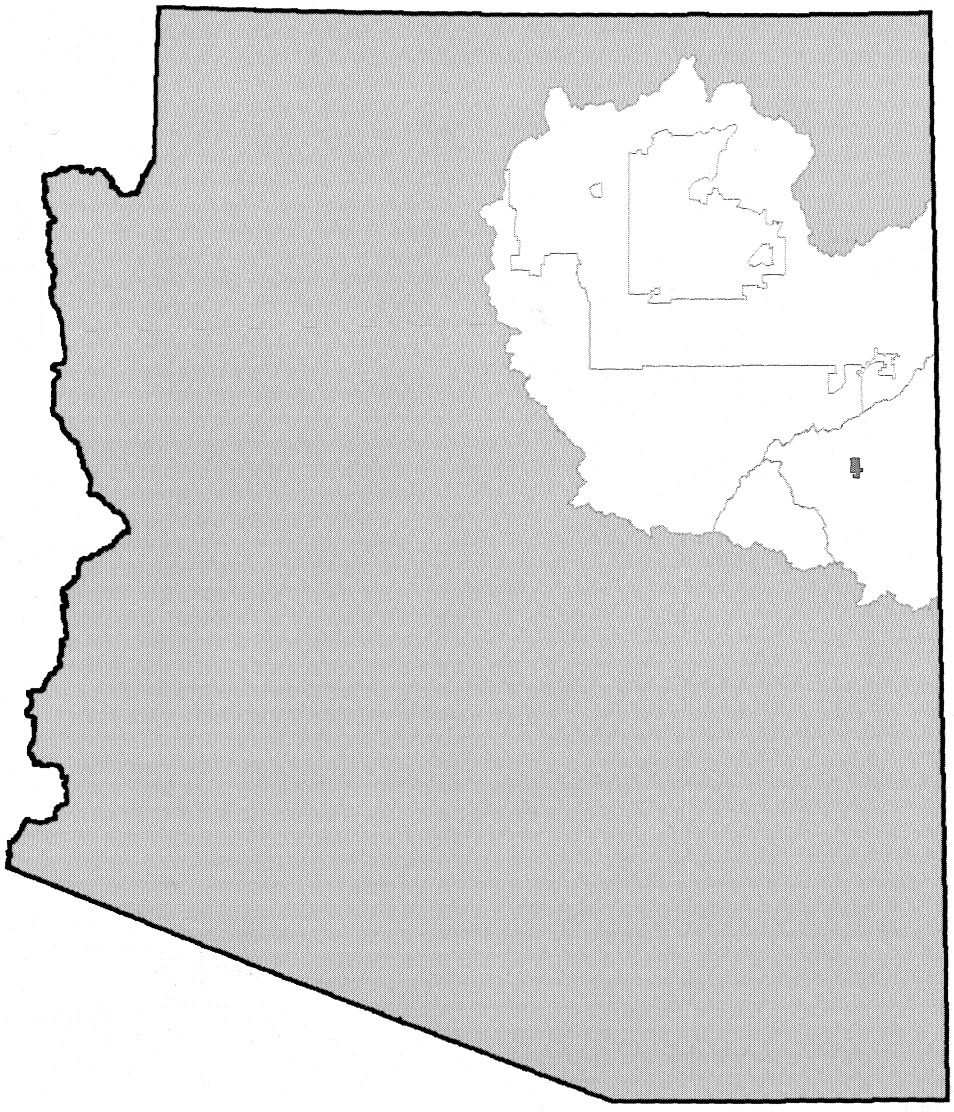
TECHNICAL ASSESSMENT OF THE ZUNI INDIAN TRIBE WATER RIGHTS SETTLEMENT

In re The General Adjudication of the Little Colorado River System and Source

Volume I



Arizona Department of Water Resources

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CHAPTER 1: INTRODUCTION

This report concerns a proposed settlement of water rights for the Zuni Indian Tribe ("Zuni Tribe" or "Tribe") and the United States on behalf of the Tribe. The proposed settlement is under consideration in a proceeding entitled *In re the General Adjudication of All Rights to Use Water in the Little Colorado River System and Source*, No. 6417, pending in the Apache County Superior Court ("LCR adjudication"). As requested by the LCR adjudication court, this report contains a factual analysis and technical assessment of the proposed settlement.

On June 7, 2002, several parties in the LCR adjudication entered into a settlement agreement ("Parties")[1] known as the "Zuni Indian Tribe Water Rights Settlement Agreement in the Little Colorado River Basin" ("Settlement Agreement"). [**Appendix A** at ¶ 1.1].[2] The purpose of the Settlement Agreement is to resolve litigation involving claims by the Zuni Tribe to water rights on the LCR and its tributaries sufficient to maintain the Zuni Heaven Reservation for long-standing religious and sustenance activities. [*Id.*]. The Settlement Agreement also addresses certain non-Indian claims to water rights, and liabilities among the Parties. [*Id.*]. The resolution of these conflicts involves federal law, state law, the Norviel Decree[3] and other

[1] Parties include the Zuni Tribe on behalf of itself and its members; the United States of America on behalf of the Zuni Tribe ("United States"); the State of Arizona; the Arizona Game and Fish Commission ("AGAF"); the Arizona State Land Department ("ASLD"); the Arizona State Parks Board ("State Parks"); the St. Johns Irrigation and Ditch Co. ("SJIC"); the Lyman Water Co. ("LWC"); the Round Valley Water Users' Association ("Round Valley"); the Salt River Project Agricultural Improvement and Power District ("SRP"); the Tucson Electric Power Company ("TEP"); the City of St. Johns; the Town of Eagar; and the Town of Springerville. Execution by the State of Arizona constitutes the state's commitment to assist in carrying out the provisions of the Settlement Agreement. [Settlement Agreement at ¶ 9.3.] Execution by ASLD, AGAF and State Parks is in their capacities as adjudication claimants. [*Id.*].

[2] **Appendix A** includes the main text of the Settlement Agreement. There are 17 attachments to the Settlement Agreement, some of which are included in separate appendices.

[3] The Norviel Decree consists of several decrees entered in the Apache County Superior Court concerning water rights in distinct geographic areas upstream and downstream of Lyman Lake. See **Figure 1.** These decrees were entered in 1914, 1918 (modified and supplemented in 1921), and 1923, which adjudicate the water rights of some of the settlement parties including SJIC, Round Valley, and LWC, as well as several other entities and individuals.

agreements among the Zuni Tribe, the United States, and certain other claimants in the LCR adjudication. [*Id.* at ¶ 1.2].

On June 23, 2003, Congress enacted the Zuni Indian Tribe Water Rights Settlement Act of 2003[4] ("Settlement Act"), which approved, ratified and confirmed the Settlement Agreement to the extent that it did not conflict with the provisions of the Settlement Act. On July 8, 2004, the Zuni Settlement Agreement was amended to conform to the Zuni Settlement Act ("Amendment No. 1"). A copy of Amendment No. 1 is included in **Appendix B**, and a copy of the Settlement Act is included in **Appendix C**.

Upon application and stipulation of the Parties dated March 1, 2006, the LCR adjudication court ("LCR Decree Court") entered an "Order for Special Proceedings to Approve an Indian Water Rights Settlement and Stipulation" on March 2, 2006. See **Appendix D**. The Parties requested that the LCR Decree Court approve the Settlement Agreement and the stipulation, and enter a Judgment and Decree that adjudicates the water rights of the Tribe and the United States in the Eastern LCR Basin.[5] Copies of the Parties' application, stipulation and proposed Judgment and Decree are included in **Appendices E-1, E-2 and E-3**, respectively.

The special proceedings will be conducted pursuant to an administrative order issued by the Arizona Supreme Court on September 27, 2000, which authorizes special procedures for the approval of settlements of Indian water rights and water rights for other federal reservations or lands. The LCR Decree Court directed the Parties to provide notice to claimants in the LCR adjudication concerning: (1) the proposed settlement, (2) related court proceedings, (3) the date of a public meeting to discuss the proposed settlement,[6] and (4) the June 29, 2006 deadline for filing objections. [**Appendix D** at 6].

Consistent with the Supreme Court's administrative order, the LCR Decree Court requested that the Arizona Department of Water Resources ("ADWR") prepare a technical

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[4] Public Law 108-34, 117 Stat. 788 (2003).

[5] The Eastern LCR Basin is depicted on Exhibit 2.10 to the Settlement Agreement and on **Figure 1**, and includes the geographic area subject to the Norviel Decree.

[6] This meeting is scheduled for June 1, 2006 at 7:00 p.m. at the Apache County Board of Supervisors' Room, St. Johns, Arizona.

report containing: (1) a review of the terms of the Settlement Agreement; (2) a summary of the statements of claimant filed by or on behalf of the Zuni Tribe in the LCR adjudication; (3) a brief description of the history, physical characteristics, and natural resources of the Zuni Heaven Reservation; (4) potential changes in the water resources in the LCR system and source due to the Zuni Settlement Agreement; and (5) impacts of the Settlement Agreement on categories of other claimants, groundwater rights, and ADWR's groundwater regulatory program. [**Appendix D** at 5, ¶ 4].

In compliance with the court's order, ADWR prepared this two-volume report. Volume I contains eight chapters, together with figures, tables and a list of references. Volume II contains appendices A to L that include copies of documents related to the matters discussed in Volume I.[7]

[7] In the preparation of this report, ADWR utilized information obtained from the Parties as noted.

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CHAPTER 2: BRIEF DESCRIPTION OF THE HISTORY, PHYSICAL CHARACTERISTICS, AND NATURAL RESOURCES OF THE ZUNI HEAVEN RESERVATION

2.1 EARLY HISTORY OF THE ZUNI TRIBE

The aboriginal lands of the Zuni Tribe reportedly covered an area as large as 15 million acres in what is now Arizona and New Mexico. The area was inhabited as early as 500 B.C. and used for hunting, gathering, and farming. Between 1250 A.D. and 1540 A.D., the Zuni Tribe constructed large pueblos that served as cultural and economic centers (U.S. Senate Report, 2003).

The first major contact with Europeans occurred in 1540 when Coronado's explorers encountered the Tribe during their search for the "Seven Cities of Gold" (Zuni, 2006). Spanish missionaries later noted the cultivation of corn by the Tribe in 1581, and irrigation and hunting practices in 1583. Spain officially recognized the "Zuni Province" in 1598 and, under Spanish Law, the Tribe retained ownership of its lands and was treated as autonomous and self-governing. The Tribe maintained its autonomy when Mexico achieved its independence from Spain in 1821, and later when the Treaty of Guadalupe Hidalgo was signed in 1848 making New Mexico and Zuni Province part of the United States (U.S. Senate Report, 2003).

2.2 ESTABLISHMENT OF ZUNI PUEBLO

The Zuni Reservation or Zuni Pueblo was established by Executive Order on March 16, 1877 and modified by a series of Executive Orders issued between 1883 and 1949 (ADWR, 1994b). Only about 3% of the Tribe's aboriginal lands were included in the Pueblo (U.S. Senate Report, 2003). In 1979, the Tribe filed a land claim suit in the United States Court of Claims for lands taken without payment, and a second claim in 1981 for damages to Zuni trust lands. The first claim was settled out of court and provided the Tribe with $25 million for lost aboriginal lands. The second claim was settled through the Zuni Land Conservation Act of 1990, which appropriated another $25 million to the Tribe (Zuni, 2006).

The Zuni Pueblo currently covers 418,304 acres in the northwestern part of New Mexico, and is located about 35 miles south of Gallup and 150 miles west of Albuquerque (Zuni, 2006). In 2000, the Zuni population was estimated to total about 10,000 (Census, 2006). Today, approximately 11,000 to 12,000 people are believed to live on the Pueblo (Bemis, 2005 and Zuni, 2006).

2.3 ZUNI HEAVEN

Excluded from the land claim suits in 1979 and 1981 were certain religious areas for which the Tribe felt it should regain legal title. One of those religious areas was Kolhu/wala:wa, also known as Zuni Heaven or "house of the gods" (ADWR, 1994b).

At least since 1540, members of two Zuni religious societies, the Kachina and Mudhead, have set out on pilgrimages to Zuni Heaven. They would leave on the summer solstice from what is now New Mexico and, over the next two days, travel 60 miles on foot down the Zuni River Valley to Zuni Heaven. After a night of ceremonies and dancing at the top of nearby mountains, both parties would descend and move around a small lake between the mountains. The sacred lake, located along the Little Colorado River (LCR) about 9 miles upstream of its confluence with the Zuni River, was considered a window into heaven where Zuni deities and ancestors resided. By 1984, it was estimated that the Tribe had made at least 110 such pilgrimages to Zuni Heaven, once every four years since 1540. If rain did not occur in the year following a pilgrimage, a special pilgrimage to Zuni Heaven reportedly would take place (Senate Report, 1984).

2.4 ZUNI HEAVEN RESERVATION AND LANDS

The Tribe petitioned the United States to recover title to Zuni Heaven and, on August 28, 1984, Congress established the Zuni Heaven Reservation. Public Law 98-498, 98 Stat. 1533 (1984). The law conveyed to the Tribe fifteen square miles of land located in Townships 14 and 15 North (T14 and 15N), Range 26 East (R26E) for religious and sustenance activities, and facilitated the Tribe's pilgrimage from New Mexico to Arizona by authorizing the United States

to obtain easements along the pilgrimage route (ADWR, 1994b). The reservation was expanded in 1990 adding Sections 13 and 23 in T14N. Public Law 101-486, 104 Stat. 1174 (1990).

Since the reservation in Arizona was established, the Tribe has acquired four ranches around and near Zuni Heaven. The Meadows, North, Seven Springs, and Wilhelm Ranches are shown in **Figure 1,** and consist of fee simple, Bureau of Land Management (BLM) and State Trust lands that historically were used for livestock grazing and irrigated for agriculture (ADWR, 1994a). As part of the Settlement Act, certain lands along the LCR upstream of the reservation and just south of the reservation are proposed to be taken into trust for the Tribe to aid in the restoration of Zuni Heaven (see **Figure 2**). Past and recent water uses on Zuni lands in Arizona are described later in this report.

2.5 RESTORATION OF ZUNI HEAVEN

Prior to Anglo development, the Zuni Heaven Reservation reportedly supported a lush riparian habitat along the LCR bottomlands that included the sacred lake, wetlands, several springs, and plant and animal species essential to the Tribe's religious practices. The sacred lake and wetlands were apparently sustained by over-bank flows from the LCR and discharge from surrounding springs. The wetlands probably contracted in size during periods of prolonged drought and then expanded with the return of normal or above normal precipitation (Briggs and others, 2001 and Stetson, 2002a).

Since predevelopment times, ecological conditions at Zuni Heaven have reportedly changed substantially. Construction of upstream dams on the LCR, and perhaps climate change, have altered the magnitude and timing of flood flows and caused the channel of the LCR within the reservation to become incised. This, in turn, has drained the shallow aquifer along the river that supported the wetlands and limited replenishment of the sacred lake by over-bank flows. In addition, regional well pumpage over the past 50 years probably contributed to the drying of springs that fed the lake. By the late 1990s, the wetlands and associated riparian vegetation that once inhabited the area were gone and replaced largely with sagebrush, saltbush and salt cedar, and the sacred lake and most of the springs within the reservation were dry (Briggs and others, 2001 and Stetson, 2002a).

Under the Zuni Wetland Rehabilitation Project ("Wetland Project"), which serves as a general planning document for restoration of Zuni Heaven, the surface water sources would include upstream Norviel Decree rights purchased and transferred to the reservation, water salvaged from upstream ranch lands recently acquired by the Tribe, and unappropriated flows in the LCR that reach the reservation. Once reestablished, the sacred lake and a primary wetlands area would be maintained with well water when surface water supplies were not available or adequate. A secondary wetlands area would be served by available surface water and subject to water shortages. The long-term goal of the project is to restore at least 700 acres of wetlands and riparian habitat with an estimated average water demand of 5,500 acre-feet per year (Stetson, 2002a). Further discussion of the hydrologic conditions in the vicinity of the reservation and the water demands of the Wetland Project are provided below in this report.

Restoration of wetlands at Zuni Heaven has already begun through contributions from the Arizona Water Protection Fund (Grant No. 99-079WPF). The goal of this initial phase of restoration is to pipe water from an existing well to three wetland areas that cover a total of 80 acres. The wetlands will be revegetated with riparian and wetlands plants historically native to the area. Since 1999, the following tasks related to the WPF grant have been completed at Zuni Heaven:

- Obtained required permits (Section 401 and Section 404), archeological clearance, and land improvement agreements;
- Consulted with the U.S. Fish and Wildlife Service;
- Rehabilitated and tested the existing well (55-600440), installed a new pump in the well, and constructed a pipeline from the well to the wetlands areas;
- Designed and installed culverts at maintenance road crossings; and,
- Developed and implemented a revegetation and monitoring plan.

CHAPTER 3: SUMMARY OF THE SETTLEMENT AGREEMENT

The Settlement Agreement is intended to settle the Zuni Tribe's water claims in the LCR adjudication. This will allow the Zuni Tribe to reestablish and maintain the wetland environment that previously existed within the Zuni Heaven Reservation. [**Appendix A** at ¶ 1.7]. This chapter summarizes the following provisions of the Settlement Agreement: (1) proposed water rights for the Zuni Tribe and authorized uses; (2) proposed water rights for certain other claimants in the LCR adjudication, and limitations on the Zuni Tribe's objections to certain surface water rights; (3) restrictions related to the Norviel Decree Area; (4) supplemental agreements entered into among the Zuni Tribe, the United States and some of the Parties as part of the Settlement Agreement; (5) federal and state contributions of monies and water rights for the settlement; (6) requirements for lands taken into trust by the United States for the benefit of the Zuni Tribe; (7) water quality monitoring, data collection and reporting; (8) waivers, retentions and limitations among the Parties; and (9) conditions that must be satisfied in order for the Settlement Agreement to become enforceable.

3.1 PROPOSED WATER RIGHTS FOR THE ZUNI TRIBE

This section outlines proposed water rights for the Zuni Tribe under the Settlement Agreement. The proposed water rights include: (1) 5,500 acre-feet per annum ("AFA") of unappropriated flows from the LCR; (2) 3,600 AFA of Norviel Decree surface water rights, including water rights from LWC and AGAF; (3) 1,500 AFA of underground water from the Zuni Pumping Lands (see **Figure 3**), and (4) abstracted and proposes surface water rights for existing non-*de minimis* surface water uses on Zuni Lands. The Zuni Tribe's proposed water rights and authorized uses are summarized and described below.

SUMMARY OF ZUNI TRIBE'S PROPOSED WATER RIGHTS

Source	Quantity	Priority Date	Place of Use	Type of Use
LCR unappropriated flows (decreed)	5,500 AFA	08/28/1984	Zuni Heaven Reservation.	As deemed appropriate.
Norviel Decree	Up to 3,600 AFA[a] • 12% LWC Delivered Water[b] • Up to 1,000 AFA (AGAF) • Other severances & transfers	Norviel Decree dates.	Zuni Heaven Reservation.	As deemed appropriate (AGAF water must be used for the Wetland Project).
Underground Water	1,500 AFA from Zuni Pumping Lands.[c]	None.	Zuni Pumping Lands.	As deemed appropriate.
Existing Rights (subject to future adjudication)	Maximum historical beneficial use.	Various.	Zuni Heaven Reservation and Zuni Fee Lands.	Irrigation, and as deemed appropriate.

[a] As described further below, the Zuni Tribe is also entitled to purchase or sever and transfer additional water rights under state law.

[b] "LWC Delivered Water" is a term of art used in an agreement between the Zuni Tribe and LWC, which is described below in Section 3.4.4.

[c] As described further below, in addition to underground water from Zuni Pumping Lands, the Zuni Tribe is also entitled to withdraw and use underground water under applicable law from other Zuni Lands including the Zuni Heaven Reservation, Zuni Fee Lands, and Zuni Trust Lands as defined in the Settlement Agreement.

3.1.1 LCR Unappropriated Flows

Under the Settlement Agreement, the Zuni Tribe is entitled to 5,500 AFA of the unappropriated flows of the LCR that reach the Zuni Heaven Reservation. [**Appendix A** at ¶ 4.6.B]. This water right has been abstracted and agreed upon by the Parties, and will become a decreed right upon approval of the Settlement Agreement and entry of the Judgment and Decree. [**Appendix E-3** at ¶ 3] The abstract indicates that these rights have a priority date of August 28, 1984, which is the date that Congress established the reservation. The listed beneficial uses are

for wetlands, irrigation and cultural use on the Zuni Heaven Reservation.[8] [**Appendix F-1** (Exhibit 4.6.B)].

3.1.2 Norviel Decree and Other Surface Water Rights

The Settlement Agreement entitles the Zuni Tribe and the United States to acquire existing Norviel Decree surface water rights from various sources, including up to 1,000 AFA of Norviel Decree surface water rights from AGAF, which will be severed and transferred for use at the Wetland Project. [**Appendix A** at ¶¶ 4.6.C]. The AGAF water rights are described in Section 3.5.

The Zuni Tribe or the United States is also entitled to purchase surface water rights up to a total of 3,600 AFA, minus water rights obtained from AGAF, from willing sellers in the Norviel Decree Area, for severance and transfer to the Zuni Heaven Reservation. These water rights retain their Norviel Decree priority dates,[9] and the Parties waive objections to uses contemplated in connection with the Wetland Project on the grounds that those uses are not irrigation uses. [*Id.* at ¶ 4.6.D]. As part of these purchases of Norviel Decree water rights, the Zuni Tribe, the United States, and LWC entered into an agreement under which LWC grants the Zuni Tribe a water right and annual entitlement to 12% of "LWC Delivered Water." The water right retains its Norviel Decree priority date. The Parties agree that this has historically provided 972 AFA of water as measured at Lyman Lake. This agreement is discussed in Section 3.4.4.

In addition to the 3,600 AFA of Norviel Decree Rights, the Settlement Agreement allows the Zuni Tribe to purchase or sever and transfer other surface water rights. However, any purchases or severances and transfers of additional surface water rights must be in accordance with state law.[10] [**Appendix A** at ¶¶ 4.6.D(5), 4.6.E, 7.7.E].

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[8] The abstract also describes a possible off-reservation storage reservoir of up to 1,000 acre-feet. The Parties advised ADWR that this reservoir is no longer part of the Wetland Project.

[9] A.R.S. § 45-176 provides authority under state law for the Zuni Tribe or the United States to sever and transfer 3,600 AFA without losing the priority date of those established water rights.

[10] Under A.R.S. § 45-172, the priority dates for water rights that are severed and transferred for recreation, fish and wildlife purposes are only retained if the transferee is the state or its political subdivision.

3.1.3 Underground Water Uses

Article 5 of the Settlement Agreement sets forth the terms and conditions that relate to the Zuni Tribe's use of underground water.[11] See **Appendix A.** Under Paragraph 5.3, the Parties recognize that the Zuni Tribe is entitled to withdraw 1,500 AFA of underground water from wells on the Zuni Pumping Lands for use thereon. See **Figure 3.**[12] Under Paragraph 5.4, the Parties recognize the Zuni Tribe's right to withdraw underground water on Zuni Lands[13] in accordance with applicable law. The Parties agree not to object to withdrawals made by the Zuni Tribe under Paragraphs 5.3 and 5.4. Under Paragraph 5.9 (amended), the Parties further agree that the Settlement Agreement does not create any vested right to groundwater under state or federal law, or any priority to the use of groundwater that would be superior to any other right or use of groundwater under state law, except as provided in Paragraph 5.3.[14] Also see Judgment and Decree at ¶ 7 **[Appendix E-2]**.

In addition to the withdrawal rights described above, the Settlement Agreement provides the Zuni Tribe with limited protection from withdrawals of underground water by certain new wells located within an area known as the Zuni Protection Area. See **Figure** 3. The circumstances under which the Zuni Tribe may object to wells located within the Zuni Protection Area are described in Section 3.2.3.

3.1.4 Abstracts of Proposed Water Rights for Existing Uses

Existing non-*de minimis*[15] surface water uses on Zuni Lands are set forth in abstracts contained in Exhibit 4.1.A(1) *et seq.* ("Zuni Abstracts"). See **Appendix F-2**. Related statements

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[11] "Underground Water" is defined as "any water beneath the surface of the earth regardless of its legal characterization as appropriable or non-appropriable under any applicable law." [*Id.* at ¶ 2.39].

[12] **Figure 3** includes information from Exhibits 2.48, 5.8.A, 5.8.B and 5.8.C to the Settlement Agreement.

[13] "Zuni Lands" include the Zuni Heaven Reservation, Zuni Fee Lands and Zuni Trust Lands as defined in the Settlement Agreement. [*Id.* at ¶ 2.47].

[14] In addition, under Paragraph 5.9 (amended), if a priority system for groundwater is established, the Parties retain the right to assert their respective priorities. However, to the extent that any portion of the underground water withdrawn by the Zuni Tribe in accordance with Paragraph 5.3 constitutes appropriable water under state law, no water rights attributes are proposed in the Settlement Agreement.

[15] As defined in Paragraph 2.8, "*de minimis* use" means "a surface water use for domestic purposes not to exceed one acre-foot per annum, for stockwatering uses or wildlife uses, or a pond having a capacity of not more than 15 acre-feet that is used primarily for watering livestock or wildlife."

of claimant are described in **Appendix K-3**. The Zuni Abstracts describe water uses in (1) the Hunt Valley, located to the west of the Zuni Heaven Reservation within Seven Springs Ranch, and (2) the Meadows Area located to the east and south of the Zuni Heaven Reservation, which includes North Ranch, Meadows Ranch, and Wilhelm Ranch.

Under the Settlement Agreement, the Zuni Tribe waives all non-*de minimis* surface water rights on Zuni Lands that are not abstracted as of the Enforcement Date.[16] [*Id.* at ¶¶ 11.2.1(A), 11.4 (amended)]. However, the Zuni Abstracts do not become decreed water rights upon approval of the Settlement Agreement by the LCR Decree Court, but rather will be adjudicated along with other water rights claims in the normal course of the LCR adjudication, including the Zuni Tribe's *de minimis* uses. [**Appendix A** at ¶ 4.1.A] At a future date determined by the LCR Decree Court, ADWR will utilize the Zuni Abstracts to prepare a preliminary and final report setting forth proposed water rights attributes for surface water uses within the Eastern LCR Basin, which will be subject to public notice and objections. [*Id.* at ¶ 4.1.D, E]. The Settlement Agreement limits the objections that may be brought by the Parties as part of the adjudication process vis-à-vis the water rights attributes set forth in the Zuni Abstracts. [*Id.* at ¶ 4.2.A]. In addition, the Tribe and the United States will not enforce the priority of any non-Norviel Decree rights that they hold against Norviel Decree rights. [*Id.* at ¶ 10.3].

3.1.5 Authorized Water Uses

The Zuni Tribe may use water rights made available under the Settlement Agreement on the Zuni Heaven Reservation and Zuni Fee Lands as set forth in Article 8. See **Appendix A.** Paragraph 8.1 authorizes the Zuni Tribe to utilize water appurtenant to the Zuni Fee Lands outside the Zuni Heaven Reservation in accordance with state law. Paragraph 8.2 states that water rights recognized under the Settlement Agreement for use on the Zuni Heaven Reservation are to be held in trust by the United States in perpetuity, are not subject to forfeiture or abandonment or state law,[17] and may be utilized by the Zuni Tribe for any purpose it deems

[16] The "Enforcement Date" is the date on which all of the conditions precedent have been satisfied, which must be on or before December 31, 2006. [**Appendix A** at ¶¶ 2.6 (amended), 2.3].

[17] Nonetheless, the LCR Decree Court or the Norviel Decree Court may assess administrative fees for delivery of water available to the Zuni Tribe under the Settlement Agreement.

advisable on the Zuni Heaven Reservation.[18] Neither the Zuni Tribe nor the United States may sell, lease, transfer or transport these water rights off the Zuni Heaven Reservation; however, they may sever and transfer such rights to other Zuni Lands in accordance with state law, in which case the severed and transferred water rights will be subject to state law.

3.2 PROPOSED WATER RIGHTS FOR OTHER CLAIMANTS AND LIMITATIONS ON THE ZUNI TRIBE'S OBJECTIONS TO THOSE RIGHTS

The Settlement Agreement describes proposed water rights for certain claimants in the LCR adjudication, which will be determined in the future in the normal course of the adjudication. Also set forth are limitations on objections by the Zuni Tribe and the United States to certain surface water rights. The proposed water rights and limitations on objections are described below.

3.2.1 Abstracts Of Proposed Water Rights For Existing Uses

Certain existing surface water rights for SJIC and LWC are set forth in water rights abstracts contained in Exhibit 4.1.C(1) *et seq.* See **Appendix F-3**. Abstracts for the surface water rights of AGAF will also be included in the Settlement Agreement at a later date.[19] The SJIC, LWC and AGAF abstracts will be utilized in the same manner as the Zuni Abstracts for purposes of the LCR adjudication. [**Appendix A** at ¶¶ 4.1.B, C]. As with the Zuni Abstracts, the Parties are limited as to what objections may be brought during the adjudication process vis-à-vis these abstracts. [*Id.* at ¶¶ 4.2.B, C].

3.2.2 Limitations On The Zuni Tribe's Objections To Surface Water Rights

The Zuni Tribe and the United States may not object to *de minimis* water rights or existing decreed surface water rights within the LCR Basin as part of the adjudication process.

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[18] However, the 1,000 AFA of water severed and transferred by AGAF under Paragraph 7.7 must be used for the Wetland Project.

[19] According to the Parties, the AGAF abstracts are still being negotiated. Once the AGAF abstracts are completed, the Settlement Agreement will be amended. [**Appendix A** at ¶¶ 3.1.F, 4.1.B, 4.2.B].

[*Id.* at ¶ 4.2.D]. Moreover, the Zuni Tribe and the United States may not object to any surface water right by asserting a federal right to either surface water or underground water. [*Id.* at ¶ 4.2.D(2)]. However, the Zuni Tribe and the United States may object to water uses in the LCR Basin if: (1) the objection is a permitted objection to an abstract under Paragraphs 4.2.B and C, or (2) the objection is based on state law to protect surface water rights on existing or future Zuni Lands. [*Id.* at ¶ 4.2.D(1), (2)].

3.2.3 Limitations On The Zuni Tribe's Objections To Underground Water Use

The Zuni Tribe and the United States may not object to any exempt well in the LCR Basin or existing well in the Eastern LCR Basin.[20] [*Id.* at ¶¶ 5.1, 5.5]. In addition, objections by the Zuni Tribe and the United States to new non-exempt wells are limited, depending on whether or not the wells are located within the Zuni Protection Area.[21]

The Zuni Tribe and the United States may not object to the withdrawal of underground water from any new non-exempt well outside the Zuni Protection Area unless it interferes with an established Zuni Tribe surface water right, other than the 5,500 AFA of unappropriated LCR flows acquired under the Settlement Agreement. The objection must also relate to a stream or other surface water condition established before the new well was drilled. [*Id.* at ¶¶ 5.6.A-C].

The Zuni Tribe and the United States retain certain federal and state claims against new non-exempt wells inside the Zuni Protection Area once the static water level in the local aquifer declines more than 50 feet.[22] [*Id.* at ¶ 5.7.D]. However, these claims are waived against landowners within the Zuni Protection Area who limit the capacity of new wells and groundwater withdrawals to a total of 500 gallons per minute ("gpm") per section of land, or a prorated amount for less than a section, pursuant to a Pumping Protection Agreement.[23] Also, these claims are waived entirely if the Zuni Tribe or the United States withdraws more than

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[20] Exempt and existing wells are defined in Paragraphs 2.14 and 2.15. Pursuant to Paragraph 5.2, ADWR is to compile a catalog of all existing wells in the Eastern LCR Basin, which is to be completed within three years of the Enforcement Date, for inclusion in the Eastern LCR Decree.

[21] Additional limitations are described in supplemental agreements with SRP, TEP and ASLD, as described in Section 3.4.

[22] The static water level decline is defined in Paragraph 5.7.D(1). Also see Paragraphs 5.7.D(2)-(4) regarding the methods by which the static water level decline will be determined.

[23] To date, the Zuni Tribe and the United States have only entered into a Pumping Protection Agreement with ASLD. See Exhibit 5.8.C.

1,500 AFA from the Zuni Pumping Lands. [*Id.* at ¶¶ 5.7.B, C]. The Zuni Tribe or the United States is required to report the Tribe's annual pumping to the LCR Decree Court by April 15 of each year. [*Id.* at ¶ 5.7.C].

3.3 NORVIEL DECREE AREA RESTRICTIONS

The Settlement Agreement describes various restrictions on water uses and storage within, and adjacent to, the geographic area subject to the Norviel Decree ("Norviel Decree Area"). The Parties agreed that these limitations are to be incorporated into the Judgment and Decree.

The Parties agreed to three types of restrictions. First, the Judgment and Decree entered by the LCR Decree Court shall contain a finding that no additional appropriable surface water exists in the Norviel Decree Area. As a result, the Eastern LCR Decree shall prohibit new appropriations in the Norviel Decree Area after the Effective Date of the Settlement Agreement, unless the appropriations are located in closed basins. [*Id.* at ¶ 4.3.A; **Appendix E-3** at ¶ 10]. Second, except as stated in Paragraph 4.4.A-D, the Judgment and Decree shall prohibit the construction of new reservoirs or dams on the LCR between Lyman Dam and the western boundary of the Zuni Heaven absent the written consent of the Zuni Tribe. [*Id.* at ¶ 4.4; *Id.* at ¶ 11]. Third, the Judgment and Decree shall provide that repair or reconstruction of Zion Dam may only occur with the written consent of the Zuni Tribe. [*Id.* at ¶ 4.5; *Id.* at ¶ 12].

3.4 SUPPLEMENTAL AGREEMENTS

As part of the Settlement Agreement, the Zuni Tribe and the United States[24] entered into the following supplemental agreements: (1) the SRP & Zuni Tribe Underground Water Agreement ("SRP Agreement") [**Appendix G-1**]; (2) the Zuni/TEP Agreement ("TEP Agreement") [**Appendix G-2**]; (3) the Zuni Indian Tribe and Arizona State Land Department Pumping Protection Agreement ("ASLD Pumping Protection Agreement") [**Appendix G-3**]; and

[24] For purposes of this section, Zuni Tribe and United States are referred to as the Zuni Tribe.

(4) the Water Right, Entitlement and Perpetual Delivery Agreement ("Entitlement and Delivery Agreement") [**Appendix G-4**]. These agreements are described below.[25]

In addition to these agreements, the Zuni Tribe also entered into the Lyman Dam Operation and Storage Agreement ("Operating Agreement") that governs LWC's operation of Lyman Lake in conjunction with the Entitlement and Delivery Agreement.[26] [**Appendix G-5**]. The Zuni Tribe is also negotiating a Water Rights Severance and Transfer Agreement, which will govern the process for severing and transferring water rights acquired by the Zuni Tribe, as well as an agreement with State Parks concerning the maintenance of a minimum pool at Lyman Lake for recreation purposes. [**Appendix A** at ¶ 9.5; **Appendix G-4** at 2]. As required by Paragraph 9.6, the Zuni Tribe also entered into negotiations with SJIC concerning deliveries of water to the Zuni Tribe, but the parties determined that an operating agreement with SJIC was not necessary.

3.4.1 SRP Agreement

On June 7, 2002, the Zuni Tribe and SRP entered into the SRP Agreement. [**Appendix G-1**]. This agreement recognizes and places certain limitations on the Zuni Tribe's withdrawal of underground water from wells located on the Zuni Pumping Lands, and SRP's withdrawal of underground water from wells located in the LCR Basin that supply water for use at the site of the Coronado Generating Station. SRP agrees not to object to the Zuni Tribe's underground water withdrawal and use up to an annual average of 1,500 AFA from the Zuni Pumping Lands as determined on a continuous 3-year rolling average. [*Id.* at ¶ 3.1]. The Zuni Tribe agrees to limit its objections to SRP's underground water uses depending upon the amount withdrawn by SRP. [*Id.* at ¶¶ 4 to 6]. However, under Paragraph 3.2, if the Zuni Tribe withdraws more than 1,500 AFA from the Zuni Pumping Lands, then the Zuni Tribe waives certain objections to SRP's underground water uses.

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[25] To the extent that they are inconsistent with the Settlement Agreement, the SRP Agreement, TEP Agreement and ASLD Agreement each control and are binding on the parties to those agreements. [**Appendix A** at ¶ 5.8]. These agreements are Exhibits 5.8.A, B and C to the Settlement Agreement.

[26] The Parties provided to ADWR a copy of the Operating Agreement, which appears to require the approval of the United States. The Parties informed ADWR that this approval is no longer necessary.

Subject to the pumping limitation outlined in Paragraph 3.2, the Zuni Tribe agrees not to object to SRP's underground water withdrawals and uses up to 15,000 AFA unless SRP's pumping causes a static water level decline in excess of 75 feet as measured at an observation well at an agreed upon location within the Zuni Pumping Lands.[27] [*Id.* at ¶¶ 4.1, 4.3]. The Zuni Tribe further agrees not to object to withdrawals and uses between 15,001 AFA and 21,000 AFA, unless the 75 foot static water level and certain total dissolved solids levels are exceeded.[28] [*Id.* at ¶¶ 5.1, 5.2]. The Zuni Tribe retains rights to object to any portion of SRP's underground water withdrawals and uses that exceed 21,000 AFA regardless of the amount of the Zuni Tribe's underground water uses on Zuni Pumping Lands.[29] [*Id.* at ¶¶ 3.2, 6.1].

Both the Zuni Tribe and SRP retain rights to initiate new withdrawals or expand existing withdrawals of underground water ("future pumping rights") that exceed 1,500 AFA and 21,000 AFA respectively, subject to restrictions on well placement. [*Id.* at ¶¶ 3.3, 3.4, and 6.2]. In the exercise of their future pumping rights, the Zuni Tribe may not locate any new or replacement wells within the Zuni Exclusion Area, and SRP may not locate any new or replacement wells within the SRP Exclusion Area. [*Id.* at ¶¶ 7.1 (amended), 7.2 and Exhibit A]. See **Figure 3**.

3.4.2 TEP Agreement

On June 7, 2002, the Zuni Tribe and TEP entered into the TEP Agreement, which sets forth the terms and conditions under which TEP may withdraw underground water and initiate new wells for use at the Springerville Generating Station (SGS). [**Appendix G-2**]. As described in Paragraph 2 of the TEP Agreement, TEP is prohibited from drilling new production wells within a certain geographic area that covers most of Apache County. See **Figure 3**.

Subject to the geographic restrictions in Paragraph 2, the Zuni Tribe agrees not to object to TEP's underground water withdrawals and uses up to 11,000 AFA from existing, replacement,

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[27] The Parties provided a copy of a map showing the location of the well in section 27 and a well construction diagram, copies of which are included in **Appendix H.** The location of section 27 is depicted on Exhibit 2.48. Also see **Figures 2 and 3**.

[28] However, the Zuni Tribe retains its right to object to these withdrawals based on state law regardless of the amount being pumped by the Zuni Tribe on Zuni Pumping Lands. [SRP Agreement at ¶ 3.2].

[29] If SRP's underground water withdrawals and uses do not exceed 21,000 AFA, then the Zuni Tribe's remedies in the event of breach will be limited to compensatory damages, which may be mitigated by SRP. [*Id.* at ¶¶ 4.3, 5.2]. If SRP's withdrawals exceed 21,000 AFA, then the Tribe may bring an action under state or federal law without a limitation on remedies. [*Id.* at ¶ 6.1].

or new wells that supply water to SGS. [*Id.* at ¶ 3]. For withdrawals between 11,000 AFA and 20,000 AFA, the Zuni Tribe agrees not to object unless the withdrawals cause a base flow decline in the LCR.[30] [*Id.* at ¶ 4.1]. Nothing in the TEP Agreement precludes TEP from initiating new underground water withdrawals in amounts greater than 20,000 AFA at SGS, but these withdrawals will be subject to the Zuni Tribe's objections under federal, state and tribal law.[31] [*Id.* at ¶¶ 5.1, 5.2].

3.4.3 ASLD Pumping Protection Agreement

On June 7, 2002, the Zuni Tribe and ASLD entered into the ASLD Pumping Protection Agreement ("ASLD Agreement"), which sets forth the terms and conditions under which ASLD may pump underground water on certain state trust lands within the Zuni Protection Area ("ASLD Restricted Lands"). [**Appendix G-3**, Attachment 1]. Also see **Figure 3**. On ASLD Restricted Lands, ASLD may not construct or operate new wells that pump more than 500 gallons per minute per section of land, or a prorated amount for less than a section. [*Id.* at ¶ 2.2]. ASLD or its lessees may construct exempt wells and replacement wells that do not exceed the capacity of the well being replaced, but those wells will also be subject to the pumping limitation.[32] [*Id.*]. As long as the ASLD Agreement remains in effect, the Zuni Tribe may not assert any claims related to the pumping of underground water on ASLD Restricted Lands in conformity with the ASLD Agreement. [*Id.* at 2.4].

3.4.4 Entitlement and Delivery Agreement

On February 27, 2006, the Zuni Tribe entered into the Entitlement and Delivery Agreement with LWC, which owns the Lyman Lake and irrigation system for the use and benefit of its stockholders owning land in the area between Zion Reservoir and Lyman Lake in the

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[30] "Base Flow Decline" is defined at Paragraph 1.3 of the TEP Agreement.

[31] If TEP's underground water withdrawals are between 11,000 and 20,000 AFA, then the Zuni Tribe's remedies in the event of breach will be limited to replacement water or compensatory damages, which TEP may mitigate. [**Appendix G-2** at ¶ 4.2].

[32] In an action for breach, the Zuni Tribe is entitled to any remedy available under federal or state law. [**Appendix G-3** at ¶ 2.6 (amended)].

Norviel Decree Area.[33] **[Appendix G-4]**. Under the Entitlement and Delivery Agreement, the Zuni Tribe will be entitled to annual deliveries of 12% of "LWC Delivered Water," which the Parties agree has historically provided 972 AFA. [*Id.* at ¶ 1]. The Zuni Tribe agrees to pay LWC $1,549,676 as compensation for its annual entitlement, and $750,324 as consideration for the Zuni Tribe's storage and delivery rights in Lyman Lake under the Operating Agreement and the Water Rights Severance and Transfer Agreement.[34] [*Id.* at ¶ 2].

LWC will establish and maintain a water account, which will be credited with the Zuni Tribe's annual entitlement, and debited by the amount delivered to the Zuni Tribe.[35] [*Id.* at ¶¶ 6.A, B]. The Zuni Tribe may order all or a portion of its annual entitlement, depending upon the amount of net storage in Lyman Lake, the time of year, and weather conditions. [*Id.* at ¶¶ 5, 7.F]. Under certain conditions, the Zuni Tribe may forbear its water entitlement for either compensation or credits. [*Id.* at ¶ 7.J].

3.5 FEDERAL AND STATE CONTRIBUTIONS

The United States, the State of Arizona, SRP, and AGAF each agreed to make certain contributions pursuant to the Settlement Agreement. The United States, the State of Arizona and SRP are contributing funds, and AGAF is contributing funds as well as water rights, to provide a water supply to the sacred lake and the re-establishment of riparian vegetation on the Zuni Heaven Reservation. These contributions are summarized and described below.

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[33] In accordance with Paragraph 4.C of the Entitlement and Delivery Agreement, the parties filed a joint motion with the Norviel Decree Court requesting the court's approval of the Entitlement and Delivery Agreement, which approval will be deemed an approval of the severance and transfer of the LWC water rights. This matter is set for hearing on August 18, 2006. A copy of the motion is included in **Appendix I**.

[34] The Parties informed ADWR that the Zuni Tribe deposited the required down payment into escrow.

[35] LWC also will establish and maintain a separate water account under Paragraph 8.1 of the Operating Agreement for water acquired by the Zuni Tribe from entities other than LWC ("Tribal Acquired Water"). The Operating Agreement governs how Tribal Acquired Water will be delivered.

SUMMARY OF FEDERAL AND STATE PARTY CONTRIBUTIONS

	United States	State of Arizona	SRP	AGAF
Funds	$19,250,000 ($3,500,000 available prior to Enforcement Date)	$1,613,000 ($613,000 Water Protection Fund)	$1,000,000 (water supplies & riparian vegetation)	$5-6 million (Stream Rehabilitation Program)
Water Rights	NA	NA	NA	Up to 1,000 AFA (Excess Rights)

According to the Parties, the United States and the State of Arizona each deposited monies into the Zuni Indian Tribe Water Rights Development Fund ("Development Fund"), established under Section 6 of the Settlement Act, as required by Paragraph 7.1 (amended) of the Settlement Agreement. The United States deposited $19,250,000 of which $3.5 million may be distributed to the Zuni Tribe to purchase water rights or options prior to the Enforcement Date of the Settlement Agreement. [**Appendix A** at ¶¶ 7.3, 7.5]. The State of Arizona deposited a portion of the required $1,613,000, of which $613,000 must be used in conformity with the purposes of the State Water Protection Fund (A.R.S. § 45-2101). [*Id.* at ¶ 7.6]. The remaining amounts will be deposited before December 31, 2006.

In addition to the amounts deposited into the Development Fund, SRP will contribute a total of $1 million, in two $500,000 installments to the Zuni Tribe to provide water supplies to the sacred lake and re-establish riparian vegetation on the Zuni Heaven Reservation. However, the SRP contribution may not be used for land acquisition. [*Id.* at ¶ 7.8].

As a contribution to the settlement, it is AGAF's goal to sever and transfer up to 1,000 AFA of surface water rights for use by the Zuni Tribe at the Wetland Project through acquisitions made with Heritage Program funds (A.R.S. § 17-297). [*Id.* at ¶ 7.7]. AGAF plans to spend $5 million to acquire agricultural land with irrigation water rights under the Norviel Decree, and then dedicate those rights to wildlife uses as part of the state's ongoing Stream Rehabilitation Program ("Stream Program"), which is located above the Zuni Heaven Reservation. [*Id.*]. If AGAF determines that any of these water rights are not required for

wildlife purposes ("Excess Rights"), they will be severed and transferred to the Zuni Tribe.[36] [*Id.* at ¶ 7.A]. If the Zuni Tribe does not use the Excess for wetland irrigation at the Wetland Project, the Excess Rights will revert back to AGAF. [*Id.*].

AGAF has 15 years from the Effective Date of the Settlement Agreement in which to sever and transfer Excess Rights to the Zuni Tribe. [*Id.* at ¶ 7.7.B]. AGAF's obligations under the Settlement Agreement will be deemed satisfied if AGAF severs and transfers 1,000 AFA to the Zuni Tribe, or AGAF expends $6 million under the Stream Program.[37] [*Id.* at ¶ 7.7.C]. Prior to acquiring Excess Rights, AGAF must consult with the Zuni Tribe, reach an agreement regarding the value of the water rights, and determine whether the Excess Rights are physically capable of reaching Lyman Lake. [*Id.* at ¶ 7.7.D, G].

3.6 LANDS TO BE TAKEN INTO TRUST

Paragraph 6.1 of the Settlement Agreement describes certain lands in Arizona that will be taken into trust by the United States for the benefit of the Zuni Tribe ("Trust Lands"). See **Appendix A**. The lands that potentially will be taken into trust are shown on Exhibit 6.1.A to the Settlement Agreement and depicted on **Figure** 2. The Parties agree not to object to actions necessary to authorize the Secretary of the Interior to take legal title to the Trust Lands. [**Appendix A** at ¶ 6.1.C].

Upon acquisition by the Zuni Tribe, certain state trust lands[38] located in Section 34, Township 14 North (T14N), Range 26 East (R26E), adjacent to the Zuni Heaven Reservation,

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[36] Paragraph 7.7.E of the Settlement Agreement contemplates that a conditional severance and transfer process for certain Excess Rights will be initiated as soon as possible to establish an efficient transfer procedure, and that after the Enforcement Date, AGAF will sever and transfer Excess Rights pursuant to state law under Paragraph 4.6.D(5). The Parties advised ADWR that it is unlikely that AGAF will sever and transfer any Excess Rights prior to the Enforcement Date.

[37] However, AGAF must continue to sever and transfer Excess Rights in connection with any future acquisitions under the Stream Program until a total of 1,000 AFA have been severed and transferred. [**Appendix A** at ¶ 7.7.C(1)(b)].

[38] Also see Paragraph 7.9 of the Settlement Agreement regarding water rights on state trust lands located in Section 32, T14N, R28E, which also may be brought into trust for the Zuni Tribe. See **Figure 2**. In Statement of Claimant No. 39-86042, ASLD claims 1,900 AFA for irrigation uses on these lands based on federal reserved water rights. The Parties informed ADWR that these water rights will be determined in the normal course of the adjudication, that ASLD has no immediate plans to assign its claim to the Zuni Tribe, and that the Zuni Tribe does not own this land.

will be made part of the reservation. [*Id.*]. ADWR understands from the Parties that the Zuni Tribe filed an application under state law with ASLD to initiate a process by which title to the state trust lands in Section 34 may be conveyed to the Zuni Tribe. Under A.R.S. §§ 37-231 to 260, these lands are subject to appraisal and public auction. Upon acquisition, Section 34 will also be made part of the Zuni Pumping Lands. See **Figures 2 and 3**.

The United States may not take legal title to the Trust Lands until an intergovernmental agreement ("IGA") between the Zuni Tribe, the State of Arizona, and Apache County is executed, and the Secretary of the Interior publishes written certification to the Governor of the State of Arizona in the Federal Register that the conditions set forth in the IGA have been satisfied. [*Id.* at ¶ 6.2.A, B]. The IGA must contain the provisions listed in Paragraph 6.2.A regarding the Zuni Tribe's water uses on Trust Lands, in lieu payments, rights-of-way, wildlife management, air and water quality regulation, religious practices outside of the Trust Lands, and waiver of sovereign immunity.

3.7 WATER QUALITY

The Settlement Agreement, the SRP Agreement, and the TEP Agreement each contain requirements relating to water quality monitoring, data collection and reporting. These provisions are found in Paragraphs 7.3-7.5 of the SRP Agreement, and Paragraphs 6.1-6.2 of the TEP Agreement. The requirements in the Settlement Agreement are described below and apply for 30 years following the Enforcement Date.

- Paragraphs 4.7 and 4.8 require AGAF to sample and test surface water at its Wenima Property and provide the results to the Zuni Tribe.
- For wells in the Eastern LCR Basin, Paragraph 5.10 requires the Parties to share water quality data that is submitted to certain state and federal agencies.
- Paragraph 5.11 requires SRP to monitor various wells within the Eastern LCR Basin and provide the Zuni Tribe with water quality testing data for those wells.

3.8 WAIVERS, RETENTIONS, AND LIMITATIONS ON OBJECTIONS

3.8.1 Parties

Article 11 of the Settlement Agreement contains a complex set of waivers and retentions of claims regarding water rights, injuries to water rights, and water quality, which are outlined in detail in **Appendices J-1 to J-3**. On July 8, 2004, the Zuni Tribe, the United States, and the State Parties executed waivers and releases of claims consistent with the provisions of the Settlement Agreement. These executed waivers are included as exhibits to Amendment No. 1 to the Settlement Agreement.

In addition to the waivers and retentions, the Settlement Agreement places certain limitations on the Parties' objections to water uses in the LCR Adjudication as well as other judicial and administrative forums. [**Appendix A** at ¶¶ 4.2, 4.6, 5.1, 5.3, 5.4, 5.5, 5.6 and 5.7]. These limitations are discussed in Sections 3.1.1, 3.1.3, 3.2.3, and 3.3.2.

3.8.2 Non-Parties

Under Paragraph 10.3 of the Settlement Agreement, the limitations on objections described in Article 5 and Paragraph 4.2.D, as well as the waivers and retentions described in Article 11, "are intended to protect and benefit all landowners and water users in the LCR basin, whether or not they are parties to the Settlement Agreement or to the LCR adjudication." Non-parties are intended third-party beneficiaries who may enforce these provisions of the Settlement Agreement.

Under the terms of the proposed Judgment and Decree, these non-parties will be bound by the proposed settlement, "except to the extent that the express terms of the Settlement Agreement provide that non-signing parties will not be bound by the Settlement Agreement." [**Appendix E-3** at ¶ 14]. There are several provisions in the Settlement Agreement that are only binding on the Parties, including the provisions of the Supplement Agreements that are only binding on the parties thereto.

The provisions of the Settlement Agreement that are not intended to bind non-Parties are set forth in Paragraphs 4.1, 4.2, 5.3 and 11.1 (amended). In Paragraphs 4.1 and 4.2, the Parties agree to the entry of a decree for certain abstracted water uses in the normal course of the

adjudication, and to limit objections to those proposed water rights. As provided by Paragraphs 4.1.D and E, non-Parties are not bound by these limitations but will have the opportunity to object in the future based upon ADWR's preparation of preliminary and final reports concerning the adjudication of these uses. See Section 3.1.4. Under Paragraph 5.3, the Parties recognize and agree not to object to the Zuni Tribe's withdrawal and use of 1,500 AFA of underground water on Zuni Pumping Lands. The Parties advised ADWR that this provision is not intended to bind non-Parties. As provided by Paragraph 11.1 (amended), the State Parties executed a waiver and retention against the Zuni Tribe and the United States, which is only binding among these parties. The waivers and retentions of the Zuni Tribe and the United States, on the other hand, benefit "the state, or any agency or political subdivision thereof, or any other person, entity, corporation, or municipal corporation, under Federal, State or other Law..." See **Appendices J-1 to J-3**.

3.9 ENFORCEABILITY CONDITIONS

In order for the Settlement Agreement to become enforceable, certain conditions precedent must be satisfied by December 31, 2006. Prior to the Enforcement Date, the Parties are not required to perform obligations, and are not entitled to benefits, under the Settlement Agreement except as may be necessary to satisfy the conditions precedent. Additionally, Paragraph 7.3 authorizes the Zuni Tribe to withdraw $3.5 million from the Development Fund for the purchase of water rights or options prior to the Enforcement Date. [**Appendix A** at ¶ 3.3]. If the conditions precedent are not satisfied, or waived as described below, then the Settlement Agreement will no longer have any force or effect, and any monies remaining in the Development Fund will be returned to the depositing entity. [*Id.* at ¶ 3.4]. The conditions precedent are set forth in Paragraphs 3.1.A-L of the Settlement Agreement, and their status is described below.[39]

[39] During March 2006, ADWR acquired information from the Parties regarding the status of these conditions.

3.9.1 Conditions That Have Been Satisfied

- On June 23, 2003, Congress adopted the Settlement Act, which approved the Settlement Agreement and established the Development Fund (¶ 3.1.A).
- The United States appropriated and deposited monies into the Development Fund (¶ 3.1.B).
- The Zuni Tribe entered into the Entitlement and Delivery Agreement and the Operating Agreement with LWC on February 27, 2006 (¶ 3.1.E).
- The Parties are preparing abstracts for AGAF water uses at certain locations, which will be incorporated into the Settlement Agreement by amendment when the abstracts are finalized (¶ 3.1.F).
- At an agreed upon location within the Zuni Pumping Lands, a well was constructed during the summer of 2006 to monitor static water levels under the reservation (¶ 3.1.G).
- The Settlement Agreement and all exhibits have been executed (¶ 3.1.J).

3.9.2 Conditions Requiring Further Action

- The State of Arizona has appropriated and deposited a portion of the required $1,613,000, and will appropriate and deposit the remainder before December 31, 2006 (¶ 3.1.B).
- The Zuni Tribe and the United States have purchased or acquired options for more than 50% of the required 2,350 AFA of Norviel Decree surface water rights. This condition is subject to waiver, but a waiver is not expected (¶¶ 3.1.C, 3.2).
- As authorized by Paragraph 3.2, the Zuni Tribe intends to waive the provisions of Paragraph 3.1.D, although a formal waiver has not yet been executed. Unless waived, this paragraph requires that conditional approval be obtained from the Norviel Decree court of the severance and transfer of Norviel Decree rights that have already been acquired.
- The Zuni Tribe is negotiating, but has not yet entered into, a Water Rights Severance and Transfer Agreement, in conjunction with AGAF (¶ 3.1.E). LWC is also in the

process of determining whether amendments to its operating procedures or by-laws are necessary in furtherance of agreements with the Zuni Tribe and the United States (¶ 3.1.E).

- The Zuni Tribe, the State of Arizona, and Apache County are negotiating an IGA that contains the provisions that are described in Paragraph 6.2 (¶ 3.1.H).
- The Zuni Tribe filed the necessary application with ASLD in order to obtain title to Section 34, T14N, R26E (¶ 3.1.I), but the ASLD process has not yet been completed.
- The LCR Decree Court must approve the Settlement Agreement (¶ 3.1.K). The Parties filed a form of final judgment and decree with the court.
- The Secretary of the United States Department of the Interior must publish in the Federal Register a statement of finding that the conditions stated above have been satisfied (¶ 3.1.L). This condition has not yet been satisfied.

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CHAPTER 4: SUMMARIES OF STATEMENTS OF CLAIMANT

There are several statements of claimant (SOCs) associated with the Zuni Tribe's proposed water rights under the Settlement Agreement, as well as SOCs filed for *de minimis* and other uses by the Tribe. Copies of these SOCs, together with summaries, are presented in **Appendices K-1 to K-3**.

Appendix K-1 includes SOC nos. 39-91736 and 39-91737, which were filed on April 7, 1972 by the United States on behalf of the "Pueblo of Zuni." These SOCs relate to the Tribe's proposed water rights to 5,500 AFA of unappropriated flows in the LCR on reservation land. These water rights are abstracted in Exhibit 4.6.B to the Settlement Agreement. The abstract indicates that the Settlement Agreement, and not these SOCs, forms the basis of this proposed water right. See **Appendix F-1,** note 8. The water right associated with this abstract will become a decreed water right upon entry of the proposed Judgment and Decree. [**Appendix E-3** at ¶ 3].

Appendix K-2 includes four SOCs: (1) 39-082094 filed on June 1, 1982 by Spencer Ellsworth; (2) 39-88868 filed on November 14, 1985 by Seven Springs Ranch, Inc.; (3) 39-89021 filed on December 4, 1985 by Limited Partnership of Meadows Ranch; and (4) 39-89022 also filed on December 4, 1985 by Limited Partnership of Meadows Ranch. These SOCs relate to the Tribe's proposed water rights based on existing uses on Zuni Lands, which are abstracted in Exhibit 4.1.A(1) *et seq*. See **Appendix F-2.** The water rights associated with these SOCs will be determined in the normal course of the adjudication.

Appendix K-3 includes SOC nos. 39-91738 to 39-91752, and 39-82089, which relate to the Tribe's *de minimis* and other uses. With the exception of SOC no. 39-82089, the United States filed these SOCs on behalf of the Tribe for uses that are defined as *de minimis* in the Settlement Agreement. [**Appendix A** at ¶ 2.8]. The claims for *de minimis* uses will be determined in the normal course of the adjudication. SOC no. 39-82089 was initially filed by an individual claimant, and then assigned to, and amended by, the Zuni Tribe for "irrigated

wetland/crop development." This SOC is not mentioned in the abstracts described in **Appendix F-1 or F-2**.[40]

In addition to the SOCs described above, on November 22, 1994, the United States filed a statement of amended claims on behalf of the Zuni Tribe, the Hopi Indian Tribe, the Navajo Nation, the San Juan Southern Paiute, and the White Mountain Apache Tribe ("Statement"). Attached was a report entitled "Report of Amended Water claims by the United States of America for the Indian Lands in the Little Colorado River Basin," prepared by a water resources consulting firm ("Report"). A copy of this filing is included in **Appendix K-4**.

The Statement was not filed on an official SOC form, and did not refer to particular SOCs. According to its terms, it was filed in response to a memorandum of the Special Master dated September 23, 1994, and "is not intended to be a definitive statement of all claims to be made by the United States on behalf of the tribes." [**Appendix K-4** at 2, 3]. At the time that the Statement was filed, the religious water uses of the Zuni Tribe on the Zuni Heaven Reservation were recognized, but the total water use had not yet been determined. [**Appendix K-4**, Report at 9].

[40] This SOC is also not listed in the Parties' Application for Special Proceedings. See **Appendix E-1** at ¶ 3.

CHAPTER 5: WATER RESOURCES

5.1 SURFACE WATER

Figure 4 shows the location of the major surface water features in the vicinity of the Zuni Heaven Reservation. Included are the LCR, four tributaries to the LCR (Big Hollow and Carrizo Washes, Concho Creek, and the Zuni River), four reservoirs (Lyman, Zion, Concho, and Little), and two springs (Salado and Concho). Each is described below.

5.1.1 LCR

The LCR flows through the southern portion of the Zuni Heaven Reservation and provides most of the surface water used for irrigation in the region. For the purposes of this report, ADWR focuses on streamflow conditions in the LCR from the point immediately below Lyman Lake to its confluence with the Zuni River downstream of the reservation. Seven USGS streamflow gages have been established on this reach of the LCR. **Figure 4** shows the location of the gaging stations, and **Table 1** summarizes streamflow data that have been collected.

The table lists the name and identification number of the gaging stations, their contributing drainage area and period of record, average seasonal flows, annual streamflow statistics, and years of annual flow record. The data provide a general indication of baseline streamflow conditions along this portion of the LCR. Note that the period of record is not the same for all stations, so direct comparison of data between stations is not always possible. Note also that because flow conditions can vary dramatically from year to year, "average" streamflows may not represent the flow in any given year.

Below Lyman Lake, the LCR is intermittent and regulated by flows from the lake. From 1941-1985, an average of about 2,700 AFA were measured in the LCR at Gage 09385500, located at the base of Lyman Dam and 39 river miles upstream of the Zuni Heaven Reservation. The gage records uncontrolled reservoir spills, non-canal releases and lake seepage. More recently, from 1986-2003, flows at this gage have averaged about 1,500 AFA. Records indicate

that most (over 60%) of the flows occur during April through June, corresponding with spring snowmelt and runoff.

About 27 river miles downstream of Lyman Lake and 11 river miles upstream of the Zuni Heaven Reservation, streamflows in the LCR have been measured at Gage 09386030. Due to the larger contributing drainage area, irrigation return flows from the St. Johns area, and inflows from tributaries and Salado Springs, streamflows are typically higher at this point on the river, and from 1975-2004 averaged about 5,100 AFA. Streamflows occur more uniformly here over the year, but on average, the greatest flows (about 30%) are still measured during the spring.

Gage 09386300 is located 6 river miles downstream of Gage 09386030 and immediately below Zion or Udall Reservoir. The reservoir is currently filled with sediment and Udall Dam has been breached. The period of record for Gage 09386300 is relatively short (1998 to present) and flows here have averaged about 2,700 AFA, about half of what was measured in the LCR upstream. The lower flows at this gage probably reflect drought conditions that have recently affected the area and evaporative losses within Zion Reservoir.

The LCR passes through the Zuni Heaven Reservation, but there are no streamflow gages within or immediately upstream or downstream of it. Construction of Zion Reservoir and Lyman Lake upstream has resulted in a decrease in the magnitude and timing of flood flows that reach the reservation from the LCR. In addition, due to the capture of sediment, the channel of the LCR below Zion Reservoir and within the reservation has become incised. Stetson (1999) estimated that if Zion Reservoir had not been built, flows in the LCR at the upstream reservation border would probably have averaged about 8,200 AFA, with the majority of these flows (over 75%) occurring during the months of January through June. With Zion Reservoir, flows in the LCR at the upstream reservation border are estimated to average about 2,000 AFA less or 6,200 AFA. These estimates were based on streamflow data collected at upstream Gage 09386030 from 1976-1997, assumed tributary inflows to the LCR from Big Hollow and Carrizo Washes, and other assumptions related to channel transmission losses along the LCR.

About 4 miles below the Zuni Heaven Reservation, flows in the LCR were measured at Gage 09386500 from 1940-1972. Flows during this period averaged about 3,800 AFA and are lower than Stetson (1999) estimated at the Zuni Heaven Reservation boundary, probably due largely to the effects of Zion Reservoir. Most (60%) of the flow measured at this station

occurred during the months of July through August, corresponding with the summer rainy season.

About 2 miles downstream of Gage 09386500 and immediately below the confluence of the Zuni River, flow in the LCR was measured at Gage 09388000 from 1929-1972. Flow at this station averaged about 10,000 AFA reflecting the significant contribution of streamflow to the LCR from the Zuni River. Like upstream Gage 09386500, most streamflows occurred here in response to summer storms.

5.1.2 LCR Tributaries

There are four major tributaries to the LCR in the vicinity of the Zuni Heaven Reservation. Big Hollow and Carrizo Washes are tributaries upstream of the reservation, Concho Creek crosses through the reservation from south to north, and the Zuni River is tributary downstream. Carrizo Wash and the Zuni River drain a large area of the LCR watershed east of the reservation, including portions of New Mexico, while Big Hollow Wash and Concho Creek drain an area south of the reservation.

The upper section of Concho Creek is perennial and fed by discharge from Concho Springs. There is no USGS streamflow gage on the creek, but measurements at the spring since the 1940's indicate a relatively steady discharge of between 1,500 to 2,200 AFA. About 600 AFA of this spring flow was previously used for irrigation and recreation from Concho Reservoir, with the remaining discharge lost to infiltration and consumed by riparian vegetation (ADWR, 1989). The lower section of Concho Creek and the other three LCR tributaries are ephemeral and only flow in response to precipitation events.

From 1998-2004, an average of about 2,100 AFA was measured in Carrizo Wash at Station 09386250, located near the confluence with the LCR (see **Table 1**). Nearly all of this flow (99%) was measured during the summer. In light of the relatively short period of record and recent drought, it is unclear whether these data reflect long-term flow conditions in Carrizo Wash. There are no streamflow data for Big Hollow Wash.

Stetson (1999) estimated that from 1976-1997, Carrizo and Big Hollow Washes on average contributed a total of about 3,000 AFA to flow in the LCR. Available data suggest the Zuni River contributes significantly more flow to the LCR than both of these washes and Concho

Creek combined. Data from Gages 09386500 and 09388000 indicate that, on average, the Zuni River adds over 6,000 AFA to the flows in the LCR. The Zuni River flows in a southwesterly direction through the central portion of the reservation from its headwaters in New Mexico to its confluence with the LCR in the Hunt Valley several miles west of the reservation.

5.1.3 Reservoirs

There are four major reservoirs in the vicinity of the Zuni Heaven Reservation. Reservoir locations are shown in **Figure 4** and summary data are listed in **Table 2**. The table includes the name of each reservoir, its water source, owner/operator, maximum and minimum storage capacity, and use.

Lyman Lake is the largest of the reservoirs with a normal storage capacity of approximately 31,000 AF. The reservoir is fed by the LCR and operated by LWC for irrigation and recreational purposes. The USGS has monitored inflows to the lake at Gage 09384000 since 1940. Over this period, lake inflows have averaged about 16,000 AFA, with more than half of these flows occurring during the spring. Water is released from the reservoir into Lyman Canal for irrigation in the St. Johns area. Gage 09385000 is located on the canal and measures the reservoir releases. From 1950-1985, flows in the canal have averaged about 8,500 AFA. Essentially all of the canal releases have occurred during April through September, corresponding with the irrigation season prescribed in the Norviel Decree. Per the Entitlement and Delivery Agreement between the Zuni Tribe and LWC, from 1951-2004, flows in the canal averaged 7,231 AFA with a median flow of 8,100 AFA.

The second largest reservoir in the area is Zion or Udall Reservoir, located on the LCR about 29 miles below Lyman Lake and about 11 miles above the Zuni Heaven Reservation. The reservoir is currently filled with sediment and Udall Dam has breached. Before filling with sediment, Zion Reservoir reportedly had a normal storage capacity of 2,500 AF. The dam was constructed in 1905, breached in 1971, was repaired in 1979, and by the early 1990's the outlet gate was jammed and left partially open (ADWR, 1994a). When ADWR visited the site in early 2000, the reservoir was covered with riparian vegetation and a channel had begun to down cut through its surface. The siltation of Zion Reservoir was primarily the result of the high sediment

load carried by Carrizo Wash, which is tributary to the LCR immediately above the reservoir (ADWR, 1994b).

The third largest reservoir in the area is Concho Lake with a normal storage capacity of approximately 1,200 AF. The reservoir is primarily fed by discharge from Concho Springs, which is located about 1.5 miles upstream of it. It is operated by Concho Water Company and used for irrigation and recreational purposes. Concho Creek flows north and downstream of the lake and crosses through the Zuni Heaven Reservation before joining the LCR.

The fourth largest reservoir in the area is Little Reservoir with a normal storage capacity of approximately 1,100 AF. The reservoir reportedly receives a mixture of water diverted from the LCR below Salado Springs and about 400 AFA via Lyman Canal (USDA, 1981). It is operated by SJIC, and used for irrigation within the town of St. Johns and for recreation. It is located adjacent to the LCR roughly half way between Lyman Lake and Zion Reservoir.

5.1.4 Springs

There are two major springs in the vicinity of Zuni Heaven Reservation. Salado Springs, the larger of the two in terms of discharge, is located on the banks of the LCR about 7 river miles below Lyman Lake (see **Figure 4**). Concho Springs is located about 4 miles southwest of the town of Concho and about 1.5 miles upstream of Concho Lake.

Discharge from Salado Springs was previously estimated by measuring streamflows in the LCR immediately upstream and downstream of the springs and calculating the difference. **Table 3** lists these discharge estimates for the period 1975-1998. The USGS established a streamflow gage (09385700) on the LCR about 2 miles below the springs in January 1985, but discontinued the gage in December 1986 and then reestablished it in July 2002. **Figure 5** shows the mean daily streamflows that the USGS has measured at this gage. As an indication of recent discharge from the springs, 7-day annual low flows measured at Gage 09385700 over the last 3 water years are included in **Table 3**. Review of the table suggests that the discharge from Salado Springs has declined from 5-8 cubic feet per second or cfs (3,600 to 5,800 AFA) in the mid-1970s to less than 2 cfs (1,500 AFA).

According to Akers (1964), the Coconino (C) Aquifer, locally comprised of the Kaibab Limestone and Coconino Sandstone, is the water source for Salado Springs. The concentration

of total dissolved solids (TDS) measured in the spring water is typically greater than 2,000 milligrams per liter (mg/l), considerably higher than the 100 and 500 mg/l TDS measured in samples of the LCR taken above Lyman Lake (SRP, 2004).

Concho Spring is fed from volcanic rocks that overlie the C Aquifer. The volcanics are reportedly underlain by low permeability sedimentary rocks that retard the downward movement of water and causes it to move laterally where it is discharged at the spring (Akers, 1964). Spring discharges have ranged from 2 to 3 cfs (1,500 to 2,200 AFA) since measurements began in 1942, with no discernible long-term change in flow (Akers, 1964 and SRP, 2004). TDS concentrations in the spring water are relatively low and have remained below 200 mg/l.

5.2 AQUIFERS

Four aquifers have been identified in the vicinity of the Zuni Heaven Reservation that can yield usable quantities of water to a well. Included are two sedimentary rock aquifers (the Coconino and Bidahochi), a volcanic aquifer, and an alluvial aquifer. Each is described below.

5.2.1 Coconino Aquifer

The Coconino or C Aquifer is the most productive and widespread of the aquifers and serves as the major source of water to wells pumped for industrial, municipal, and agricultural purposes. **Figure 6** is a map from Hart and others (2002) that shows the regional extent of the C Aquifer, generalized directions of aquifer flow, flow divides, and the approximate water level elevations in wells that penetrate the aquifer. The map indicates that the C Aquifer is locally recharged in the White Mountains south and east of the town of Springerville and from there, water in the aquifer flows to the north-northwest beneath the Zuni Heaven Reservation. Water occurs in the aquifer under both confined and unconfined conditions.

Water is locally discharged from the C aquifer to the LCR through springs and through upward seepage into stream alluvium. Akers (1964) estimated that between Lyman Lake and the Hunt Valley, located just west of the Zuni Reservation, from 4 to 10 cfs (2,900 to 7,200 AFA) of water is discharged in the LCR from the C Aquifer. Salado Springs is a primary point of aquifer discharge in this area and, as a result, flows in the LCR are perennial from the springs

downstream to St. Johns. Another important discharge point may be underneath Lyman Lake. Bills and others (1990) estimated that from 1985-1986, an average of 6 cfs (4,300 AFA) was discharged into the reservoir from the C Aquifer, with a standard error of estimate of 4.9 cfs (3,500 AFA). Water level data collected from wells on and near the reservation suggest that the C Aquifer does not currently discharge water to the LCR within the reservation boundaries (Briggs and others, 2001, Stetson, 2002b, and SRP, 2004).

Wells completed in the C Aquifer commonly yield in excess of 500 gallons per minute (gpm) in the vicinity of the Zuni Heaven Reservation. **Figure 7** is a map of the region by the USDA (1981) that shows where wells will yield at least 500 gpm and the approximate pumping level, in feet below land surface, which would exist in the wells after 100 days of pumping at this rate. The map also shows expected TDS concentrations in water pumped from wells that yield at least 500 gpm. Note that a line roughly following the course of the LCR from Springerville to the town of Holbrook characterizes the quality of water in the C Aquifer. South and west of the LCR, water in the aquifer is fresh (TDS less than 1,000 mg/l) and can be used directly for most purposes. North and east of the LCR, water in the aquifer is slightly to moderately saline and generally unsuitable for use without treatment.

The quality of water in the C Aquifer also varies in a vertical direction. In neighboring Navajo County, Mann (1976) observed that dissolved solids concentrations in the water of the lower part of the aquifer increased greatly with increased depth. In test holes drilled by the U.S. Bureau of Reclamation and Arizona Public Service, chloride concentrations ranged from 50 to 450 mg/l in the upper portions of the aquifer compared to 825 to 16,300 mg/l in the lower portions. The Moenkopi Formation, located immediately above the C Aquifer, also contains large concentrations of salts, which can contaminate the underlying aquifer either by recharge and seepage under water-table conditions or by poorly completed wells under confined conditions.

The Zuni Heaven Reservation is located where wells completed in the C Aquifer are expected to yield at least 500 gpm, but also near the border that separates good and poor water quality. This was confirmed when Well No. 19, located on the reservation in Section 27, T14N, R26E, was pumped in July 2001. After well rehabilitation and initial step testing, the well was pumped at an average rate of 1,507 gpm for 24 hours. Drawdown at the end of pumping was

only 6.9 feet. Analysis of the drawdown data indicated that the C Aquifer is locally confined (storage coefficient of 0.0002) and highly productive (transmissivity of 600,000 to 800,000 gallons per day per foot or gpd/ft), with an estimated thickness of 300 feet. Two water samples collected during the pump test had TDS concentrations of 913 and 957 mg/l (Stetson, 2002b).

5.2.2 Minor Bedrock Aquifers

There are two minor bedrock aquifers in the vicinity of the Zuni Heaven Reservation. These aquifers cover less area and are comprised of younger rocks that overlie the C Aquifer. **Figure 8** is a map from ADWR (1989) that shows the location of these and other minor aquifers in the region.

The Bidahochi Aquifer occurs east of, and within, the St. Johns area. Its main water-bearing unit, the sandstone member of the Bidahochi Formation, typically yields from 10 to 20 gpm. Water quality is generally good and water is primarily used for livestock and domestic purposes (ADWR, 1989).

A volcanic aquifer occurs over a relatively large area south and west of the Zuni Heaven Reservation. Well yields are reportedly highly variable, even over short distances, and can range from less than 5 gpm up to 350 gpm. This aquifer is widely used for domestic and stock purposes and, in the Pinetop-Lakeside area, for public supply and irrigation. Water quality is usually good (ADWR, 1989).

5.2.3 Alluvial Aquifer

Stream alluvium along the LCR and its tributaries may also be a source of water to wells. In southern Apache County, the alluvium may locally be up to 150 feet thick and more than 1 mile wide, with depths to water ranging from less than 10 feet to as much as 65 feet (Mann and Nemecek, 1983). Water can enter the alluvium either through streamflow infiltration and/or from discharge into the alluvium from the C and Bidahochi Aquifers. Water quality is expected to depend on the source of water recharging the alluvium.

In southern Navajo County, Mann (1976) reported that yields from wells completed in stream alluvium are highly variable and can range from less than 5 gpm to over 1,500 gpm. It is

unlikely that high-yielding alluvial wells are present near the Zuni Heaven Reservation since most pumpage has occurred from wells completed in the C Aquifer.

Within and upstream of the Zuni Heaven Reservation, the channel of the LCR is incised. Climatic factors and construction of Zion Reservoir in 1905 probably contributed to the channel incision and, as a result, the alluvial aquifer along the LCR has been partially dewatered. Before Anglo development, the alluvial aquifer at Zuni Heaven was apparently saturated at or near ground surface and supported a relatively broad, flat marsh along the bottomlands of the LCR. Since that time, wetlands have dried up and perennial pools and backwater areas have been lost. Based on recent water level measurements, the depth to water in alluvium at the reservation is estimated at about 20 feet below ground surface (Briggs and others, 2001). A primary goal of the wetlands restoration project is to locally increase water levels in the alluvial aquifer using a combination of upstream surface water sources and water pumped from the underlying C Aquifer.

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CHAPTER 6: PAST AND PRESENT CULTURAL WATER USES

6.1 WELL PUMPAGE

Table 4 lists data on well pumpage in the vicinity of the Zuni Heaven Reservation for the period 1978-2005. Data are presented in two categories, well pumpage for industrial use by power plants, and well pumpage for agricultural and municipal purposes. Well pumpage by the Tribe is also listed. Most, if not all, of the pumpage in **Table 4** has occurred from wells completed in the C Aquifer.

Little data are available on well pumpage for agricultural and municipal purposes. Available data are presented in **Table 4** for three regions in the vicinity of the reservation, Concho, Hunt Valley, and St. Johns. These agricultural regions are shown on a map in **Figure 11**.

Since 1988, agricultural and municipal pumpage has been lower than pumpage by the power plants and currently makes up less than 15% of the total well pumpage in the area. Also, sometime between 1992 and 2005, there was apparently a significant decrease in agricultural and municipal pumpage. Assuming that the local population has remained stable or increased over the period, this suggests a decrease in well pumpage for agriculture. Several factors could explain this decrease including land development, fallowing of fields because of poor economic conditions, and retirement of agricultural lands due to a change in ownership. The latter has reportedly affected portions of the Hunt Valley and the Meadows and Wilhelm Ranches, recently acquired by the Tribe (Stetson, 1999 and Parties, 2006).

However, in the mid 1990s, a potato farm was established about 3 miles southwest of Salado Springs. This farm covers approximately 350 acres in Sections 23, 24, and 27 of T12N, R27E, and is estimated to pump 700 AFA from wells completed in the C Aquifer (Parties, 2006).

Limited data were available to ADWR on well pumpage within the Zuni Heaven Reservation. It is known that since 2003, approximately 100 AFA has been pumped by the Tribe to support wetland restoration efforts (Parties, 2006).

Three well fields have supplied water to power plants in the area. SRP operates the Concho Well Field located about 4 miles southwest of the Zuni Heaven Reservation, and the Patterson Well Field located about 2 miles northeast of St. Johns and about 12 miles east of the reservation. Both well fields supply water to the Coronado Generating Station located adjacent to the Patterson Well Field. This power plant was brought on-line in 1979. SRP also owns the Greer Well Field that is located between the Concho Well Field and the Patterson Well Field; however, the Greer Well Field has not been in operation. TEP operates the SGS West Well Field adjacent to its Springerville Generating Station located about 10 miles north of Springerville and 12 miles southeast of St. Johns. This power plant was brought on line in 1985. TEP also owns the SGS East Well Field, which is located nearby but which has not been in operation. See **Figure 1**. Total pumpage from the well fields has increased steadily from approximately 6,000 AFA in 1980, to almost 21,000 AFA in 2004. Since 1997, SRP and TEP have each pumped roughly equal quantities of water.

Figures 9 and 10 are maps that show how water levels in the C Aquifer have changed since the power plants began operations. **Figure 9** from SRP (2004) shows water level changes in the C Aquifer below and adjacent to the Concho and Patterson Well Fields from 1977-2002. **Figure 10** from EMAI (2004) shows water level changes in the C Aquifer below and adjacent to the SGS West Well Field from 1981-2004. The two maps overlap and cover a combined area that extends from Springerville in the southeast to Hunt Valley in the northwest. Within this region, over 100 wells completed in the C Aquifer have been routinely monitored by SRP and TEP. Hydrographs for several of these wells are included in **Appendix L**, together with water level data and water level elevation changes. Review of the maps and hydrographs indicate the following regarding water levels in the C Aquifer:

- Since the late 1970s, the average water level below the Concho and Patterson Well Fields has declined a total of approximately 114 feet and 147 feet, respectively.
- Since the early 1980s, the average water level below the SGS West Well Field has declined a total about 66 feet.

- Water levels in most of the SRP and TEP production wells have continued to decline since they were first pumped. This indicates that the cones of depression formed by the well fields have not stabilized and are still expanding.
- In general, between the well fields and across the region, water levels in the C Aquifer have steadily declined since the power plants began pumping. Over the same period, total well pumpage for irrigation and municipal purposes appears to have decreased. Pumpage for irrigation has, however, increased locally about 3 miles southwest of Salado Springs where a potato farm has been developed.

Water levels have risen slightly or not changed substantially in wells completed in the Hunt Valley area (see hydrographs for wells 35W, 37W, 40W, 42W, and 51W) and beneath the SGS East Well Field (see hydrographs for wells E-2, M-3, P-1, and P-3 through P-6). [**Appendix L**]. Well pumpage for irrigation in Hunt Valley reportedly decreased since the Tribe acquired the property, and the SGS East Well Field has not been used by TEP.

6.2 SURFACE WATER DIVERSIONS

Surface water diversions in the vicinity of the Zuni Heaven Reservation have primarily been used for agriculture (USDA, 1981 and ADWR, 2006). **Table 5** lists data on agricultural lands in the Concho, Hunt Valley, and St. Johns Regions including estimates of the total acreage of irrigated lands, the number of acres irrigated with surface water, and the amount of surface water diverted for this purpose. Irrigation data were available for three periods, circa 1980, from 1992-1993, and from 1999-2000. Footnotes in the table provide additional information on the number of surface water diversions, water sources, irrigation providers, and assumed water duties.

The data in **Table 5** suggests that a significant decline in irrigation and use of surface water has occurred in the area. In the early 1980s, it was estimated that over 11,000 acres of land were being irrigated by diverting over 20,000 AFA of surface water, primarily from the LCR and to a lesser degree from Concho Creek. Since that time, the number of irrigated acres has apparently declined in all three regions, and in 1999-2000 probably totaled less than 3,000 to

4,000 acres. Note that irrigation data for 1999-2000 come from a land use study conducted by the USGS (2005) using satellite imagery. That study involved little or no field verification, so it is expected that some marginal or deficit-irrigated fields were not mapped from the imagery. As mentioned above, several factors could explain this decline in agricultural activity including land development, poor economic conditions and land transfers, as well as the recent drought that has impacted the area.

In 1994, the Tribe was using surface water to irrigate approximately 840 acres on its reservation (ADWR, 1994b). Prior or more recent data on surface water diversions by the Tribe were not available to ADWR or provided by the Parties (Parties, 2006).

CHAPTER 7: POTENTIAL CHANGES IN WATER RESOURCES IN THE LITTLE COLORADO RIVER SYSTEM AND SOURCE DUE TO THE SETTLEMENT AGREEMENT

This section describes potential changes to the quantity and quality of water resources in the vicinity of the Zuni Heaven Reservation as a result of the Settlement Agreement. Potential changes to the major surface water features in the area are discussed first and include the LCR, four tributaries to the LCR, four reservoirs, and two springs. Potential changes to aquifers in the area are discussed next. These include two sedimentary rock aquifers (the Coconino and Bidahochi), a volcanic aquifer, and an alluvial aquifer.

7.1 LCR

The Settlement Agreement allows the Tribe to acquire up to 3,600 AFA of existing Norviel Decree water rights upstream of the reservation and sever and transfer these rights for use on the reservation. See Section 3.1.2. The Tribe and the United States have already executed an agreement with LWC to receive 12% of the "LWC Delivered Water," which the parties agree historically has provided an average of 972 AFA. As of March 2006, the Tribe had reportedly also acquired some shares in SJIC, and was "pursuing additional acquisitions" (Parties, 2006). As part of the 3,600 AFA, the Tribe may also receive up to 1,000 AFA of water severed and transferred to the reservation through AGAF's Stream Program. The severance and transfer of these and other Norviel Decree water rights to the reservation are expected to affect how Lyman Lake is operated and change the flow regime and sediment load in the LCR below the reservoir.

Between Lyman Lake and Zion Reservoir, flows in the LCR could increase as indicated in **Table 6** and cause local scouring of the channel and redeposition of sediment. These changes in channel geomorphology could be pronounced in the area of Zion Reservoir. As previously discussed, Zion Reservoir is currently filled with sediment and Udall Dam has breached. Increased flows in the LCR should facilitate removal of the stored sediment and eventually cause

the channel downstream of the reservoir to aggrade. This, in turn, is expected to allow LCR flood flows within and upstream of the reservation to more regularly leave the channel (Stetson, 1999).

In addition to decreed water rights, the Tribe plans to use water rights appurtenant to recently acquired lands within the Meadows and Wilhelm Ranches, located along the LCR immediately upstream of Zion Reservoir. Historically, the ranches diverted and/or spread flows from the LCR and Carrizo and Big Hollow Washes to irrigate surrounding pasture. See **Figure 4.** The Tribe has proposed to close the diversions, remove any spreading structures, and channelize surface flows through the area to minimize consumptive use from irrigation and losses due to riparian vegetation. **Table 6** lists the average amount of surface water that Stetson (1999) estimated could be salvaged each month from this area. The salvaged water would increase the current flow of the LCR through Zion Reservoir and further aid in the removal of stored sediment and downstream channel aggradation.

A proposed third source of surface water for use at the Zuni Heaven Reservation is the unappropriated natural flow in LCR at the reservation boundary. **Table 6** includes the average amount of unappropriated flows that Stetson (1999) estimated could be diverted from the LCR each month and used for the Wetland Project.

Without the Wetland Project, Stetson (1999) estimated that flows in the LCR immediately below the reservation have averaged 6,050 AFA. With the project and accounting for the severance and transfer to the reservation of decreed surface water rights, and salvaged surface water from the Meadows and Wilhelm Ranches, Stetson (1999) predicted that LCR flows below the reservation would increase by an average of 1,730 AFA.

The prediction that the Wetland Project will increase flows in the LCR downstream of the reservation is based on several assumptions, most notably:

- No future losses to evaporation as the LCR flows through Zion Reservoir; and
- 40% return flow from the reestablished wetlands to the LCR.

Recent losses to evaporation as the LCR flows through Zion Reservoir were estimated to average 2,120 AFA. The time it would take for these losses to be reduced to zero was not

indicated, but it was expected to take a decade or longer for the sediment filling the reservoir to be removed and the stream channel to be reestablished (Stetson, 1999).

ADWR visited Zion Reservoir in April 2006 and found that two channels, 20- to 30-feet wide and 4- to 6-feet wide, have eroded into the sediment and, at the dam face, the breach is now about 40-feet deep and extends to the base of the dam. Minor losses through the reservoir due to evaporation are expected to continue, but in light of the amount of channel downcutting that has already occurred, its effect on the quantity of flows in the LCR at and below the reservation will probably be insignificant.

It is not clear to ADWR how long it will take before the assumed 40% of the water applied to the Wetland Area is returned to the LCR. Presumably, as the primary and secondary wetlands are being reestablished and near surface soils are being resaturated, return flows to the LCR will be less than at the end of the project. This, in the short-term, could affect the quantity of flows in the LCR below the reservation. **Figure 12** shows the preliminary features of the project including the location of primary and secondary wetlands, the sacred lake area, a diversion dam and canal, and wells and associated pipelines, pumps, and tanks.

In general, since more surface water will be available for use at the Zuni Heaven Reservation, the Wetland Project should eventually increase downstream flows in the LCR due to return flows. A reduction in LCR flows downstream of the reservation could result from the Tribe's plan to divert and consumptively use previously unappropriated flows within the reservation. However, it is unlikely that the Tribe will be able to divert the largest of the LCR flows that currently pass through the reservation, and it is those flood flows that have the greatest chance to reach downstream users.

7.2 LCR TRIBUTARIES

As described above, the Tribe plans to salvage water from the Meadows and Wilhelm Ranches by closing diversions, removing spreading structures, and channelizing surface flows through the area. As a result, the flow and sediment load in Carrizo and Big Hollow Washes near their confluence with the LCR would be expected to increase and channel conditions probably would change. **Table 6** lists the total amount of surface water the Tribe estimates

would be salvaged from the ranches. Based on historic irrigation in the area, most of this salvaged water would come from flows in Carrizo Wash and the LCR.

In addition to the LCR, and Carrizo and Big Hollow Washes, the Settlement Agreement contains Zuni Abstracts that include water from Concho Creek and the Zuni River. See **Appendix F-2**. However, it is unclear to ADWR if or how these other LCR tributaries would be used by the Tribe on the Zuni Heaven Reservation. Neither of the reports by Stetson (1999 and 2002a) that describe the Wetland Project in detail list Concho Creek or the Zuni River as potential surface water sources. ADWR therefore assumes that flow conditions in these tributaries would not be affected by the Settlement Agreement.

7.3 RESERVOIRS

Under the Settlement Agreement, there are restrictions on constructing new dams and reservoirs on the LCR between Lyman Lake and the Zuni Heaven Reservation. In addition, the Settlement Agreement does not allow for repairs to, or the replacement of, Udall Dam without the consent of the Tribe, and, as discussed above, changes in channel geomorphology may be significant in the vicinity of Zion Reservoir. It is also possible that the Settlement Agreement would change SJIC's operation of Little Reservoir, as well as LWC's operation of Lyman Lake. However, no changes in the operation of Concho Lake are expected from the Settlement Agreement (Parties, 2006).

Little Reservoir is fed by the LCR and Lyman Canal, and has been used by SJIC to supply water for irrigation in the St. Johns area. The Zuni Tribe has reportedly acquired shares in the SJIC, and potentially a portion of this water, previously diverted from the LCR and/or released into Lyman Canal, may be left in the river for downstream use on the reservation.

Table 6 lists the average amount of decreed water, by month, that Stetson (1999) estimated would have to be released from Lyman Lake to supplement other downstream water sources and meet the water demands of the Wetland Project. No releases of decreed water from Lyman Lake are planned from November through February, but an average of up to 1,060 AF are planned for release in June and lesser amounts are planned for release during the other months. To account for these increased releases and potential changes in reservoir operations,

the Tribe signed an Entitlement and Delivery Agreement and an Operating Agreement with LWC.

7.4 SPRINGS

The Settlement Agreement is not expected to affect the discharge from Concho Spring. This spring is fed from a volcanic aquifer that overlies and is separated from the C Aquifer by relatively low permeability sedimentary rocks. The Settlement Agreement does not address pumpage from this overlying aquifer.

Salado Springs are fed from the C Aquifer and, as indicated in **Table 3**, their discharge has steadily decreased from 5-8 cfs (3,600 to 5,800 AFA) in the mid-1970s to less than 2 cfs (1,500 AFA) in 2005. Discussion of the potential impact of the Settlement Agreement on flow from Salado Springs and on the C Aquifer is provided below.

7.5 COCONINO AQUIFER

The Settlement Agreement, the SRP Agreement, and the TEP Agreement have potential impacts on pumpage from the C aquifer by imposing limitations on amounts withdrawn in certain geographic areas, the location of new wells, water level declines, and impacts on water quality. These limitations are described in Sections 3.2.3, 3.4.1 and 3.4.2.

In 1980, SRP pumped about 6,000 AF from wells completed in the C Aquifer for the Coronado Generating Station, and in 1985 TEP pumped about 3,700 AF from wells completed in the C Aquifer for the Springerville Generating Station. The power plants have since increased their pumping, and in 2000, each was removing about 10,000 AFA from the aquifer. The power plants are currently the largest users of C Aquifer water in the region.

The effects from previous pumping in the region are described in Section 6.1. Future pumping by SRP and TEP will be subject to the limitations of the Settlement Agreement, SRP Agreement and TEP Agreement. However, the Parties "have not evaluated the impact of continued power plant pumping on regional water supplies as part of the settlement" (Parties, 2006), although TEP reportedly has been revising its groundwater flow model of the C Aquifer

to account for recent and projected pumping rates by the power plants. TEP's model has not been submitted to ADWR, and ADWR does not have any other models that predict impacts on the C Aquifer from the Settlement Agreement.

Although ADWR has not been provided with the results of any predictive models, discussed below are ways that the Settlement Agreement could potentially change water levels and water quality in the C Aquifer based on past and current hydrologic data. The discussion focuses on nine areas, the TEP Geographic Restriction, the SRP and Zuni Exclusion Areas, the Zuni Protection Area, the St. Johns area, the SRP and TEP Well Fields, and Lyman Lake and Salado Springs.

7.5.1 Exclusion and Geographic Restriction Areas

Figure 3 shows the location of the SRP and Zuni Exclusion Areas and the TEP Geographic Restriction area. The SRP Exclusion Area includes the Zuni Protection Area plus more than 250 square miles to the north and west. The Zuni Exclusion Area is mostly south of the Zuni Pumping Lands and extends from SRP's Patterson Well Field in the east to SRP's Concho Well Field in the west. The TEP Geographic Restriction Area covers a large area including most of Apache County.

The SRP Agreement and the TEP Agreement do not allow the Tribe, SRP, or TEP to install new wells within their respective exclusion and geographic restriction areas. These limitations on new wells should minimize the number of new cones of depression that develop in the C Aquifer over much of the Eastern LCR Basin.

7.5.2 Zuni Protection Area

The Zuni Protection Area is located north and west of St. Johns and includes the Zuni Reservation, Zuni Trust Lands, and Zuni Pumping Lands (see **Figure 3).** Within this area, water levels in the C Aquifer have both risen and declined since pumping by SRP began in the late 1970's. Beneath Hunt Valley in the western part of the Zuni Protection Area, water levels have risen, probably in response to decreased irrigation pumpage since the Tribe acquired land in the area. East of Hunt Valley, water levels in the Zuni Protection Area have generally declined by about 5 to 20 feet over the period (see hydrographs for wells 43W, and 46W through 48W).

[**Appendix** L]. Because irrigation in the Zuni Protection Area has probably decreased, these water level declines may be a response to SRP's pumpage from the Concho Well Field to the southwest and Patterson Well Field to the southeast. Further water level declines are possible in this part of the Zuni Protection Area, but the rate and/or amount of decline may eventually be limited by the terms of the Settlement Agreement and the SRP Agreement.

Increased pumpage by the Tribe to supplement its surface water supplies for the Wetland Project could also cause water level declines in the C Aquifer below the Zuni Protection Area. Under the Settlement Agreement, the Tribe can pump and use up to 1,500 AFA from the Zuni Pumping Lands without losing certain rights to claim injury from SRP's pumping, or to make objections to other new non-exempt wells in the Zuni Protection Area. See Sections 3.2.3 and 3.4.1. However, regardless of the amount pumped by the Zuni Tribe from the Zuni Pumping Lands, the Tribe may object to any portion of SRP's pumping that exceeds 21,000 AFA, as well as withdrawals that exceed 15,000 AFA subject to certain limitations.

As discussed above, limited well pumpage data on the Zuni Heaven Reservation were available to ADWR. **Table 7** lists the maximum well pumpage, by month, expected by the Tribe. Once the Wetland Project is fully developed, this well pumpage is expected to decline to 200-300 AFA, but during dry years could exceed 800 AFA (Stetson, 1999 and 2002b). Since 2003, the Tribe has been pumping about 100 AFA from a well on the reservation. If necessary, the Tribe is also considering developing a well field outside of its Pumping Lands within the Meadows Ranch. This well field could reportedly support the flow of acquired surface water so that water will physically reach the reservation (Parties, 2006). Details on the amount of water potentially pumped from the ranch well field were not provided.

The Settlement Agreement allows the Tribe to object to new non-exempt wells in the Zuni Protection Area that, on average, cause more than 50 feet of drawdown beneath the reservation over a 3-year period. Also, the Tribe may enter into agreements with landowners in the Zuni Protection Area who agree to limit their pumpage to 500 gpm per section of land (or a prorated amount). See Section 3.2.3. These restrictions should minimize the number and size of new cones of depression that develop in the C Aquifer within the Zuni Protection Area.

Within the northern and eastern portions of the Zuni Protection Area, the water quality in the C Aquifer is relatively poor with TDS concentrations ranging from 1,500 mg/l to over 3,000

mg/l. The water quality improves to the south and west and near the Concho Well Field, TDS concentrations are near 500 mg/l or less. Continued or increased pumping by SRP could draw higher TDS waters into the protection area. The SRP Agreement allows the Tribe to claim injury if the TDS level beneath the reservation increases to a 3-year rolling average of 3,000 mg/l and if the increase is "causing significant harm to species native to the area on the Reservation." To make the claim, SRP must at the same time be pumping from 15,001-21,000 AFA and the static water level below the reservation must have declined by more than 75 feet.

7.5.3 St. Johns

Since the mid-1970s, water levels in the C Aquifer near the town of St. Johns, located between TEP's SGS West Well Field and SRP's Patterson Well Field, have declined between 20 and 30 feet (see hydrographs for wells 27W and 58W). [**Appendix L**]. This drawdown is probably the combined effect of regional pumping by the power plants and local pumping for irrigation. As indicated above, total agricultural and municipal pumpage in the St. Johns region appears to have declined over the period, and in 2005 totaled about 1,300 AFA. Additional water level declines are expected in this area, but the rate and/or amount of decline may eventually be limited by the terms of the Settlement agreement, the SRP Agreement, and/or the TEP Agreement. Any increased pumpage for irrigation could cause still more water level declines. Water quality in the C Aquifer below St. Johns area has been poor with TDS levels between 1,500 and 3,000 mg/l, and is not expected to change substantially in the future.

7.5.4 SRP and TEP Well Fields

SRP's and TEP's past and current pumping of water from the C Aquifer has created cones of depression below their well fields. As SRP and TEP continue to pump C Aquifer water, the cones of depression below their well fields could expand until such time that the rate of pumping equals the aquifer recharge captured by the wells. If the cones of depression expand further, water levels in wells already affected by this pumping would continue to decline, aquifer storage would be locally depleted, and the depth to drill new wells in the area would increase. However, the terms of the Settlement Agreement, the SRP Agreement and the TEP Agreement could eventually limit or slow down the expansion of these cones of depression due to

limitations on the amount of groundwater that may be withdrawn and the placement of new wells.

Subsidence is not of concern below and adjacent to the well fields since the C Aquifer consists of consolidated, sedimentary rocks. However, it is possible that expansion of the cones of depression could increase the concentration of dissolved solids in the aquifer.

As discussed above in Section 5.2.1, the quality of water in the C Aquifer varies in both a horizontal and vertical direction. Roughly south and west of the LCR, water in the aquifer is fresh and can be used directly for most purposes. To date, water quality samples collected from TEP's production wells have not indicated an increase in TDS (EMAI, 2004), but minor (less than 300 mg/l) increases in TDS have been measured in SRP's production wells (SRP, 2004).

7.5.5 Lyman Lake and Salado Springs

Past and current pumpage by TEP appears to have caused water levels in the C Aquifer beneath Lyman Lake to decline by about 29 feet since 1981 (see hydrographs for wells M-6 and M-7). [**Appendix L**]. Five miles north of the lake, discharge from Salado Springs, fed by the C Aquifer, has decreased from 5-8 cfs (3,600 to 5,800 AFA) in the mid-1970s to less than 2 cfs (1,500 AFA) in 2005. This decrease in discharge may be the combined effect of TEP's pumping, and approximately 700 AFA of pumping for a potato farm established in the mid 1990s about 3 miles southwest of the springs (see hydrograph for well M-8). [**Appendix L**]. As discussed above, in 2000, TEP's rate of pumping was approximately 10,000 AFA. Under the TEP Agreement, the Zuni Tribe may claim injury if the power plant increases its pumpage to between 11,000-20,000 AFA and if baseflow in the LCR downstream of Salado Springs at Gage 09385700 declines below a 3-year running average. **Figure 5** shows recent streamflows at this gage. Additional impacts on Salado Springs may be expected, but these impacts may eventually be limited by the terms of the Settlement Agreement and the TEP Agreement.

7.6 MINOR BEDROCK AQUIFERS

The Settlement Agreement is not expected to change water levels or water quality conditions in the Bidahochi and volcanic aquifers. Due to their relatively low yield compared to

the C Aquifer, these aquifers have not been utilized by the power plants or major agricultural pumpers in the region. In addition, these aquifers do not extend beneath the Zuni Reservation and therefore, would not be utilized by the Tribe.

7.7 ALLUVIAL AQUIFER

The proposed sever and transfer of Norviel Decree rights and water salvaged from the Meadows and Wilhelm Ranches is expected to increase flows in the LCR below Lyman Lake, most notably during the spring and summer months (see **Table 6**). However, not all of this additional flow is expected to reach the Zuni Heaven Reservation. Stetson (1999) estimated that due to transmission losses, an average of 470 AFA of the transferred water would be lost between Lyman and Zion Reservoir and another 120 AFA would be lost between Zion Reservoir and the reservation.

Riparian vegetation along the LCR is expected to account for part of these transmission losses. The remaining losses would result from recharge to the alluvial aquifer that borders and underlies the river. Increased recharge to the alluvial aquifer would increase water levels and, below Salado Springs, could locally improve aquifer water quality. The TDS of surface water that feeds Lyman Lake available for transfer to the Zuni Heaven Reservation is about 1,000 mg/l lower than the water discharged from Salado Springs.

Within the Zuni Heaven Reservation, water levels in the alluvial aquifer along the LCR are also expected to rise, and should eventually reach the surface in the area of the sacred lake and where the primary and secondary wetlands are proposed (see **Figure 12**). Available data suggest that water levels in the alluvial aquifer may currently be at or above water levels in the underlying C Aquifer in this area (Briggs and others, 2001 and Stetson, 2002b). If that is true, then proposed pumping by the Tribe of water from the C Aquifer would not be expected to substantially impact water levels in the alluvial aquifer.

Along the LCR downstream of the Zuni Heaven Reservation, water levels in the alluvial aquifer could initially decline if flows in the river decrease as the Wetland Project is being developed. Eventually, it is expected that streamflows downstream of the Zuni Heaven Reservation will increase and water levels in the alluvial aquifer could locally rise.

CHAPTER 8: POTENTIAL IMPACTS OF THE SETTLEMENT AGREEMENT ON CLAIMANTS AND GROUNDWATER RIGHTS

This chapter addresses the potential impact of the proposed settlement upon categories of other claimants in the adjudication. Also included is a discussion of the impacts of the proposed settlement on rights to use groundwater underlying or in the vicinity of the reservation, and on the groundwater regulatory program administered by ADWR.

8.1 POTENTIAL IMPACTS OF THE SETTLEMENT AGREEMENT ON OTHER CLAIMANTS IN THE LCR ADJUDICATION

The Zuni Tribe's adjudication objections to surface water rights in the LCR Basin are limited under the Settlement Agreement, and these limitations affect all claimants in the LCR Basin. The Zuni Tribe may not object to *de minimis* water uses or existing surface water rights subject to a decree, including Norviel Decree water rights. In addition, the Zuni Tribe may only object to other surface water uses under state law to the extent that those uses interfere with the Zuni Tribe's surface water rights, or the objection involves abstracted uses. See Section 3.2.2. These provisions are intended to benefit and protect all landowners and water users in the LCR Basin, regardless of whether they are Parties. See Section 3.8.

Under the Settlement Agreement, the Zuni Tribe and the United States will receive the following water rights: (1) a decreed water right to 5,500 AFA of LCR unappropriated flows with a priority date of August 28, 1984; and (2) the right to sever and transfer up to 3,600 AFA of acquired Norviel Decree water rights. Additionally, the Parties agreed to abstracts of proposed water rights for water uses on Zuni Lands.[41] The proposed LCR water right could affect other claimants, both upstream and downstream of the Zuni Heaven Reservation, with priority dates junior to 1984. However, there may be additional water in the LCR downstream of

[41] The abstracted water rights will not be determined under the Settlement Agreement, but instead will be subject to adjudication in the future, with the opportunity for affected water users to object. See Section 3.1.4.

the reservation after the Wetland Project is completed. See Section 7.1. The sever and transfer of Norviel Decree rights will also increase LCR flows downstream of Lyman Lake. See Section 7.1. However, the severances and transfers of the Norviel Decree rights will require the approval of the Norviel Decree Court. See Section 3.1.2. The court process will involve notice and opportunities for other claimants to object. See **Appendix I**. The Norviel Decree water rights acquired by the Tribe will retain their Norviel Decree priority dates. The priority dates for any additional water rights acquired by the Tribe will be determined by state law.

8.2 POTENTIAL IMPACTS ON GROUNDWATER RIGHTS AND ADWR'S GROUNDWATER REGULATORY PROGRAM

8.2.1 Groundwater Rights

The Settlement Agreement restricts the location of new non-exempt wells, and limits the extent to which objections may be made to withdrawals of underground water underneath, and in the vicinity of, the Zuni Heaven Reservation. With certain exceptions, these restrictions and limitations are intended to protect and benefit all landowners and water users in the LCR Basin, regardless of whether they are Parties. See Section 3.8.

For purposes of the Settlement Agreement, "underground water" includes "water beneath the surface of the earth regardless of its legal characterization as appropriable or non-appropriable under any applicable law." [**Appendix A** at ¶ 2.39]. ADWR believes that most of the underground water withdrawn in the Eastern LCR Basin is from the C Aquifer, which serves as the major source of water to wells pumped for industrial, municipal and agricultural purposes. See Sections 5.2.1. The Coronado Generating Station, operated by SRP, and the Springerville Generating Station, operated by TEP are the largest users of C Aquifer water in the region. See Section 7.5.

Under the SRP Agreement and the TEP Agreement, which are binding only on the parties to those agreements, new and replacement wells may not be located in certain geographic areas. See Sections 3.4.1 and 3.4.2. In addition, there are limitations on the objections that the Zuni Tribe may raise and the remedies that may be available depending on the amount of water

pumped separately by SRP and TEP and the affect of that pumping on water levels and water quality. Under the Settlement Agreement, the Parties agree not to object to the Zuni Tribe's withdrawal and use of 1,500 AFA of underground water on the Zuni Pumping Lands. See Section 3.1.3. The Zuni Tribe also agrees to limit its objections to certain withdrawals from new non-exempt wells depending upon whether the proposed well will be located within or outside the Zuni Protection Area. However, the Zuni Tribe and the United States may not object to any exempt well in the LCR Basin or existing well in the Eastern LCR Basin. See Section 3.2.3.

8.2.2 ADWR's Groundwater Regulatory Program

Under the 1980 Groundwater Code, ADWR is responsible for administering a groundwater regulatory program with requirements that apply differently within certain geographic areas of the state. See A.R.S. § 45-401 *et seq.* Statewide, all wells must be registered with ADWR, must be drilled by a licensed well driller and must comply with well construction standards. Also, there are restrictions on the transportation of groundwater within and between groundwater basins. In addition, in certain areas of the state known as irrigation non-expansion areas ("INAs"), there are restrictions on the expansion of irrigated agriculture. Within other areas of the state, known as active management areas ("AMAs"), the ability to withdraw groundwater is subject to a system of rights and permits designed to control groundwater overdraft in those parts of the state. Outside of AMAs, as a general rule, groundwater may be withdrawn and used for a reasonable and beneficial use. A.R.S. § 45-453.

The Settlement Agreement is not anticipated to have any impact on ADWR's groundwater regulatory program. The water uses and geographic areas that could be potentially impacted by the Settlement Agreement do not lie within an AMA or an INA, and do not involve the transportation of groundwater.

TABLE 1. STREAMFLOW DATA COLLECTED NEAR THE ZUNI RESERVATION[1]

USGS Station Number[2]	Station Name	Contributing Drainage Area, in square miles	Period of Record[3]	Average Seasonal Flow, as a percentage (%) of annual flow[4]				Annual Flow, in acre-feet (Year)[5]				Years of Annual Flow Record[3]	Notes[6]
				Winter	Spring	Summer	Fall	Minimum	Median	Mean	Maximum		
09384000	Little Colorado River above Lyman Lake near St. Johns	704	4/1940-present	20	52	17	10	2,259 (1996)	11,113	15,588	51,258 (1941)	64	Inflows to Lyman Lake.
09385000	Lyman Canal below Lyman Reservoir near St. Johns	Not determined	5/1950-9/1985[7]	<1	45	55	<1	188 (1957)	8,902	8,486	15,344 (1966)	27	Diversions from Lyman Lake for irrigation near St. Johns.
09385500	Little Colorado River below Lyman Reservoir near St. Johns	790	4/1941-9/1985[7]	21	63	6	10	478 (1963)	1,509	2,722	19,547 (1973)	34	Uncontrolled spills, non-canal releases, and seepage from Lyman Lake; 39 river miles above the Zuni Reservation.
09385700	Little Colorado River below Salado Springs	845	3/1985-present	26	52	13	9	2432 (2003) and 2164 (2004)				2	About 30 river miles above the Zuni Reservation.
09386000	Little Colorado River at St. Johns	964	4/1906-4/1940 (discontinued)	24	33	27	16	2,013 (1939)	3,895	10,309	45,538 (1909)	8	21 river miles above the Zuni Reservation.
09386030	Little Colorado River above Zion Reservoir near St. Johns	1,005	10/1975-present	29	31	16	24	94 (2004)	3,453	5,149	18,823 (1985)	29	11 river miles above the Zuni Reservation.
09386250	Carrizo Wash near St. Johns	Not determined	8/1998-present	0	0	99	1	65 (2004)	1,596	2,082	5,168 (2002)	6	Tributary to Little Colorado River; formerly Station 09386020.
09386300	Little Colorado River below Zion Reservoir near St. Johns	Not determined	9/1998-present	1	<1	97	2	80 (2003)	116	2684	11,798 (2002)	6	5 river miles above the Zuni Reservation and 0.5 river miles below Zion Reservoir, which breached in 1972; formerly Station 09386100.
None	Little Colorado River at Zuni Reservation	Not determined	1976-1997, if Zion Reservoir had not been constructed	36	42	5	17	1,170 (1997)	3,630	8,157	32,740 (1997)	22	Estimated by Stetson (1999) based on data from Station 09386030, estimates of tributary inflows from Big Hollow and Carrizo Washes, and 15% channel transmission loss.
09386500	Little Colorado River above Zuni River near Hunt	3,557	3/1940-9/1972 (discontinued)	16	10	60	14	8 (1961)	2,266	3,778	22,009 (1955)	31	5 river miles below the Zuni Reservation.
09388000	Little Colorado River near Hunt	6,173	5/1929-9/1972 (discontinued)	14	12	64	10	239 (1962)	5,046	10,424	58,424 (1941)	34	Below the confluence with the Zuni River and 7 river miles below the Zuni Reservation.

Notes:

[1] Primary data source - USGS (2006).

[2] Stations listed from upstream to downstream along Little Colorado River. See Figure 4 for locations.

[3] Period of Record (POR) indicates when streamflows were first and last measured at the station. It does not reflect if and when the station was inactive, which can be significant. POR may not equal Years of Annual Flow since the latter is only calculated when data are available for all 12 months.

[4] Calculated using average monthly streamflows. Winter season assumed to include months of January, February, and March; Spring includes April, May, and June; and so on. Due to rounding, sum of seasonal flows may not equal 100%.

[5] Statistics based on Calendar Years (CY), except for LCR at Zuni Reservation which is based on Water Years (WY).

[6] River miles from Stetson (1999).

[7] Station operated by SRP after 1985; table statistics do not include SRP data. According to EMAI (2004), during WY 1986-2003, an average of 6,715 acre-feet per year (AFA) was measured at Station 09385000 and 1,470 AFA was measured at Station 09385500.

TABLE 2. MAJOR RESERVOIRS NEAR THE ZUNI RESERVATION[1]

Reservoir/Lake Name	Water Source	Owner/Operator	Maximum Storage Capacity, in acre-feet	Normal Storage Capacity, in acre-feet	Use
Lyman	Little Colorado River	Lyman Water Co.	44,500	30,600[2]	Irrigation and recreation
Zion	Little Colorado River and Carrizo Wash	H.J. Platt	5,000[3]	2,500[3]	Debris control
Concho	Concho Springs	Concho Water Co.	1,560	1,198	Irrigation and recreation
Little	Little Colorado River and Lyman Canal	St. Johns Irrigation Co.	Not provided	1,128	

Notes:

[1] Primary data source: USACE (2005).

[2] An average of 15,400 acre-feet is stored in Lyman Lake (NRCS, 2006).

[3] Zion Reservoir is currently filled with sediment and Udall Dam is breached.

TABLE 3. DISCHARGE DATA FOR SALADO SPRINGS[1]

Measurement Date	Discharge, in cfs	Data Source
02/13/75	6.0	BIA (undated)
09/15/75	8.2	SRP (2004)
11/19/75	4.5	
04/15/76	5.4	
04/06/77	5.1	
09/20/77	5.1	
05/10/78	4.8	
09/13/78	4.8	
04/11/79	6.1	
09/12/79	4.7	
09/25/80	5.7	
04/15/81	6.0	
09/24/81	8.0	
03/26/82	3.9	
10/19/82	6.7	
09/19/84	2.7	
10/23/85	5.1	
10/16/86	4.6	
03/18/87	2.4	
09/23/87	3.2	
10/25/88	4.1	
03/16/89	4.3	
11/01/89	3.7	
03/21/90	3.2	
01/30/91	3.9	
07/31/91	2.7	
04/20/92	2.7	
11/10/92	2.7	
04/28/93	6.0	
11/09/93	4.2	
05/05/94	2.3	
03/09/98	2.5	BIA (undated)
WY 2003	0.8[2]	USGS (2006)
WY 2004	0.9[2]	
WY 2005	1.0[2]	

Notes:

[1] Spring discharge estimated by measuring streamflow in Little Colorado River above and below the springs area.

[2] Spring discharge estimated based on annual minimum 7-day average streamflow at USGS Station 09385700 located 2 miles below the springs area.

TABLE 4. WELL PUMPAGE IN THE VICINITY OF THE ZUNI RESERVATION, IN ACRE-FEET

Year	Industrial (Power Plants)[1]				Agricultural and Municipal				
	SRP		TEPCO	Total Industrial	Concho Area[2]	Hunt Valley Area[3]	St. Johns Area[2]	Total Agicultural and Munipal	Zuni Reservation[4]
	Concho Well Field	Patterson Well Field	SGS West Well Field						
1978	281	0	0	281	7,000	na	2,800	---	na
1979	1,049	743	0	1,792	8,100	na	3,400	---	na
1980	3,060	2,956	0	6,016	11,100	na	2,100	---	na
1981	3,044	5,058	256	8,358	6,000	na	2,150	---	na
1982	4,708	3,528	234	8,470	5,900	na	90[5]	---	na
1983	5,032	2,487	306	7,825	4,800	na	2,600	---	na
1984	5,392	3,010	599	9,001	4,500	na	3,000	---	na
1985	4,779	3,198	3,722	11,699	4,700	na	6,050	---	na
1986	3,242	2,162	2,176	7,580	3,850	na	4,800	---	na
1987	3,626	2,042	3,254	8,922	3,100	na	5,800	---	na
1988	4,545	2,551	3,573	10,669	813	1,649	6,000	8,462	na
1989	4,983	3,126	4,341	12,450	1,261	2,241	2,362	5,864	na
1990	4,653	2,466	6,382	13,501	1,033	1,060	2,483	4,576	na
1991	2,951	3,426	8,043	14,420	717	na	2,150	---	na
1992	5,063	3,438	7,478	15,979	4,402	1,600	2,562	8,564	na
1993	5,591	3,466	9,116	18,173	na		na	---	na
1994	6,664	3,479	8,808	18,951	na	na	na	---	24 (domestic only)
1995	3,978	3,455	10,025	17,458	na	na	na	---	na
1996	4,362	3,479	9,436	17,277	na	na	na	---	na
1997	4,410	3,457	10,242	18,109	na	na	na	---	na
1998	5,501	3,465	8,880	17,846	na	na	na	---	na
1999	6,416	3,479	9,531	19,426	na	na	na	---	na
2000	7,224	3,470	9,424	20,118	na	na	na	---	na
2001	6,957	3,443	10,134	20,534	na	na	na	---	na
2002	4,894	4,819	9,753	19,466	na	na	na	---	na
2003	5,324	5,250	10,316	20,890	na	na	na	---	109
2004	5,237	5,240	10,088	20,565	na	na	na	---	116
2005	5,774	5,423	NA	---	500	1,100	1,300	2,900	104

Notes:

[1] Pumpage from Parties (2006).

[2] Pumpage estimated using data from SRP (2004), ADWR (2006), Parties (2006) and USGS (2006).

[3] Pumpage estimated using data from ADWR (1994a), SRP (2004) and Parties (2006).

[4] Considered part of Hunt Valley area. Pumpage estimated using data from NRCE (1994) and Parties (2006).

[5] Value is suspect.

na = data not available.

TABLE 5. AGRICULTURAL LANDS IN THE VICINITY OF THE ZUNI RESERVATION

Year	REGION[1]									Data Source
	Concho			Hunt Valley			St. Johns			
	Total Agricultural Lands, in acres	Agricultural Lands Irrigated with Surface Water, in acres[2]	Surface Water Diverted for Agricultural Lands, in acre-feet[3]	Total Agricultural Lands, in acres	Agricultural Lands Irrigated with Surface Water, in acres[4]	Surface Water Diverted for Agricultural Lands, in acre-feet[3]	Total Agricultural Lands, in acres	Agricultural Lands Irrigated with Surface Water, in acres[5]	Surface Water Diverted for Agricultural Lands, in acre-feet[3]	
circa 1980	1,425	1,050	2,100	5,040	4,000	4,000	5,020	5,020	15,220	USDA (1981)
1992-1993[6]	667	567	1,702	3,670[7]	2,880	5,759	6,244	5,221	10,442	ADWR (1994a)
1999-2000[8]	90[9]	45[9]	90[9]	667	nd	nd	2,155	nd	nd	USGS (2005)

Notes:

[1] See Figure 11 for a map that shows the location of Concho, Hunt Valley, and St. Johns Regions.

[2] During 1992-93, ADWR identified 9 surface water diversions supplying agricultural lands in the Concho Region. Seven of the diversions were located on Concho Creek, which is fed by Concho Springs. Concho Water Company was the main irrigation provider.

[3] ADWR calculated surface water diversions for the Concho Region using a water duty of 3 acre-feet/acre based on the Concho Decree, and for the Hunt Valley and St. Johns Regions using a water duty of 2 acre-feet/acre based on the Norviel Decree. USDA estimated surface water diversions using spring and streamflow records, reservoir storage, and 'yield analysis.'

[4] During 1992-93, ADWR identified one main surface water diversion supplying agricultural lands in the Hunt Valley Region. The diversion was located on the mainstem of the Little Colorado River within the Zuni Reservation. There was no known irrigation provider.

[5] During 1992-93, ADWR identified 8 surface water diversions supplying agricultural lands in the St. Johns Region. All of the diversions were located on the mainstem of the Little Colorado River. Lyman Water Company and St. Johns Irrigation Company were the main irrigation providers.

[6] Only includes cropped acreage identified by ADWR in the field; not cropped and discontinued acreage was not included. It was assumed in this table that half (50%) of the lands found to be irrigated by mixed well and surface water sources were supplied with surface water.

[7] In 1994, ADWR (1994b) determined that the Zunis were using surface water to irrigate 840 acres of reservation land and well water to irrigate 358 acres of non-reservation and leased lands within the Hunt Valley Region.

[8] Agricultural lands were mapped from satellite imagery with little or no field verification.

[9] No agricultural lands were identified in the Concho Region by USGS (2005), however it is estimated by ADWR (2006) that during this period, about 45 acres of the golf course at the Concho Valley Country Club were being irrigated using about 90 AFA of surface water.

TABLE 6. POTENTIAL SURFACE WATER SOURCES AND SURFACE WATER DEMANDS FOR THE ZUNI WETLANDS PROJECT[1]

Location	Water Source/ Demand	Type	Average Flow, in acre-feet											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Potential Surface Water Sources:															
Norviel Decree Area	Little Colorado River (LCR)	Decreed Water Released from Lyman Lake	0	0	35	365	647	1,059	624	271	494	129	0	0	3,624[2]
Meadows and Wilhelm Ranches	LCR and Carrizo and Big Hollow Washes	Water Salvaged from Decreed and Non-Decreed Ranch Lands	0	0	30	160	140	60	150	180	140	120	20	0	1,000[3]
Zuni Reservation	LCR	Unappropriated Flows	90	190	340	260	190	50	40	140	70	100	170	90	1,730
Potential Surface Water Demands:															
Zuni Reservation	Primary and Secondary Wetlands, Including the Sacred Lake	See above	100	170	380	660	820	990	710	490	610	280	170	100	5,480

Notes:

[1] Data Source: Stetson (1999).

[2] Due to transmission losses downstream of Lyman Lake, about 3,080 AFA of this total is expected to reach the reservation and be usable for the wetlands project.

[3] Due to transmission losses downstream of the ranches, about 680 AFA of this total is expected to reach the reservation and be usable for the wetlands project.

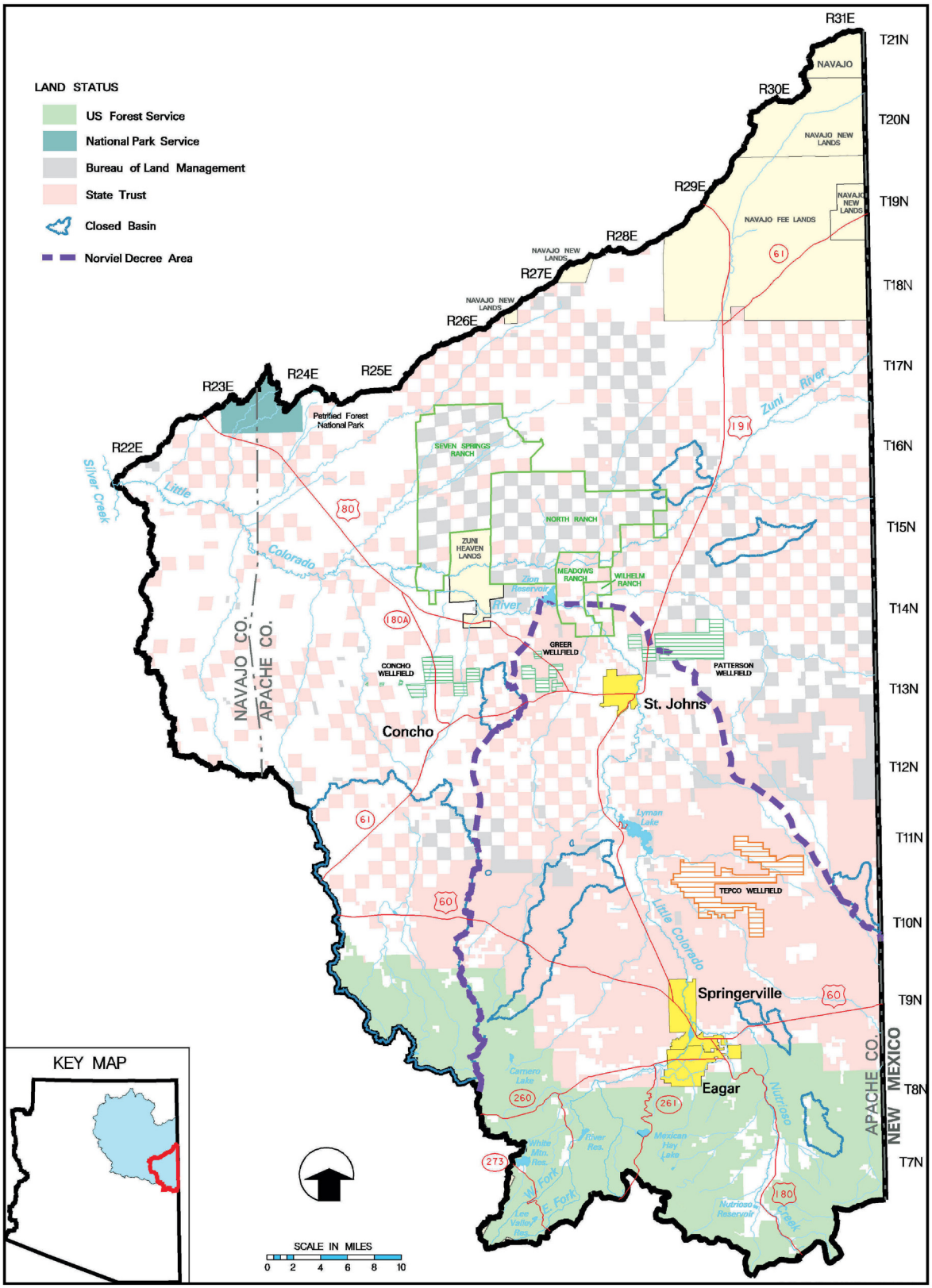
TABLE 7. POTENTIAL WELL WATER DEMANDS FOR THE ZUNI WETLANDS PROJECT[1]

Period	Average Pumpage, in acre-feet												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Initial Project Startup	22	51	99	181	219	267	191	131	166	79	48	22	1,476
Normal Project Maintenance	*Monthly pumpages were not provided*												230
Project Maintenance During Dry Years	*Monthly pumpages were not provided*												800

Notes:

[1] Data Source: Stetson (1999).

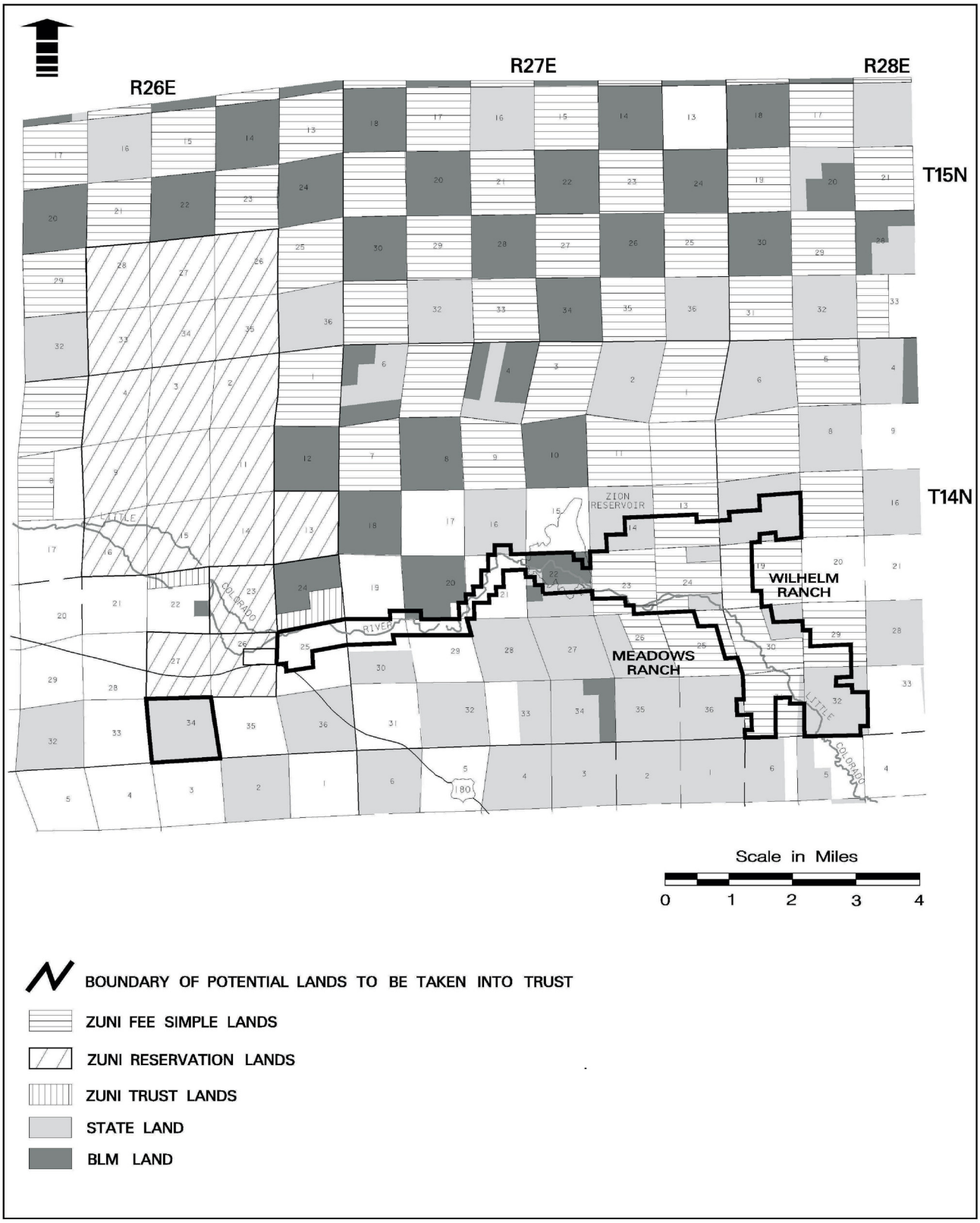
FIGURE 1. EASTERN LCR BASIN AND NORVIEL DECREE AREA



Source: Exhibit 2.10, Zuni Indian Tribe Water Rights Settlement.

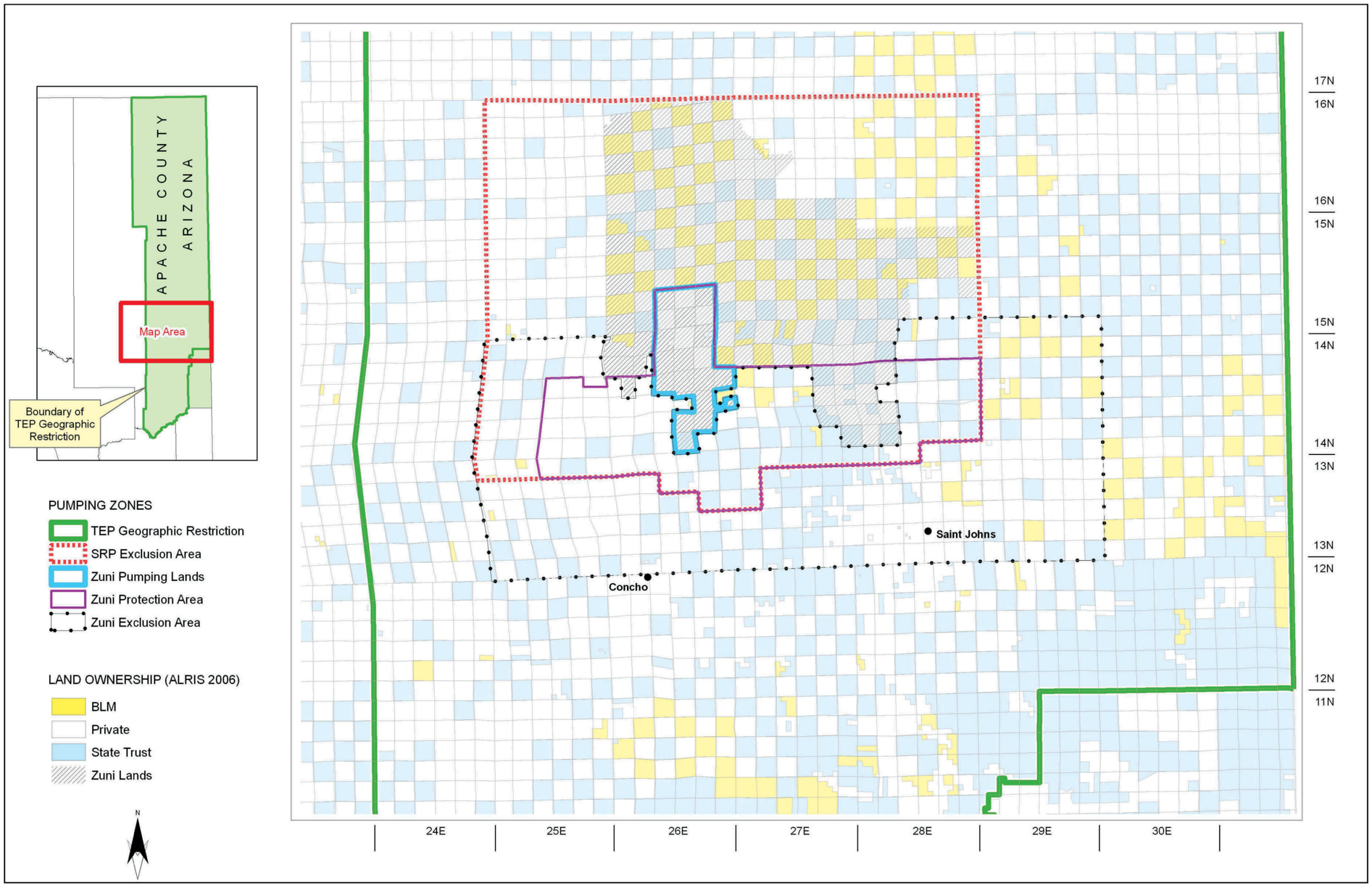
ADWR Technical Report on the Zuni Settlement, May 2006

FIGURE 2. POTENTIAL LANDS TO BE TAKEN INTO TRUST FOR THE ZUNI WETLAND RESTORATION PROJECT

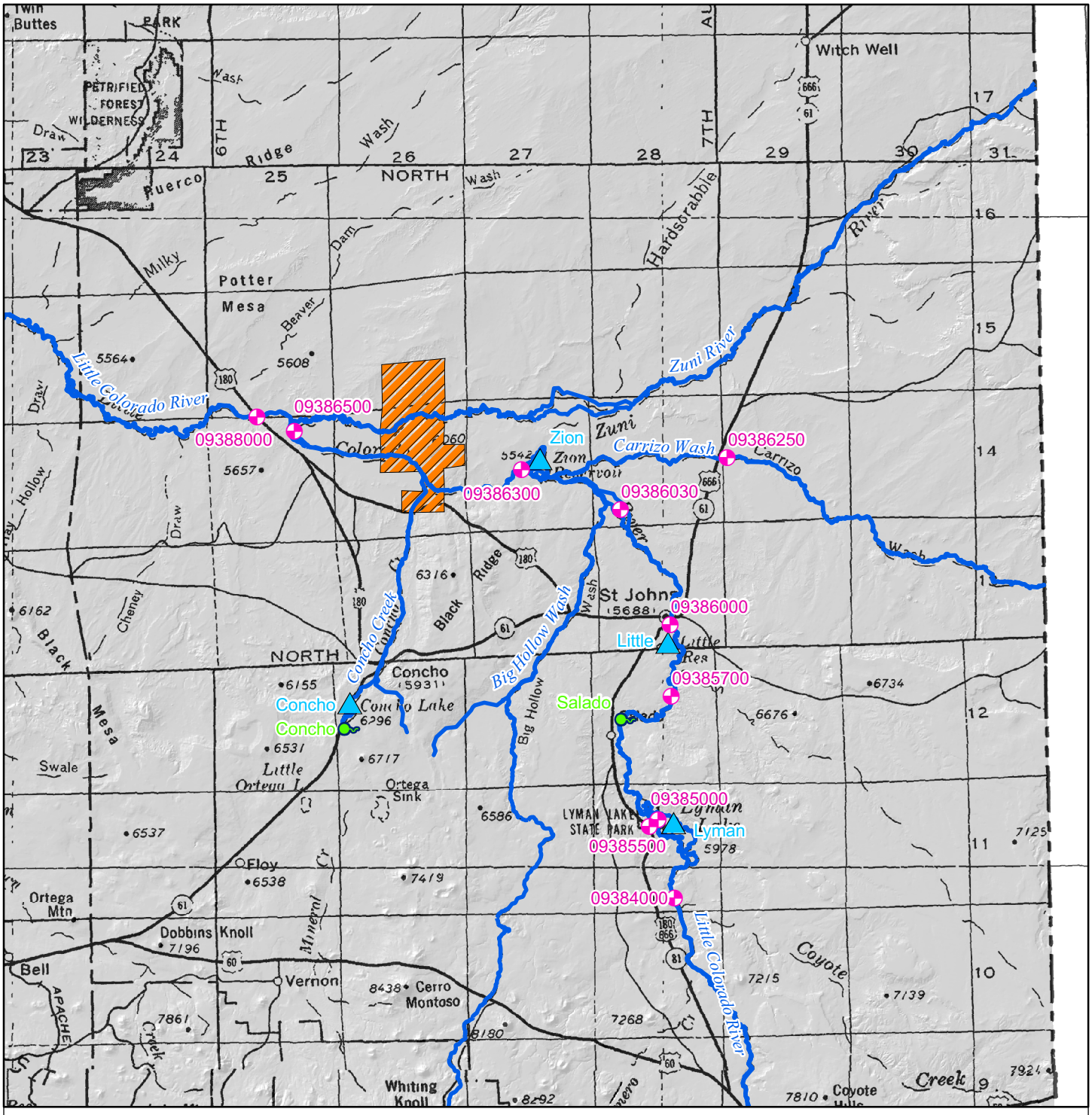


Source: Exhibit 6.1, Zuni Indian Tribe Water Rights Settlement Agreement

FIGURE 3. SRP AND ZUNI EXCLUSION AREAS, TEP GEOGRAPHIC RESTRICTION, AND ZUNI PROTECTION AREA AND PUMPING LANDS



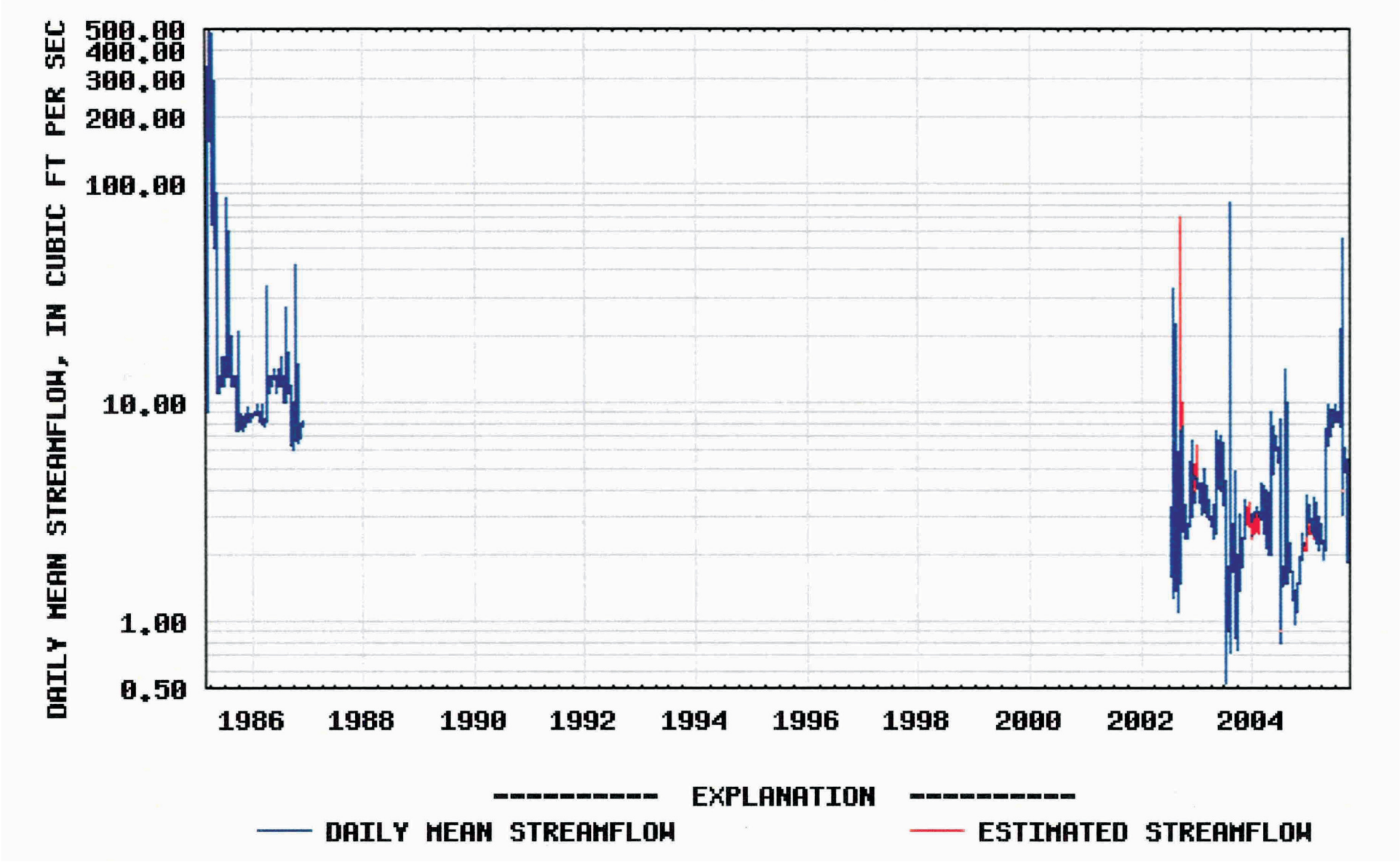
Source: Parties (2006).



Surface Water Resources In The Vicinity Of The Zuni Reservation

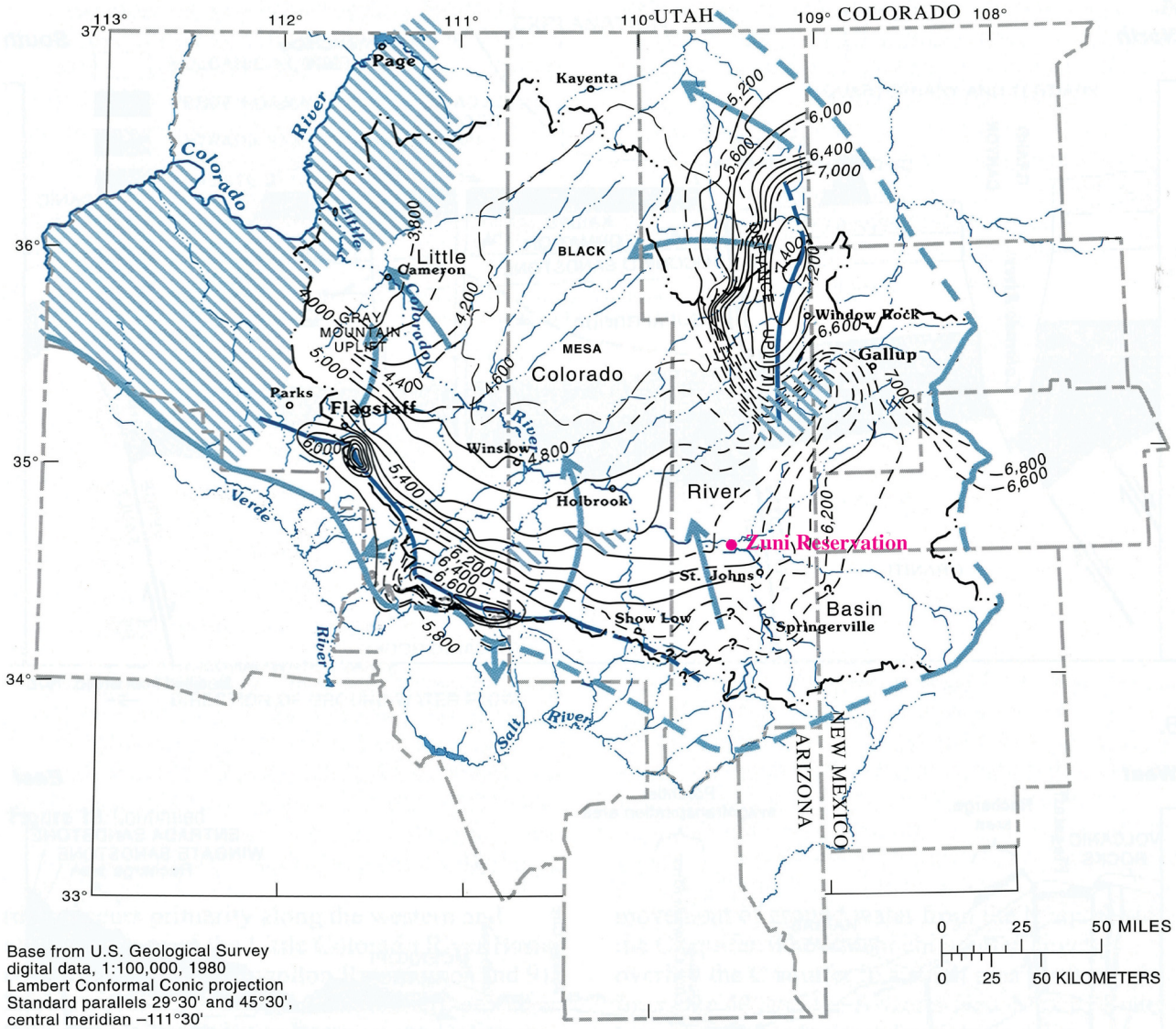
Figure 4

FIGURE 5. STREAMFLOW IN THE LITTLE COLORADO RIVER BELOW SALADO SPRINGS AT USGS GAGE 09385700



Source: USGS (2006).

FIGURE 6. REGIONAL CONDITIONS IN THE COCONINO (C) AQUIFER



Base from U.S. Geological Survey
digital data, 1:100,000, 1980
Lambert Conformal Conic projection
Standard parallels 29°30' and 45°30',
central meridian –111°30'

EXPLANATION

—6,200— —? PONTENTIOMETRIC CONTOUR—Shows altitude at which water level would stand in a tightly cased well penetrating the C aquifer, 1972–85. Dashed where approximately located; queried where inferred. Contour interval 200 feet. Datum is sea level

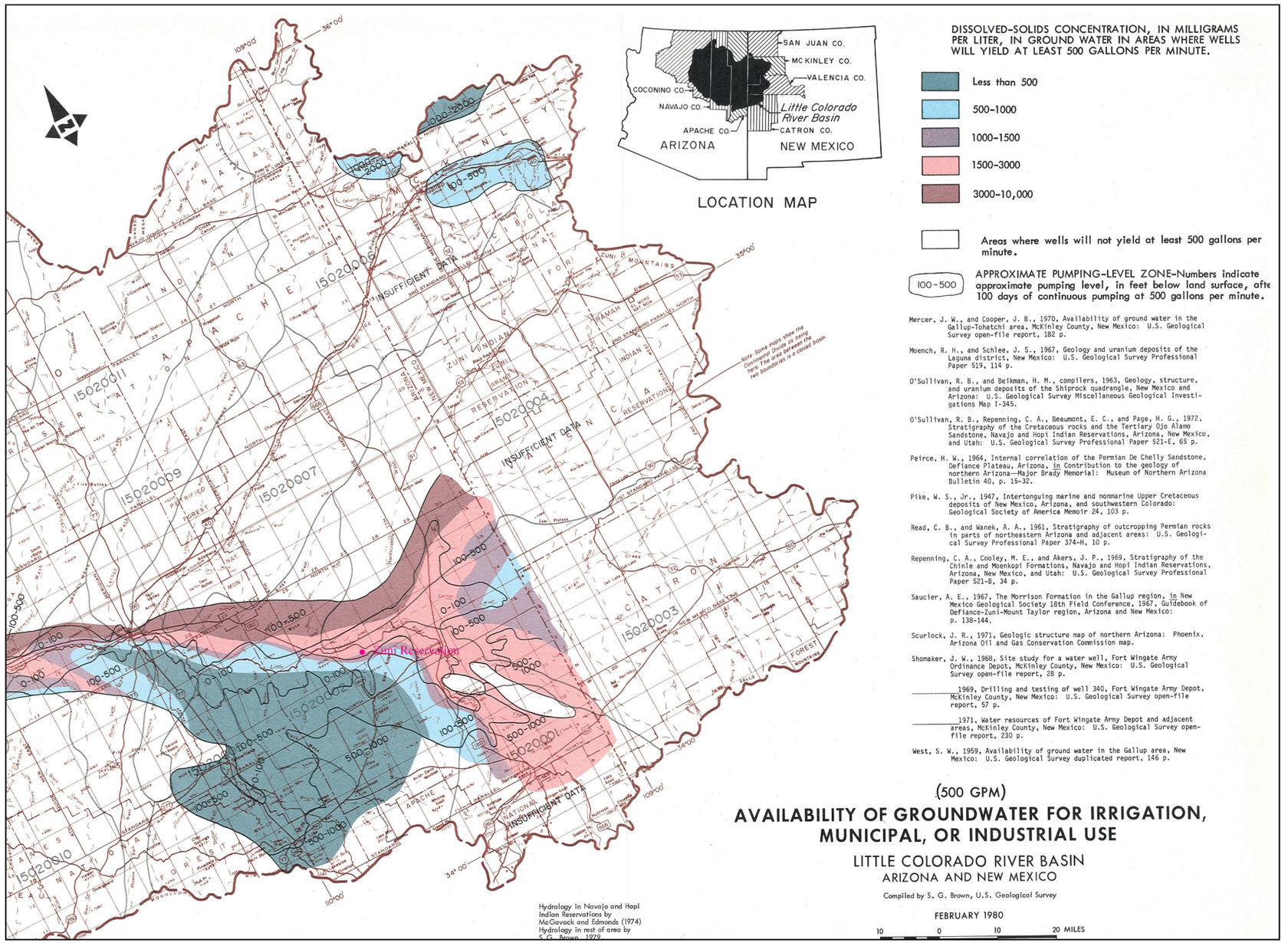
GENERALIZED BOUNDARY OF THE C AQUIFER—Aquifer extends to the Colorado River in Utah. Dashed where boundary uncertain. Hachures indicate approximate areas where the C aquifer is dry except for perched water.

GENERALIZED DIRECTION OF FLOW IN THE C AQUIFER

GROUND-WATER DIVIDE—Dashed where location is uncertain

Source: Hart and others (2002).

FIGURE 7. AREAS YIELDING AT LEAST 500 GPM TO WELLS AND ASSOCIATED WATER QUALITY CONDITIONS



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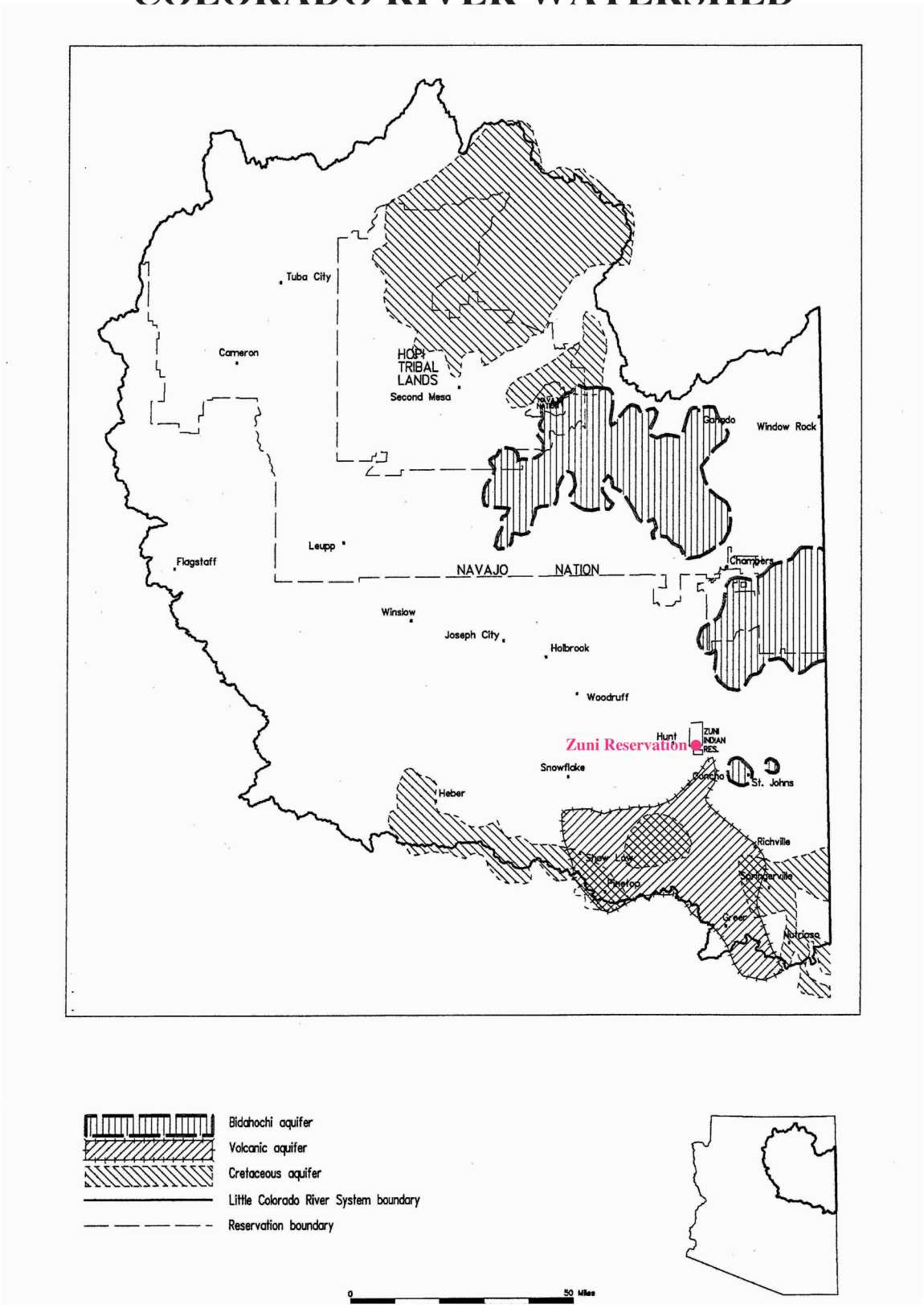
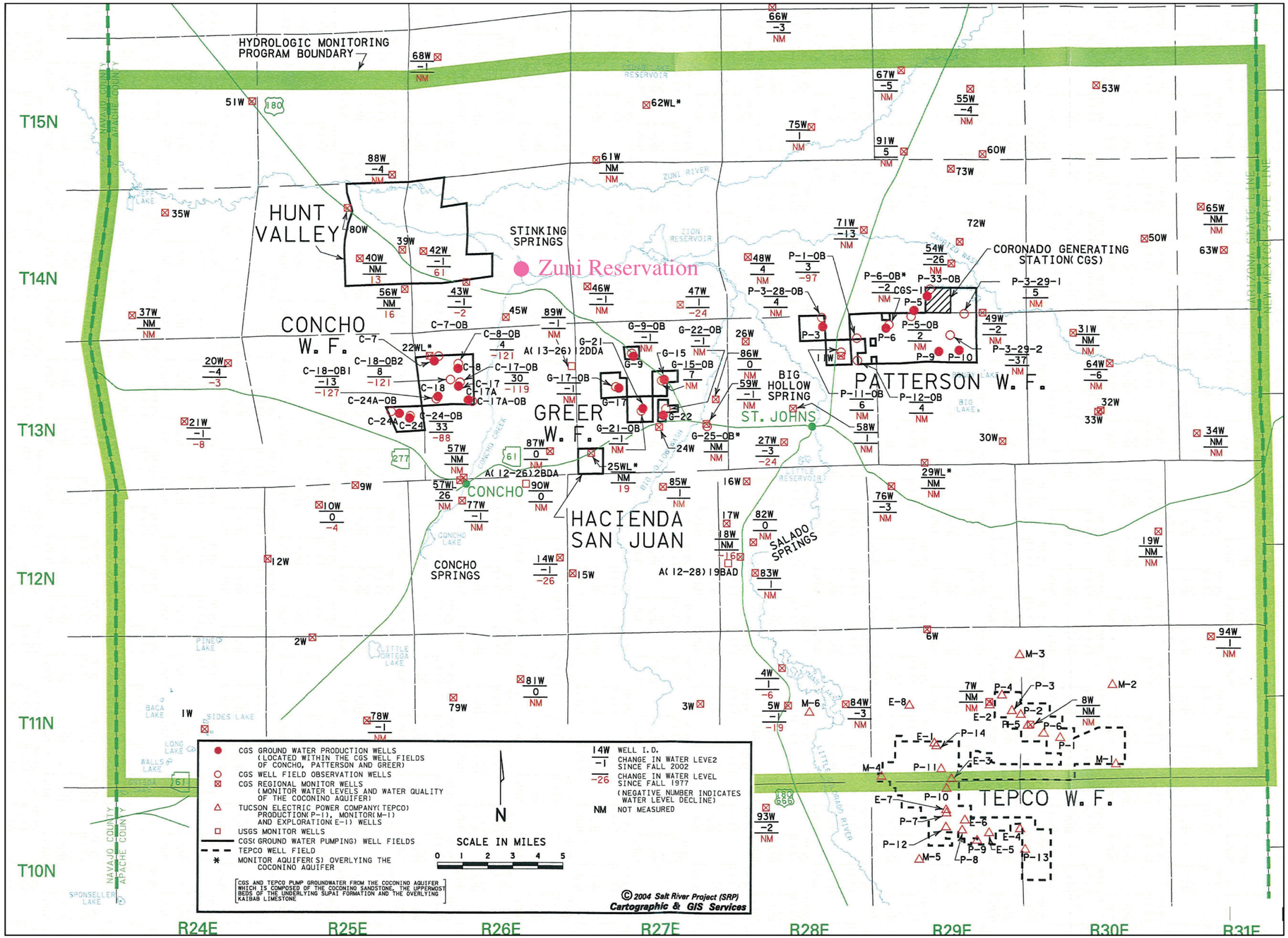
Source: USDA (1981).

FIGURE 8. MINOR AQUIFERS IN THE LITTLE COLORADO RIVER WATERSHED



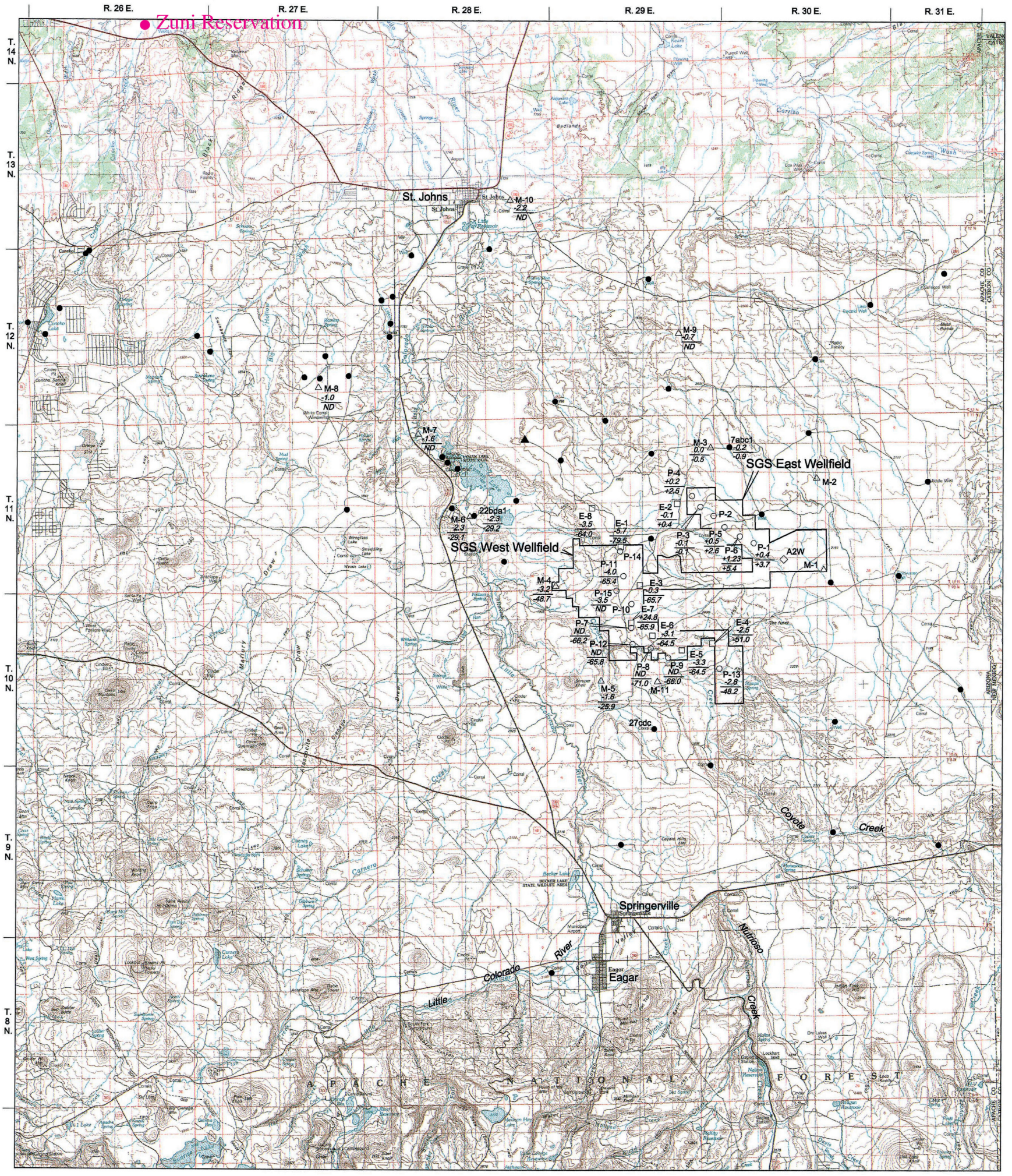
Source: ADWR (1989).

FIGURE 9. WATER LEVEL CHANGES IN THE C AQUIFER BELOW AND ADJACENT TO SRP'S WELL FIELDS



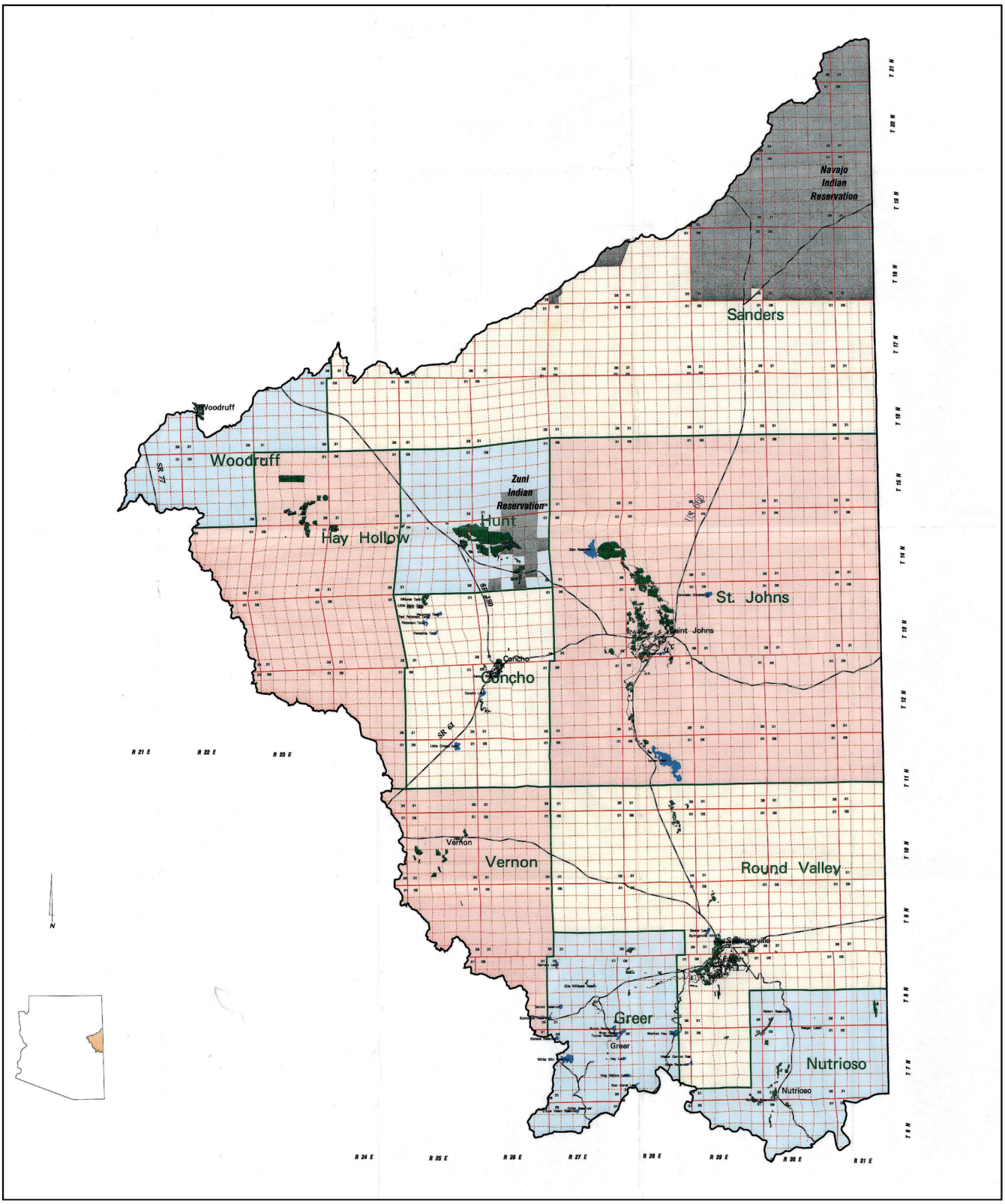
Source: SRP (2004).

FIGURE 10. WATER LEVEL CHANGES IN THE C AQUIFER BELOW AND ADJACENT TO TEP'S WELL FIELD



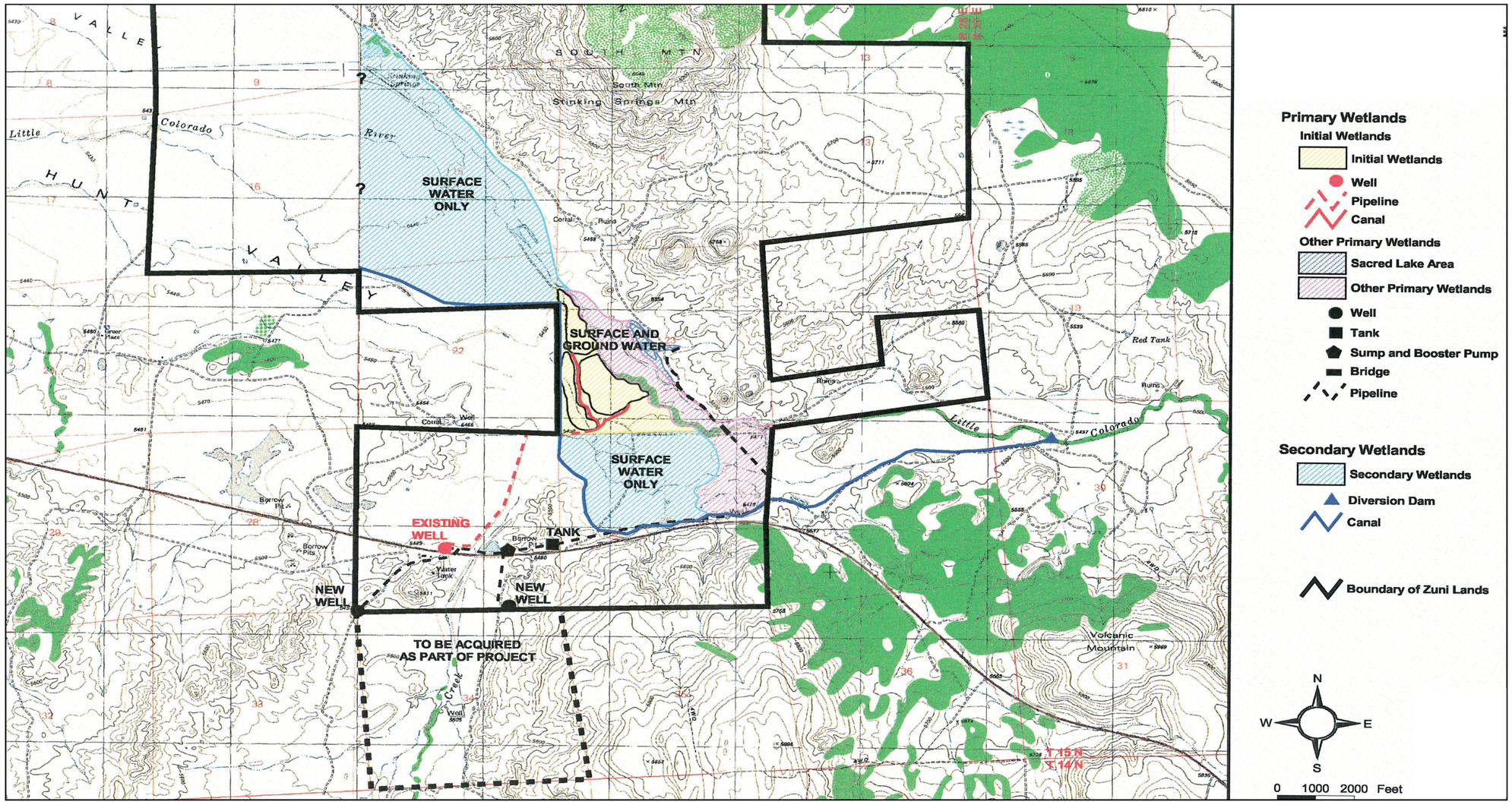
Source: EMAI (2004).

FIGURE 11. AGRICULTURAL REGIONS IN THE VICINITY OF THE ZUNI RESERVATION



Source: ADWR (1994a).

FIGURE 12. PRELIMINARY FEATURES OF THE ZUNI HEAVEN WETLANDS REHABILITATION PROJECT



Source: Stetson (2002b).

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