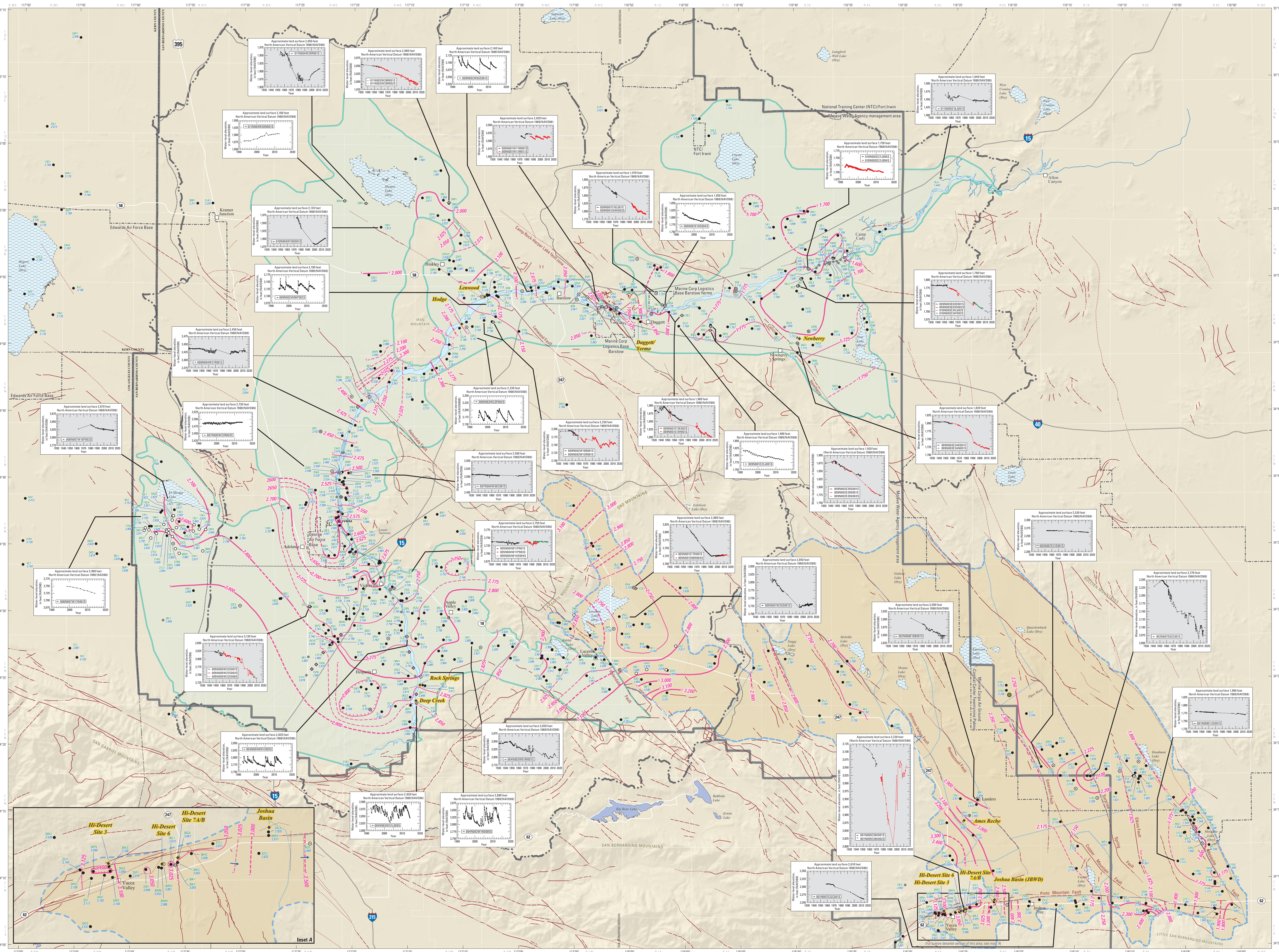

Base from U.S. Geological Survey and other Federal and State digital data, various scales
Universal Transverse Mercator Projection, zone 11.
North American Datum of 1983

NORTH AMERICAN VERTICAL DATUM OF 1988

EXPLANATION

Boundaries

- **Mojave River drainage basin**
- **Mojave River groundwater basin (approximate)**
- **Morongo groundwater basin (approximate)**
- **Morongo groundwater basin subbasin (approximate)**
- **Mojave Water Agency management area**
- **Mojave Water Agency management area subarea**

Perched water table

Military installation

Faults

- Location accurate
- Approximately located
- Concealed

Water-table contour—Shows elevation of water table (spring 2014). Contour interval, in feet, is variable. Contour is querried where uncertain. Thick contours indicate100-foot contour interval. North American Vertical Datum of 1988 (NAVD 88).

- Location approximate
- Location uncertain
- Depression—hachures point into depression

Generalized direction of groundwater flow

11C1 / 1,582 — **Well**—Top number is abbreviated State well number. Bottom number is elevation of water level, in feet above NAVD 88 (spring 2014).

3G93 / 1,710 — **Water-level record may contain pressure-transducer data**—Top number is abbreviated State well number. Bottom number is elevation of water level, in feet above NAVD 88 (spring 2014).

26N2 / 2,886 — **Well with perched water level**—Top number is abbreviated State well number. Bottom number is elevation of water level, in feet above NAVD 88 (spring 2014).

34D1 — **Well with historical data shown on a hydrograph**

3A1 / 2,100 — **Multi-depth well**—Well shown is most shallow and was used to generate water-table contours. Top number is abbreviated State well number. Bottom number is elevation of water level, in feet above NAVD 88 (spring 2014).

3A1 / 2,100 — **Multi-depth well with pressure-transducer data**—Well shown is most shallow and was used to generate water-table contours.

11E10 / 2,861 — **Westbay® well**—Top number is abbreviated State well number. Bottom number is elevation of water level, in feet above NAVD 88 (spring 2014).

Lenwood — **Artificial-recharge site and name**

Victor Valley Wastewater Reclamation Authority (VVWRA)

Hydrograph—Shows period of record for well. Symbols indicate actual data values from National Water Information System (NWIS). Number represents well identifier. Shaded hydrographs are long-term data. Replaced wells are indicated by ⊖ on map.

2014 WATER TABLE

Data for static water levels measured in about 610 wells during March–April 2014 by the U.S. Geological Survey (USGS), the Mojave Water Agency (MWA), and other local water districts were compiled to construct this regional water-table map. This map shows the elevation of the water table and general direction of groundwater movement in and around the Mojave River and Morongo groundwater basins. Water levels recorded by the USGS and MWA staff were measured and compiled according to the procedures described in the Groundwater Technical Procedures of the U.S. Geological Survey (Cunningham and Schalk, 2011). Water-level data submitted by cooperating local water districts were collected by using procedures established by the corresponding agency and were compiled according to the procedures described in the Groundwater Technical Procedures of the U.S. Geological Survey (Cunningham and Schalk, 2011). All data were compared to historical data for quality-assurance purposes. Water-level contours from the 2012 water-level map (Teague and others, 2014) were used as a guide to interpret and shape the 2014 water-level contours in areas where 2014 water-level data were not available; these contours are shown as dashed (approximate) on this water-table map. Water-level data and contours are shown for the Warren subbasin in the Morongo groundwater basin in greater detail on inset A.

The water table is the surface at which the fluid pressure in the pores of a porous medium is exactly atmospheric (Freeze and Cherry, 1979). The water table is defined by the level of the water surface in wells that just penetrate the top of the water body (Lohman, 1972). The water-level measurements used for the water-level contour maps are from wells that have more than one perforated interval in the saturated zone of the groundwater basins. Although these wells can have different perforated zones, the measured water levels from the zones were within about 10 feet (ft) and, therefore, reasonably represent the water-table elevation. Water levels measured from the perched-groundwater zones were not used to construct the water-level contours.

As part of a groundwater-observation network, the USGS, in cooperation with local water agencies, water districts, the military, and private landowners, has constructed many multiple-well monitoring sites. These sites consist of a cluster of two or more observation wells completed at different depths in a single borehole, each typically screened across a 20-foot interval (Huff and others, 2002). Data from the shallowest well of a multiple-well site were used for the regional water-table maps.

BACKGROUND

The Mojave River and Morongo groundwater basins are approximately 80 miles north and 40 miles northeast of Los Angeles, respectively, in the southwestern part of the Mojave Desert in southern California (fig. 1). The Mojave River and Morongo groundwater basins together have an area of about 2,400 square miles. The climate of these basins is typical of the Mojave Desert region of southern California. Most areas of the basin floor receive 4 to 6 inches of precipitation each year, although annual precipitation can be greater than 40 inches in the southern and eastern San Bernardino and the San Gabriel Mountains (Lines, 1996). Recharge of the groundwater system from direct infiltration of precipitation is minimal.

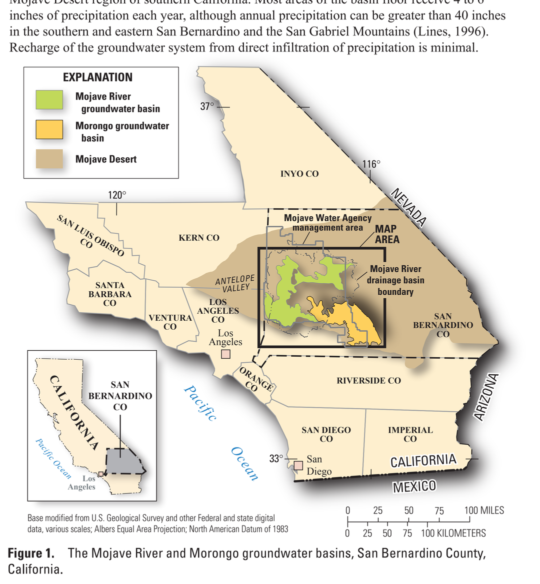

Figure 1. The Mojave River and Morongo groundwater basins, San Bernardino County, California.

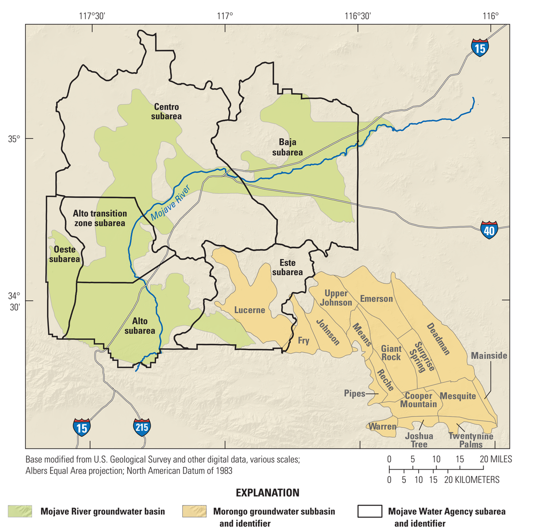

Figure 2. The Mojave Water Agency subareas and the Morongo groundwater subbasins of the Mojave River and Morongo groundwater basins, respectively.

The primary sources of groundwater recharge in the Mojave River groundwater basin are intermittent streamflow, usually during January through March, in the Mojave River and sporadic releases of imported water from the California State Water Project (SWP). The basin has received SWP water at the Rock Springs recharge site (near well 4N/3W-29E5), southeast of Hesperia, since 1994; at the Hodge recharge site (near well 9N/3W-23D2) since 1999; at the Lenwood recharge site (near well 9N/3W-1R7) since 1999; at the Yermo/Daggett recharge site (near well 9N/1E-20B3) since 2003; and at the Newberry Springs recharge site (near well 9N/3E-22R7) since March 2006 (Brian Hammer, Mojave Water Agency, written commun., April 2006).

MORONGO GROUNDWATER BASIN

The Morongo groundwater basin has an area of about 1,000 square miles and is bounded by the Ord and Granite Mountains to the north, the Bullion Mountains to the east, the San Bernardino Mountains to the southwest, and the Little San Bernardino Mountains to the south. The Morongo groundwater basin contains 17 subbasins: Lucerne, Fry, Johnson, Upper Johnson, Means, Pipes, Reche, Emerson, Giant Rock, Copper Mountain, Surprise Spring, Deadman, Mesquite, Mainside, Warren, Joshua Tree, and Twentynine Palms (fig. 2). The Morongo groundwater basin is recharged by infiltration of flow in ephemeral stream channels and, since 1995, by SWP water supplied to ponds at three Hi-Desert Water District recharge sites (near wells 1N/5E-36M5 and 1N/5E-34Q1) in the Warren subbasin.

GEOHYDROLOGY

GROUNDWATER MOVEMENT

MOJAVE RIVER GROUNDWATER BASIN

MORONGO GROUNDWATER BASIN

LONG-TERM AND SHORT-TERM WATER-LEVEL CHANGES

MOJAVE RIVER GROUNDWATER BASIN

MORONGO GROUNDWATER BASIN

WATER-LEVEL CHANGES 2012–2014

REFERENCES CITED

Regional Water Table (2014) in the Mojave River and Morongo Groundwater Basins, Southwestern Mojave Desert, California

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