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Hydrology, Water Chemistry, and Revised Water Budgets for Tracy Segment Hydrographic Area, Storey, Washoe, and Lyon Counties, West-Central Nevada, 1998-2002

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ABSTRACT

Growth of the Reno/Sparks metropolitan area has resulted in development of rural and undeveloped land in the nearby Tracy Segment Hydrographic Area. A study of hydrology, inorganic water chemistry, distribution and movement of ground water, and water budgets for the 285 square mile hydrographic area began in 2000. Streamflow from the Truckee River and precipitation are dominant inflows of water to the Tracy Segment, and combined streamflow from the river and the Truckee Canal, along with evapotranspiration and consumptive water-use are the primary outflows. Estimated long term (1971–2000) mean-annual precipitation ranges in the study area from 150,000 to 200,000 acre-feet per year and during this study (water years 1998–2002) the range was adjusted from 130,000 to 174,000 acre-feet per year. Water year used herein is the 12-month period October 1 through September 30. The water year is designated by the calendar year in which the 12-month period ends. Data from two micrometeorological stations located at 5,000 and 6,000 feet above sea level indicated that evapotranspiration of surface and soil moisture consumed 124,000 to 158,000 acre-feet per year during water year 2002. An additional 6,000 acre-feet per year is estimated to be transpired from ground water by phreatophytes.

Average flow of the Truckee River (water years 1998–2002) was 614,000 acre-feet per year at the upstream Tracy Segment Hydrographic Area boundary and 616,000 acre-feet per year near the downstream boundary crossed by the Truckee River and Truckee Canal. Five active agricultural diversions and one industrial diversion total an average flow of 9,000 acre-feet per year. About 5,000 acre-feet per year of flow may discharge to the river from tributary ephemeral channels. Streamflow data indicate a net gain of 11,000 acre-feet per year from ground water. Seepage loss to ground water beneath the Truckee Canal was estimated to be about 9,000 acre-feet per year, much of which contributed to gains in the lower reach of the river.

Depth to water at 30 wells ranged from about 25 feet above land surface at a flowing well completed in permeable bedrock to more than 400 feet below land surface in a test well completed in bedrock beneath an alluvial fan. Water levels measured in wells completed in

basin-fill deposits near the Truckee River are less than 30 feet below land surface and indicate a hydraulic gradient that parallels the river. Subsurface inflow from the Fernley Hydrographic Area was estimated at 3,200 acre-feet per year, most of which was from diverted irrigation water. Ground-water pumpage (2000) was 8,200 acre-feet per year and subsurface outflow to Dodge Flat Hydrographic Area was estimated at 2,400 acre-feet per year.

Ground-water samples collected from 11 wells indicated that ground water generally is suitable for drinking water and industrial supplies with a few exceptions. Concentrations of dissolved arsenic exceeded the current maximum contaminant level (50 micrograms per liter) at two sites and the future maximum contaminant level (10 micrograms per liter) was exceeded at four additional sites. The proposed maximum contaminant level for dissolved radon gas (300 picocuries per liter) was exceeded in 10 of the 11 samples collected. Secondary maximum contaminant levels for dissolved fluoride, manganese, iron, and dissolved solids were exceeded at three, two, one, and two wells, respectively. Stable isotopes of hydrogen and oxygen in samples indicate that 8 ground-water samples are mixtures of 11–94 percent Truckee River water and ground water represented by samples from 3 wells completed in the mountain blocks.

Water-budget estimates for water years 1998 through 2002 indicate total inflow ranged from 748,000 to 791,000 acre-feet per year and outflow ranged from 759,000 to 793,000 acre-feet per year. Ground-water inflow ranged from 78,000 to 101,000 acre-feet per year and outflow was 88,000 acre-feet per year. Surface water of the Truckee River dominates both total- and ground-water budget estimates, comprising about 80 percent of total inflow and outflow, and about 61 and 81 percent of ground-water inflow and outflow, respectively. Ground-water pumpage is about 9 percent of ground-water discharge.

Contents

Abstract

Introduction

 Background

 Purpose and Scope

 Acknowledgments

Methods Used In This Study

 Collection of Hydrogeologic Data

 Estimation of Ground-Water Recharge and Discharge

Description of Study Area

 Geographic Setting

 Climate and Vegetation

Hydrogeologic Setting

 Physical Properties of Hydrogeologic Units

Hydrology

 Annual Precipitation

 Evapotranspiration

 Surface Water

 Truckee River and Diversions

 Ephemeral Streams

 Gains and Losses of the Truckee River

 Ground-Water Distribution and Movement

- Springs
- Water Chemistry
 - Major Ions
 - Trace Elements and Radon Gas
 - Ratios of Oxygen and Hydrogen Stable Isotopes
- Estimates of Recharge, Discharge, and Subsurface Flow
 - Recharge
 - Empirical Estimates
 - Chloride-Mass Balance
 - Water-Mass Balance
 - Recharge from Intermittent Streamflow
 - Recharge from Truckee River Water
 - Estimation of Secondary Recharge
 - Discharge
 - Subsurface Inflow and Outflow
- Estimated Water Budget
- Summary and Conclusions
- References Cited

Figures

Figure 1. Location and selected geographic features of Tracy Segment HA and other hydrographic areas and locations of selected National Weather Service precipitation stations in west-central Nevada

Figure 2. Locations of wells, precipitation sites, surface-water gage sites, micrometeorological sites, neutron-logging access-borehole/chloride-profile sites, and ephemeral streambed temperature-profiles sites, in and near the Tracy Segment Hydrographic Area, west-central Nevada.

Figure 3. Annual precipitation and cumulative departure from average annual precipitation measured at Virginia City and Reno, west-central Nevada, 1971–2002.

Figure 4. Generalized distribution of dominant land cover, Tracy Segment Hydrographic Area, west-central Nevada.

Figure 5. Generalized geologic units and structural features of Tracy Segment Hydrographic Area, west-central Nevada

Figure 6. Average daily evapotranspiration measured at the desert shrub site at 5,200 ft altitude, and at the pinion-juniper forest site at 6,100 ft altitude, January 2001–October 2002, Tracy Segment Hydrographic Area, west-central Nevada

Figure 7. Average monthly evapotranspiration measured at the desert shrub site at 5,200 ft altitude, and at the pinion-juniper forest site at 6,100 ft altitude, January 2001–October 2002, Tracy Segment Hydrographic Area, west-central Nevada

Figure 8. Average water-level altitude for wells, 2000–2002, in and near the Tracy Segment Hydrographic Area, west-central Nevada.

Figure 9. Measured water-level fluctuations in selected wells completed in consolidated-rock aquifers in the mountain block, 2000–2002, Tracy Segment Hydrographic Area, west-central Nevada 28

Figure 10. Measured water-level fluctuations in selected wells completed in consolidated-rock aquifers beneath alluvial-fan deposits, 2000–2002, Tracy Segment Hydrographic Area, west-central Nevada.

Figure 11. Relation between water-level fluctuations in nearby wells and Truckee River stage measured at U.S. Geological Survey streamflow-gaging station at Site 13 and near Site 14, Tracy Segment Hydrographic Area, west-central Nevada

Figure 12. Relation of deuterium to oxygen-18 for selected ground-water and Truckee River water samples, Tracy Segment Hydrographic Area, west-central Nevada

Figure 13. Chloride concentrations in pore water of unsaturated sediment, at selected sites in the Martin Canyon drainage basin, Tracy Segment Hydrographic Area, west-central Nevada.

Figure 14. Changes in volumetric moisture content in unsaturated sediments at selected depths at selected sites in the Martin Canyon drainage basin, June 2001 through September 2002, Tracy Segment Hydrographic Area, west-central Nevada.

Figure 15. Relation of precipitation reported for National Weather Service station near Virginia City and maximum discharge recorded at crest-stage station on Long Valley Creek near Lockwood, Tracy Segment Hydrographic Area, west-central Nevada.

Figure 16. Hourly subsurface temperature recorded beneath intermittent stream channels in A, Long Valley Canyon and B, Martin Canyon, Tracy Segment Hydrographic Area, and cumulative precipitation recorded at Virginia City, west-central Nevada.

Tables

Table 1. Table 1. Site number, location, and type of data available for precipitation, micrometeorological, soil-moisture and chloride-profile, thermocouple, surface-water, wells, and dry boreholes, Tracy Segment Hydrographic Area, west-central Nevada.

Table 2. Transmissivity of bedrock estimated by pumped-aquifer tests, Tracy Segment Hydrographic Area, west-central Nevada.

Table 3. Precipitation data, normalized to 1971-2000, and selected estimates for stations in and near the Tracy Segment Hydrographic Area, west-central Nevada.

Table 4. Estimated vegetation and land classification coverage, Tracy Segment Hydrographic Area, west-central Nevada.

Table 5. Estimated mean annual precipitation, Tracy Segment Hydrographic Area, west-central Nevada.

Table 6. Average, maximum, minimum, and seasonal daily evapotranspiration rates, computed using the Bowen-ratio method, January 2001-September 2002, and annual total evapotranspiration for water year 2002, Tracy Segment Hydrographic Area, west-central

Nevada.

Table 7. Information for surface-water gaging stations and diversions in and near Tracy Segment Hydrographic Area, west-central Nevada.

Table 8. Estimated area and mean annual runoff from ephemeral streams, Tracy Segment Hydrographic Area and selected subbasins (estimates are rounded), west-central Nevada.

Table 9. Peak discharge at Long Valley Creek crest-stage gage (10350100) and precipitation recorded at National Weather Service station near Virginia City, Tracy Segment Hydrographic Area, west-central Nevada.

Table 10. Gain or loss of Truckee River streamflow in Tracy Segment Hydrographic Area, west-central Nevada, based on the difference between discharge measured by the USGS at the Truckee River gaging station at Vista and the sum of discharge measured at the Truckee River gaging station at Vista and the sum of discharge measured at the Truckee River gaging station at Wadsworth and at the Truckee Canal near Wadsworth.

Table 11. Summary of streamflow measurements and gains to and losses from Truckee River, Tracy Segment Hydrographic Area, west-central Nevada, 1971–1994.

Table 12. Nevada safe drinking-water standards.

Table 13. Statistical summary of ground-water quality data, Tracy Segment Hydrographic Area, west-central Nevada, 2001-2003.

Table 14. Statistical summary of surface-water quality data, U.S. Geological Survey Station Number 10350500, Truckee River at Clark, Tracy Segment Hydrographic Area, west-central Nevada, 1991-2003.

Table 15. Percent composition of local recharge water and Truckee River water estimated from stable isotopic mixing for ground-water samples collected in the Tracy Segment Hydrographic Area, west-central Nevada.

Table 16. Estimated mean annual recharge from precipitation, Tracy Segment Hydrographic Area, west-central Nevada.

Table 17. Chloride concentrations in pore-water extracts and selected physical characteristics of unsaturated-sediment samples collected from six test holes drilled in the Martin Canyon drainage basin, Tracy Segment Hydrographic Area, west-central Nevada.

Table 18. Cumulative mass of chloride in pore water in unsaturated sediment samples, and chloride-age and average annual recharge rates estimated by chloride-mass balance, Tracy Segment Hydrographic Area, west-central Nevada.

Table 19. Estimates of ground-water discharge, Tracy Segment Hydrographic Area, west-central Nevada.

Table 20. Estimates of water budget and of ground-water inflow and outflow for Tracy Segment Hydrographic Area, west-central Nevada, 1998-2002.

This report is contained in the following files:

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