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SLIDES: Ground-Water Resources in the Western United States: Status and Trends

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Ground-Water Resources in the western United States

Status and trends
Figure 4. The principal aquifers of the United States are in six types of rocks and deposits. The geologic zones, advancing from center, are: (1) sand and gravel aquifers, (2) sandstone and conglomerate aquifers, (3) limestone and dolomite aquifers, (4) sandstone and carbonate rock aquifers, (5) sandstone and carbonate rock aquifers, and (6) sandstone and carbonate rock aquifers. Sand and gravel aquifers are found in many areas of the country.
DEFINITION OF BOUNDARY AND INITIAL CONDITIONS IN THE ANALYSIS OF SATURATED GROUND-WATER FLOW SYSTEMS — AN INTRODUCTION
I - O = ΔS
I − O = ΔS

I = O
Increase in recharge → Removal of water stored in the system → Decrease in discharge
Schematic of the artificial recharge process

- Sedgwick site
- Treatment
- Little Arkansas River
- Source water
- Halstead site
- Diversion
- Recharge basin
- Diversion
- Recharge trench
- Seepage
- Recharge basin
- Flow into deeper aquifer
- Flow captured by pumping well
- Confining clay layer
- Equus Beds aquifer—receiving ground water

Not to scale
Estimated Baseflow - Frenchman Creek near Imperial, Ne (6831500)

<table>
<thead>
<tr>
<th>Water Year</th>
<th>Avg 1950</th>
<th>Avg 1986</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1940</td>
<td>53,390</td>
<td>18,552</td>
<td>-34,838</td>
</tr>
<tr>
<td>1942</td>
<td>47,952</td>
<td>17,278</td>
<td>-30,674</td>
</tr>
</tbody>
</table>

(values in ac-ft)
Map of perennial stream reaches in Kansas
GROUND-WATER USE (MGD) IN THE 17 WESTERN STATES

TOTAL GW
IRRIGATION
PUBLIC SUPPLY
DOMESTIC


USGS
Aquifer

- High: 703.2
- Average: 657.1
- Low: 612.5
- Difference: .6 ft.

USGS
Provisional Data Subject to Revision
We thought the aquifer looked like this...

The light blue areas represent the most productive part of the aquifer.

But it really looks like this:

[Diagram showing detailed aquifer structure with labels for Rio Puerco, West Mesa, Rio Grande, Northeast Heights, Sandias, and Ancestral Rio Grande Deposits]
Mayor Martin Chavez announced Albuquerque’s water conservation goal to reduce our use by 40% by 2014.

WATER REBATES

🌟 XERISCAPE
🌟 TOILET
🌟 WASHING MACHINE
🌟 WATER RECIRCULATION
🌟 FREE AUDIT/RETROFIT
🌟 RAINWATER HARVESTING
🌟 DISHWASHER
🌟 MULTI-SETTING SPRINKLER TIMER
Modified from:

EXPLANATION

Central Valley

Redding Basin—Included with Northern California basin-fill aquifers

Central Valley aquifer system subregions

- Sacramento Valley
- Sacramento-San Joaquin Delta
- San Joaquin Valley
- Tulare Basin

Central Valley drainage basin boundary

Land subsidence from 1926 to 1970

Subsidence (feet)

- Less than 1
- 1 to 4
- 4 to 8
- 8 to 12
- 12 to 16
- 16 to 24
- Greater than 24

(Modified from Poland and others, 1975)
During the droughts of 1976–77 and 1987–91, deliveries of imported water to the west side of the San Joaquin Valley were cut back. More ground water was pumped to meet the demand, resulting in a drop in the water table and consequent compaction.

Some elastic expansion of the aquifer system has occurred, but the compacted materials can never return to their pre-compacted thickness.
EXPLANATION

Coastal Basins aquifers

California Department of Water Resources, 1980,
Ground water basins in California: California
Department of Water Resources Bulletin 118-80, 73 p.
As a percentage of the total, ground-water use has dropped significantly, but total water use is rising.
Figure 53. Pliocene and younger basaltic-rock aquifers predominate in the eastern plain, whereas unconsolidated-deposit aquifers predominate in the western plain.

EXPLANATION
Snake River Plain regional aquifer system:
- Unconsolidated-deposit aquifers
- Pliocene and younger basaltic-rock aquifers
- Volcanic- and sedimentary-rock aquifers
- Miocene basaltic-rock aquifers

Base modified from U.S. Geological Survey National Atlas, 1:2,000,000, 1970
Modified from Whitehead, 1997

SCALE 1:2,500,000
0 25 50 MILES
0 25 50 KILOMETERS

USGS
Ground Water Atlas of the United States

The series consists of 13 chapters which describe the ground-water resources of regional areas that collectively cover the 50 States, Puerto Rico, and the U.S. Virgin Islands.

Each of the 13 chapters is published as a Hydrologic Investigations Atlas (HA).

For chapter author, table of contents and book availability: