CLARK, LINCOLN, AND WHITE PINE COUNTIES GROUNDWATER DEVELOPMENT PROJECT EIS

WATER RESOURCES TECHNICAL REVIEW
MEETING 1 – BASELINE DATA
June 23-24, 2005

HYDROLOGY – GROUNDWATER – WATER LEVELS

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Southern Nevada Water Authority

Presentation Organization

- Definitions
- Water-level data types
- Common methods of measurement
- Uses of water-level data
- Study area
- Sources of data
- Project basins observations
- Data Considerations
- How to access the data

Definitions

- **Water level (or depth to water)**
  - The level of water in a borehole or well at a particular time.
  - The level can be reported as depth to water below land surface or from a reference point.
- **Water-level elevations**
  - Water-level elevations are calculated by subtracting the depth to water from the elevation of your reference point (i.e., Land surface or measuring point)

Water-level Data Types

- **Primary Types of Information**
  - Site location information (GPS coordinates, legal descriptions)
  - Depth to water
  - Elevation of land surface or measuring point
- **Secondary Types of Information**
  - Well construction information (e.g., hole size, casing diameter, perforated intervals)
  - Lithology of the borehole
  - Aquifer(s) tapped

Common Methods of Measurement

- Graduated steel tape
- Electrical methods
- Air line methods

Uses of Water-Level Data

- Determination of steady-state conditions
- Construction of water-level contour maps
- Assessment of directions of groundwater flow
- Estimating hydraulic characteristics of an aquifer

Study Area

- Data collected for an area slightly larger than the “General Hydrologic Study Area”
- Includes portions of Clark, Lincoln, and White Pine counties in Nevada
- Includes hydrographic areas in Utah (parts of Snake and Hamlin Valleys)

Sources of Data

- U.S. Geological Survey's (USGS) National Water Information System (NWIS) / Groundwater Site Inventory (GWSI) database
- Nevada Department of Water Resources (NDWR) "Well Log" database
- Southern Nevada Water Authority (SNWA) data
- Other Sources of Data
  - Published reports, maps, and online databases (including Utah data)

USGS NWIS / NWISWeb Data

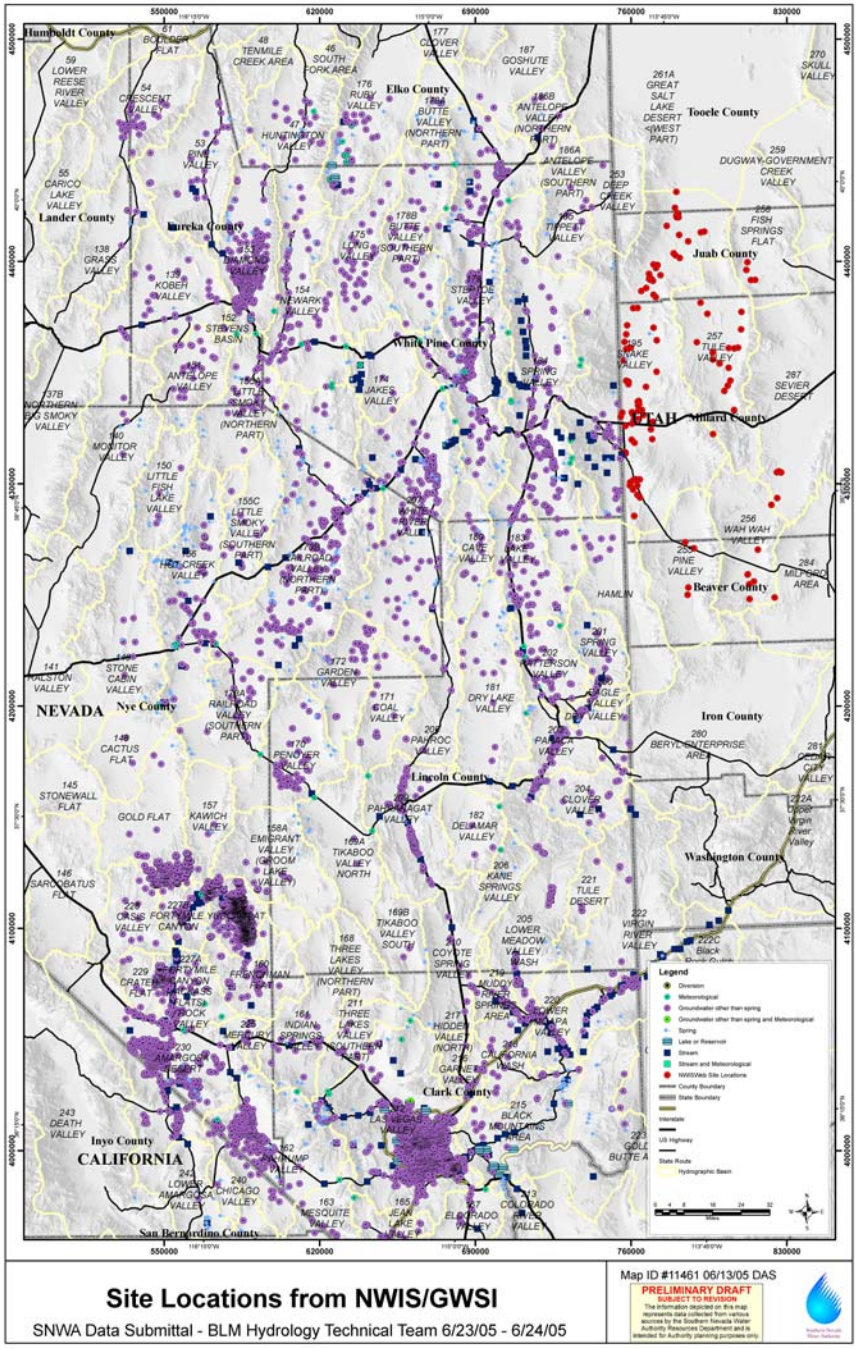
- NWIS/GWSI data obtained from the Henderson, NV USGS district office June 2, 2004
- Data included:
  - Site information (10,044 records)
  - Depth to water (94,269 records)
  - Borehole, casing, and open interval information
  - Discharge
  - Site remarks
  - Lithology
- Data obtained as a set of *.rdb files that were loaded into an Microsoft Access database

USGS NWIS / NWISWeb Data (cont'd)

- Data obtained from http://waterdata.usgs.gov/nwis
- Obtained from website to include locations in Utah
  - Contains only site location and depth to water data

Spatial Distribution of NWIS Locations

- NWIS/GWSI period of record
  - 1905-2004
- NWISWeb period of record
  - 1850-2004
- Of the locations, over 4,200 had depth-to-water measurements



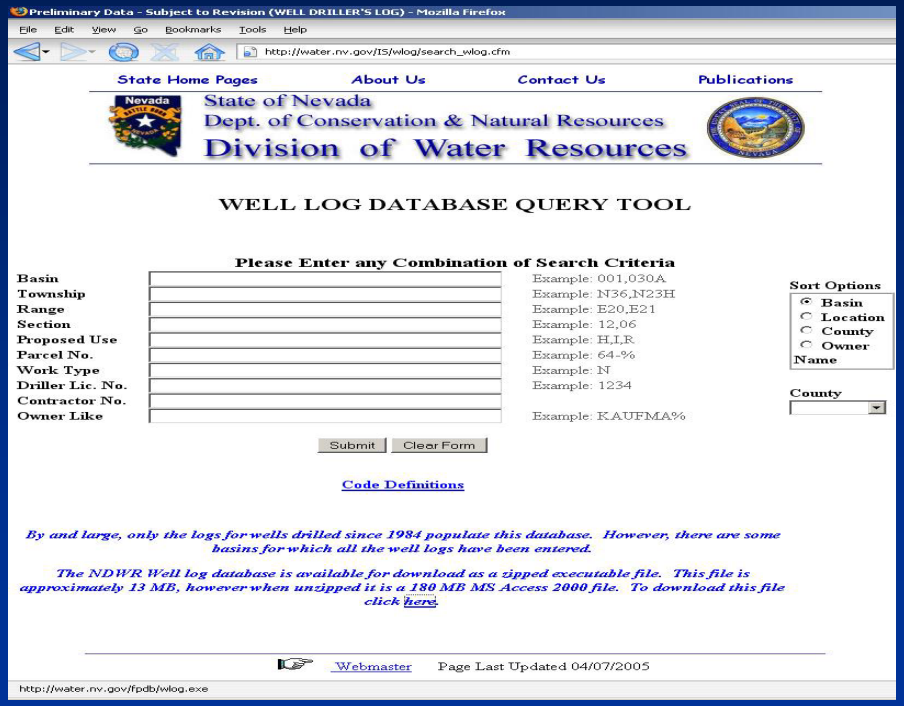
Site Locations from NWIS/GWSI

SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05

Map ID #11461 06/13/05 DAS

PRELIMINARY DRAFT
SUBJECT TO REVISION

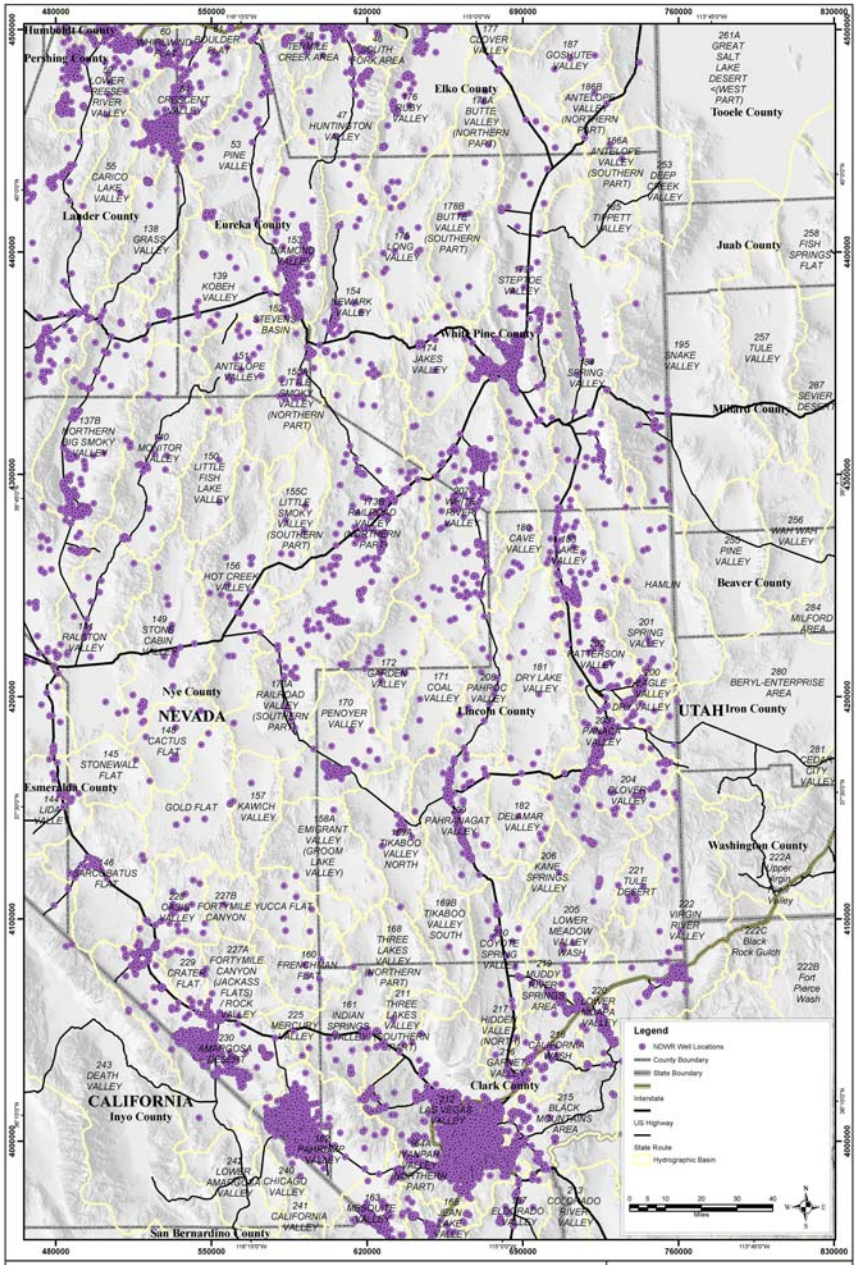
NDWR Well Log Database



- Obtained from URL http://water.nv.gov/IS/wlog/wlog.htm
- Contains 3 different tables
  - Contractor: 437 records
  - Driller: 2,274 records
  - WLOG: 83,868 records

Spatial Distribution of NDWR Locations

(in study area vicinity)



Site Locations from NDWR Well Log Database

SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05

Map ID #11462 06/13/05 DAS

PRELIMINARY DRAFT
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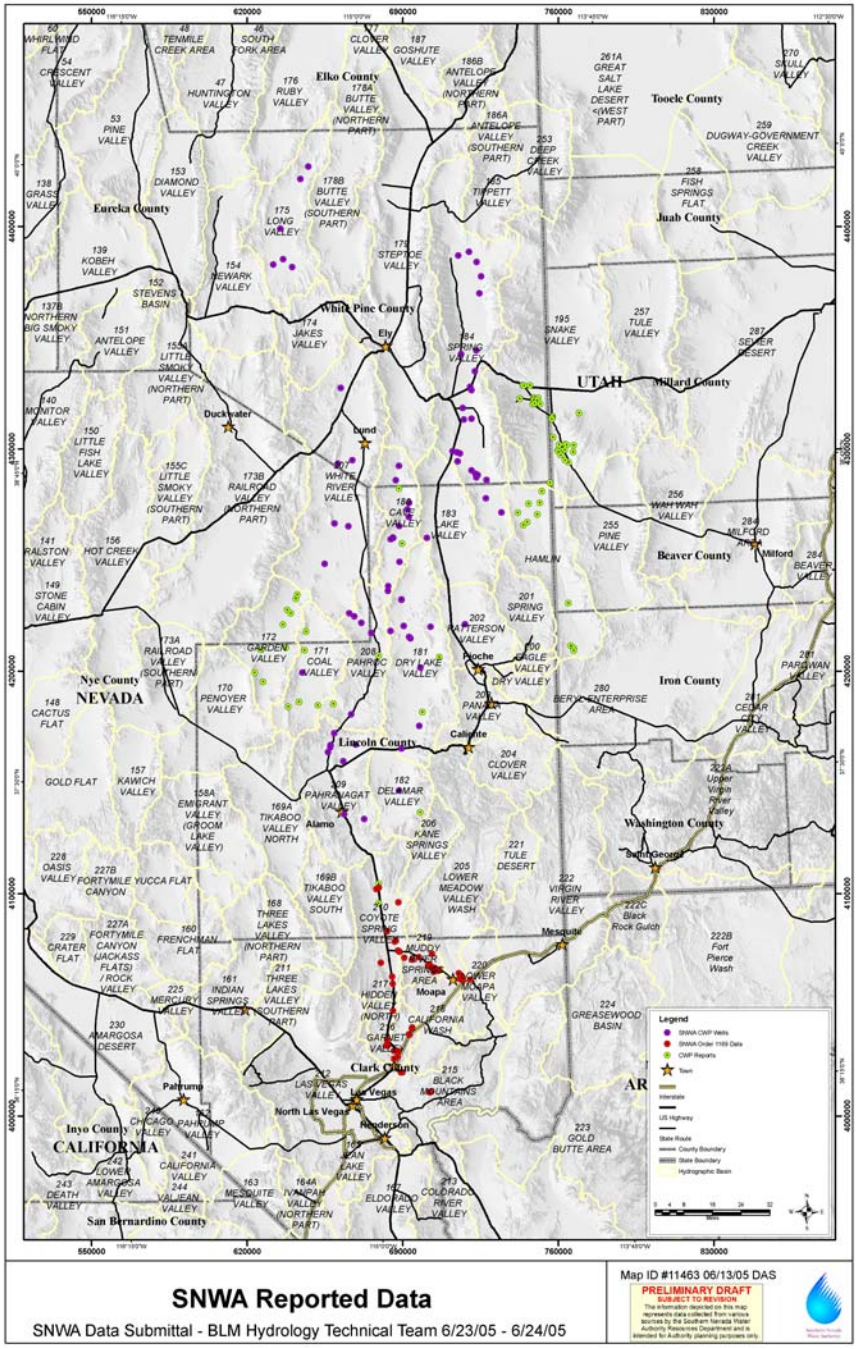
SNWA Reported Data

- CWP data
  - Yearly field measurements of water levels since 1996
- Water-level data compiled in support of NV State Engineer's Order 1169
- Cooperative water project reports (1992-1995)
  - Report No. 03 – Coyote Spring Valley
  - Report No. 06 – Tikaboo North and South
  - Report No. 08 – Coal and Garden Valleys
  - Report No. 09 – Snake
  - Report No. 10 – Pahroc
  - Report No. 11 – Cave
  - Report No. 13 - Spring

Spatial Distribution of SNWA Reported Data



Other Major Sources of Data

- **Ertec (1981) & Bunch and Harrill (1984)**
  - Documented hydrologic investigations in support of the MX-missile siting program.
  - Contained data on groundwater levels, spring and stream discharge, and water quality.
- **Nevada ground-water resources-reconnaissance reports**
  - Published by the state of Nevada department of conservation and natural resources in conjunction with the USGS
  - 57 total reports investigating the groundwater resources of NV

Other Major Sources Data cont'd

- **McKay and Kepper (1988)**
  - Analyzed over 100 wildcat oil and gas records
  - Drill-stem tests analyzed for hydraulic conductivities and transmissivities
  - Depth-to-water data obtained from the drill-stem test data
- **Thomas and others (1986)**
  - Map of groundwater-levels in the great basin region of Nevada, Utah, and adjacent states
  - Depth-to-water measurements estimated from locations on map

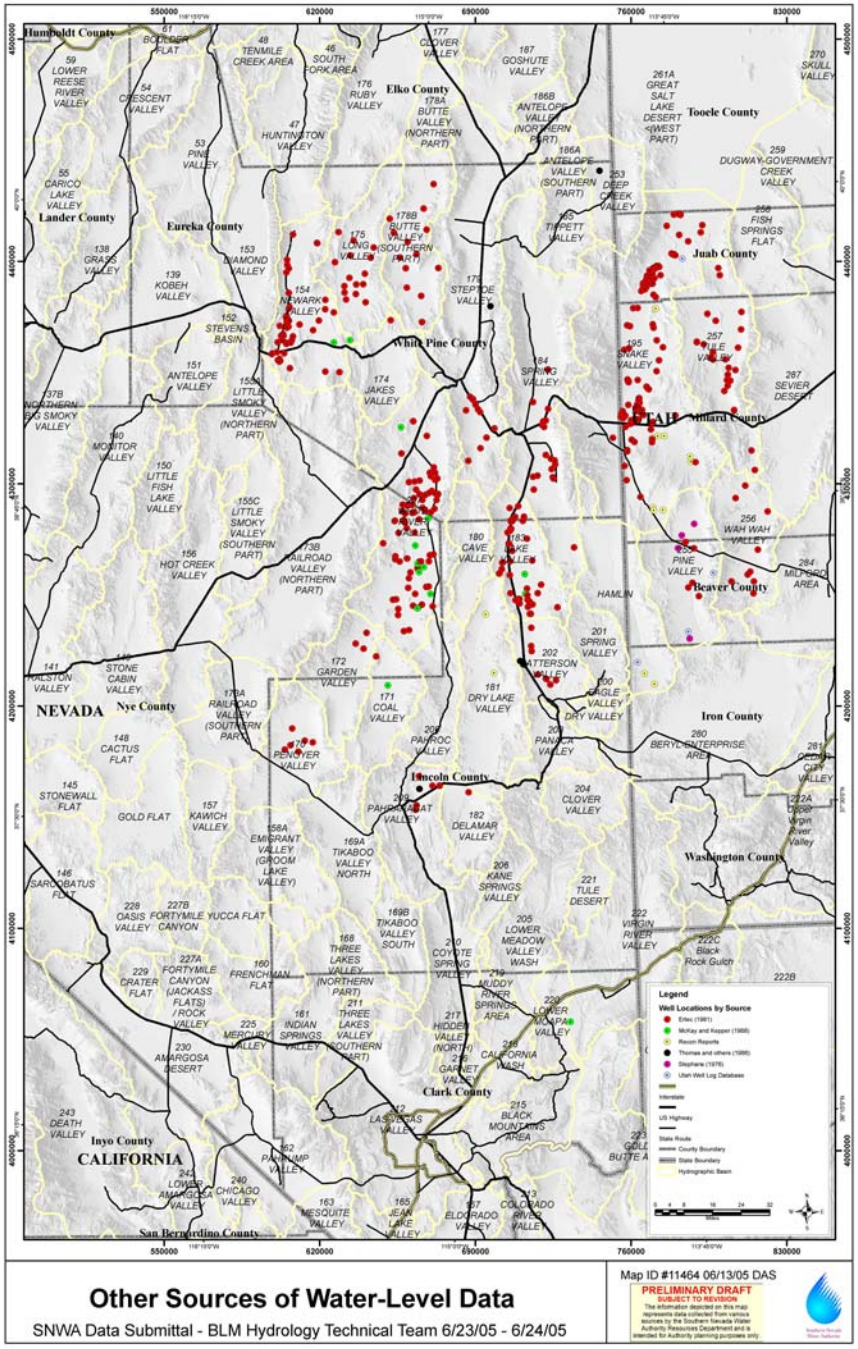
Other Major Sources of Data cont'd

- **Stephans (1976)**
  - State of Utah Department of Natural Resources Technical Publication No. 51
  - Similar in scope to Nevada's reconnaissance reports
  - Hydrologic reconnaissance report for Pine Valley, UT

Utah Well Log Database

- Only available online at http://nrwrt1.nr.state.ut.us/wellinfo/default.htm.
- Website provides a well log search engine by Section, Township, and Range as well as by map search

Spatial Distribution of Other Water-level Data

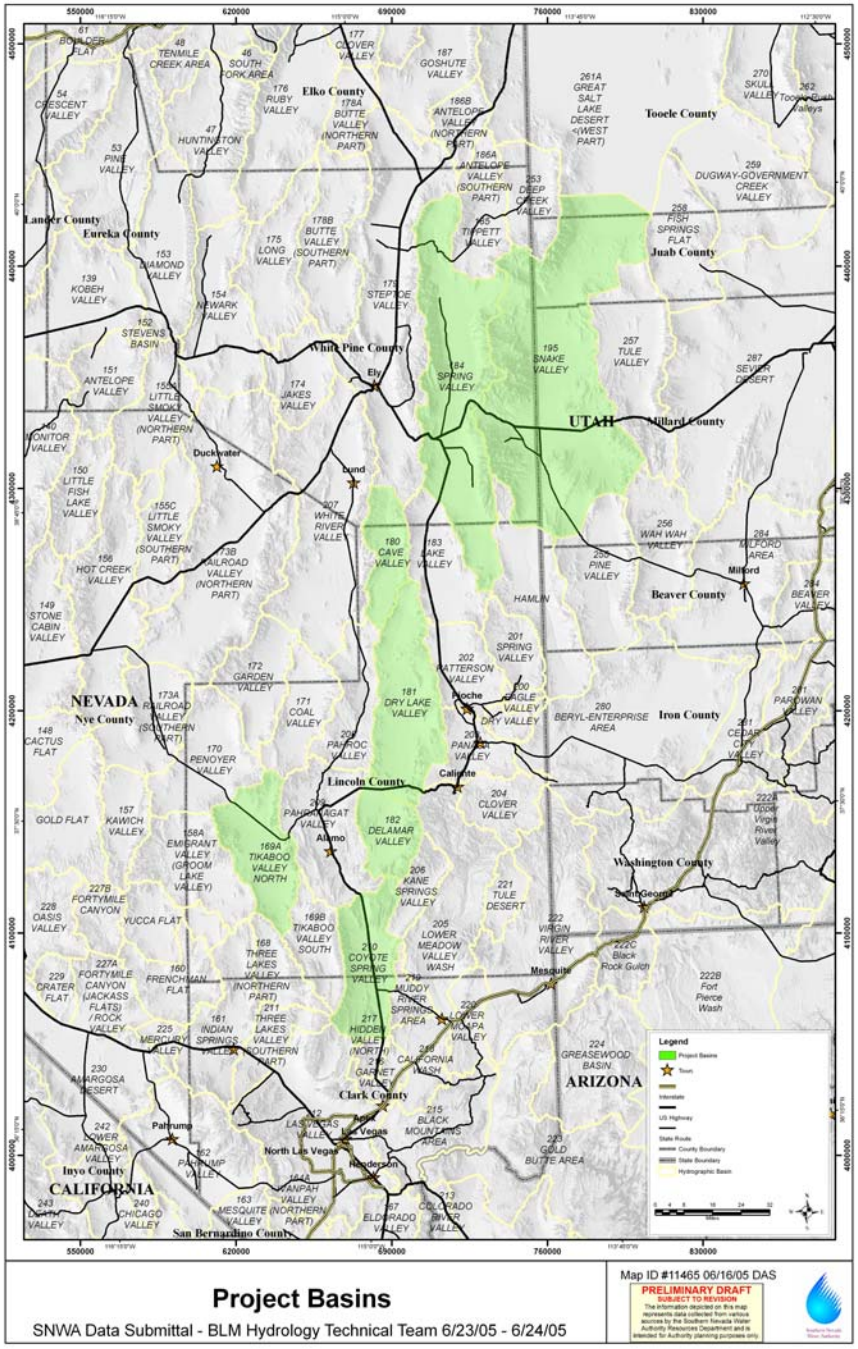


Other Sources of Water-Level Data

SNWA Data Submittal - BLM Hydrology Technical Team 6/23/05 - 6/24/05

Map ID #11464 06/13/05 DAS

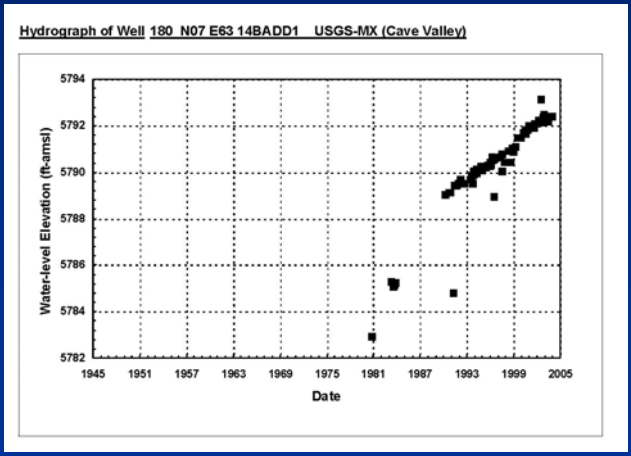
PRELIMINARY DRAFT
SUBJECT TO REVISION



Project Basin Observations

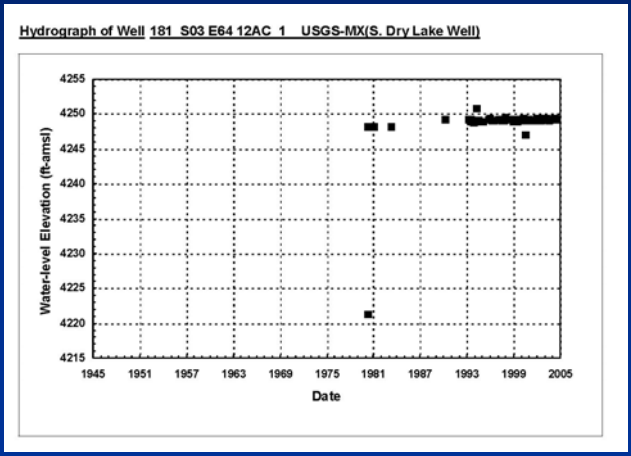
- Number of sites with data
  - Delamar – 6
  - Dry Lake – 26
  - Cave – 28
  - Snake – 286
  - Spring – 175
  - Coyote Spring Valley – 26
  - Tikaboo North – 2
- There is also a great variability in the number of measurements for a given site

HA 180 - Cave Valley



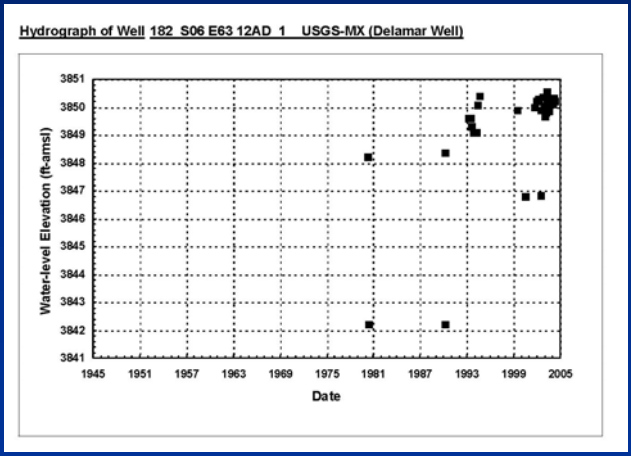
- DTW measurements vary from 2 to 338’ with an average value of 181’ bgs
- Elevations range from 5749’ to 7296’ with an average value of 6061’ amsl
- 9 wells have more than 5 depth-to-water records

HA 181 – Dry Lake Valley



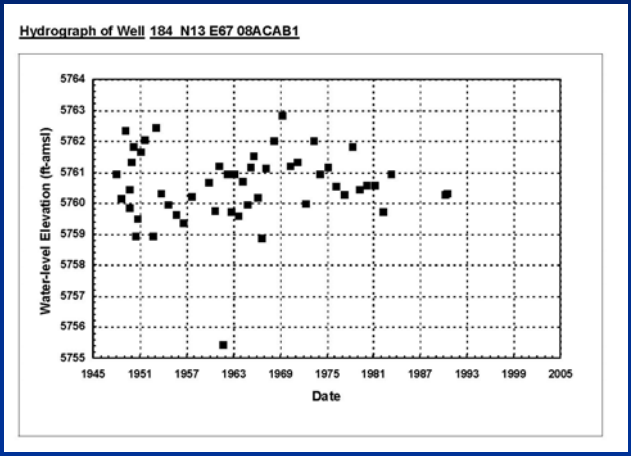
- DTW measurements vary from 3’ to 869’ with an average value of 266’ bgs
- Elevations range from 4247’ to 6630’ with an average value of 5091’ amsl
- 8 wells have more than 5 depth-to-water measurements

HA 182 – Delamar Valley



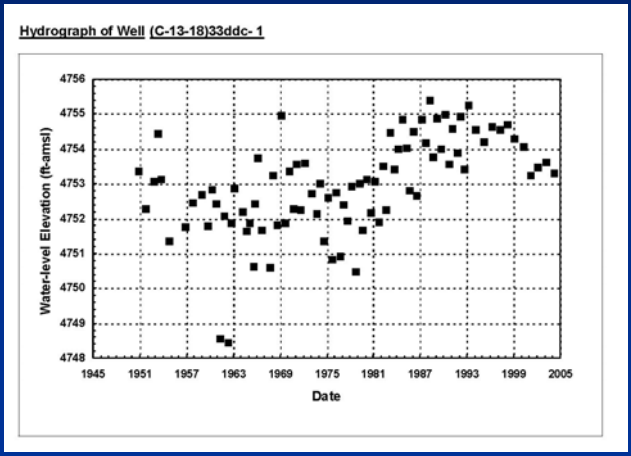
- DTW measurements vary from 220’ to 871’ with an average value of 652’
- Elevations vary from 3842’ to 4533’ with an average value of 4075’ amsl
- 1 well has more than 5 depth-to-water measurements

HA 184 – Spring Valley



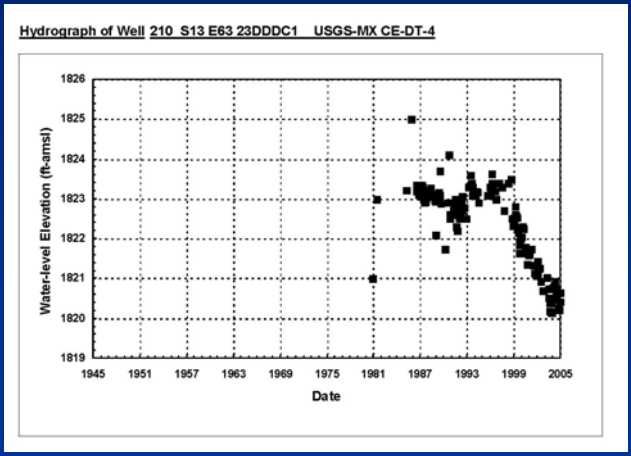
- DTW measurements vary from flowing to 564’ with an average of 62’ bgs
- Elevations vary from 5532’ to 6862’ with an average value of 5819’ amsl
- 28 wells have more than 5 depth-to-water measurements

HA 195 - Snake



- DTW measurements vary from flowing to 750’ with an average of 51’ bgs
- Elevations vary from 4323’ to 7175’ with an average of 5057’ amsl
- 43 wells have more than 5 depth-to-water measurements

HA 210 – Coyote Spring Valley

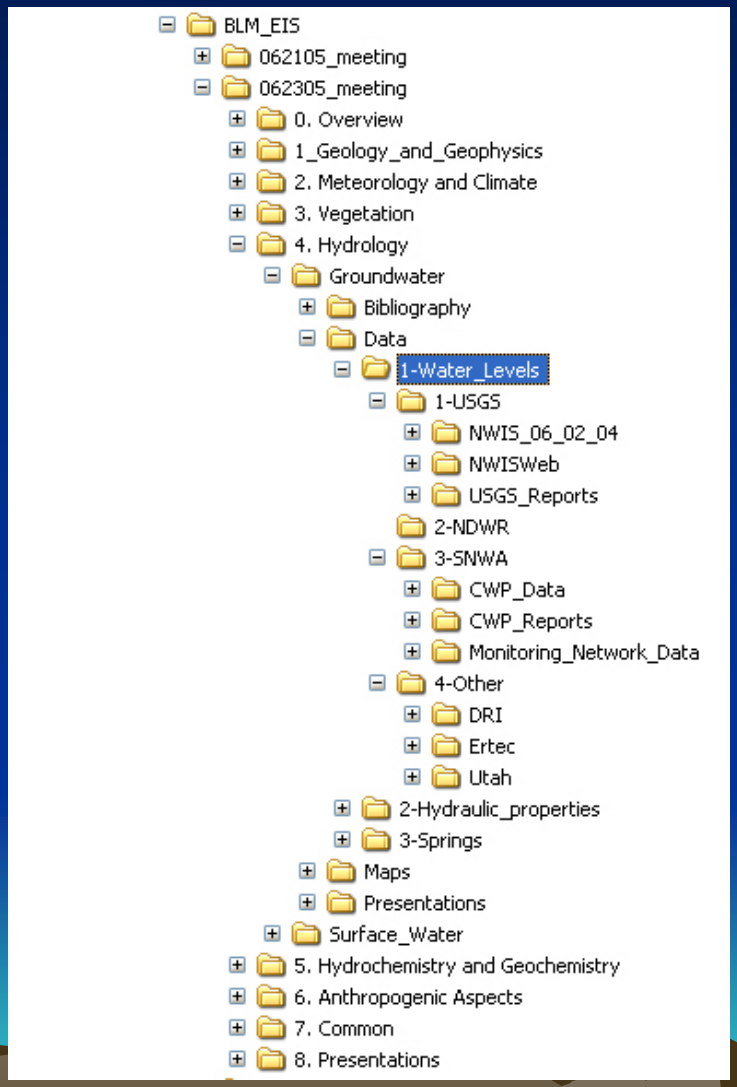


- DTW measurements vary from 14’ to 1087’ with an average value of 404’ bgs
- Elevations vary from 1817’ to 2970’ with an average value of 2088’ amsl
- 14 wells have more than 5 depth-to-water measurements

Data Considerations

- Sparse data in certain hydrographic areas
- Limited historical data for many locations
- Location inaccuracies
- Depth-to-water measurements from the same reference point?
- Differing levels of confidence in reported values (NWIS vs. NDWR)
- Duplicate locations and depth-to-water measurements

How to Access the Data



- **Water-level data found in the “Hydrology” section**
- **Data is organized by the source of data descried in this presentation**

Questions

Thank You