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

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

SURFACE WATER DATA COLLECTION

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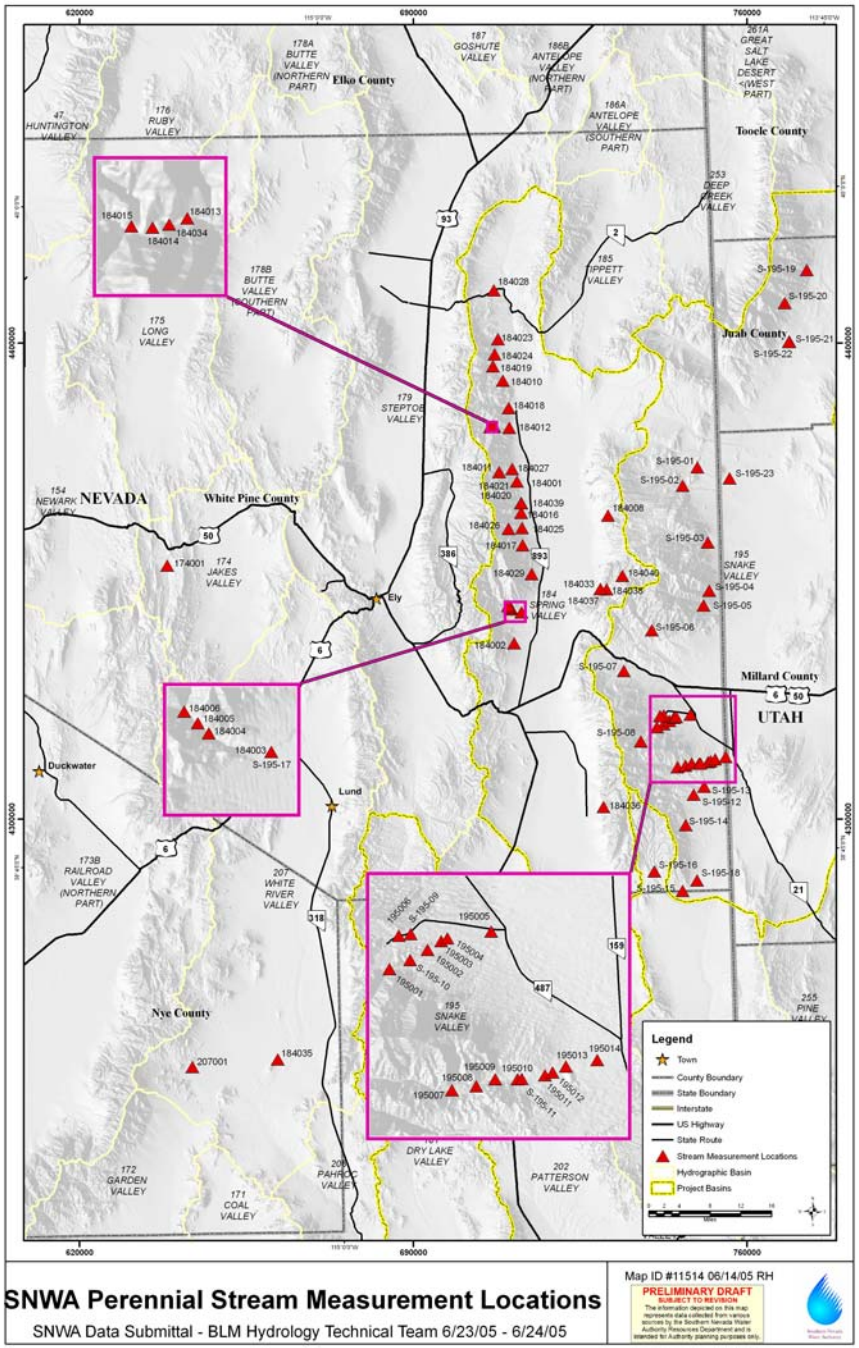
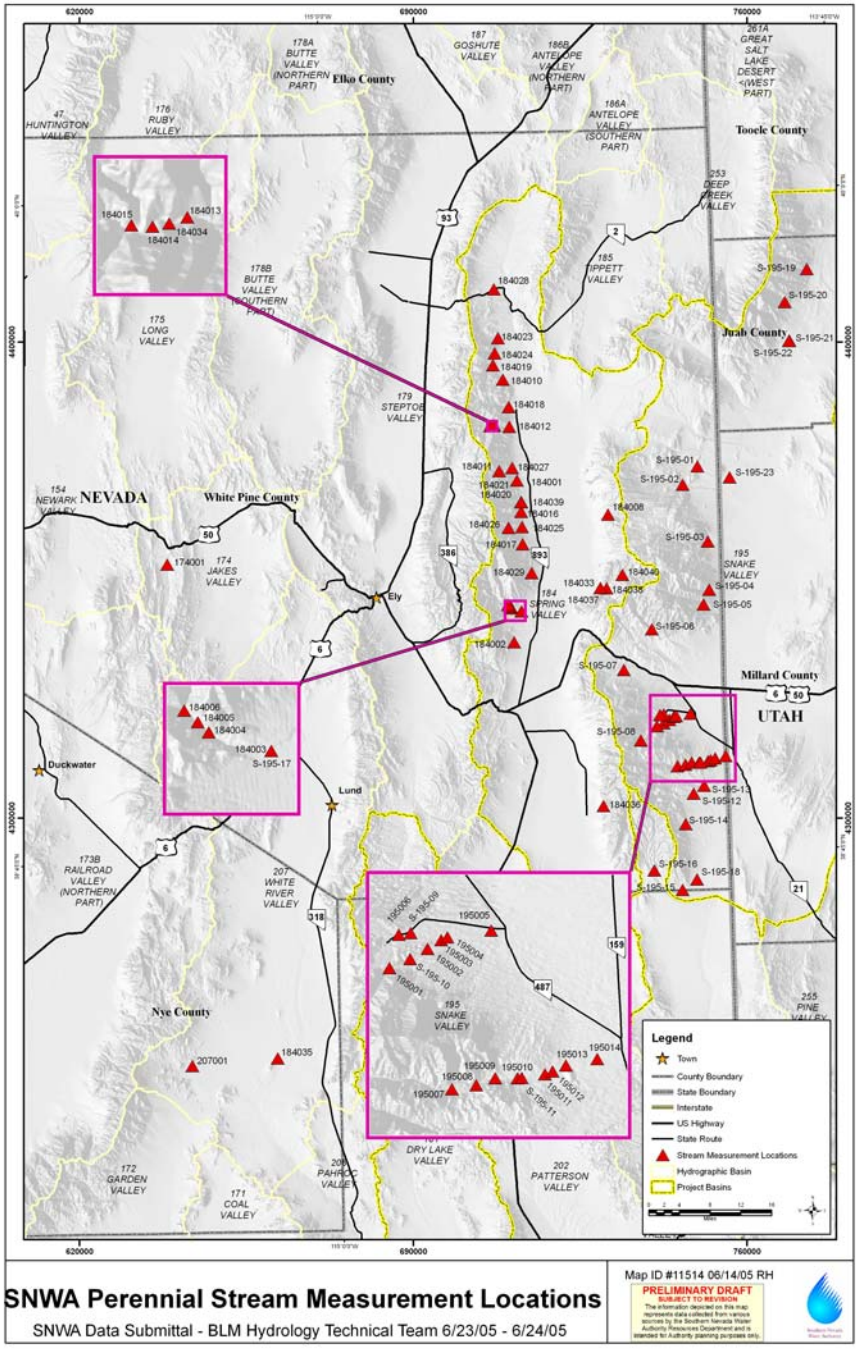
Presentation Overview

- Description of the two data sets
  - Discharge from perennial streams (SNWA data only)
  - Characterization of selected springs in Eastern, Nevada (Multi-agency data set)
- How the data were collected
- Use of the data
- Qualifying the data
- Questions

Perennial Stream Discharge Data

- Discharge measurements at approx. 50 streams
- Majority of the data were collected in Snake Valley and Spring Valley
- Collected in 1993, 1996-2004 (Late July, Early August)



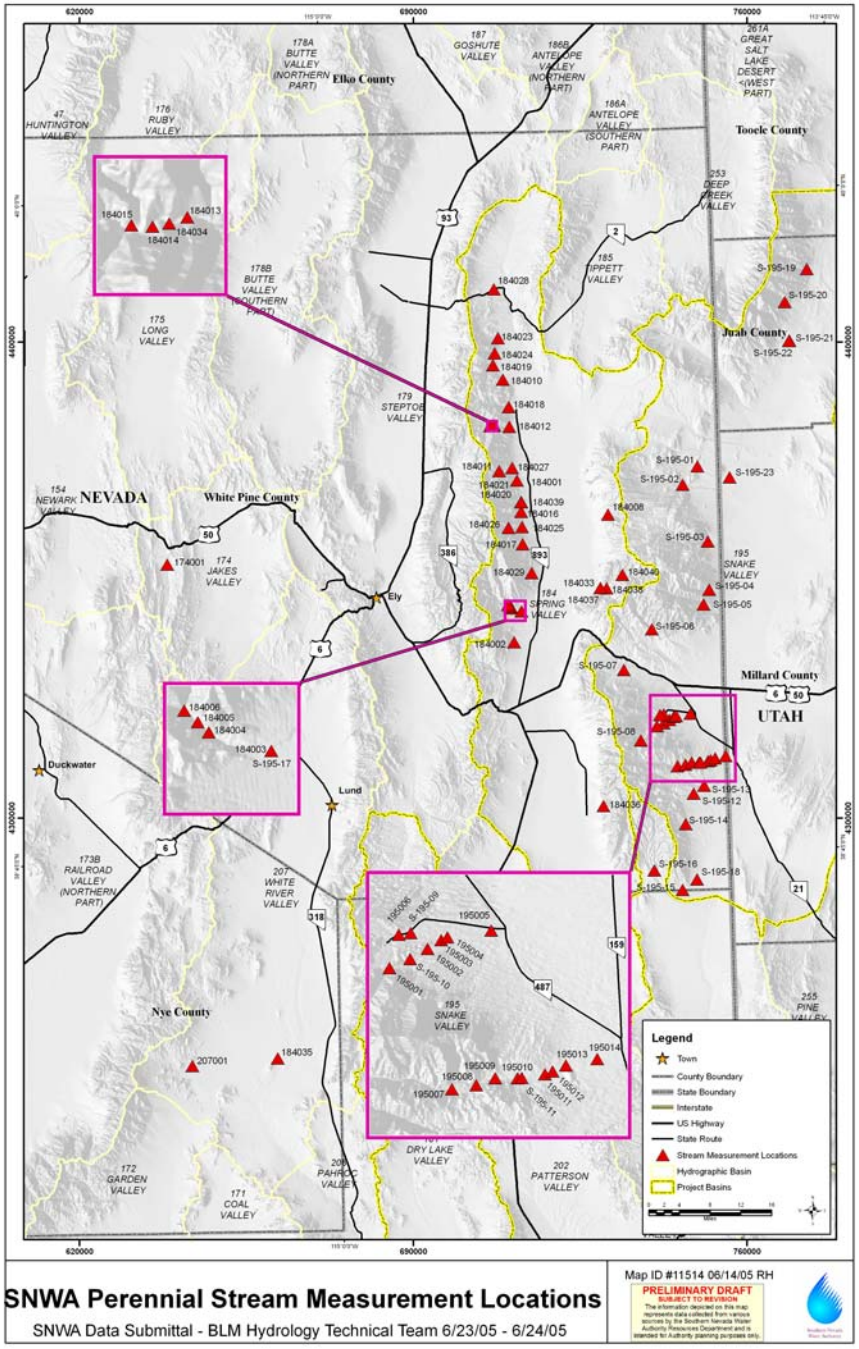


Spring Valley

- Data were collected at a suitable measurement section at the edge of the mountain block
- At selected streams “seepage runs” were done, to determine gains and losses over the length of the stream within the mountain block
- Results of these studies were published in:

  Katzer T., and Donovan, D., 2003, Surface water Resources and Basin Water Budget for Spring Valley, White Pine and Lincoln Counties, Nevada

- A PDF of this report has been included in the data transmittal

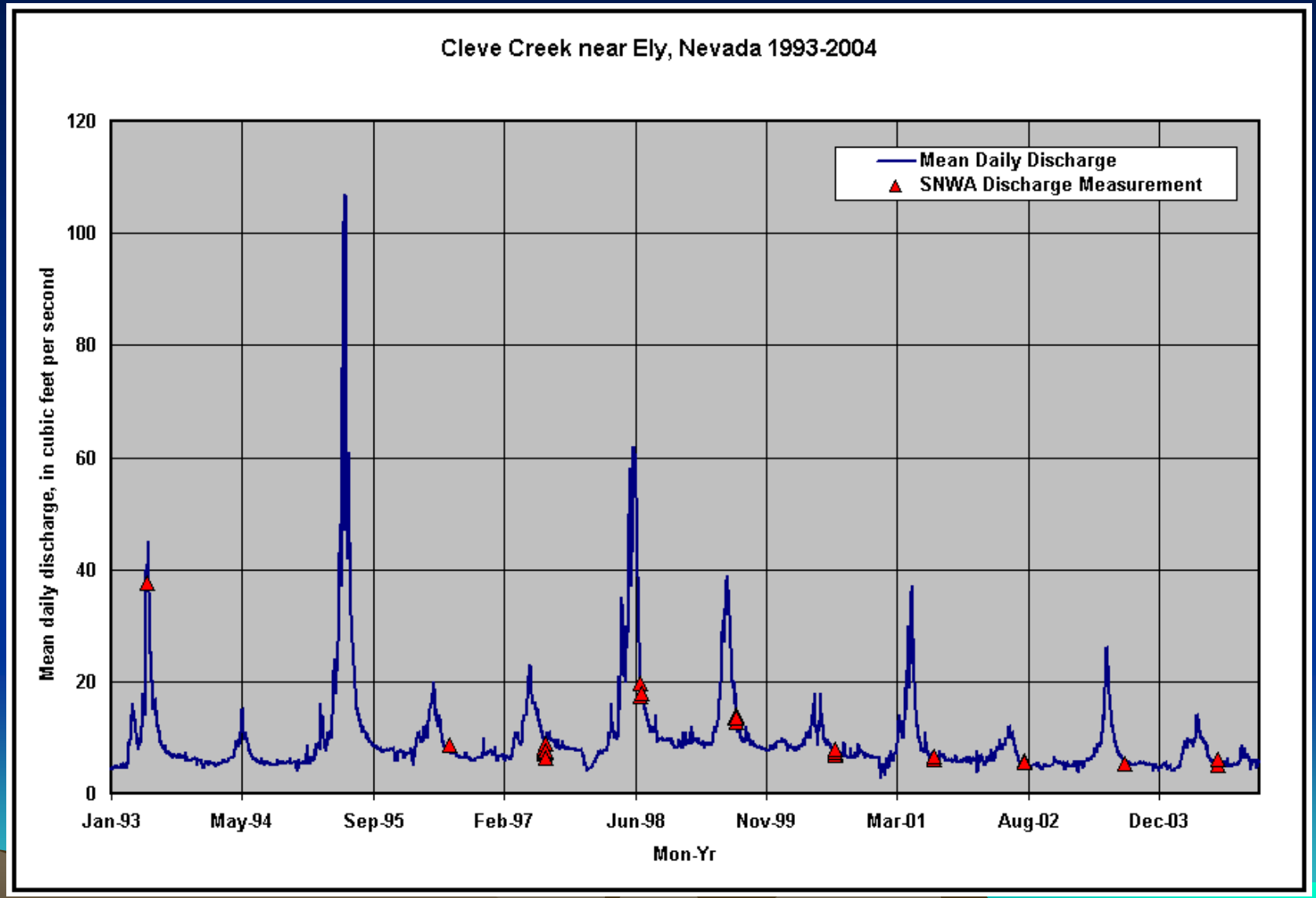


Snake Valley

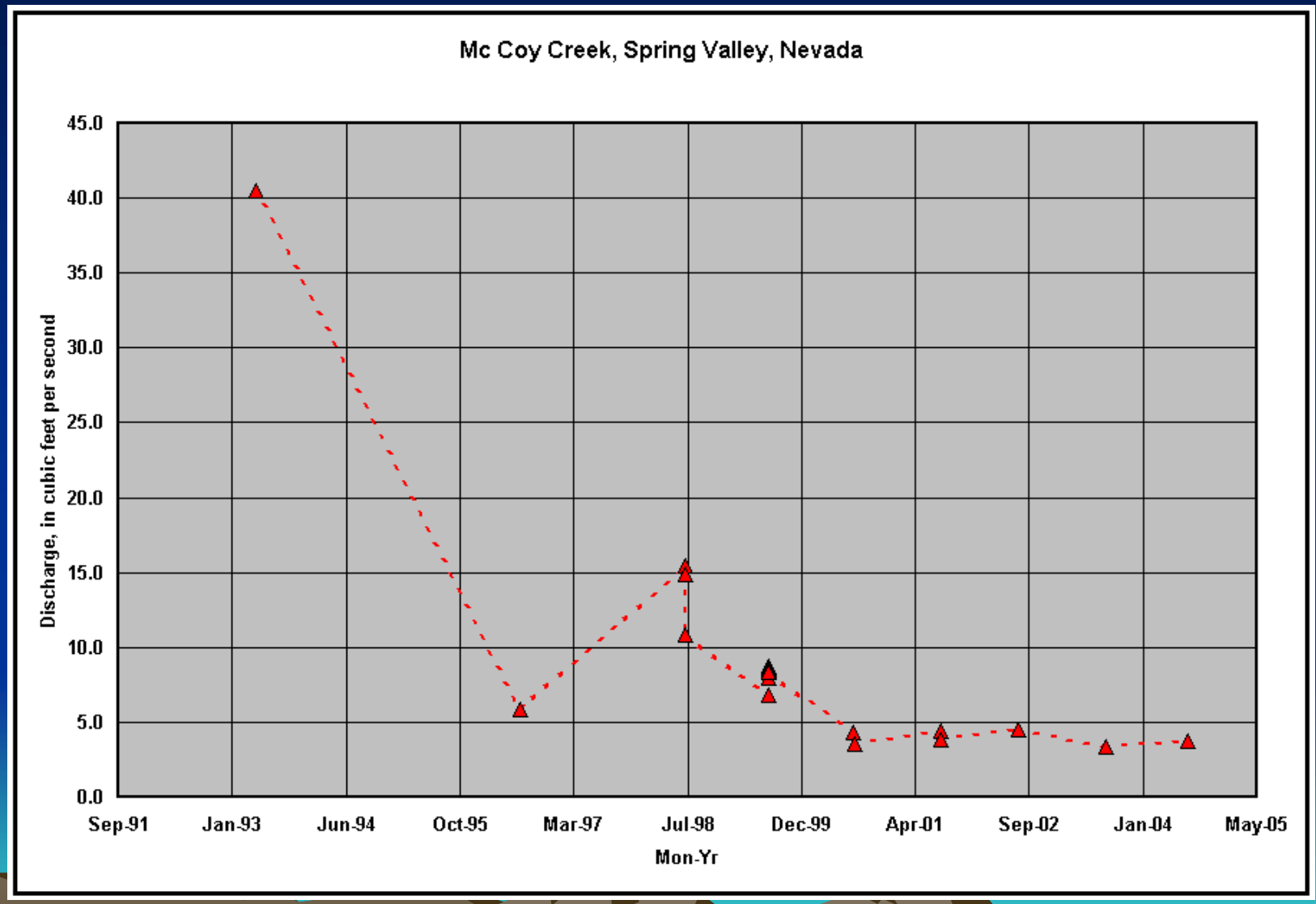
- Data were collected at a suitable measurement section at the edge of the mountain block
- Results of these studies were published in:

  Squires, R., 2004, Water Resource Report, East Slope, Snake Range, Nevada-Utah
- A PDF of this report has been included in the data transmittal

Cleve Creek near Ely, Nevada



Mc Coy Creek, Spring Valley, Nevada



Spring Data Compilation and Collection

- Sources
  - USGS
  - Nevada State Engineer
  - Ertec Western Inc. (MX-Missile Program)
  - Nevada Bureau of Mines and Geology
  - SNWA Field Investigations
  - SNWA Reports
  - DRI / UNLV / UNR

U.S. Geological Survey

- NWIS Database, June 2004
- Water Resource Data Reports
- Miscellaneous Data Requests
- Water-Supply Papers
- Recon Reports

Nevada State Engineer

- Water Resources Reconnaissance Series
- Biennial Reports
- Water Resource Bulletins

Nevada Bureau of Mines and Geology

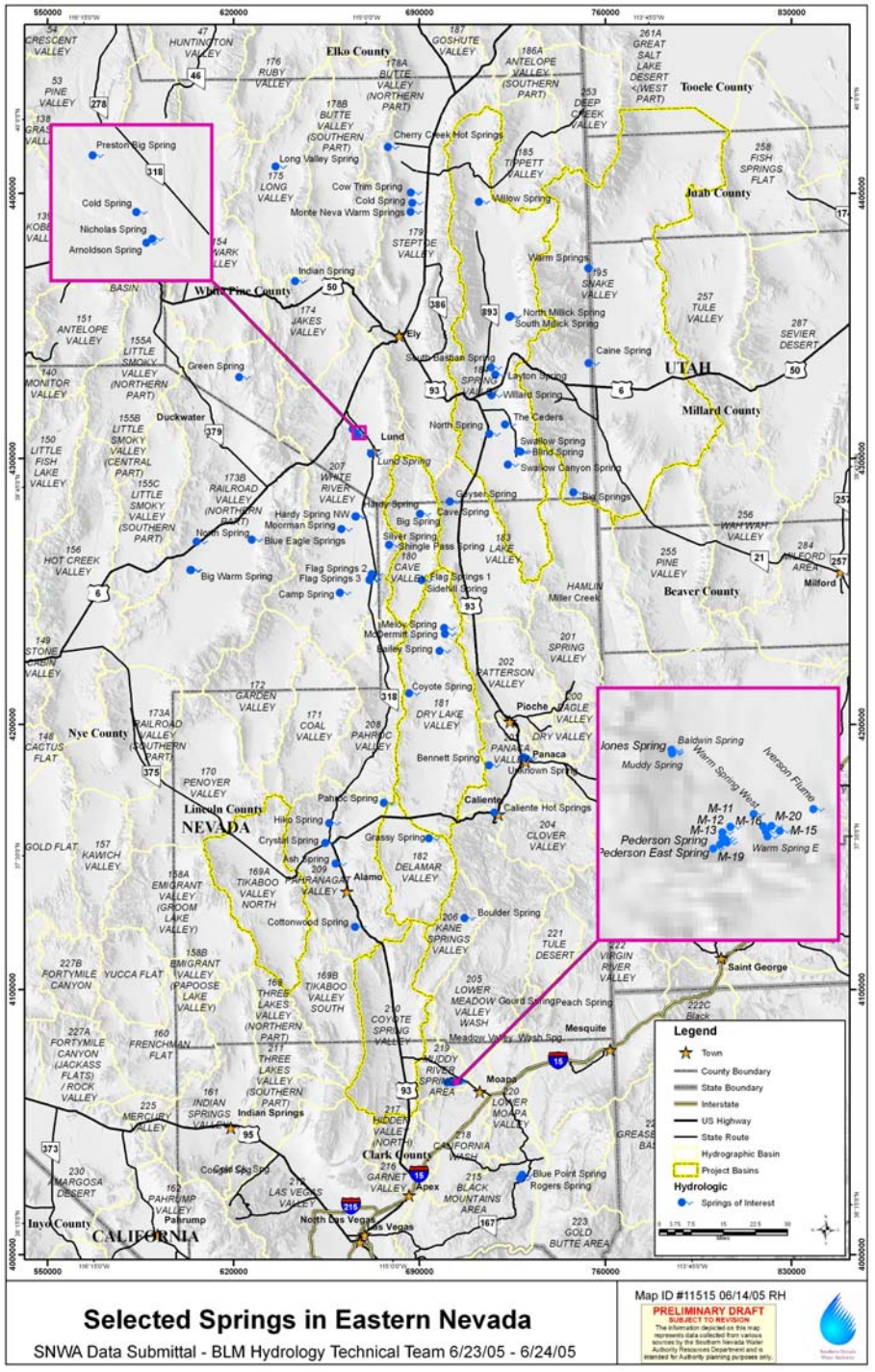
- **Bulletins**
  - **County Geology Reports**
  - **Thermal Springs Report**

DRI-UNLV-UNR

- Graduate Work
- DRI Reports

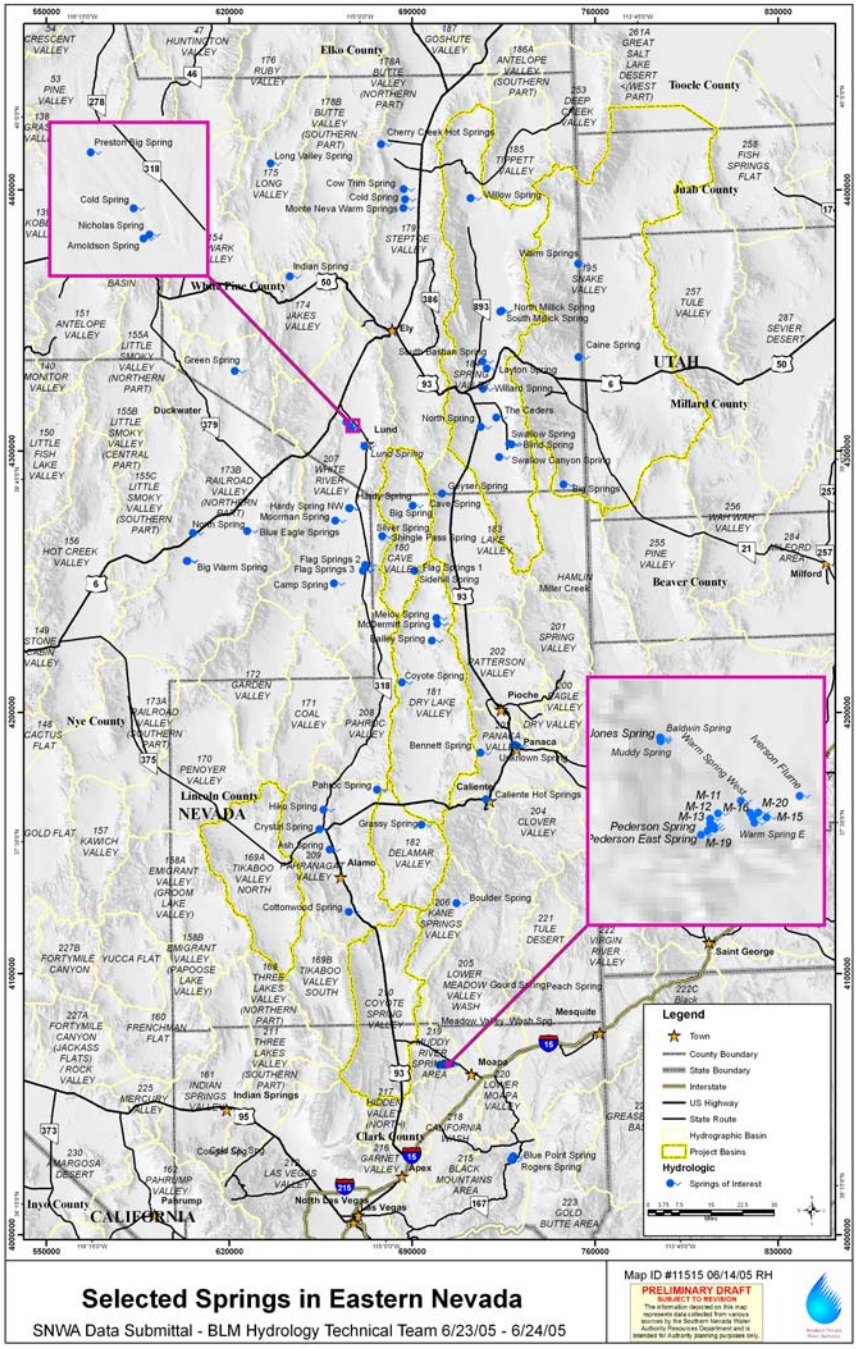
SNWA

- Reports
  - CWP Series (Published under LVVWD)
  - Katzer and Donovan (2003)
  - Squires (2004)
- Field Work
  - Characterization of springs
  - Quantification mountain front runoff



Characterization of Springs

- Data Collection
  - Approx. 75 springs
  - Summer of 2004 (June-September)
  - Geologic mapping at selected springs
  - Discharge measurements
  - Photographic log
  - Water quality samples



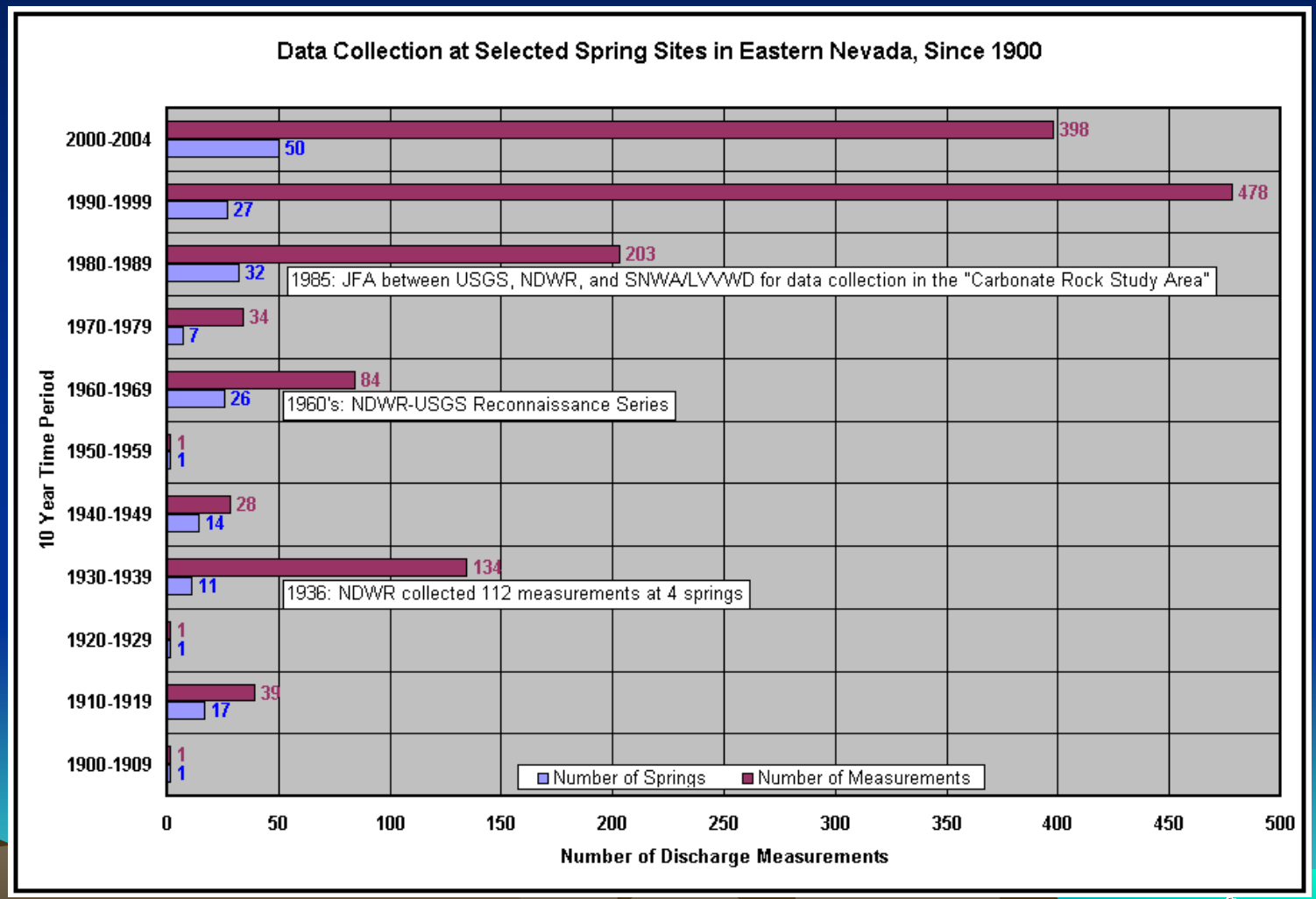
Selected Springs

- Discharge measurements and water quality samples were taken as close to the orifice as possible
- Small groups of springs were measured at their confluence when possible
- Discharge data is provided in an Access database

Criteria for Selecting Springs

- Springs are located in basins which SNWA has applications, and adjacent basins
- Large springs located on the valley floor (e.g. Crystal Spring, Hot Creek Spring)
- If a selected spring was inaccessible this was noted, and a substitution was made in the field

Summary of Data Collection Efforts, at Springs in Eastern Nevada, Over the Past 100 Years



Methods of Discharge Measurements

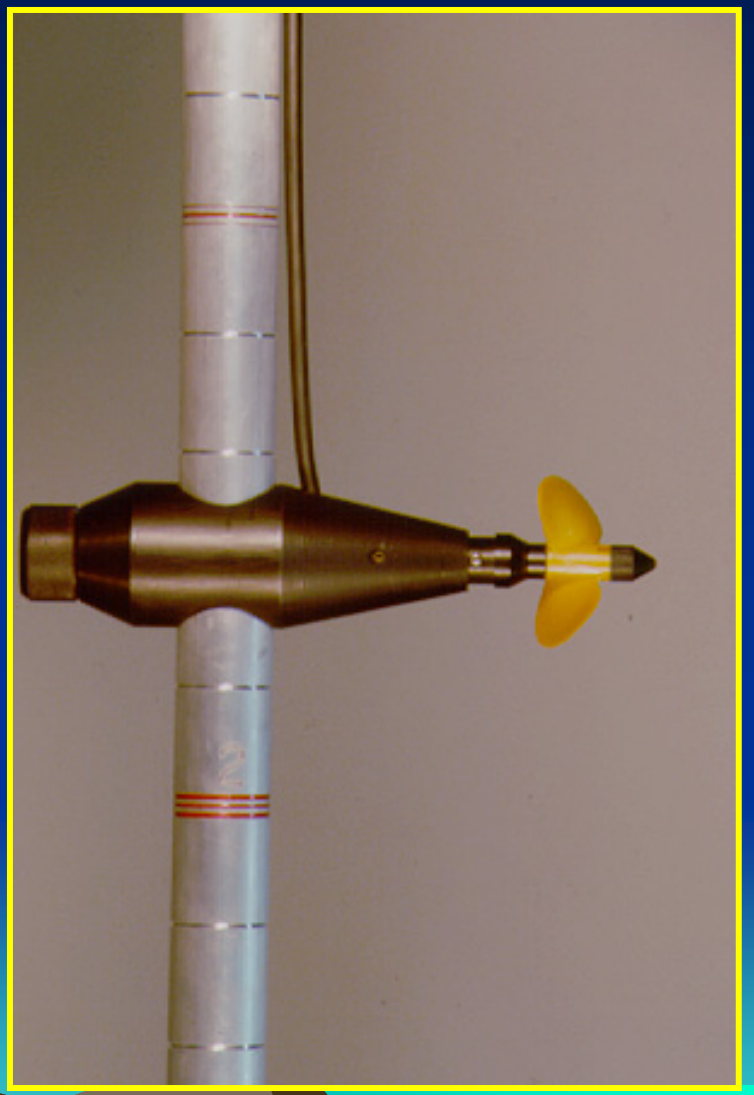
- Discharge measurements were made using:
  - Stream Gaging
  - Artificial Controls
  - Volumetric
  - Estimation

Stream Gaging

- Used methods described in Rantz and others (1982)
- Used Price AA, Pygmy, and Swoffer meters
- Discharge was calculated using the USGS standard rating (June, 1999) (except for Swoffer)

Swoffer Meter

- Data collected for SNWA by Western States Engineering, used a Swoffer meter.
- Uses 2-inch propeller with an optical sensor inside the meter
- Velocities are reliable in the range of 0.1 to 25 ft/sec
- Comparison measurements were made at Cleve Creek using standard Price meters



Artificial Controls

- Cippoletti Weir
  - $Q=3.367*L*H^{3/2}$
- 3-inch Modified Parshall Flume
  - Calibrated by USGS-HIF

Volumetric Measurement

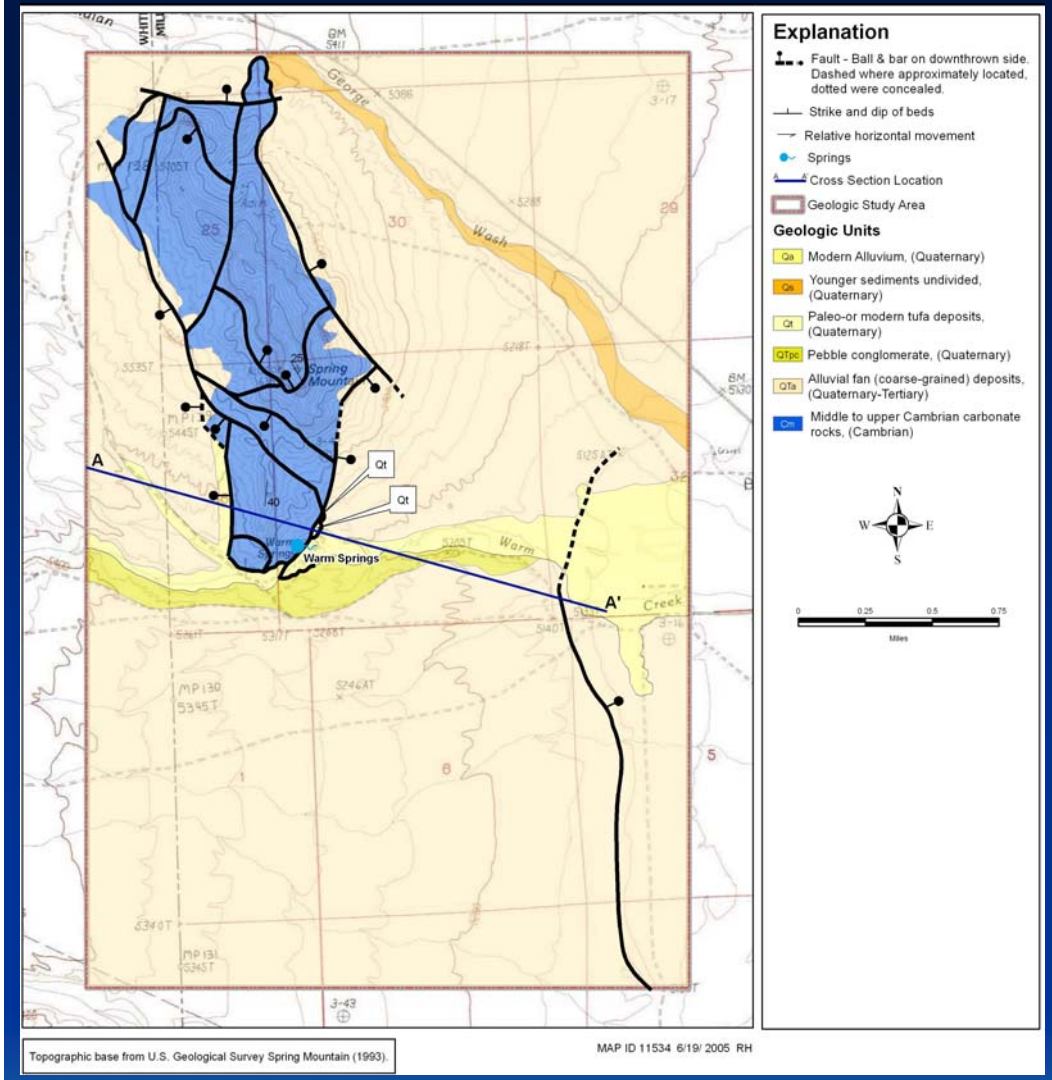
- Used containers of known volume
- Recorded the amount of time to fill the given container
- Repeated at least 3 times
- Used at small springs usually 1 to < 1 gpm

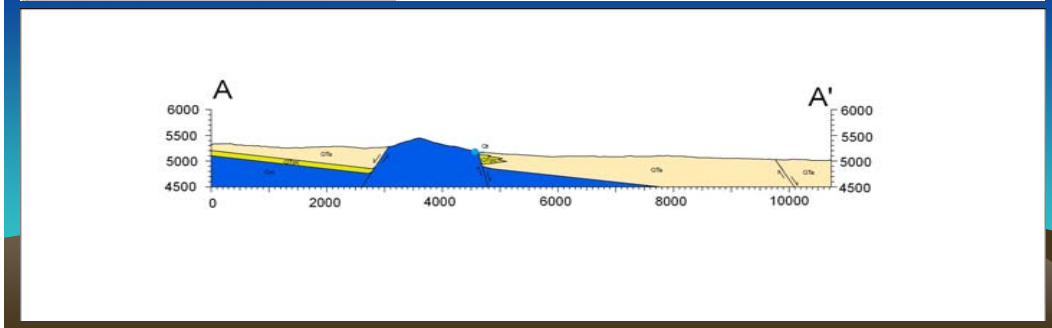
Water Quality Sample Collection

- SNWA's procedures are based on USGS sample collection protocol as defined in Wood, 1976
- Samples were collected as grab samples
- Field parameters collected included: pH, Temperature, Electrical Conductivity, Dissolved Oxygen

Photographic Documentation

- Orifice
- Diversions
- Discharge measurement devices
- Cross sections
- Spring Pool
- Channel conditions
- General Area





Geologic Mapping

- Base maps are from county NBMG Bulletins
- Field mapping was conducted at several springs
- Cross sections were drawn from field observations

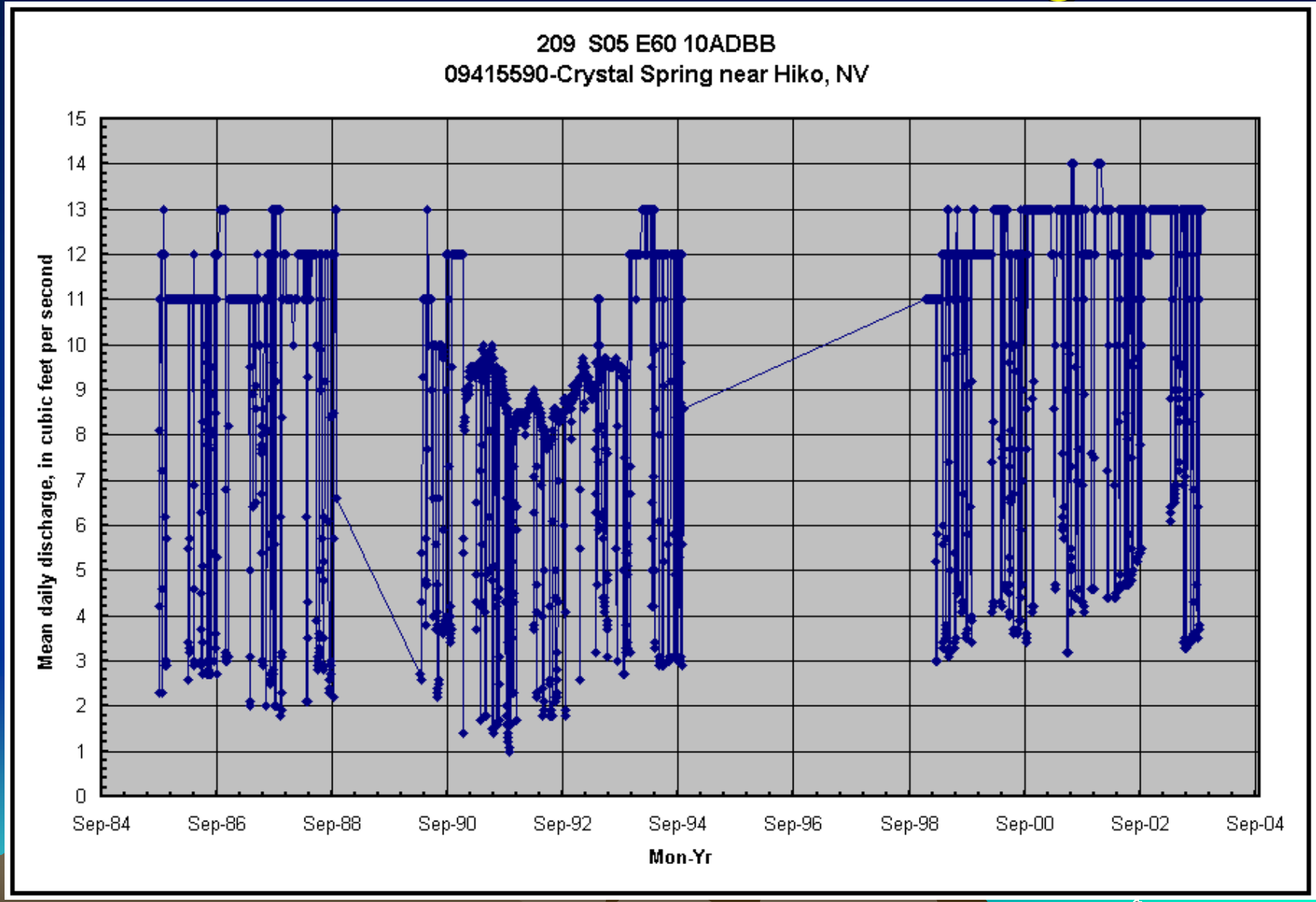
Uses of Spring Discharge and Stream Flow Data

- Determine baseline hydrologic conditions
- Assist in developing water budgets for basins
- Assist in quantifying changes in hydrologic conditions (monitoring of surface water)

Qualifying Data

- Accounting for diversions above the gage
- Condition of artificial controls
- Measurement cross section locations
- Change in diversion structure

Diversions Above the Gage

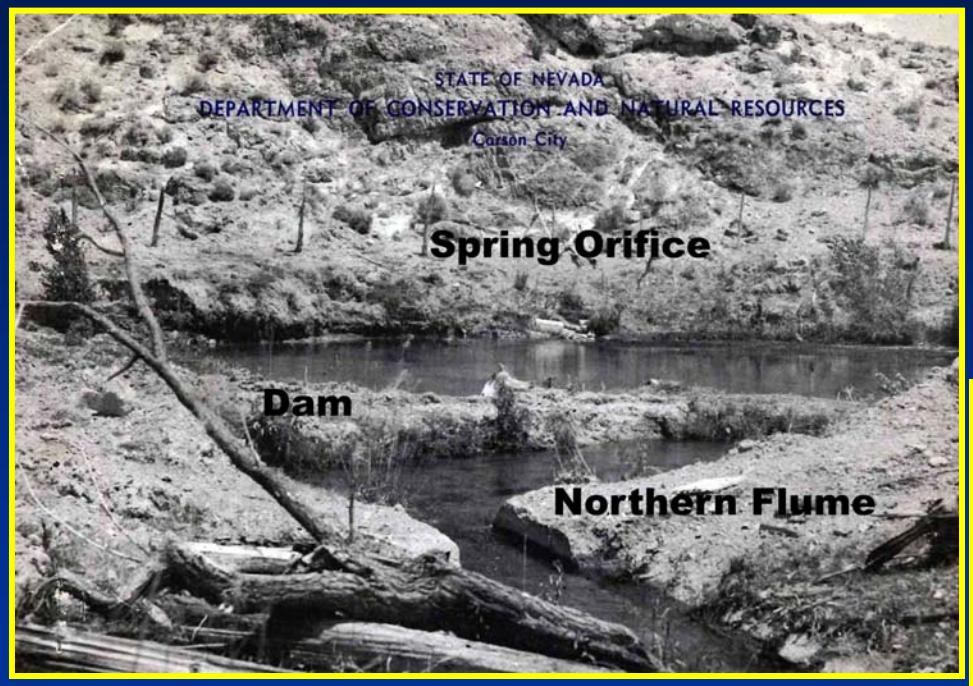


Condition of Artificial Controls

Measurement Locations

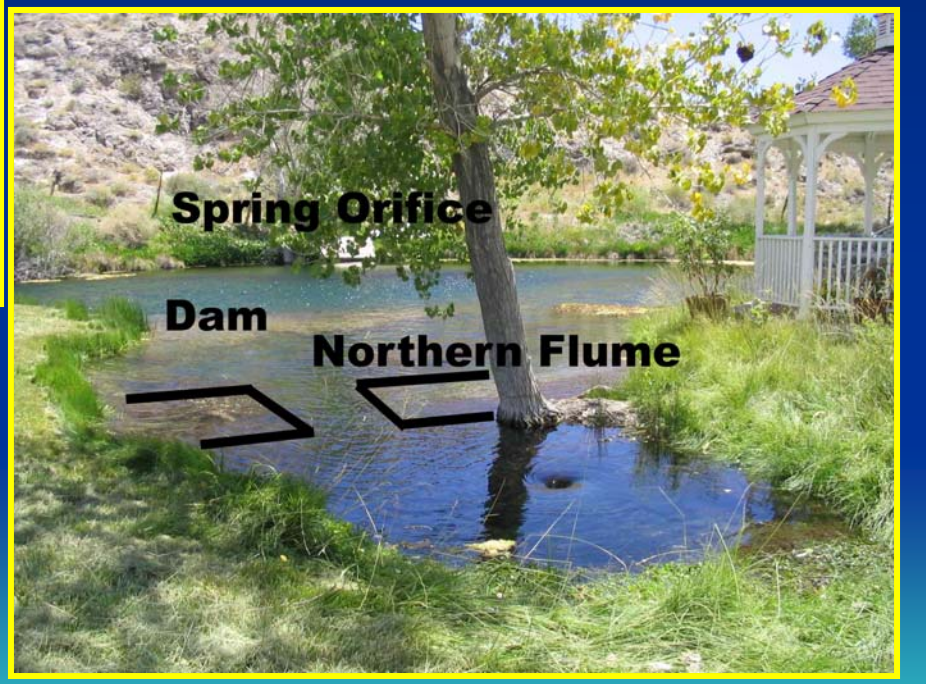
- Warm Spring in Northern Snake Valley, Utah
- Rush and Kazmi (1965) estimated 8 cfs
- SNWA (2004) measured below the main orifice 8.4 cfs
- SNWA (2004) measured above the diversion box 15 cfs

Change of Diversion Structures

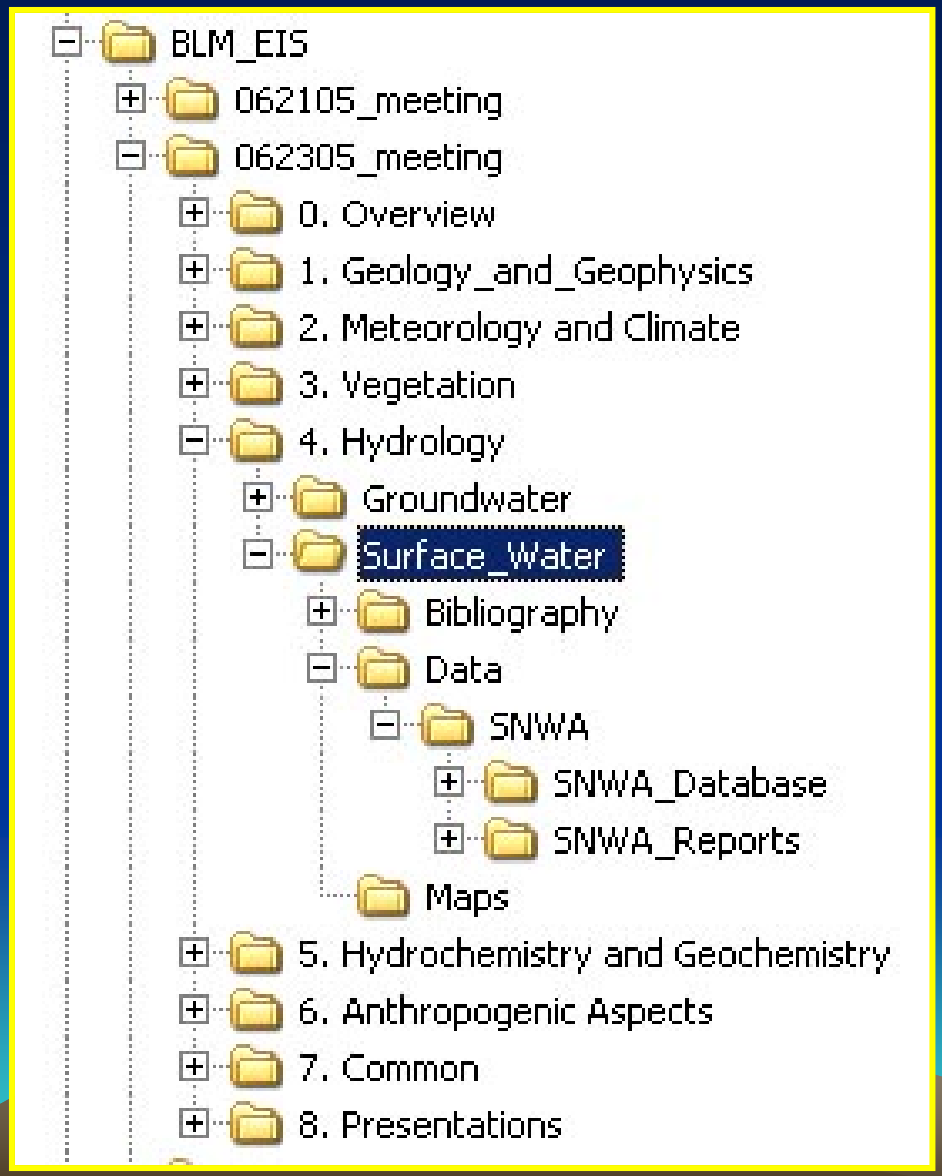


Hiko Spring, 1963

Hiko Spring, 2004



How to Access the Data



- Spring and perennial stream discharge data are found under the "Hydrology" heading in an Access database
- Water quality are found under the "Hydrochemistry and Geochemistry" heading
- Interpretive geologic maps and photographs will be available in a technical report

Questions