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Water Resources of the Basin and Range Carbonate-rock Aquifer System (BARCAS)

U.S. Department of Interior
U.S. Geological Survey

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Overview of Briefing

- Lincoln County Land Act
- Scope of Study
- Summary of Findings
- Limitations of Study
- Products

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EXHIBIT O - LANDS
Document consists of 14 pages.
Entire Exhibit Provided
Meeting Date: 03-07-08

BARCAS Study

- Study mandated by Lincoln County Conservation, Recreation, and Development Act of 2004 (PL-108-424)
- Funding of $6 million provided by amendments to Southern Nevada Public Lands Management Act
- Draft Report for Public Comment– June 1, 2007
- Final Report Completed – December 1, 2007

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Lincoln County Land Act

- "(1) IN GENERAL – The Secretary, acting through the United States Geological Survey, the Desert Research Institute, and a designee from the State of Utah shall conduct a study to investigate ground water quantity, quality, and flow characteristics in the deep carbonate and alluvial aquifers of White Pine County, Nevada, and any groundwater basins that are located in White Pine County, Nevada, or Lincoln County, Nevada, and adjacent areas in Utah".

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Study Team Participants

- United States Geological Survey
  - Nevada Water Science Center
  - California Water Science Center
  - Utah Water Science Center
  - Geology Discipline, Denver, Colorado
  - Geology Discipline, Menlo Park, California
- Desert Research Institute
  - Reno, Nevada
  - Las Vegas, Nevada
- Designee from Utah – Utah State Engineer's Office – Informed consent only

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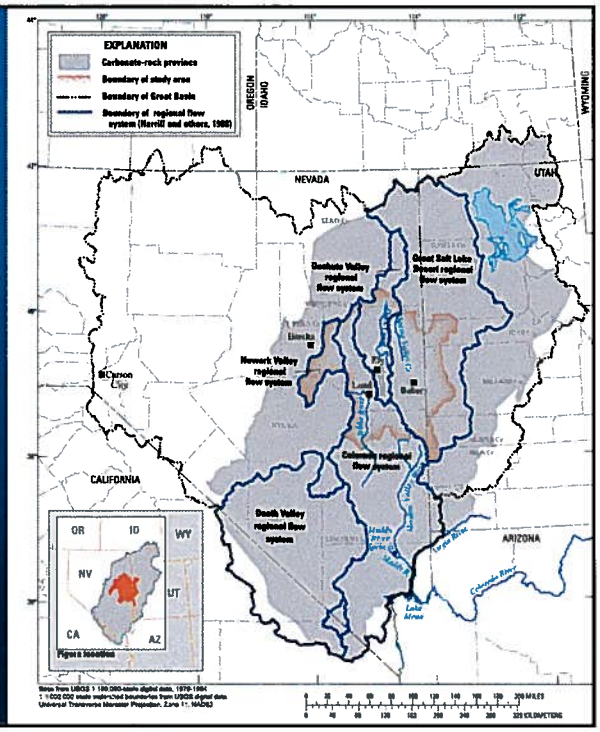
BARCAS study area within the Carbonate-rock province of the Great Basin, and selected flow systems



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Lincoln County Land Act

"The study shall–

- Focus on a review of existing data and may include new data,
- Determine the approximate volume and quality of water stored in the aquifers,
- Refine basin and regional ground-water budgets:

  - evaluate extent and thickness of aquifers,
  - identify geologic structures controlling ground-water flow,
  - determine direction of basin and regional ground-water flow,
  - evaluate distribution and rates of recharge and natural discharge."

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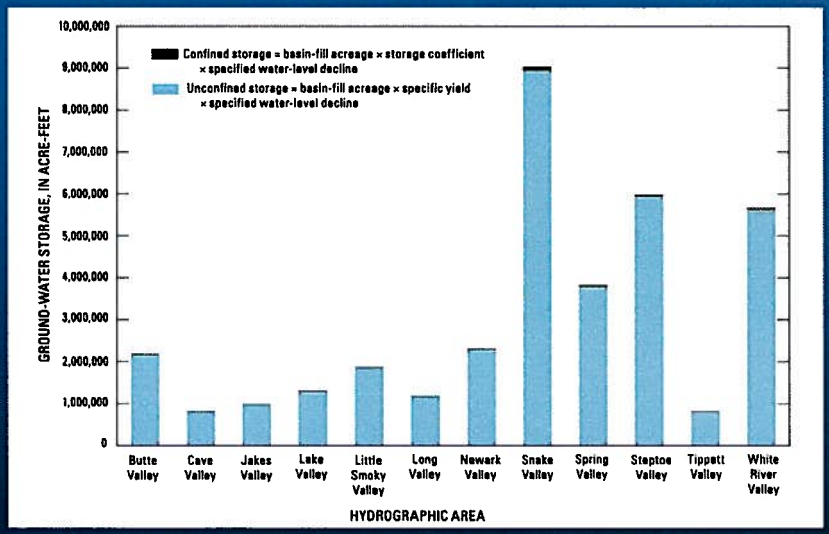
Storage Estimates by Aquifer Type



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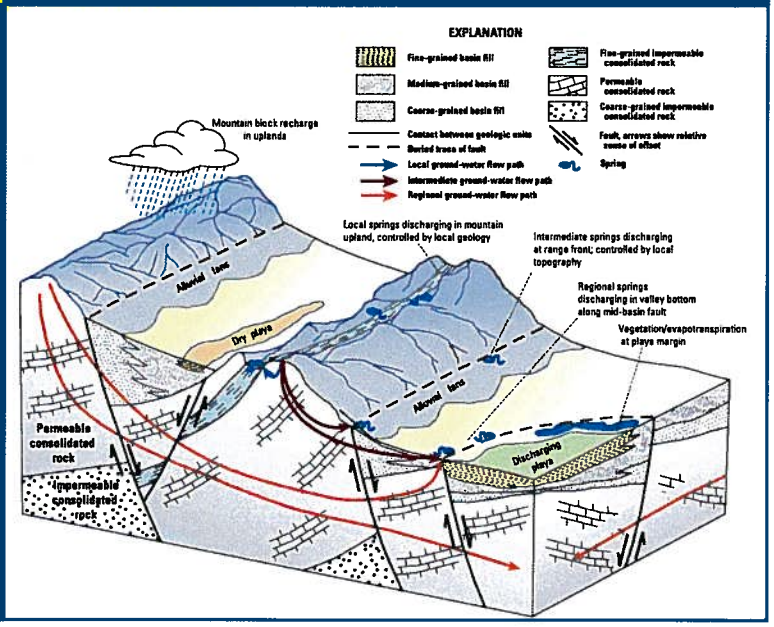
Conceptual Model



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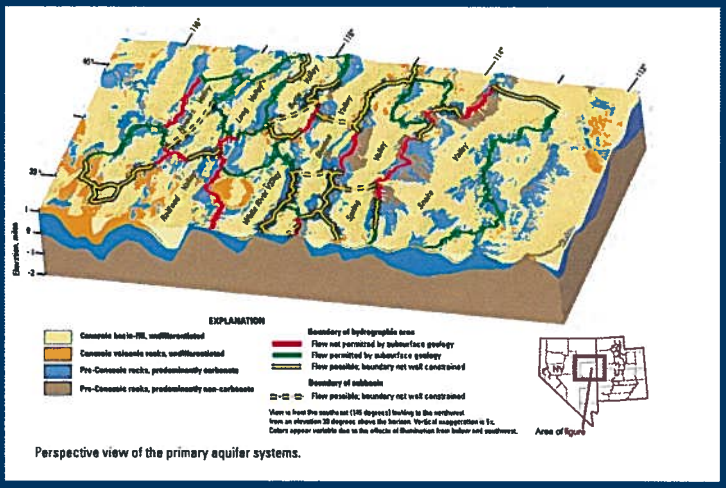
Aquifer Systems



Perspective view of the primary aquifer systems.

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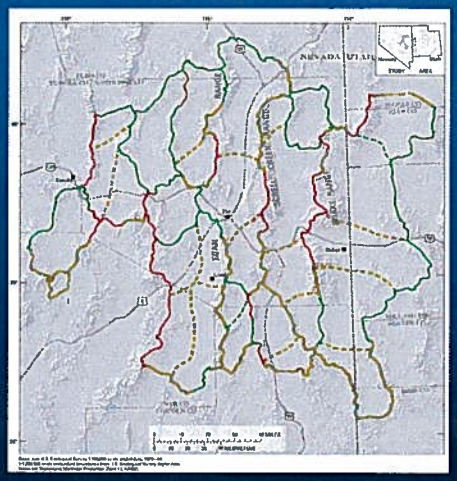
Geologic and Structural Controls on Flow

Red lines—flow not permitted by subsurface geology

Yellow lines—flow possible; boundary not well constrained

Green lines—flow permitted by subsurface geology



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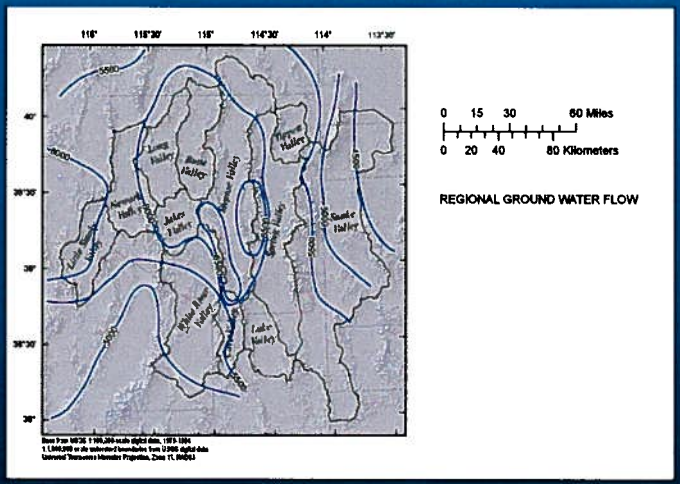
Potentiometric Surface Map



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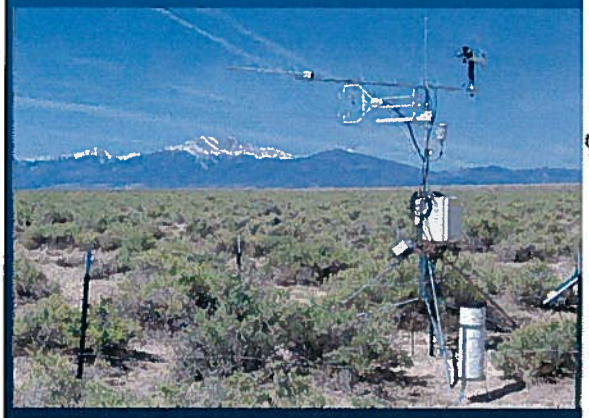
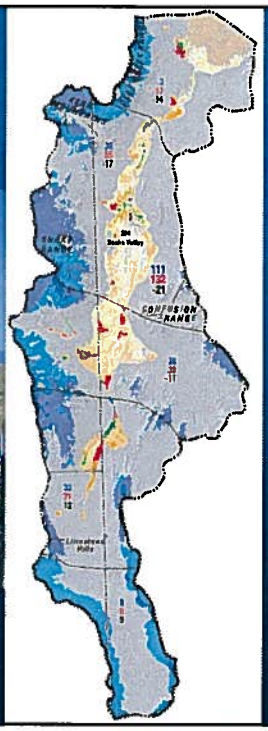
Distribution and rates of recharge and discharge





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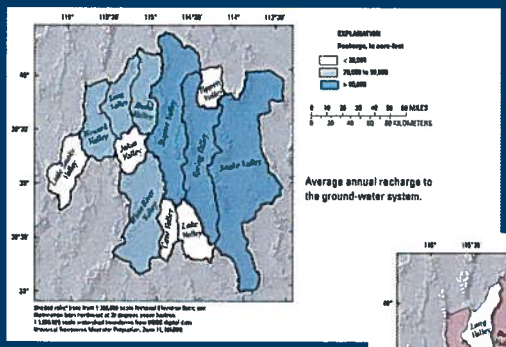
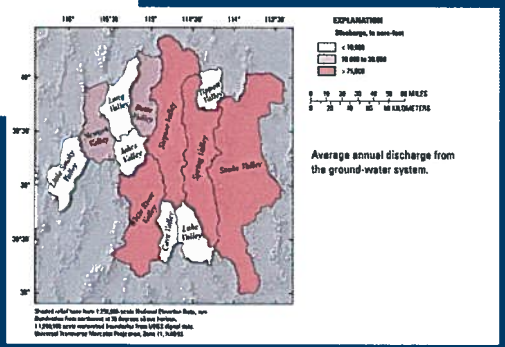
Basin Recharge and Discharge





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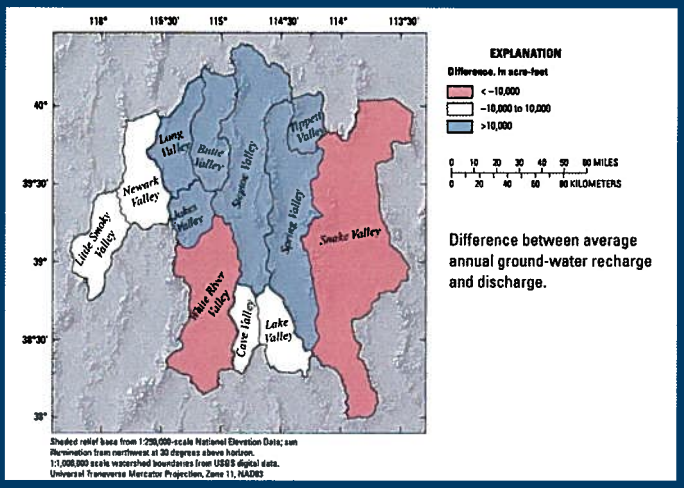
Distribution of excess or deficit recharge



Difference between average annual ground-water recharge and discharge.

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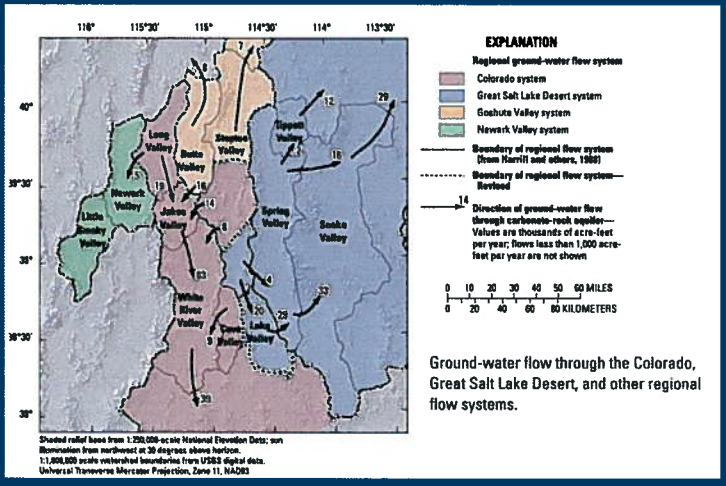
Interbasin Flow



Ground-water flow through the Colorado, Great Salt Lake Desert, and other regional flow systems.

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Study Limitations (Scientific)

- Data Gaps
  - Deep wells in correct locations – geologic control
  - Aquifer properties and water levels in carbonate rocks
  - Limited deuterium isotope and other chemical data
- Non-unique solution to geochemical model
- Study area not inclusive of complete flow systems – Did not allow closure

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Study Limitations (Logistic)

- Time – 2 ½ years to produce draft report
  - Need ½ year to develop plan of study
  - Need ½ year to write report(s)
- Funding transfers complex and difficult
  - Development of study plan – division of funds/agreements
- Study did not (directly) address water development issue
- Public comment process

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Summary Report

Focus on Water Budgets

- Summary for 12 HAs
- Regional Budget
  - ~ 530,000 afy recharge
  - ~ 440,000 afy discharge
  - ~ 90,000 afy exiting SA

http://nevada.usgs.gov

Nevada Water Science Center/
Publications/SIR 2007-5261

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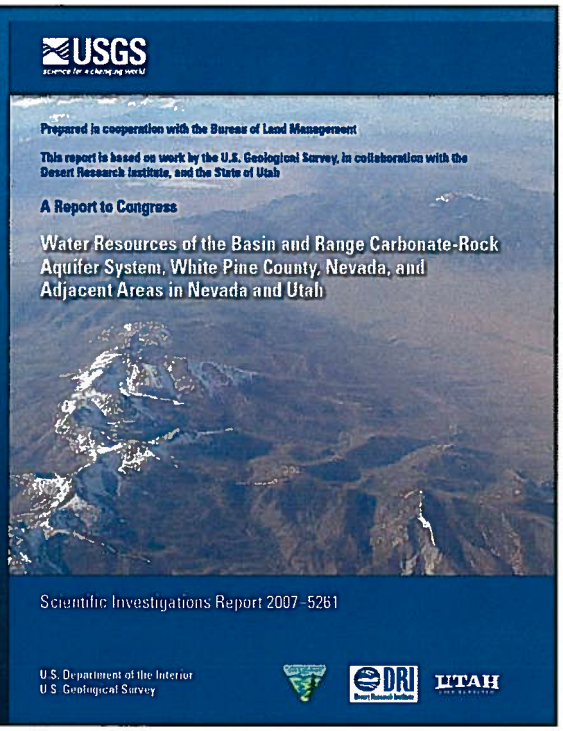

Supporting Reports

DRI Reports: http://barcas.dri.edu/

1. A methodology for mapping scrub canopy cover using high resolution satellite imagery
2. Steady-state water budget accounting model
3. Ground-water chemistry
4. Estimating ground-water recharge using chloride mass-balance method
5. Uncertainty analysis of ground-water discharge estimates

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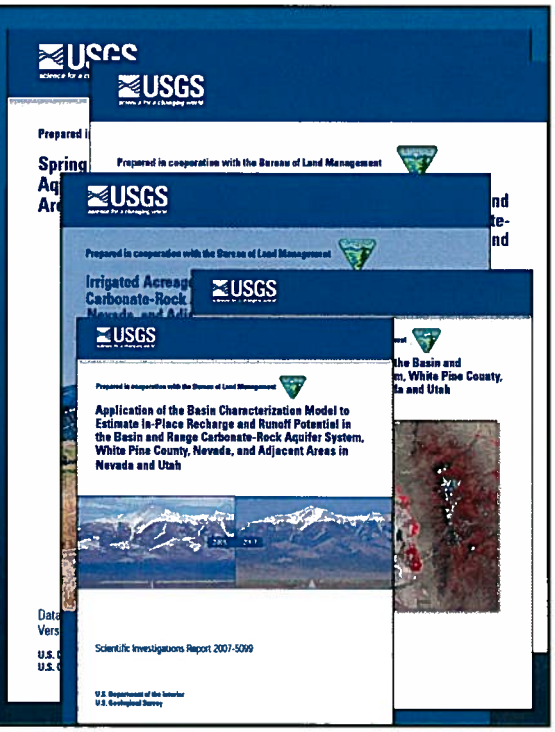

Response to Public Comment

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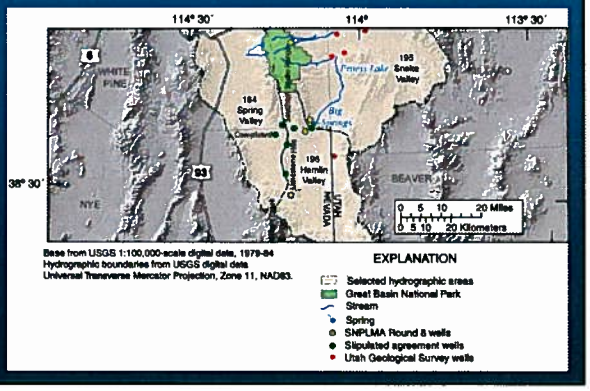
Continuing Study

Focused on deep (300'-1,000') drilling in southern Spring and Snake Valleys

- Stipulated Agreement
  - DOI and SNWA – 6 wells
- Utah Geological Survey and USGS
  - 5 wells
- USGS SNPLMA Round 8 proposal
  - 4 wells



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Groundwater Development Project (GWDP)

Environmental Impact Statement (EIS): Technical Assistance to the Bureau of Land Management (BLM) and Other DOI Agencies

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Role of the USGS

- Single point of contact for EIS related tasks
- Technical advisor at cooperating agency meetings, hydrology work group, other working groups as requested by BLM
- Provide information/data to BLM supporting scientific elements of the EIS
- Provide technical review of data, methodology, interpretation, scientific defensibility of final results
- Review internal drafts and final EIS document

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Funding and Products

- Reimbursable funds through IGO (inter-governmental order) for 16 months (June 1, 2007 through September 30, 2008)—not to exceed $250,000
- No USGS information products anticipated; however, if USGS collaborates or data offered to the public BLM will provide adequate time for a peer review process as required by USGS

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Future Plans

- Assist in finalizing approach for developing water budget used for model input
- Provide technical guidance during development of the numerical ground-water flow model
- Select USGS experts to participate with the formal review of the conceptual model, calibrated flow model, and results from predictive model runs

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