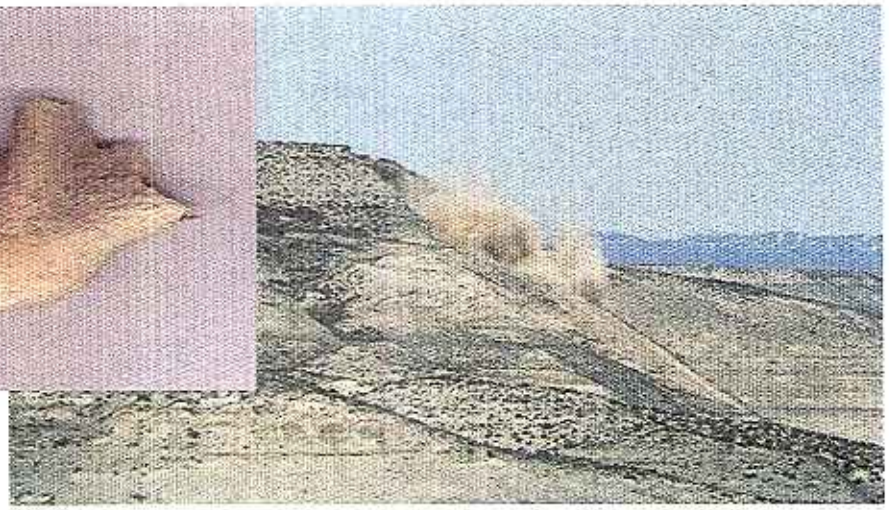
First Stop – Sligar's Hot Springs

Hagerman Valley Geology

A Focus on:

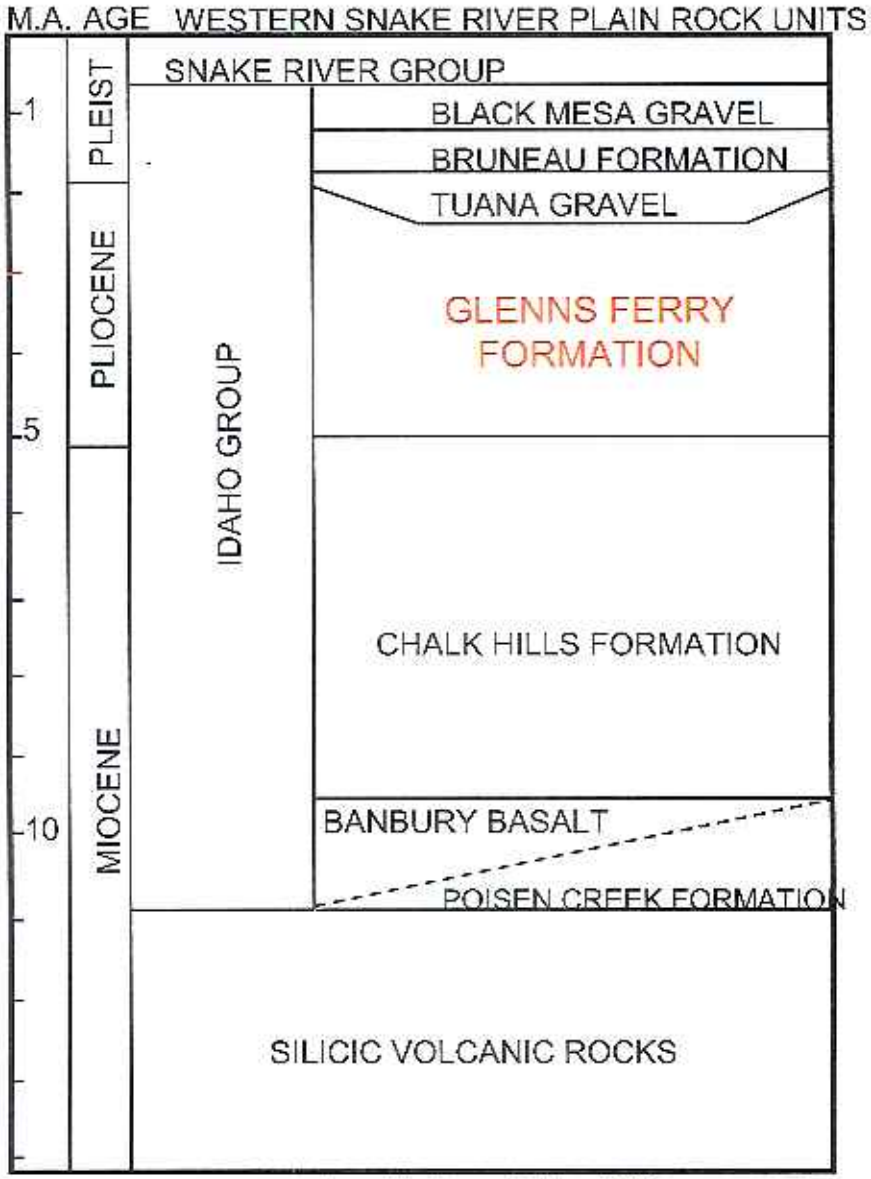
The Effect of Large-scale Heterogeneities and Geologic Structures on Spring Spatial Distribution

By: Neal Farmer
Idaho Department of Water Resources
Email: neal.farmer@idwr.idaho.gov



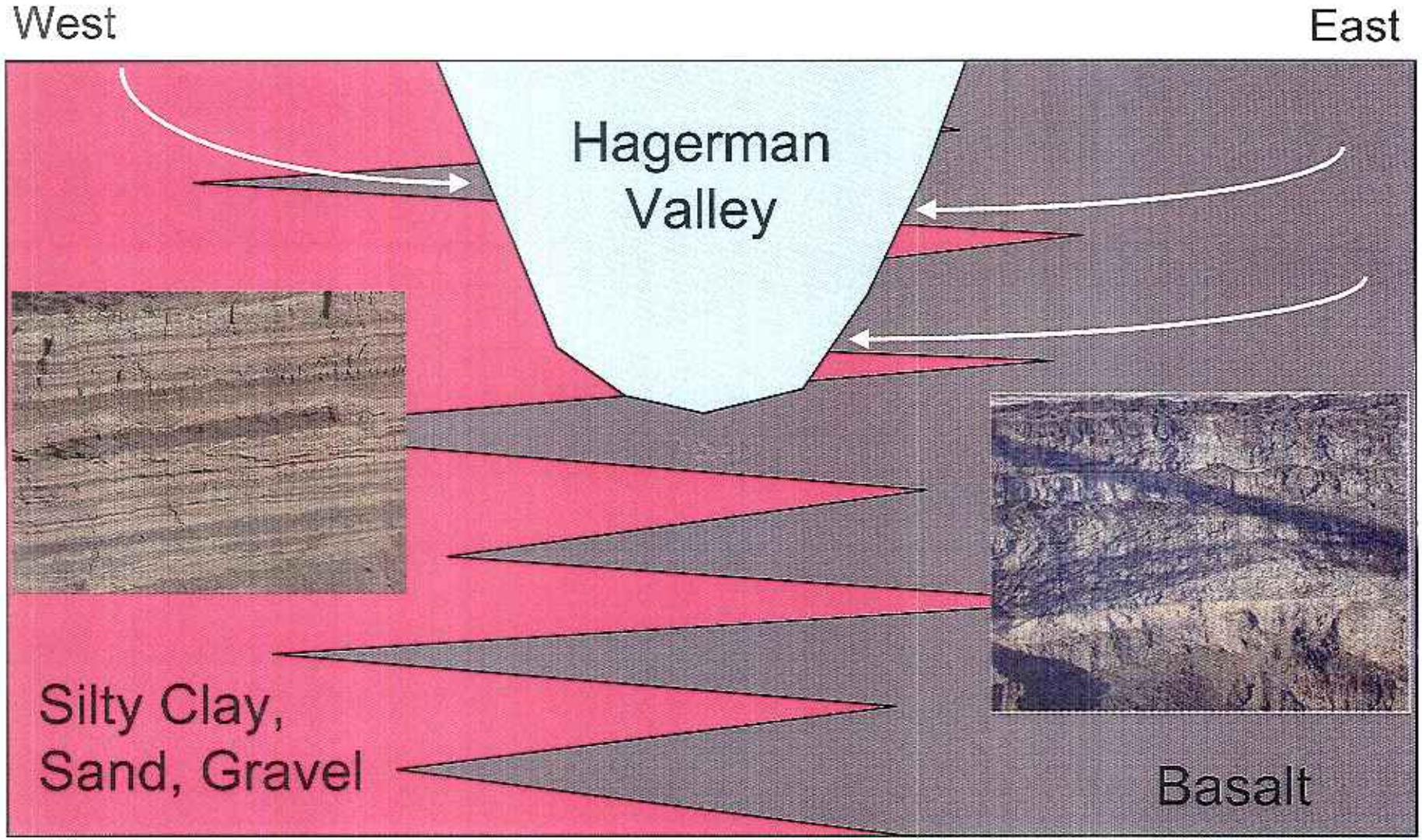
'Lake Idaho'

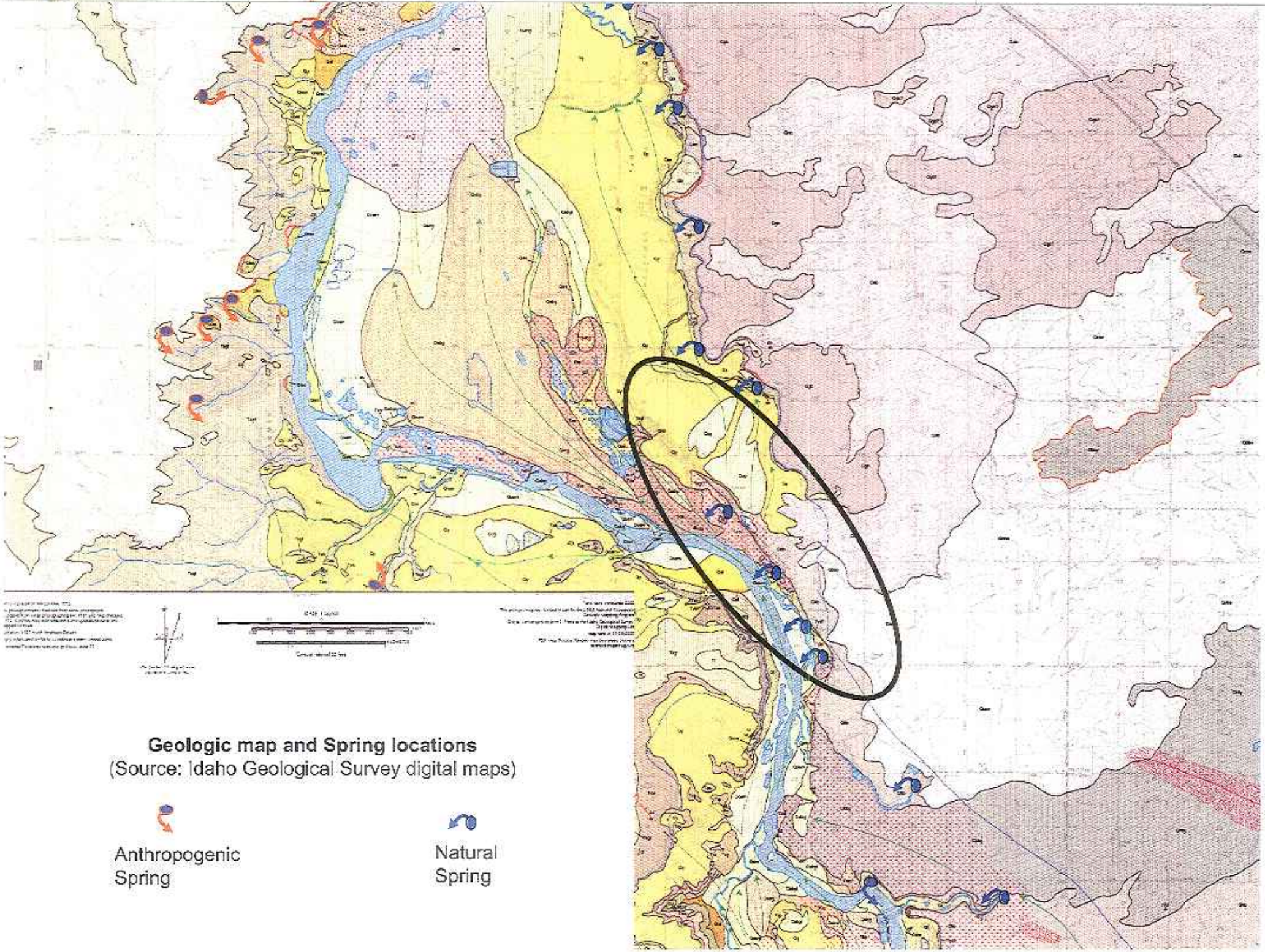
- 5 to 1.5 m.a.
- deposited Glenns Ferry Formation.
- about 50 miles wide and 150 miles long.
- some fossils are radioactive including the official Idaho State Fossil – "The Hagerman Horse".



(modified from Malde, 1972)

"East Meets West" – Geologic Transition Zone of the Eastern and Western Snake River Plain



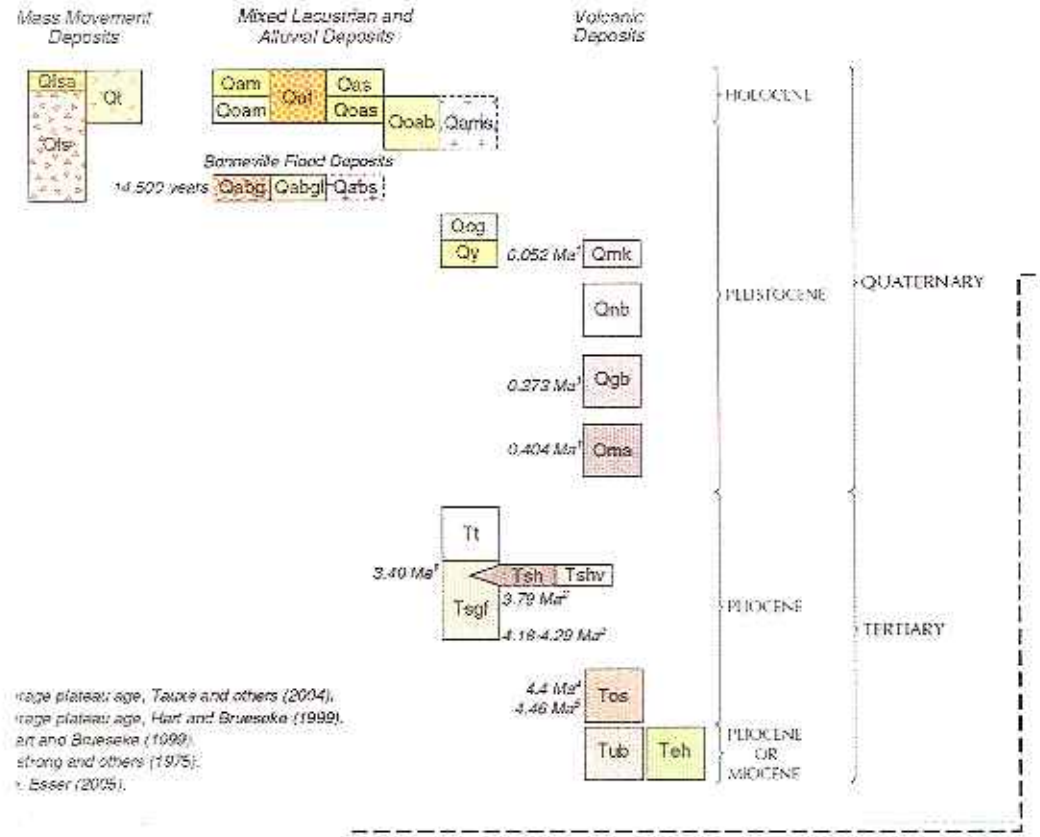


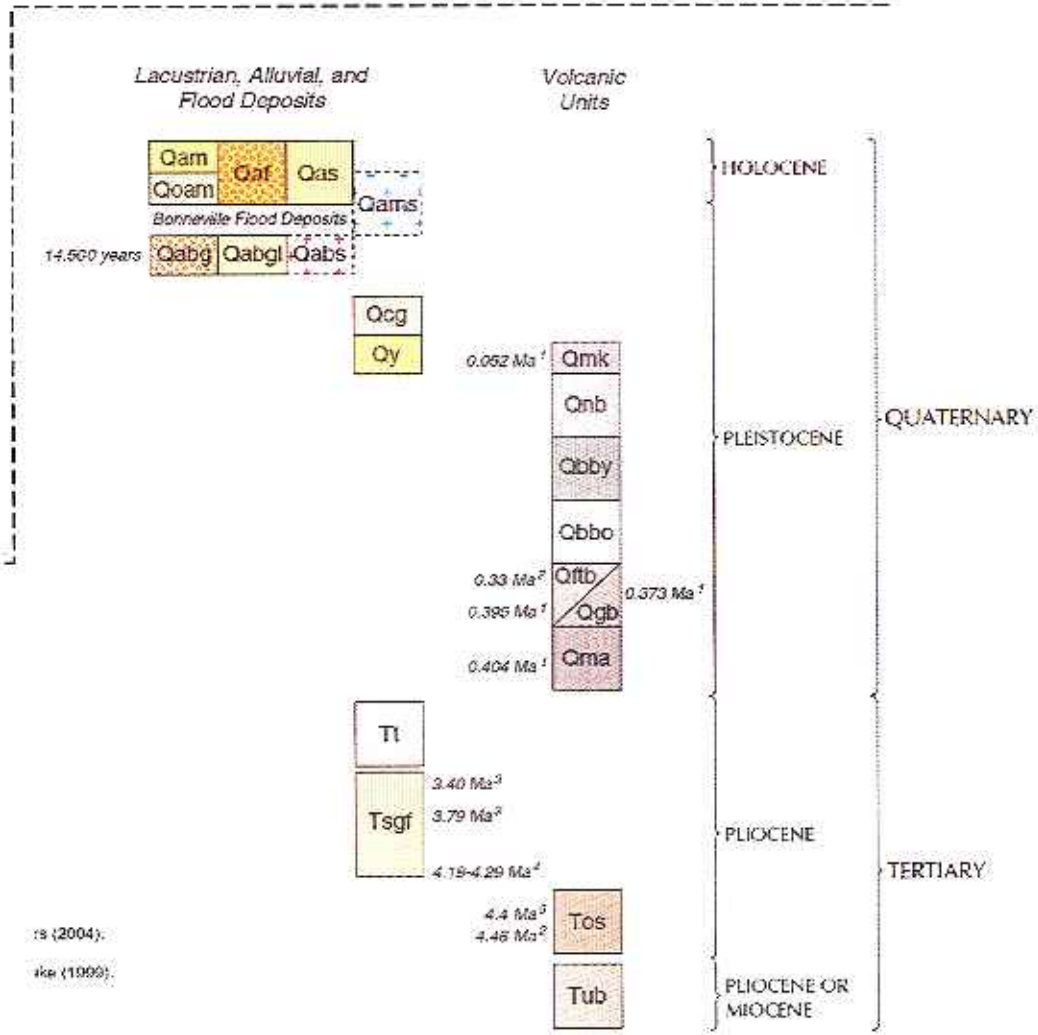
Geologic map and Spring locations
(Source: Idaho Geological Survey digital maps)

Anthropogenic Spring

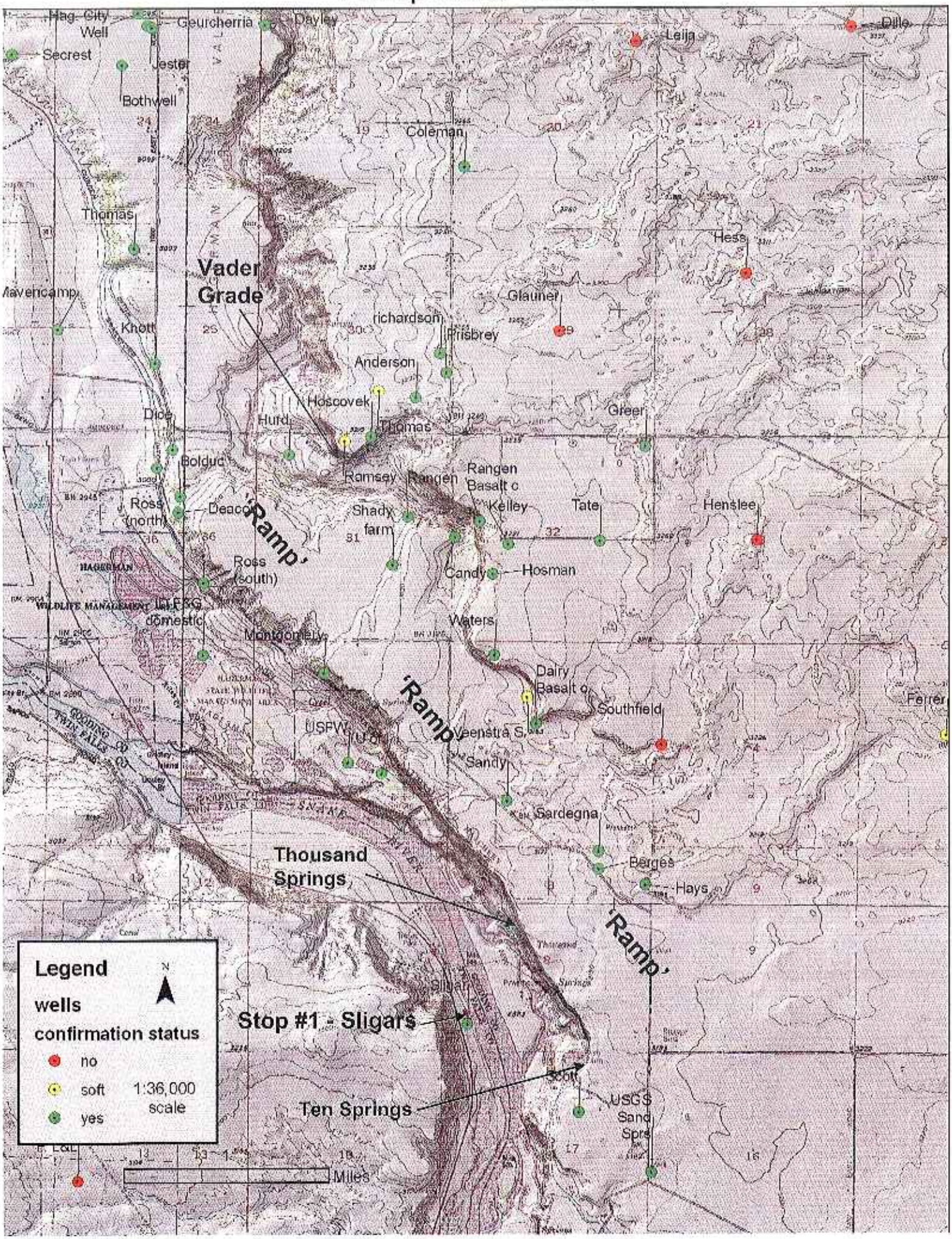
Natural Spring

CORRELATION OF MAP UNITS





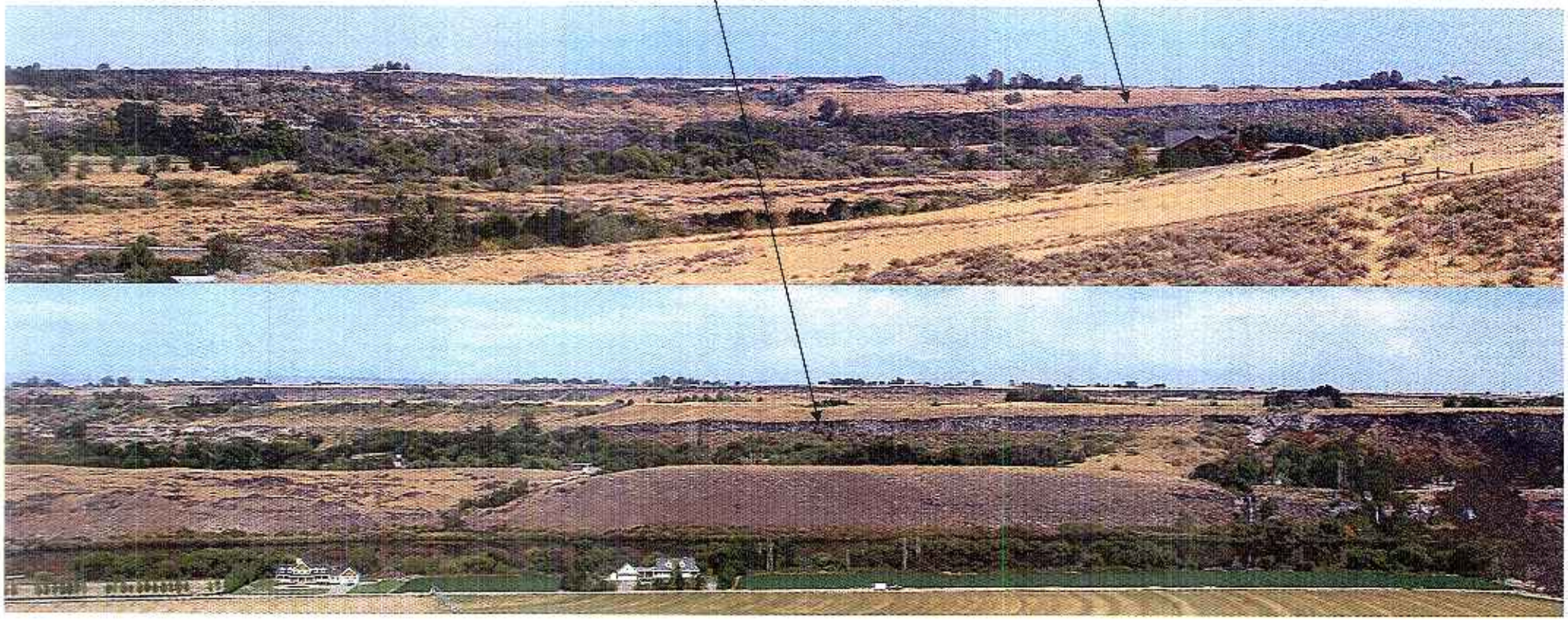
'Ramp' Area Wells



Thousand Springs – note the dip of the springs and contact.

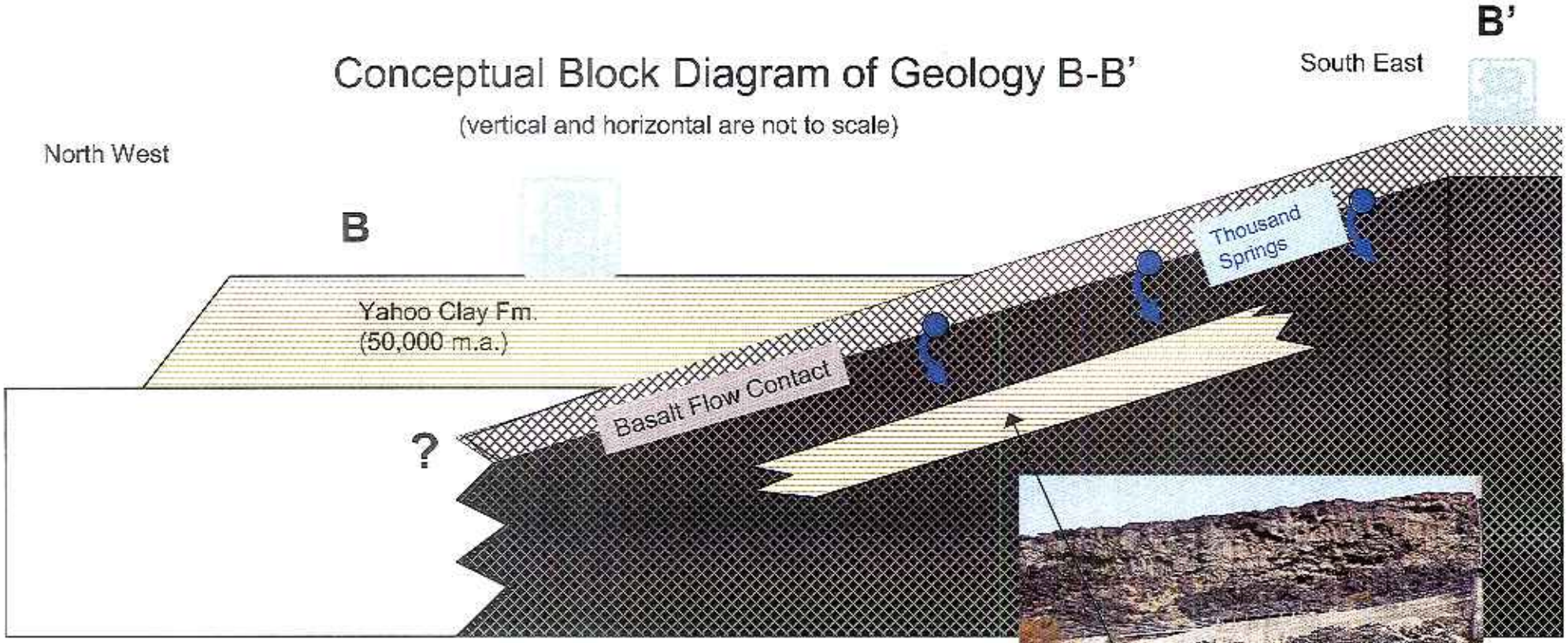
Northwest Dipping Basalt near Thousand Springs

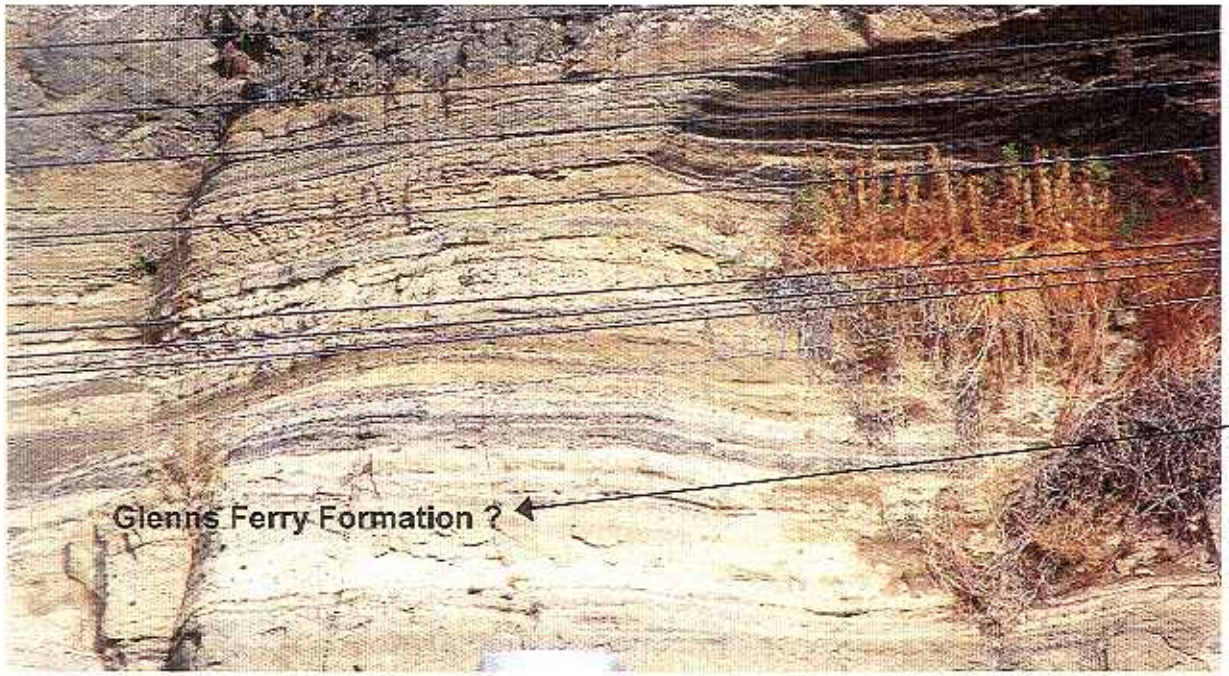
(view azimuth is east)

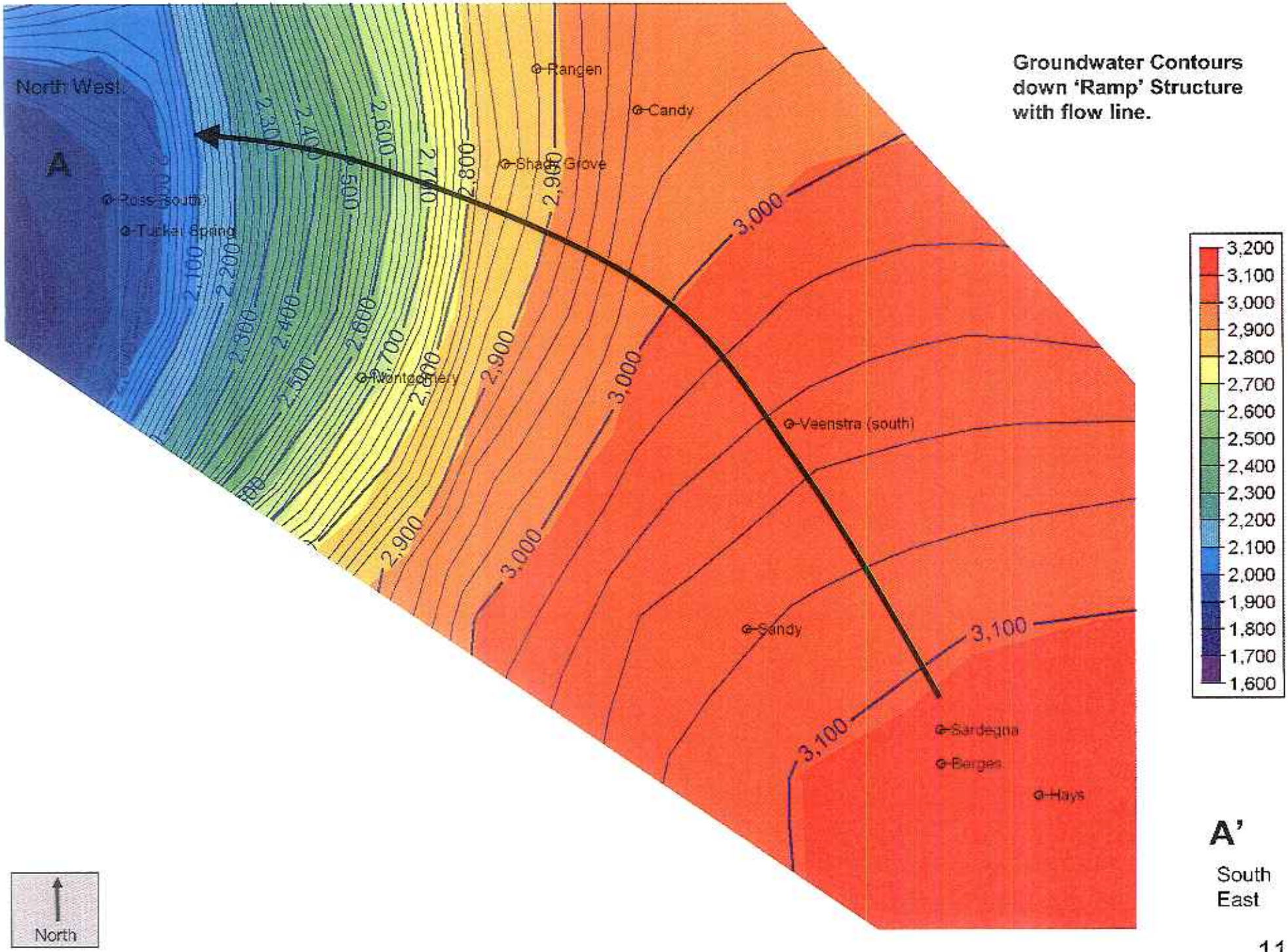


Conceptual Block Diagram of Geology B-B'

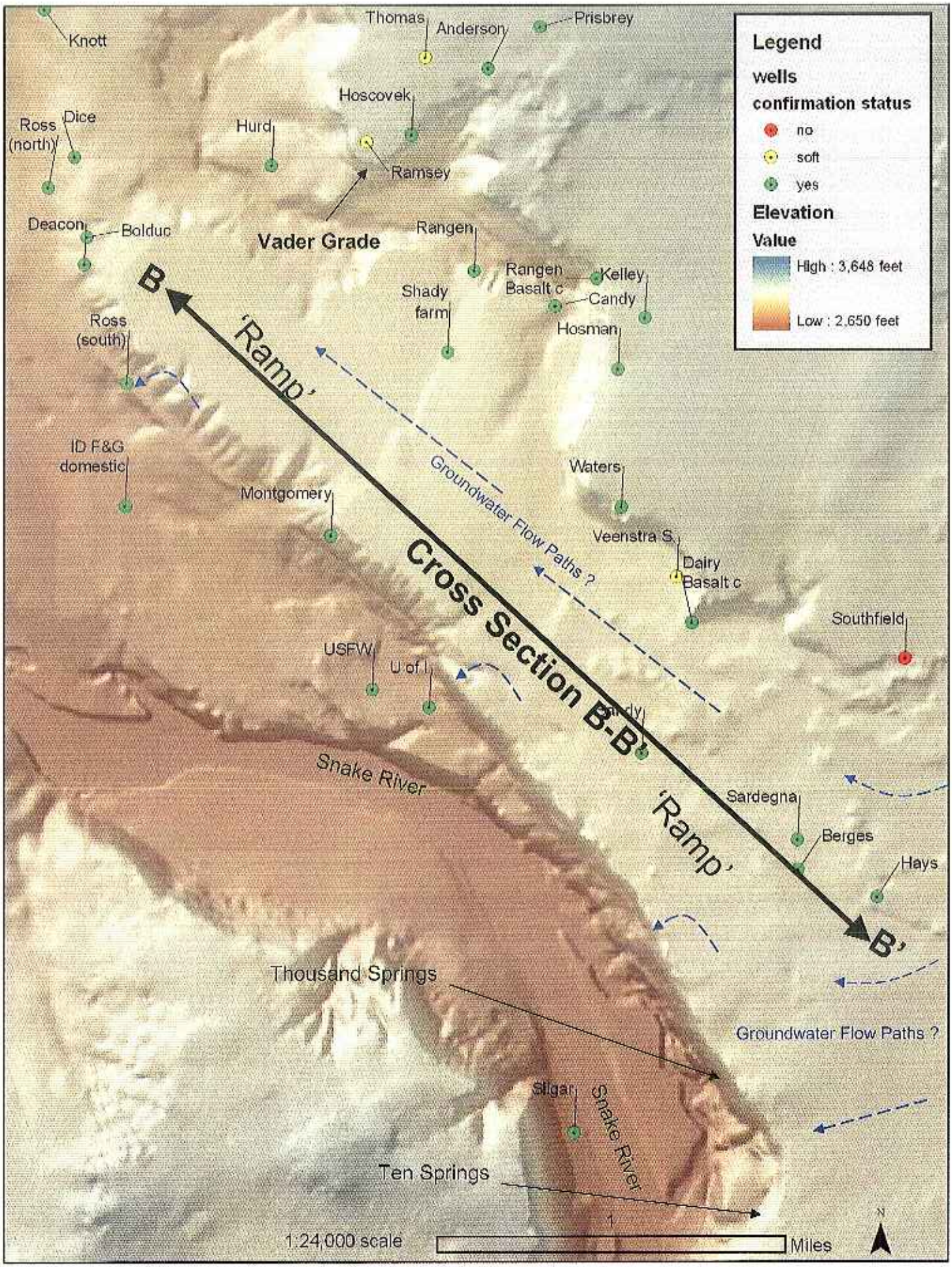
(vertical and horizontal are not to scale)

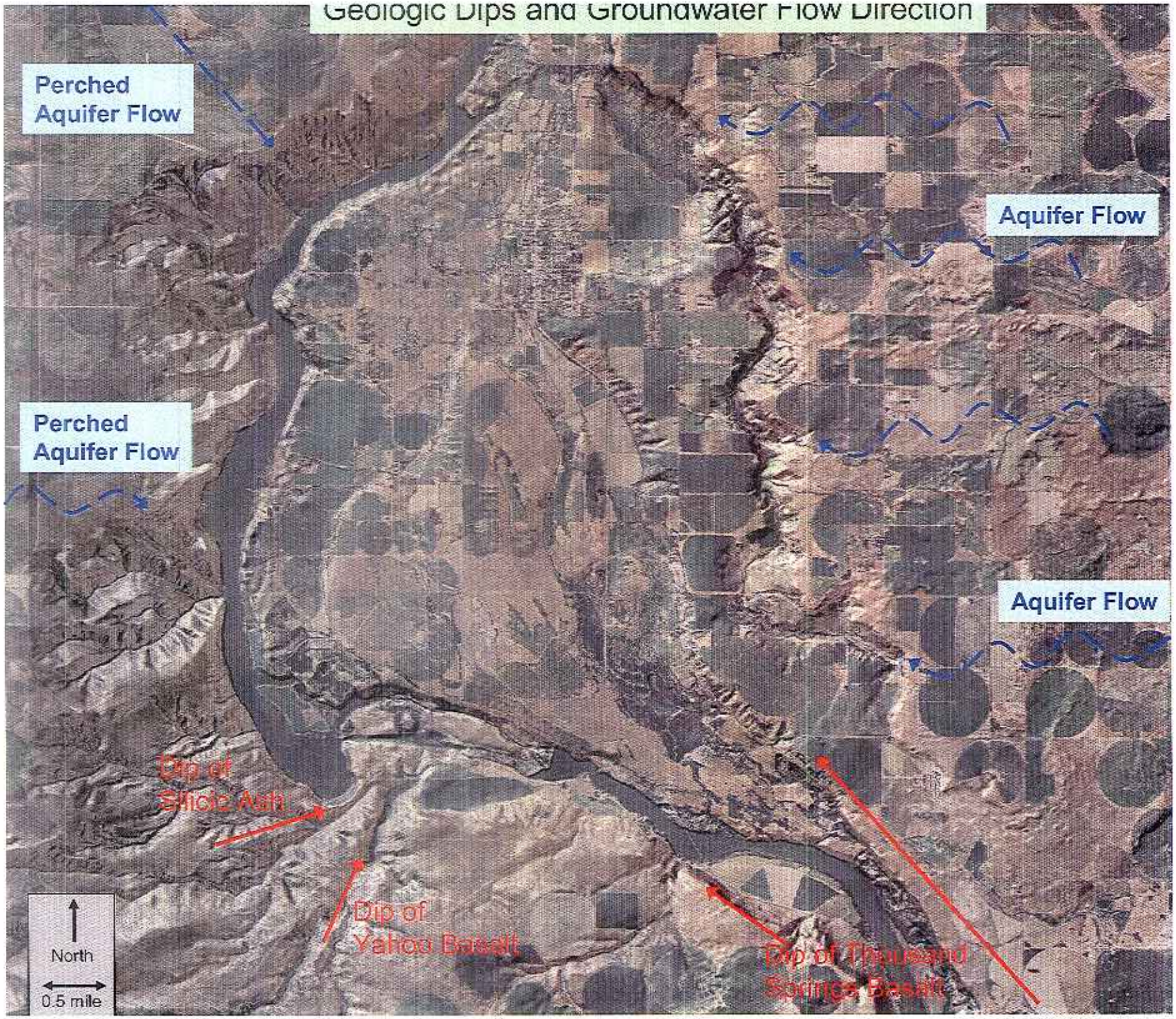





Groundwater Contours down 'Ramp' Structure with flow line.
North West
A
A'
South East
North
Rangen
Candy
Shady Grove
Ross (south)
Tuttle Spring
Montgomery
Vaenstra (south)
Sandy
Sardegna
Bergen
Hays
3,200
3,100
3,000
2,900
2,800
2,700
2,600
2,500
2,400
2,300
2,200
2,100
2,000
1,900
1,800
1,700
1,600

'Ramp' Area Wells




Geologic Dips and Groundwater Flow Direction
Perched Aquifer Flow
Aquifer Flow
Perched Aquifer Flow
Aquifer Flow
Dip of Silicic Ash
Dip of Yahoo Basalt
Dip of Thousand Springs Basalt
North
0.5 mile

Northwest Dipping Basalt on west side of Snake River

(view azimuth is to the west from National Fish Hatchery)

Northward Dipping Basalt at Yahoo Creek
Intercalated with Glenns Ferry Fm.
(view azimuth is west)

North Eastward Dipping Ash Interbedded within Glenns Ferry Fm.

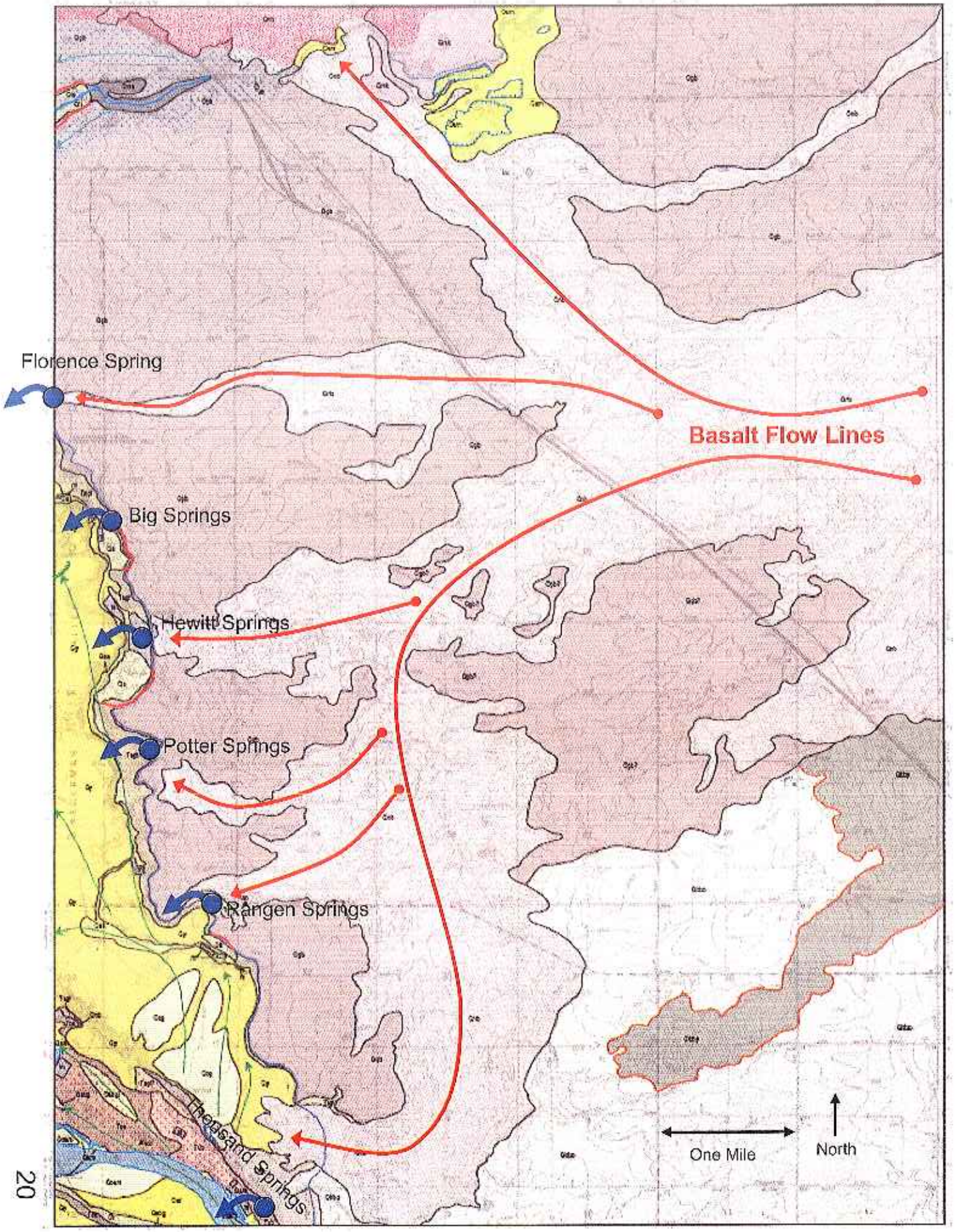
(view azimuth is west)

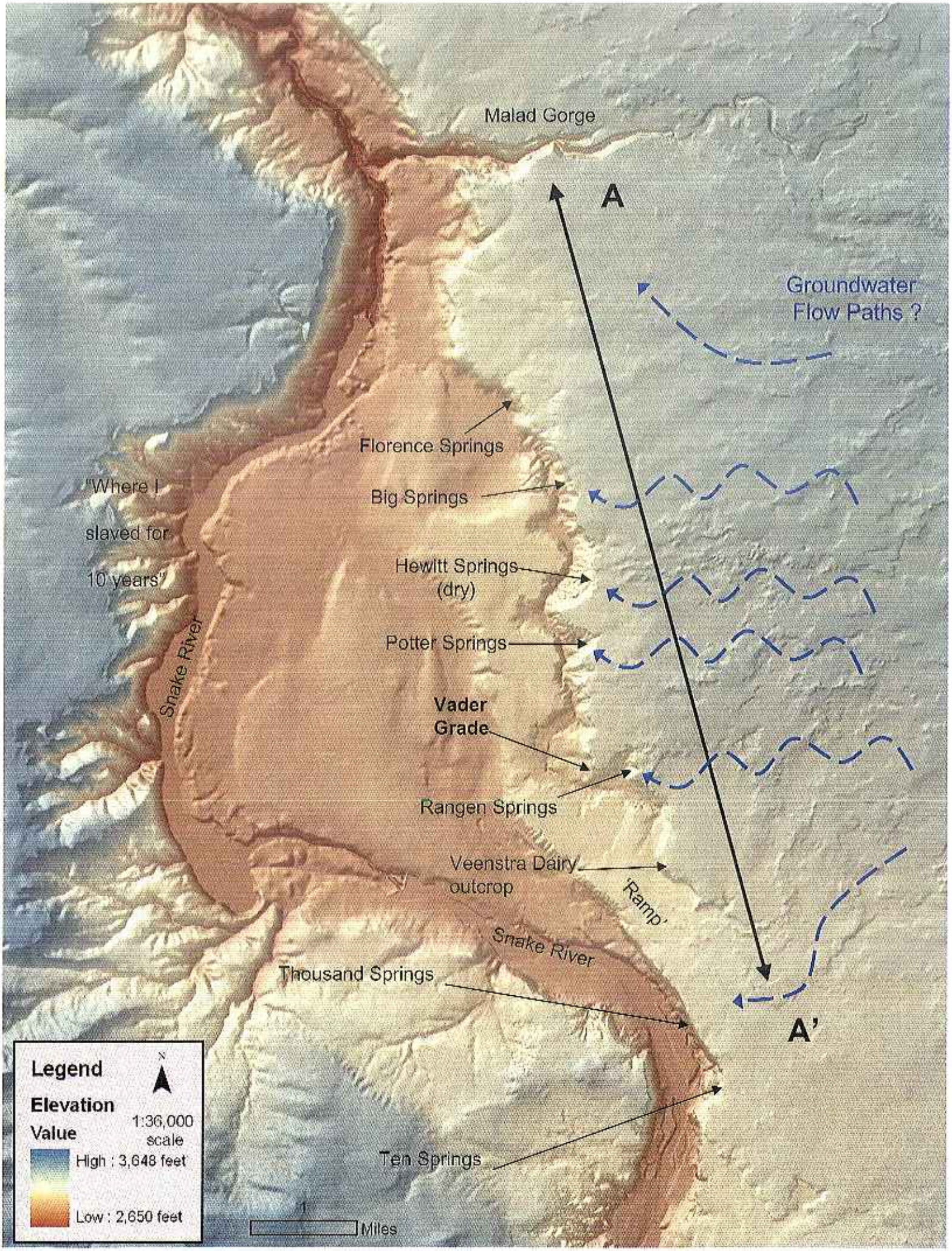
Flourescent dye groundwater tracer tests document direction of groundwater flow is to southeast.

Surveyed geologic outcrops and well logs in this area support a southeast dipping architecture.

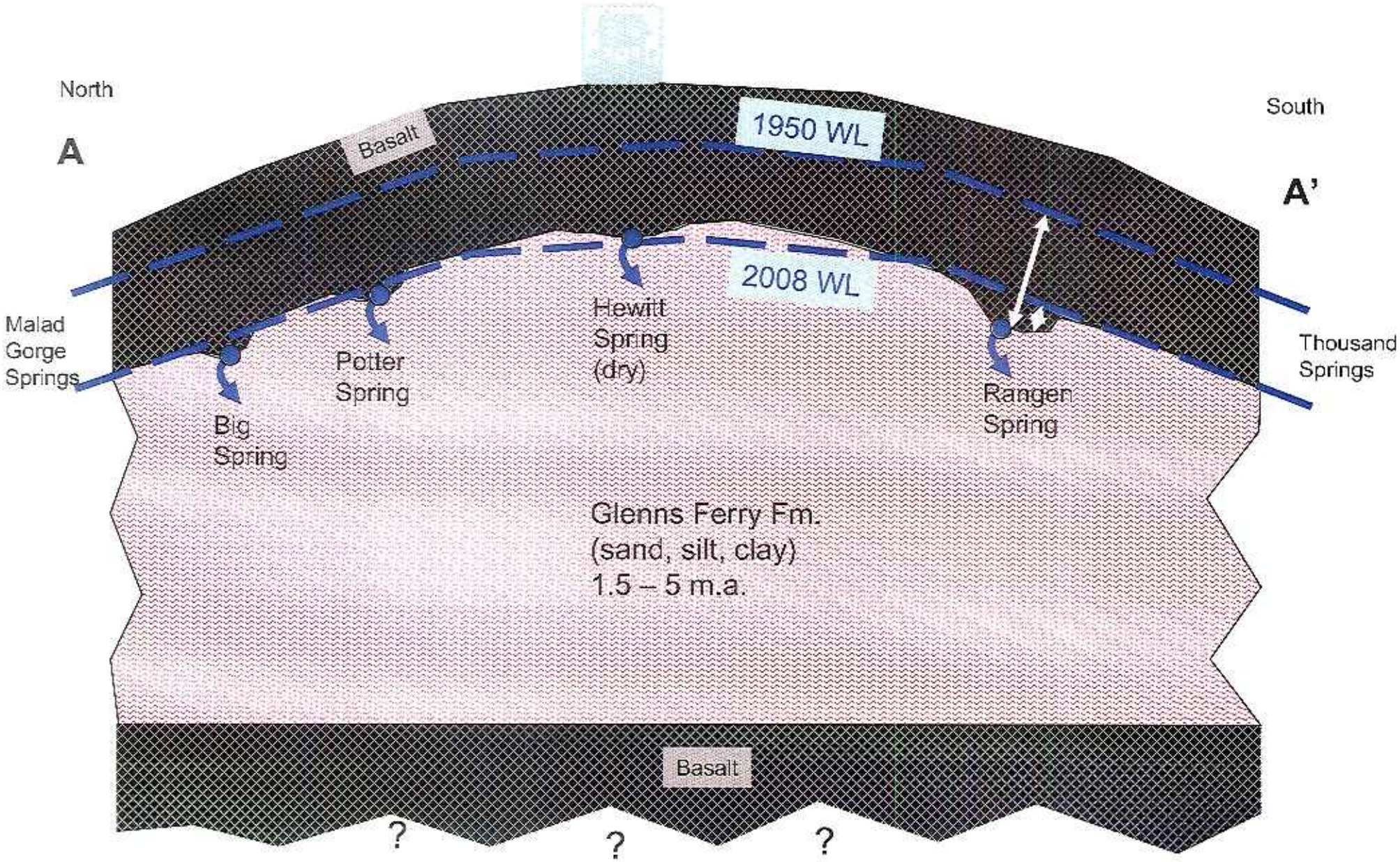
Flourescent Dye Groundwater Tracer Tests

Vader Grade Stop


Florence Spring
Basalt Flow Lines
Big Springs
Hewitt Springs
Potter Springs
Rangen Springs
Thousand Springs
One Mile
North

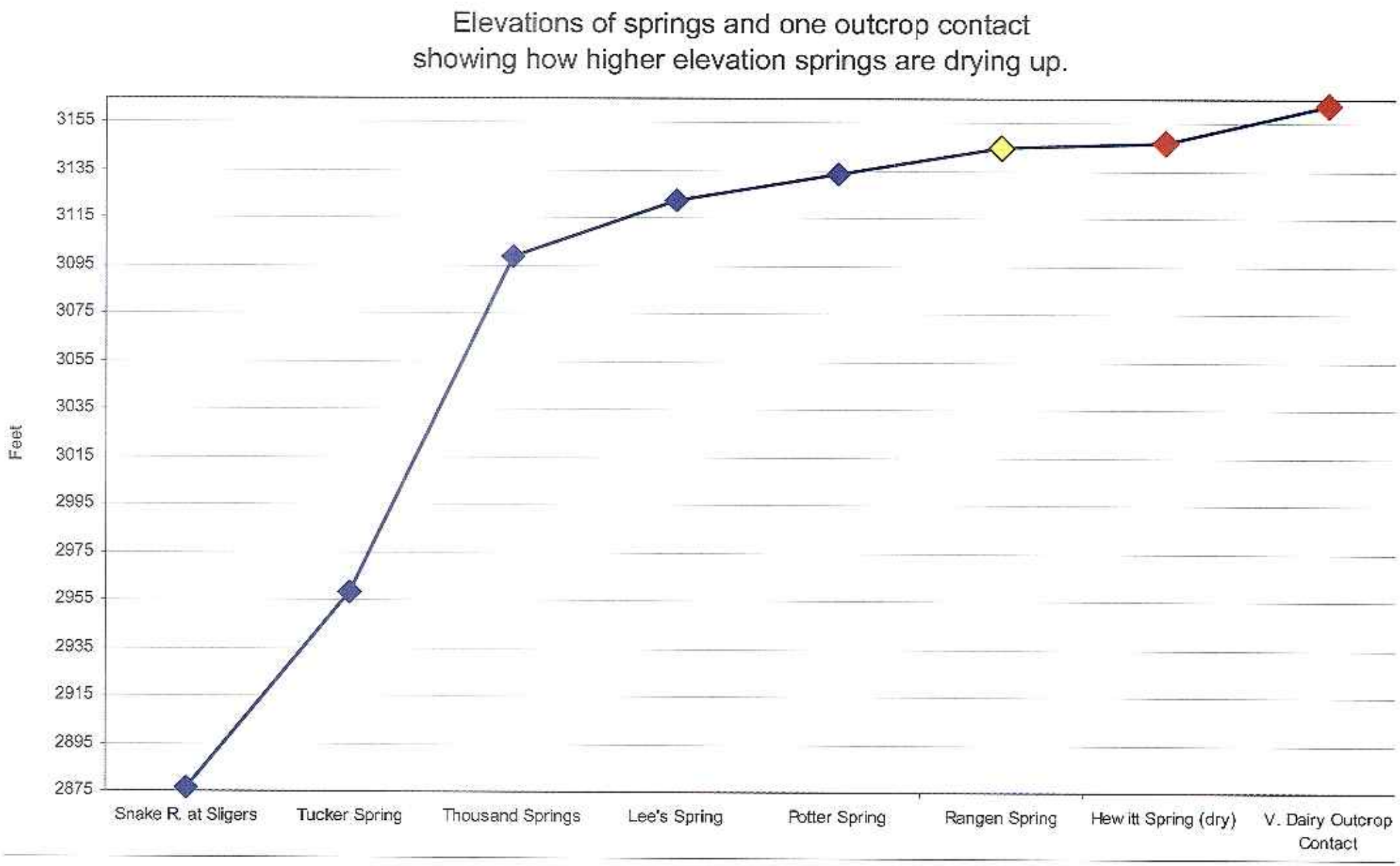

Malad Gorge
A
Groundwater
Flow Paths ?
Florence Springs
"Where I
slaved for
10 years"
Big Springs
Hewitt Springs
(dry)
Potter Springs
Snake River
Vader
Grade
Rangen Springs
Veenstra Dairy
outcrop
'Ramp'
Snake River
Thousand Springs
A'
Ten Springs
Legend
N
Elevation
Value
1:36,000
scale
High : 3,648 feet
Low : 2,650 feet
1
Miles

Conceptual Block Diagram



(vertical and horizontal are not to scale)

Outcrop example of a paleo-topographic low depression which groundwater will follow.

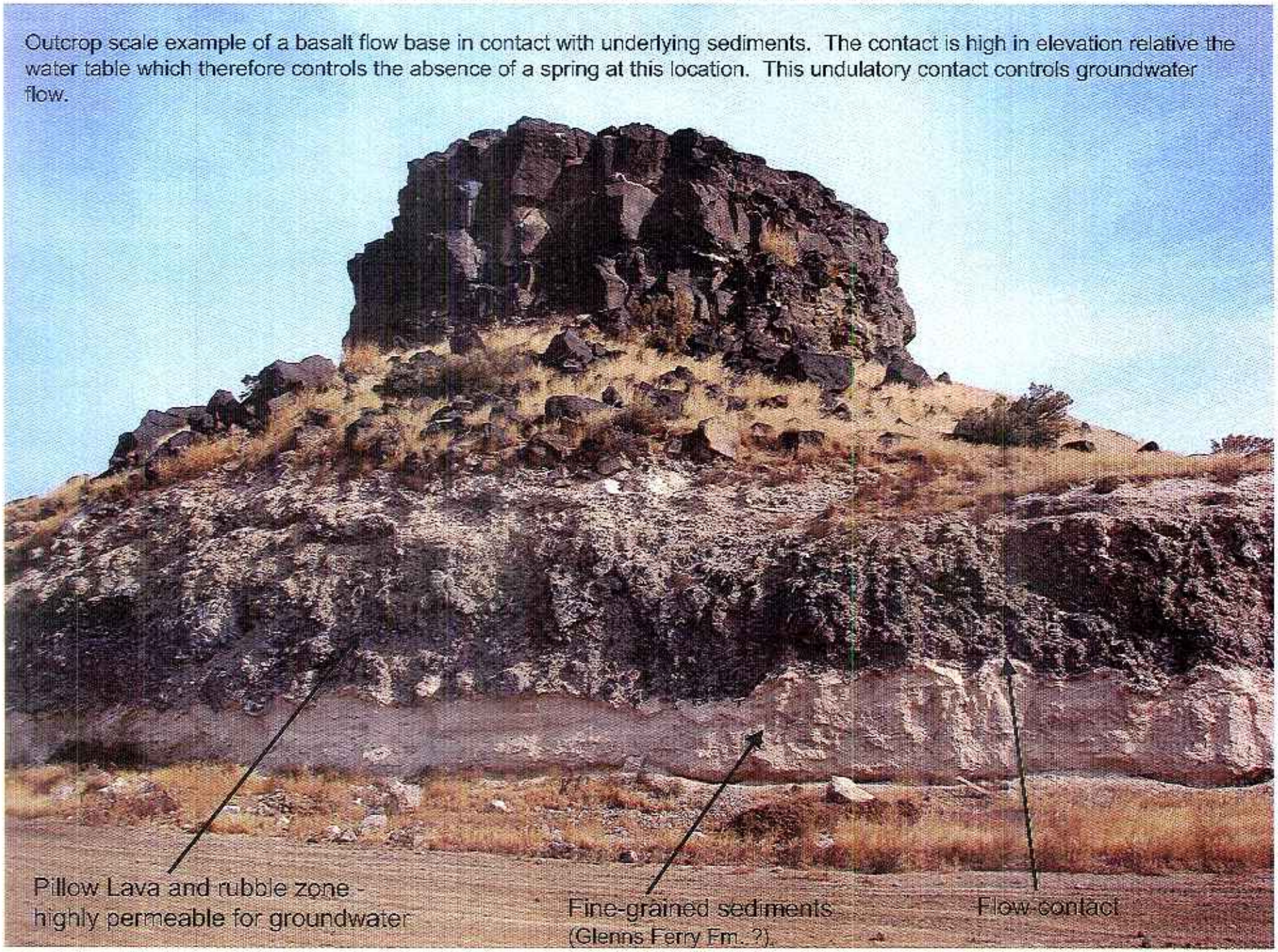

Elevations of springs and one outcrop contact
showing how higher elevation springs are drying up.
Feet
3155
3135
3115
3095
3075
3055
3035
3015
2995
2975
2955
2935
2915
2895
2875
Snake R. at Sligers
Tucker Spring
Thousand Springs
Lee's Spring
Potter Spring
Rangen Spring
Hew itt Spring (dry)
V. Dairy Outcrop Contact

Hewitt Spring (dry)

The groundwater table has dropped below
the elevation Of the spring.

Rangen Spring – compare to Veenstra Dairy Geologic outcrop.

Veenstra Dairy outcrop contact south of Vader Grade outcrop.



Next Stop Vader Grade