



Pluvial Lakes

Pluvial lakes represent large paleolake systems that formed in semi-arid to arid environments throughout Quaternary.

Pluvial lakes record periods of either higher precipitation and/or lower evaporation rates.

The timing of pluvial lake formation occurs in either glacial or interglacial periods, depending upon atmospheric and oceanic circulation patterns.

The pluvial lakes within the Great Basin region had their highest lake levels during glacial periods.

The Mass Balance of Pluvial Lakes

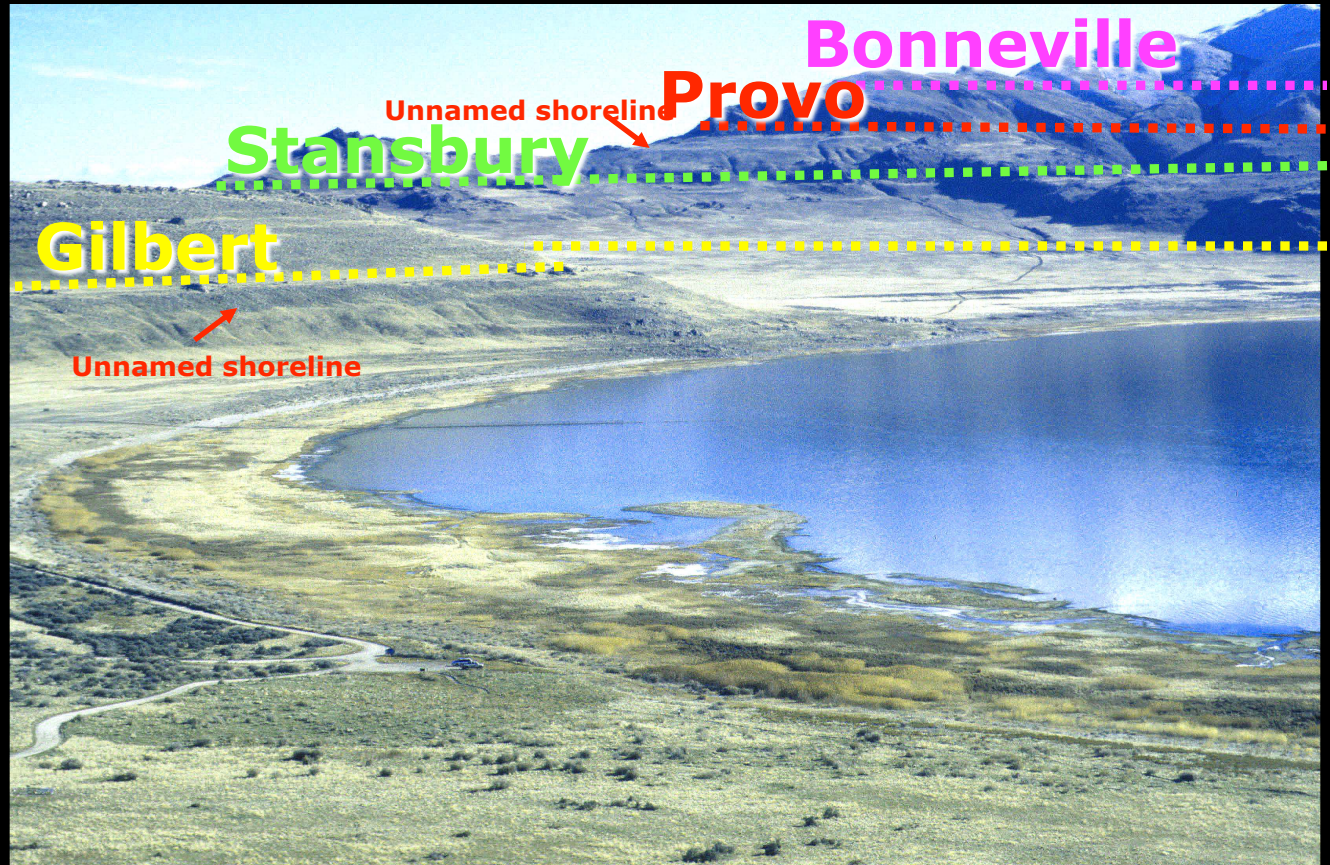
The change in lake volume = input - output of water into the lake basin.

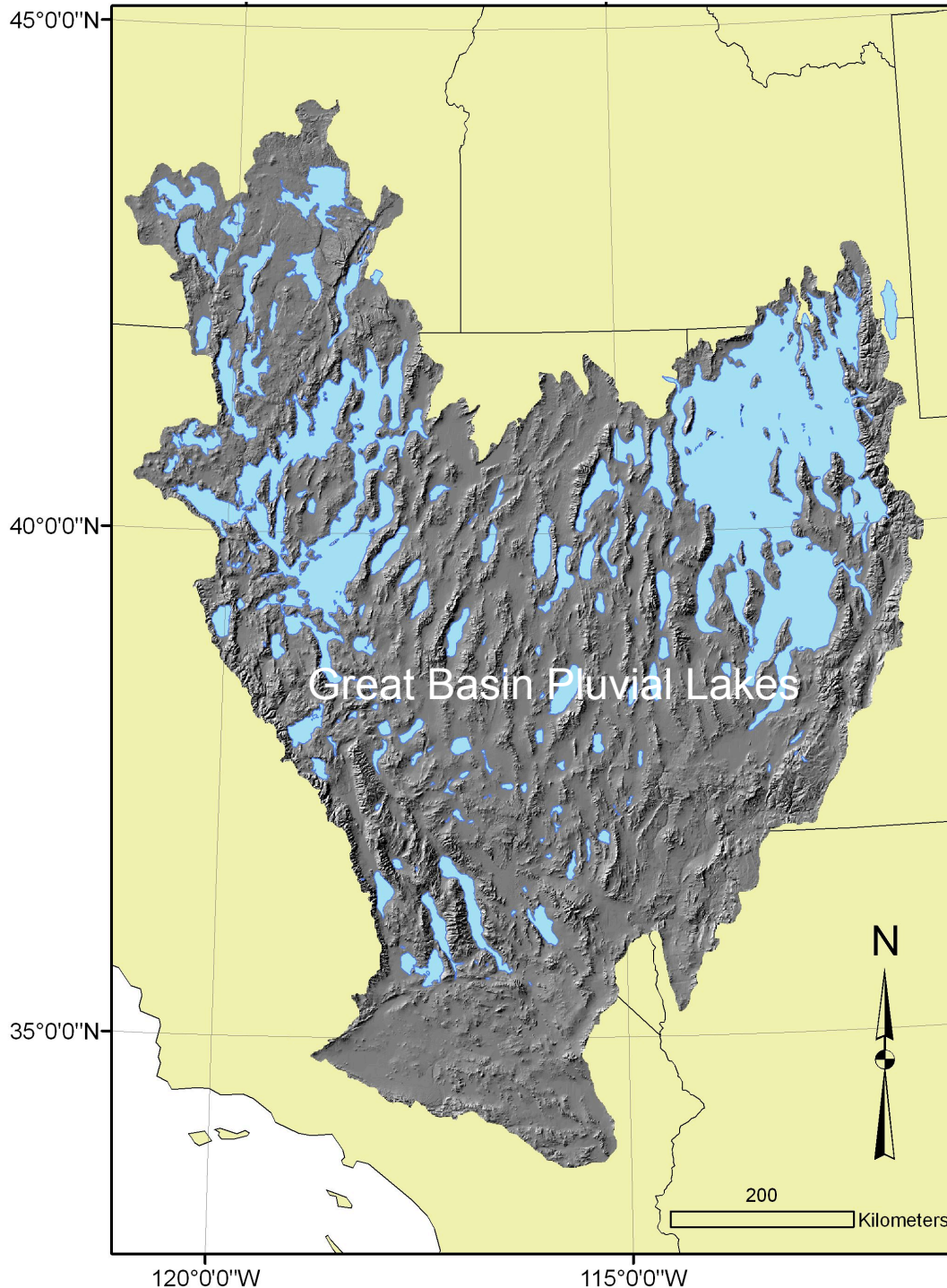
$$\Delta V = I - O$$

The change in surface area of the lake (and lake level) depends upon the ΔV and basin topography.

Six shorelines of glacial

Lake Bonneville are identified in the image on the left. The shorelines represent different high stands and were incised by wave erosion when the lake level was stabilized.





Mass Balance of Lake Water

I = precipitation on lake, surface runoff from surrounding drainage basin, groundwater inflow.

O = evaporation, surface outflow, and ground water outflow.

Controls on Water Input (I)

Precipitation rate

Temperature (effect on evaporation from the lake surface and to a lesser extent, wind)

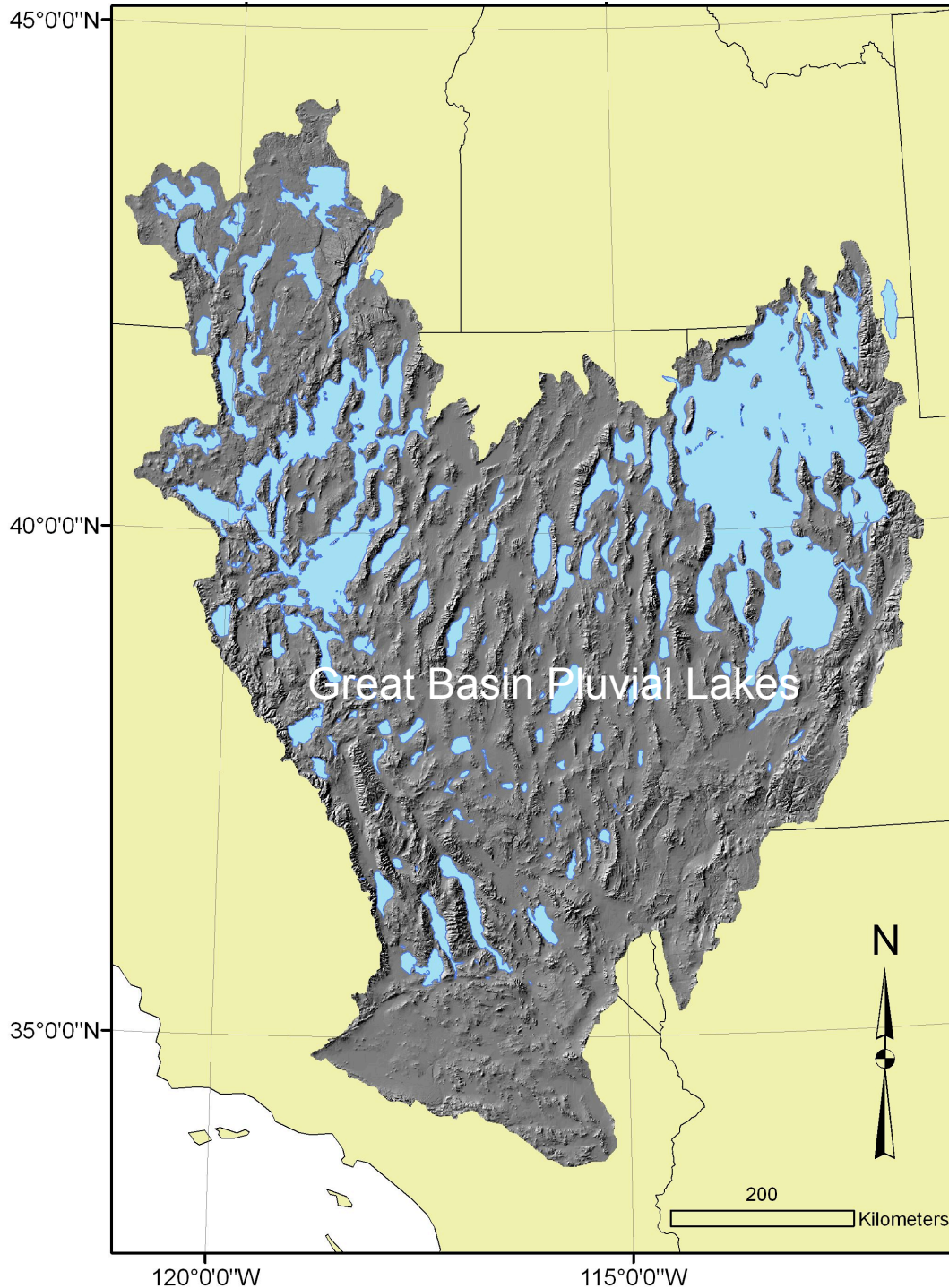
Controls on Water Output (O)

Elevation of the lake surface relative to the outflow point (sill).

Lake area (greater surface area, greater evaporation).

Temperature (higher temperature, greater evaporation).

Other factors (groundwater outflow rate, wind)



Pluvial Lakes of the Great Basin

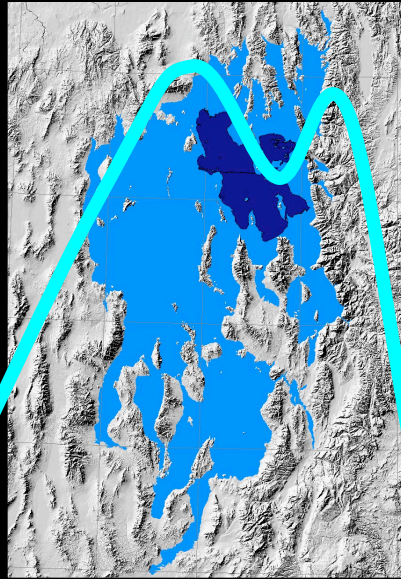
Formed during glacial periods and persisted into the glacial-interglacial transition.

Largest Lakes

Lake Bonneville (northwestern Utah).

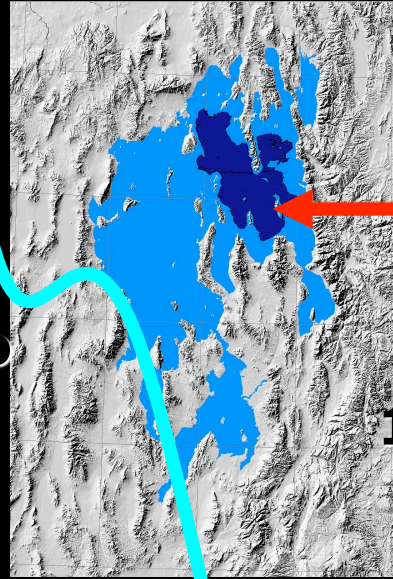
Lake Lahontan (western Nevada)

The Rise and Fall of Lake Bonneville



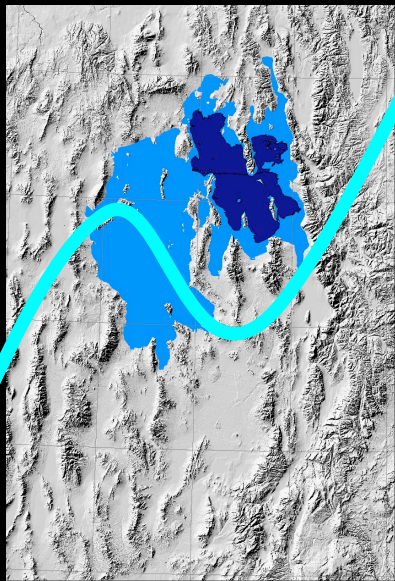
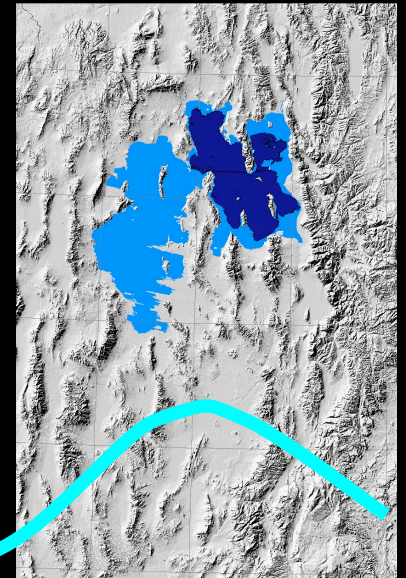
Bonneville Level
18,000 years ago

Provo Level
17,000 years ago



Great Salt Lake today

Gilbert Level
12,000 years ago



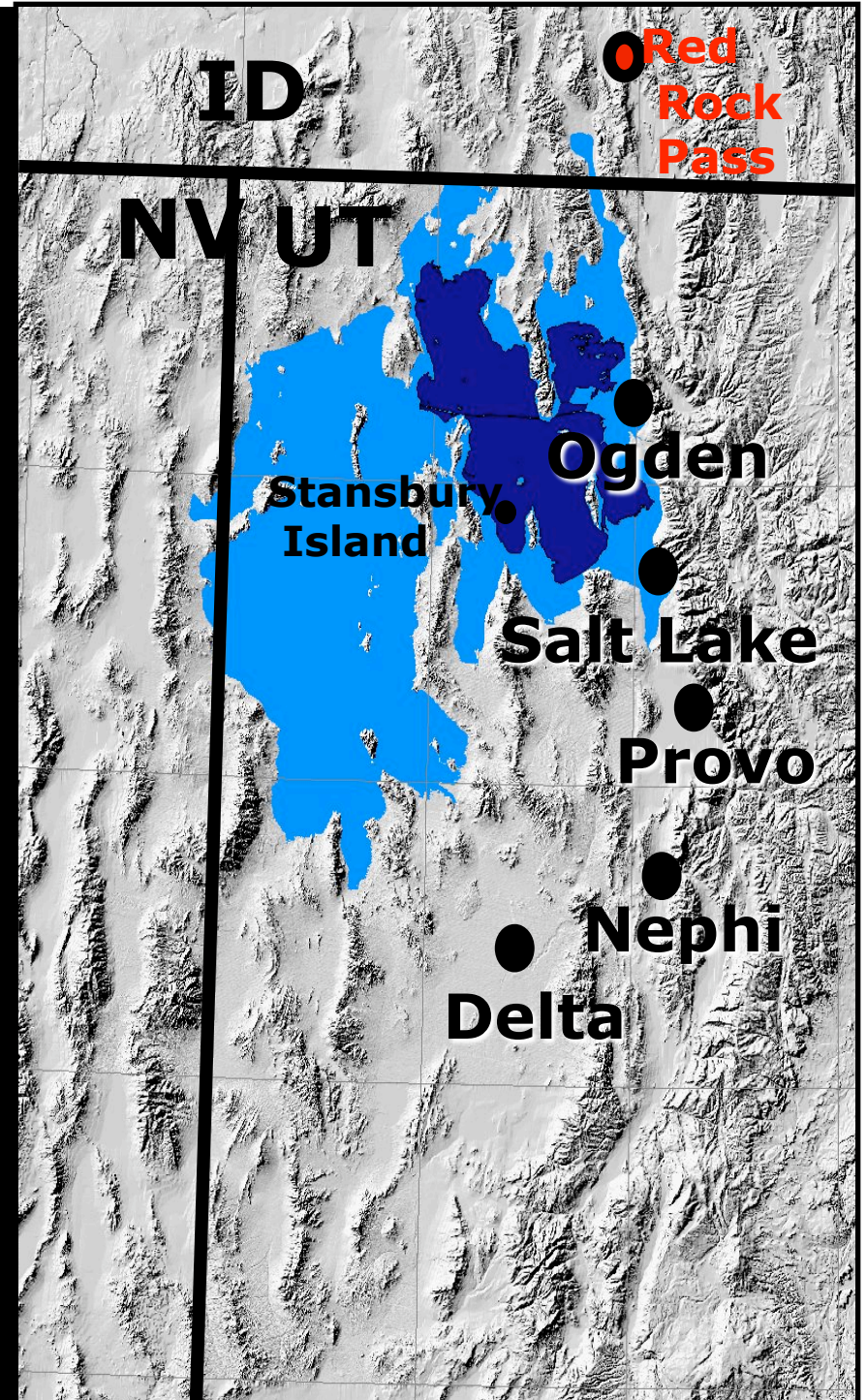
Stansbury Level
24,000 years ago

Hydrograph of Lake Bonneville



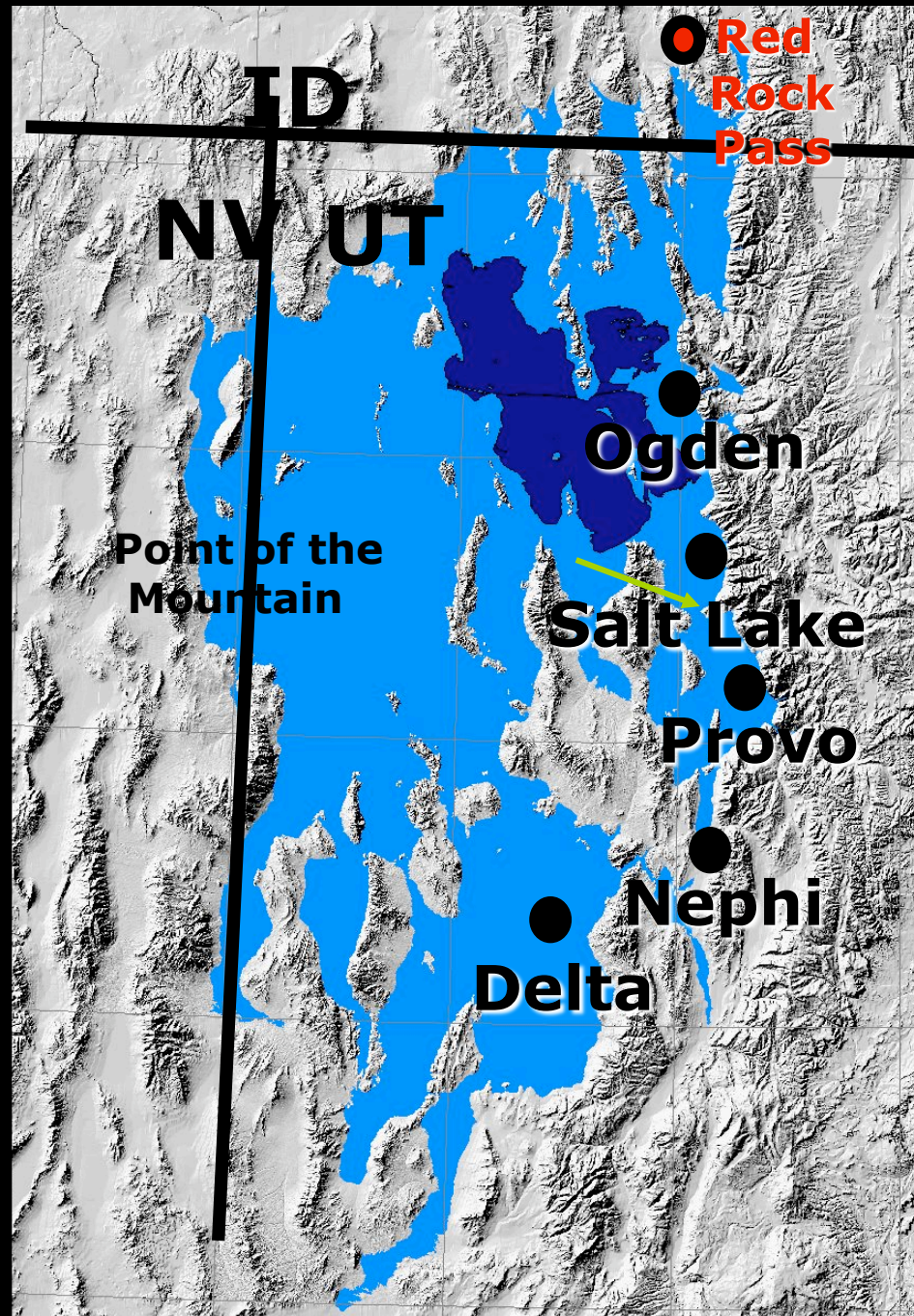
Stansbury Shoreline

~24,000 years ago



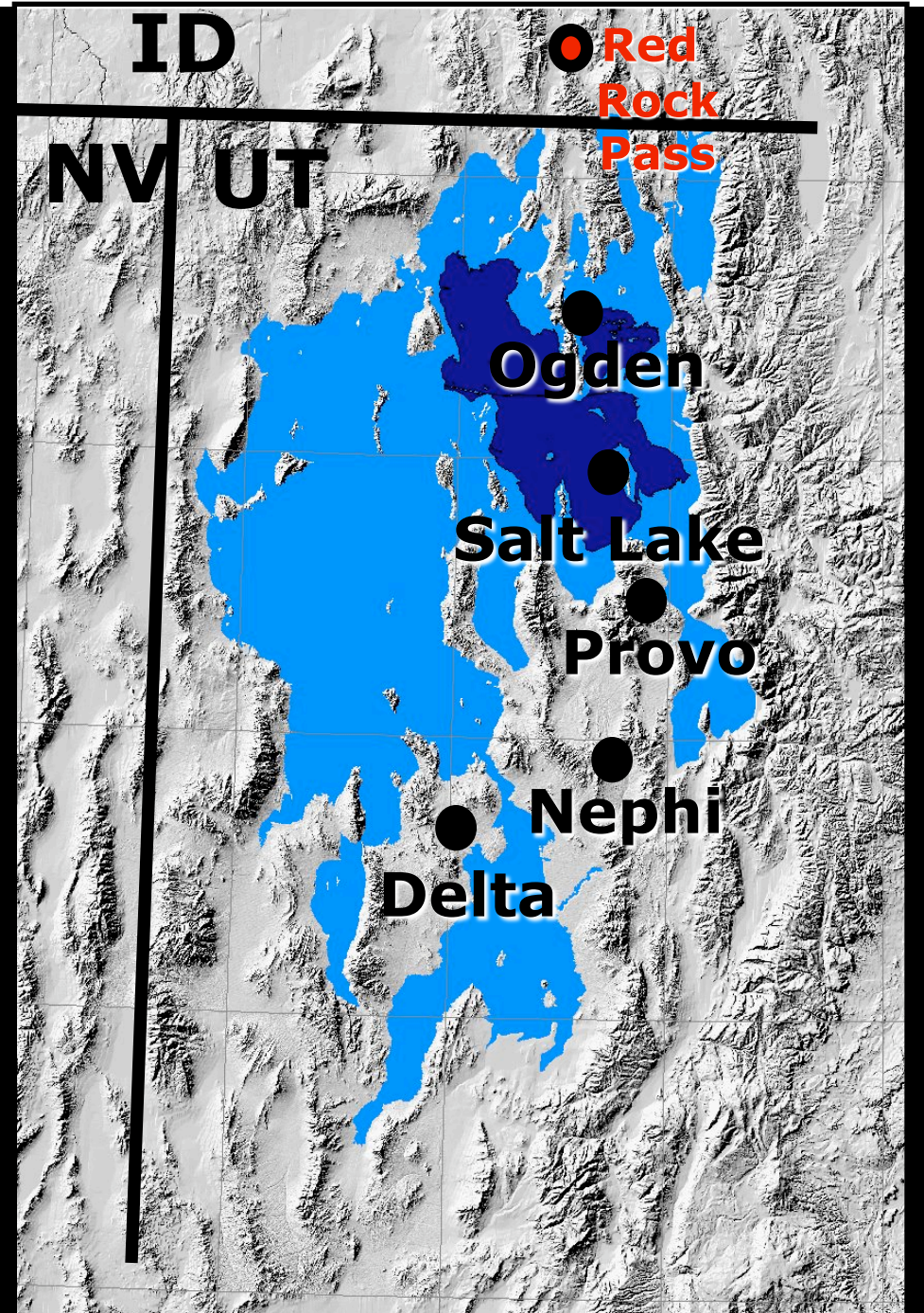
Bonneville Shoreline

~18,000 years ago

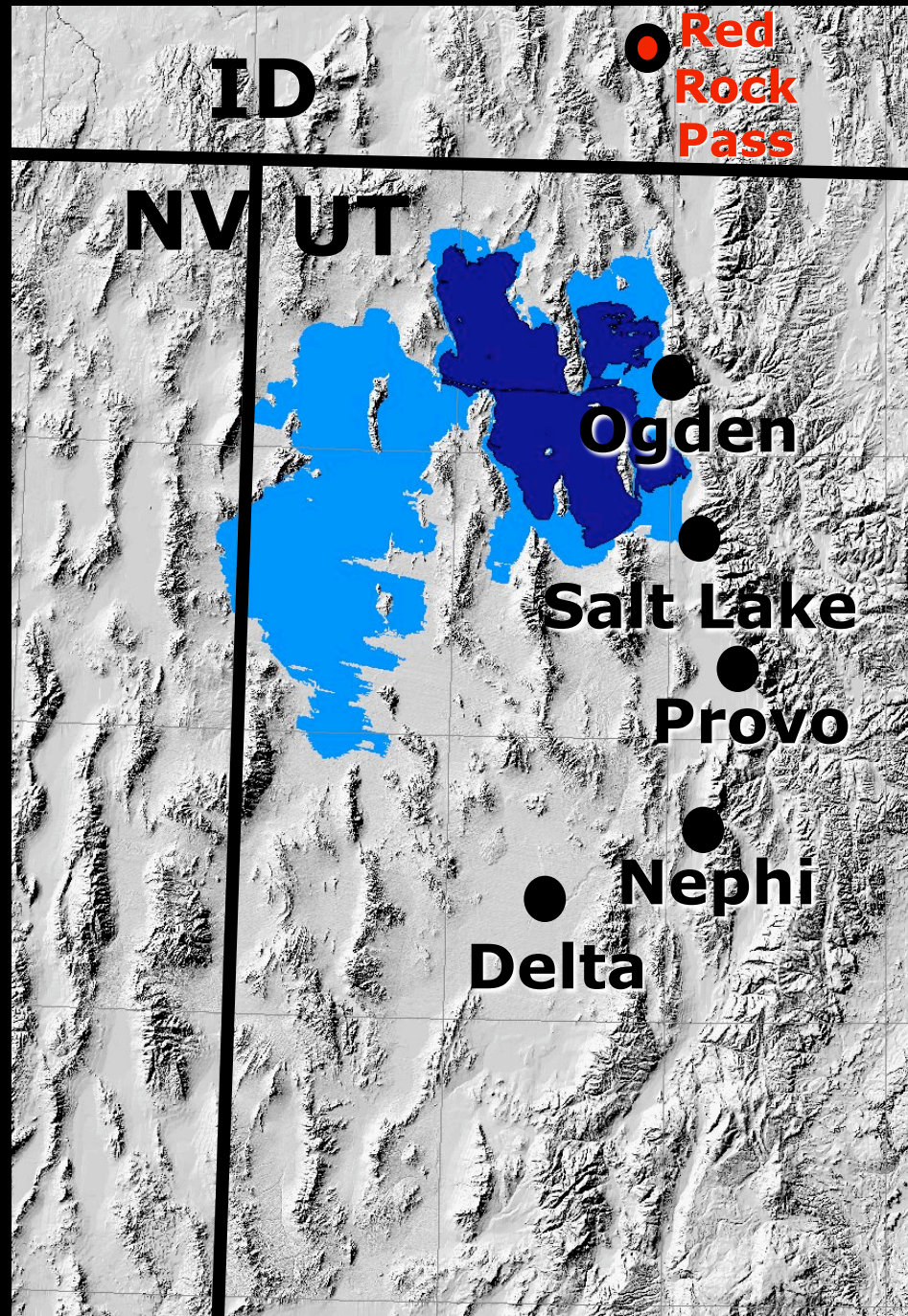


Provo Shoreline

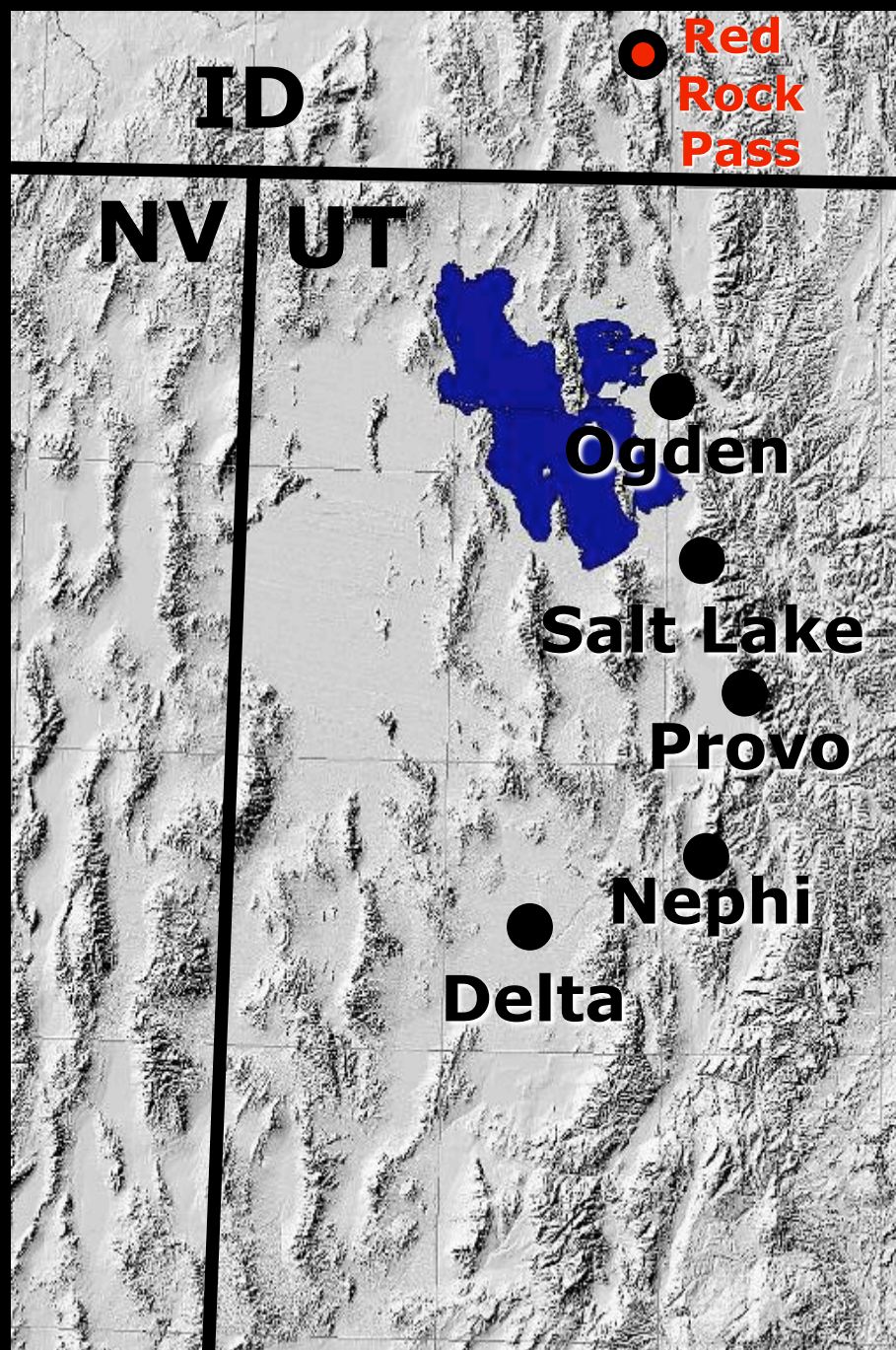
~17,000 years ago



**Gilbert
Shoreline
~12,000 years ago**



Great Salt Lake Today



Shorelines of Lake Bonneville at Antelope Island





**Bonneville
Shoreline at
Point of the
Mountain**



**Bonneville
Shoreline
at the "U"**



**Bonneville
Shoreline at
Point of the
Mountain**

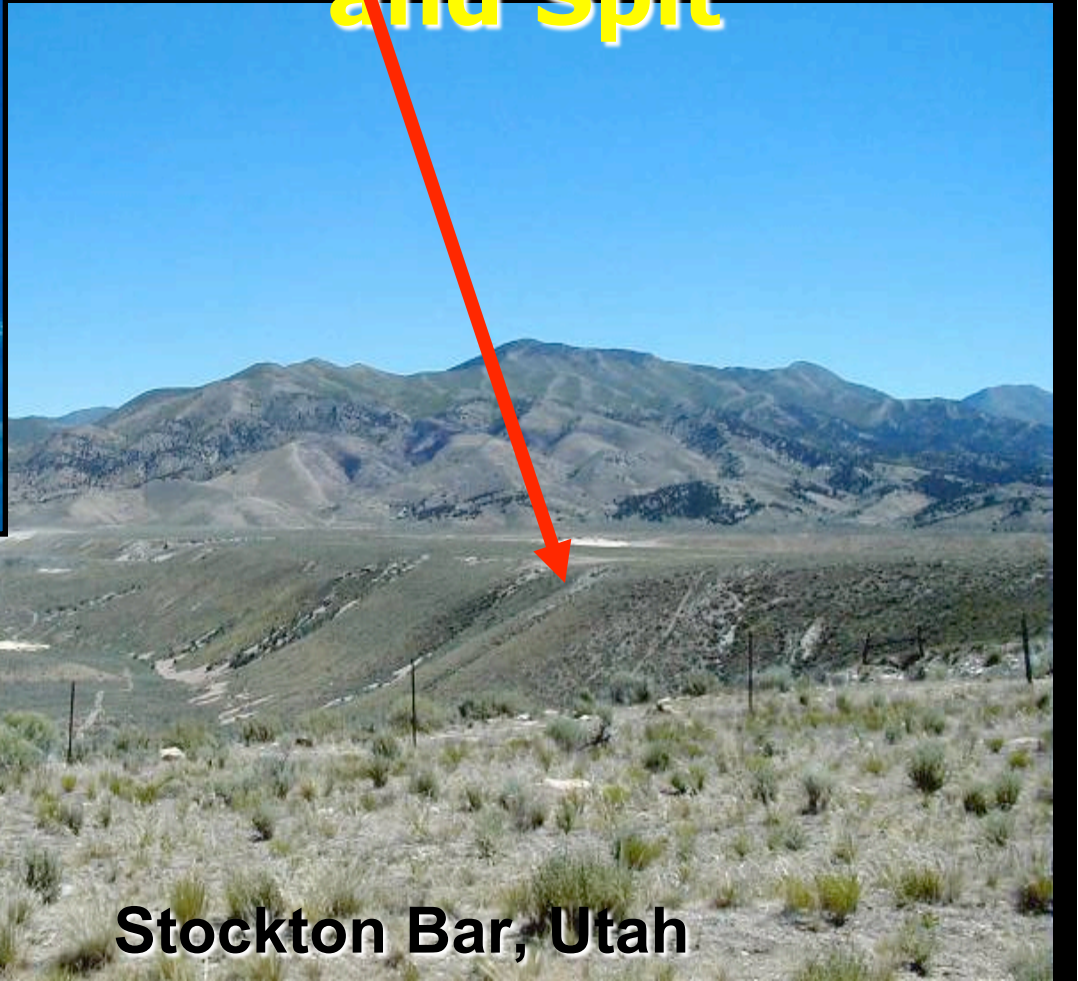


**Kiawah Island,
South Carolina**



**Modern
Barrier
Bar and
Spit**

**Lake
Bonneville
Barrier Bar
and Spit**



Stockton Bar, Utah

Boundary conditions for COHMAP (1988) climatic reconstructions.

