Why Geology is Important

Exploration

Mining plays a major role in Nevada's economy.

Blast at the Bald Mountain Mine, White Pine County. *Photographer: Steve Castor*

Nevada leads the U.S. in gold production.

Gold specimen, 3.3 cm, Round Mountain Mine, Nye County. *Photographer: Jeff Scovil*

Geologic Mapping

Geologic mapping is important to Nevada's economy as a tool for mineral, geothermal, and oil-gas resource exploration. See the extensive list of available geologic maps at the Nevada Bureau of Mines and Geology's website: www.nbmg.unr.edu.

Las Vegas, Clark County, Nevada. Geologic maps in urban settings help planners consider geologic hazards, such as earthquakes and floods, as they plan and design infrastructure and development. *Photographer: Nick Hinz*

Geologic mapping in southern Nevada. NBMG's detailed mapping of the different rock and soil types, documenting locations of young flood deposits, and studying active faults is essential to planning for hazards and infrastructure engineering and design. *Photographer: Seth Dee*

Public Safety

Geologic hazards like earthquakes and flash floods can cause great damage and loss of life. Understanding geologic hazards can mitigate losses. See the information available on geohazards at the Nevada Bureau of Mines and Geology's website: www.nbmg.unr.edu.

Surface rupture from the Monte Cristo Range Earthquake (6.5 magnitude), Esmeralda County, May 15, 2020. *Photographer: Seth Dee*

Erosion and debris-flow deposits from the August 2014 flash flood, Hot Spring Mountain, Douglas County. *Photographer: Seth Dee*

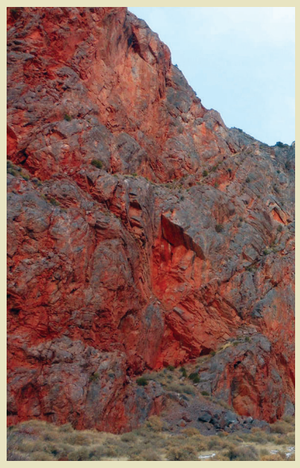
Rock Types

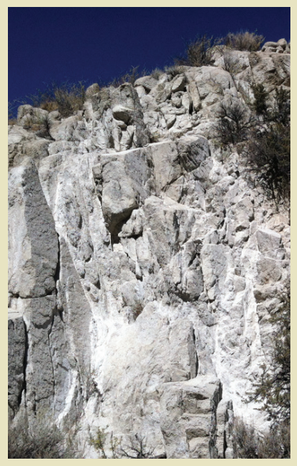
Igneous Rocks

Plutonic rocks are igneous rocks such as granite and granodiorite formed from molten rock (magma) that crystallized while deep below the Earth's surface.

Volcanic rocks are igneous rocks such as tuff and basalt lava flows. Tuffs are volcanic rocks formed by explosive eruptions. Basalt lava flows are typically formed by less violent volcanic eruptions released from cracks in the Earth's surface.

First (left): Layers of non-welded pyroclastic fall deposits (ash-fall tuff), Calico Mountains, Humboldt County. *Photographer: Jack Hursh*
Second: Miocene-age welded tuff, Mineral County. *Photographer: Brian Swick*
Third: Ignimbrite (also known as ash-flow tuff), Condor Canyon, Lincoln County. *Photographer: Jennifer Vlcan*
Fourth (right): Granodiorite, Clear Creek Canyon, Carson City. *Photographer: Jennifer Vlcan*





Sedimentary Rocks

Clastic sedimentary rocks such as shale and sandstone are formed by accumulations of particles of pre-existing rocks broken down and transported by the action of water, wind, ice, or gravity and deposited in new locations.

Nonclastic sedimentary rock, such as tufa and limestone, is chemically or biologically formed material precipitated out of bodies of water and springs.

Left: Bands of tuffaceous sandstone, Monte Cristo Range, Esmeralda County. *Photographer: Jack Hursh*
Center: Aztec Sandstone, Red Rock Canyon, Clark County. *Photographer: Rachel Micander*
Right: Lahar, volcaniclastic sedimentary rock, Mineral County. *Photographer: Brian Swick*

Metamorphic Rocks

Metamorphic rocks are pre-existing igneous, sedimentary, or older metamorphic rocks that have been changed by heat, pressure, or chemically active fluids.

Left: Folding in metamorphosed Cambrian-Ordovician sedimentary rocks at Secret Valley Gorge between the northern Ruby Mountains and East Humboldt Range, Elko County. *Photographer: Chris Henry*
Right: Approximately 1.7-billion-year-old mylonitic gneiss from the southern Eldorado Mountains, Clark County. *Photographer: Nick Hinz*

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Nevada Geology

Basin and Range

Trinity (foreground), West Humboldt, and Stillwater (distant) ranges, Pershing and Churchill counties. Nevada's topography is dominated by basins and ranges consisting of fault-block mountains and intervening sediment-filled basins. Nevada is considered to be the most mountainous state in the country after Alaska. *Photographer: Jack Hursh*

Earthquakes and Faults

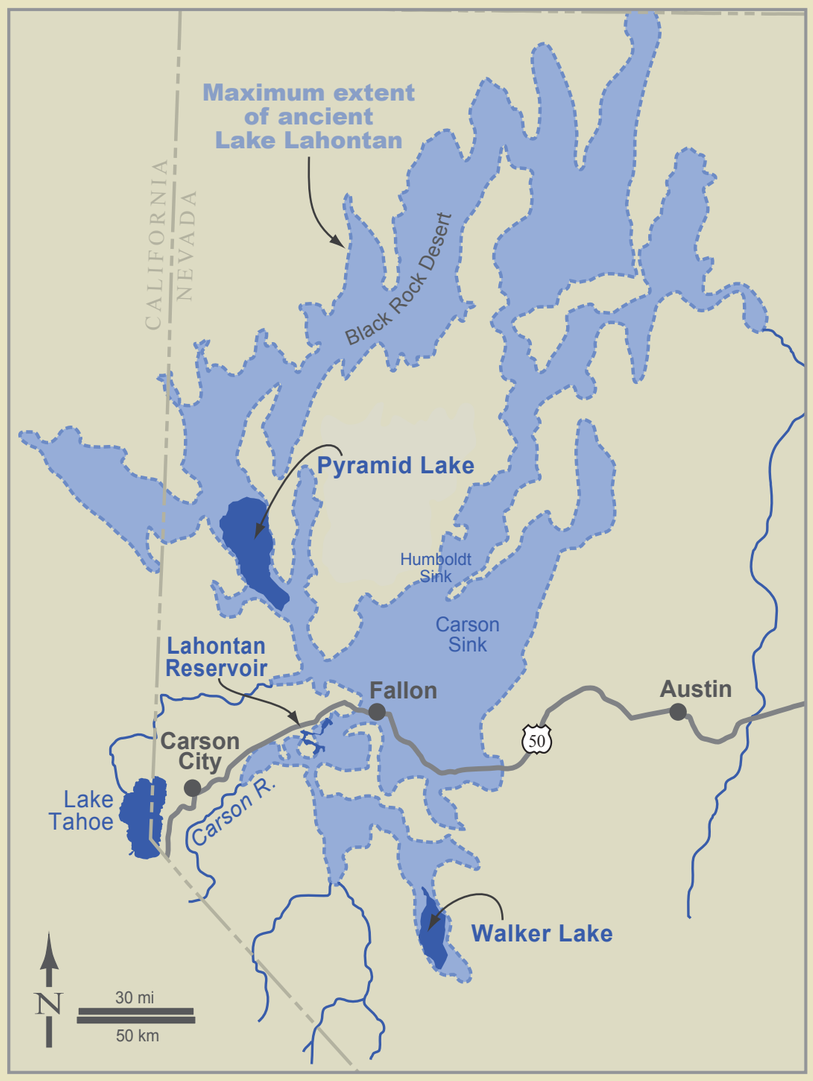
During the last 150 years, Nevada has been the third most active state in the number of large earthquakes. Since the 1850s, more than 63 earthquakes with potentially destructive magnitudes of 5.5 or greater have occurred in Nevada. Given the many "earthquake-generating" faults in Nevada, the crustal motions measured by geodetic stations, and the many historical earthquakes, it is clear that earthquakes will continue to occur in the state.

With the GPS antenna (white disk in photo), geodesists at the NBMG can precisely measure the minute changes over time in the location of the antenna. When compared with measurements of other GPS stations elsewhere, they can very precisely map where deformation is building up that leads to future earthquakes. *Photographer: Bill Hammond*

For an extensive list of available publications and information on earthquakes, see the Nevada Bureau of Mines and Geology website: www.nbmg.unr.edu/Geohazards/.

Ancient Lake Lahontan

This glacial lake covered a large area of northwestern Nevada during the Pleistocene Epoch. The lake was most extensive 12,700 years ago, when it covered 8,500 square miles and was nearly 900 feet (274 meters) deep at what is now Pyramid Lake, or more than 550 feet (168 meters) above the present-day level of Pyramid Lake.



Geologic Age

EON	ERA	PERIOD		EPOCH	YEARS AGO
PHANEROZOIC	CENOZOIC	Quaternary		Holocene	0.01 Ma
				Pleistocene	2.6 Ma
		Tertiary	Neogene	Pliocene	5.3 Ma
				Miocene	23.0 Ma
			Paleogene	Oligocene	33.9 Ma
				Eocene	56.0 Ma
				Paleocene	66.0 Ma
	MESOZOIC	Cretaceous			145 Ma
		Jurassic			201 Ma
		Triassic			252 Ma
	PALEOZOIC	Permian			299 Ma
		Pennsylvanian			323 Ma
		Mississippian			359 Ma
		Devonian			419 Ma
		Silurian			444 Ma
		Ordovician			485 Ma
		Cambrian			541 Ma
PROTERO-ZOIC					2,500 Ma
ARCH-EAN					4,000 Ma

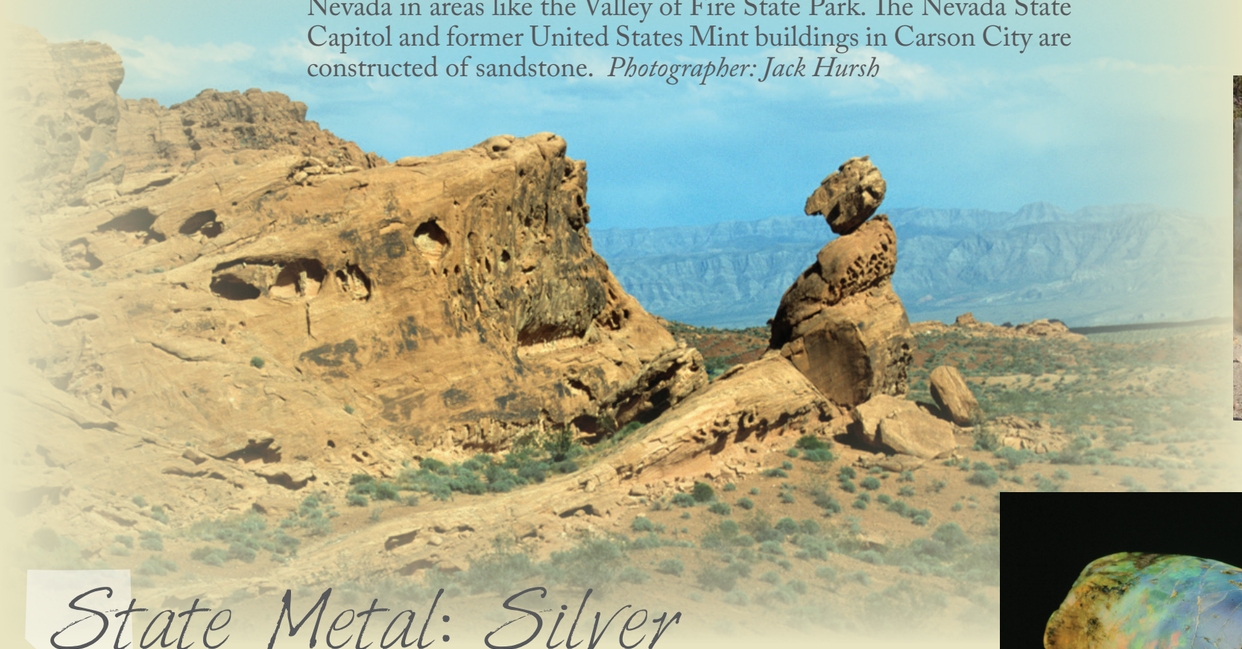
HADEAN (EON) 4,000 to 4,600 Ma

Ma=Mega-annum=million years

Nevada Facts

State Rock: Sandstone

Sandstone is a sedimentary rock commonly composed of grains of quartz and feldspar. Sandstone is found throughout the state of Nevada in areas like the Valley of Fire State Park. The Nevada State Capitol and former United States Mint buildings in Carson City are constructed of sandstone. *Photographer: Jack Hursh*



State Fossil: Ichthyosaur

This 60-foot (18 meters) life-size frieze depicts the size of some of the ichthyosaurs, whose fossil specimens are found at Berlin-Ichthyosaur State Park. They belong to the genus Shonisaurus (named for the Shoshone Mountains in Nevada) and are some of the largest ichthyosaurs in the world. *Photographer: Jeremy Vlcan*

State Metal: Silver

Nevada is known for its outstanding Comstock Lode and Tonopah silver districts that produced silver and gold worth $12 billion and $4.6 billion, respectively, in today's dollar values. Nevada silver deposits generally occur in intrusive igneous rocks, in older rocks adjacent to intrusive rocks, in igneous dikes, in volcanic rocks, and along fault contacts between intrusive and igneous rocks.

State Precious Gemstone: Virgin Valley Black Fire Opal

Left: Opal is generally considered to be amorphous silica with no definite crystalline structure; however, partially crystalline varieties exist. The mineral is commonly deposited near or at the surface by thermal water. This sample (at left) from the Virgin Valley district, Humboldt County, is 2.5 centimeters in diameter and occurs as petrified wood. *Photographer: Jeff Scovil*

State Soil: Orovada

Orovada soils, common in northern Nevada, are found on semiarid rangeland with sagebrush-grass plant communities. Orovada soils, when irrigated, produce bountiful alfalfa for hay and seed, winter wheat and barley, and grass for hay and pasture. See Nevada Bureau of Mines and Geology's website: https://gisweb.unr.edu/NevadaSoils/.

State Semi-Precious Gemstone: Turquoise

Right: Turquoise, found in many parts of Nevada, is a complex hydrated copper aluminum phosphate mineral found in veins, seams, and nodules in a variety of rocks. This 2.4-cm-long sample is from the Number 8 Mine, Eureka County. *Photographer: Steve Castor*

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