

HANDBOOK FOR ARIZONA COMMUNITIES
On Floodplain Management and the National Flood
Insurance Program

APPENDIX E

CHRONOLOGY OF FLOOD EVENTS IN ARIZONA

Date	Location	Description of Damage
Jan. 1862	Colorado & Gila River	Floods washed away Colorado City, a town on the lower Colorado River.
Aug. 1881	Hassayampa Canyon	Ten tons of freight being shipped to Phoenix destroyed by floods.
Jul. 1883	Dragoon Mountains	Heavy rainstorms in Cochise County. No damage estimates.
Dec. 1883	Phoenix	Flood rips out dam and headgates on the Salt River.
Mar. 1884	Yuma	Railroad tracks west and east of Yuma were reported to have been washed away. The Gila River broke through the levee and flooded the town; many families were compelled to vacate their homes, and numerous buildings were undermined. Flood destroys many adobe homes. Portions of the Southern Pacific Railroad bridge over the Colorado River were washed away.
Aug. 1885	Fort Verde, Glove City	A heavy rainstorm, accompanied by high wind and hail, occurred during the afternoon. A number of trees and telegraph poles in this vicinity (Fort Verde) were prostrated. Severest wind, rain, and hailstorm ever known at that place (near San Carlos). Buildings were unroofed, and other damage caused.
Nov. 1885	Yuma	The rain was the heaviest that has fallen in this vicinity for a long time, and great damage was done to the track of the Southern Pacific Railroad, causing delay of trains.
Aug. 1886	Yuma	On the 1st light rain fell during the greater part of the day. The wind, which at 7 a.m. was blowing gently from the south, backed to the southeast and increased in force until, at 12:15p.m., it attained a velocity of 34 mph. 75 miles west of Yuma the rain was heavy, causing a washout on the Southern Pacific Railroad and delaying trains. On the 15th a thunderstorm began at 10:55 a.m. and continued until 4:30 p.m. During this storm, 1.57 inches of rain fell, 0.80 inch falling in 20 minutes from 2:40 to 3 p.m.; this is the largest rainfall that has occurred since the Signal Service station was established here (1876). The track of the Southern Pacific Railroad was washed out both east and west of Yuma, causing an entire suspension of traffic for several days. On the 27th, heavy rain fell in the mountains east of Yuma, producing floods and destructive washouts that delayed trains.
Jul. 1887	Nogales	On the afternoon of the 7th, a remarkably heavy rainstorm occurred. Streets were flooded, and dams and bridges washed away. Washouts occurred on the Sonora Railroad, causing delay of trains. On the afternoon of the 13th, another heavy rainstorm occurred. It is reported that, on the mountains to the southwest of Sonora, there was a "cloudburst," which in a short time flooded a portion of Sonora, washing away a number of houses.

Date	Location	Description of Damage
Jul. 1887	Fort Apache	During the prevalence of a thunderstorm from 5:20 to 8:10 p.m. on the 8th, a "cloudburst" occurred on the east fork of the White River, in the mountains east of the station. A volume of water 3 feet deep came down the canyon, carrying on its crest large trees, etc.; the water subsided in about 2 hours.
Sep. 1887	Tucson	Heavy rains caused freshets in the Santa Cruz and Rillito rivers on the 9th. Several miles of the Southern Pacific Railroad track and some bridges in the vicinity of Pantano were washed away. The Chicago "Times" on the 13th contained the following: "TUCSON, ARIZ., September 13. -- The extent of the destruction to the railroad by washouts is much greater than at first supposed. One filling 50 ft. high on the Dragoon grade is washed out for 8 miles. It will take 3 weeks to repair washed out places between Benson and Tucson so that trains can pass over the road. The present is the most destructive washout yet suffered by the Southern Pacific Railroad, and it will cost not less than \$200,000 to repair the damage. A through wire to the east was made today. The heavy rains of yesterday extended into Sonora, where 5 miles of track and 3 bridges were washed out on the Sonora Road. The streets of Tucson are flooded with perishable freight for the eastern market."
Dec. 1889	Central Arizona	On the 5th, the Salt and Verde rivers rose very rapidly, and at Fort McDowell the Verde River overflowed its banks, flooding the adjacent lowlands. On the 6th, at Fort Verde, the Verde River was higher than it has been during the last 15 years, and considerable damage was caused along the river by the inundation of alfalfa fields, washing out of dams, etc.
Feb. 1890	Central Arizona	At Fort Verde, on the 21st, the Verde River reached the highest point known at that place, drowning cattle and washing out irrigating ditches. A large area of the Gila Valley was under water during the latter part of the month, flooding sections that had been considered safe from inundation, and severely damaging irrigating canals. At Phoenix, the Salt River rose 17 feet in 15 hours on the 22nd. Also on the 22nd, a large storage dam, built across the Hassayampa River about 30 miles above Wickenburg, gave way under pressure of floods caused by heavy rains and melting snow, causing loss of life, and destroying considerable property.
Mar. 1890	Hassayampa area	Heavy rains broke Walnut Grove Dam; 128 people drowned in flood.
Aug. 1890	Southern Arizona	Advises from Tucson, dated the 5 th , stated that heavy rain had swollen rivers, that 60 miles of the Santa Fe Road between Benson and Nogales were washed out, and that the Santa Cruz River was flooding the valley. Cochise County was visited by a heavy rainstorm at night on the 7th; damage was done at Tombstone and Fairbank.
Feb. 1891	Gila at Ft. Thomas	Flood damage to adobe houses, cattle.

Date	Location	Description of Damage
Feb . 1891	Arizona	Flood destroys Yuma. All streams in Arizona were extremely high. Many lives were lost and great destruction was caused to property and roads. Telegraph lines were washed out. Loss sustained by railroads was immense. Destruction continued for ten days. This event was referred to as "The Great Flood."
Aug. 1895	Colorado River	Earthquake and river wave (seiche) causes damage to villages on the river.
Aug. 1895	Maricopa County	Flood on the Gila River destroys bridge.
Jul. 1896	All Streams	Flooding along streams statewide. One death at Beaver Creek.
Oct. 1896	Southeast Arizona	A succession of heavy downpours in the upper San Pedro Valley caused a disastrous flood in the river. Six persons were drowned, and property valued at \$10,000 was destroyed.
Sep. 1897	Salt River	Floods damage canals and property along the Salt River. Flooding in and around Phoenix.
Jan. 1905	Salt, Gila River	Floods cause damage to bridge, railroads, roads, dams; traffic across rivers is delayed 10 days.
Feb. 1905	Central & Northern Central Arizona	General floods throughout area; road washouts.
Mar. 1905	Salt, Gila, Little Colorado	Floods damage land, crops, railroads; traffic delayed for days.
Apr. 1905	Northern Arizona	Heavy rains delay farm work.
Nov. 1905	North & Central Arizona	Floods occurred in Gila, Salt, and lower Colorado rivers. These were the greatest floods since 1891.
Aug. 1906	All Arizona	Streams impassible.
Dec. 1906	San Francisco River, Duncan Area	Severe floods on San Francisco River kill "many." Much property damage.
Oct. 1907	Mohawk Summit	Heavy rains delay traffic and damage railroad beds.
Dec. 1908	Navajo, Coconino	Washouts in Navajo & Coconino County area.
Jan. 1910	North Central Arizona	Heavy snows on watersheds of the upper Verde River and in the Bradshaw and San Francisco mountain ranges with cold temperatures prevailing until December 30. Marked increase in temperature on December 30 and into January caused rapid runoff and damaging floods in Cataract and Oak Creeks and the upper Verde River. The Havasupai Indian Village near the entrance of Grand Canyon was severely damaged by flooding.
Jul. 1910	Bisbee Area	A severe rainstorm in the mining town of Bisbee in southeastern Arizona resulted in the loss of several lives and caused damage to the amount of about \$150,000. Four inches of rain fell in a little more than 2 hours.

Date	Location	Description of Damage
Jun. 1912	Colorado River	Remarkably high flows occurred on the Colorado for a short time, due to snowmelt upstream. The damage was widespread owing to the breaking of dikes and the flooding of farmlands, principally on the Arizona side, above Needles. On the morning of the 3rd, the approximately 20-mile-long levee, protecting about 200,000 acres of land north of Needles, broke, and the entire upper Mohave Valley was put at the mercy of the flood. A conservative estimate placed the loss at more than \$175,000. Along the riverfront at Needles the damage was over \$25,000. The loss in livestock was considerable, but the great loss was to growing crops. Much hay and grain were swept away, and the alfalfa is dead from being under water. Many families lost all, houses included. In the country covered by the Yuma irrigation project, the damage to land, crops, and prospective sale value of the land may amount to \$100,000.
Sep. 1914	Ray, Arizona	Two floods severely damage mining town of Ray.
Dec. 1914	Southern half of State	Considerable damage to bridges and to diversion dams from floods. The greatest destruction appears to have been done in the Santa Cruz River Valley, south of Tucson. That river is said to have attained a width of more than a mile and a half in places south of Tucson.
Jan. 1916	Statewide	Heavy flooding, largest since 1891 & 1905. Four lives lost. \$304,000 property damage estimated from bridges, irrigation works, etc. Traffic disrupted for several days.
Jul. 1916	Statewide	Amounts of rain in excess of 2.0 inches in 24 hours fell at 16 stations. Benson, Cochise County reported 2.43 inches in less than one hour. The Salt River and Tonto Creek, flowing into Roosevelt Reservoir, showed runoff of 215,380 acre-feet during the month.
Sep. 1916	Salt River	Floods damage canals.
Jul. 1919	Cochise County	Considerable damage to property and roads. Train wrecks caused by washed out tracks. Bridges destroyed.
Nov. 1919	Hassayampa at Wickenburg Agua Fria at Avondale	Bridges washed out.
Feb. 1920	South & East Arizona	Damage from floods estimated at \$342,00 for bridges and roads alone.
Aug. 1921	Cave Creek, State Capitol	Many floods damage Arizona. Basement and first floor of Capitol flooded out. Crops, irrigation, equipment, loss of records, damage to homes estimated at \$240,000.
Sep. 1922	Western Arizona	Heavy rains caused three serious breaks in the main canal of the Yuma irrigation project. Bridges and culverts washed out and highways damaged in Mohave and Yavapai counties.

Date	Location	Description of Damage
Sep. 1923	Holbrook Area	The principal damage occurred at and in the vicinity of the town of Holbrook at the junction of the Rio Puerco and the Little Colorado rivers, where many buildings, including residences, were washed away and one life was lost. Streets were inundated, and much property along the river banks was carried away by erosion. Trains were rerouted through western New Mexico and southern Arizona; one such train in route from Phoenix northward was wrecked near Wickenburg, resulting in the death of four persons.
Sep. 1925	Southwest Arizona, Winkelman, Chandler, Florence	Highway and train damage; crops damaged or lost from floods.
Sep. 1926	Central & Southeast Arizona	Transportation systems damaged. Thatcher, Nogales, Douglas, Safford had heavy flood damage. Damage estimated at \$450,000 to railroad and highways. One of the biggest floods in Arizona history.
Sep. 1926	Southeastern Arizona	Unusually heavy rains in southeastern Arizona resulted in marked rises in streams draining that area. During the night of 26th-27th, a stage of 6 ft. was reached at Kelvin, on the Gila River; at 9:30 a.m. of the 28th, a stage of 9.5 ft. was reported; and the crest of the rise, 16 ft. (11 ft. above flood stage), was reached at 10 p.m. of the 28th. The major damage occurred along small tributaries in the immediate vicinity of the heavy rainfall, the property suffering most being railway tracks, bridges, highways, and approaches to highway bridges. It is thought that little damage occurred below Kelvin.
Sep. 1927	Verde River, Gila River, Central Arizona	Death at Coolidge Dam; serious damage to Phoenix water supply; railroad damage.
Jul. 1928	Miami	Flood at Miami spreads over town, uprooted trees; business section under 4' of water. \$300,000 in damages.
Aug. 1929	Littlefield	As a result of heavy rain, a dam across the Virgin River was destroyed. The resulting flood killed a considerable number of livestock.
Sep. 1929	South Central Arizona, Southeast Arizona	Town of Benson marooned. Damage to roads, culverts, bridges estimated at \$50,000.
Aug. 1930	Nogales	Four lives lost; business section flooded; many residences were damaged (esp. adobe). \$20,000 estimated loss.
Feb. 1931	Southern Arizona	Flash floods on Gila; Salt River flooded; Verde flooded; San Pedro flooded; two men drowned on the Verde; railroad trestle and beds out; Wellton, near Yuma, flooded with one death and many people marooned and suffering from exposure and hunger.
Aug. 1931	Statewide	Village of Continental, 22 miles south of Tucson, inundated; Tucson also had severe flood damage; Florence Junction Road impassable; over 22 motorists marooned at Wittman.
Jul. 1932	Nogales	Homes and businesses flooded; property damage estimated at \$75,000; flood waters demolished a large oil tank and 17,000 gallons of oil floated throughout Nogales.

Date	Location	Description of Damage
Aug. 1934	Gila River, Eastern Arizona	Heavy flooding caused severe soil erosion in N.E. Arizona; Duncan evacuated; livestock killed; Globe-Miami flooded damaging homes and stores. In Globe, Miami, stores and homes damaged; woman drowned when the car in which she was riding became stalled in floodwaters.
Aug. 1935	Cochise, Maricopa, Pima	Floods and flash floods caused considerable loss of life and property; five killed near Willcox in bus accident caused by floods; severe property damage at Wickenburg, Tucson, and at localities between Tucson and Nogales.
Jul. 1936	Central Arizona	Severe property damage in Jerome, Salome, Phoenix, Mesa, Casa Grande, and Gilbert.
Feb. 1937	Central and West Central Arizona	Bridges destroyed at Parker, Bartlett Dam site; gas line in Salt River broken by flood.
Mar. 1938	Gila, Salt, Verde, Oak Creek	Floods on Gila, Salt, Verde and Oak Creek did an estimated \$248,228 damage.
Aug. 1940	Southern Arizona	Flood stages at Kelvin on the Gila River. A flash flood occurred in the vicinity of Tucson following a heavy local rainfall of 2.35 inches within 70 minutes.
Sep. 1940	Arizona Strip	Floods at Moccasin, 18 miles west of Fredonia, flooded town and buried crops under one foot of sand.
Sep. 1941	Gila River from Duncan to Coolidge Dam	Gila River from Duncan to Coolidge Dam flooded; Duncan and Safford flooded; one of the worst floods ever for Duncan area; conservative estimates of damage \$500,000.
Aug. 1943	Maricopa County	Arizona Canal overflows; damage est. by SCS at \$100,000; damage to highways \$15,000; irrigation systems \$30,000.
Sep. 1944	Thatcher, Safford	Severe property damage from flood estimated at \$700,000. The heaviest rains occurred on Sept. 25, and the rainfall totals for the entire storm period ranged from 4.69 in. at Hawk Hollow on the Fry Mesa Road at the foot of the Mesa to as much as 7.65 in. in Thatcher.
Aug. 1945	Pima County	Floodwaters washed down an ordinary dry wash and tore a 15-foot gap in a bridge on the highway approximately 4 miles south of Tucson. Four automobiles plunged into the raging torrent; 10 persons were drowned, while four others struggled out of the floodwaters.
Aug. 1945	Clifton	Damages of \$150,000 as flood covers town with mud and rocks to the depth of 2 to 3 feet.
Aug. 1946	Phoenix, Miami, Cortaro	Intense thunderstorm hit Phoenix area. Heavy rains and thunderstorms hit Miami. A highway bridge in the vicinity of Cortaro was washed out.
Aug. 1947	State	Average precipitation for the state as a whole was 3.2 inches.
Jul. 1948	Western Arizona	Highway damage from washing, near Peoria, Morristown, Bouse, and at 12-Mile Hill near Ehrenbert. Traffic disrupted several hours.

Date	Location	Description of Damage
Aug. 1948	Grand Canyon	0.80 inch of rain in 55 minutes damaged powerhouse and government installations on North Rim of Grand Canyon and in canyon bottom. Large sections of flume washed away and creek bottom in several places dammed rock and mud slides. Power and water supplies disrupted for 2 days.
Aug. 1948	Central Arizona	2.25 inches of rain in one hour. Three auto courts extensively damaged. Sidewalks washed out. Rock and debris on roads northeast of Crown King. Flooded canyons cut main road up to 50 feet wide and 200 feet deep. Corrals and barns washed out in vicinity of Cleator. Observer estimated 8 inches of rain in storm center in about 1¼ hours. Main part of Douglas flooded.
Sep. 1948	Continental	Heavy rains, accompanying thunderstorm, brought flash flood down a canyon 7 miles south of Continental.
Oct. 1948	Casa Grande	Heavy rain, accompanying a thunderstorm, caused flash flood, which came down a draw and flooded Dutch Miller cottage camp 18 miles west of Casa Grande, overturning 15 cabins and injuring three persons.
Jun. 1949	Hayden	Several homes flooded by flash flood in canyon between Millside and Smelterside.
Jul. 1949	Central Arizona	A car washed off highway in flash flood west of Casa Grande; passenger disappeared and presumed drowned. In Globe-Miami area, power and telephone poles felled. Stores in Globe flooded. Roof of warehouse in Miami caved in. Several tons of muck removed from streets after storm.
Aug. 1949	Buckeye – Gila Bend	Flash floods from Maricopa Mountains caused extensive damage to Highways 84 and 80 east of Gila Bend. Floodwaters broke into full canal, crossed canal, and caused 3 breaks in highway. Centennial Wash ran 4½ feet deep across highway.
Aug. 1949	Northeastern Arizona	Heavy thundershowers in Show Low-Holbrook area and in McNary-Springerville sector caused many flash floods. A 75-foot fill on State Highway 77 near Shumway washed out. A portion of Apache Railroad between McNary and Snowflake washed out.
Sep. 1949	Gila Bend	Flash flood blocked Highway 80 about 10 miles north of Gila Bend. Stalled auto washed off highway when irrigation canal above road washed out, drowning four persons.
Sep. 1949	Phoenix	Flash floods, fields badly flooded in Tolleson-Deer Valley areas, secondary roads washed out in Pleasant Valley sector.
Jun. 1950	Tucson	Several residential blocks inundated by water, which reached 3 feet deep in places.
Jul. 1950	Gila Bend	Flash floods passed through town. Dwellings, highway and railroad grades washed out in several places, canal bank damaged extensively, and a railroad bridge washed badly. About 20 hogs drowned.

Date	Location	Description of Damage
Jul. 1950	Tucson	Rillito Creek spilled over its banks in several places. Severe flooding occurred in many sections of the city. Over 2.00 inches of rain fell in one hour. Man drowned at Indian School Bridge over Santa Cruz River.
Jul. 1951	Phoenix Area	Series of severe thunderstorms accompanied by high winds covered Salt River Valley from Bradshaw Mountains to Chandler and from Tolleson-Phoenix area to Buckeye. Flash floods coursed down most washes, inundated portions of Litchfield Park and Luke Field; temporary evacuation of 50 families. Canals and ditches extensively damaged. County roads washed out where crossing river bottoms without bridges. The Southern Pacific Railroad tracks were washed in a number of places between Buckeye and Liberty.
Aug. 1951	Central Arizona	Major damage caused by flash flooding from heavy rains. Moist air from a tropical hurricane began flowing into southwestern Arizona during the 26th. Heavy rain spread northward and northeastward into the Bradshaw and Mazatzal Mountains, causing flooding on the Hassayampa River at Wickenburg, on the Agua Fria River at Marinette, and on the Gila River at Kelvin. The rainfall over the Hassayampa and Agua Fria River Basins averaged 6.44 inches during the 5-day storm.
Dec. 1951	Coconino County	Some flooding in Tucson during October. In December, main part of storm along "Rim" section from south of Flagstaff to north of Payson. Several creeks flooded. Oak Creek, lower Beaver Creek, and the Verde River near Camp Verde experienced some damaging high water.
Jan. 1952	San Carlos Area	Severely damaged large irrigation ditches from 10 miles north of San Carlos to Peridot. About 5 miles of 30-inch tile ditches ruined, and a diversion dam was washed out. Twenty-five dwellings in San Carlos temporarily flooded. Several dwellings affected by floodwaters at Taylor. Apache Railroad sustained considerable damage.
Jul. 1952	Oak Creek Canyon	Heavy rain with hail in narrow Oak Creek Canyon sent high water down creek and caught several cars and swimmers without warning at Baldwin Crossing, 8 miles south of Sedona. Baby washed from car and drowned. Roads washed out.
Jul. 1952	Central Arizona	Heavy thunderstorms hit Phoenix, Mesa, Tucson, Miami, Buckeye, Eloy, and Tonopah. Rain temporarily flooded streets and entered several stores where plate glass was broken in Phoenix.
Aug. 1952	Tucson	Rain of cloudburst proportion in vicinity of Davis-Monthan AF Base caused heavy flooding.
Mar. 1953	Clifton	A heavy thundershower brought 1.35 inches of rain in approximately 30 minutes.
Jul. 1953	Statewide	Highway bridges destroyed and homes damaged between Nogales and Patagonia and near Wickenburg; other property and crop damage in Phoenix, Marana, St. Johns. A girl was killed near Safford when a shack collapsed on her, and a man drowned trying to cross a wash on horseback during a flash flood near Hayden Junction.

Date	Location	Description of Damage
Jul. 1954	Miami, Globe	Flash flood at Miami piles up cars. Heavy rain sent a wall of water down Pinal Creek severely damaging business area in Globe. Water rose to a height of several feet. The greatest damage was caused in two blocks where 25 business buildings were destroyed, forty others were damaged, and 126 families suffered loss.
Aug. 1954	East Salt River Valley	Flashfloods filled washed in the desert areas to the west, and Queen Creek, normally dry, ran at flood stage. Floodwaters breached irrigation canals on the southeastern portion of the Salt River Valley Project and overflowed farm and residential areas. Gilbert and Apache Junction were heavily flooded. A railroad trestle in Superior was damaged. Maturing cotton from the communities of Queen Creek to Gilbert were damaged by flooding. Damage to roads and ditches.
Jul. 1955	South Central Arizona	A canal near Florence broke, allowing water to the depth of 3 feet to run down the main street; crop and road damage; business and residential.
Aug. 1955	South Central Arizona	Flash flooding took the lives of two children trapped in Ripsey Wash near Kelvin; damaged a railroad bed near Kelvin, streets and utilities in Wickenburg, the Tucson water system, and Maricopa County roads; and washed out a bridge approach 6 miles south of St. David.
Jul. 1956	Stanfield	A Stanfield man was drowned when a flash flood overturned his truck as he was crossing an arroyo four miles west of Stanfield. His companion was injured but swam safely to shore. Heavy rainfall near Vermillion Cliffs caused flash flood that inundated fields and damaged homes in Fredonia.
Oct. 1956	Maricopa County	Floodwaters from Cave Creek poured into a gravel pit and buried a crushing plant under 30 feet of water. School children were stranded all day at the Sierra Vista school, about 10 miles north of Glendale, but were rescued by nightfall.
Jul. 1957	Safford, Thatcher	Homes and stores flooded; \$100,000 in property damage; crop damage at \$65,000.
Oct. 1957	Picacho area	Heavy rains in the Picacho area caused floodwaters to race through a labor camp, dislocating 250 migrant workers from houses; flooding about 50 cabins and a dozen homes nearby.
Nov. 1957	Northern, Central Arizona	A 3-day rainstorm caused flooding of rivers and streams in northern and central Arizona. A 4-year-old boy was drowned in a flash flood 12 miles southeast of Cottonwood, and some 200 deer hunters were stranded in the mountains by swollen streams. Several roads and highways were washed out.
Jul. 1958	Western Arizona	Water damaged buildings, injured a worker at Parker, and washed out several miles of U.S. 60-70 east of Ehrenburg.
Jul. 1958	Tucson	4.92 inches of rain flooded streets and buildings; greatest storm damage in 60 years.

Date	Location	Description of Damage
Jul. 1959	Tucson	Torrential rains, hail, and gale force winds ripped parts of Tucson flooding underpasses, filling arroyos to overflowing and damaging landscaping and retaining walls. Two inches of rain fell in 30 minutes at San Xavier Mission.
Aug. 1959	Arizona	Winslow was flooding due to thunderstorm rains. Flooding near the Arizona Canal in Phoenix. Heavy rain in the Greene Reservoir area flooded cotton fields. In Tucson, hundreds of motorists stranded, downtown streets turned into torrents. Downtown area hit by a cloudburst, flooding scores of stores and homes. At least 30 families forced from their homes; cars plunged into arroyos and drainage ditches when visibility obscured by deluge, 2 inches of rain in 45 minutes.
Oct. 1959	Central, Eastern Arizona	Seven people, including two young children, drowned in raging torrents as a chilling storm brought snow, hail, and rain to much of Arizona. There were 50 injuries during the storm.
Dec. 1959	Statewide	Streams and rivers all over Arizona flooded by an intense storm; roads and bridges washed out.
Jul. 1961	Central, Southern Arizona	In Phoenix and Glendale, strong winds and heavy rains damaged residences, business establishments, and utilities. Several automobiles were washed down flooded arroyos in Phoenix and Tucson. In Tucson a severe thunderstorm accompanied by hail, heavy rain, and a possible tornado did about \$100,000 damage. Property damage was heaviest in the Flecha Caida Estates area. An 8-year-old girl suffered a head injury from flying debris.
Jul. 1961	Western Arizona	Heavy local rains flooded Paradise Harbor, 7 miles north of Parker, damaging boats. In Bisbee, heavy rainfall flooded Brewery Gulch.
Aug. 1961	Tucson	An unusually heavy rainstorm hit the Tucson area bringing over two inches of rain in 1 hour. The heavy runoff produced by the storm caused severe damage to roads and property. Several automobiles were caught in flash floods.
Sep. 1962	Marana	Heavy rains caused property and crop damage. Floodwaters deposited mud and debris in streets and also in some buildings in lower areas. Severe thunderstorms in the Sells, Tucson, Marana area caused considerable damage to secondary roads. Flooding along the Santa Cruz River below Marana and the Santa Rosa wash in the Stanfield-Maricopa area inundated cotton fields and caused damage to secondary roads and soil erosion.

Date	Location	Description of Damage
Aug. 1963	Statewide	Thundershowers were unusually frequent and heavy over most of the State during this month. More than 10 inches of precipitation fell during the month at Bar T Bar Ranch, Blue, Crown King, Natural Bridge, Painted Canyon, Payson, Superior, Tonto Creek FH, and Young. The greatest amount was 13.09 inches at Crown King. The 11.03 inches recorded at Superior exceeds the maximum catch at that station during any month by almost 2.5 inches. In Phoenix many roads were washed out and about 50 automobiles were damaged by floodwaters. On the evening of the 16th a thunderstorm intensified over the Glendale area lasting into the early morning hours of the 17th. The Grand Canal overflowed its banks, flooding homes and business establishments in Glendale, Maryvale, and in northwest Phoenix. Two unofficial but reliable reports of more than 5 inches of precipitation were received for storm totals in the Glendale area. Heavy precipitation was also reported near Globe and in the Miller Valley area near Prescott, with considerable flooding of homes and damage to highways.
Aug. 1963	Prescott	Damage due to flash flooding was particularly high in southwest Prescott. Floodwaters washed out sewer lines so that about 75% of Prescott's sewage was carried away before reaching the disposal plant. As a result of the hazardous health situation and heavy local damage, the Governor declared Prescott a "disaster area."
Nov. 1963	West Arizona	Remnants of tropical storm "Katherine" moved into Western Arizona producing rainfall of locally heavy intensity. The heaviest property damage occurred in the Yuma area, where 2.04 inches of rain were measured in one hour at the Weather Bureau Airport Station, an all-time record for the station. Highways were washed out; many automobiles were caught in rising floodwaters and suffered severe water damage. Many homes and businesses were flooded. Cotton and alfalfa fields were inundated, and most of the fall lettuce crop had to be replanted.
Oct. 1963	Phoenix Area	A heavy rainstorm hit the Phoenix area. Floodwaters invaded homes and damaged furnishings in Phoenix and caused considerable damage to roads in Scottsdale.
Jul. 1964	Southeast and Central Arizona	Moderate to heavy thunderstorm activity caused property damage due to flooding in Tucson, Phoenix, and Wickenburg.
Jul. 1964	Jerome, Sedona	Nearly all damage in Jerome was caused by excessive water runoff. Majority of damage to highways and sidewalks. Due to hilly nature of Jerome, debris from roadways washed onto private property and damaged homes and businesses
Jul. 1964	Flagstaff and Northeast Phoenix	Floodwaters caused considerable damage to streets in Flagstaff and homes, businesses, and motor vehicles in Youngtown, Glendale, and El Mirage.
Jul. 1964	South Central Arizona	Heavy damage to homes and autos in Tucson area; Papago Indians in Sells area were stranded by running washes and needed food lifts.

Date	Location	Description of Damage
Aug. 1964	South Central Arizona	Most of the area between Stanfield and Maricopa was flooded causing damage to homes, stores, highways and railroads. Casa Grande, Florence and Eloy were heavily flooded. Farther north, heavy rains drenched Winslow, with runoff from surrounding mountains increasing the flooding. All patients were evacuated from Winslow Memorial Hospital, and all highway traffic, as well as Santa Fe Railway traffic, was halted in the area.
Sep. 1964	Central Arizona	Phoenix battered with hail, high winds, lightning, and a drenching downpour. Hundreds of city streets awash from curb to curb. South of Tucson, the Santa Cruz broke out of its banks in five places and flooded a 1.5-mile swath of the channel near Green Valley. About 200 picnickers were trapped by a flash flood in Sabino Canyon, northeast of Tucson. A 6-ft. wall of water sliced through the area.
Jun. 1965	West Phoenix	Flooding by heavy rains and pelting by hail caused heavy damage to cantaloupes, other melons, and cotton.
Dec. 1965	Central, Southern Arizona	Precipitation produced snow in the White Mountains and caused flooding in the southern part of the State along the Santa Cruz River and along the Gila east of Coolidge Dam. Finally, a warm rainstorm melted much of the existing snow cover on the Salt and Verde watersheds, making necessary the release of about 70,000 cubic feet per second of water into the Salt River. The result was the worst flood in the Salt River Valley since completion of the reservoir system. All roads crossing the river in the Tempe, Mesa, Scottsdale, and Phoenix areas were washed out, and all bridges were at least partially damaged, creating the worst traffic jam in the history of the State. In Pima and Pinal counties, several hundred acres along the Santa Cruz River were flooded, and Rillito Creek ruptured sewage lines, contaminating a number of wells in the Tucson area. Several bridges over the Santa Cruz and Rillito were damaged and closed to traffic. This was the wettest December on record at a number of stations.
Feb. 1966	Yuma	Releases from Painted Rock Dam caused road crossings to be inundated in Dateland.
Feb. 1966	Graham, Maricopa, Pima, Pinal, Greenlee	Floods; State/federal disaster declared.
Jul. 1966	Bisbee	Flooding.
Aug. 1967	Eastern Arizona	Floods that caused considerable damage affected Graham and Greenlee counties. Heavy rain on the headwaters of the Gila and San Francisco rivers caused flooding downstream. Floods damaged roads, utilities, homes, and businesses. Heaviest damage to both property and crops occurred in Graham County.
Nov. 1967	Santa Cruz County	Storm waters caused damages along Green Wash in Santa Cruz County. The Santa Cruz overtopped its bank at Tubac School.

Date	Location	Description of Damage
Aug. 1968	Flagstaff, Globe, Miami	In Flagstaff, heavy rain on the slopes of Mt. Elden produced locally heavy runoff in east Flagstaff on the 2nd. Most of the damage was to streets and roads. Several homes were also flooded. A storm began in the Globe-Miami area causing damage to homes and stores. Floodwaters from locally heavy rains damaged streets and roads. Heavy rains continued the next day with additional flooding on that date.
Dec. 1968	Santa Cruz County	Green Wash floods again.
Jul. 1970	Tucson	Heavy rains flooded streets and arroyos. Phoenix- heaviest damage occurred in South Phoenix, where heavy rains caused extensive damage to store interior and merchandise.
Aug. 1970	Ajo	Heavy rains caused flooding of arroyos and streets. Pavement was broken in many places, and bridges were washed out. Casa Grande - heavy rains flooded several homes, damaging furnishings. Phoenix - heavy rains flooded homes in west Phoenix.
Sep. 1970	Central Arizona	Twenty-three people lost their lives and several million dollars of damage was done when Pacific tropical storm NORMA precipitated an unusual rainfall. The flooding in the disaster area was spectacular and terrifying. Rivers that drain hundreds of square miles rose 5 to 10 feet per hour. Uprooted trees, huge boulders, fences, automobiles, and small buildings were swept downstream as much as 30 to 40 miles before being deposited on banks twenty feet or more above stream beds. At one point, near Sunflower, waters crested an estimated 36 feet above the creek bed. The deaths occurred when campers taking advantage of the long Labor Day weekend got caught in the raging torrents produced by the storm.
Aug. 1971	Statewide	An unusually well developed summer monsoon brought abundant moist air into the State on a consistent basis. Thunderstorms were numerous. At some of the higher elevations, it rained almost every day of the month. Monthly totals exceeded 10 inches at Prescott and Groom Creek. In Lake Havasu City, heavy runoff from local thunderstorms caused an estimated \$250,000 damage to streets and drainage systems.
Sep. 1971	Navajo and Pinal Counties	Rains related to tropical storm OLIVIA fell on Navajo and Pinal Counties. Holbrook was severely damaged when a broken dike flooded the city. Roads, sewers, bridges, and homes were damaged. The towns of Mammoth, Winslow, and Show Low all received damage.
Dec. 1971	Navajo County	Heavy rains that melted several inches of snow cover caused heavy runoff, with considerable damage to roads, bridges, and dams. Principal damage was reported at Highway 160 at the Fools Hollow Crossing, the Porter Creek crossing on Porter Mountain Road, Billy Creek, Show Low Lake north of the dam, Clay Springs Road at Cottonwood Wash, Silver Creek east of Taylor, and in a subdivision in the Pinetop area.

Date	Location	Description of Damage
Jun. 1972	Maricopa, Pima, Navajo	Heavy rains in amounts up to more than four inches fell within a two-hour period. Severe flooding occurred on Indian Bend Wash and the wash that drains westward from the area between Camelback and Mummy mountains. Over 800 homes were damaged or destroyed. Irrigation canals were breached flooding a number of homes and businesses.
Oct. 1972	Statewide	Heavy rain on the 3rd -7th and 17th-21st combined to make this usually dry month one of the wettest on record. Moisture was derived from a tropical storm ("Joanne") which entered Arizona with its cyclonic air circulation intact. "Joanne" entered the State near Ajo and passed almost due north over Prescott and Flagstaff. The rains washed out numerous secondary dirt roads and destroyed a highway bridge south of Tucson. The second storm affected mostly east central Arizona. Safford, Clifton, and Duncan suffered extremely heavy losses due to flooding along the San Francisco and Gila rivers. Most of the 8 deaths were caused by drowning. More than 10 inches of rain fell during the month at Alpine, Junipine, Sunrise Mountain, Williams, Natural Bridge, Payson, Sierra Ancha, Tonto Creek FH, Pinal Ranch, Sunflower, and Blue. The greatest amount was 14.74 inches at Junipine.
Mar. 1973	Statewide	This month ranks with March 1941, 1954, and 1970 as one of the wettest Marches on record.
1972-1973	Statewide	Precipitation in the period from October 1972 to September 1973 resulted in the highest flows on record in many Arizona streams. The flow in the Salt River which continued for 94 days caused a great deal of inconvenience in metropolitan Phoenix where traffic across the river was limited to Tempe Bridge and the bridges on the I-10 freeway.
Jul. 1974	Lake Havasu City	Severe thunderstorm with winds to 80 mph and up to 2 inches of rain caused very extensive flooding of streets. Some streets had completely washed out sections 4 and 5 feet deep, and some streets and normally dry washes were flooded with water up to 5 feet deep. Many cars were abandoned and washed away. Three members of one family were carried to their death and one injured when their station wagon was carried 3,000 feet down a wash by a wall of water 10 feet high.
Jul. 1974	Salt River Valley	Thunderstorms moved into the Valley for the second consecutive night. Hardest hit was Tempe-Chandler area. Streets were flooded.
Aug. 1974	Statewide	Up to 3.80 inches of rain caused considerable flooding of streets and highways in Phoenix area, with water up to 8 feet deep at one of the underpasses on the Black Canyon Freeway. Massive flooding over much of Tempe and southeast Phoenix. Around 2 inches of rain in 3 hours at Clifton, resulted in flash flooding. In Tucson, heavy thunderstorm did widespread damage to mobile homes, buildings, airplanes, trees, and flooded streets and homes.
Sep. 1974	Bullhead City	Thunderstorm with strong winds and heavy rain swept through the area causing extensive flooding.

Date	Location	Description of Damage
Dec. 1978	Eastern, Central Arizona	Second major flood over the same part of the state in less than a month. Ten counties were declared disaster areas by President Carter. Thirteen persons lost their lives. Approximately 10,000 people were forced to leave their homes. Both bridges on I-17 over the Agua Fria River at Black Canyon City collapsed. Duncan, on the Gila River in extreme eastern Arizona, experienced the worst flood on record when a dike broke, sending 3-6 feet of water raging through most of the town.
Jan. 1979	Central Arizona	Significant flooding occurred especially over the Salt River and Verde River basins. This was the third major flood within 2 months and the fourth within 10 months. Water was discharged into the Salt River through the greater Phoenix area at rates as high as 77,800 cfs. Such flows closed all but three of the bridges. Traffic was again completely disrupted. Farmland and residences were flooded from waters of the Salt and Agua Fria rivers. Considerable damage at Black Canyon City along the Agua Fria. Rockslides forced the Catalina Highway to Mt. Lemmon, north of Tucson, to close.
Mar. 1979	Phoenix	Water was released into the Salt River due to runoff from the mountains, forcing the closing of most of the bridges over the river in the Phoenix metropolitan area. The I-10 freeway bridge that crosses the Salt River in Phoenix was closed because it began to sag, leaving only two crossings over the river.
Aug. 1979	Statewide	Flooding from up to 3 inches of rain each day, near Cochise, caused damage to crops, pumps, and irrigation ditches. In Tempe, Mesa, and Tucson streets were flooded by up to 2 inches of rain.
Jan. 1980	Phoenix Area	Severe thunderstorms. Numerous streets were flooded, and the Black Canyon freeway was closed for several hours.
Feb. 1980	Statewide	Severe flooding occurred along the Salt, Verde, and Agua Fria rivers and along the Gila River below the confluence of the Salt River. Also on the Hassayampa and Little Colorado rivers. The Salt River below Granite Reef Dam and the Agua Fria below Lake Pleasant became raging torrents. The greatest flood damage occurred along the Salt River in the Greater Phoenix Area. Eleven of the 13 bridges or crossings were destroyed or damaged. About 600 homes to the west of Phoenix were damaged, many totally destroyed. Around 6,000 persons were evacuated.
Aug. 1980	Santa Cruz County	Flooding
Sep. 1980	Franklin	An infant girl and her 2-year-old brother drowned after they were swept from their mother's arms by the raging water of Railroad Wash. A 3-year-old sister also drowned as they were trying to reach the highway on higher ground a short distance from their mobile home. They were caught in a very sudden surge of water that had built up as a result of 4 inches of rain upstream in New Mexico during the afternoon and evening.
Jul. 1981	Colorado City	Massive flash flooding resulting from very heavy rains. Roads, streets, water and sewer lines were destroyed.

Date	Location	Description of Damage
Jul. 1981	Tanque Verde Falls	Eight persons lost their lives when a wall of water 15 feet high rushed down the canyon and over the 100-foot falls.
Aug. 1981	Yuma, Somerton	Localized flooding occurred in homes, streets, and fields.
Oct. 1981	Phoenix	Widespread flooding of streets and roads.
Oct. 1981	Sedona	Heavy rain of over 2 inches caused flooding in the area.
Mar. 1982	Coconino, Yavapai Counties	Heavy rains of 2-4 inches caused flash flooding of streams, creeks and washes. At Williams, huge amounts of water poured over the Santa Fe Dam, forcing evacuation of between 30 and 40 families. At Sedona, Oak Creek rose to near flood stage. At Flagstaff, there was considerable flooding of streets, residential areas and mobile home parks to depth of several feet. It was one of the worst floods in the city since 1937. At Prescott, there was flash flooding of creeks and washes. A woman drowned in rain-swollen Granite Creek.
Jul. 1982	South Central Arizona	Severe thunderstorms. In Kearney, more than 100 homes were flooded. In Tucson very heavy rain. Flooding of streets was widespread.
Aug. 1982	Statewide	There were many fierce thunderstorms with heavy rains in the state this month, causing many floods and lots of damage and inconveniences.
Nov.-Dec. 1982	Statewide	Widespread flooding of highways and streets due to winter storms moving across the state.
Mar. 1983	Santa Cruz County	Flooding due to heavy rain.
Jun.-Jul. 1983	Western Arizona	Severe controlled flooding occurred along Colorado River below Hoover Dam. The hardest hit areas below Hoover Dam were Bullhead City, Bermuda Plantation, Parker, and Yuma, where many houses, etc were under 1 to 6 feet of water.
Aug. 1983	Tucson, Phoenix Area	Several cars were trapped by flash floods in washes at Tucson. In Phoenix area, one to two inches of rain fell over much of the metropolitan area and caused flash flooding of streets and roads, with some localized flooding of houses and businesses.
Sep. 1983	Prescott Area	Three to 8 inches of rain caused extensive flash flooding. Two dams overflowed, causing Willow Creek to become a raging torrent. Considerable flooding of streets and roads with a number of wash-outs to the west and north.
Sep. 1983	Phoenix Area	Extremely heavy rain caused extensive flooding of streets and highways with some flooding of homes and businesses. One underpass was filled with 9 feet of water.

Date	Location	Description of Damage
Jul. 1975	Sedona – Oak Creek	Intense downpour of 3.8 inches of rain, with 3.5 inches falling in 45 minutes, caused severe flash flooding of Soldiers and Mormon Washes. Roads, houses, and trailers were flooded, retaining walls, culverts, and butane tanks were washed out. Water was 3 to 5 feet deep in one trailer park. Water also damaged a number of shops.
Sep. 1975	Greenlee, East Graham Counties	Heavy rains over southeastern Arizona caused flooding of the Gila, San Francisco and Blue Rivers. Hardest hit was Clifton, where the San Francisco rose to 2 ½ feet above flood stage. Three hundred persons were evacuated. Water rose to a depth of 3 feet in streets. The governor declared a state of emergency for these areas.
Feb. 1976	Central Arizona	Heavy rains of 2 to 5 inches caused flooding of Oak Creek and a number of other streams below the Mogollon Rim. In the Sedona-Oak Creek area, five residents had to be rescued. Hardest hit was Verde Lakes Estates near Camp Verde.
Jul. 1976	Tucson, Heber, Central, Western Arizona	Tucson, locally heavy rain of 2 inches flooded streets. Heber, heavy thundershowers produced a deluge of 6 inches of rain in 36 hours. Camp Verde, flooding during thunderstorms. A terrific thunderstorm near Kingman produced flash flooding. Heavy rains in Apache Junction flooded highway dips.
Aug. 1976	Colorado City	In Colorado City a heavy thunderstorm dumped 1.36 inches of rain in ½ hour and created flooding conditions throughout the community.
Sep. 1976	Western Arizona	Tropical storm ("Kathleen") with rains of 2 to 5 inches, brought severe flash flooding to Mohave County. The hardest hit was Bullhead City and surrounding area along the Colorado River. Eight washes carried walls of water into Bullhead City area. Silver Creek Wash crossing Highway 95 was cut into a 20-40 foot deep canyon by the raging water. City was cut off from the outside. Mohave and adjacent counties declared state of emergency.
Sep. 1976	Western, Central Arizona	A second devastating storm brought 2 to 5 inches of rain caused additional damage to Bullhead City. Highway 95, the only access to the outside, was again quickly inundated in several places. Heavy thunderstorms deluged sections of Yuma County. There was considerable flooding of streets in the City of Yuma and many low-lying sections of highways in the County. In the Phoenix area rain over 2 inches triggered home-damaging mud and rock slides on Camelback Mountain. In Scottsdale area many cars were either stranded in washes or carried downstream. In Tucson, heavy thundershowers rapidly filled normally dry washes, especially the Pantano Wash and the Rillito River. Flooding occurred on almost 100 streets and roads throughout the city.

Date	Location	Description of Damage
Aug. 1977	Western Arizona	Tropical storm ("Doreen") with it torrential rains of 2 to 7 inches brought extensive flooding to the area. In Yuma, two bridges were destroyed and 25 to 30 miles of roads and streets damaged. Flooding of houses and businesses. The Bullhead City area was devastated. A number of washes became raging torrents. Severe damage to streets, highways, residences, and businesses. Some streets were gouged out to a depth of 3-5 feet. The hardest hit highway was the junction of 95 and 68 where rising waters tore up one-thousand-pound chunks of pavement and tossed them to the side. Several dikes were heavily damaged.
Aug. 1977	Camp Verde	Rainfall of over 2 inches in 48 minutes produced flash flooding in the area. Several highway bridges were washed out; highways were damaged by washouts. Many houses were flooded.
Sep. 1977	Tucson	Nearly 2 inches of rain slammed into the east side and washed out sections of streets, set vehicles afloat, flooded houses, and caused numerous tree and power line fires.
Oct. 1977	Southern Arizona	Torrential rains from tropical storm Heather over a four-day period brought severe flooding and devastation to southern Arizona along the Santa Cruz and San Pedro rivers. Peak discharge occurred on the Santa Cruz between Nogales and Continental, reaching the so-called "100-year flood level" of 30,000 - 40,000 cfs. More than 400 persons were driven from their homes in what some described as the worst flood they had ever experienced.
Jan. 1978	Tucson, Maricopa County	Heavy rains of 1 to 3 inches caused flooding. Two men were drowned in separate incidents when their vehicles became stalled and were swept downstream by the flashflood waters. In Maricopa County heavy rains flooded crops in the Salt River Valley.
Mar. 1978	Statewide	Warm temperatures accompanied heavy rain. Reservoirs behind all, except Roosevelt, dams on the Salt and Verde rivers filled and large amounts of water were released from the reservoirs. This was the largest flow of water down the Salt since 1891. The released water overflowed the channel and flooded residential areas and farmlands. During the same period storm fronts passing over the State caused flash flooding and destruction. Eventually Apache, Gila, Graham, Greenlee, Maricopa, Mohave, Navajo, Pima, Yavapai and the Navajo and Hopi reservation were declared a Presidential disaster area. Thousands of homes were damaged and 116 homes were destroyed. More than 7,000 people had to be sheltered and four people lost their lives.
Nov. 1978	Statewide	Some flooding of the Hassayampa, Agua Fria, New, and Verde rivers. Roads washed out in the Walnut Canyon area near Flagstaff. Considerable flooding over southeastern Arizona. The San Francisco, Blue, and Gila rivers all rose well over the flood stage.

Date	Location	Description of Damage
Sep.-Oct. 1983	Eastern, Central Arizona	Extremely heavy rain deluged much of the State. A disturbance entered the State at the same time as a surge of moisture from tropical storm "Octave" off the coast of Baja California. The result was torrential rains and very destructive flooding over the southeast quarter of the State in broad zones along rivers, creeks and washes. Many persons who fled from their homes were cut off from help because roads, bridges, phone and electric lines were washed away. Twenty main highways were closed. I-10 was washed out at Gila River. Nine people drowned trying to cross-flooded washes. The hardest hit cities were Clifton, Tucson, Marana, Nogales, Safford, Winkelman, and Hayden. Damage to agriculture was enormous. This was Arizona's most destructive flood and the 7th major flood in less than six years.
Jul. 1984	Maricopa, Mohave, Yuma	Flooding and wind damage.
Jul. 1986	Bisbee	Flood down Whiskey Gulch into the historical areas of town; fear of underground tunnels beneath the town collapsing.
Jul. 1986	La Paz, Ehrenberg	Flash floods from out of mountains caused extensive damage to mobile home park.
Jul. 1989	Yuma, San Luis	Wind driven rains bend stop signs to the ground; houses are flooded by wind driven water. Yuma Historical Prison, especially the old adobe buildings, damaged.
Oct. 1989	Willcox	Sheet flooding from the mountains floods downtown and La Paz area.
Jan. 1991	Coconino, Mohave, Pima, Yavapai, Pinal, Mohave, Graham, Maricopa	Severe storms caused by monsoon rains from July 8 through Sept. 14, 1990. Heavy rains and high winds caused flash flooding and wind damage. Havasupai reservation received heavy flood losses. Three lives were lost.
Jul. 1992	Havasupai	Flooding in the Grand Canyon destroys much of what had been rebuilt following earlier flood.
Aug. 1992	Graham County	Heavy rains and flooding.
Aug. 1992	La Paz County	Heavy rains and flooding.
Jan. 1993 ✓	Apache, Coconino, Gila, Graham, Greenlee, Pima, Maricopa, Pinal, Yavapai, Cochise, Navajo, Yuma, Santa Cruz	Persistent EL NINO established new record rainfalls and intensity throughout the State; creeks, washes, rivers migrated out of beds causing extensive erosion. Winkelman "Flats" heavily impacted with four houses lost down the Gila River and the structures destroyed. Homes in Tonto Basin and Verde Lakes were either severely damaged or destroyed. Bridge crossings on the lower Gila became impassable isolating families on the north side. Thousands of acres of valuable farmland was inundated destroying crops. Yuma County continues to flood from releases from Painted Rock.