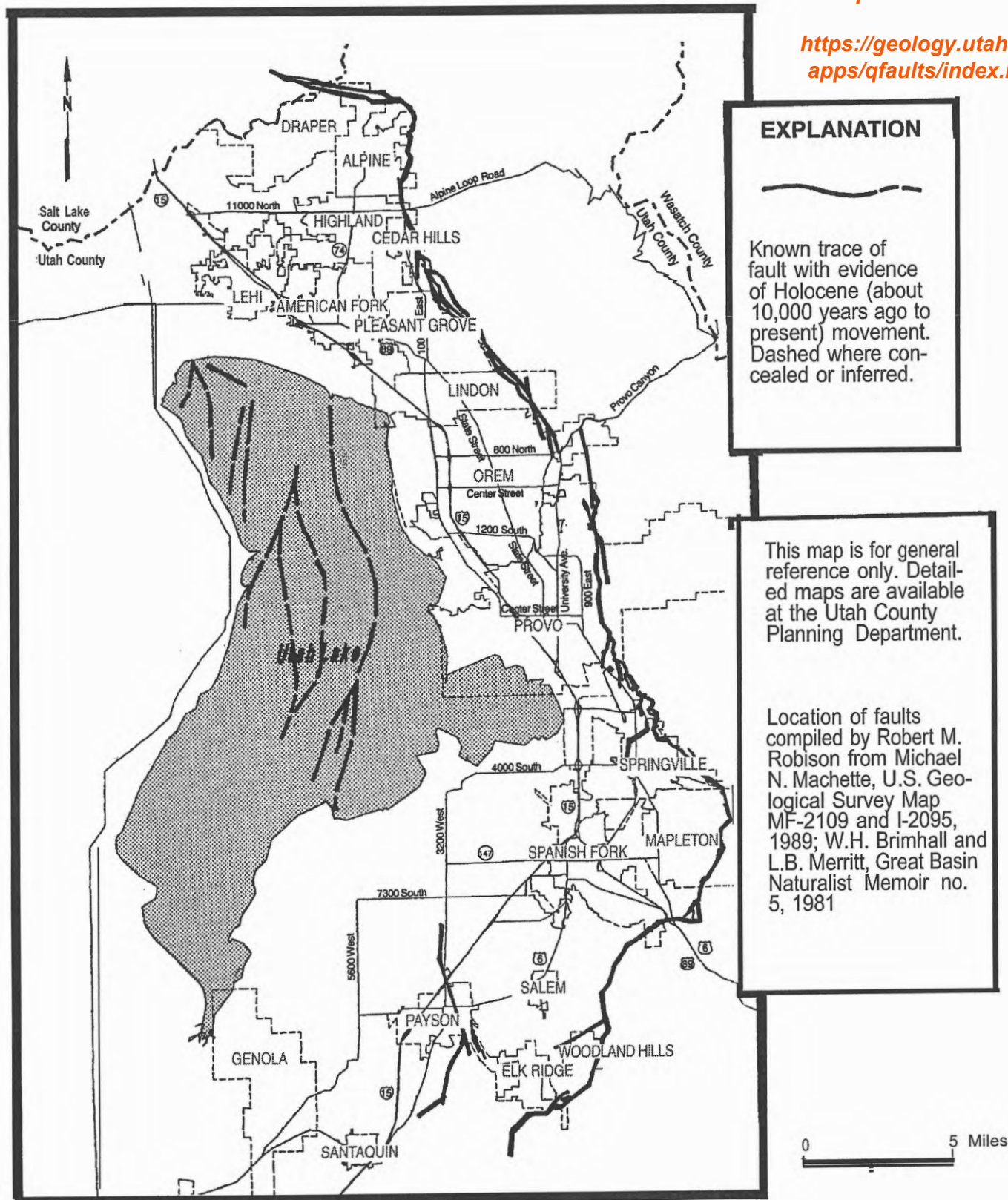


EARTHQUAKE FAULT MAP OF A PORTION OF UTAH COUNTY, UTAH

UGS Public Information Series 11

See our Quaternary Fault
and Fold interactive map for
up to date fault and
earthquake information at

[https://geology.utah.gov/
apps/qfaults/index.html](https://geology.utah.gov/apps/qfaults/index.html)



Digital compilation by Bruce J. Hall, Utah County Geographic Information System through Utah County Planning Department.

UTAH GEOLOGICAL SURVEY

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EARTHQUAKE FAULTS

What is a fault? A fault is a break in the earth's crust along which movement can take place causing an earthquake. In Utah, movement along faults is mostly vertical; mountain blocks (for example, the Wasatch Range) move up relative to the downward movement of valley blocks (for example, the Salt Lake Valley).

Why are faults a concern? Faults with evidence of Holocene (about 10,000 years ago to present) movement are the main concern because they are most likely to generate future earthquakes. If the earthquake is large enough, surface fault rupture can occur.

What is surface fault rupture? With a large earthquake (about magnitude 6.5 and greater), the fault rupture can reach and displace the ground surface, forming a fault scarp (steep break in slope). The resulting fault scarp may be several inches to 20 feet in height, and up to about 40 miles in length, depending on the size of the earthquake.

What are the effects of surface fault rupture?* An area hundreds of feet wide can be affected, called the zone of deformation, which occurs chiefly on the downthrown side of the main fault and encompasses multiple minor faults, cracks, local tilting, and grabens (downdropped blocks between faults). Buildings in the zone of deformation would be damaged, particularly those straddling the main fault. Also, anything crossing the fault, such as transportation corridors, utilities, and other lifelines, both underground and above ground, can be damaged or broken. The ground can be dropped below the water table on the downdropped side, resulting in localized flooding. Surface fault rupture can also cause tectonic subsidence, which is the broad, permanent tilting of the valley floor down toward the fault scarp. Tilting can cause flooding along lake and reservoir shorelines nearest the fault; along altered stream courses; and along canals, sewer lines, or other gravity-flow systems where slope gradients are lessened or reversed.

Where and when is surface fault rupture likely to occur? On the Holocene fault on which a magnitude 6.5 (approximate) or larger earthquake occurs. On average, these earthquakes may occur once every 120 years on various faults in the Wasatch Front region; once every 350 years somewhere along the central part of the Wasatch fault (between Brigham City and Nephi); once every 2,000 years at any specific locality along the central Wasatch fault; and once every 5,000 to 20,000 years or more on other Holocene faults in the state.

What can be done to protect homes? Faults can be avoided by setting homes back a safe distance. Special-study areas have been delineated along faults where geologic studies are recommended to assess the hazard, locate faults, and recommend setbacks. However, the use of special-study areas in land-use ordinances varies by county and city, as does the level of enforcement. Therefore, buyers, particularly of older homes (pre-1985), should personally check available fault maps to see if the home is near a fault (within a few hundred feet) and, if so, may want a geological site investigation performed. For newer homes, buyers should check with the county or city to determine whether geologic studies were performed for the site or subdivision and, if so, look at a copy of the geologic report.

Where to get additional information. Detailed fault and special-study-area maps used in ordinances are available at county and city planning departments. A statewide fault map is available from the Utah Geological Survey: *Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization*, UGS Bulletin 127, by Suzanne Hecker, 1993.

* For other earthquake hazards, including ground shaking, please see PI-29, PI-38, and PI-48.

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