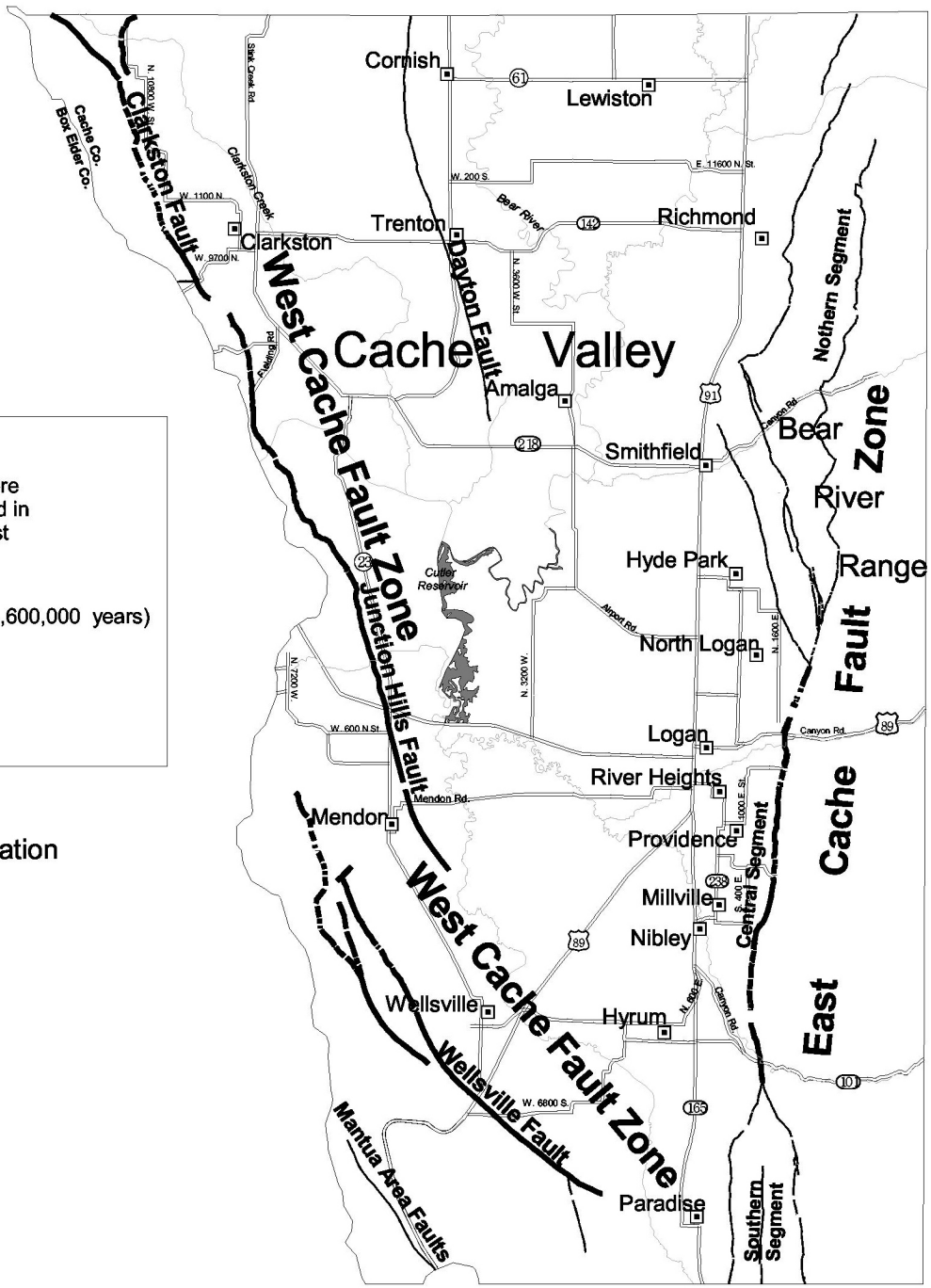
EARTHQUAKE FAULT MAP OF A PORTION OF CACHE COUNTY, UTAH



Explanation

- Latest Quaternary fault (where fault movement has occurred in the past 15,000 years) - Most likely to generate future earthquakes.
- Quaternary fault (15,000 - 1,600,000 years)
- Cities
- Water Bodies

Map Location

This map is for general reference only.

Modified from "Quaternary Fault and Fold Database and Map of Utah" by Bill D. Black, Suzanne Hecker, Michael D. Hylland, Gary E. Christenson, and Greg N. McDonald, 2003, Utah Geological Survey Map 193DM.

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EARTHQUAKE FAULTS

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

Why are faults a concern? Faults that show evidence of movement within the past 15,000 years (called Latest Quaternary faults on this map) are the main concern because they are generally considered the most likely to generate future earthquakes. If the earthquake is large enough, surface fault rupture can occur.

What is surface fault rupture? In 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 tens of feet high, and up to tens of miles long, 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 mostly 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 can be damaged, particularly those straddling the main fault. Also, anything crossing the fault, such as transportation and lifeline corridors, both underground and above ground, can be damaged. The ground can be dropped below the water table on the downthrown side, resulting in localized flooding. Surface fault rupture can also cause tectonic subsidence on the downthrown side that results in the broad, permanent lowering and 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 Latest Quaternary fault on which a magnitude 6.5 (approximate) or larger earthquake occurs. On average, the time between surface-faulting earthquakes on one of the segments (Clarkston, Junction Hills, and Wellsville faults) of the West Cache fault zone and the central segment of the East Cache fault zone is several thousand to tens of thousands of years. The time between earthquakes is much longer for the faults such as the Dayton, Mantua, and northern and southern segments of the East Cache fault zone.

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. A statewide fault map is available (on compact disc, as a paper copy, or on the web at http://geology.utah.gov/maps/geohazmap/index.html) from the Utah Geological Survey: *Quaternary fault and fold database and map of Utah*, by Black and others, UGS Map 193DM. This map is an update of a 1993 publication called *Quaternary tectonics of Utah with emphasis on earthquake-hazard characterization*, UGS Bulletin 127, by S. Hecker, 1993, which contains additional geologic information on Utah's earthquake hazard.

* For other earthquake hazards, please see PI-38 and PI-48.

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