

# Where sleeping quakes lie

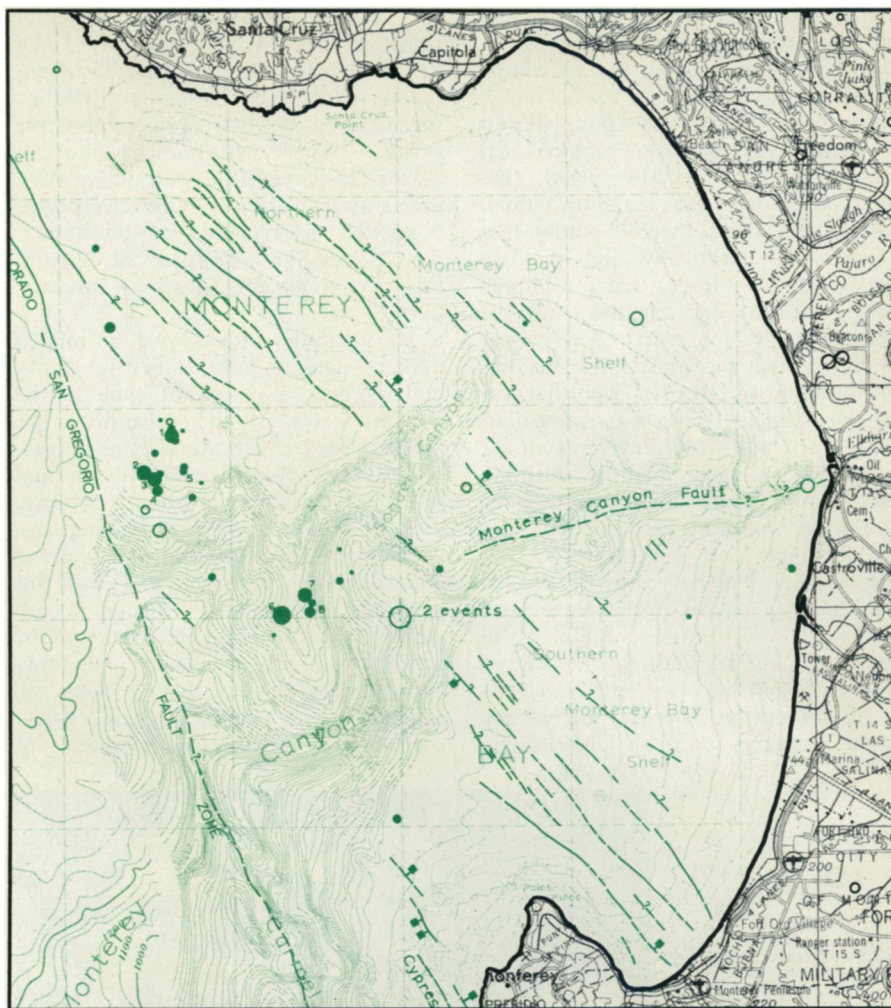
Reconnaissance begins in the war on damaging earthquakes with a map of the fault zones in California's Monterey Bay

by Jonathan Eberhart

A major part of the war on damaging earthquakes (SN: 9/29/73, p. 200) is the U.S. Geological Survey's plan to chart the specific fault zones and hazardous areas of the United States, particularly those near centers of population. The results are intended for use in land-use planning, structural design of large buildings and disaster control.

The initial target is almost inevitably the California coast, where the edges of two of the vast plates of the earth's crust are scraping against each other. The titanic stresses of geologic conflict have triggered hundreds of large and small quakes, most of them concentrated along the notorious San Andreas fault which runs for hundreds of miles along the western edge of the state.

The first result of the survey is a map of the present faults and past quake centers in Monterey Bay, about 50 miles south of San Francisco between Santa Cruz and Monterey. To locate the cracks and fissures, research ships sailed more than 2,600 kilometers back and forth across the bay (it is



U.S.G.S.

Mapping of earthquake hazards in the United States has begun with this chart of the numerous fissures scoring the floor of California's Monterey Bay. Lines are faults, circles are quakes from 1911 to 1968, dots are quakes from 1969 to 1972. The large circle marks two 1926 quakes felt over almost 180,000 sq. km.

less than 50 kilometers from Santa Cruz to Monterey) using listening devices to time the reflection from the bay floor of shock waves created by powerful underwater sparks. A modified radar system, formerly used to guide antiaircraft artillery fire, was positioned on a high hill on the bay's eastern shore where the radar operator could direct the surveyors to an accuracy of 30 meters. Shipboard navigation, less accurate than radar tracking, was also used to extend the survey north almost to San Francisco and south to Point Sur.

Two major fault zones reflect the turmoil in the rocks beneath the bay. The Palo Colorado-San Gregorio zone is largely a single, long fault, crossing the mouth of the bay and extending onto the land for at least 135 kilometers. The Monterey Bay fault zone is a sprawling collection of shorter fissures filling much of the floor of the inner bay.

"Detection of earthquakes and determination of their location and focal depth in the Monterey Bay area are

difficult," say usgs marine biologist H. Gary Greene and three colleagues who conducted the project, "because the area lies largely outside the network of seismographic stations." This does not mean, however, that the area is inactive. Reports of quakes go back as far as 1836, and more than 50 were recorded between 1969 and 1972. "Analysis of earthquakes in the bay," says Greene, "shows that the direction of ground movement is very similar to the type observed on the San Andreas fault. Since there is good evidence that the fault zones in the bay are part of the San Andreas fault system, continuing earthquakes in the Monterey Bay region should be expected."

The Palo Colorado-San Gregorio fault zone is particularly suspect. It is similar in length, direction of displacement and depth of past quakes to the Hayward fault zone, which also connects with the San Andreas fault, and as such, says Greene, is probably "capable of generating earthquakes up to a Richter magnitude of about 7.2 to 7.9." □