SUBMERGED SHORELINES OF JACKSON LAKE, WYOMING: DO THEY EXIST AND DEFINE POSTGLACIAL DEFORMATION ON THE TETON FAULT

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Objectives

The Teton fault is one of the most active normal faults in the world, as attested by the precipitous high front of the Teton Range. Following glacial recession about 15,000 years ago (Porter and others, 1983), offset on the Teton fault southwest of Jackson Lake has totaled 60-80 feet (19-24 m) (Gilbert and others, 1983). In less than the last 9 million years, offset on the Teton fault has totaled 25,000-30,000 ft (7,000-9,000 m) (Love and Reed, 1971).

Downdropping on the Teton fault results in tilting of Jackson Hole towards the fault. Because the level of Jackson Lake is controlled by the fortuitous location well east of the fault of both the lake outlet and the low-gradient Oxbow Bend reach of the Snake River, submerged paleoshorelines of Jackson Lake may record this downdropping and tilt (for a more complete explanation, see report for 1986). Study of the subaerial part of the fault has not permitted field definition of the amount of offset during individual faulting events. Consequently, the size and recurrence interval of associated earthquakes has not been determined based on the actual history and character of the Teton fault.

If paleoshorelines can be recognized and the lake outlet has been tectonically and erosionally stable, such paleoshorelines can be interpreted to define the age and size of offsets and associated earthquakes on the Teton fault over the last 15,000 years. Thus, the number and spacing of paleoshorelines may define the history of offsets and associated earthquakes on the Teton fault. Such information is of value to interpret the Teton landscape to Park visitors, to the design of engineering structures in the region, and to understanding of ongoing Basin and Range tectonism.

Methods

The report for 1986 describes the marine geophysical methods used to locate paleoshorelines thought to result from down dropping on the Teton fault. In 1987 and 1988, lake-margin cores were taken from a platform

built of plywood lashed onto two 17 foot canoes. A 2-inch Livingston corer was used to take cores up to 15 ft long. For cores longer than 3 ft, casing was emplaced from the platform down to the lake bottom and multiple core increments taken.

Results

As described in the report for 1986, about 10 paleoshorelines are apparent from the marine geophysical records and may represent a comparable number of major earthquakes on the Teton fault in about the last 15,000 years.

Work in 1988 was primarily devoted to obtaining accelerator carbon-14 ages on material from cores. Nine samples were dated yielding ages from 300 and 8,000 yr B.P. In addition, Mazama ash was identified by Andrei Sarna-Wojcicki (written commun., 1988) from about 5 m below the natural shoreline. Some inconsistencies between the carbon-14 ages and the stratigraphy need to be resolved before publication of the carbon-14 ages. At present, it seems justified to conclude that the last shoreline submergence event occurred at least 1,000 years ago and amounted to about 1.2 meters.

In September of 1988, several days were spent doing additional coring in the Bearpaw Bay and North Moran Bay to obtain addition samples for carbon-14 age determinations.

Literature Cited

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