Crater Lake, Oregon, partially fills the caldera that formed $\sim$7,700 years ago by the eruption of 50 km$^3$ of mainly rhyodacitic magma and collapse of Mount Mazama. Prior to the climactic event, Mount Mazama had a 400,000-year eruptive history, much of which was like those of other Cascade volcanic centers such as Mount Shasta. Since the climactic eruption, there have been several less violent, smaller eruptions within the caldera itself. Until a recent bathymetric survey, relatively little was known about the character and timing of these eruptions because their products are obscured beneath Crater Lake's surface. In the summer of 2000, the lake bottom was mapped with a high-resolution multibeam echo sounder (Gardner et al., 2001), providing a 2m/pixel view of the lake floor from its deepest basins virtually to the shoreline. Using Geographic Information Systems (GIS) applications, the bathymetric data has been visualized and analyzed (aided by images and samples obtained with the manned submersible Deep Rover, sediment cores and dredged rocks, and detailed geologic mapping of Mount Mazama) to determine a geologic map of the lake bottom, a history of lake filling (Nathenson et al., 2001), and volumes, times, and rates of postcaldera eruptions.

Postcaldera eruptions have been both subareal and subaqueous, and were well underway within about 90 years after the climactic eruption, beginning with andesitic lava flows from the Wizard Island and central platform volcanoes. The eruptive history of the Wizard Island volcano is divided into three periods defined by former shorelines where subaerial flows entered the lake, quenched rapidly, and fractured, forming lobate deltas and breccia slopes. The shorelines are visible in slope and shaded-relief images of the lake floor created with GIS. The lake filling model suggests that these shorelines formed at $\sim$90, 250, and 480 years after the lake began to fill. Combining volume calculations determined with GIS and age information from the lake filling model, oldest to youngest Wizard Island minimum eruption rates are $8.4 \times 10^6$ m$^3$/yr, $6.5 \times 10^5$ m$^3$/yr, and $3.6 \times 10^5$ m$^3$/yr. These are comparable to rates calculated for the central platform volcano using the same approach. The minimum eruption rate for the entire 4 km$^3$ of postcaldera andesite erupted from $\sim$90 to 480 years after caldera formation is $8.4 \times 10^6$ m$^3$/yr, which is comparable to historic rates of lava effusion at arc volcanoes. The cessation of postcaldera volcanic activity at Crater Lake, $\sim$4,900 years ago, is marked by subaqueous extrusion of a 0.074 km$^3$ rhyodacite dome on the east flank of Wizard Island.

DE: 8494 Instruments and techniques
SC: V
MN: 2001 AGU Fall Meeting