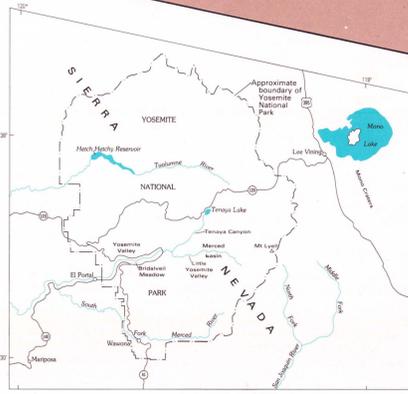


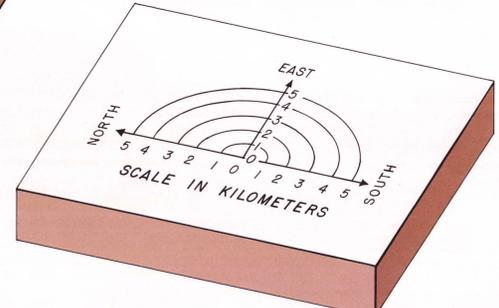
INDEX MAP OF CALIFORNIA AND NEVADA



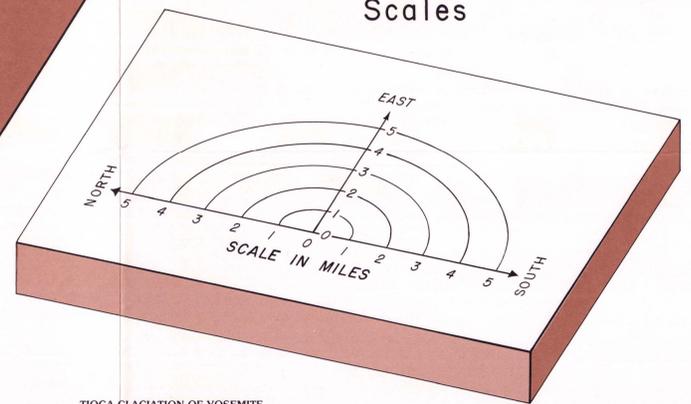
INDEX MAP OF YOSEMITE NATIONAL PARK,  
CENTRAL SIERRA NEVADA, CALIFORNIA

- EXPLANATION**
- Arrows indicate direction of ice flow
  - Ice-surface contours in feet
  - Crevasses on glacier surface (diagrammatic)
  - Glacial moraines

Scale varies with direction in this obliquely viewed map.  
Vertical scale is twice horizontal scale.



Scales



**OBLIQUE MAP SHOWING MAXIMUM EXTENT OF 20,000-YEAR-OLD (TIOGA) GLACIERS,  
YOSEMITE NATIONAL PARK,  
CENTRAL SIERRA NEVADA, CALIFORNIA**

By  
**Tau Rho Alpha, Clyde Wahrhaftig, and N. King Huber**  
1987

**TIOGA GLACIATION OF YOSEMITE**  
This map shows the alpine ice field and associated valley glaciers at their maximum extent during the Tioga glaciation. The Tioga glaciation, which peaked about 15,000-20,000 years ago, was the last major glaciation in the Sierra Nevada. The Tuolumne ice field fed not only the trunk glacier that moved down the Tuolumne River canyon through the present-day Hatch Hatch Reservoir, but it also overflowed major ridge crests into many adjoining drainage systems. Some of the ice flowed over low passes to augment the flows moving from the Merced basin down through Little Yosemite Valley. Tuolumne ice flowed southwest down the Tuolumne River into the Tenaya Lake basin and then down Tenaya Canyon to join the Merced glacier in Yosemite Valley. During the Tioga glaciation, the glacier in Yosemite Valley reached only as far as Bridalveil Meadow, although during a much earlier glaciation, a glacier extended about 10 miles farther down the Merced River to the vicinity of El Portal.  
Ice of the Tioga glaciation also flowed eastward from the summit region to cascade down the canyons that cut into the eastern escarpment of the Sierra Nevada. Southeast of the present-day Yosemite Park, glaciers formed in the Mount Lyell region flowed east onto the Mono lowland and southeast and south down the Middle and North Forks of the San Joaquin River. In the southern part of the park, glaciers nearly reached to the present-day site of Wawona along the South Fork of the Merced River.

At the time of the maximum extent of the Tioga glaciation, Lake Russell (Pleistocene Mono Lake) had a surface elevation of 6,800 feet, 425 feet higher than the 1980 elevation and 400 feet lower than its maximum level at the end of the Tioga glaciation. Only a few volcanic cones of the Mono Craters existed at the time of the Tioga glaciation.  
The distribution of vegetation, as suggested by the green overprint, is based on our interpretation. Forests were restricted to lower elevations than present day, but alpine plant species probably thrived where snow was seasonal, much as they occur today.  
The physiography of present-day Yosemite is available in a companion map (Alpha and others, 1986). The history of glaciation in Yosemite is discussed by N.K. Huber (in press).

**REFERENCES CITED**  
Alpha, T.R., Huber, N.K., Wahrhaftig, Clyde, 1986, Oblique map of Yosemite National Park, central Sierra Nevada, California: U.S. Geological Survey Miscellaneous Investigations Series Map I-1776.  
Huber, N.K., in press, The geologic story of Yosemite National Park: U.S. Geological Survey Bulletin 1595.