Variability of Secchi disk readings in an exceptionally clear and deep caldera lake
Larson, GL; Buktenica, MW
Archiv fuer Hydrobiologie [Arch. Hydrobiol.]. Vol. 141, no. 4, pp. 377-388. Mar 1998.

The variability of Secchi disk readings was explored in Crater Lake, an exceptionally clear and deep subalpine caldera lake. The primary objective was to document summer monthly and annual variability in Secchi disk readings, and variation caused by observers, disk size, and surface condition of the lake. An additional objective was to determine differences between descending and ascending disk readings (the averages of the two readings representing the disk readings) relative to the depth of the Secchi disk readings, lake surface conditions, and disk size. Secchi disk data were collected from June through September, 1978-1995. Secchi disk depths typically were in the high 20- to low 30-m range. Secchi disk readings were deepest in June and shallowest in August. Average monthly disk readings exhibited considerable variation among years (9.4 m in June, 13.4 m in July, 13.0 m in August, and 8.2 m in September). On average, variation in Secchi disk readings among observers was 1 m or less. When the lake surface was calm and skies were clear or had high haze, differences between descending and ascending observations decreased slightly with increased disk depth. Waves from tour boats, drips of water from the research vessel, and wind generated ripples and chop decreased disk readings as much as 5 m relative to readings recorded when the lake surface was calm. Clarity readings using a 100-cm disk were 7.0 m deeper than were 20-cm disk readings. Documentation of the extensive variation in Secchi disk clarity is needed to determine "normal" conditions and to judge the long-term status and trends of lake clarity. Furthermore, documenting the variation caused by slightly disturbed lake surface conditions relative to calm surface conditions and among trained observers ensures consistent interpretation of the long-term data base.

Descriptors: Lakes; Sub-alpine environments; Water quality; Geology; Variability; Secchi Disks; Deep Water; Data Interpretation; Temporal Distribution; Tourism