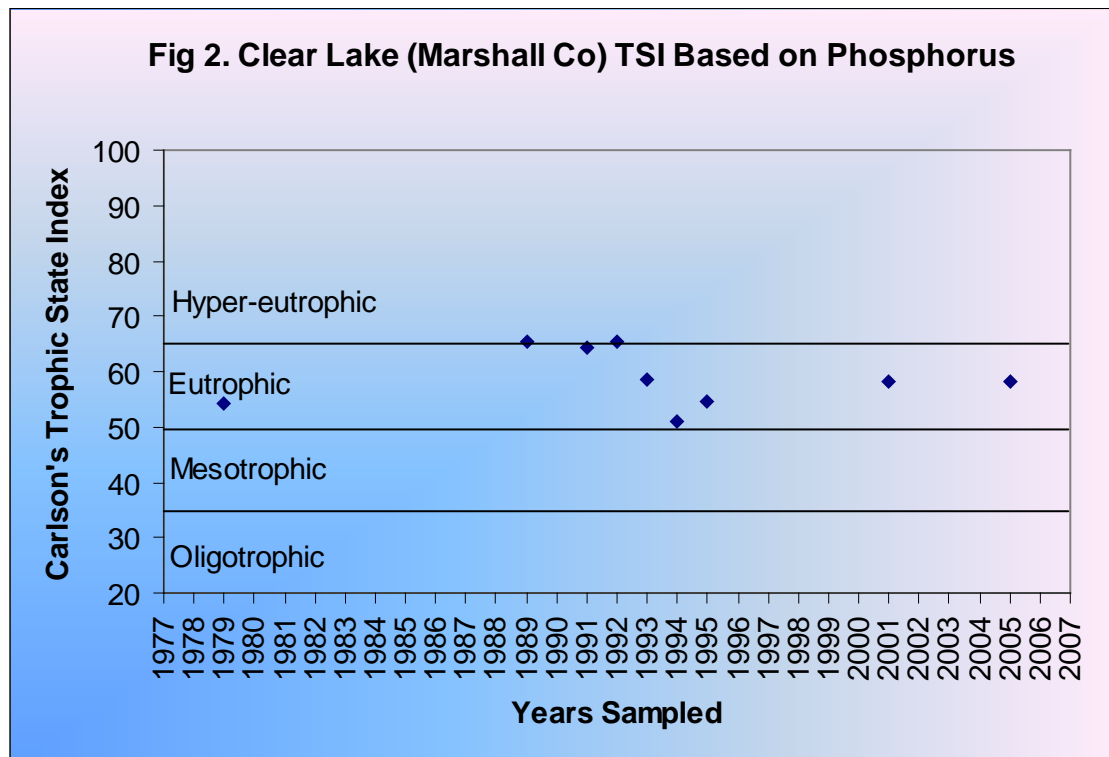
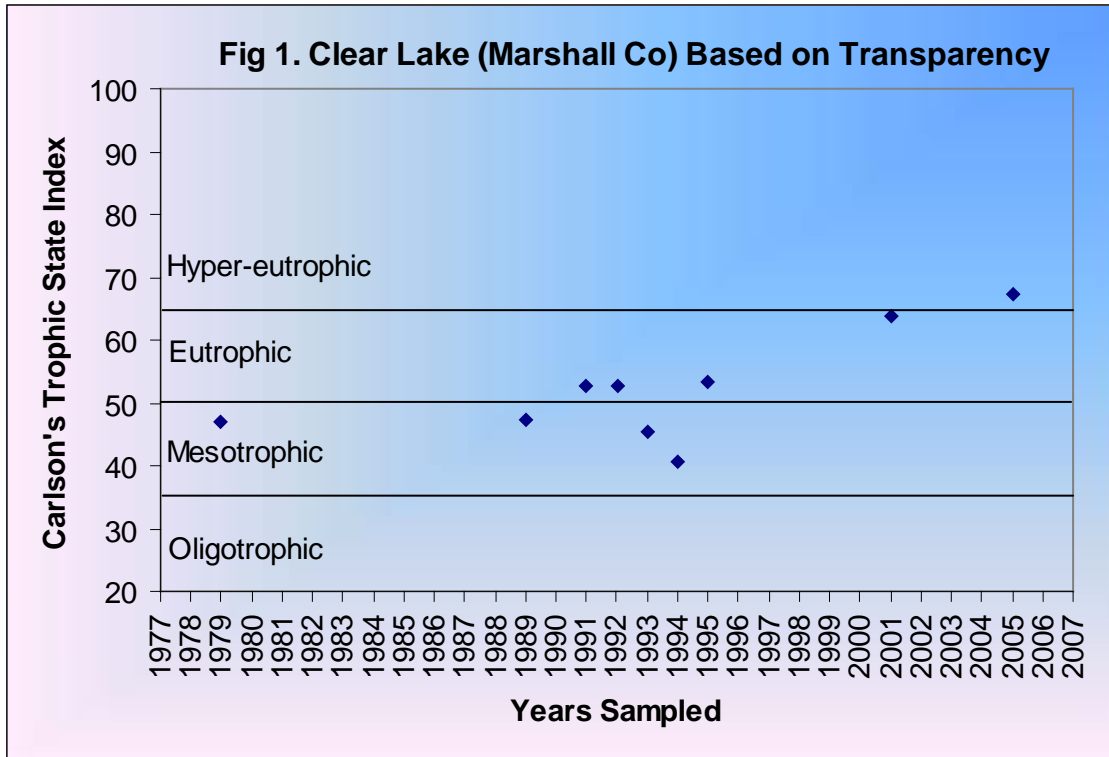


# Clear Lake Water Quality 1979-2005

Lakes range from nutrient poor (oligotrophic), to moderately rich (mesotrophic), to highly enriched (eutrophic), to excessively enriched (hyper-eutrophic). Calculating a Trophic State Index (TSI) is a numerical way of describing how productive or enriched a lake may be compared to other lakes. We can also look at TSIs to detect water quality changes that have occurred in a lake over the years. Lower TSIs indicate better water quality. Total phosphorus and Secchi disc transparency are commonly used to calculate TSI values. Clear Lake TSIs from 1979 to 2005 are shown in Figures 1 and 2.



The South Dakota Department of Environment and Natural Resources (DENR) sampled Clear Lake in 1979 and 1989 and again in 2001 and 2005. The South Dakota Water Resources Institute (WRI) conducted studies in 1991-1995. In 2006, WRI conducted sampling as part of an undergraduate research project.

What do these graphs tell us about Clear Lake? In the period from 1979 to 2005 Clear Lake could be described as mesotrophic to eutrophic. We see year to year variations in water quality that may be due to weather patterns or changes in phosphorus loads from the watershed. Mesotrophic lakes typically respond to relatively small increases or decreases in phosphorus loadings. It appears that Clear Lake water quality is sensitive to changes in phosphorus loadings.

Water quality in Clear Lake declined somewhat in the period from 1979 to 1992 then improved to a mesotrophic by 1994. Clear Lake drifted to more eutrophic conditions again by 2005. Apparently, weather events or watershed activity had increased phosphorus loadings to the lake. Large snowfalls in 1996-1997 probably increased phosphorus loadings to the lake but no data is available.

If we look at the most recent two years of data for both phosphorus and Secchi disc transparency we see declining water quality. Shoreline development tends to increase phosphorus loadings to lakes and results in declining water quality. Construction and increased seepage from septic tanks are major factors.

Water quality in lakes is a reflection of the watersheds that discharge water to them. The activities and practices of people living in the watershed and along the lakeshore can have a significant impact on the water quality of a lake. This data indicates that Clear Lake is sensitive to changes in phosphorus loadings. It is likely that if conditions in the watershed change and phosphorus loadings increase, Clear Lake may drift to a more eutrophic condition. When the CRP land in the watershed is returned to production the combined increases in phosphorus loadings from cropland and shoreline development will probably result in declining water quality in Clear Lake if phosphorus loadings from other sources are not reduced.