

A primary nutrient for algae and weed growth has remained within a limited range during the past seven years.

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Abstract: Three variables monitored during annual LCWC sampling of Les Cheneaux waters include Total Phosphorus (TP), Soluble Reactive Phosphorus (SRP) and Chlorophyll-a (Chl-a). Phosphorus is a growth limiting nutrient for phytoplankton (free-floating algae). Therefore, the availability of phosphorus is a primary factor in determining how much algae is present during any given year. SRP is a readily used form of phosphorus and can be quickly depleted during times of rapid algae growth. The relationship of these variables is an indicator of Les Cheneaux water chemistry stability. Observed values for these variables each year remain within the upper oligotrophic index signaling the nutrient fluctuation to be within normal Les Cheneaux variation. The stability of TP, SRP and Chl-a demonstrates the resiliency of our wetland ecology, even during years of continued increase in the Lake Huron level of 63 inches (160 cm) during this reporting period.

A follow-up paper will be developed to compare SRP/TP ratios of Les Cheneaux waters those of L Huron open waters to determine if the seven-year rise in lake level impacted LCI ratios.

Background: Chl-a is a measure of a specific type of chlorophyll present in phytoplankton (free-floating plankton, or free-floating algae) at the time of each sampling. The Chl-a value is an indirect estimate of phytoplankton density. Higher phytoplankton populations will consume greater amounts of phosphorus as an energy source.

SRP is a bioavailable form of phosphorus that can be readily metabolized by phytoplankton. TP must undergo a conversion, either chemical or microbial, to the SRP form before it is available for metabolic use by phytoplankton. In a healthy, balanced system TP values will be greater than SRP.

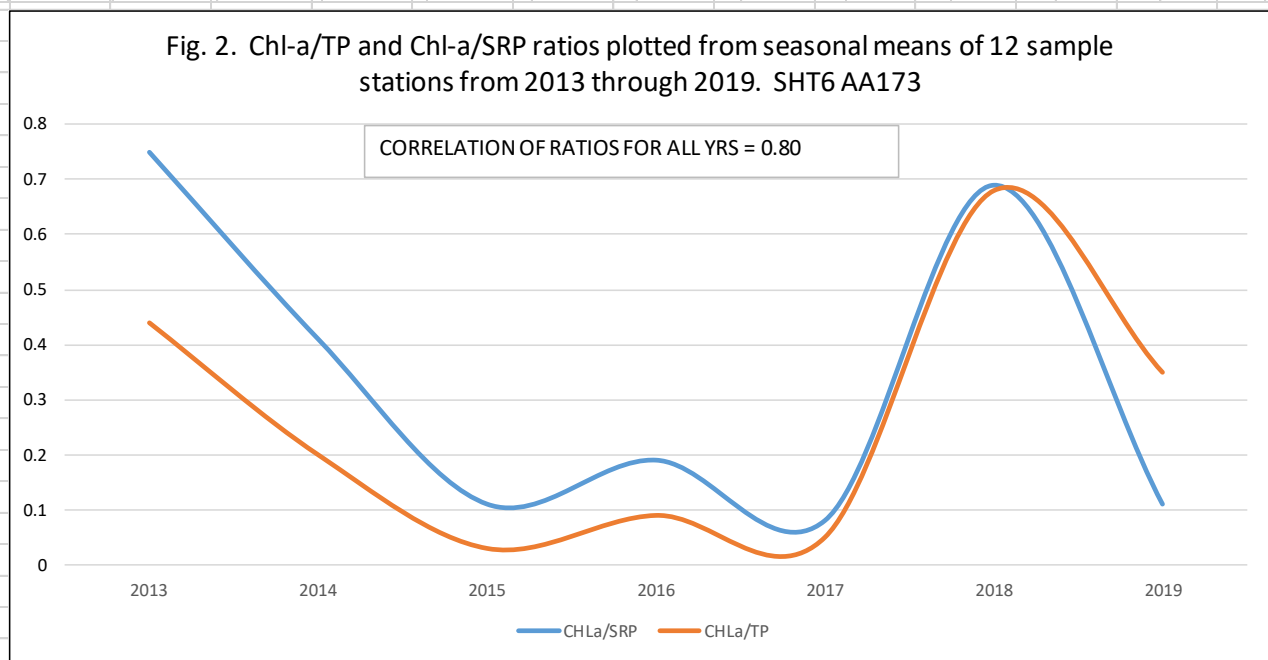
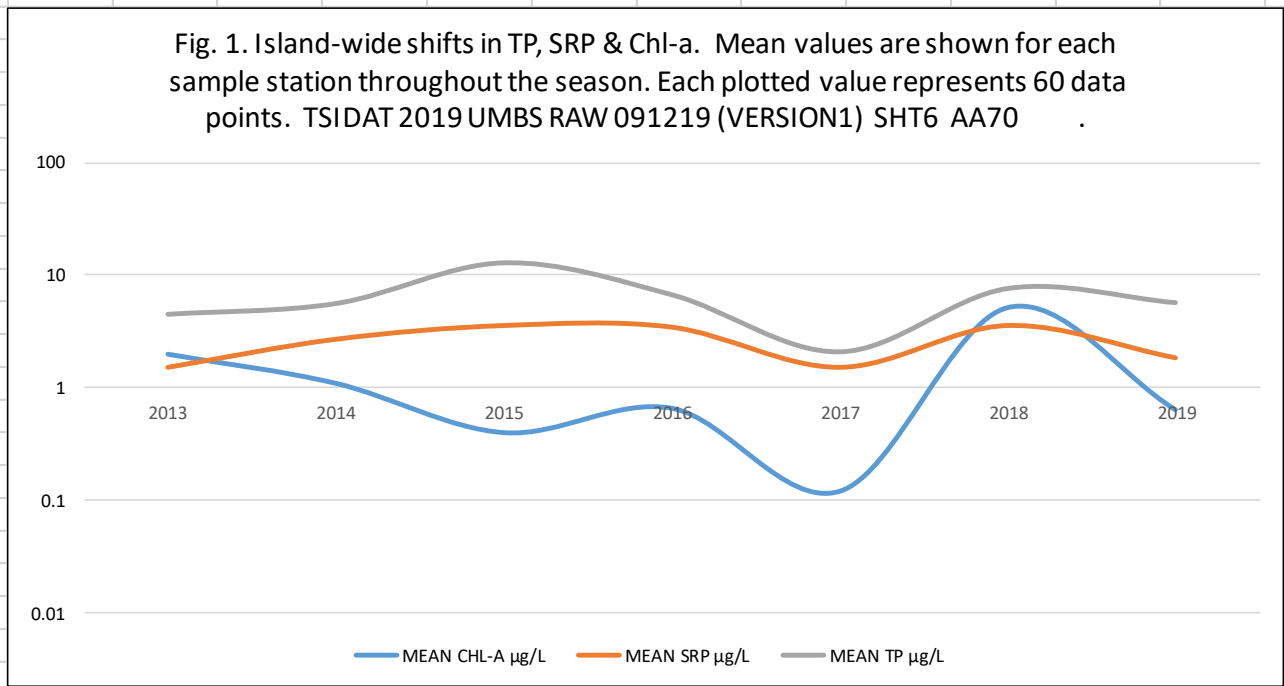
Phytoplankton (Chl-a) values are normally lower than SRP concentrations. It follows that, since SRP is a component of TP, that Chl-a values will also be lower than observed TP levels. Thus ratios of Chl-a/SRP and Chl-a/TP can be used as a measure of that relationship for a given sample event or period.

Sample stations monitored during this period range from Marquette Bay in the west to McKay Bay in the east and covered twelve different locations. Each point on the chart represents 60 individual assay values. Stations were monitored monthly from May through September.

Results & Discussion: Seasonal concentrations of TP, SRP and Chl-a over a seven yr period are shown in Fig. 1 . In general, the relationship among the variables is as expected. Variation of absolute values for each of the variables differs from year-to-year due to a number of factors such as temperature, light and the variation of all algal species which might be dominant in any given year. The reason for Chl-a being greater than SRP in 2013 and in 2018 is unknown but data for both variables were internally consistent, thereby validating the assay accuracy. What the data indicate is that there was a high SRP demand by algal populations during those two years.

Ratios between TP/Chl-a and SRP/Chl-a shown in Fig. 2 are remarkably consistent with a correlation between TP and SRP data sets of 0.80 and reflect the trend of individual variables from Fig. 1.

The steady rise of Lake Huron level of 63" (160 cm) is not considered a factor in the data trend, even during years of continued increase of Lake Huron level of 63 inches from 2013 through 2019. It is likely that any dilution of phosphorus in Les Cheneaux channels by the in-flowing nutrient-poor water from L Huron was offset by onshore organics suspended in the water during the seven year rise of L Huron.



Summary: The relationship of three variables in this paper: TP, SRP and Chl-a reflects the stability of other water quality factors within our channels and demonstrates the resiliency of our Les Cheneaux wetland ecology. Consistency of the Chl-a/TP and Chl-a/SRP ratios of 0.80 is an exceptionally high degree of correlation for biological data over a multi-year period. The steady rise of Lake Huron level of 63" (160 cm) from 2013 through 2019 did not appear to affect relationships of TP/SRP, Chl-a/TP or Chl-a/SRP.