

# Yearly Red Fleet Reservoir Water Quality Report



**CENTRAL UTAH WATER**  
**CONSERVANCY DISTRICT**

**2020**

Prepared by,  
Joe Crawford

The water quality in Red Fleet Reservoir near the dam was examined for the years 2015-2017. Data was compiled and analyzed for the following parameters: phytoplankton, nitrogen (no3 + no2), phosphorus (TP), total organic carbon (TOC), Total Suspended Solids (TSS), and a Trophic State Index (TSI). Water samples were collected from Red Fleet Reservoir at the surface and bottom of the water column as well as above and below the thermocline (if the thermocline was not present a sample was collected from the middle of the water column). Secchi depth, 2x secchi depth and 3x secchi depth samples were also collected for phytoplankton.

### **Phytoplankton Data**

The phytoplankton data collected at each depth were averaged together and broken down by algal division. Figures 1-3 show all of the samples collected in each month for the corresponding years. Chlorophyta (green algae) was the dominant algae in July and May of 2015 and 2016 respectively. In the latter end of the 2015 season there was an increase in the Cyanophyta (cyanobacteria). In 2017 (Figure 3) the most abundant algae were in the Bacillariophyta (pennate diatoms) division.

Figure 1

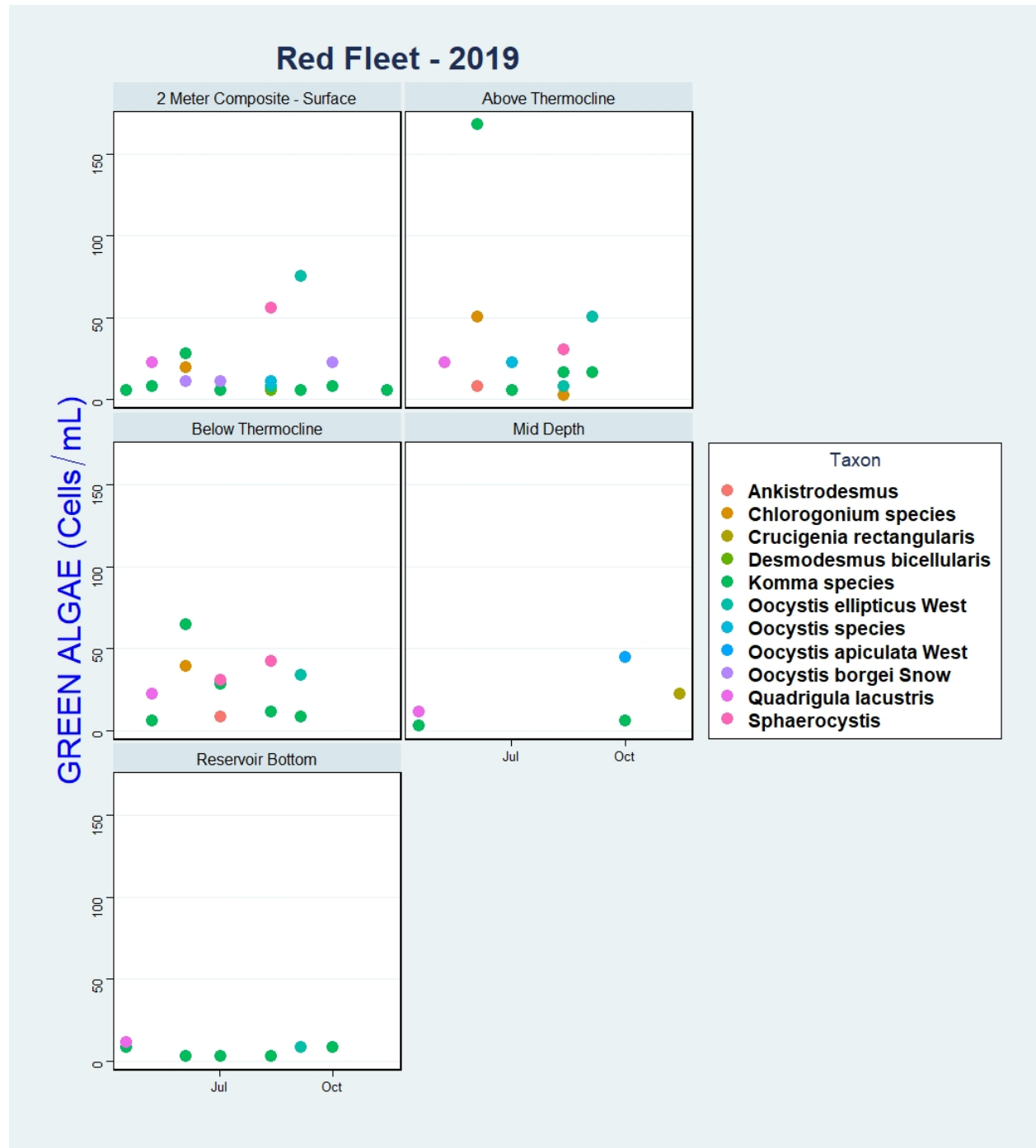


Figure 1:

Figure 2

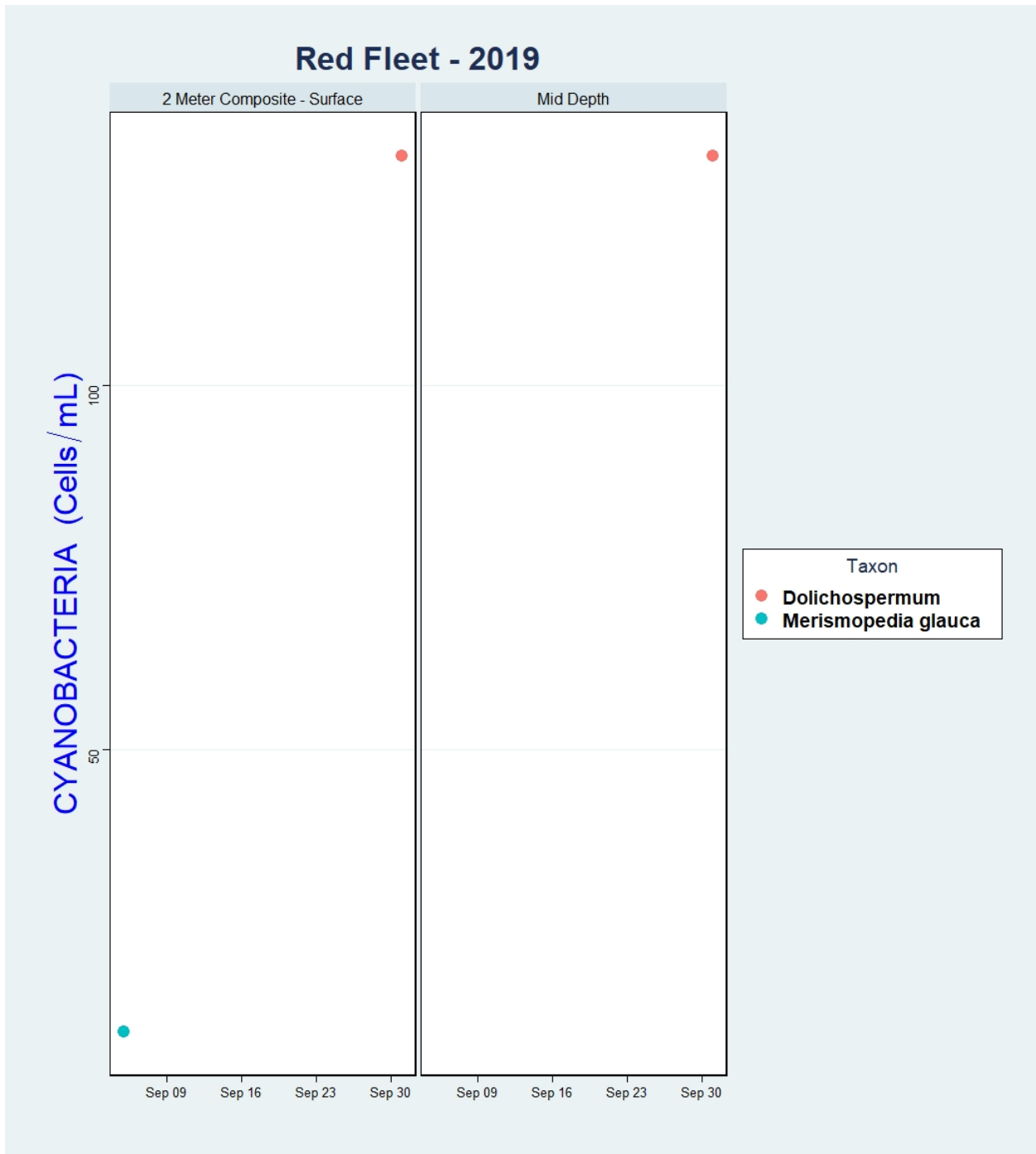


Figure 2:

Figure 3



Figure 3:

#### Nutrients

Nutrient levels in the water column were averaged for each month that samples were collected. The Division of Water Quality has determined that Total Phosphorus (TP) levels start to impact water quality at 0.025 mg/L. During 2015 and 2016 the TP concentration went above that value (Figure 4). In

2015 the reservoir level was significantly lower than the other two years, possibly attributing the high levels of phosphorus during that time. During 2017 the average TP concentration peaked at 0.025 mg/L in June and was below that value the rest of the season.

Nitrate levels at Red Fleet Reservoir were low during the last 3 years. The average concentration never went above 225 ug/L (Figure 5). According to the Division of Water Quality nitrate doesn't start to negatively impact water quality until it reaches 4000 ug/L (4 mg/L).

Figure 4

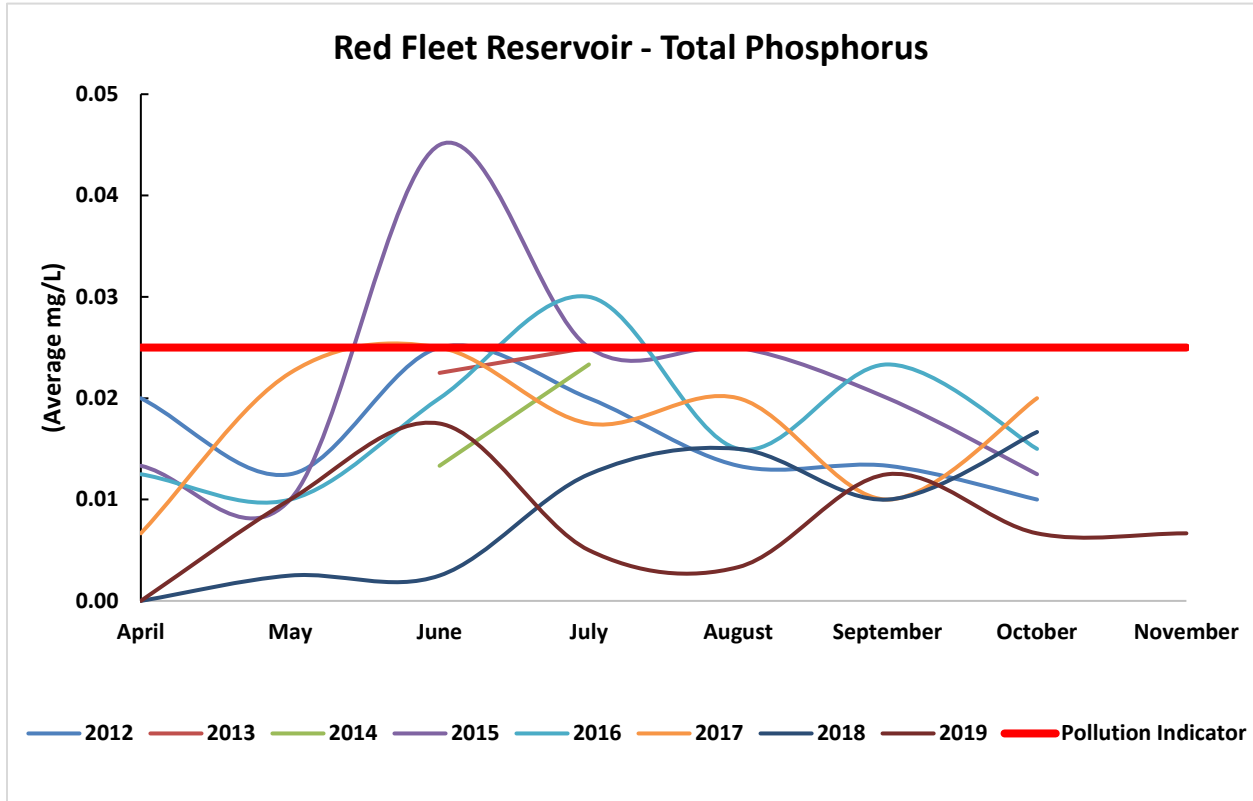


Figure 4:

Figure 5

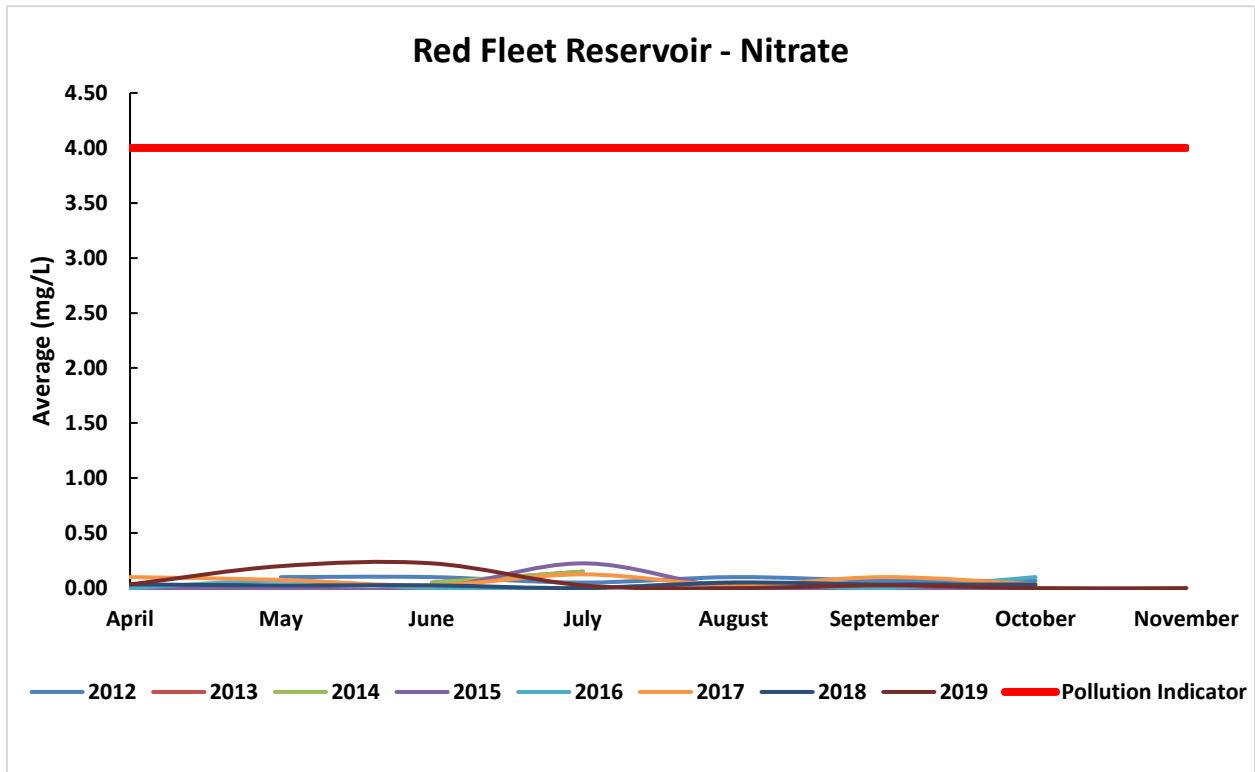


Figure 5: Total Organic Carbon

The Total Organic Carbon (TOC) levels for all three years were fairly similar (Figure 6). In 2017 there was a increase in TOC in the beginning of the season which was not surprising due to an increase in flow coming into the reservoir during spring runoff.

Figure 6

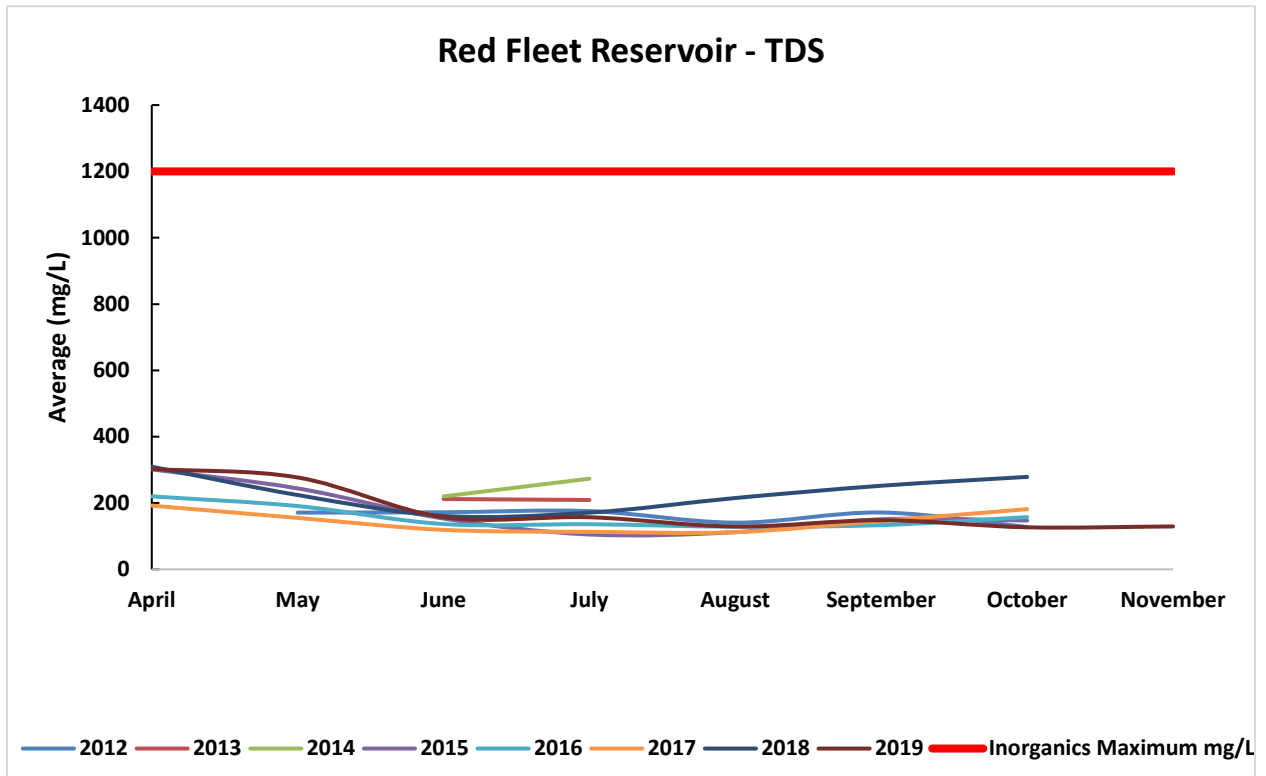


Figure 6:



## Trophic State Index

The aquatic ecosystem productivity of a lake is often described by the terms: oligotrophic, mesotrophic and eutrophic. Oligo, as a prefix means, "few" and trophic is defined as: "relating to nutrition (or food)," thus oligotrophic means "little food" and eutrophic means "many foods" with mesotrophic being located in the middle.

The Trophic State Index (TSI) is a tool that classifies lakes and reservoirs into different trophic levels. It is often calculated using water clarity, via secchi depth, and phytoplankton biomass, via the surrogate chlorophyll *a* (chl *a*). A TSI value greater than 50 is considered Eutrophic, any value greater than 40 and less than 50 is Mesotrophic, and any value less than 40 is Oligotrophic. Generally the lower the TSI the greater the water clarity and the lower the phytoplankton biomass. Furthermore, usually the secchi and the chl *a* TSI values are similar and often overlap each other. However, for almost 30 years these values have not overlapped at Red Fleet Reservoir. Thus, while the secchi TSI is fairly high and often times above the Eutrophic line the chlorophyll *a* TSI value never crosses the Eutrophic line and is often below the Mesotrophic line. This suggests that the water clarity in the reservoir is diminished by something more than just phytoplankton.

Figure 8

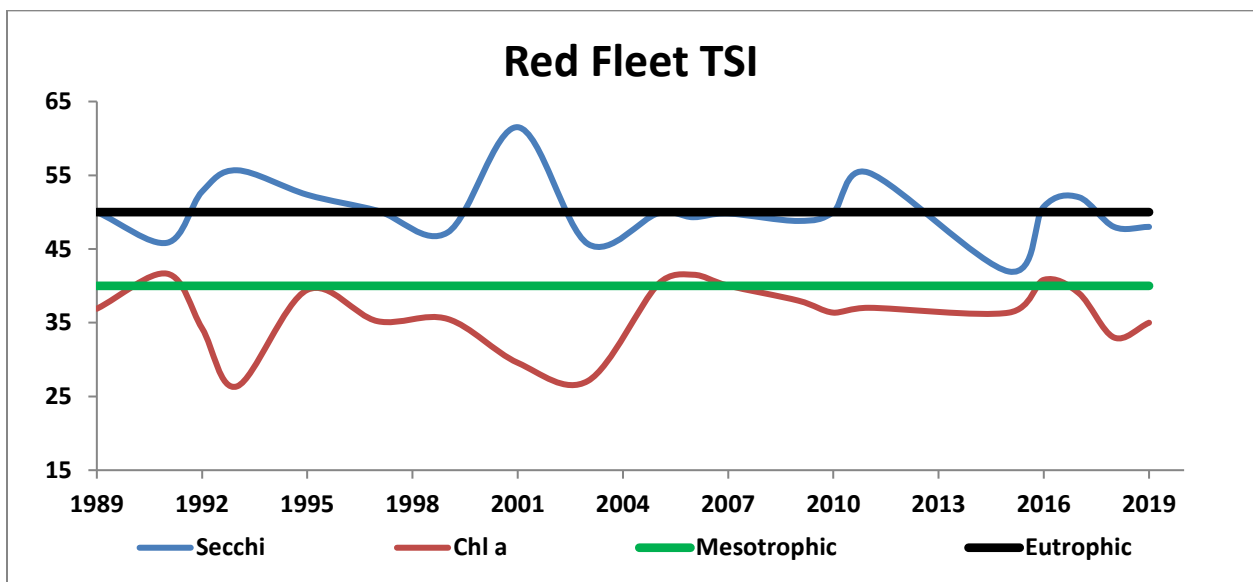


Figure 8: Red Fleet Trophic State Index. The TSI for Red Fleet is different than most reservoirs because the secchi and chl *a* values do not overlap. This suggests that the water clarity is being impacted by more than just algae.

## Summary

Chlorophyta was the most abundant algal division in 2015 and 2016 while Bacillariophyta was the dominant in 2017. During the summer months of June, July and Augusts, the Total Phosphorus average level often met or exceeded 0.025 mg/L. The Trophic State Index for Red Fleet is atypical. The secchi TSI value is frequently above the eutrophic line while the chlorophyll a TSI value is often below the oligotrophic value. This difference in values suggests that the water clarity is being impacted by more than algae.