

Water Quality Status and Trends in Newnans, Lochloosa, and Orange Lakes

Jian Di & Erich Marzolf

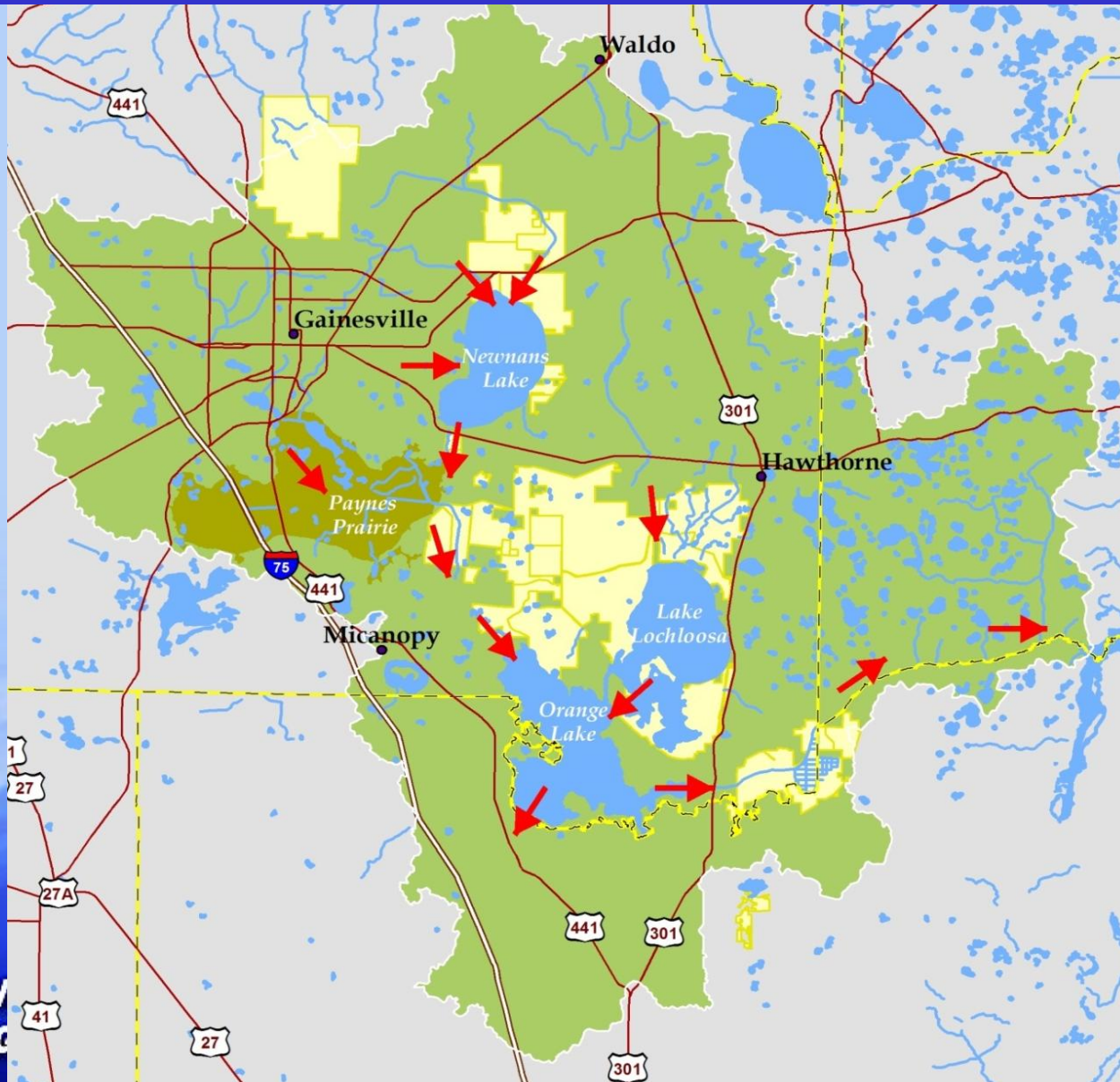
jdi@sjrwmd.com

emarzolf@sjrwmd.com



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Orange Creek Basin



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Water Quality Status

- **Evaluated based on recent five years (March 2004- March 2009)**
- **Total Phosphorus (TP)**
- **Total Nitrogen (TN)**
- **Algal Abundance (Chl-a)**
- **Trophic State Index (TSI)**



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Water Quality Status

Trophic State Index (TSI) scores are used to describe the water quality status:

- **TSI > 70** Water quality is **POOR**.
- **TSI between 60 -70** Water quality is **FAIR**.
- **TSI <60** Water quality is **GOOD**.



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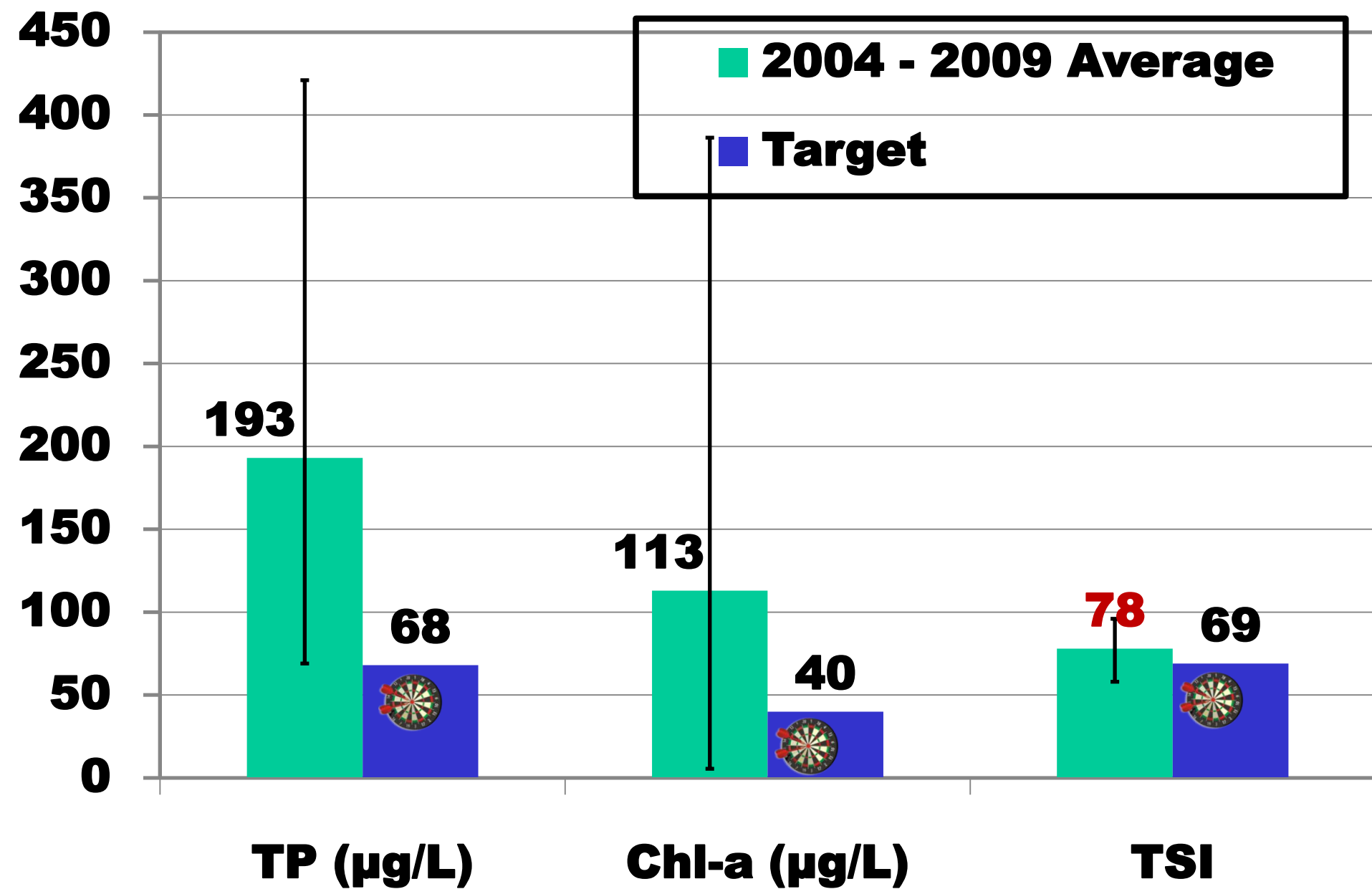
Water Quality Trends

- **Evaluated using 15 years data (1994 to 2009) of TP, TN, Chl-a and TSI in the lakes**
- **Lake stage variation is considered for the analysis**

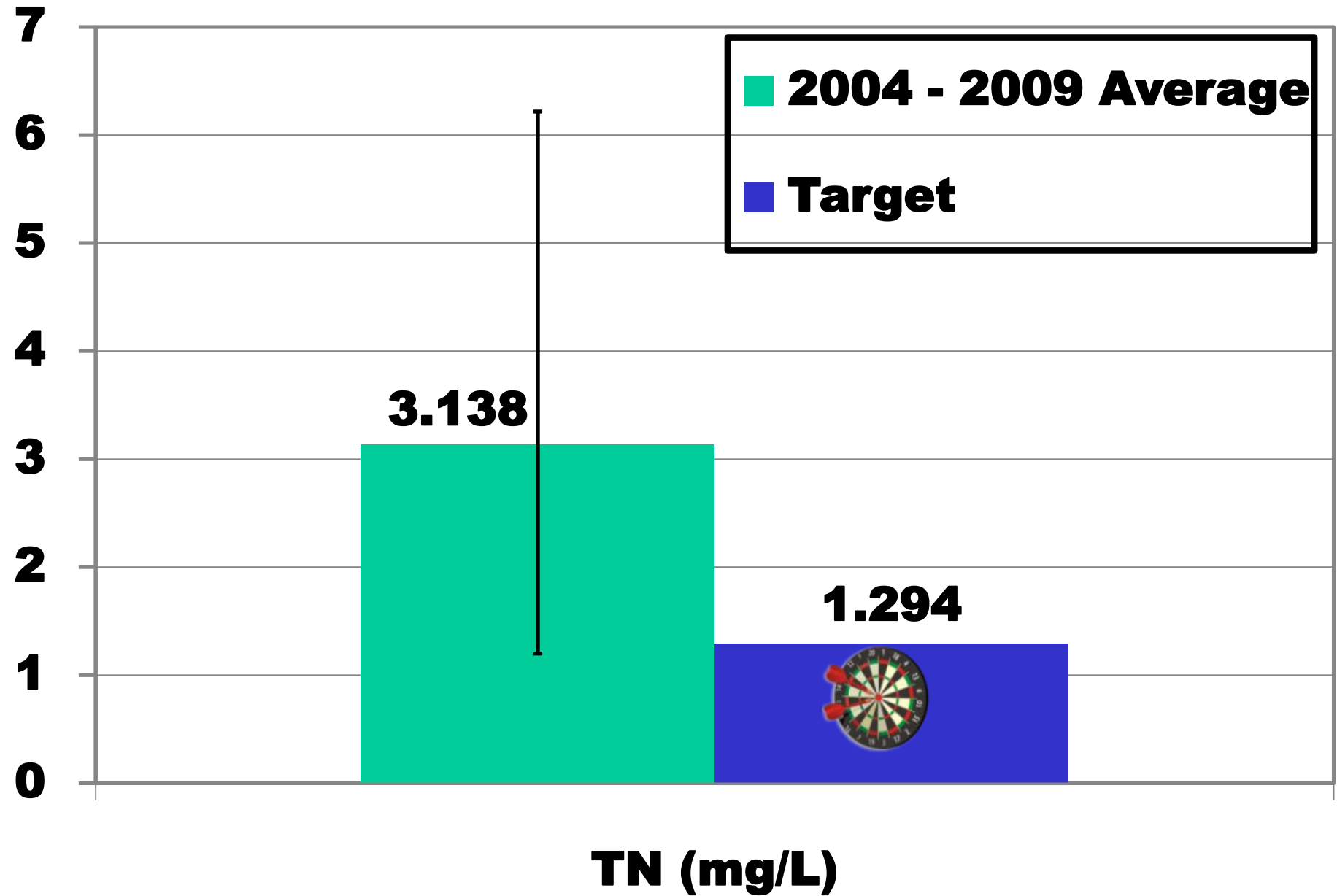


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Newnans Lake Water Quality Status

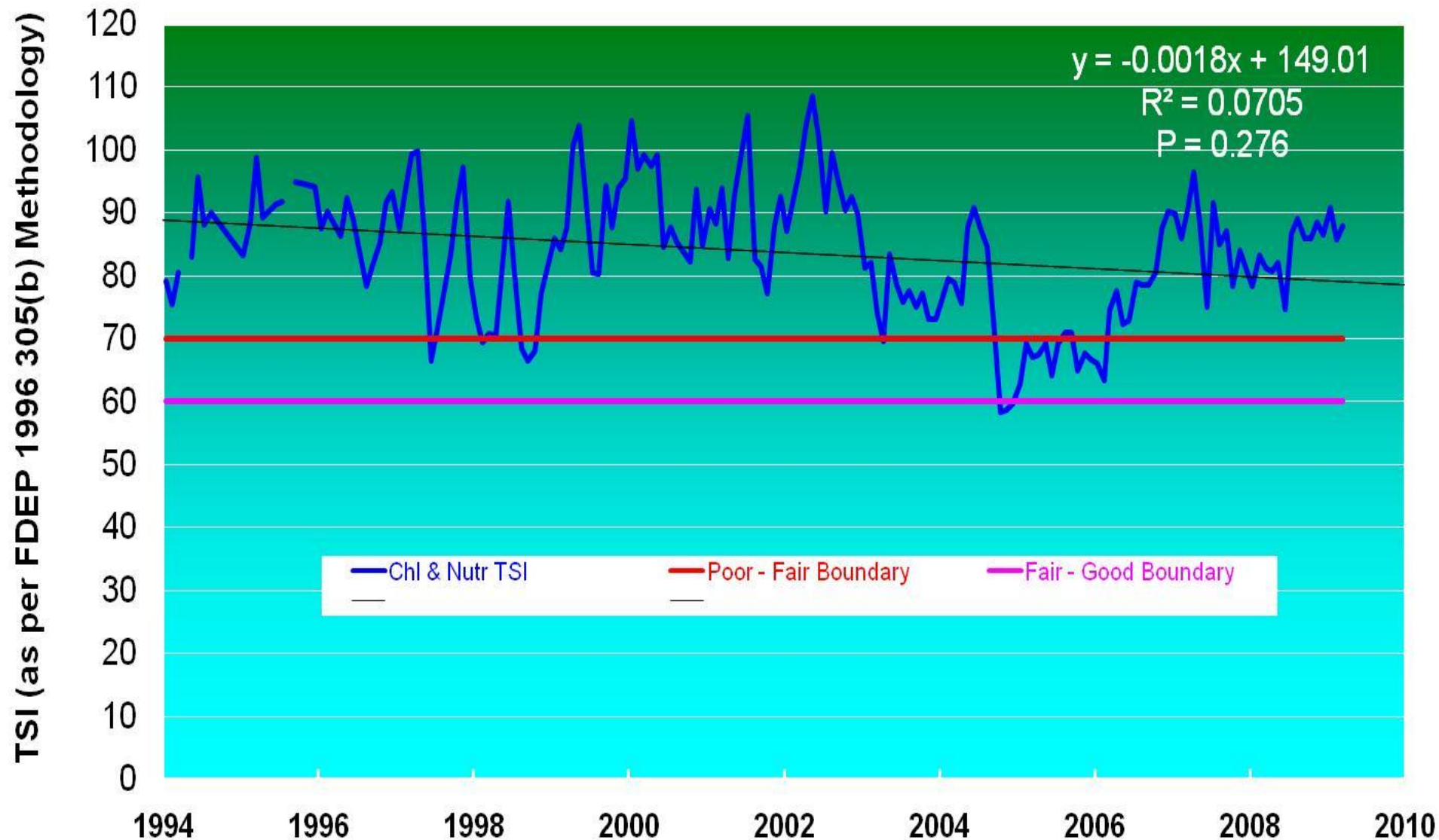


Newnans Lake Water Quality Status

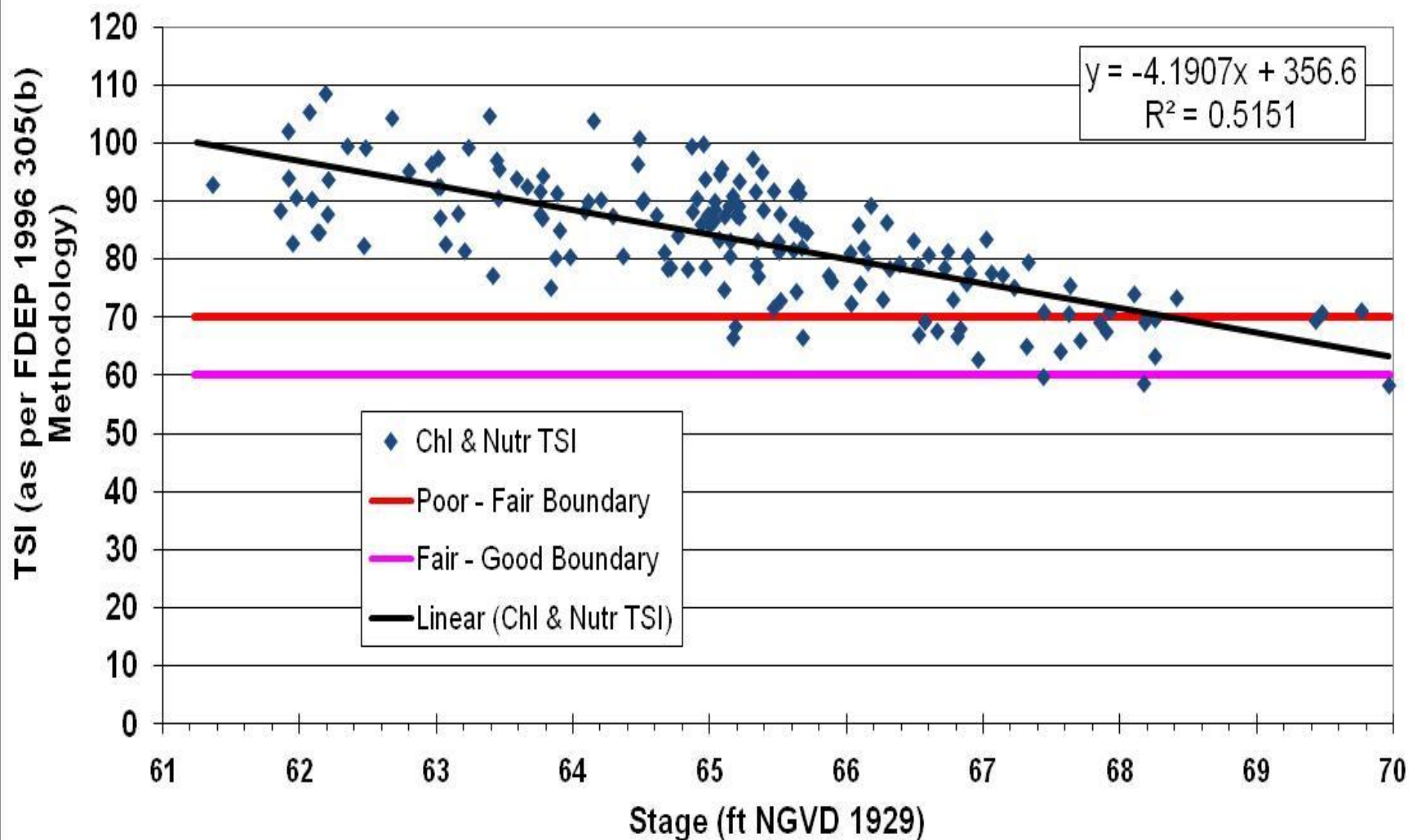


Newnans Lake Water Quality Trends

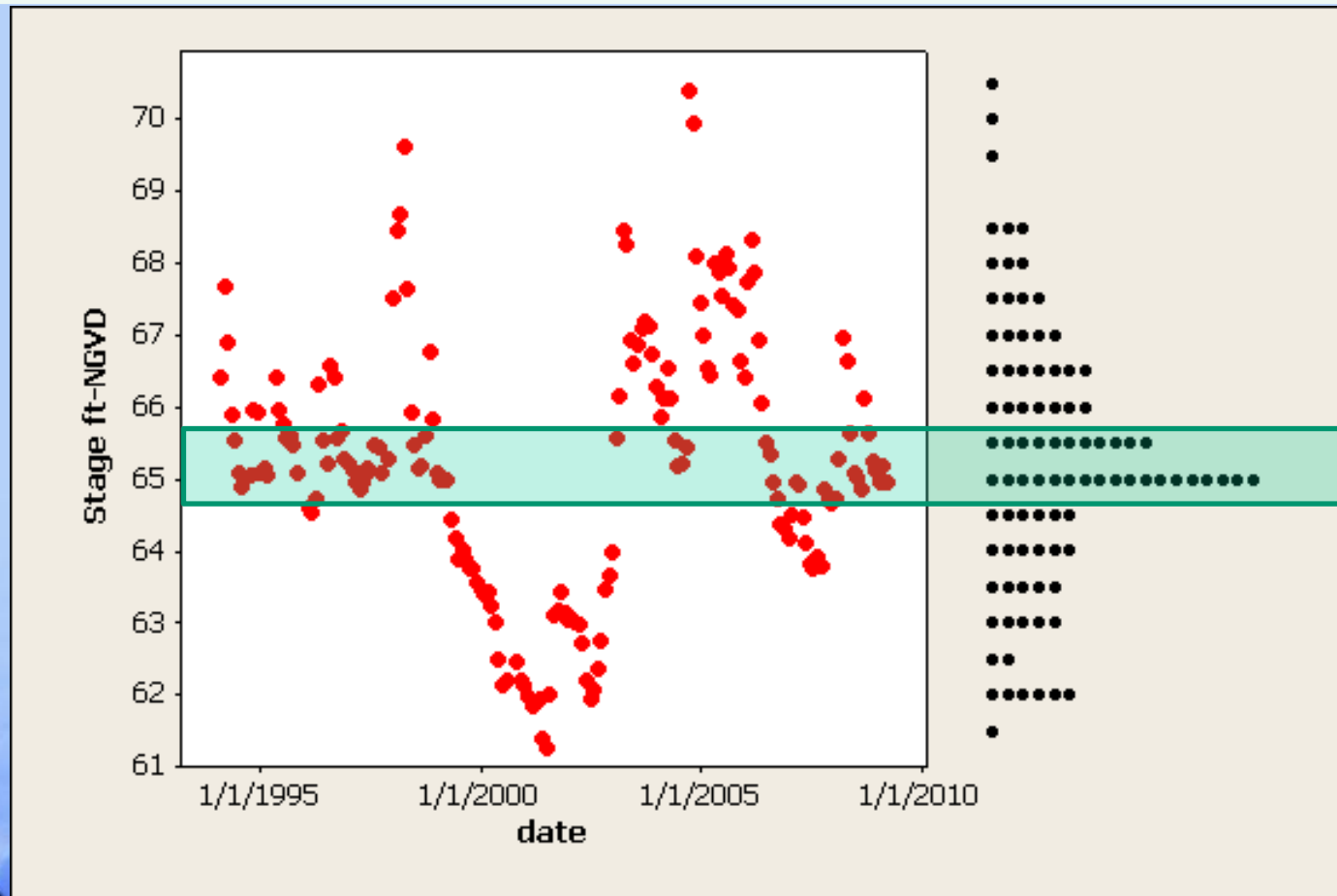
Lake Newnans Mean Monthly TSI



Lake Newnans Mean Monthly TSI Vs. Stage (p~0)



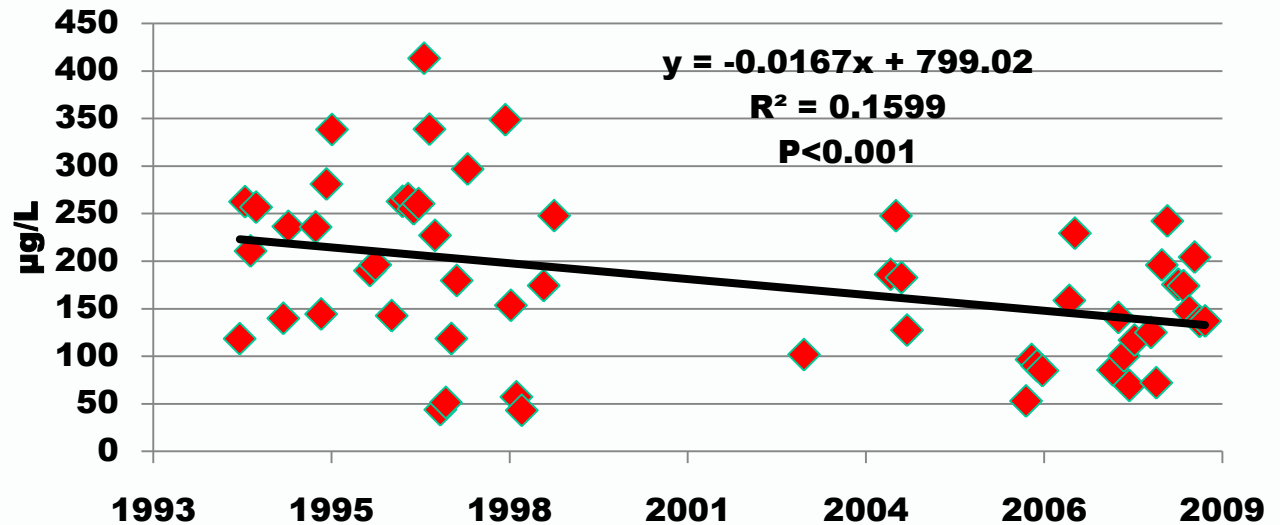
Monthly median stages and distribution in Newnans Lake 1994 -2009



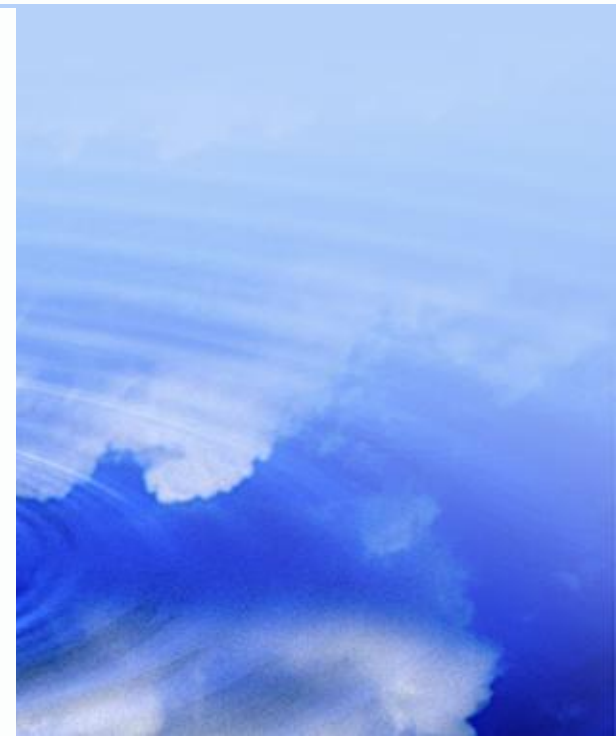
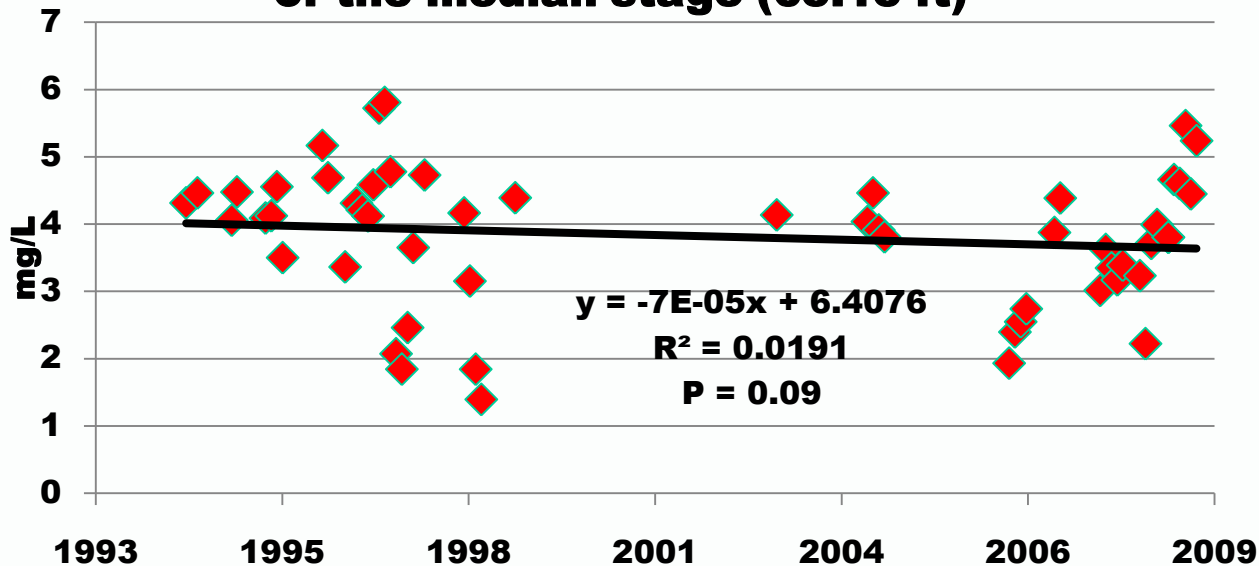
❑ **Median = 65.15 ft NGVD**

❑ **Data range for trend analysis 64.65 ft – 65.65 ft**

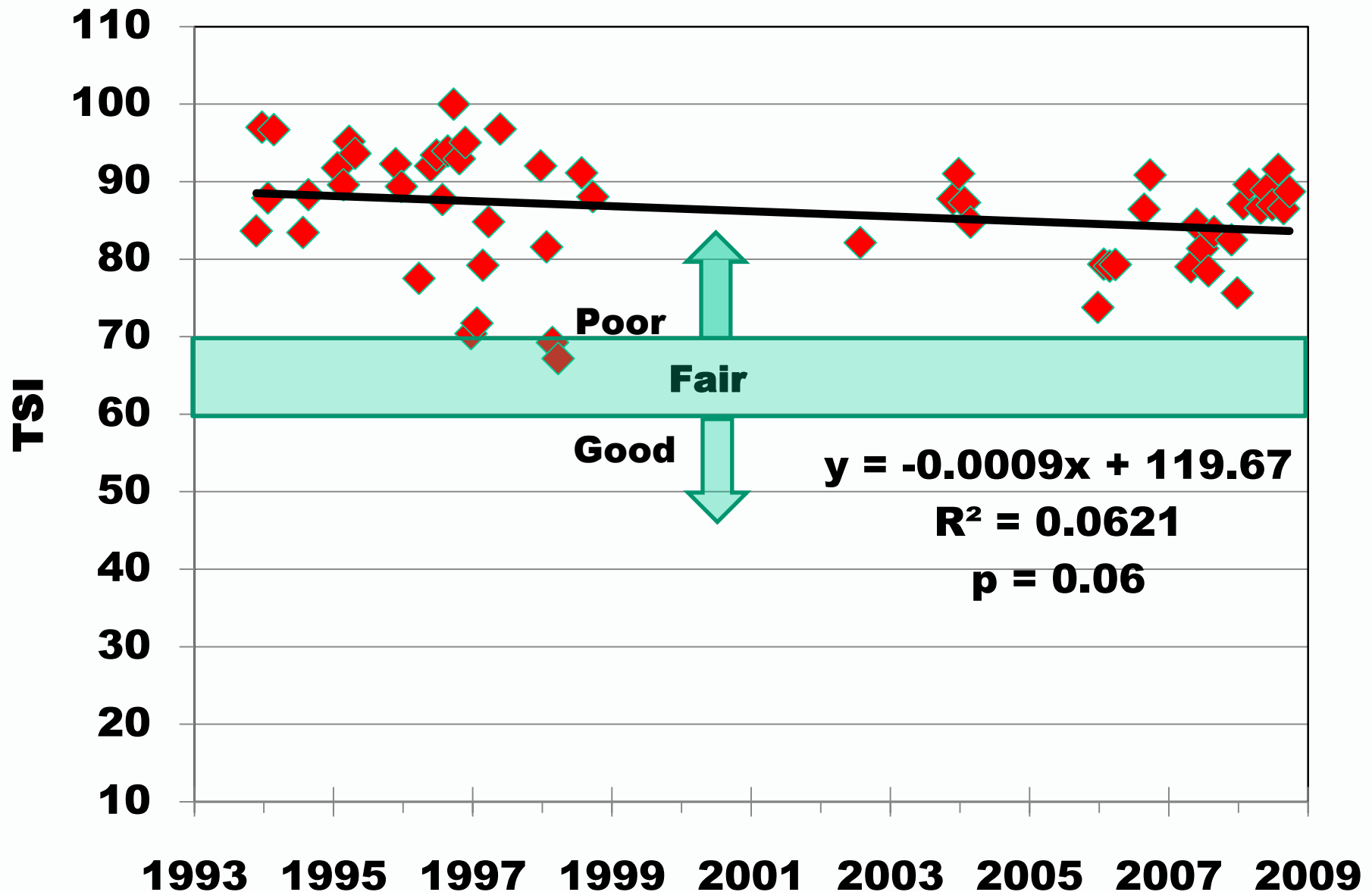
Newnans Lake **Chl-a** concentration at ±0.5 ft of the median stage (65.15 ft)



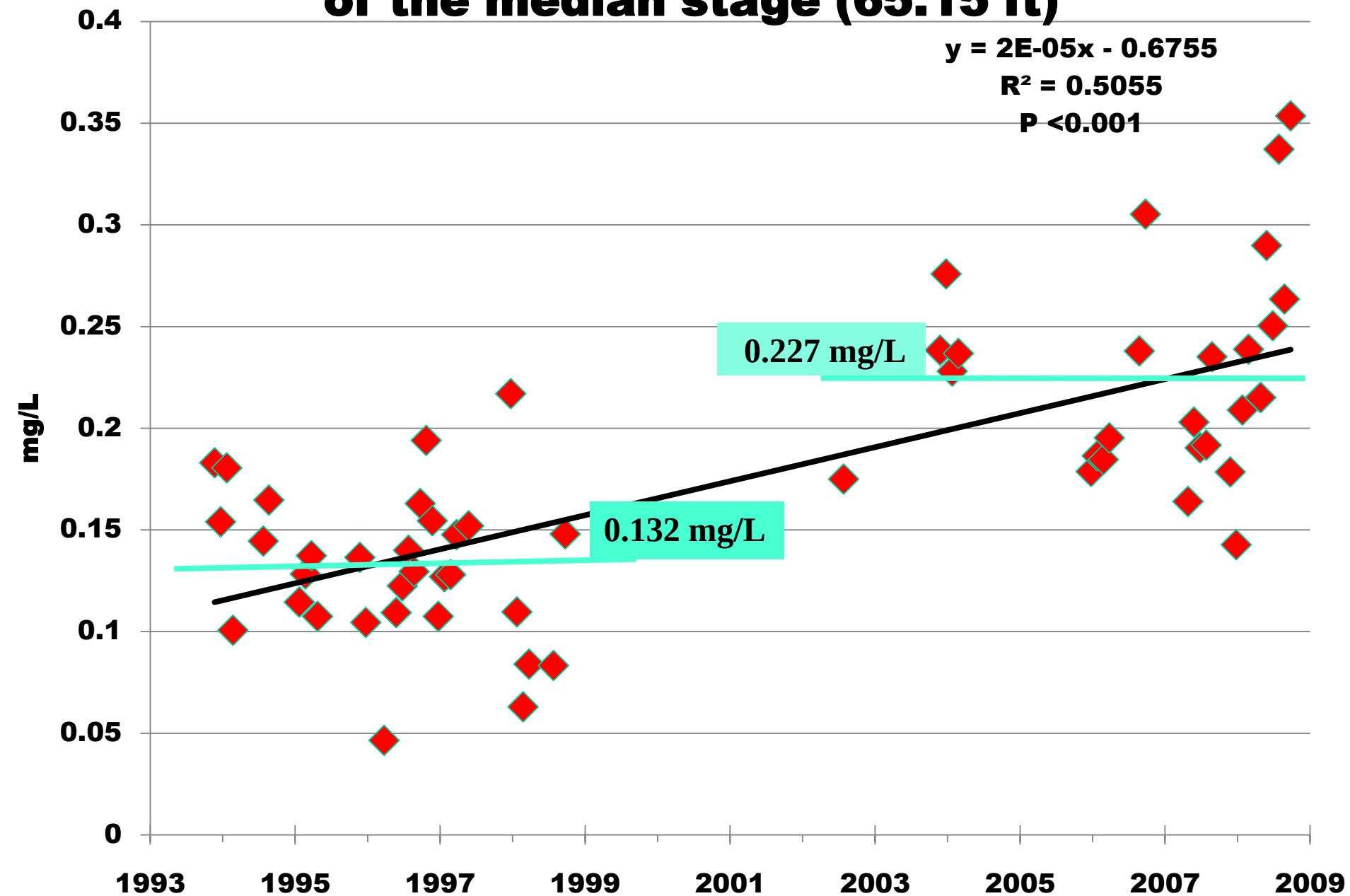
Newnans Lake **TN** concentration at ±0.5 ft of the median stage (65.15 ft)



Newnans Lake TSI at ± 0.5 ft of the median stage (65.15 ft)



Newnans Lake **TP** concentration at 0.5 ft of the median stage (65.15 ft)



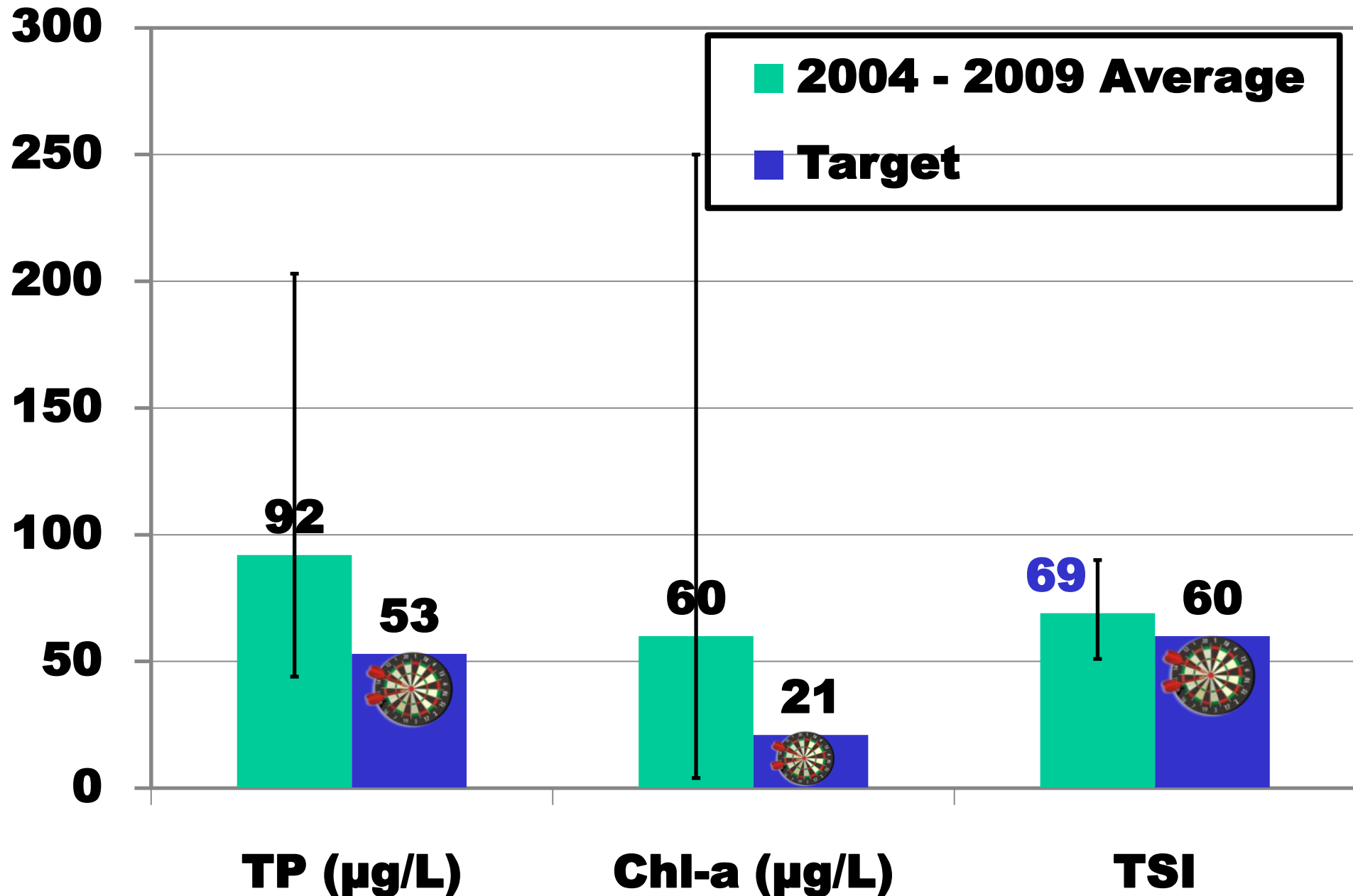
Newnans Lake

- **Water quality is generally poor and varies strongly with lake stage.**
- **The decline in TSI, TN and Chl-a over the past 15 years might indicate that Newnans Lake water quality is improving.**
- **However, TP trends with and without a lake stage correction suggest the TP concentration is increasing.**

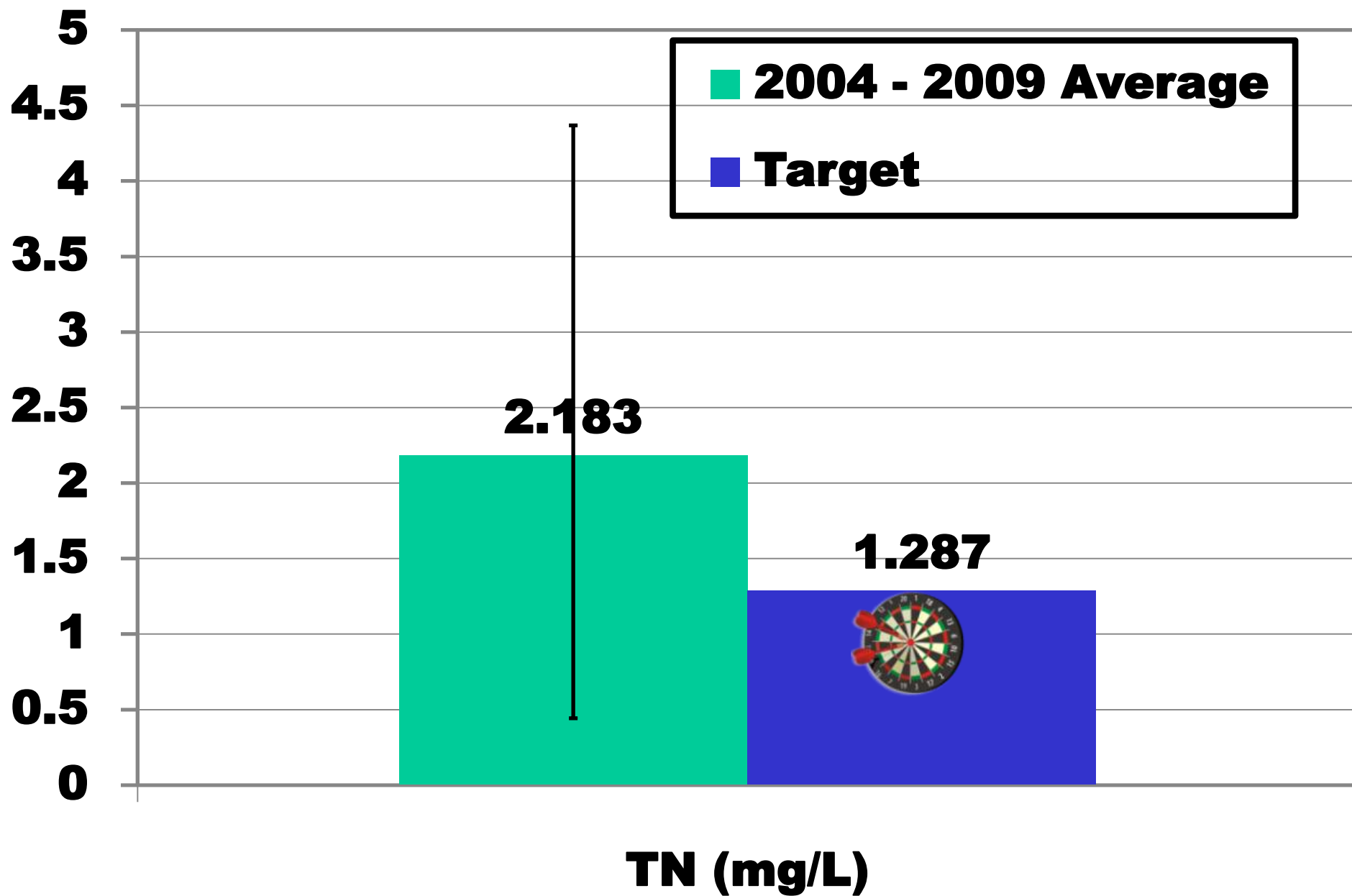


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Lochloosa Lake Water Quality Status

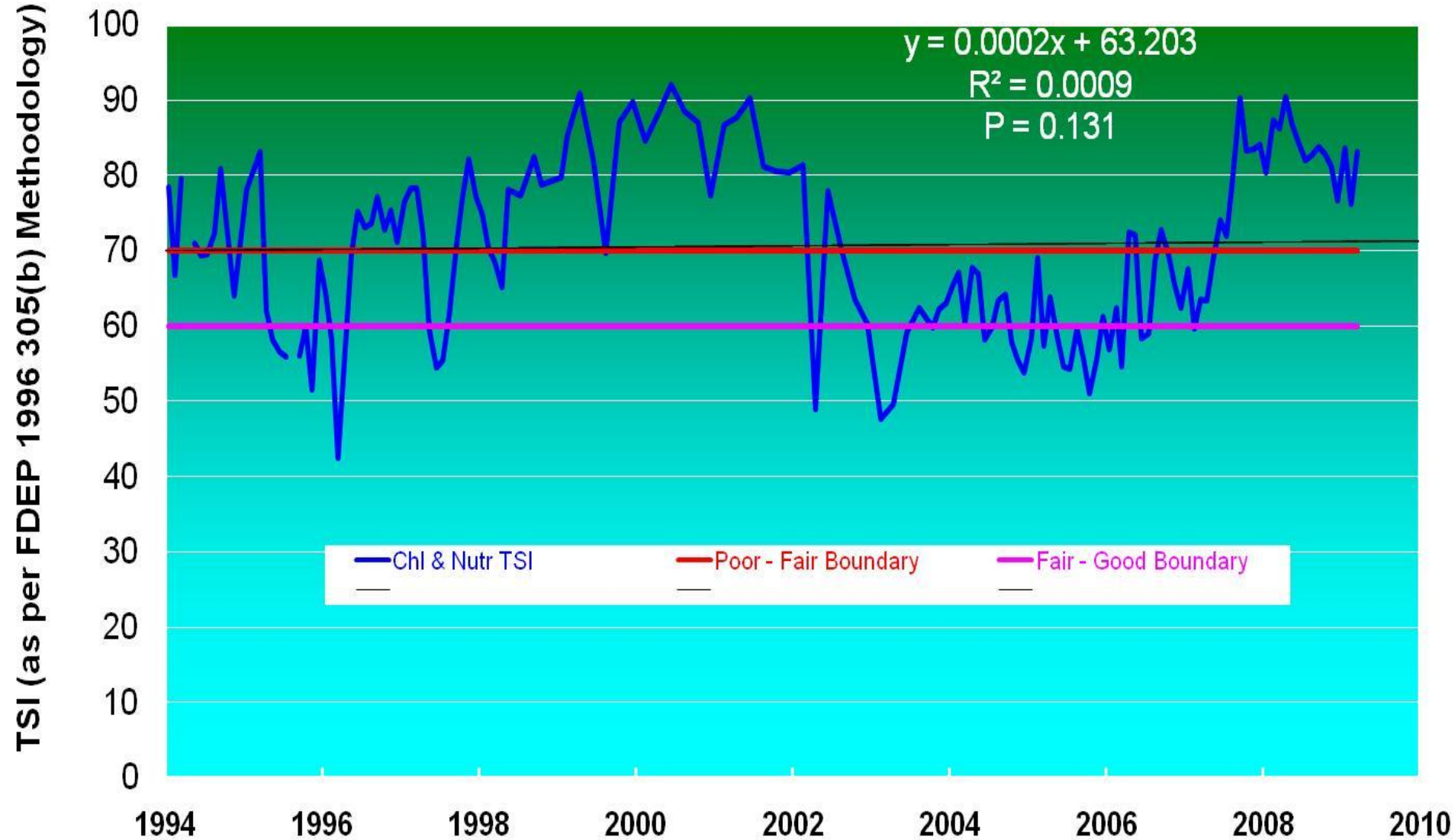


Lochloosa Lake Water Quality Status

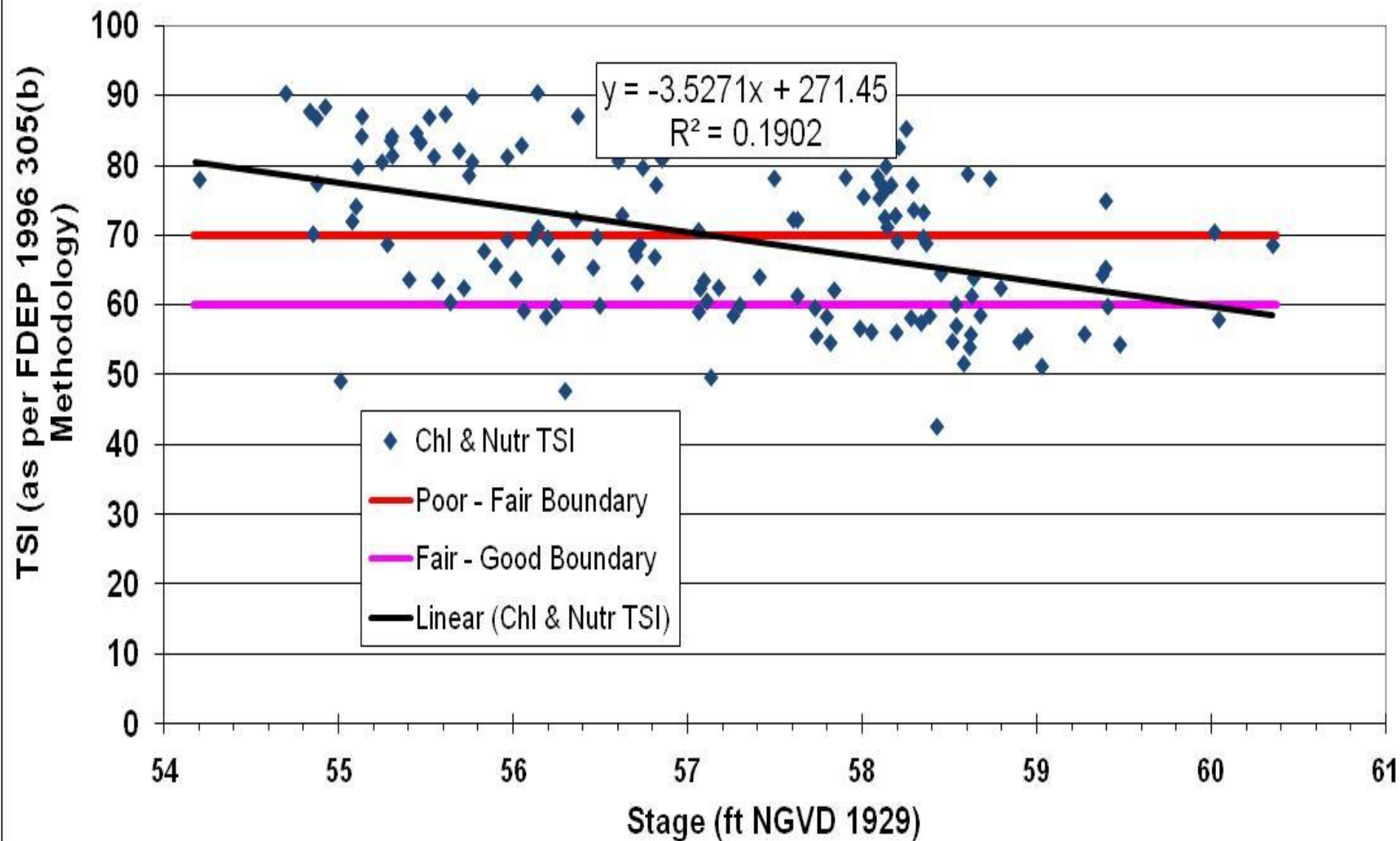


Lochloosa Lake Water Quality Trends

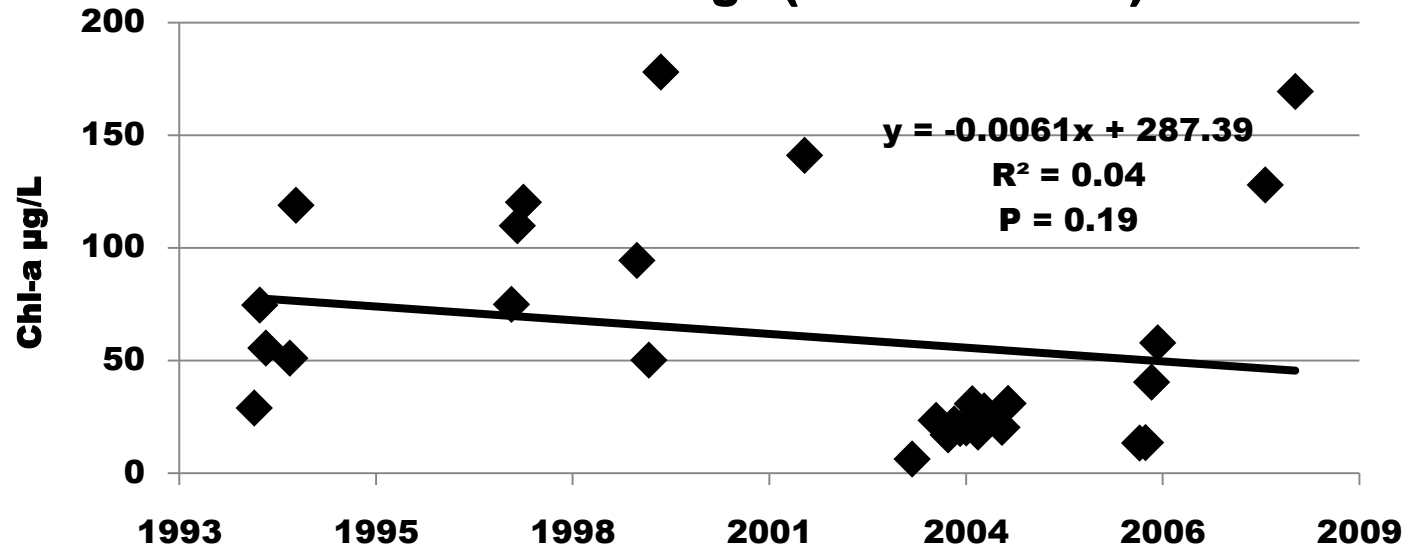
Lake Lochloosa Mean Monthly TSI



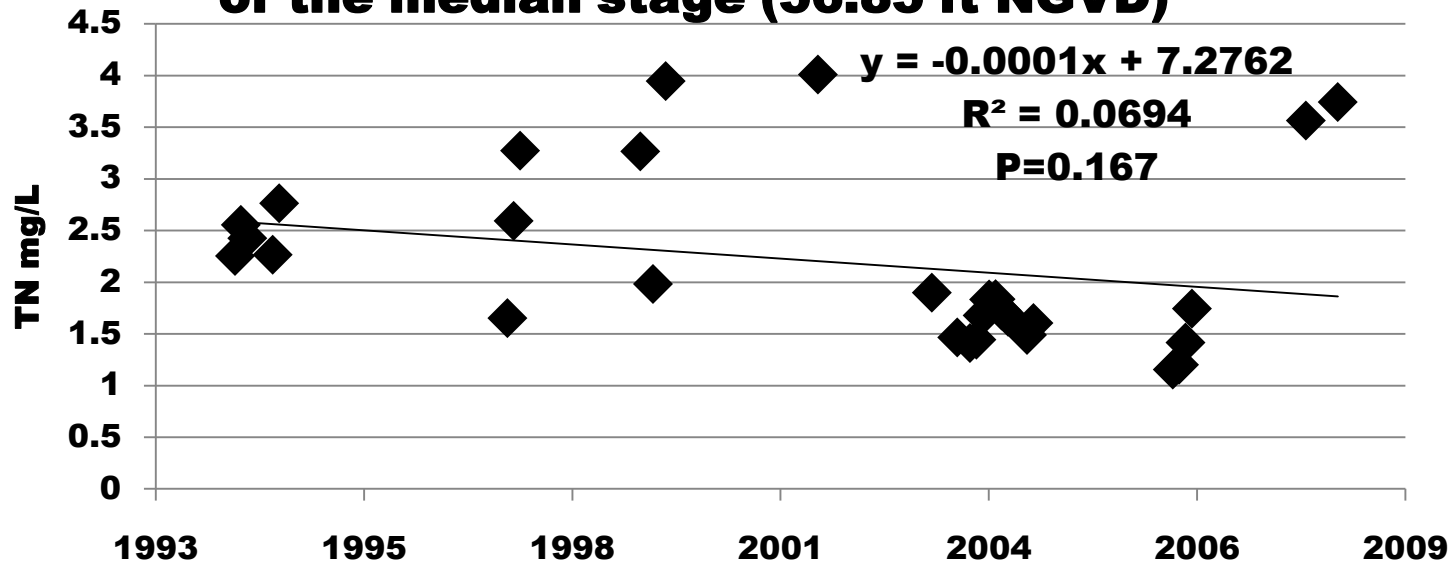
Lake Lochloosa Mean Monthly TSI Vs. Stage (p~0)



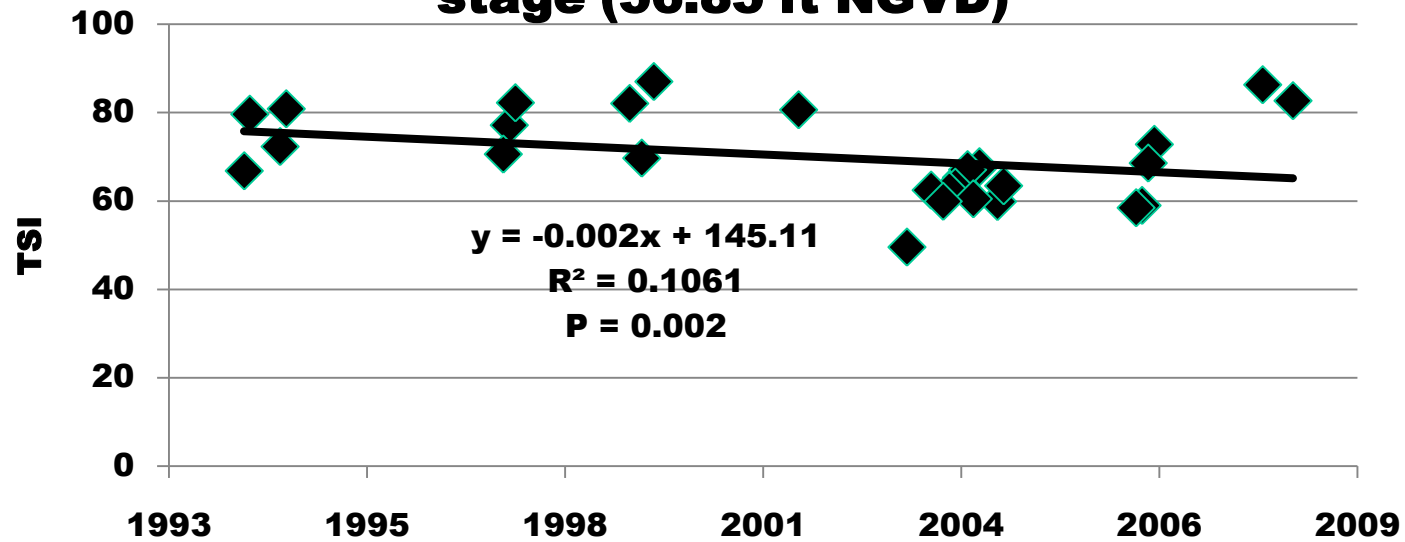
Lochloosa Lake **Chl-a** concentration at 0.5 ft of the median stage (56.85 ft NGVD)



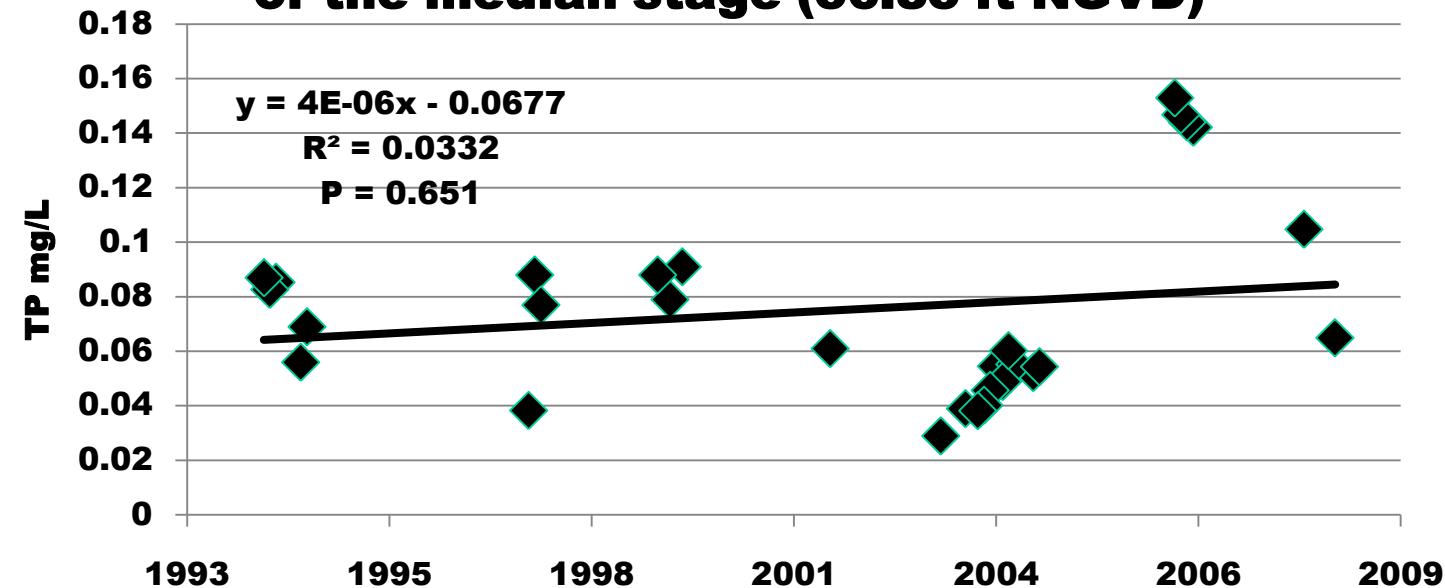
Lochloosa Lake **TN** concentration at 0.5 ft of the median stage (56.85 ft NGVD)



Lochloosa Lake **TSI** at 0.5 ft of the median stage (56.85 ft NGVD)



Lochloosa Lake **TP** concentration at 0.5 ft of the median stage (56.85 ft NGVD)



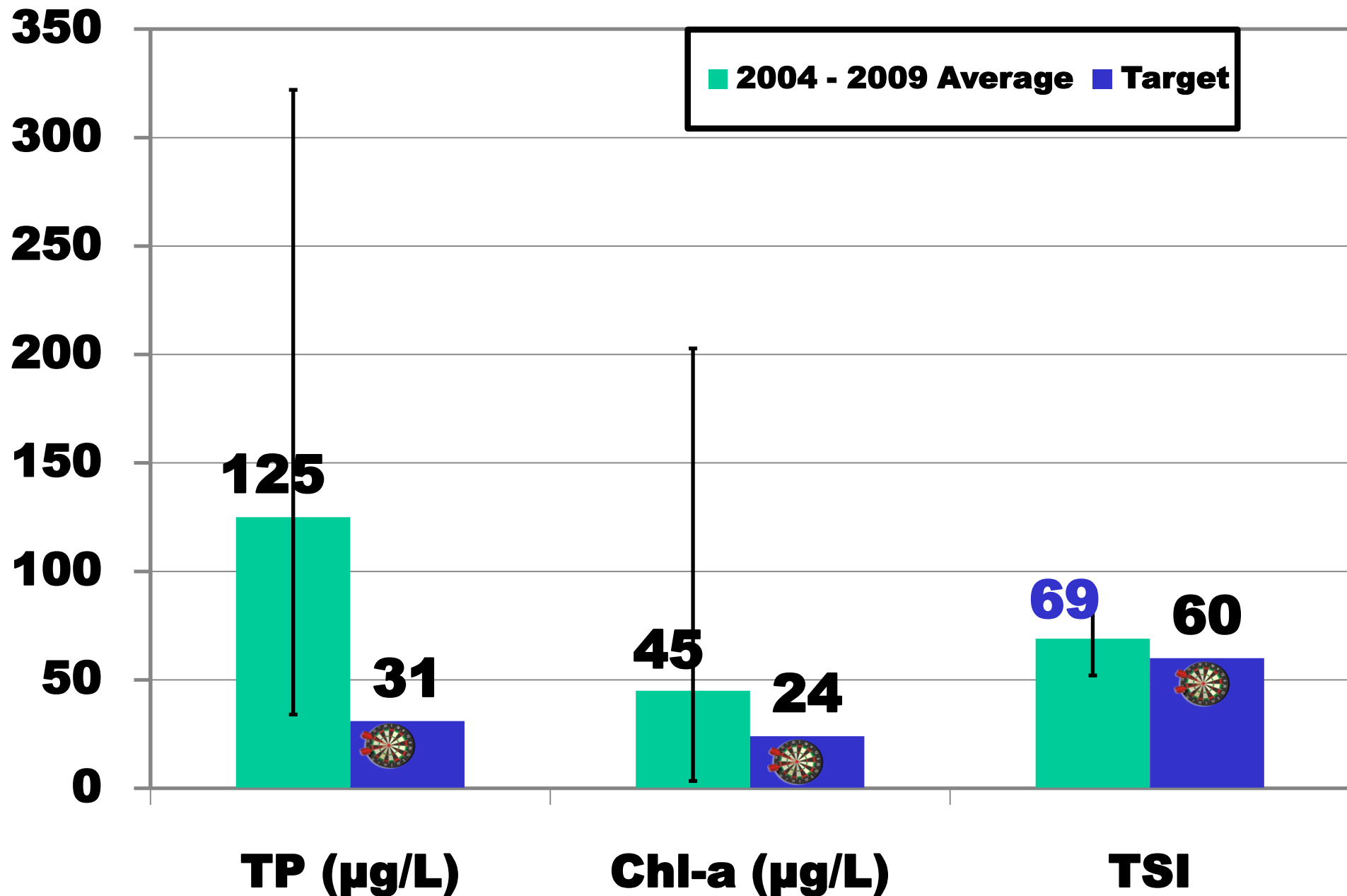
Lake Lochloosa

- **Water quality is fair, but varies from good to poor.**
- **Less stage driven variability than in Newnans.**
- **Very weak to no trends in TP, TN, Chl-a and TSI.**

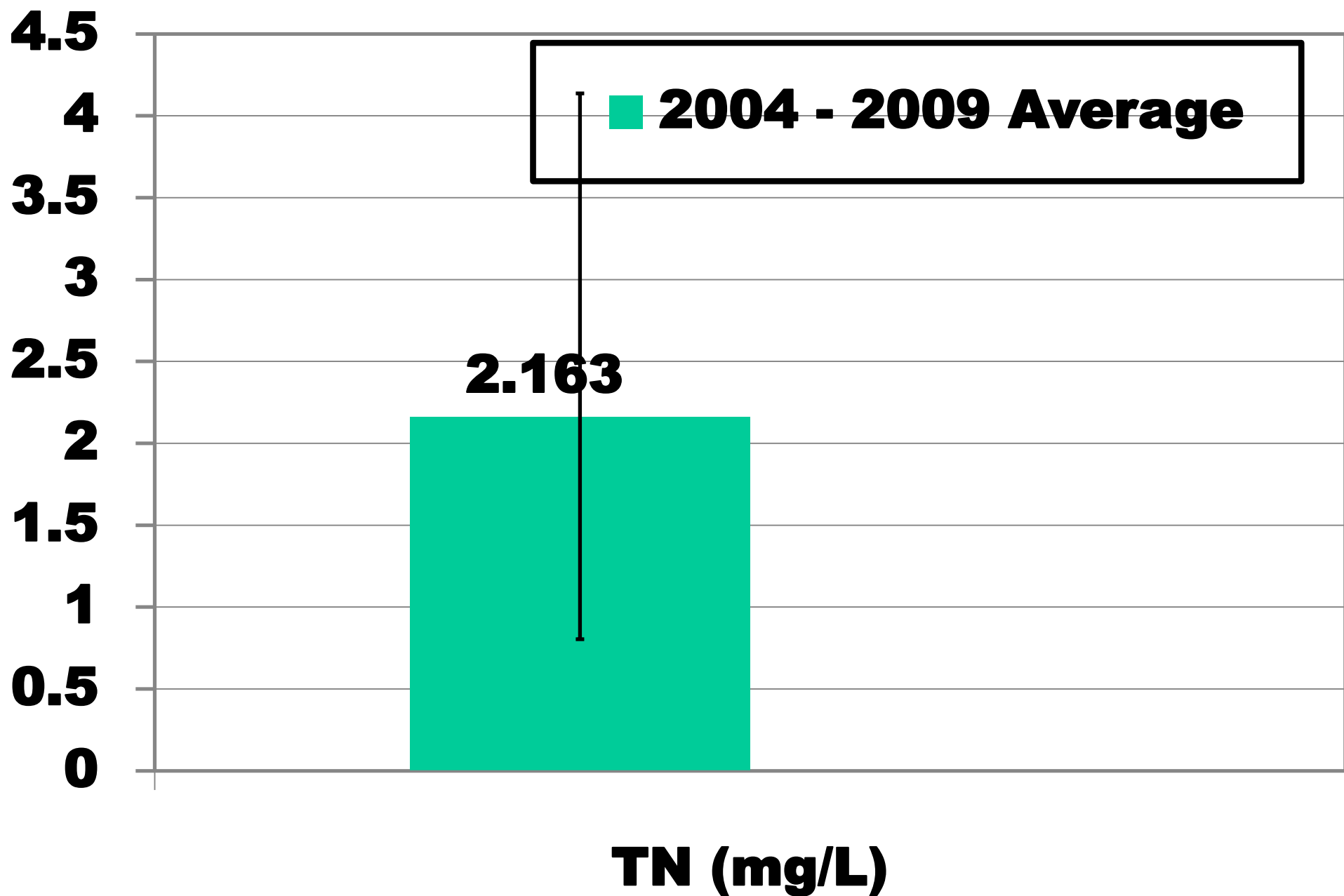


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Orange Lake Water Quality Status

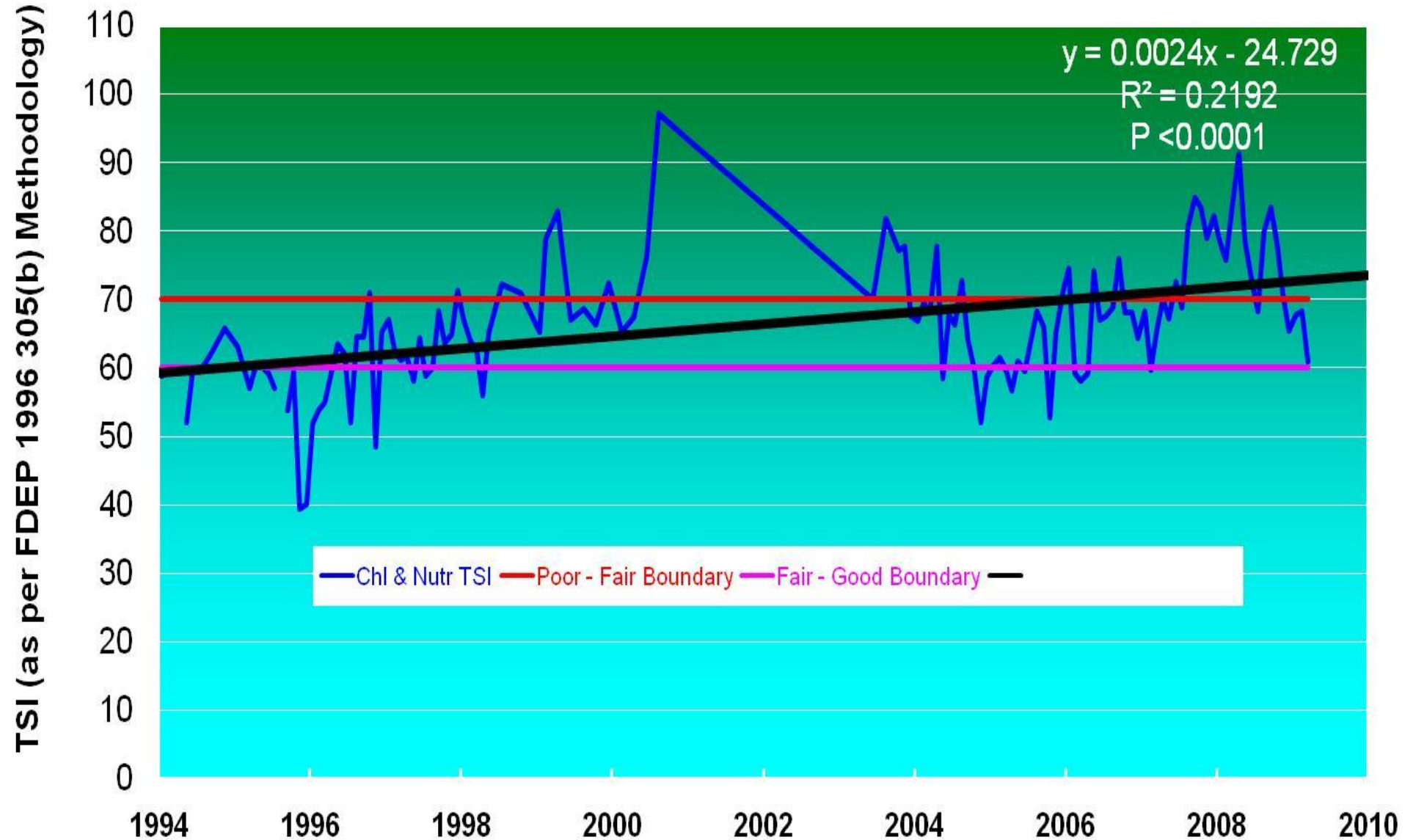


Orange Lake Water Quality Status

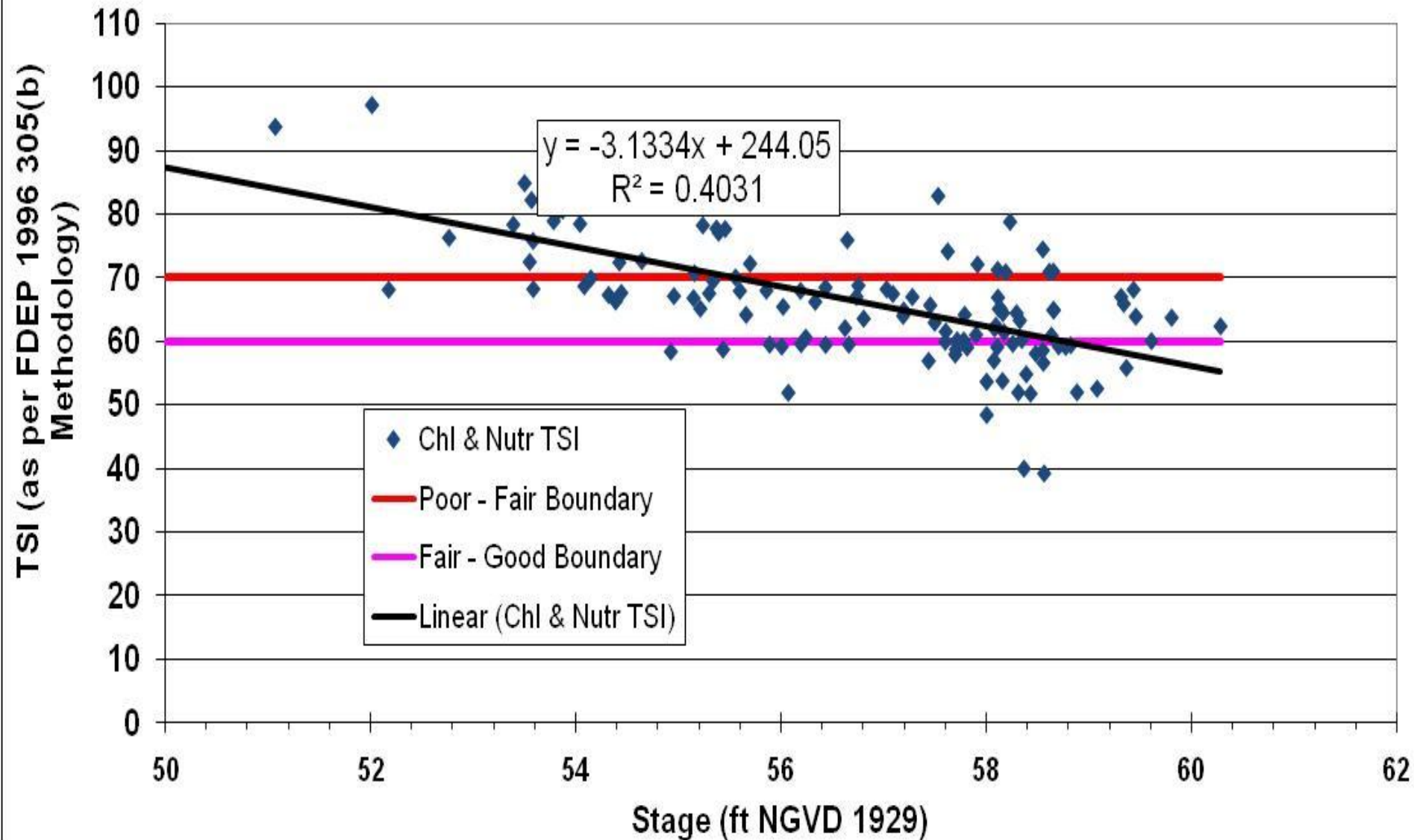


Orange Lake Water Quality Trends

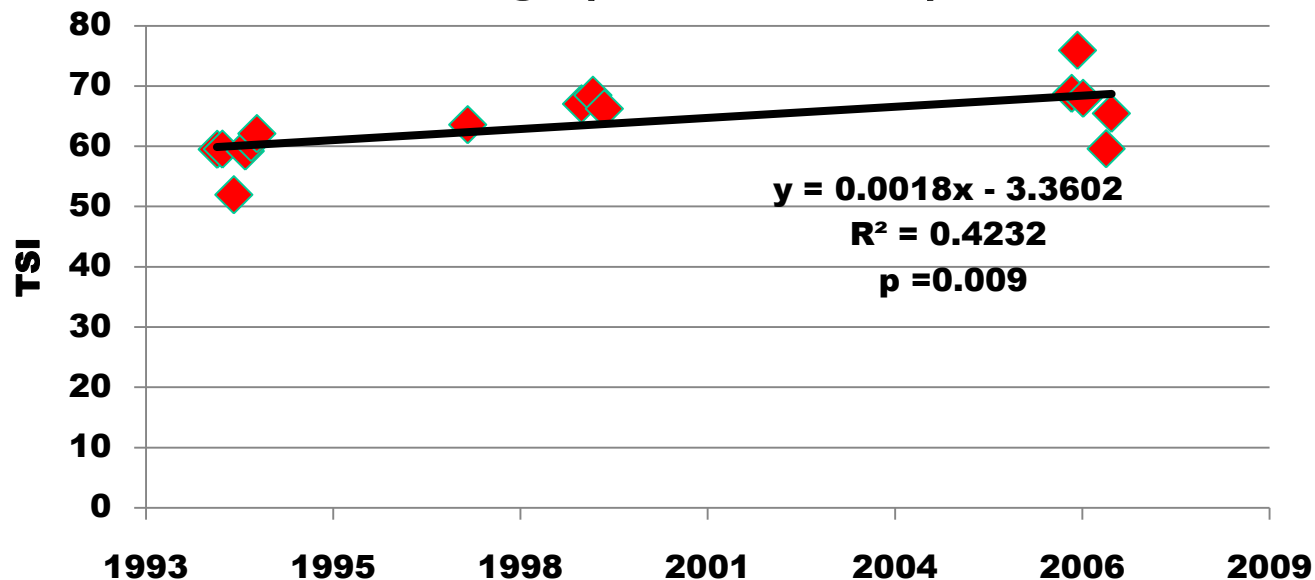
Lake Orange Mean Monthly TSI



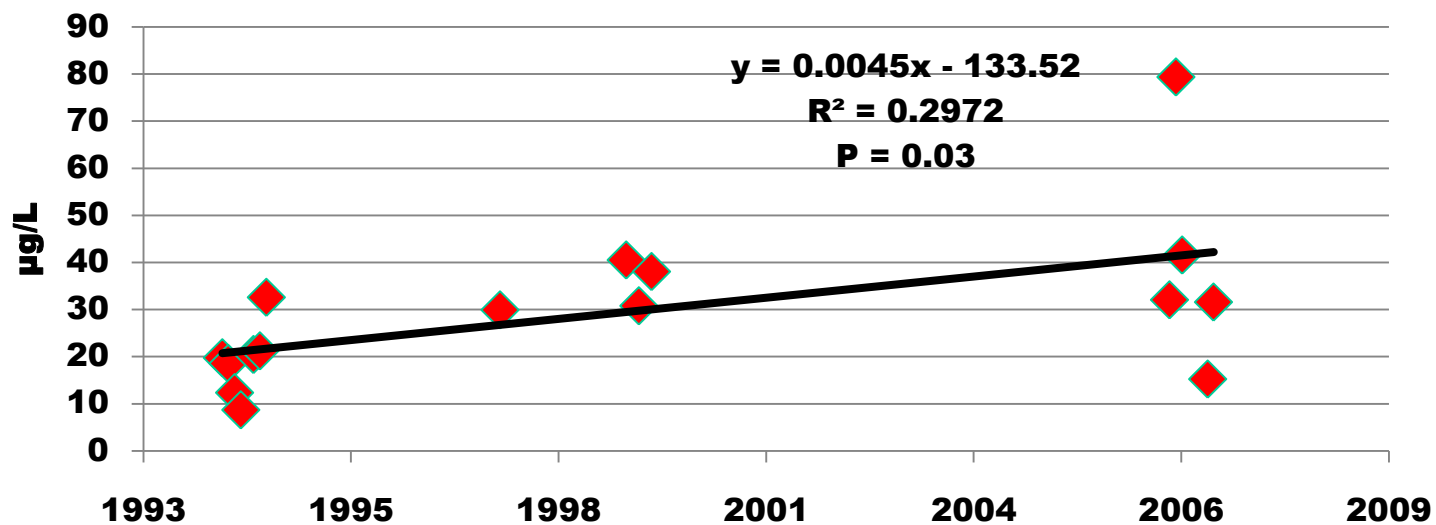
Lake Orange Mean Monthly TSI Vs. Stage (p~0)



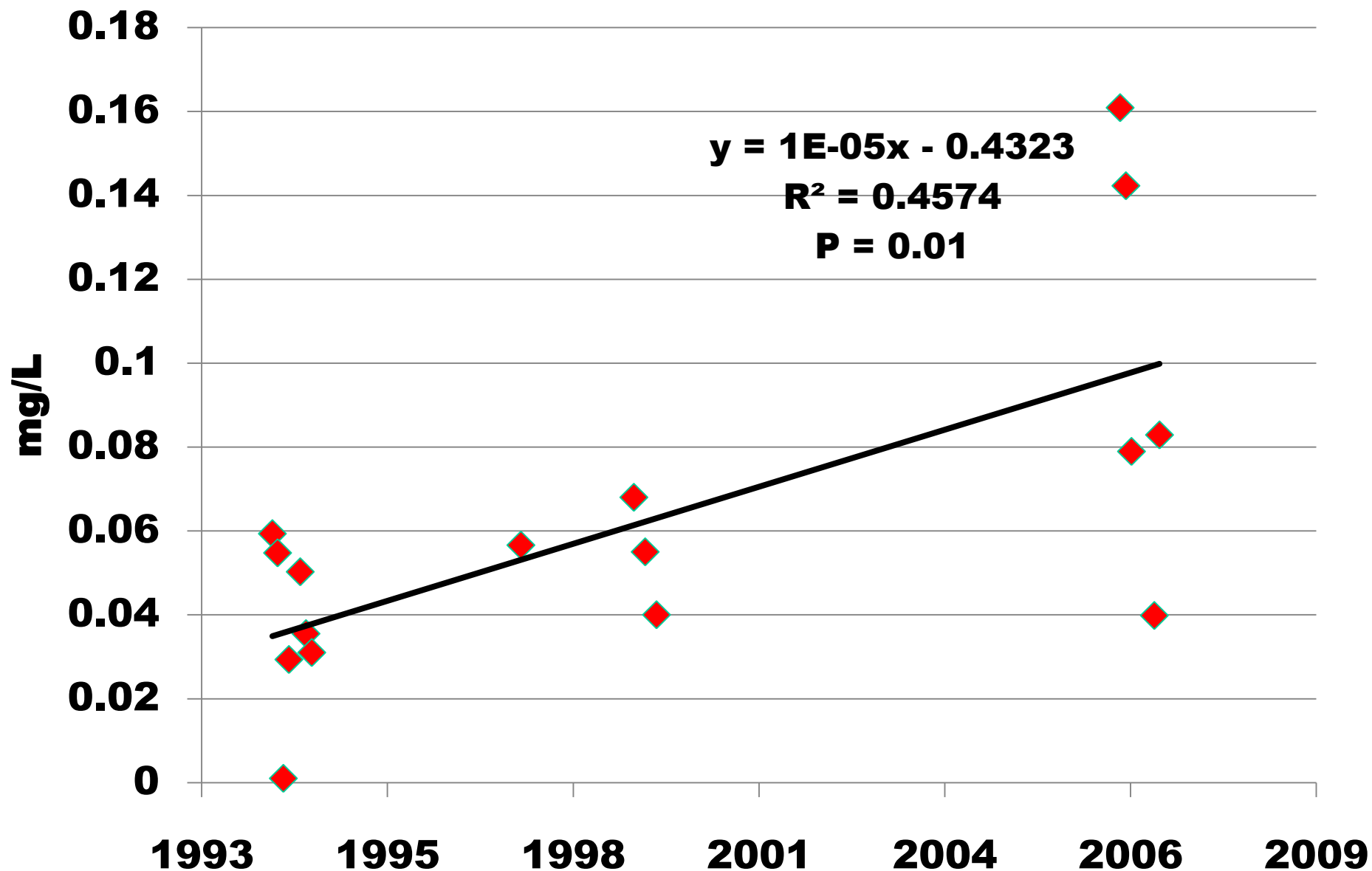
Orange Lake TSI at 0.5 ft of the median stage (56.43 ft NGVD)



Orange Lake Chl-a concentration at 0.5 ft of the long term median stage (56.43 ft NGVD)



Orange Lake TP concentration at 0.5 ft of the median stage (56.43 ft NGVD)



Orange Lake

- **Water quality is fair, but varies from good to fair.**
- **Water quality varies strongly with stage, but not as strongly as Newnans.**
- **TP, Chl-a, and TSI show significant increasing trends over the past 15 years.**

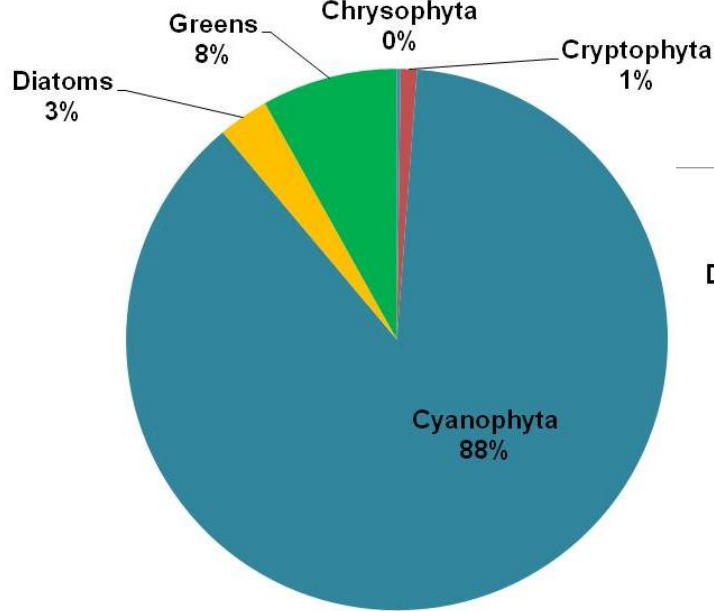


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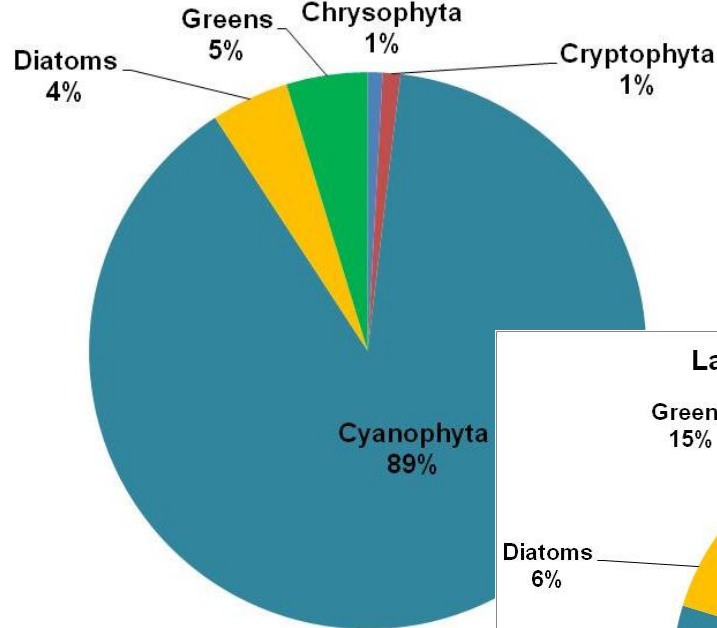
Algal Biomass Diversity

Cyanophyta dominated by N-fixing species

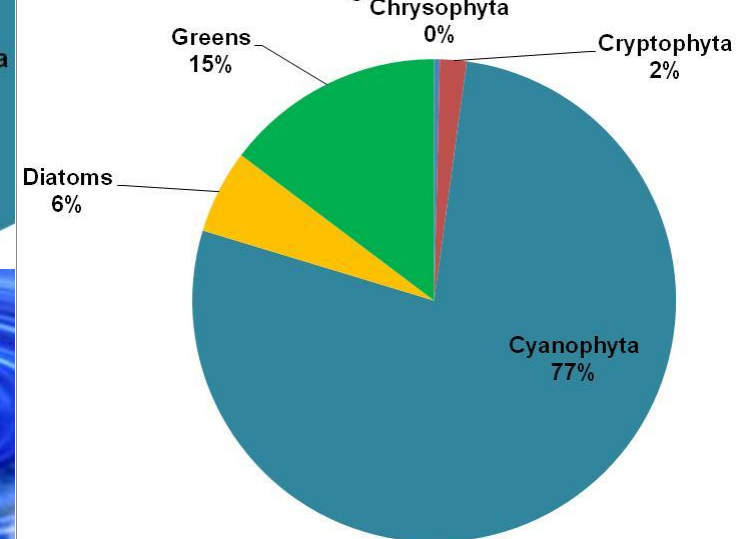
Lake Newnans Plankton Biovolume



Lake Lochloosa Plankton Biovolume



Lake Orange Plankton Biovolume



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Summary

➤ Water Quality Status:

Newnans Lake --- Poor.

Orange & Lochloosa Lakes --- Fair.

➤ Water Quality Trends:

Newnans Lake

- **No significant trends in the past 15 years.**
- **Phosphorus concentration appears to be increasing.**



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Summary

➤ Water Quality Trends:

Lochloosa Lake

- **No significant trend in the past 15 years.**
- **Water quality varies from good to poor.**

Orange Lake

- **Significant water quality deterioration trend in the past 15 years.**



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Summary

➤ **Phytoplankton Community**

- **All three lakes dominated by Cyanophyta (blue-greens), capable of fixing nitrogen.**
- **Therefore, need to focus on phosphorus load reductions, especially in Newnans Lake.**



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Questions and Comments

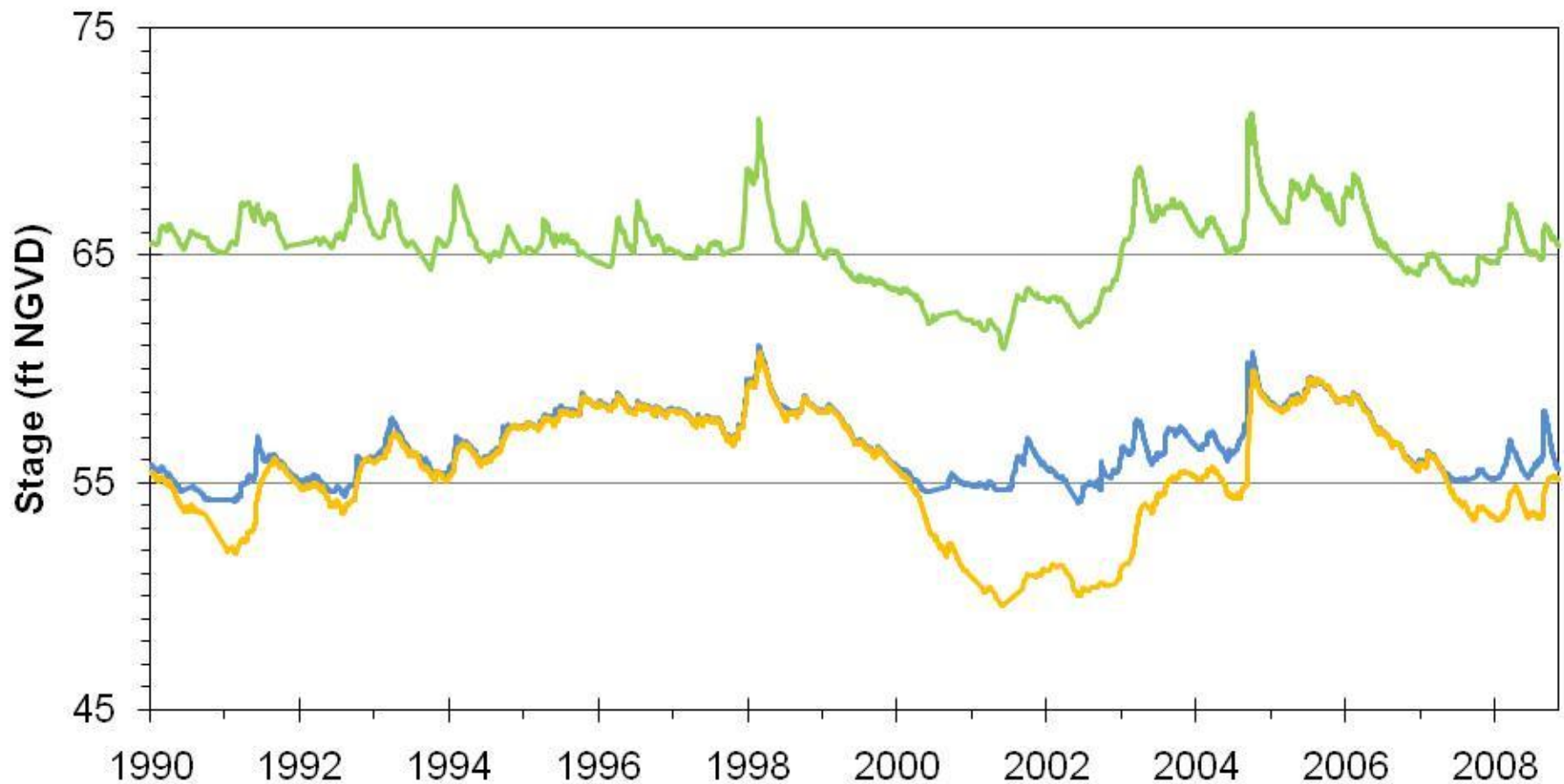


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Lake Stages

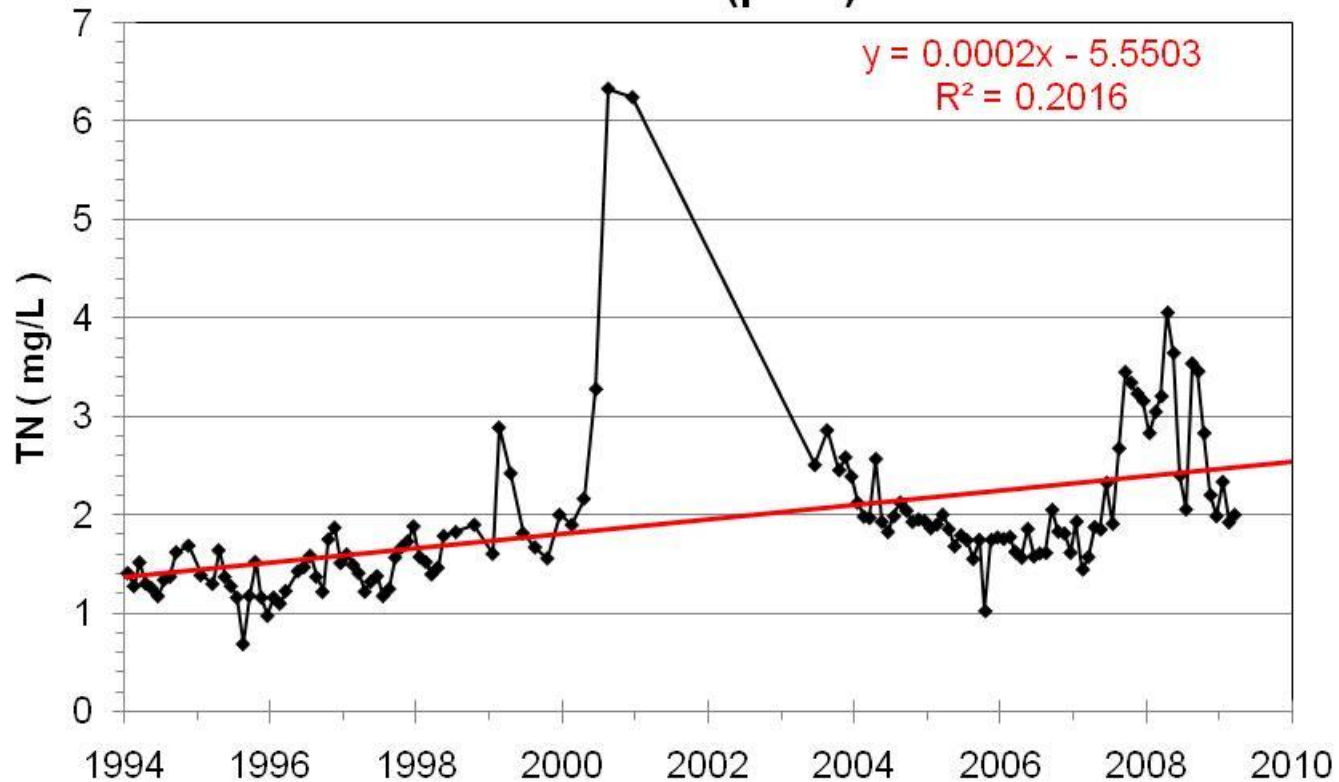
Orange Creek Basin Lake Stage

— Newnans — Lochloosa — Orange



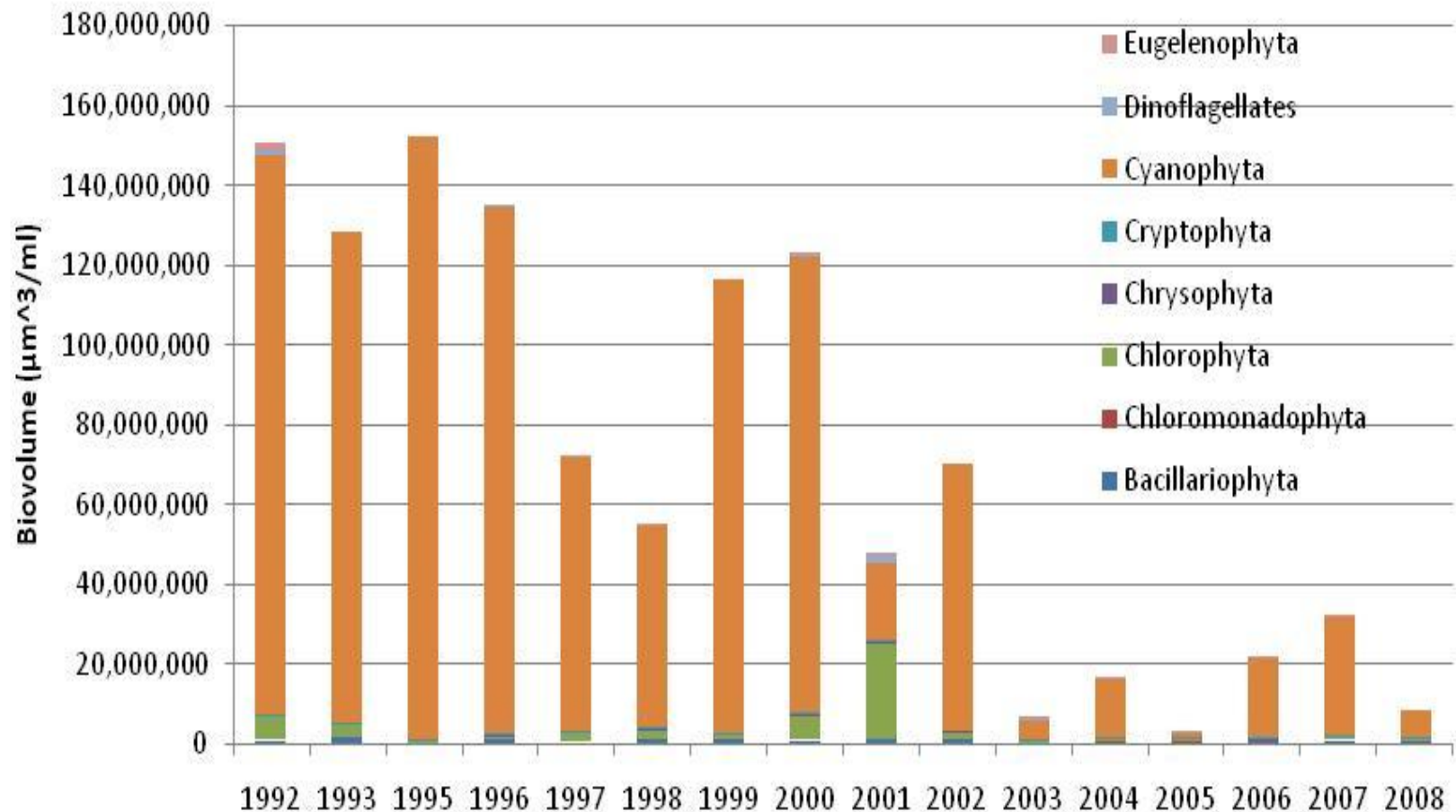
End

Mean Monthly Total Nitrogen for Orange ; Significant Trend (p ~ 0)

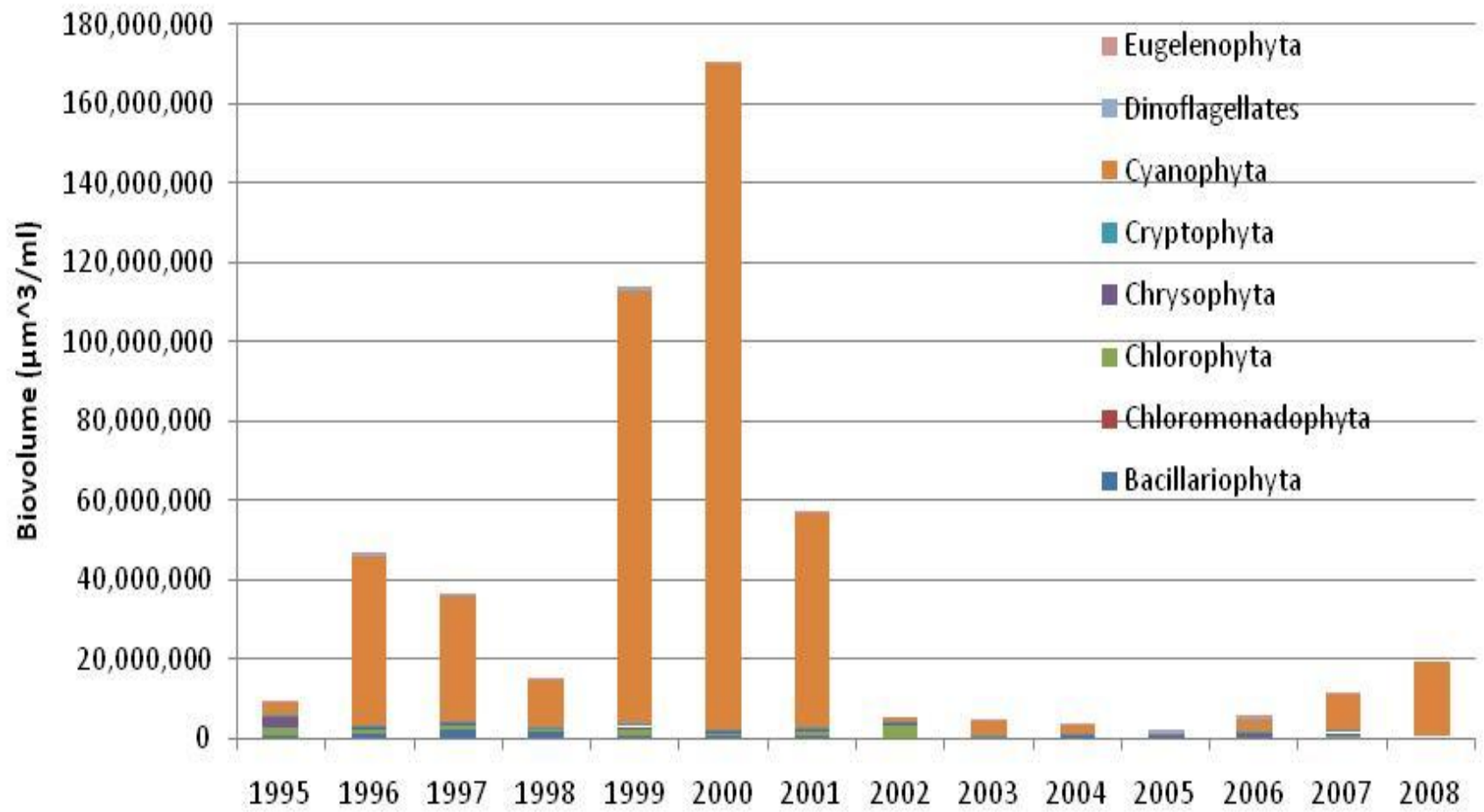


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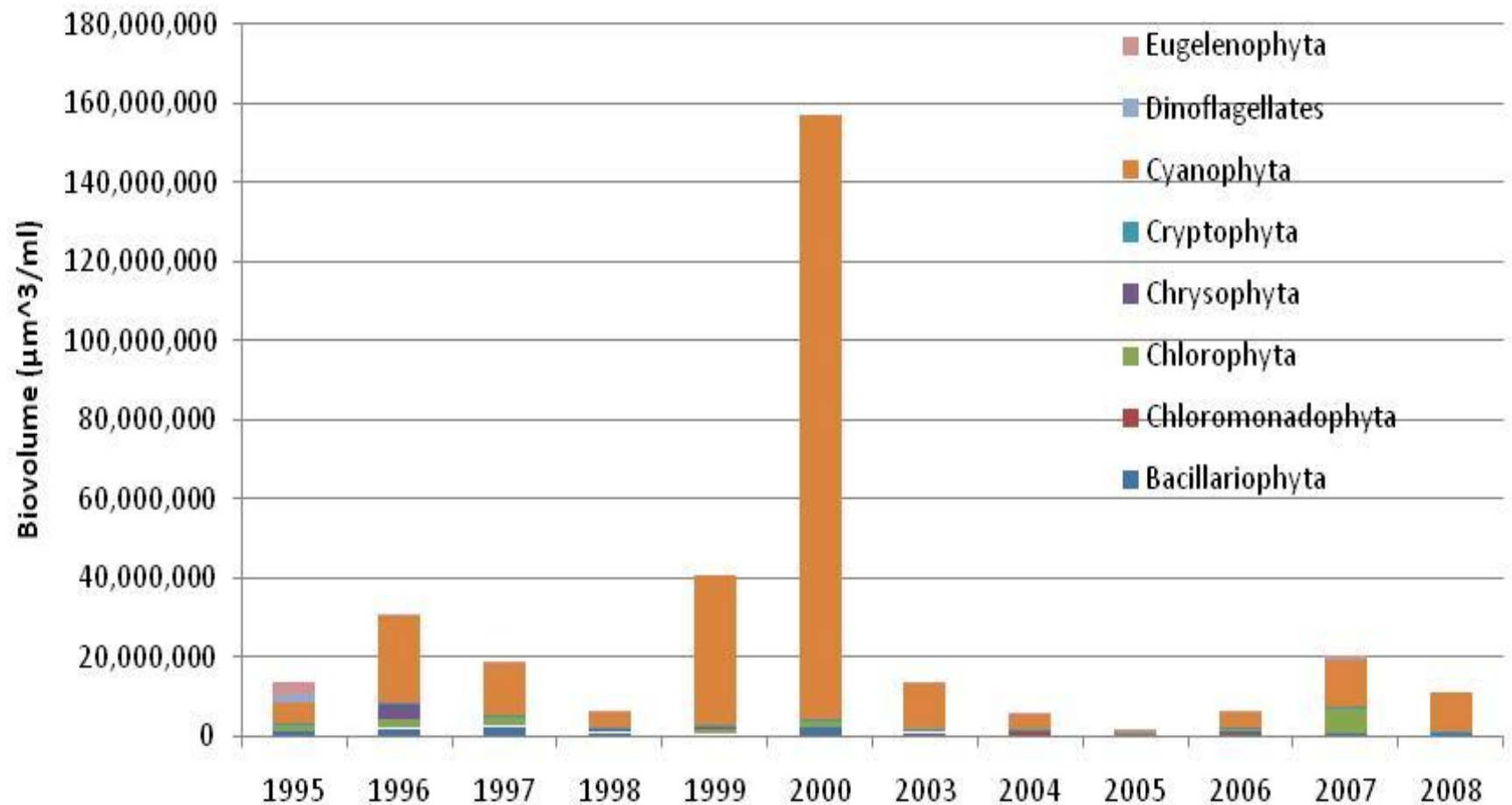
Annual average phytoplankton biovolume in Newnans Lake



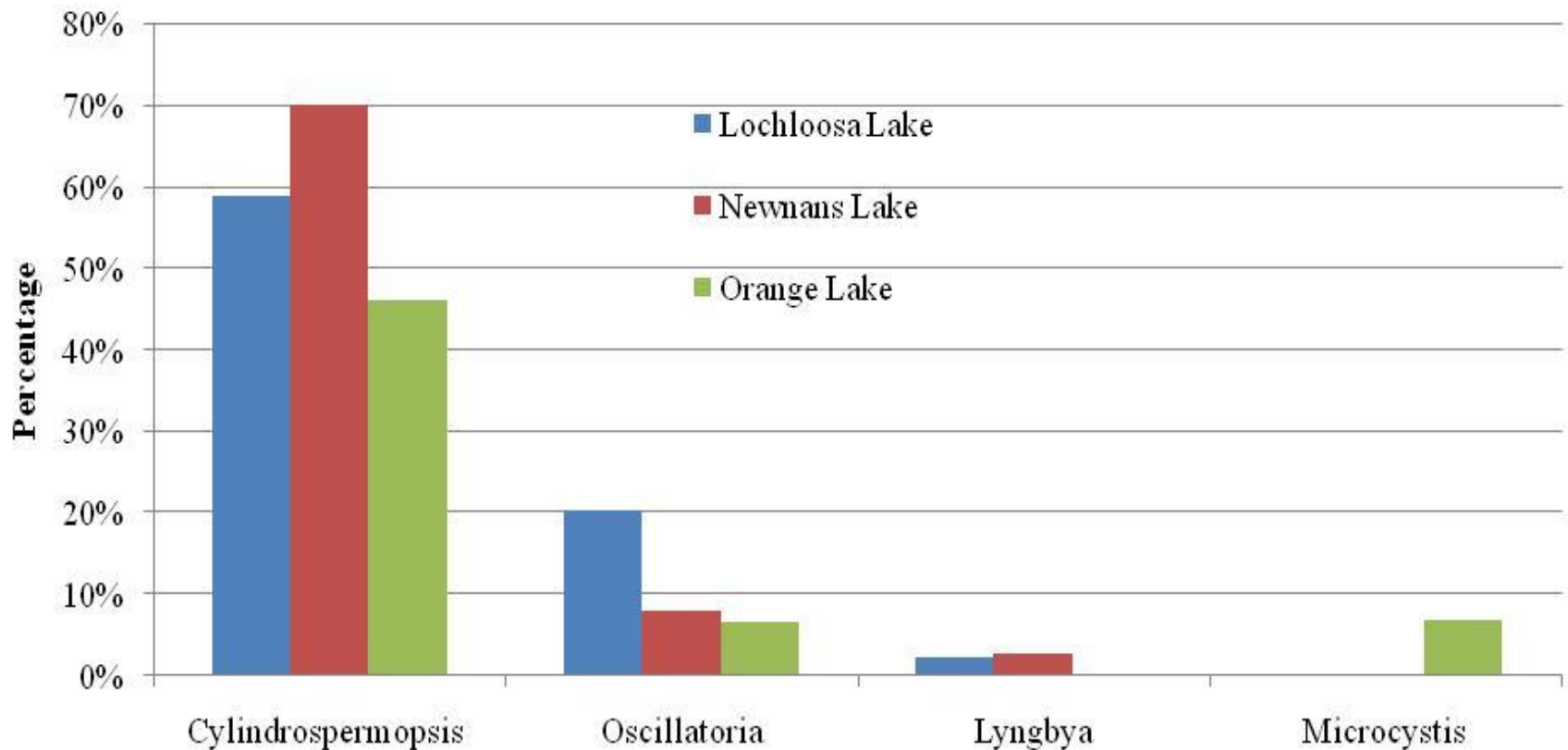
Annual average phytoplankton biovolume in Lochloosa Lake



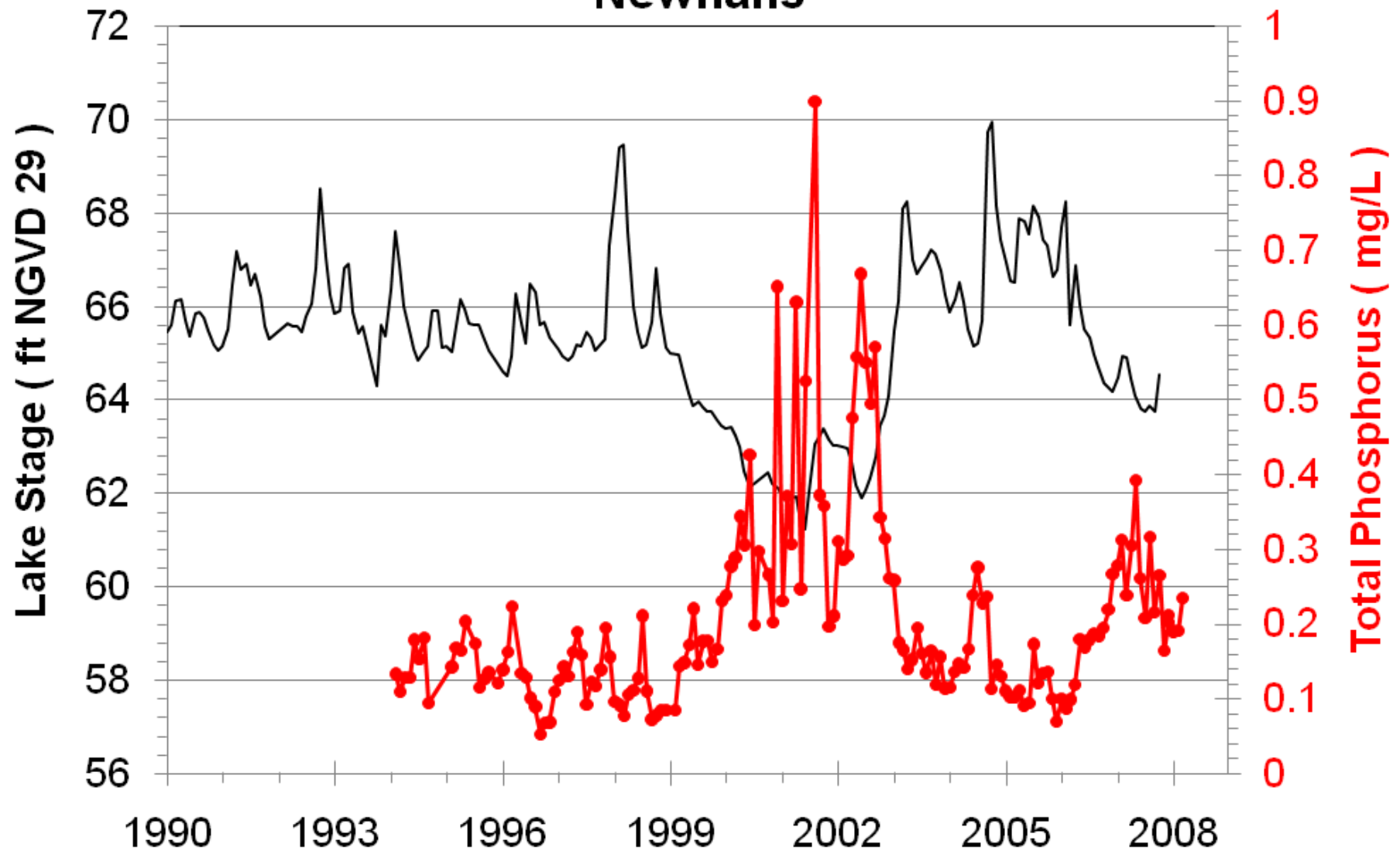
Annual average phytoplankton biovolume in Orange Lake



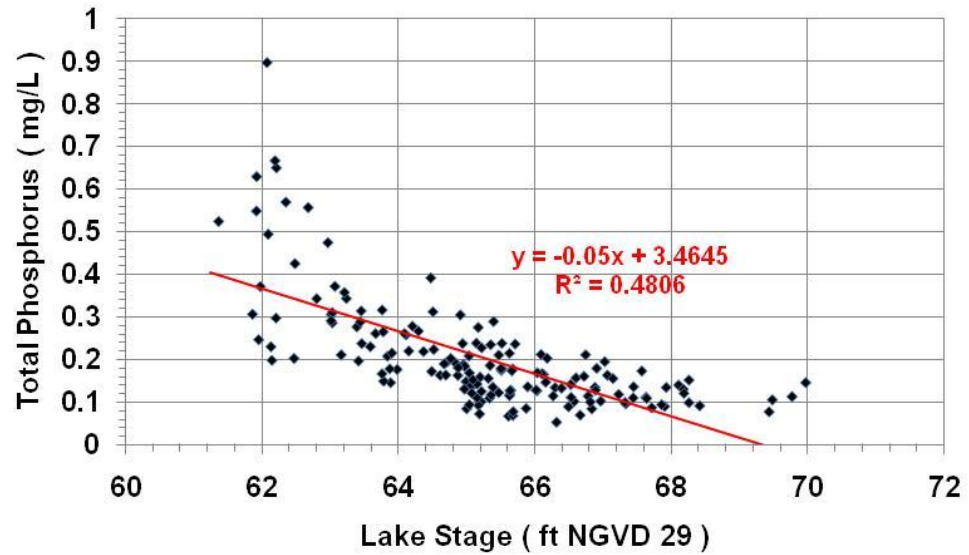
Top three dominant phytoplankton genera In the three lakes



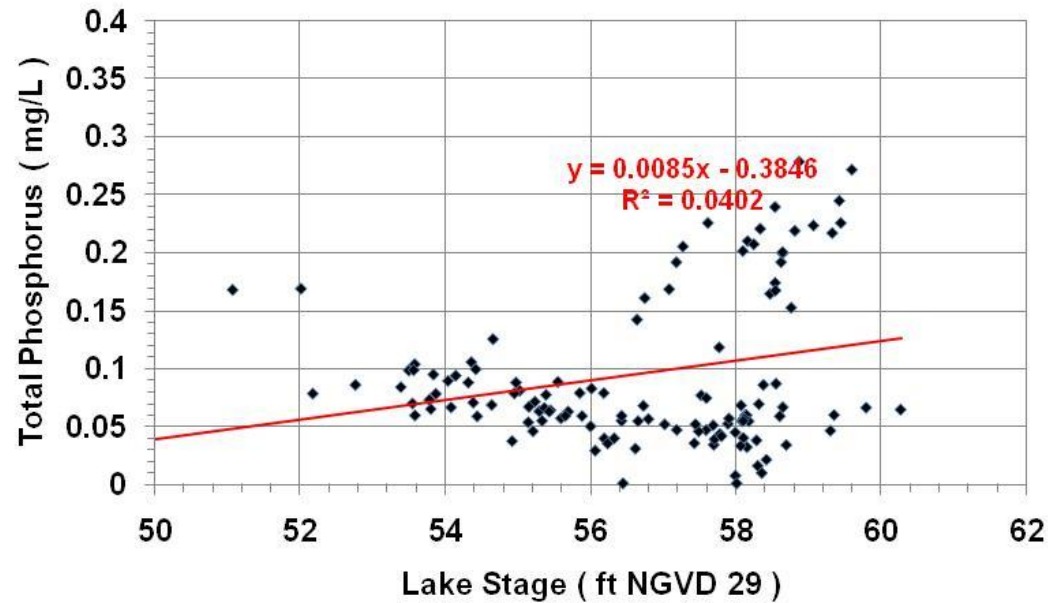
Stage & Mean Monthly Total Phosphorus for Newnans



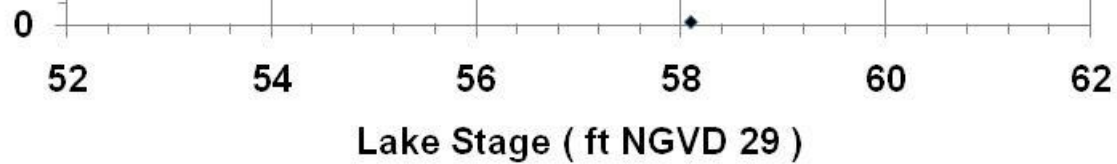
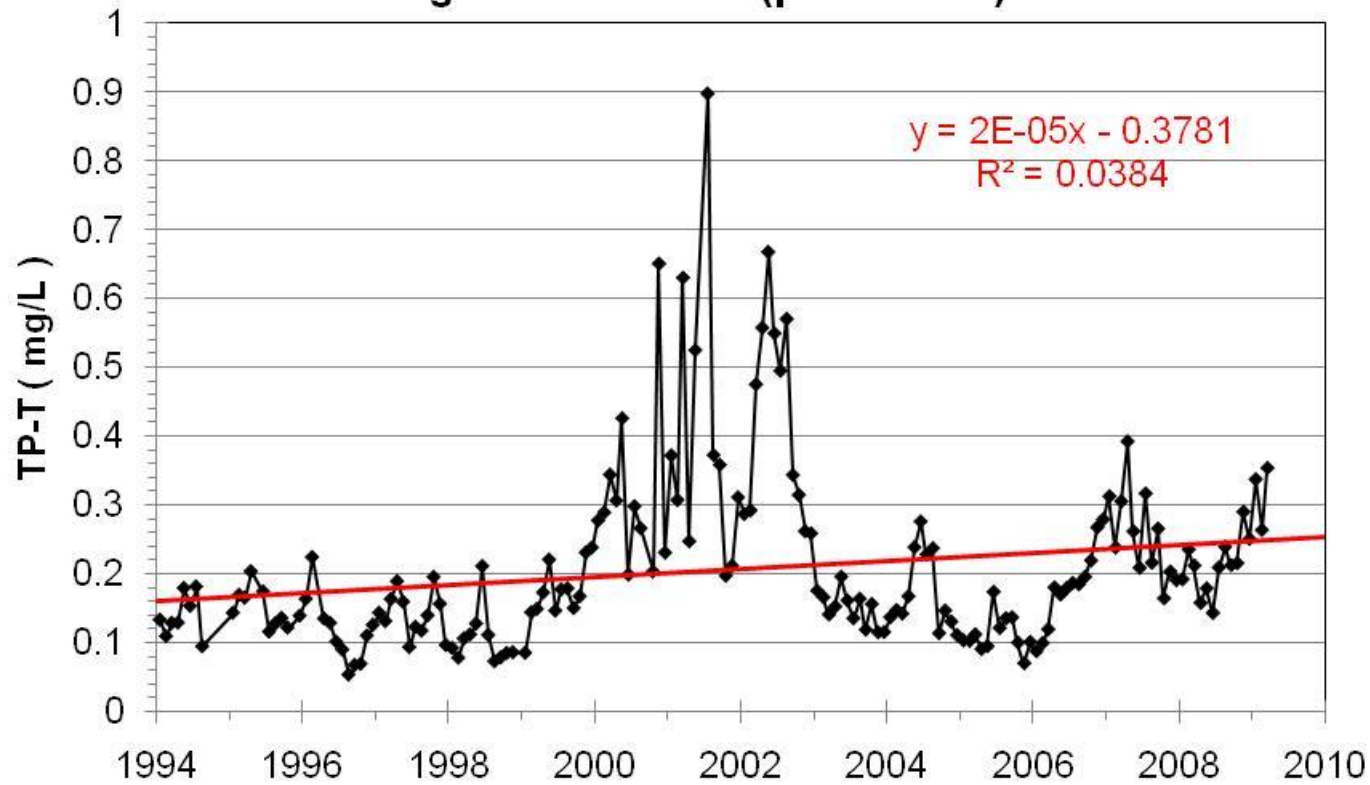
**Stage & Total Phosphorus for Newnans;
Significant ($p \sim 0$)**



**Stage & Total Phosphorus for Orange;
Significant ($p \sim 0.0233$)**



Mean Monthly Total Phosphorus for Newnans ; Significant Trend (p ~ 0.0097)



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Summary

(Water Quality Status)

- **Newnans Lake has consistently poor water quality, which is strongly affected by lake stage.**
- **Orange & Lochloosa Lakes vary from good to poor condition.**
- **Hydrilla and its management are an additional factor complicating nutrient patterns in Orange Lake.**



Summary

- **Phosphorus appears to be increasing in Newnans & Orange Lakes.**
 - **Orange Lake shows a significant water quality deterioration in TSI over the past 15 years.**
 - **All three lakes dominated by Cyanophyta (blue-greens), capable of fixing nitrogen.**
- Therefore, need to focus on phosphorus load reductions, especially in Newnans Lake**

