

# Florida Department of Environmental Protection



## Water Quality Restoration Program

# Upper Ocklawaha Basin Fifth Year Review

Mary Paulic

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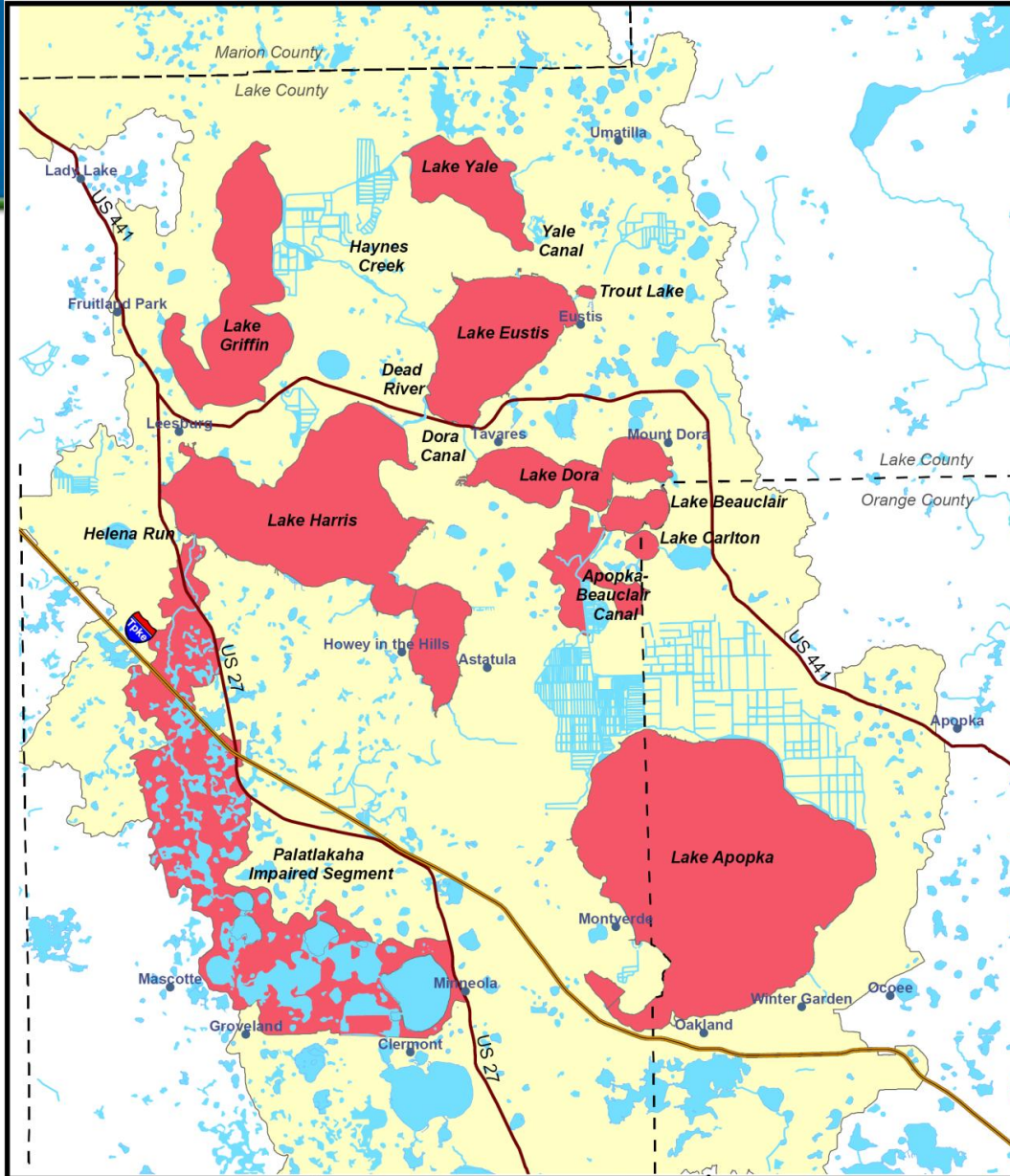
**October 2, 2013**





# Upper Ocklawaha BMAP

- Adopted in 2007 and addresses TMDLs for nutrients;
  - Lake Apopka, Lake Beauclair, Lake Dora, Lake Carlton, Lake Harris, Lake Eustis, Lake Yale, and Lake Griffin ( and connecting waterways) for total phosphorus;
  - Trout Lake and Palatlahaha River for total nitrogen and total phosphorus.
- Upper Ocklawaha Basin Working Group
  - Last met in 2011.
  - Decision making group.



0 1 2 3 4 5 6 Miles

## Upper Ocklawaha Basin



Map prepared April 4, 2006 by the  
Bureau of Watershed Management,  
Division of Water Resource Management.  
Modified August 1, 2006.

## Legend

- Florida County Boundaries
- Ocklawaha Basin Boundary
- Impaired Waterbodies



# Today's Purpose

- 2013 is year 6 of the first BMAP iteration
- It is time for the 5 year review and assessment of the BMAP and revision of the BMAP.
  - Provision of the Florida Watershed Restoration Act (Chapter 403.067 F.S.).
- Preliminary water quality and loading review was done in October 2011.
- Accelerated schedule to draft a revised BMAP by end of 2013 calendar year.
- Propose BMAP for adoption in 2014.



# Meeting Organization

|                   |                                                                               |
|-------------------|-------------------------------------------------------------------------------|
| <b>9:30 a.m.</b>  | <b>Welcome and Introductions</b><br>(Mary Paulic and Charles Gauthier, DEP)   |
| <b>9:45</b>       | <b>Local Agency Updates</b>                                                   |
| <b>10:00</b>      | <b>Lake Apopka Habitat Restoration</b> (Ed Hayes, FWC)                        |
| <b>10:40</b>      | <b>BMAP Fifth Year Water Quality and Loading Review</b><br>(Mary Paulic, DEP) |
| <b>12:00 p.m.</b> | <b>Lunch Break</b>                                                            |
| <b>1:15</b>       | <b>Upper Ocklawaha Basin Assessment Document</b><br>(Mary Paulic, DEP)        |
| <b>2:45</b>       | <b>Next Steps</b> (Mary Paulic, DEP)                                          |



# Florida Department of Environmental Protection



## Upper Ocklawaha Basin Water Quality Review

Mary Paulic (DEP)

Loading information courtesy of Vickie Hoge  
and Rolland Fulton, SJRWMD





# Methodology

Calculation of means for water quality variables are made in the following order:

- Seasonal means- 4 seasons per year;
- Annual means; and
- Longterm mean is made by averaging annual means.
- All stations within a waterbody are compiled together to produce waterbody averages.



# TSI Methodology

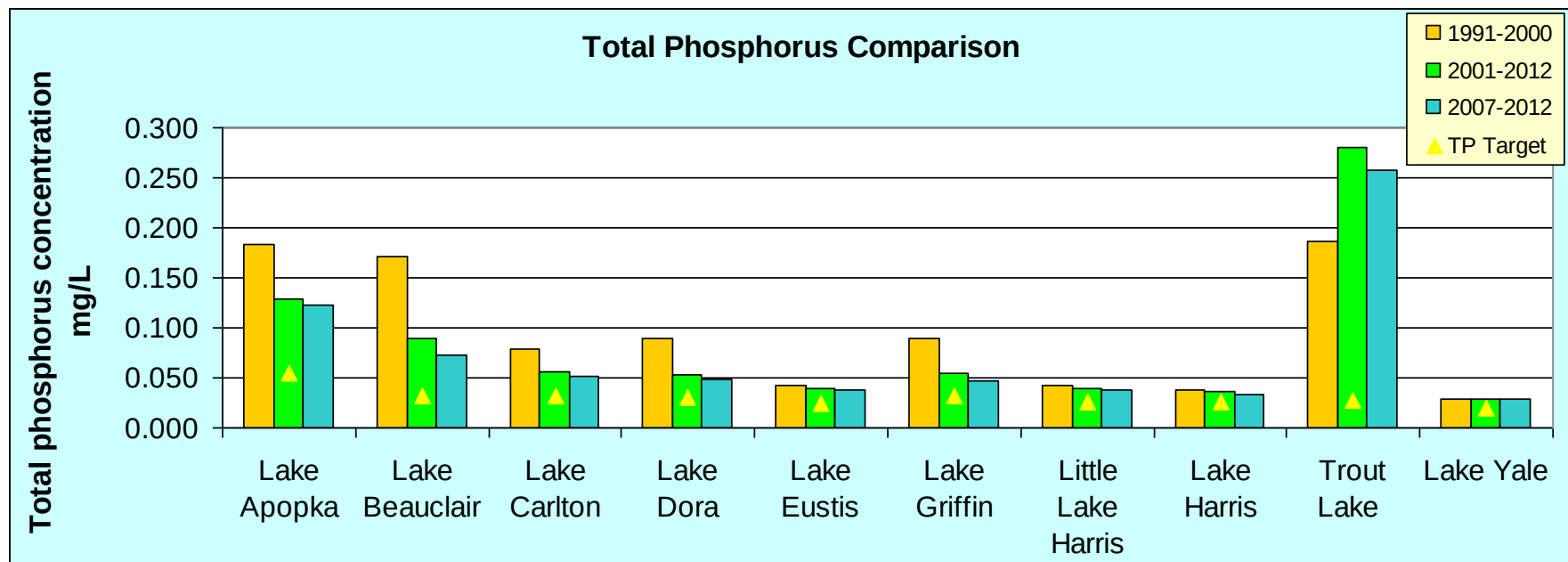
## Steps for calculating Trophic State Index:

- Match pairs of TN, TN, and chlorophyll a data;
- Calculate daily TSI value;
- Calculate seasonal mean TSI Value;
- Annual mean TSI is calculated; and
- Longterm mean is made by averaging annual means.
- Note: DEP prefers corrected chlorophyll a.
- Did fill in some values for Lake Carlton and Trout Lake with uncorrected chlorophyll a because of a lack of corrected chlorophyll a data.





# TP Lake Comparison

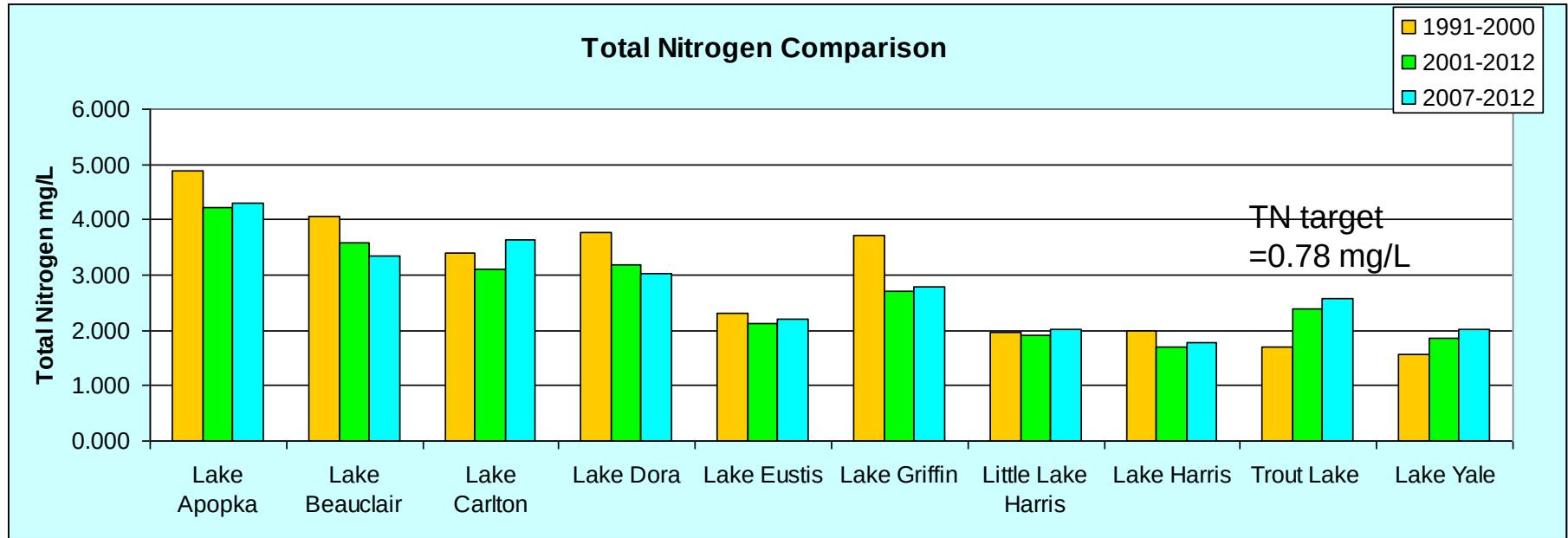


**TP concentrations listed below are mg/L.**

| TP        | Lake Apopka | Lake Beauclair | Lake Carlton | Lake Dora | Lake Eustis | Lake Griffin | Little Lake Harris | Lake Harris | Trout Lake | Lake Yale |
|-----------|-------------|----------------|--------------|-----------|-------------|--------------|--------------------|-------------|------------|-----------|
| 1991-2000 | 0.183       | 0.171          | 0.079        | 0.090     | 0.043       | 0.089        | 0.043              | 0.038       | 0.186      | 0.028     |
| 2001-2012 | 0.129       | 0.089          | 0.056        | 0.053     | 0.039       | 0.054        | 0.039              | 0.036       | 0.281      | 0.029     |
| TP Target | 0.055       | 0.032          | 0.032        | 0.031     | 0.025       | 0.032        | 0.026              | 0.026       | 0.028      | 0.02      |
| 2007-2012 | 0.123       | 0.072          | 0.052        | 0.049     | 0.038       | 0.047        | 0.038              | 0.034       | 0.257      | 0.029     |



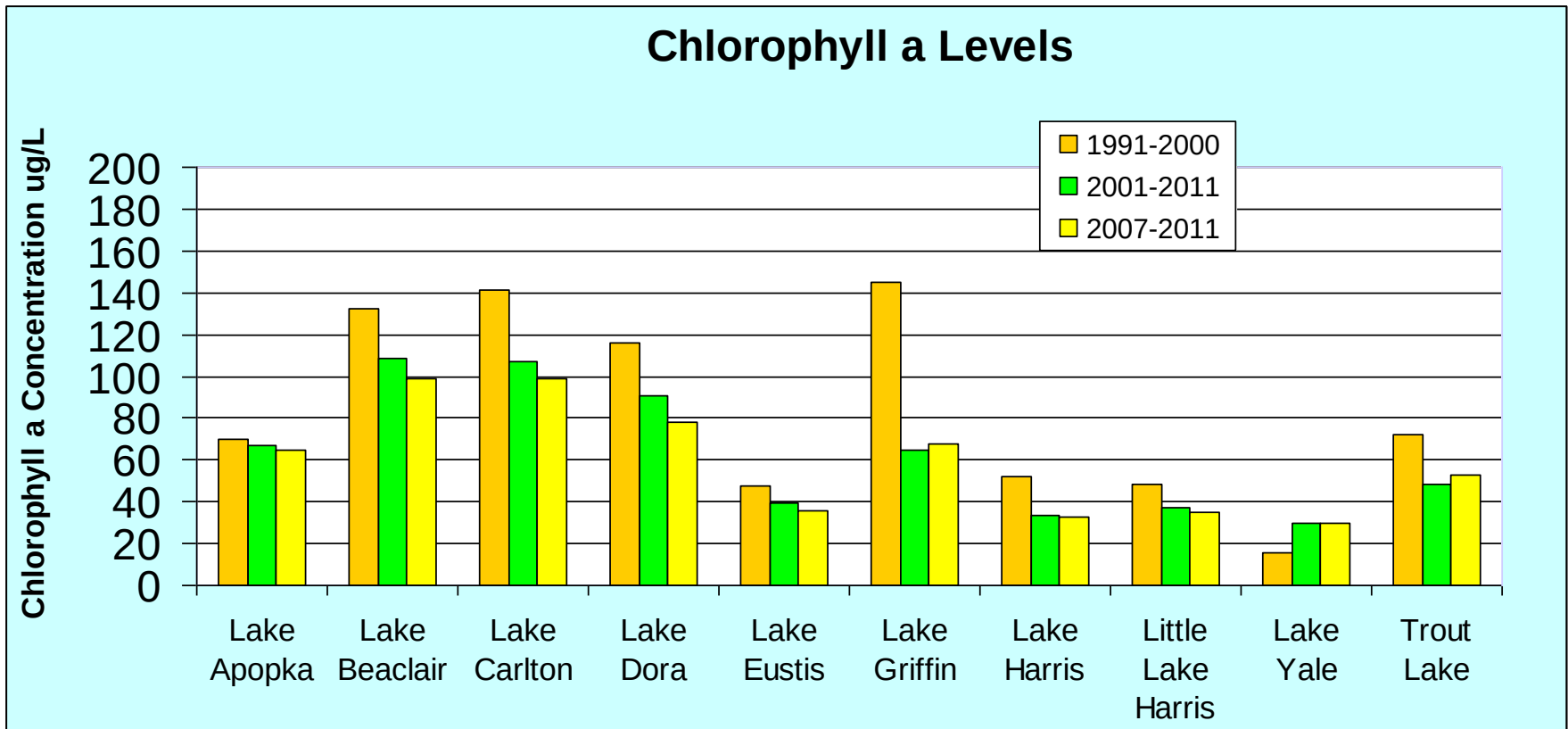
# TN Comparison



TN concentrations listed below are mg/L.

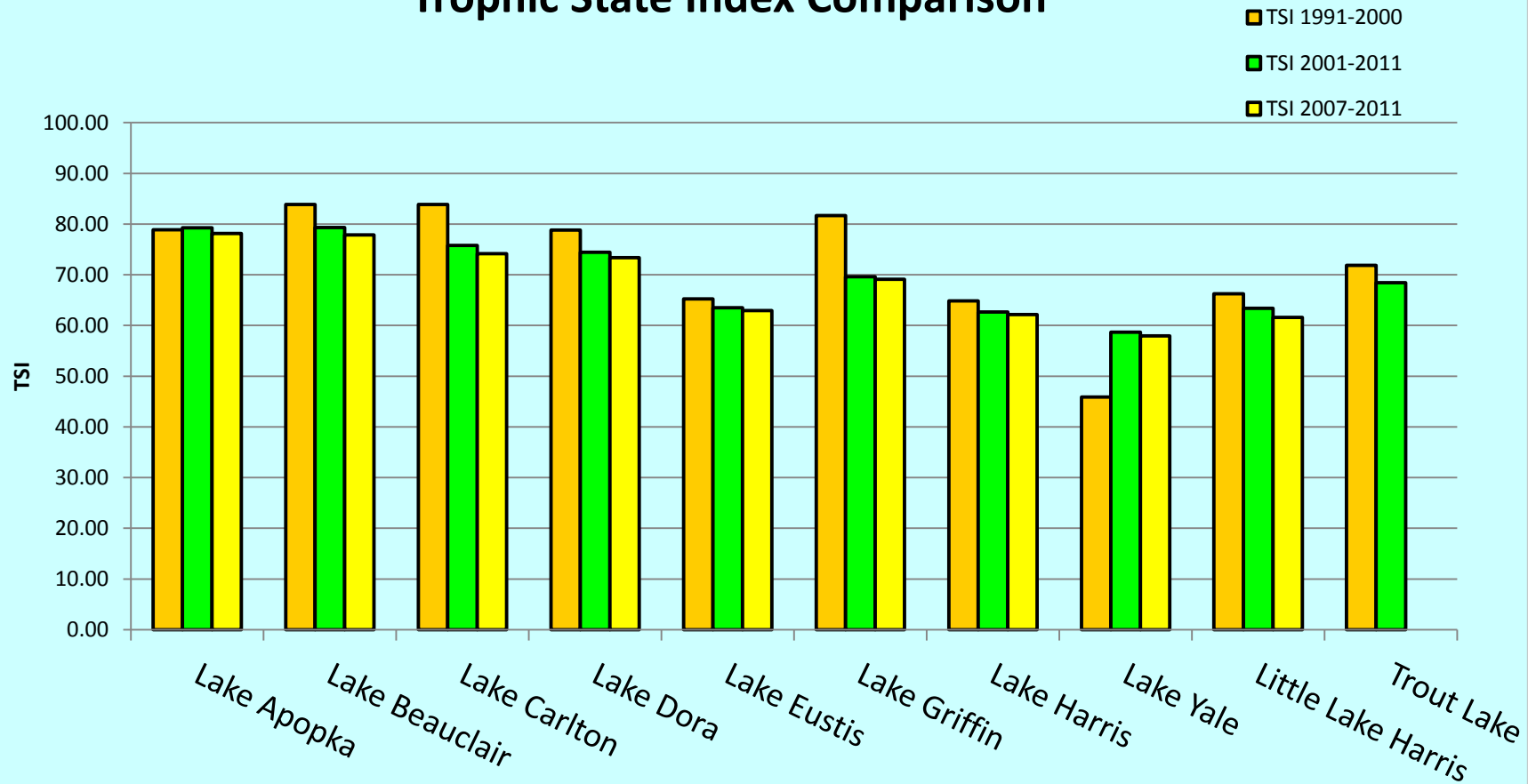
| TN mg/L   | Lake Apopka | Lake Beauclair | Lake Carlton | Lake Dora | Lake Eustis | Lake Griffin | Little Lake Harris | Lake Harris | Trout Lake | Lake Yale |
|-----------|-------------|----------------|--------------|-----------|-------------|--------------|--------------------|-------------|------------|-----------|
| 1991-2000 | 4.884       | 4.070          | 3.409        | 3.777     | 2.323       | 3.705        | 1.967              | 1.981       | 1.690      | 1.557     |
| 2001-2012 | 4.230       | 3.582          | 3.094        | 3.185     | 2.125       | 2.703        | 1.912              | 1.694       | 2.394      | 1.852     |
| 2007-2012 | 4.306       | 3.340          | 3.630        | 3.030     | 2.208       | 2.780        | 2.006              | 1.767       | 2.563      | 2.024     |

# Chlorophyll a Comparison



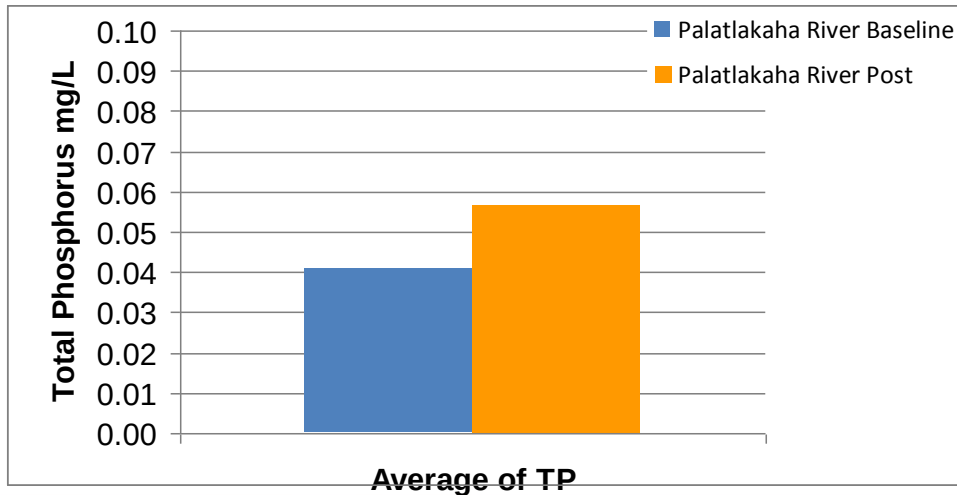
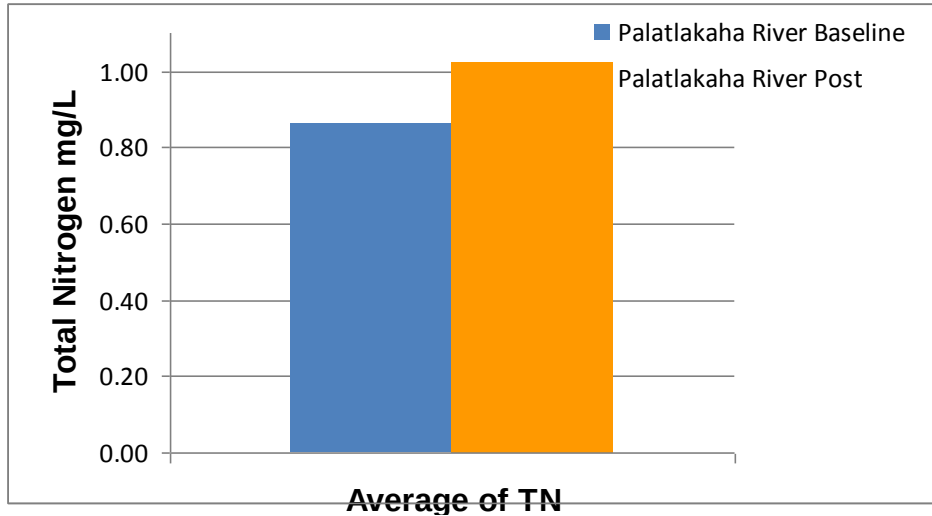
# TSI Comparison

## Trophic State Index Comparison





# Palatlakaha River

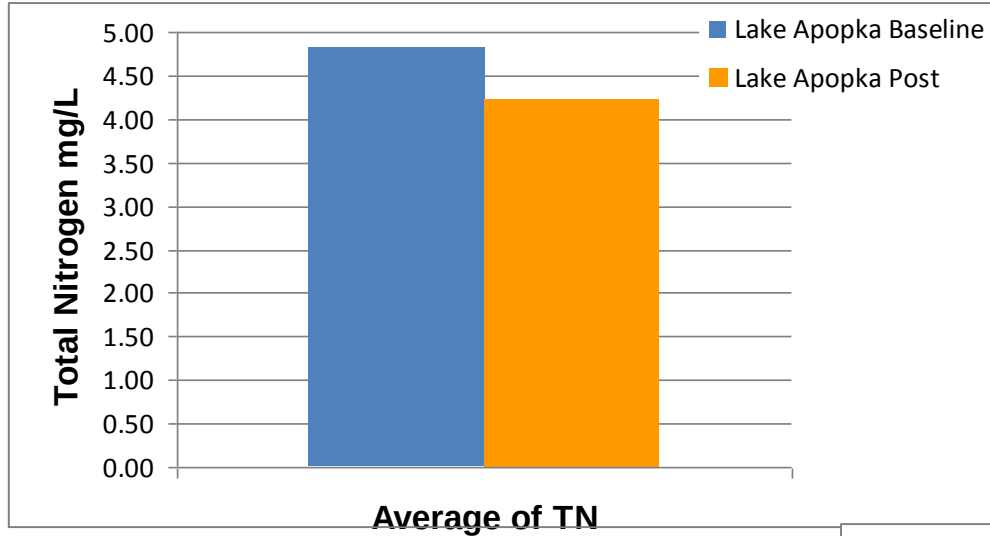


| Palatlakaha River    | DO   | NOBS   | Std Dev |
|----------------------|------|--------|---------|
| 1991-2000 (Baseline) | 4.78 | 167    | 2.07    |
| 2001-2012 (Post)     | 4.38 | 278.00 | 2.03    |
| 2007-2012            | 4.51 | 163.00 | 2.12    |

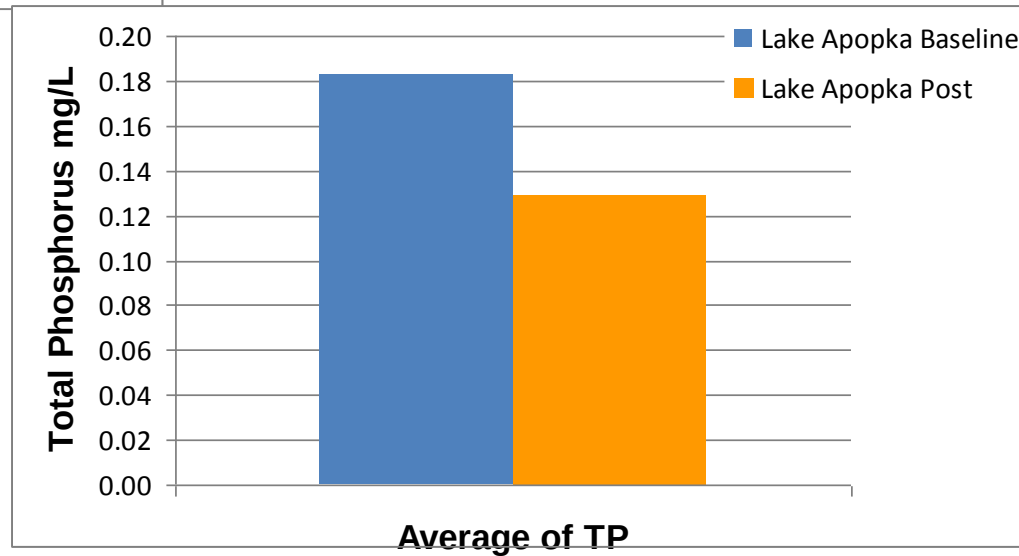
| Palatlakaha River    | BOD  | NOBS | std Dev |
|----------------------|------|------|---------|
| 1991-2000 (Baseline) | 1.54 | 81   | 0.99    |
| 2001-2012 (Post)     | 1.42 | 37   | 0.71    |
| 2007-2012            | 1.66 | 11   | 0.82    |



# Lake Apopka



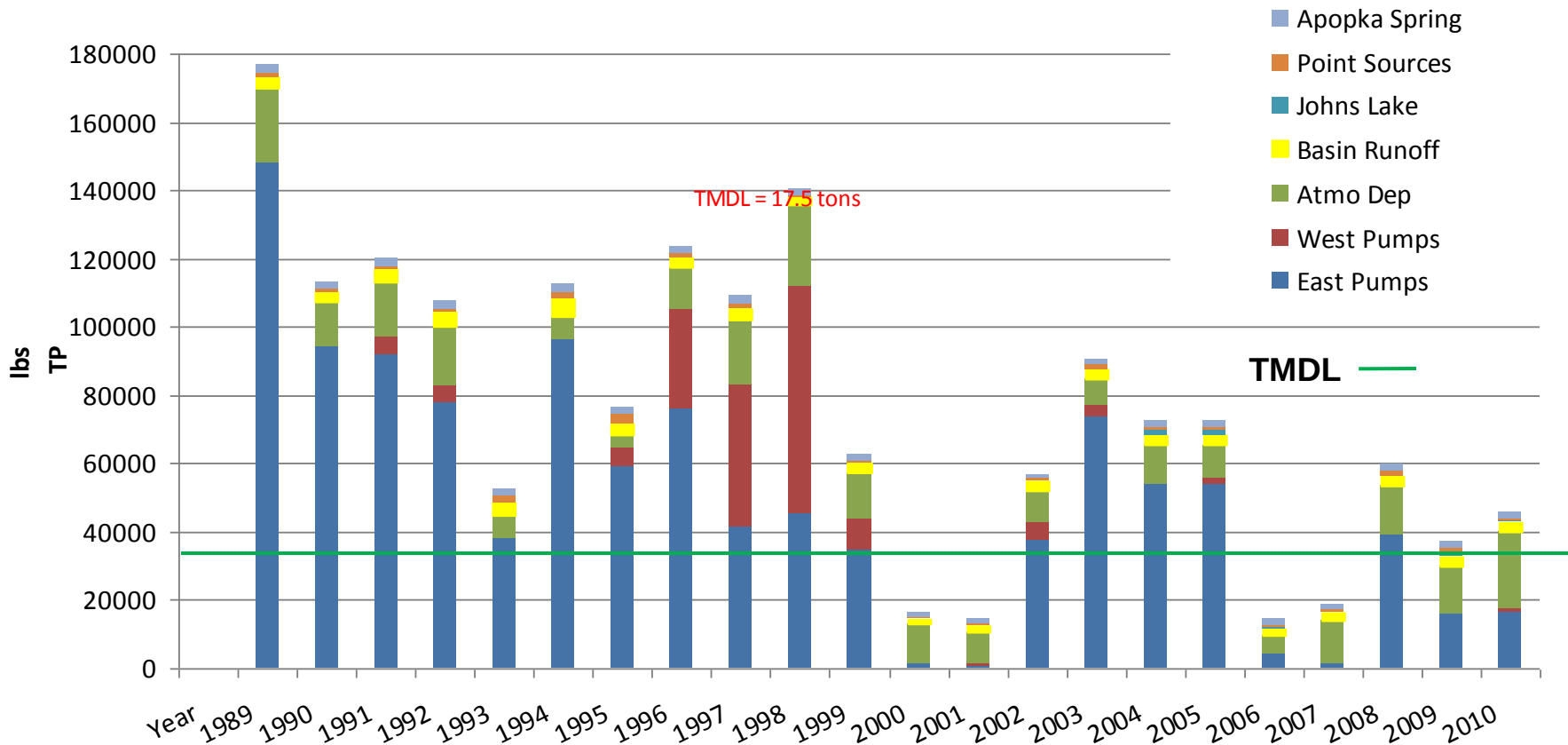
**Note: Baseline = 1991-2000**  
**Post = 2001-2012**







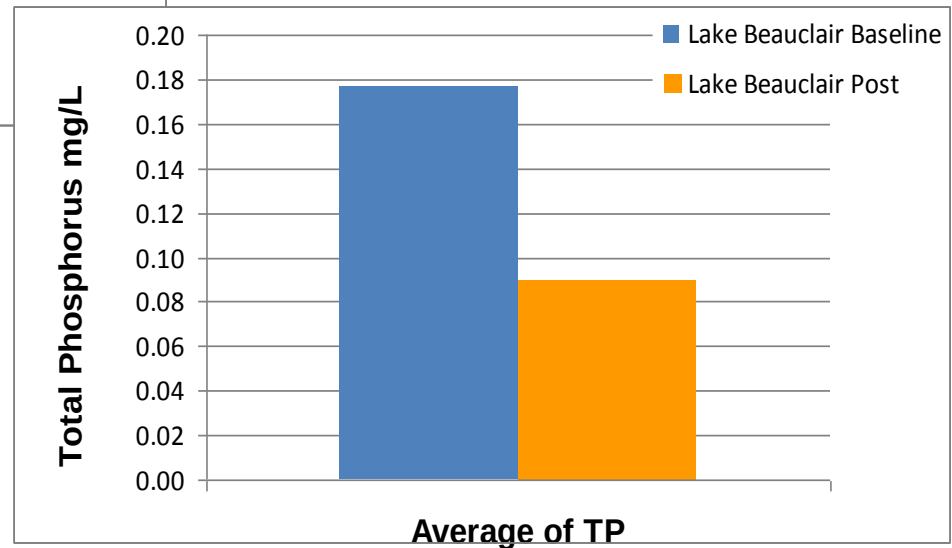
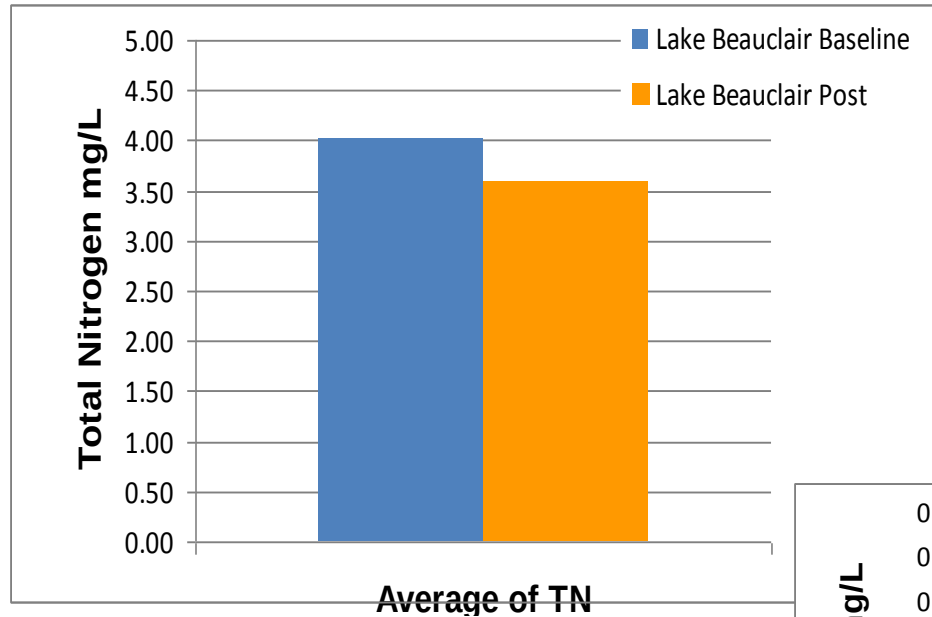
# Lake Apopka Loadings



**Note: Loadings data period 1989-2010**

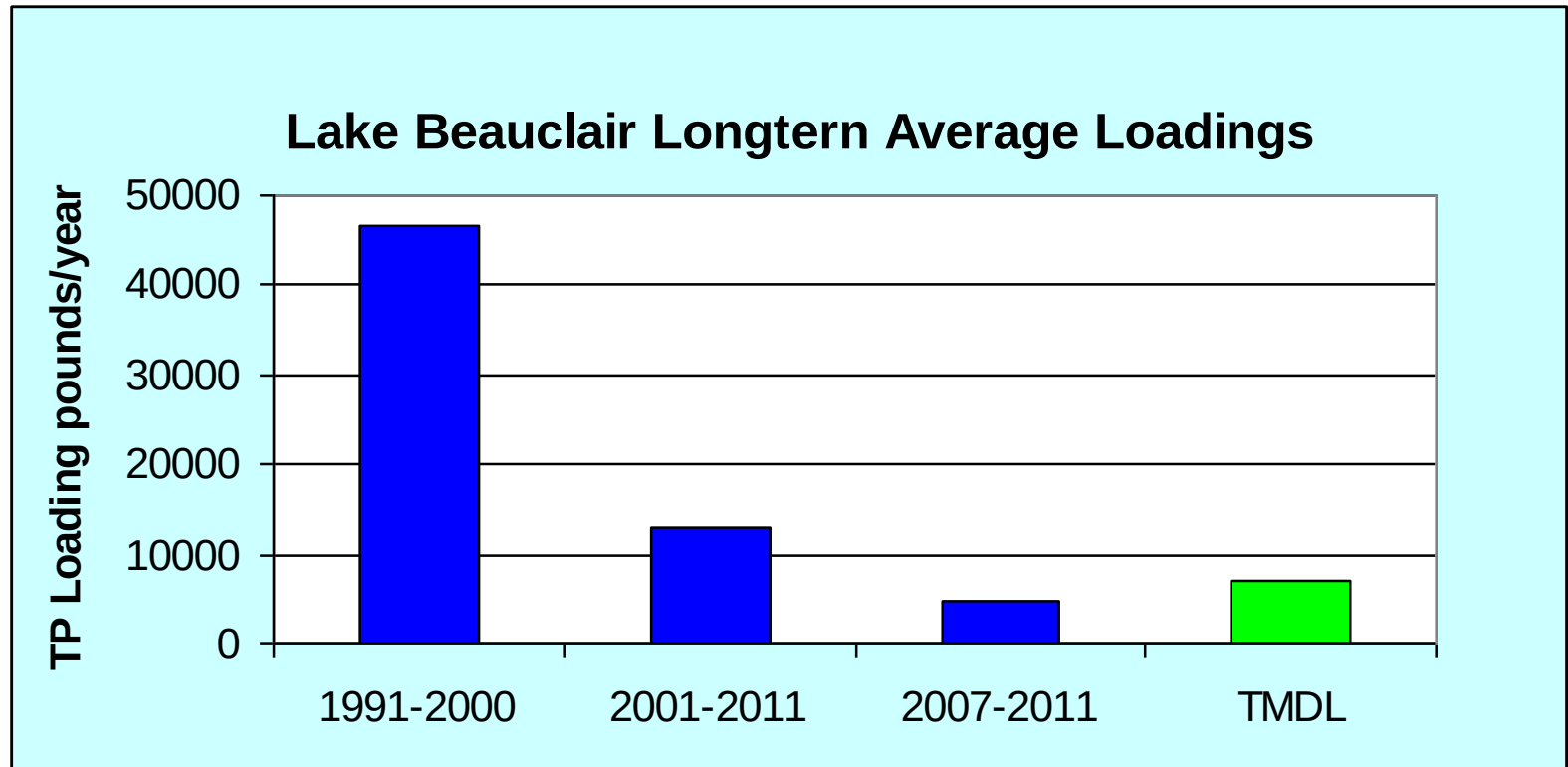


# Lake Beauclair



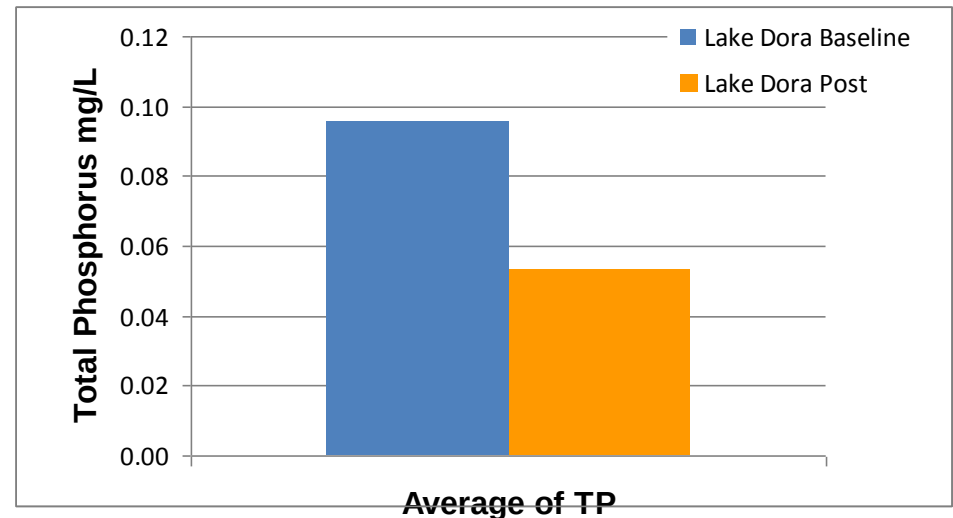
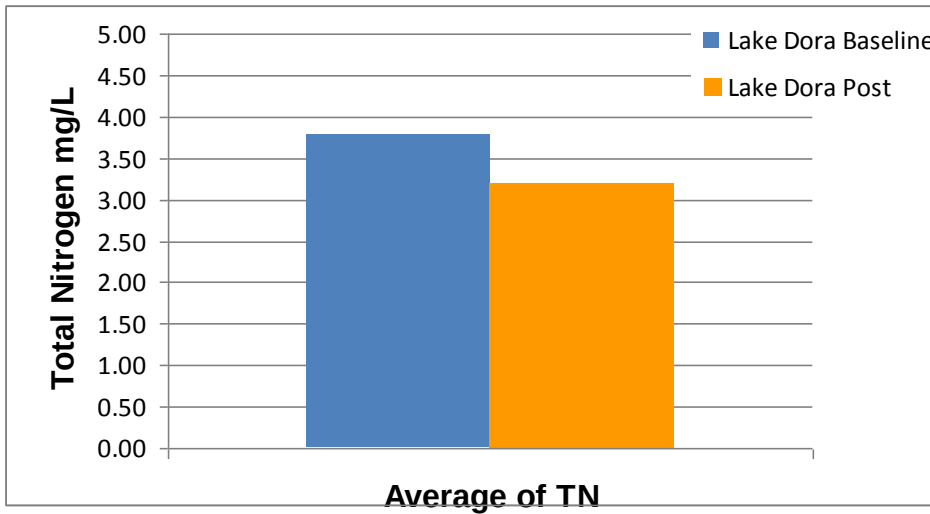


# Lake Beauclair Loadings





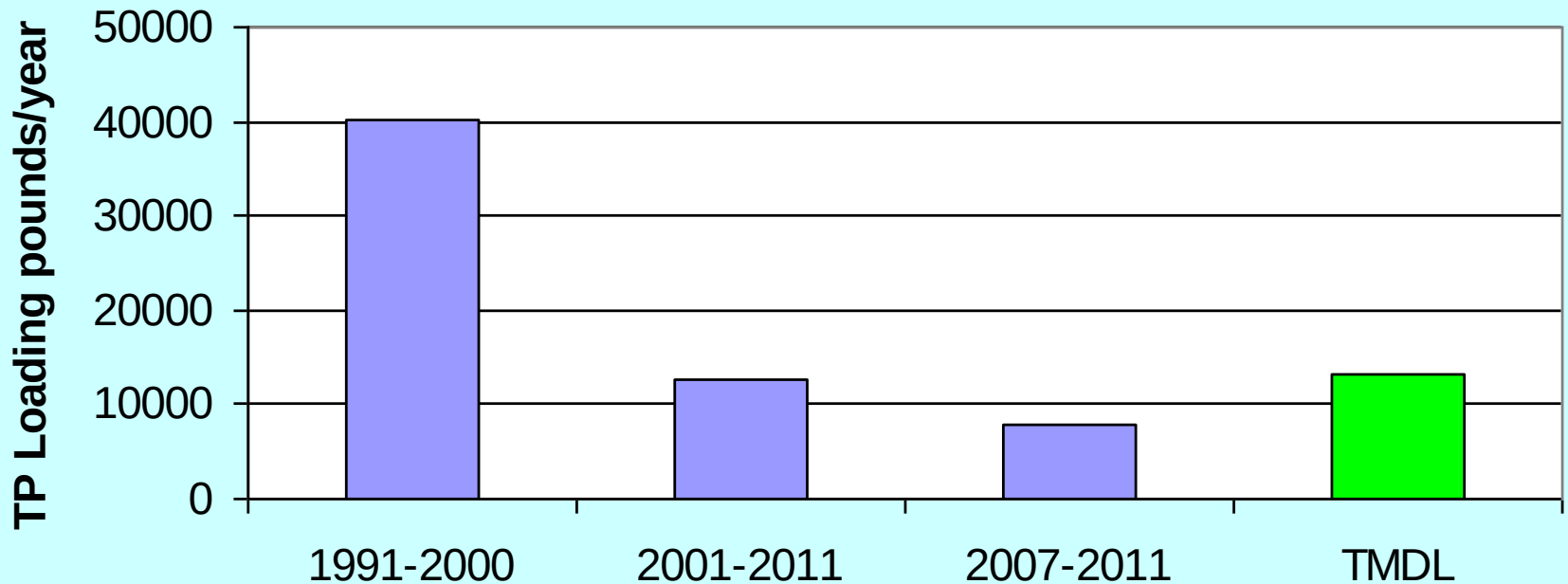
# Lake Dora





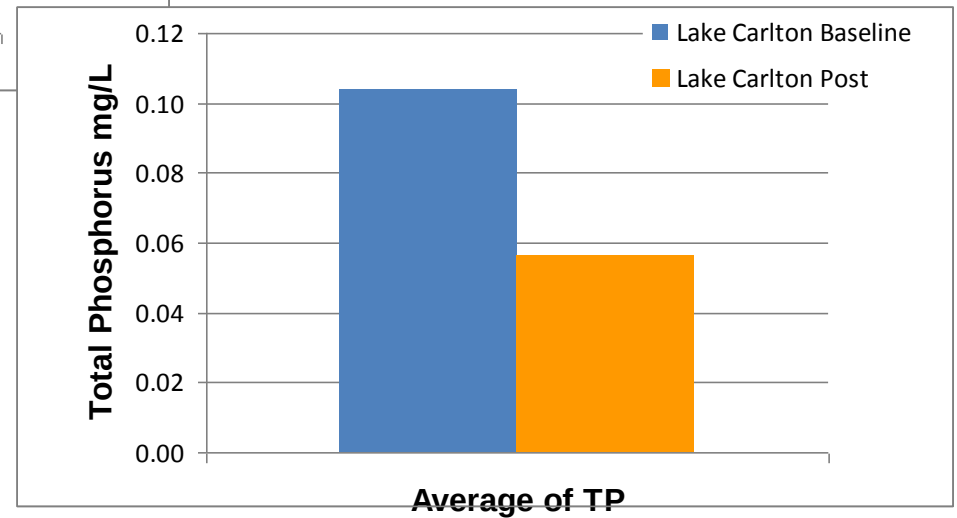
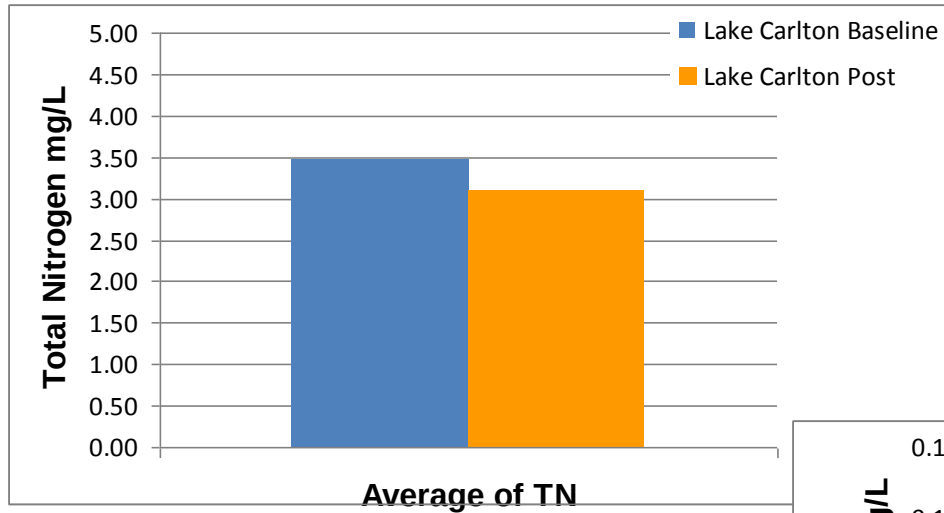
# Lake Dora Loadings

**Lake Dora Longterm Average TP Loadings**



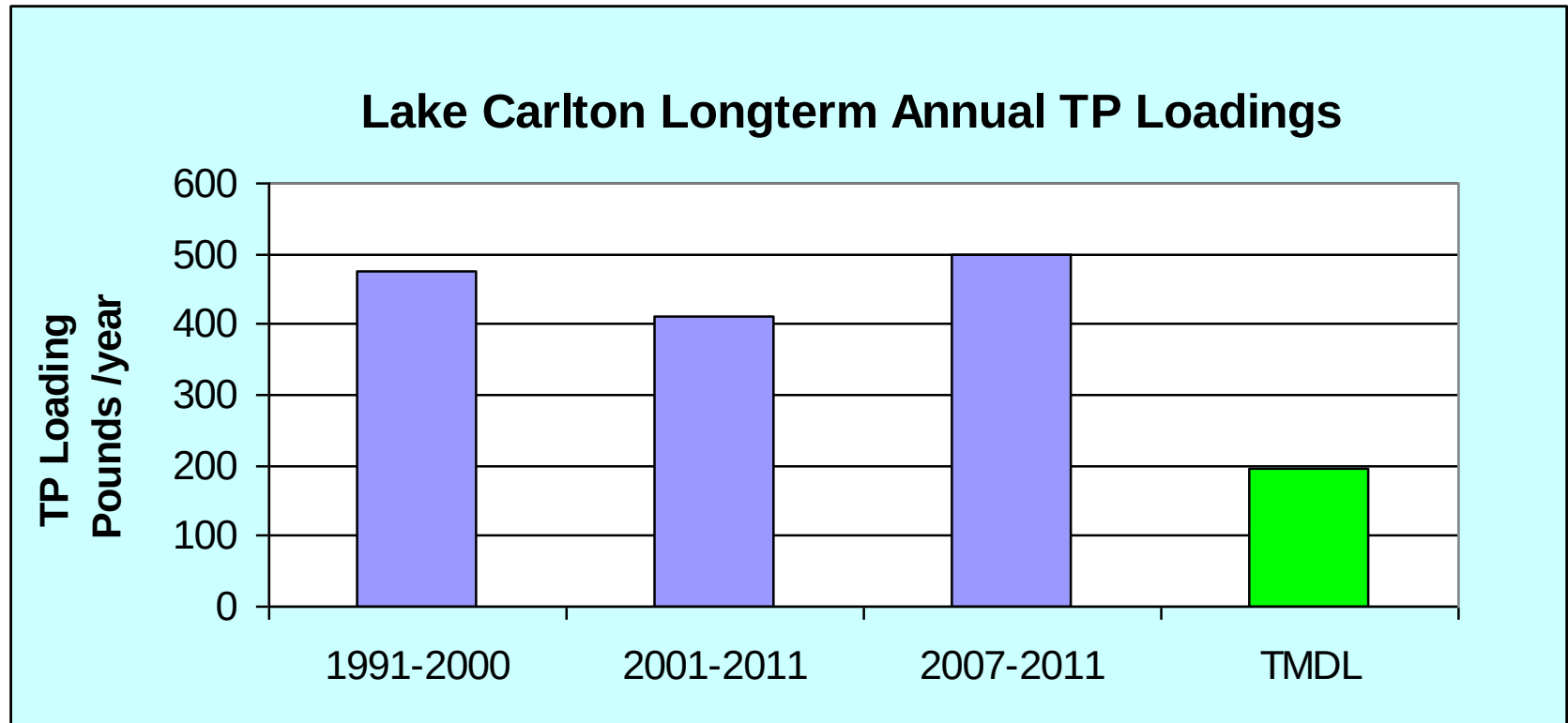


# Lake Carlton



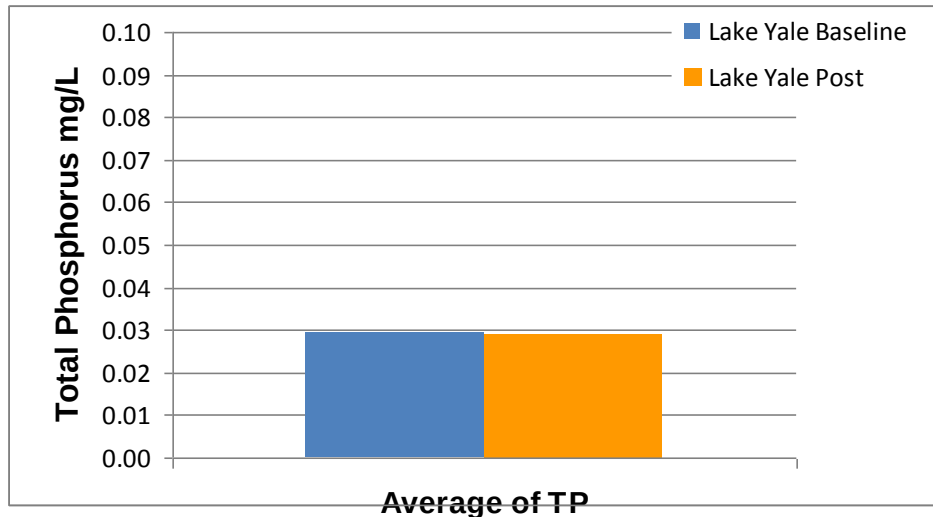
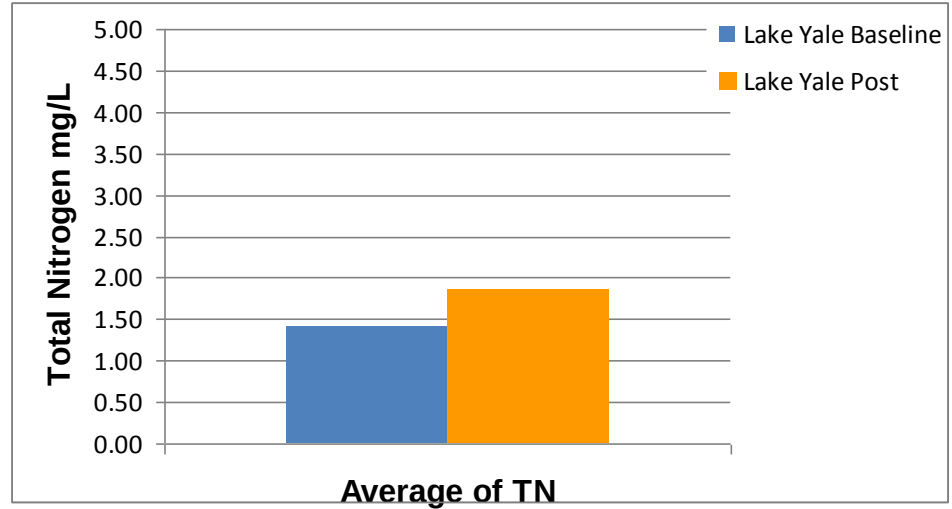


# Lake Carlton Loadings





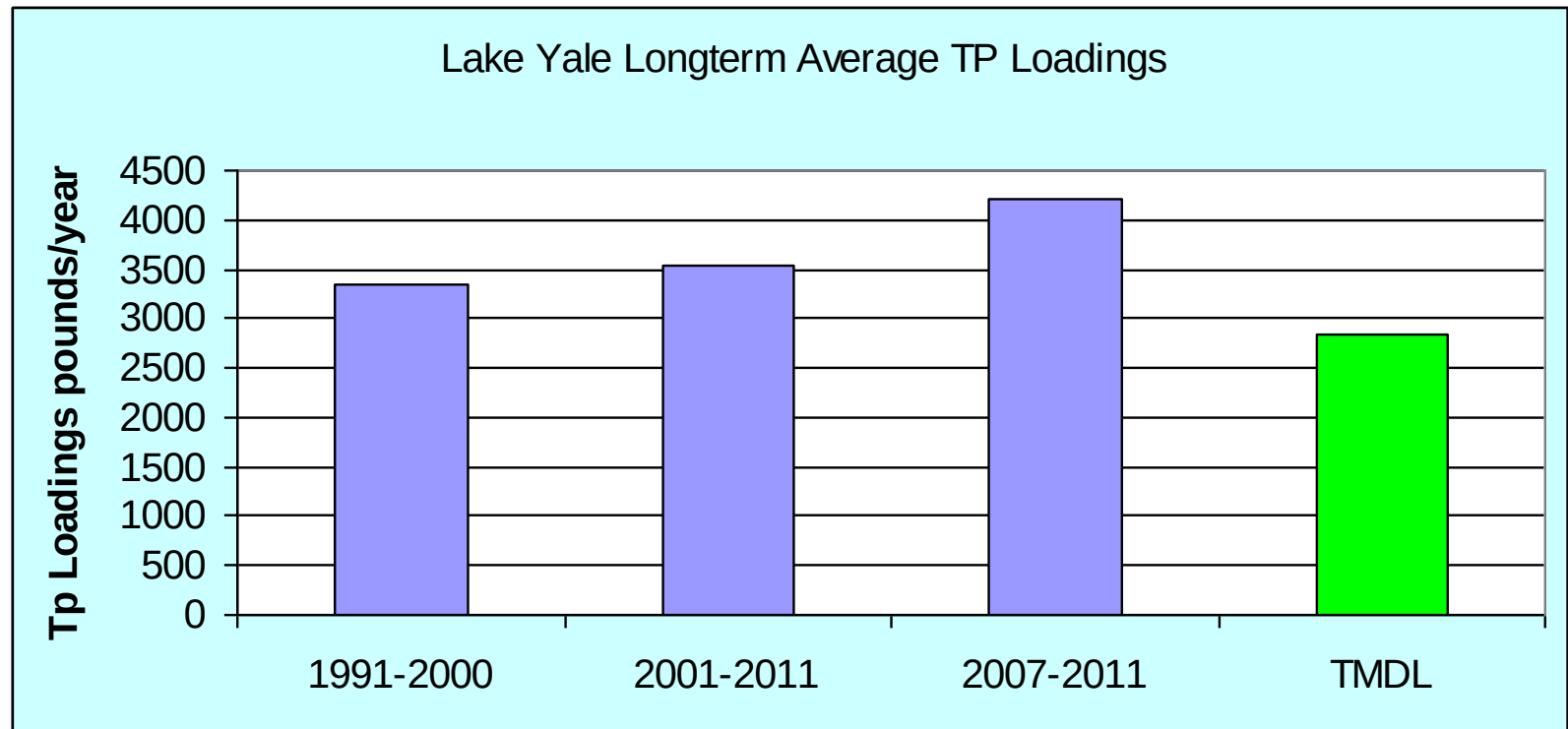
# Lake Yale





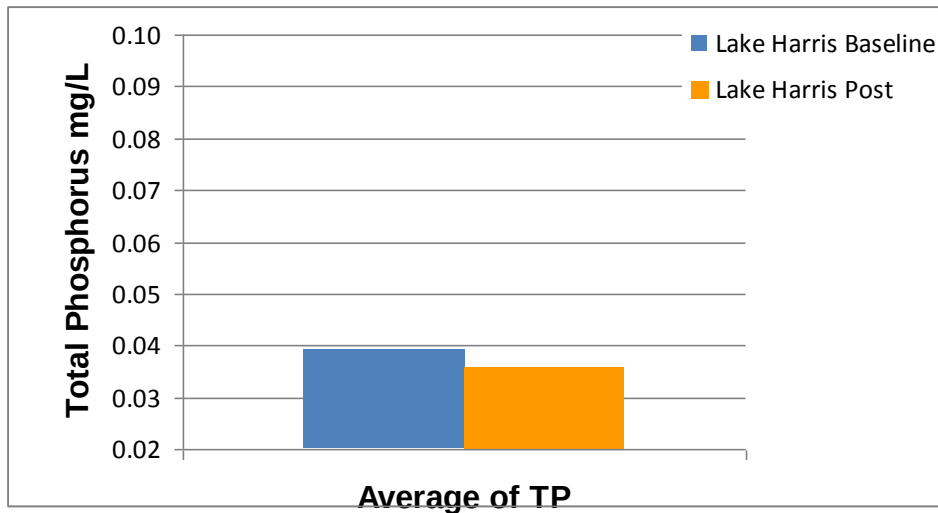
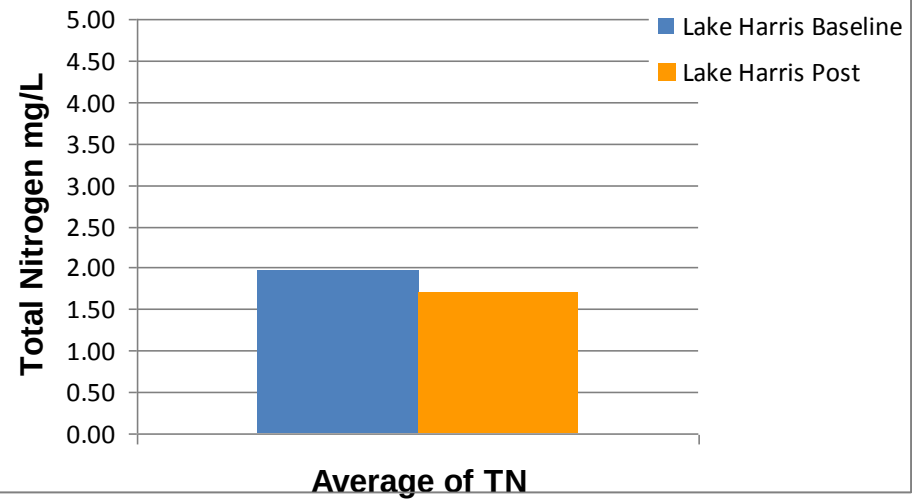


# Lake Yale Loadings



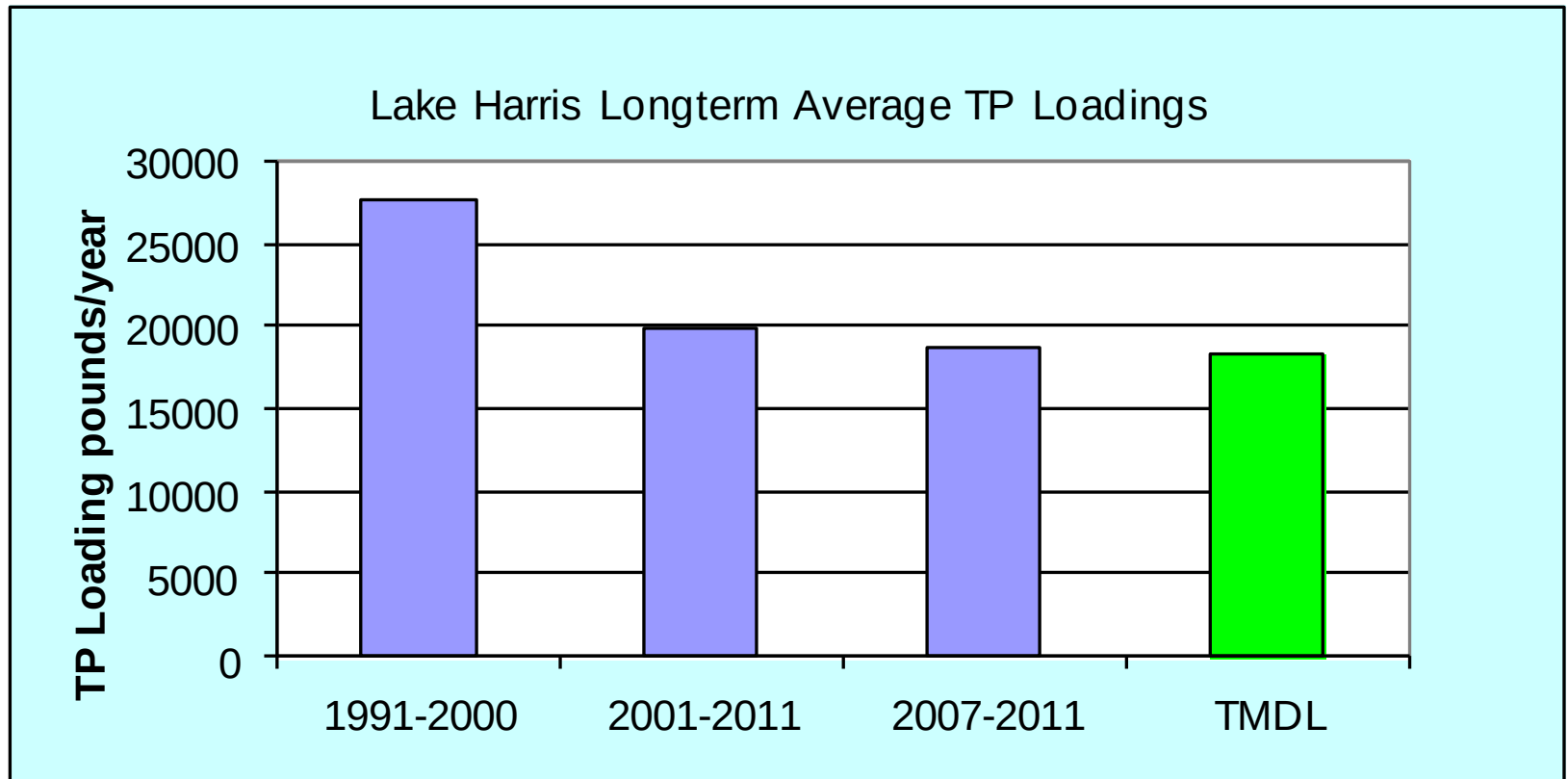


# Lake Harris



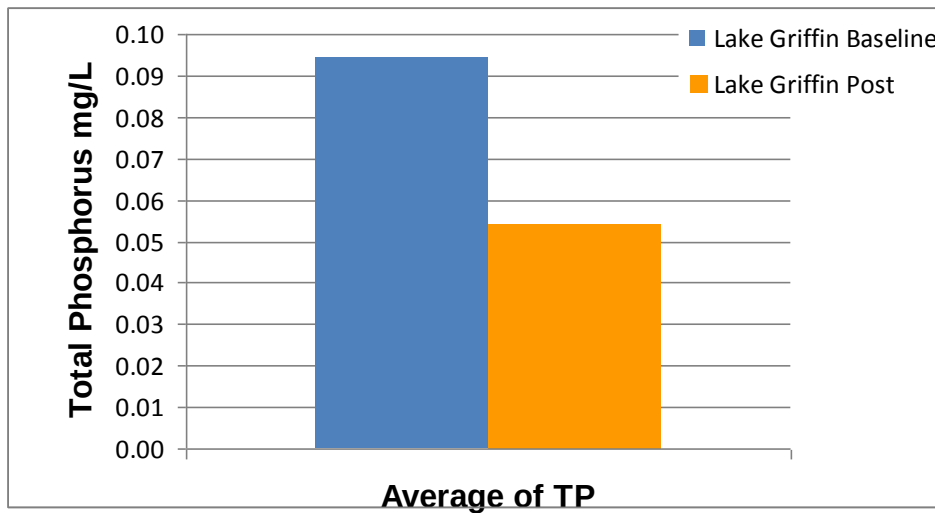
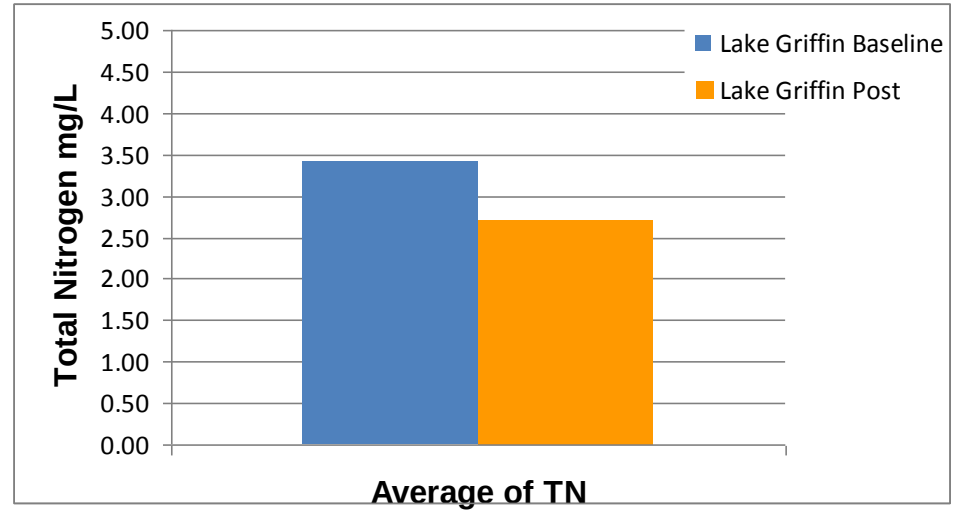


# Lake Harris Loadings



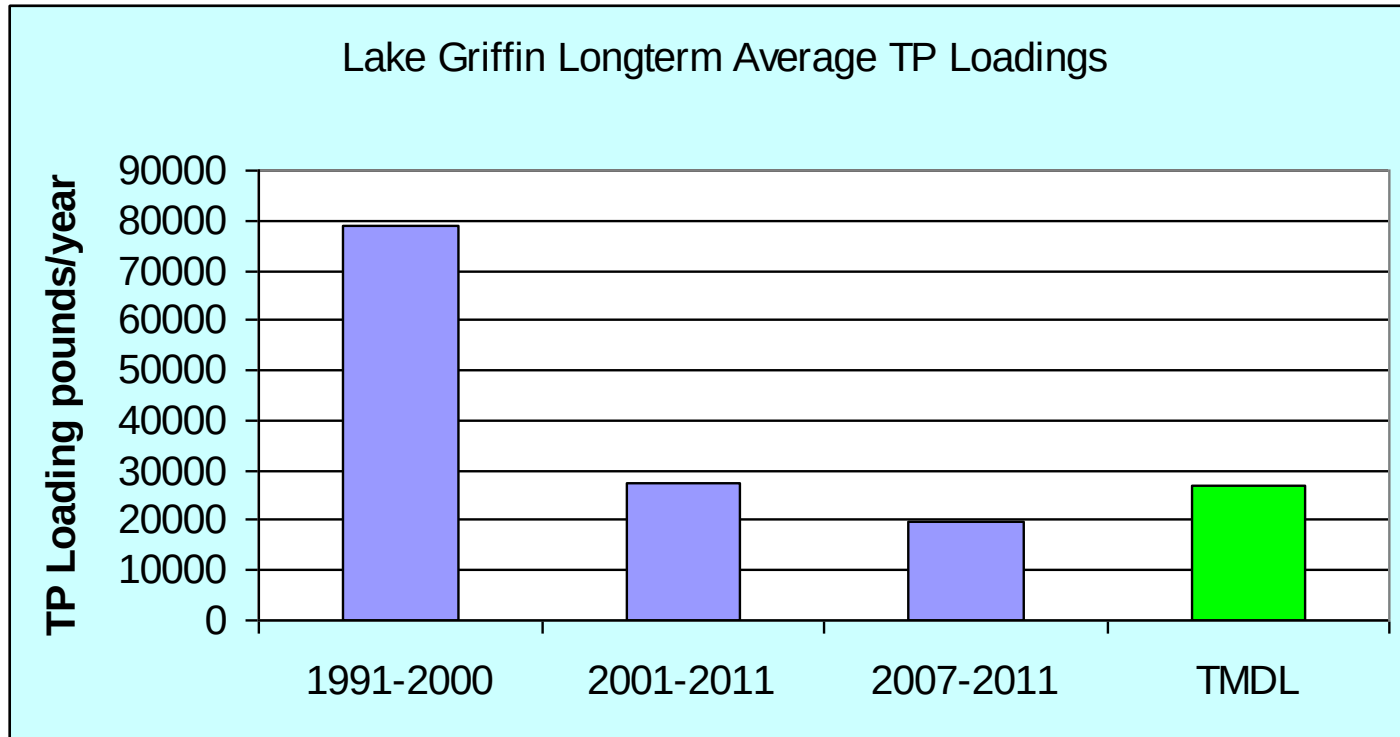


# Lake Griffin

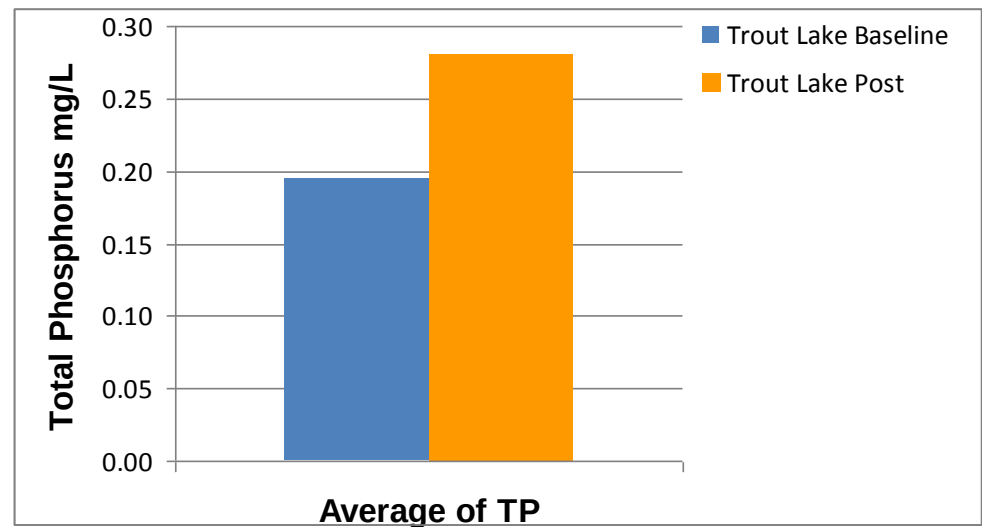
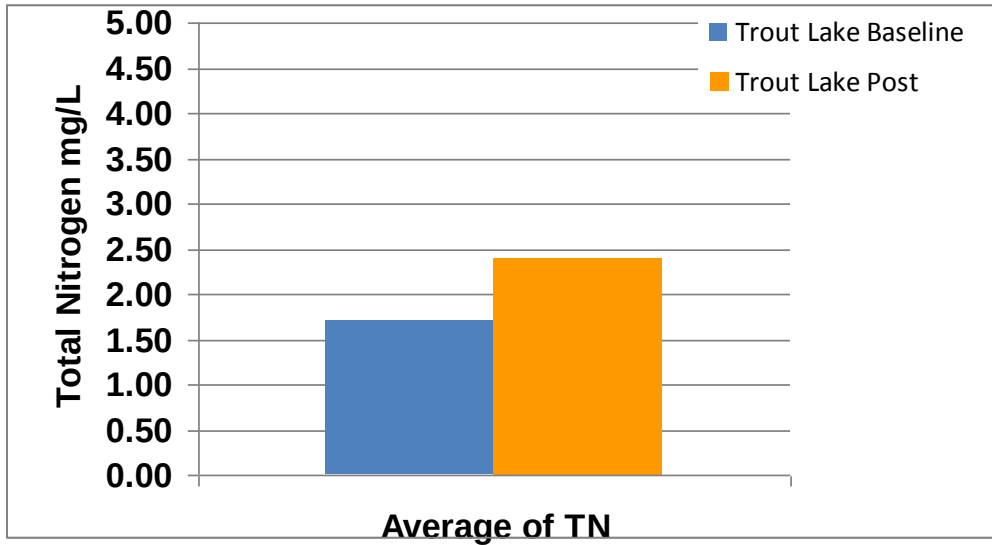




# Lake Griffin Loadings



# Trout Lake





# Loadings Summary

| Lake                                                                  | Carlton | Beauclair | Dora  | Eustis | Harris | Griffin | Yale | Apopka |
|-----------------------------------------------------------------------|---------|-----------|-------|--------|--------|---------|------|--------|
| Average Loading 1991-2000 lbs/year (baseline)<br>For Apopka 1989-1994 | 476     | 46721     | 40059 | 35519  | 27597  | 78885   | 3354 | 113932 |
| Average Loading 2001-2011 lbs/year (Post)                             | 410     | 14106     | 13410 | 22422  | 20161  | 28652   | 3538 | 47813  |
| Percent reduction between baseline and post periods                   | 14%     | 70%       | 67%   | 37%    | 27%    | 64%     | -5%  | 58%    |
| Reduction needed to meet TMDL lbs/year (based on 1991-2000)           | 281     | 39665     | 26829 | 15233  | 9295   | 51984   | 510  | 12761  |
| Reduction needed to meet TMDL lbs/year (based on 2001-2011)           | 215     | 7050      | 180   | 2136   | 1859   | 1751    | 694  | 12761  |
| TMDL Loading Target lbs/year                                          | 195     | 7056      | 13230 | 20286  | 18302  | 26901   | 2844 | 35052  |
| Average Loading 2007-2011 lbs/year                                    | 499     | 4669      | 7996  | 16382  | 18779  | 19649   | 4205 | 40249  |



# Water Quality Summary

- Average annual loadings have declined for all the lakes with the exception of Lake Yale.
- Recent loadings data (2007-2011) indicate the same trend with the exception Lake Yale and Lake Carlton.
- Note: Extended recent droughts with limited stormwater runoff may have also contributed to the recent reductions in loadings.
- Total phosphorus concentrations have declined with the exception of Trout Lake and Lake Yale.
- Total nitrogen concentrations have declined with the exception of Lake Carlton, Trout Lake, Lake Yale, and Little Lake Harris.





# Document Review

## Purpose

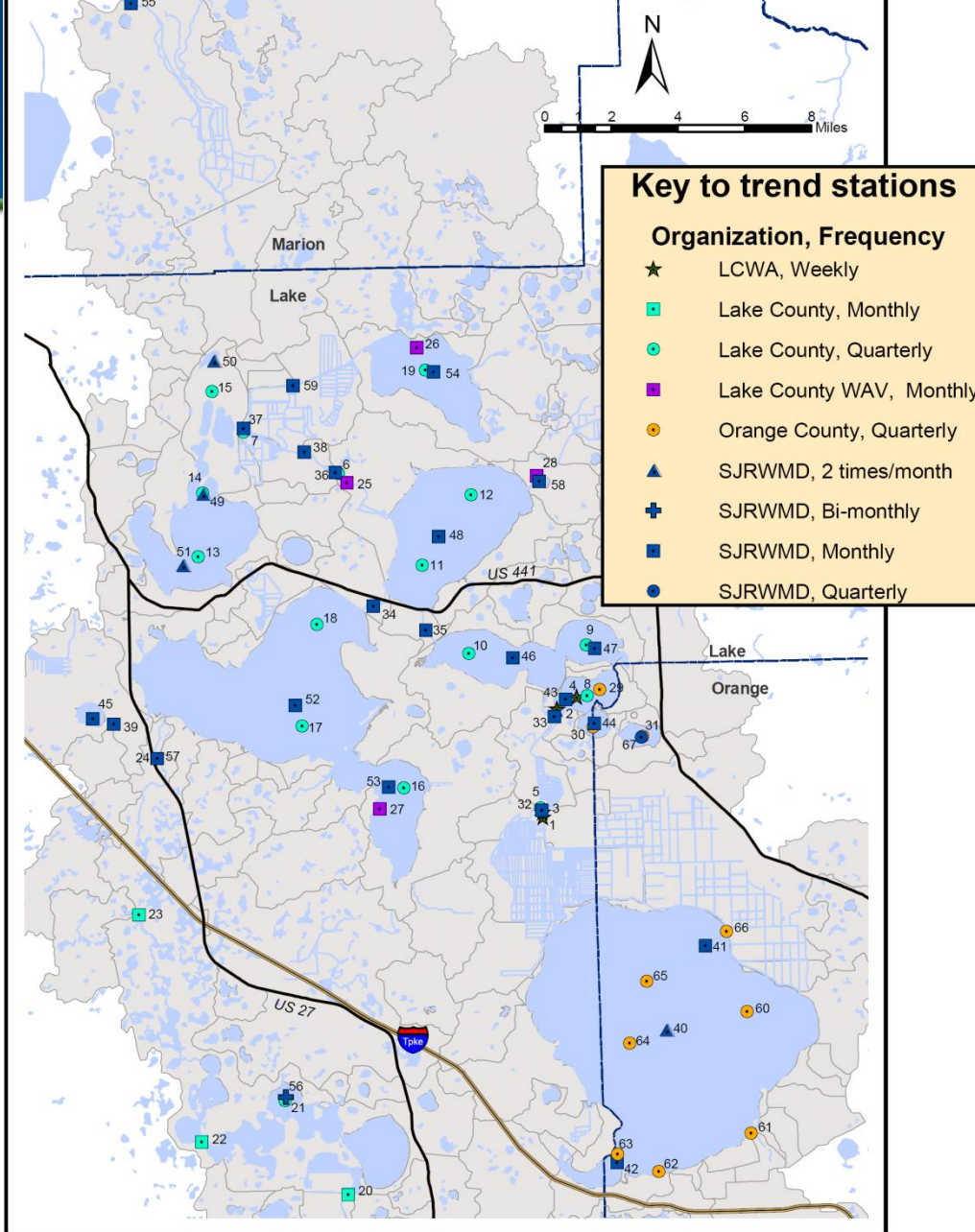
The Upper Ocklawaha Basin Management Action Plan was adopted in August 2007. It was adopted to address nutrient Total Maximum Daily Loads adopted in the Upper Ocklawaha Basin. As specified in the Watershed Restoration Act (Chapter 403.067, Florida Statute), during the fifth year of the first five year iteration of the BMAP, a review of water quality and progress made in achieving requisite TMDL reductions is made. The Upper Ocklawaha BMAP is scheduled for revision in late 2013 with subsequent re-adoption in early 2014. This report summarizes the status of water quality of TMDL waterbodies, efforts (projects) undertaken to improve water quality, identifies insufficiencies, and notes what additional actions should be taken over the next five year iteration of the BMAP.



# Project Status

- 155 projects adopted with BMAP;  
Additional 20 projects ready for adoption, in preparation for a new BMAP adoption:
  1. Project list needs to be reviewed by BWG.
  2. Current project list is incomplete. Information is still needed from some agencies.
  3. New capital improvement projects to add?
  4. Project review completed by early November.
  5. There will be opportunities to identify new projects over the next year.

# Monitoring



- Monitoring is one of the requirements of BMAP
- Current monitoring list needs review
- Finish review by early November

**Legend**

County Boundaries

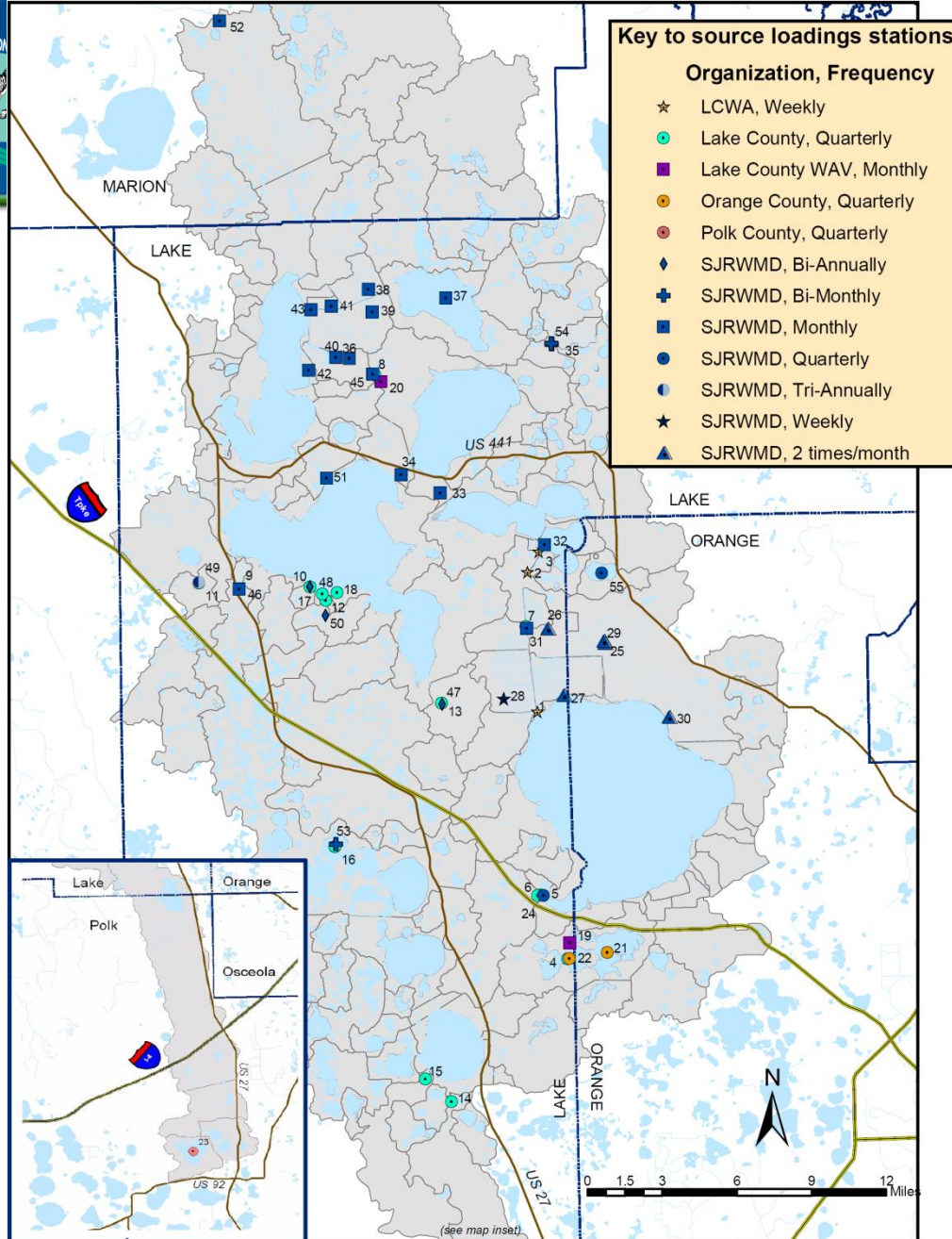
Upper Ocklawaha Basin Boundary

## Upper Ocklawaha River Basin

Numbers represent Map Id in Table I-1.

Map prepared June 19, 2006  
by the Bureau of Watershed  
Management. Edited July 7, 2006.  
For display purposes only. Last edit  
August 1, 2006.









# Future TMDLs

- Lake Weir.
- Lake Denham.
- Lake Marshall.
- Lake Roberts.
- Completion by end of 2014.
- All will be nutrient TMDLs.



# Explanation of Priorities

- Consideration was given to the change in loadings between baseline and post baseline periods, recent average loadings (2007-2011), direction of TP concentrations, and number of improvement projects adopted for that waterbody.
- Priority waterbodies are those with a negative trend or no trend for any of the above categories. Negative or no trend is indicated in the table as a red square. The number of projects by itself was not enough to make a waterbody a priority if loadings and TP concentrations are lower in the post period.



# Priority Waterbodies

| Lake                                                        | Carlton  | Beau-clair | Dora     | Eustis         | Harris         | Griffin  | Yale      | Apopka   | Trout Lake    | Palatla-kaha River |
|-------------------------------------------------------------|----------|------------|----------|----------------|----------------|----------|-----------|----------|---------------|--------------------|
| Average Loading 1991-2000 lbs/year                          | 476      | 46,721     | 40,059   | 35,519         | 27,597         | 78,885   | 3,354     | 113,932  | 2,604         | NA                 |
| Average Loading 2001-2011 lbs/year                          | 410      | 14,106     | 13,410   | 22,422         | 20,161         | 28,652   | 3538      | 47,813   | not Available | NA                 |
| Percent reduction between periods                           | 14       | 70         | 67       | 37             | 27             | 64       | -5        | 58       |               | NA                 |
| Reduction needed to meet TMDL lbs/year (based on 1991-2000) | 281      | 39,665     | 26,829   | 15,233         | 9,295          | 51,984   | 510       | 12,761   |               | NA                 |
| Reduction needed to meet TMDL lbs/year (based on 2001-2011) | 215      | 7,050      | 180      | 2,136          | 1,859          | 1,751    | 694       | 12,761   |               | NA                 |
| TMDL Loading Target                                         | 195      | 7,056      | 13,230   | 20,286         | 18,302         | 26,901   | 2,844     | 35,052   | 521           |                    |
| Average Loading 2007-2011 lbs/year                          | 499      | 4,669      | 7,996    | 16,382         | 18779          | 19,649   | 4,205     | 40,249   |               | NA                 |
| Lake Apopka baseline 1989-1994                              |          |            |          |                |                |          |           | 113,932  |               |                    |
| Number of Projects Adopted                                  | <5       | <5         | 15       | 28             | 17             | 22       | <5        | 22       | <5            | 20                 |
| Trend in TP Levels                                          | Decrease | Decrease   | Decrease | Small decrease | Small decrease | Decrease | No change | Decrease | Increase      | Increase           |
| Waters expected to need additional effort                   | Carlton  |            |          |                | Harris         |          | Yale      |          | Trout         | Palatla-Kaha River |



# Time Lines

- October 2 meeting.
  - Review projects and monitoring activities during October.
  - Draft agriculture BMP targets.
- Subsequent meetings.
  - Mid November:
    - First draft of BMAP (may not be complete).
    - Validated and new project information.
    - Validated monitoring information.
    - Agriculture BMP targets.





# Time Lines

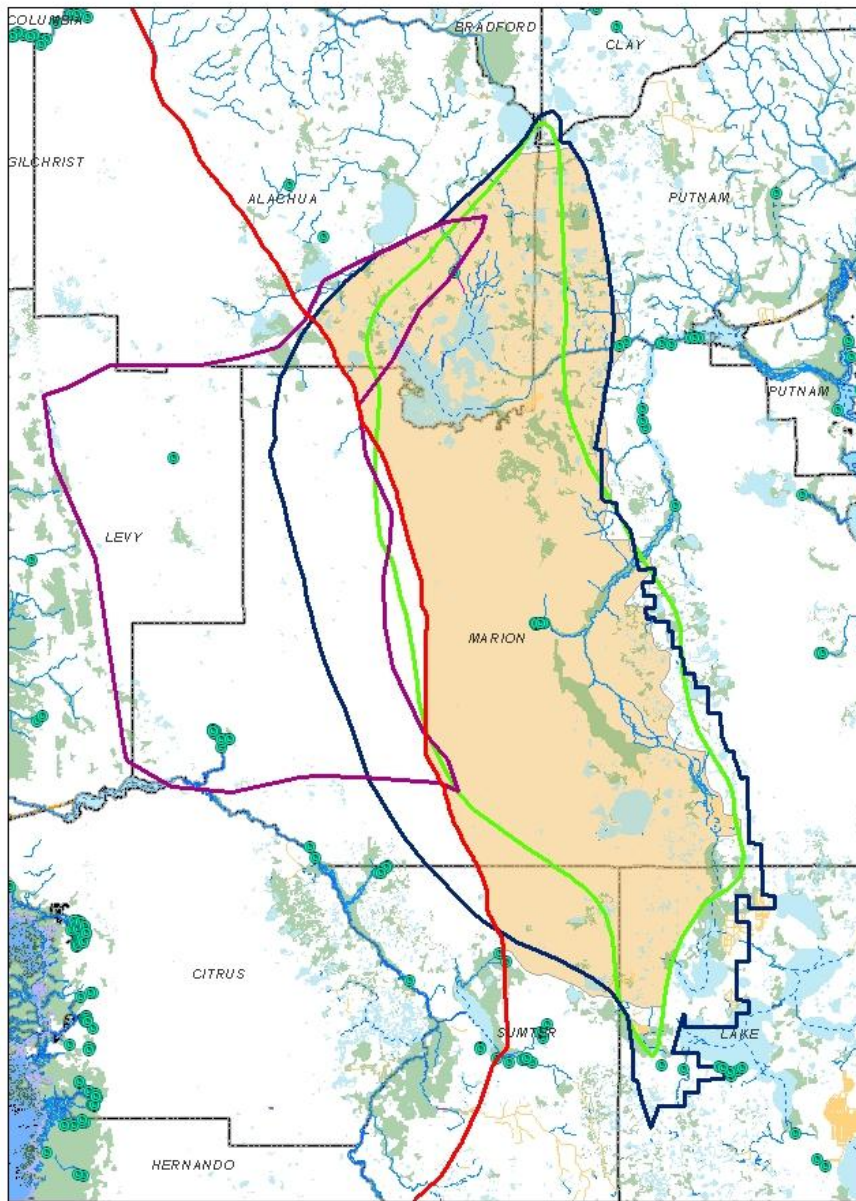
- Mid December:
  - Final draft BMAP ready for review.
  - Briefings?
- January 2014:
  - Adoption of revised BMAP.
- 2014/2015.
  - Periodic BWG meetings to work on projects for lakes.
  - Support new TMDL development.
  - Support other TMDLs as they arise.



# Silver Springs and Wekiva BMAPs

- Wekiva overlaps with Upper Ocklawaha Basin.
- Wekiva post BMAP activities may be beneficial to Upper Ocklawaha.
- Silver Springs started March 2013, nitrate is focus.
- Management area overlaps with Upper Ocklawaha Basin.
  - There is a potential that research and projects completed for Silver Springs will benefit Upper Ocklawaha Basin.
  - Example: inventory of nitrogen sources.

# Silver Springs BMAP Area



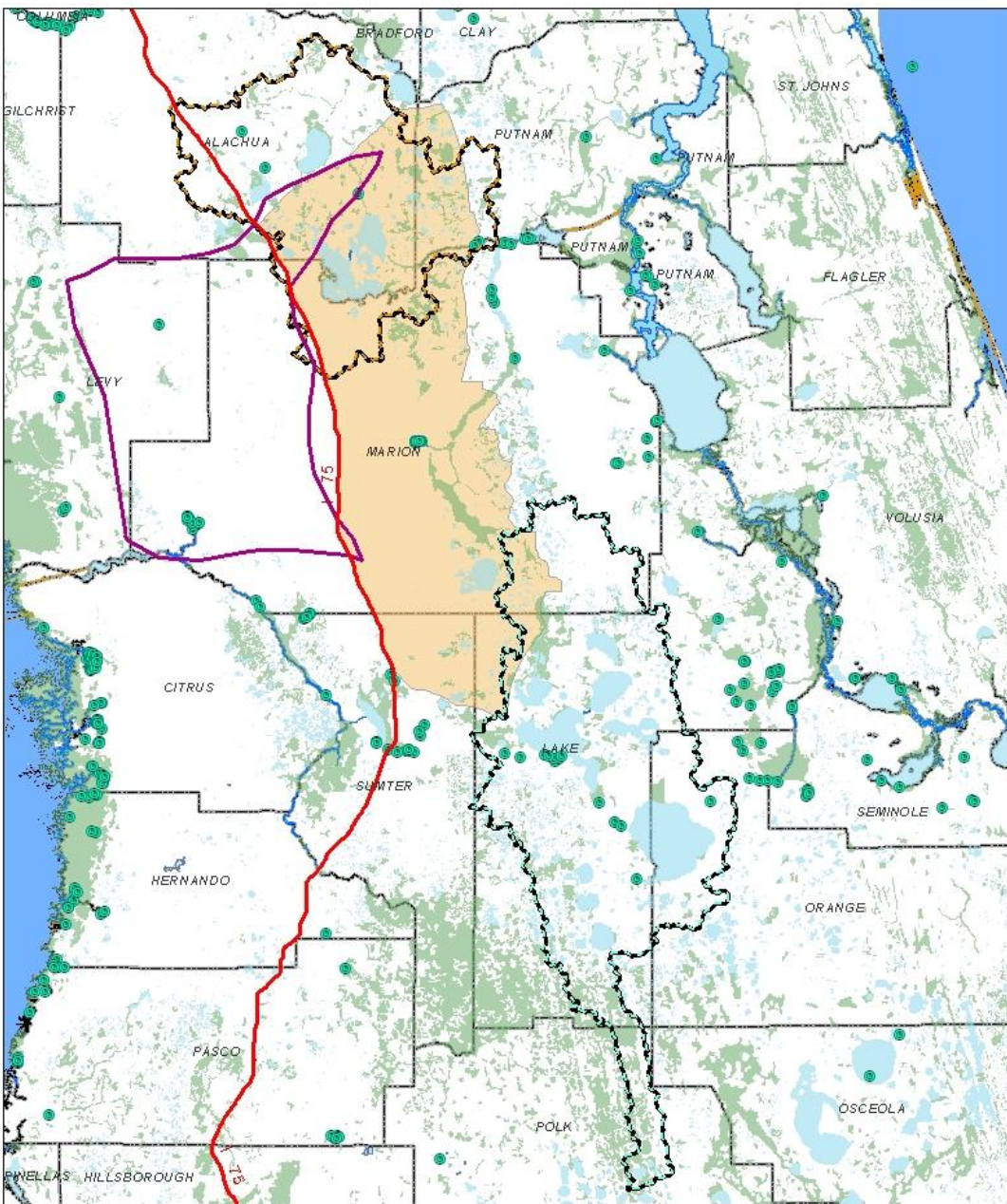
N  
0 3 6 12 18 24 Miles  
Silver Springs Boundary Delineations



# All Ocklawaha BMAPs

## Legend

- Rainbow Springshed 2005
- I-75
- Springs (2011)
- Orange Creek Basin
- Upper Ocklawaha Basin
- BMAP Management Area



All BMAP Area Boundaries

0 4 8 16 24 32 Miles

