



**Florida Department of Environmental Protection**  
Water Quality Restoration Program

# **Orange Creek Basin Technical Discussion**

**January 28, 2016**

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# Monitoring Recommendations

- Add staff gage to Lake Wauberg to measure water level.
- Collect phytoplankton samples.
  - Restart collection for Orange Lake, Newnans Lake, Lochloosa Lake.
  - Start collecting in Lake Wauberg.
  - Dependent on budget.



# Loading Summary

| WATERBODY /<br>WBID     | TMDL<br>PARAMETER | TMDL<br>(LB/YR AS N<br>OR P) | TMDL<br>BASELINE<br>LOADING<br>(POUNDS PER<br>YEAR [LB/YR]) | LOADING<br>REDUCTION<br>NEEDED<br>(LB/YR) | TOTAL<br>LOADING<br>REDUCTIONS<br>ACHIEVED<br>(LB/YR) | REMAINING<br>LOADING<br>(LB/YR) |
|-------------------------|-------------------|------------------------------|-------------------------------------------------------------|-------------------------------------------|-------------------------------------------------------|---------------------------------|
| Newnans Lake /<br>2705B | TN                | 85,470                       | 315,510                                                     | 233,144                                   | 3,773                                                 | 229,411                         |
| Newnans Lake /<br>2705B | TP                | 10,924                       | 25,732                                                      | 14,808                                    | 655.7                                                 | 14,152.3                        |
| Orange Lake /<br>2749A  | TP                | 15,262                       | 27,889                                                      | 12,623                                    | 54                                                    | 12,569                          |
| Orange Lake /<br>2749A  | TN                | No TMDL                      | -                                                           | -                                         | 257.1                                                 | -                               |
| Lake Wauberg /<br>2741  | TN                | 2,062.2                      | 4,064                                                       | 2001.8                                    | 163.3                                                 | 1,838.5                         |
| Lake Wauberg /<br>2741  | TP                | 374                          | 748                                                         | 374                                       | 34.4                                                  | 339.6                           |
| Alachua Sink /<br>2720A | TN                | 256,322                      | 462,557                                                     | 206,235                                   | 125,105.8                                             | 81,129.2                        |
| Alachua Sink /<br>2720A | TP                | No TMDL                      | -                                                           | -                                         | 3,359                                                 | -                               |
| Lochloosa Lake /        | Draft TN          | 168,718                      | 443,682.4                                                   | 274,964.4                                 | 5,824                                                 | 269,140.4                       |
| Lochloosa Lake /        | Draft TP          | 12,330                       | 21,640                                                      | 9,310                                     | 1,032                                                 | 8,278                           |

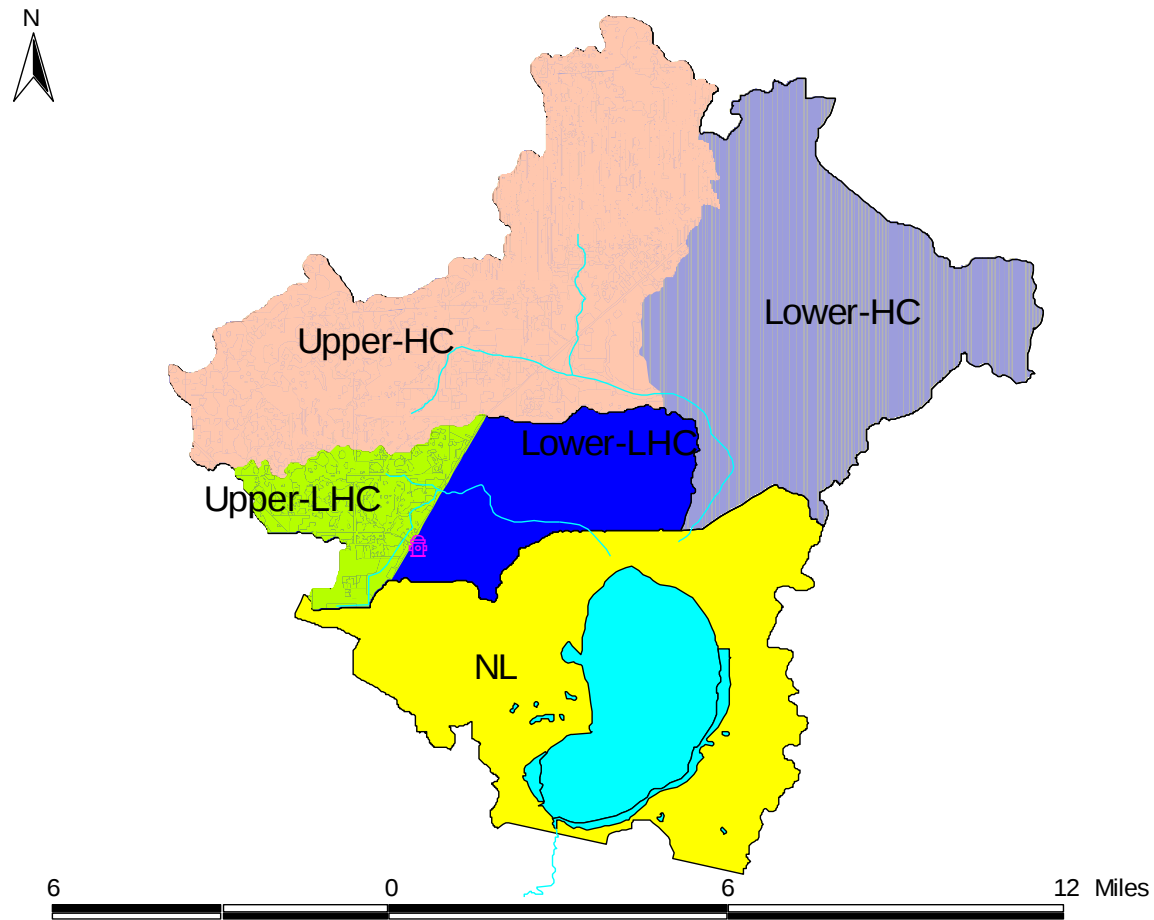


# TMDL Characteristics

- Orange and Newnans Lake used 1995 land use to estimate loads.
- Newnans Lake watershed includes:
  - Hatchett Creek loadings.
  - Little Hatchett Creek loadings.
- Orange Lake watershed includes
  - Part of Camps Canal/River Styx loadings.
  - Loading inputs from Camps Canal/Prairie Creek and Cross Creek.



# Newnans Lake Sub-basins





# Newnans Lake Land Use

| Land Use Category                | 2009 acres | 1995 acres | Difference in acres | Percent difference | Percent of watershed |
|----------------------------------|------------|------------|---------------------|--------------------|----------------------|
| Agriculture                      | 4283.7     | 3644.3     | 639.4               | 14.9%              | 0.8%                 |
| Mining                           | 98.2       | 135.8      | -37.5               | -38.2%             | 0.0%                 |
| Industrial                       | 469.9      | 547.7      | -77.8               | -16.6%             | -0.1%                |
| Urban                            | 7268.4     | 7352.0     | -83.6               | -1.1%              | -0.1%                |
| Forest/Silviculture/Rural Open   | 39022.6    | 41582.5    | -2559.9             | -6.6%              | -3.2%                |
| Recreational                     | 741.7      | 395.7      | 346.0               | 46.7%              | 0.4%                 |
| Water/Wetlands                   | 23227.4    | 22195.7    | 1031.7              | 4.4%               | 1.3%                 |
| Rangeland                        | 2339.2     | 1936.7     | 402.4               | 17.2%              | 0.5%                 |
| Transportation and Communication | 1830.3     | 1529.8     | 300.5               | 16.4%              | 0.4%                 |
| Urban Open                       | 65.7       | 26.9       | 38.8                | 59.0%              | 0.0%                 |



# General Approach

- TMDL watershed loads developed with watershed management model.
  - Land use composited by sub-basin.
  - Distance from lake not a factor.
- Basis of allocation approach is land use distribution.
- Allocation focuses on urban runoff, developed land uses.
  - Agriculture addressed by BMPs.



# Approach

- Use GIS to translate loading calculated by modeling to distribution of land use within jurisdictions.
- May simplify or aggregate developed land use categories, but still maintain loading distribution.
- Consider aggregating by EMC and/or imperviousness.
- TMDL water quality targets and loading targets **DO NOT CHANGE!**



# Upper Ocklawaha Approach

- Used GIS to translate sources of loading by location.
  - Created land use database.
  - Includes lake basin and sub-basin for each land parcel.
  - Jurisdiction assigned to each land parcel.
- Mapped modeled categories of land use for each jurisdiction.
- Separate out categories for all agriculture, muck farms, natural lands, water/wetlands, and developed uses.
- Focus on developed land uses that generate urban stormwater for developing reductions.



# Upper Ocklawaha Approach

- Aggregated developed land use into 3 categories.
  - High intensity.
  - Medium intensity.
  - Low intensity.
- Acres (portion) of a land use category within a jurisdiction as a percent of the total acreage for that land use in the entire basin.
- This percent area by jurisdiction is the basis for all calculations of loading reductions and allocations.



# Question

- First Question: Use TMDL 1995 land use loading estimates that are part of TMDL, but use 2009 land use distribution?
- Second Question: Do we allocate for basin as one whole piece or do we consider tributaries, which are Hatchett Creek, Little Hatchett Creek, and Newnans Lake, separately?
  - TMDLs estimate loadings by sub-basin areas, so it is possible to break out the tributaries from the rest of the lake basin.



# Newnans Lake Modeled Land use

| Land Use                            | Hatchett Creek<br>(acres) | Little Hatchett<br>Creek (acres) | Newnans<br>Lake (acres) |
|-------------------------------------|---------------------------|----------------------------------|-------------------------|
| Forest/Rural Open                   | 26220.09                  | 5415.89                          | 7497.64                 |
| Urban Open                          | 734.58                    | 865.48                           | 765.77                  |
| Agriculture                         | 1880.69                   | 142.37                           | 1420.55                 |
| Low Density Residential             | 1970.12                   | 94.59                            | 1283.36                 |
| Medium Density<br>Residential       | 386.03                    | 441.15                           | 1063.86                 |
| High Density<br>Residential         | 28.83                     | 83.10                            | 93.28                   |
| Communication and<br>Transportation | 307.35                    | 1065.97                          | 150.24                  |
| Rangeland                           | 654.31                    | 636.54                           | 644.02                  |
| Water/Wetlands                      | 8902.87                   | 2161.97                          | 9818.15                 |
| Total                               | 41084.86                  | 10907.04                         | 22736.89                |



# EMC

| Land Use Categories                 | TN mg/L | TP mg/L | Reference   |
|-------------------------------------|---------|---------|-------------|
| Forest/Rural Open                   | 1.85    | 0.33    | CDM 1990    |
| Urban Open                          | 1.18    | 0.15    | Harper 1994 |
| Agriculture                         | 2.32    | 0.334   | Harper 1994 |
| Low Density Residential             | 1.77    | 0.177   | Harper 1994 |
| Medium Density Residential          | 2.29    | 0.30    | Harper 1994 |
| High Density Residential            | 2.42    | 0.49    | Harper 1994 |
| Communication and<br>Transportation | 2.08    | 0.34    | Harper 1994 |
| Rangeland                           | 2.32    | 0.334   | Harper 1994 |
| Water/Wetlands                      | 1.6     | 0.19    | Harper 1994 |



# Question

- Third Question: Do we aggregate all developed land uses into one category? OR;
- Should we aggregate developed land use in the following way?
  - Developed low = low density residential + urban open.
  - Developed medium = medium residential + transportation.
  - Developed high = high density residential.
  - Agriculture = agriculture + rangeland.
- OR: There are only 5 developed land use categories used in modeling. It is possible that all 5 categories can be used. The EMC's used for agriculture and rangeland are the same, but these land uses do not have to be combined.



# Newnans Lake TP Example

| Sources of total phosphorus (loading in pounds /year) | TMDL Baseline loading* | Percent of Baseline Loading | Controllable TMDL baseline loading | Controllable TMDLStormwater % contribution | Proportional reduction needed to meet TMDL | Reduction based on TMDL Percent Reduction | Expected load reduction from current projects | Remaining phosphorus load | Net estimated TP load |
|-------------------------------------------------------|------------------------|-----------------------------|------------------------------------|--------------------------------------------|--------------------------------------------|-------------------------------------------|-----------------------------------------------|---------------------------|-----------------------|
| <b>Point sources</b>                                  | 145                    | 0.6%                        | 386                                | 0.0%                                       |                                            | 0                                         |                                               |                           |                       |
| WWTP discharges                                       |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| Brittany Estates Mobile Home Park                     | 145                    | 0.6%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| <b>Wastewater infrastructure</b>                      |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| leakage from WW collection systems                    |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| illegal connections to SW                             |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| Overflows from sanitary sewer system                  |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| Private collection systems                            |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| <b>MS4 S-W systems (outfalls)</b>                     |                        | 0.0%                        |                                    |                                            |                                            |                                           |                                               |                           |                       |
| <b>Stormwater runoff (direct to lake)</b>             | 2,270                  | 8.9%                        | 0                                  | 0.0%                                       |                                            |                                           |                                               |                           |                       |
| <i>Natural area runoff</i>                            | 1,823                  | 7.1%                        | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| forest/rural                                          | 329                    | 1.3%                        | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| rangeland                                             | 95                     | 0.4%                        | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| water/wetland                                         | 1,399                  | 5.5%                        | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| <i>stormwater runoff from developed uses</i>          | 447                    | 1.7%                        | 447                                | 2.2%                                       | 327                                        | 264                                       |                                               |                           |                       |
| Urban open                                            | 33                     | 0.1%                        | 33                                 | 0.2%                                       | 24                                         | 19                                        |                                               |                           |                       |
| Low density residential                               | 145                    | 0.6%                        | 145                                | 0.7%                                       | 106                                        | 86                                        |                                               |                           |                       |
| Medium density residential                            | 204                    | 0.8%                        | 204                                | 1.0%                                       | 149                                        | 120                                       |                                               |                           |                       |
| High density residential                              | 31                     | 0.1%                        | 31                                 | 0.2%                                       | 23                                         | 18                                        |                                               |                           |                       |
| Transportation/communication                          | 34                     | 0.1%                        | 34                                 | 0.2%                                       | 25                                         | 20                                        |                                               |                           |                       |
| <b>Agriculture</b>                                    | 209                    | 0.8%                        | 209                                | 1.0%                                       | 153                                        | 123                                       |                                               |                           |                       |
| <b>Atmospheric deposition (wet/dry)</b>               | 3,197                  | 12.5%                       | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| <b>Tributary inflows</b>                              | 5,683                  | 22.2%                       | 5,683                              | 28.5%                                      | 4,153                                      | 3,353                                     |                                               |                           |                       |
| Hatchett Creek                                        | 4,259                  | 16.6%                       | 4,259                              | 21.4%                                      | 3,112                                      | 2,513                                     |                                               |                           |                       |
| Little Hatchett Creek                                 | 1,424                  | 5.6%                        | 1,424                              | 7.1%                                       | 1,041                                      | 840                                       |                                               |                           |                       |
| <b>Seepage/groundwater</b>                            | 540                    | 2.1%                        | 0                                  | 0.0%                                       | 0                                          | 0                                         |                                               |                           |                       |
| <b>Septic tanks</b>                                   | 108                    | 0.4%                        | 108                                | 0.5%                                       | 79                                         | 64                                        |                                               |                           |                       |
| <b>Internal nutrient recycling</b>                    | 13,478                 | 52.6%                       | 13,478                             | 67.6%                                      | 9,850                                      | 7,952                                     |                                               |                           |                       |
| <b>Loading information</b>                            |                        |                             |                                    |                                            |                                            |                                           |                                               |                           |                       |
| TMDL baseline TP-loading and % lbs/yr                 | 25,630                 | 100.0%                      | 19,925                             | 100.0%                                     | 14,561                                     | 11,756                                    |                                               |                           |                       |
| TMDL stormwater baseline loading lbs/year             | 25,485                 |                             |                                    |                                            |                                            |                                           |                                               |                           |                       |
| Total Maximum Daily Load Allocation(lbs/yr)           | 10,924                 |                             |                                    |                                            |                                            |                                           |                                               |                           | 10,924                |
| TP Loading reduction needed in lbs/yr                 | 14,561                 |                             |                                    |                                            |                                            |                                           |                                               |                           |                       |
| <b>Loading reduction needed for Orange Lake</b>       | 6,223                  |                             |                                    |                                            |                                            |                                           |                                               |                           |                       |

DRAFT

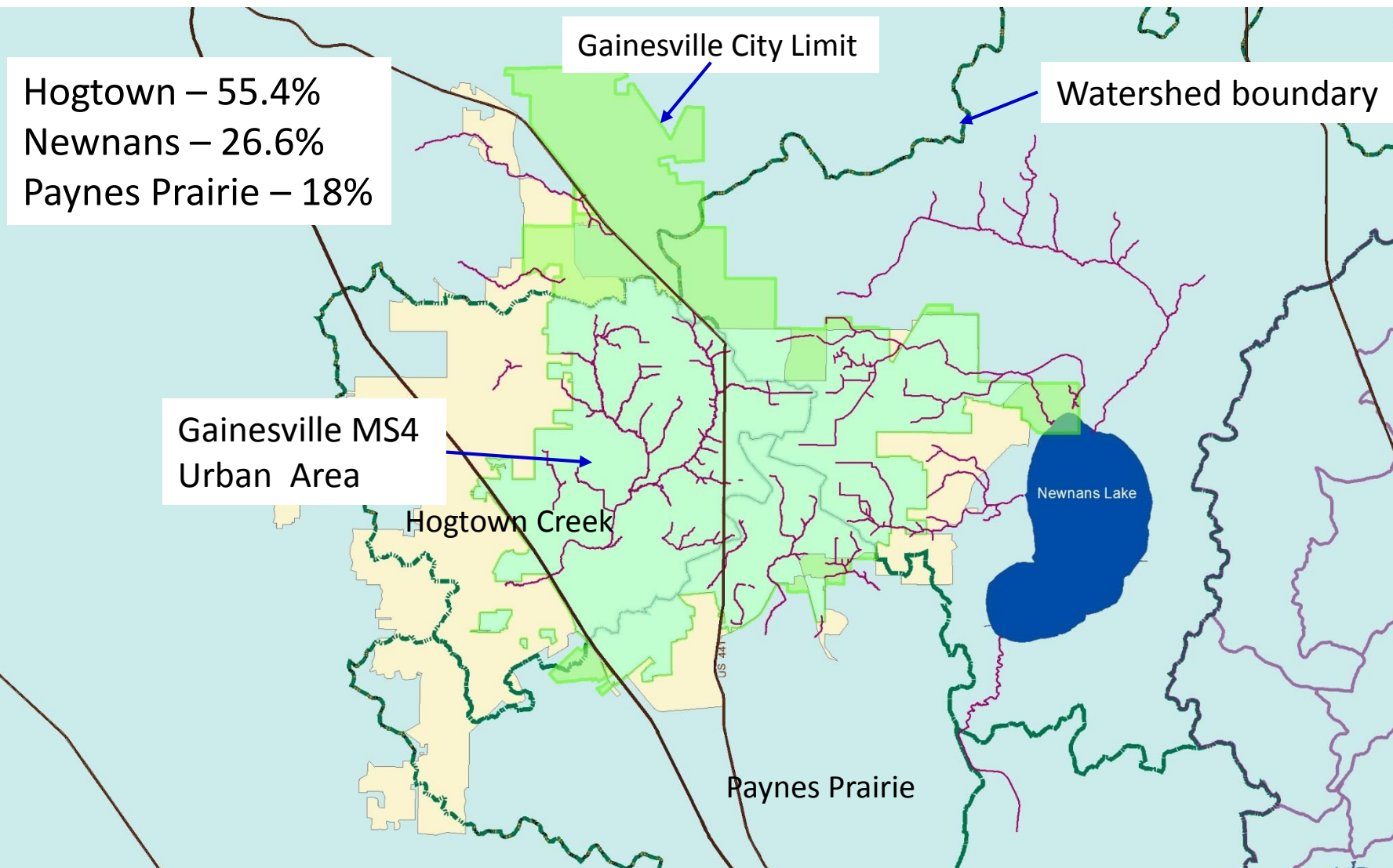


# Total Loading Reduction

- Developed land uses + septic system = total loading reduction and total allocation.
- Point sources have own allocation given in the TMDL.
- Nutrient budget is tool for estimating loading reductions from projects and also transport of reductions downstream.



# Gainesville Urban Boundary



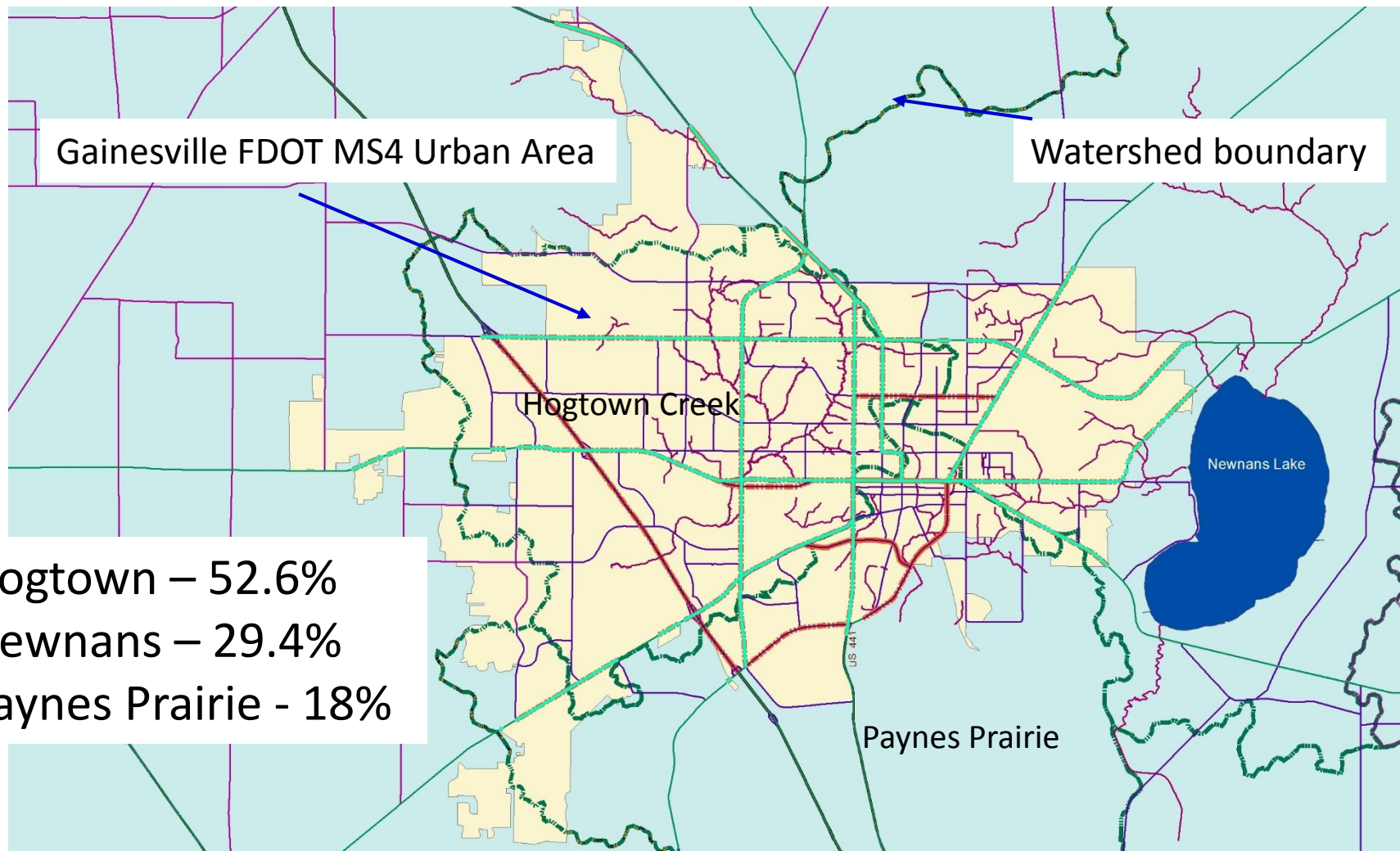


# Question

- Fourth Question: Do we allocate by jurisdiction or between Gainesville urban area and non Gainesville urban area?



# FDOT Delineated Urban Area



Hogtown – 52.6%  
Newnans – 29.4%  
Paynes Prairie - 18%



# Internal Loading

- Part of budget.
- Accounting for loading reductions.
  - Quantification so far has been difficult.
  - Projects do address.
  - Consider reduction in watershed = internal load reduction.
- Role of internal loading:
  - Recycles nutrient stored in sediment.
  - May add new loading through algal activities.



# To Do List

- Need jurisdiction boundaries.
- Adjust watershed boundaries for Newnans and Orange Lake to match TMDL model.
- Estimate area of each land use category.
- Answer questions.



# Next Steps

- Questions?
- Follow-up assignments.
- Future meeting planning.
  - Next BMAP meeting late February.

A photograph of an empty lecture hall with rows of blue seats. The seats are arranged in a tiered fashion, facing towards the front of the room. The background is a plain, light-colored wall.

• Any comments or questions???