Updating Jacksonville's Stormwater Master Plan: New Vision for the Future

John Pappas, P.E. – Deputy Public Works Director

Marcy Cook – Utility Billing Manager

UNF – 2010 Environmental Symposium

CDM

Jacksonville Stormwater Utility

Mapping the Risk

Agenda

- Stormwater Program Goals
- Funding the Vision – Jacksonville Stormwater Utility
- Focusing the Vision – Master Stormwater Management Plan
- Implementing the Vision
  - River Accord
  - TMDL – Basin Management Action Plan
  - Septic Tank Phase Out
  - Capital Project Selection
- Conclusion

COJ Stormwater Program Goals

- The city's stormwater program has two primary goals:
  - Improve public safety through floodplain management and CIP projects
  - Maintain environmental stewardship for the Lower St. Johns River (LSJR) and its tributaries
- Achieving these goals requires:
  - Sufficient, dedicated funding
  - A modern, accurate representation of current problems and future opportunities

Jacksonville Stormwater Utility

Reaching Stormwater Program Goals Requires a Stable and Dedicated Funding Source

Increasing Costs

- Aging infrastructure
- TMDL regulations
- Failing septic tanks
- Flood control
- River Accord

Decreasing Revenue

- Property tax reform
- Economic downturn
- Slowdown in residential and commercial development

Stormwater Utility - Rate Structure

Residential Rate Structure:

	SFU	Annual Charge
Single Family		
Small	0.5	$30
Medium	1	$60
Large	1.5	$90
Condo/Townhouse	0.49	$29.40
Duplex/Triplex/Quadplex	0.49	$58.80/$88.20/$117.60
Apartment (5-9)	0.32	(0.32) x # units x $60
Apartment (>9)	0.44	(0.44) x # units x $60
Mobile Home	0.81	$48.60

Non-residential Rate Structure: Impervious area/3100 sf x $60

Stormwater Utility - Credits

- Permitted Stormwater Pond credit - 30%
- Detailed Drainage Study credit – up to 50%
  - Landlocked System credit – Bonus +25%
- Programs & Services - 4%

  (Provide education or other non-structural services to reduce burdens on the stormwater system)
- NPDES Industrial permit – 2%
- Education credit – 2%

  (For businesses/organizations >100 employees)
- Other Best Management Practices – 2%

  (Stormwater quality initiatives unique to the other credits offered)

➔ JSU has awarded over $1.5 million in credits since 2008

Stormwater Utility - Billing

- Billing methods studied by Stormwater Advisory Committee (SWAC) in 2007
- Three methods considered: stand alone, tax bill, utility bill
- SWAC recommended independent billing
- COJ issued bills in 2008 and 2009
  - Average 76% collection rate
  - Budgeted for 85% collection
- In 2010, fee billing as non-ad valorem assessment
  - Budgeting for 95.5% collection; expect 99%

Stormwater Utility - Revenue

- Stormwater fee generated $42.2 million over 18 months
  - Residential properties comprise majority of unpaid
- Future performance based on minimal growth
  - 1% per year
- Anticipating $27 - $30 million per year over the next five years
- No base rate increase allowed without legislative approval

Master Stormwater Management Plan

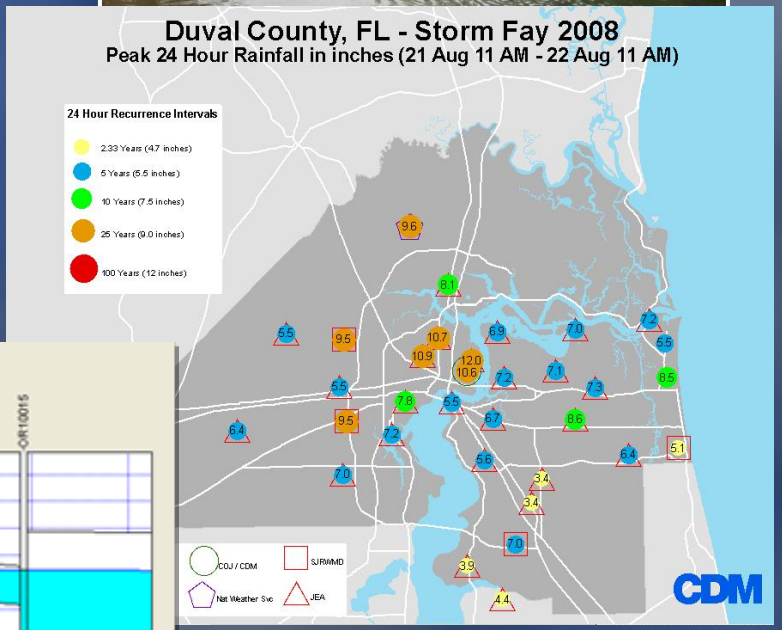
Updating and Modernizing Jacksonville's Stormwater Guide

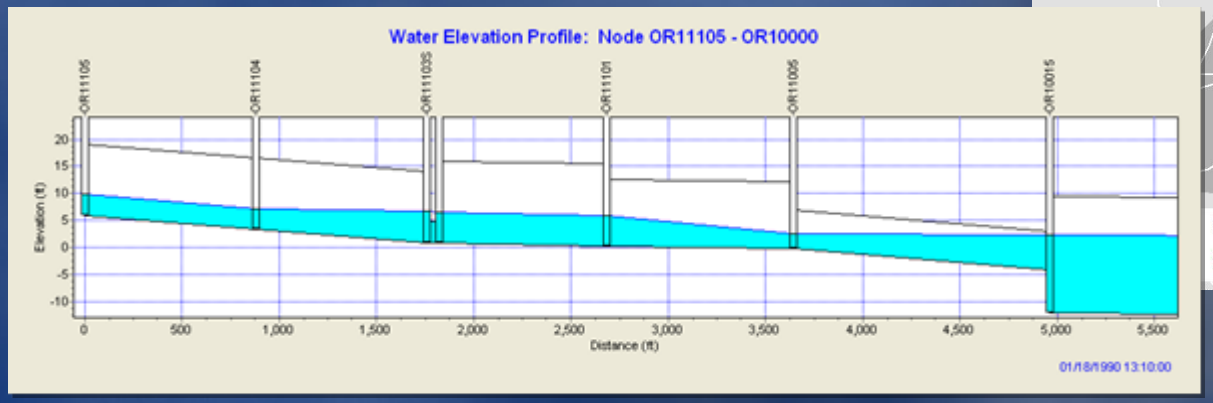
- Six Components of the MSMP Update
- Hydrologic and Hydraulic (H&H) modeling
- Mapping – FEMA

Through these efforts, the city has been able to develop an effective toolset to meet the Stormwater Program Goals

Components of the MSMP Update

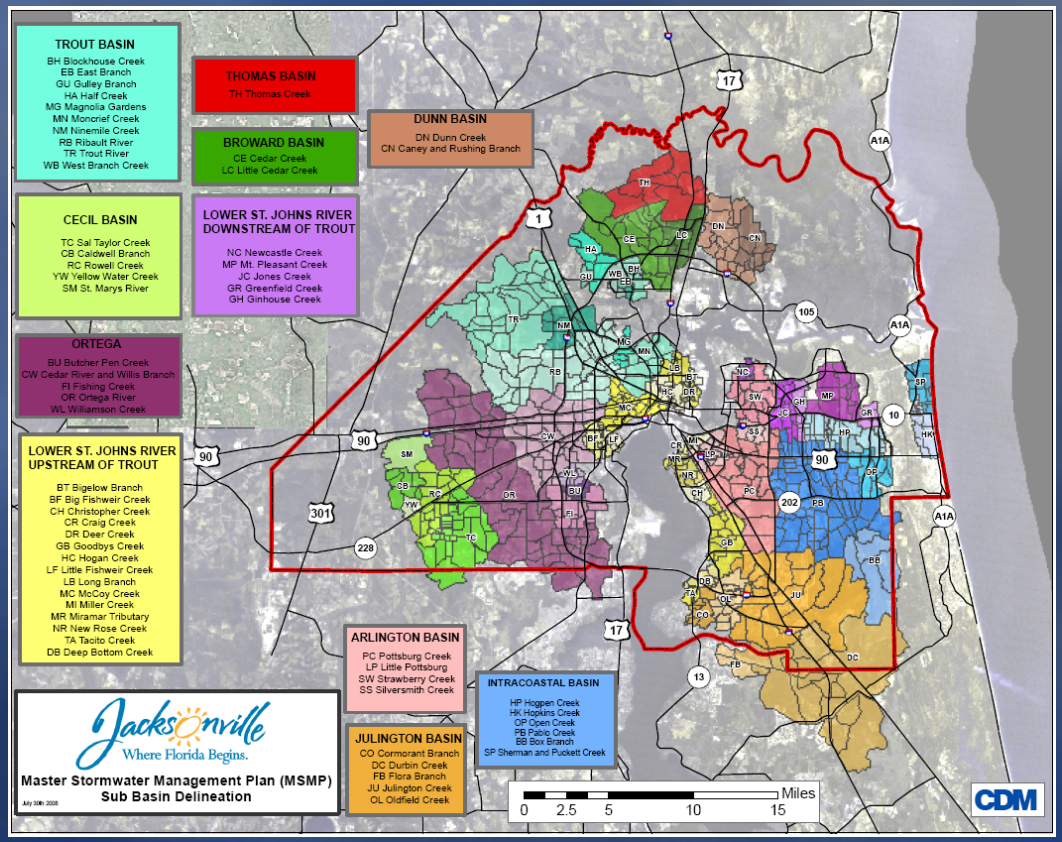
- Datum Conversion
- LiDAR Topographic Data
- Riverine Analysis
- Coastal Redelineation
- Effective Zone Digitization
- Community Outreach





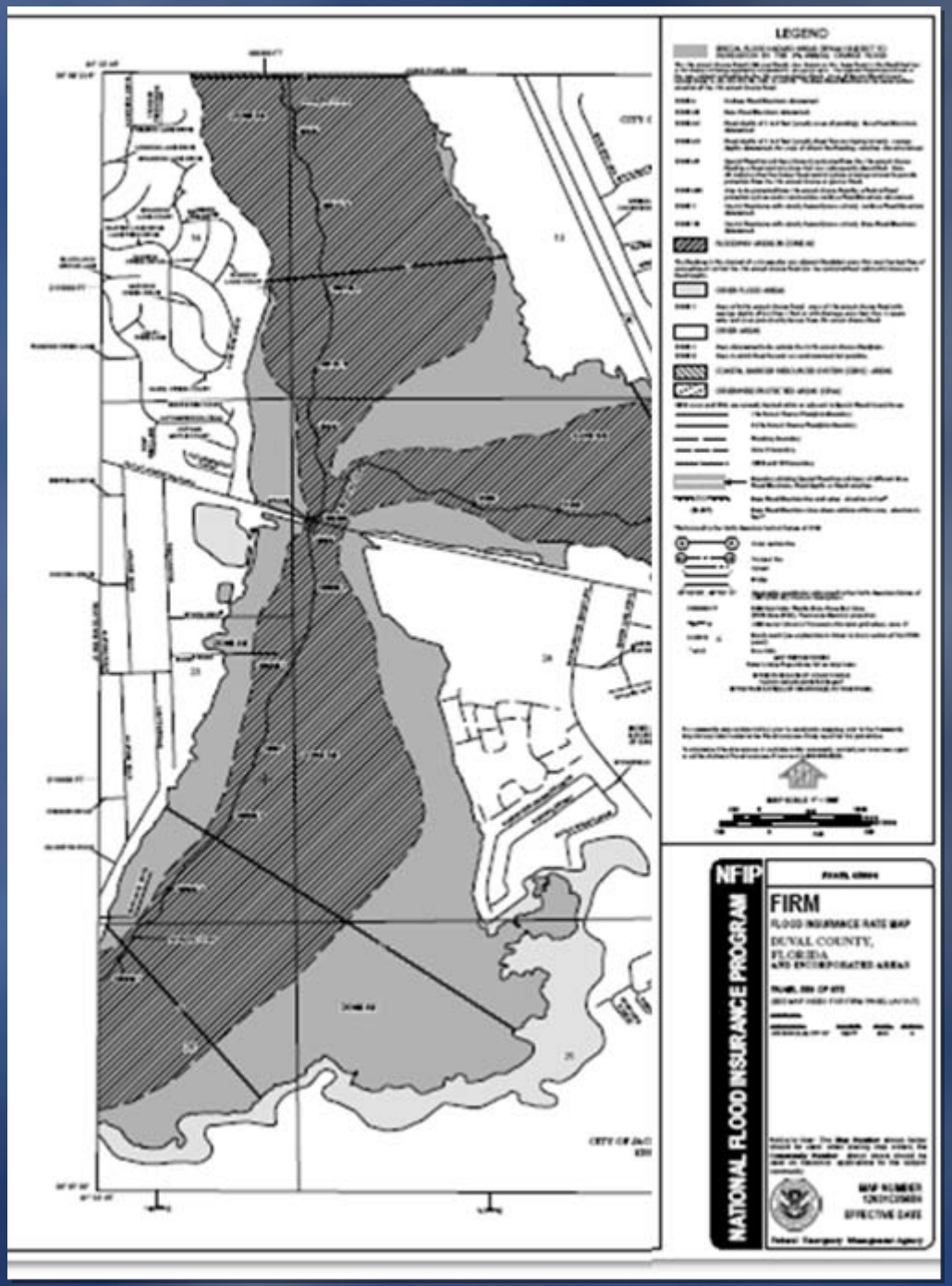
Hydrologic and Hydraulic (H&H) Modeling

- 426 Detailed Stream Miles
- 73 Approximated Stream Miles
- AO, AH digitized from effective
- 245 surveyed structures
- 187 surveyed cross sections
- Model: SWMM 5.0
- Model results validation during TS Fay (August 2008)



Mapping – FEMA DFIRMs

- The final mapping results were standard FEMA DFIRM panels



Implementing the Stormwater Program

The River Accord

- In October 2006, Mayor John Peyton joined partners from JEA, SJRWMD, WSEA, and DEP in *The River Accord – A Partnership for the St. Johns*
- Total funds committed - $700 million
- Four goals for pollutant reduction:
  - Phasing out older technology treatment plants
  - Improving other wastewater plants and building pipelines necessary for water reuse
  - Eliminating failing septic tanks
  - Capturing and treating stormwater prior to entering natural waterways
- City of Jacksonville's commitment - $150 million

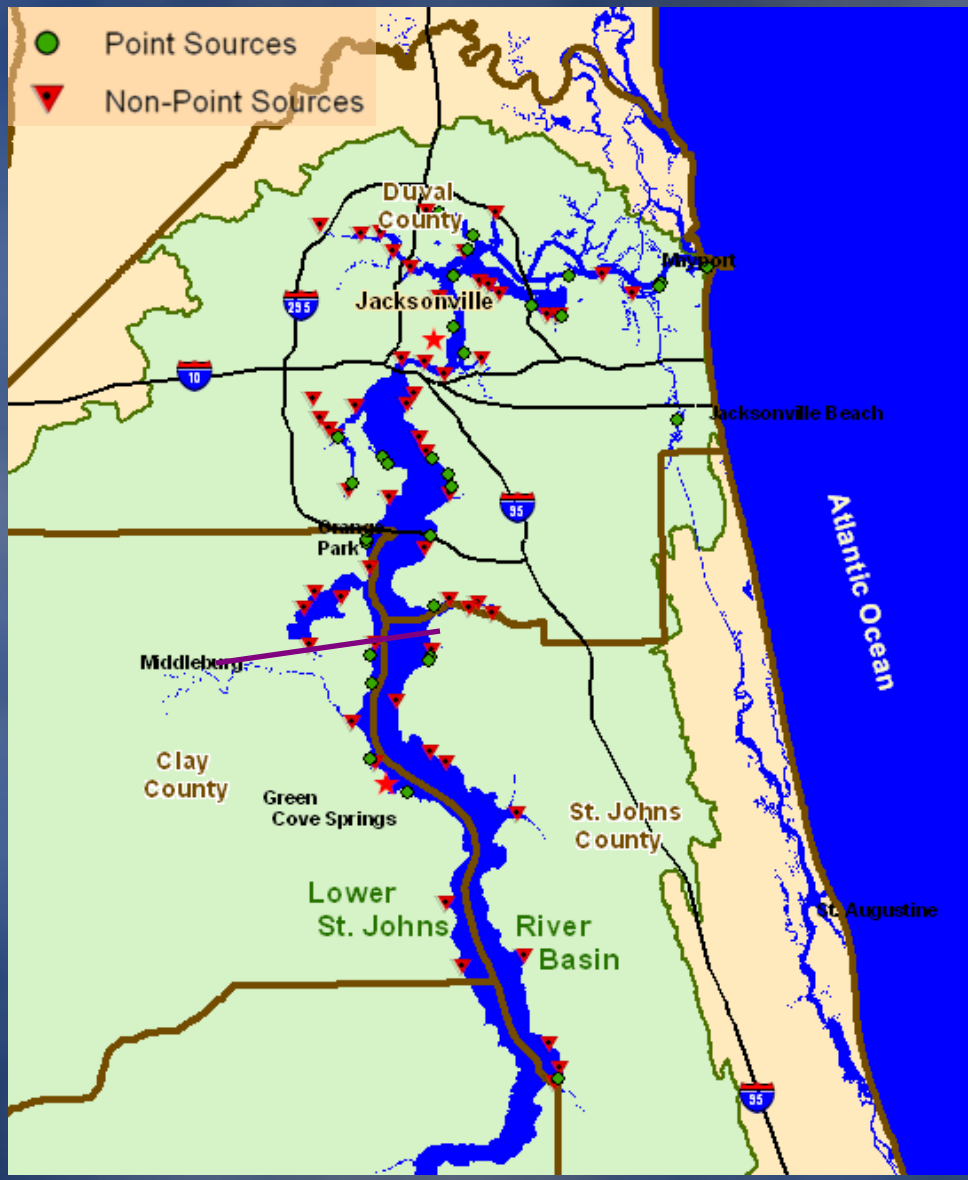
Implementing the Stormwater Program

Introduction of TMDLs

- TMDLs were established for the Lower St. Johns River Basin (LSJRB) as part of the BMAP in October 2008
- Established Reduction Goals for Pollutant Loads
  - The city was allocated a non-point source pollutant load reduction goal of 107 MT TN/yr
- Tools Identified to meet TN Reduction Goals
  - Septic Tank Phase-Out
  - Non-Structural BMPs
  - Stormwater Capital Improvement Projects

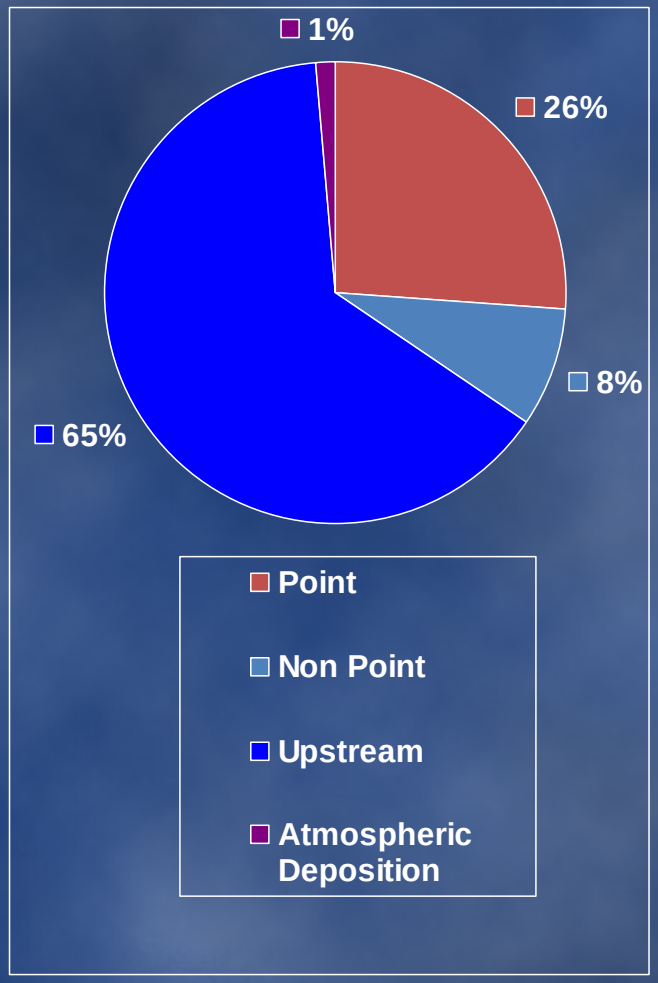
TMDLs of the Lower St. Johns Basin

- Duval County in Marine Section
- Clay County mostly in Marine Section (Black Creek)
- Developed Segment of NW St. Johns in Marine Section

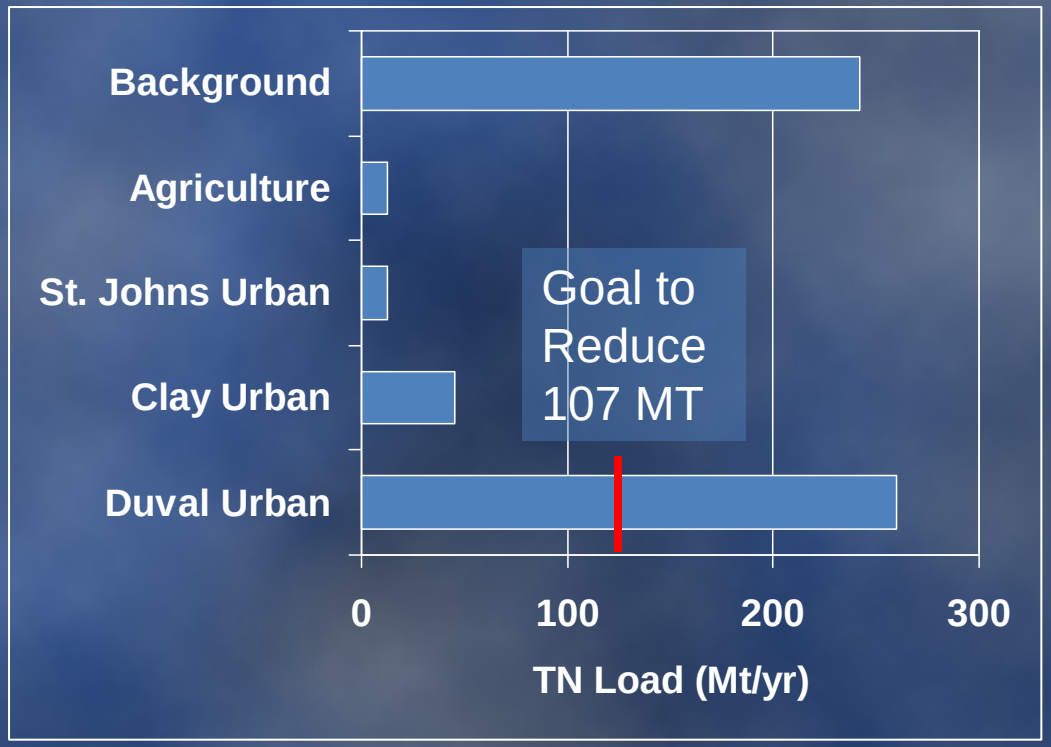


Pollutant Load Reductions Established

Total TN Load

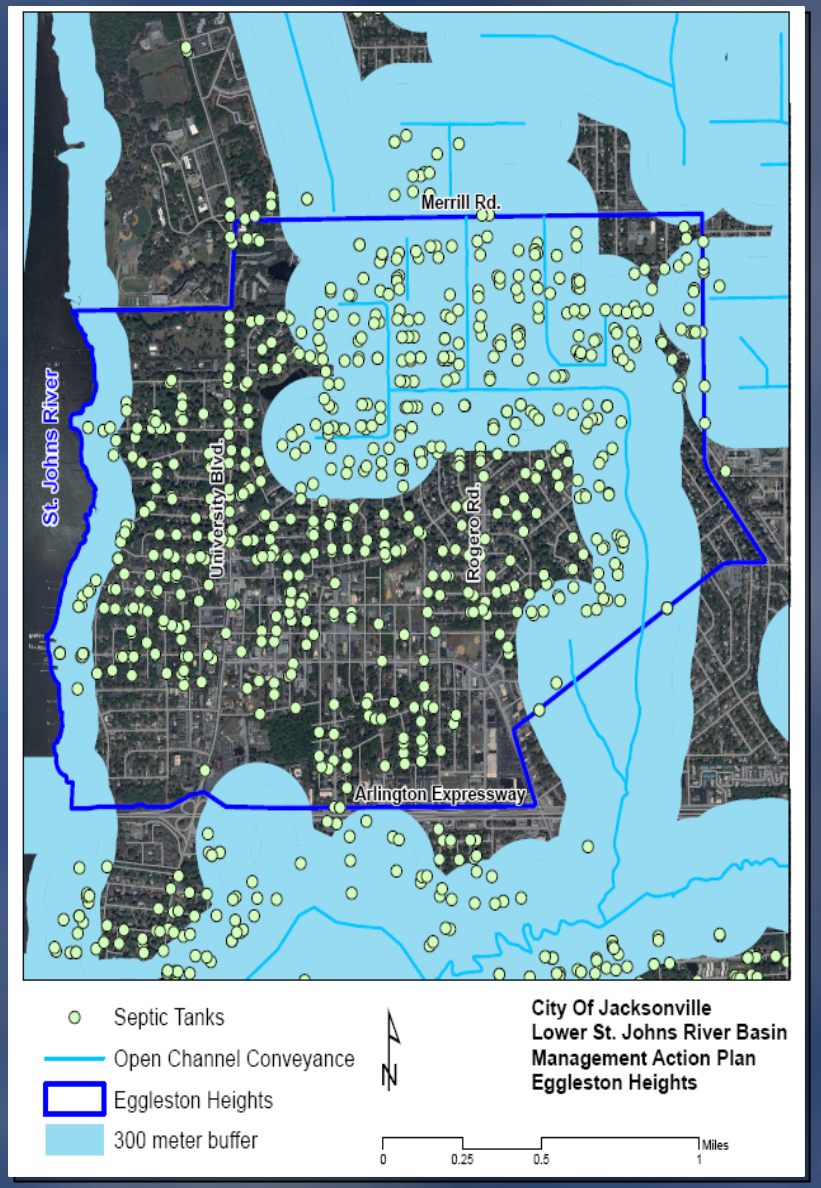


Non-Point TN Loads



Septic Tank Phase-Out

- Each failing septic tank contributes approx. 8.2 kg of nitrogen
- The same volume treated by a wastewater treatment plant contributes 1.4 kg/year of nitrogen
- Removing septic tanks in a 300-meter stream buffer can improve water quality

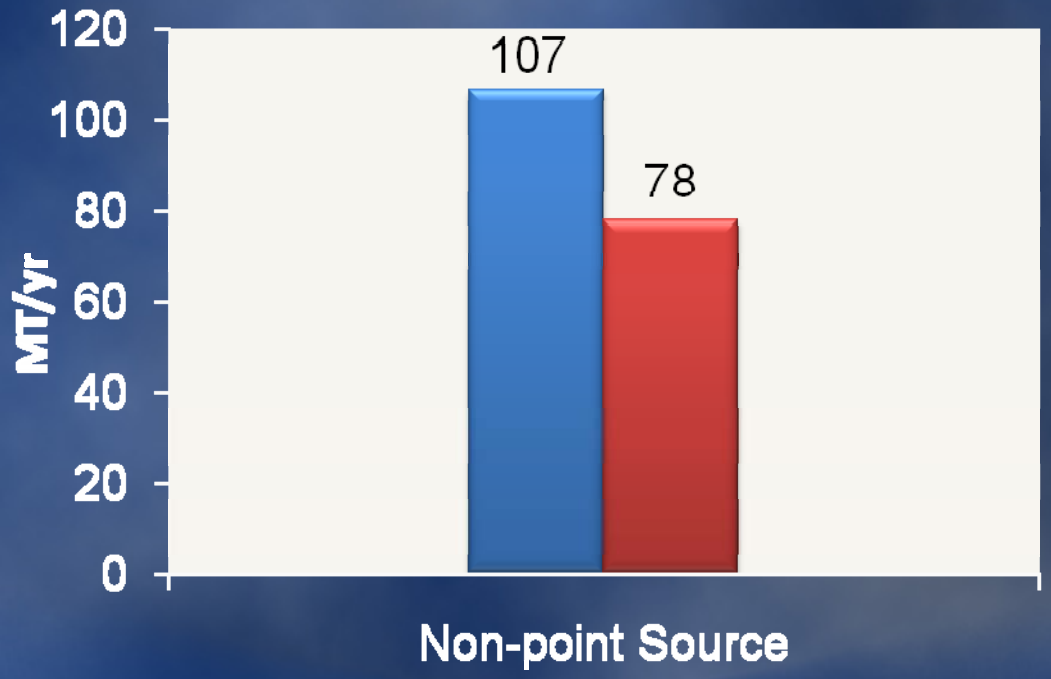


Source: Watershed Management Model Manual, Civil Engineering Reference Manual, and Advanced Wastewater Treatment Standards (Florida Apricot Act 1994)

Septic Tank Phase-Out

By the Numbers: Reduction Impacts

- **15,238 septic tanks phased out = 111 MT/yr**
- **An estimated 75 percent phased out = 78 MT/yr**
- **An estimated 50 percent phase out = 52 MT/yr**



Non-Structural BMPs

BEEMATS

WATER REUSE

BIO RETENTION & LOW IMPACT DEVELOPMENT

Capital Stormwater Projects

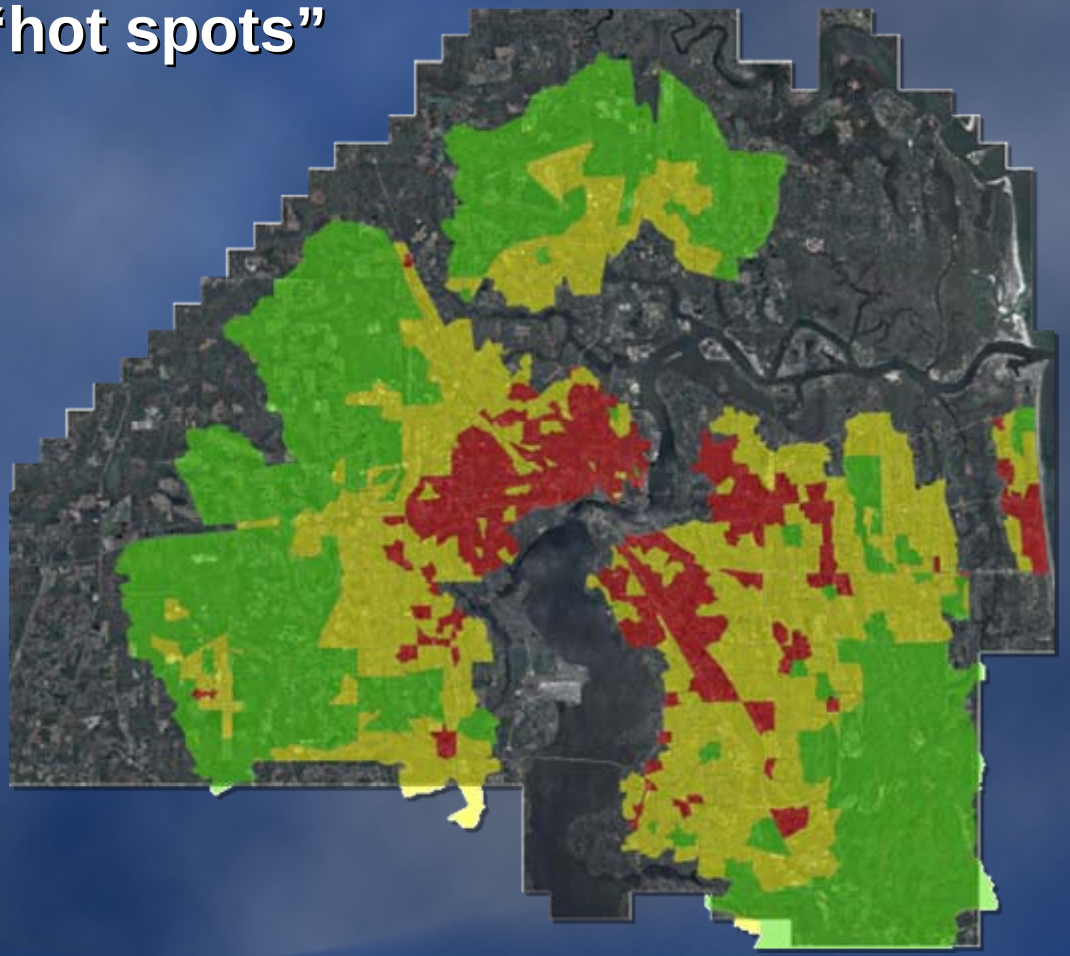
COJ used Watershed Management Model (WMM) for Water Quality Evaluation

- **Developed based on GIS coverage**
  - **Land Use (2004)**
  - **Best Management Practices (BMPs)**
- **Also used other local/regional data**
  - **Rainfall**
  - **Streamflow**
  - **Runoff and baseflow concentrations**

Capital Stormwater Projects

Water monitoring identified nutrient concentrations

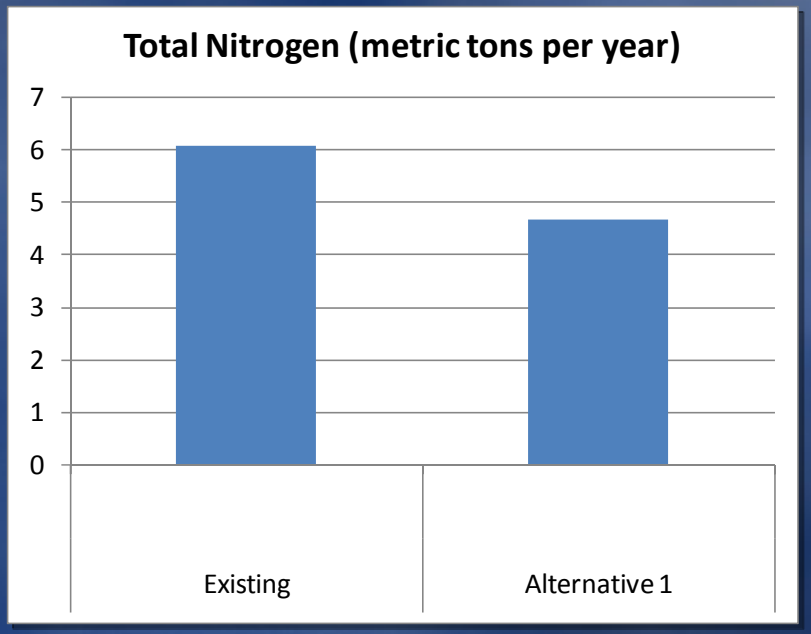
- WMM runs performed on each of the sub-basins
- Highlighted nutrient “hot spots”

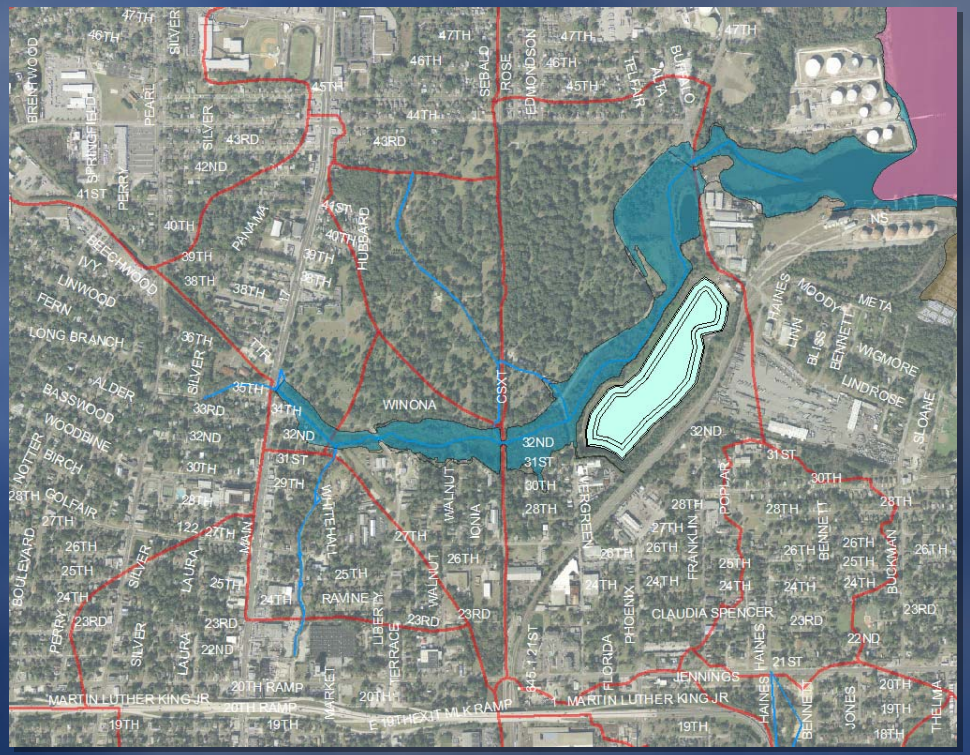


Capital Stormwater Projects

Determining quality improvements through proposed BMPs

- **Example: A 22-acre pond in Long Branch sub-basin reduces TN load by 23 percent**



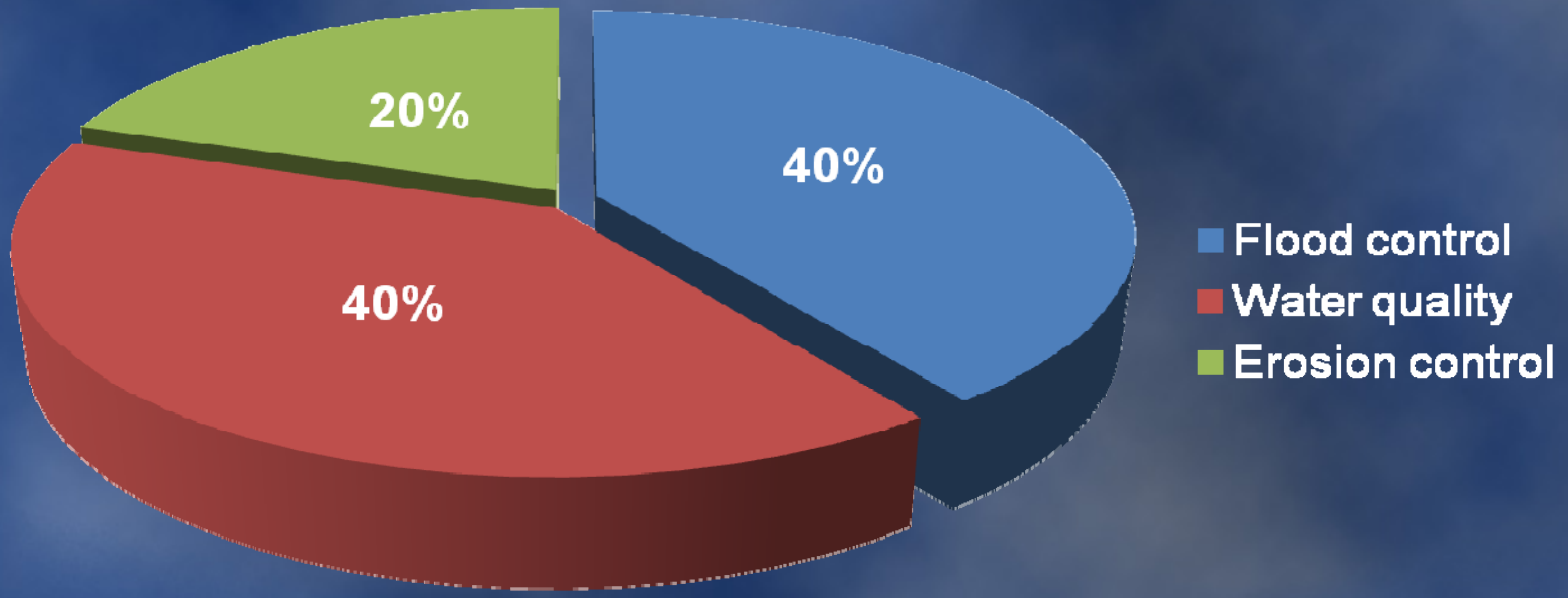


Capital Project Selection

- Importance of Water Quality represented a significant departure from previous capital planning efforts
  - Previous efforts focused on flood control
- Developed project selection matrix to ensure maximum “bang for the buck”
  - Establish distinct alternatives and costs
  - Identify relationships between alternatives
  - Quantify benefits based on level of service goals
  - Standardize benefits to compare at a local and countywide level

Capital Project Selection

- City defined a prioritization and weighting system for each level of service goal:
  - Water Quality – 40%
  - Flood Control – 40%
  - Erosion Control – 20%



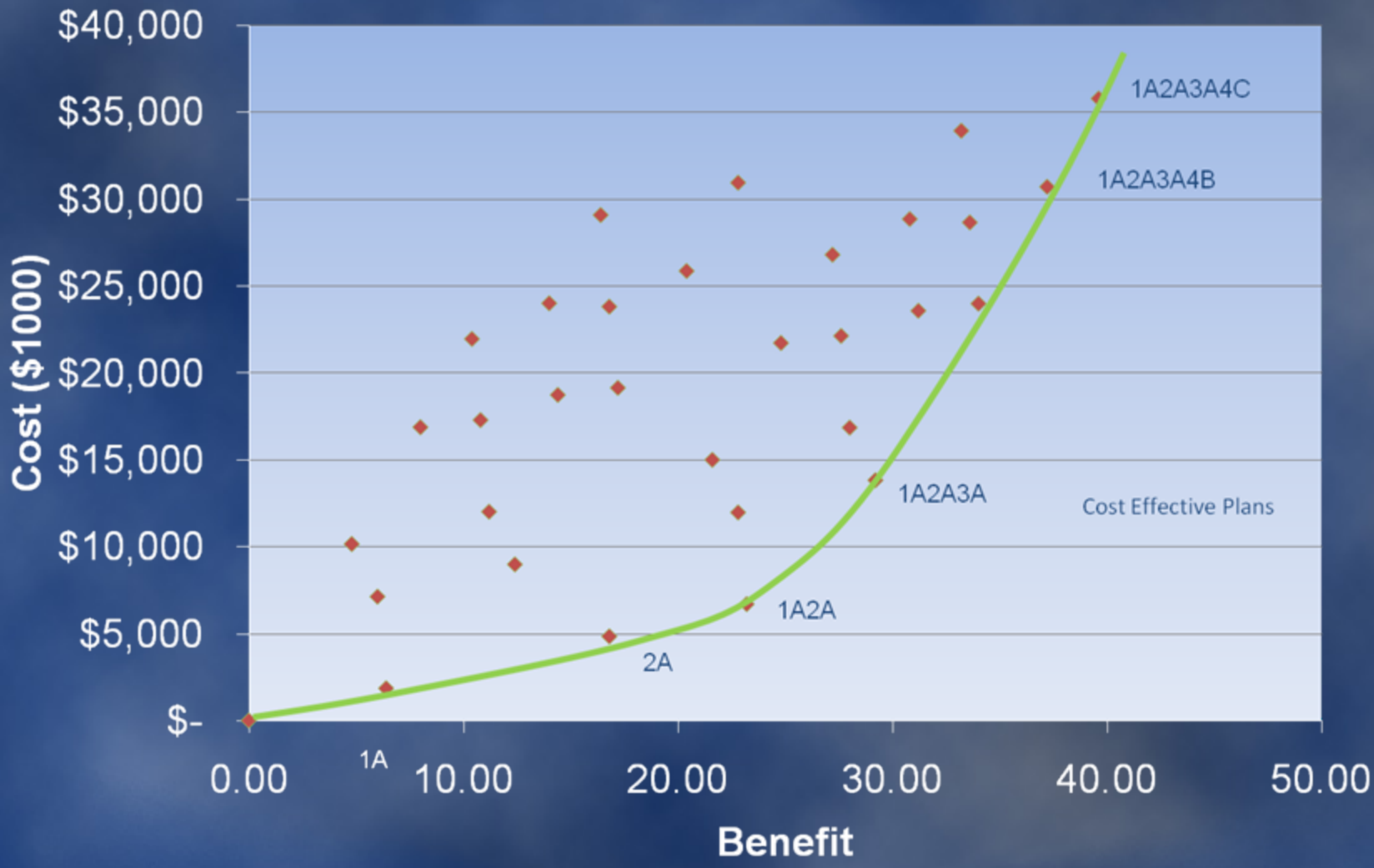
Capital Project Selection

- Alternatives are ranked based on a structured cost/benefit analysis in a Project Selection Matrix

	Water Quantity 40%	Water Quality 40%	Erosion 20%	Total Benefit Score	Cost ($1000)
Alt 1	7	0	24	6	$1,857
Alt 2	0	42	0	17	$4,848
Alt 3	0	15	0	6	$7,136
Alt 4A	0	12	0	5	$10,166
Alt 4B	0	20	0	8	$16,892
Alt 4C	0	26	0	10	$21,977

Capital Project Selection

- Determine most cost effective combination of projects

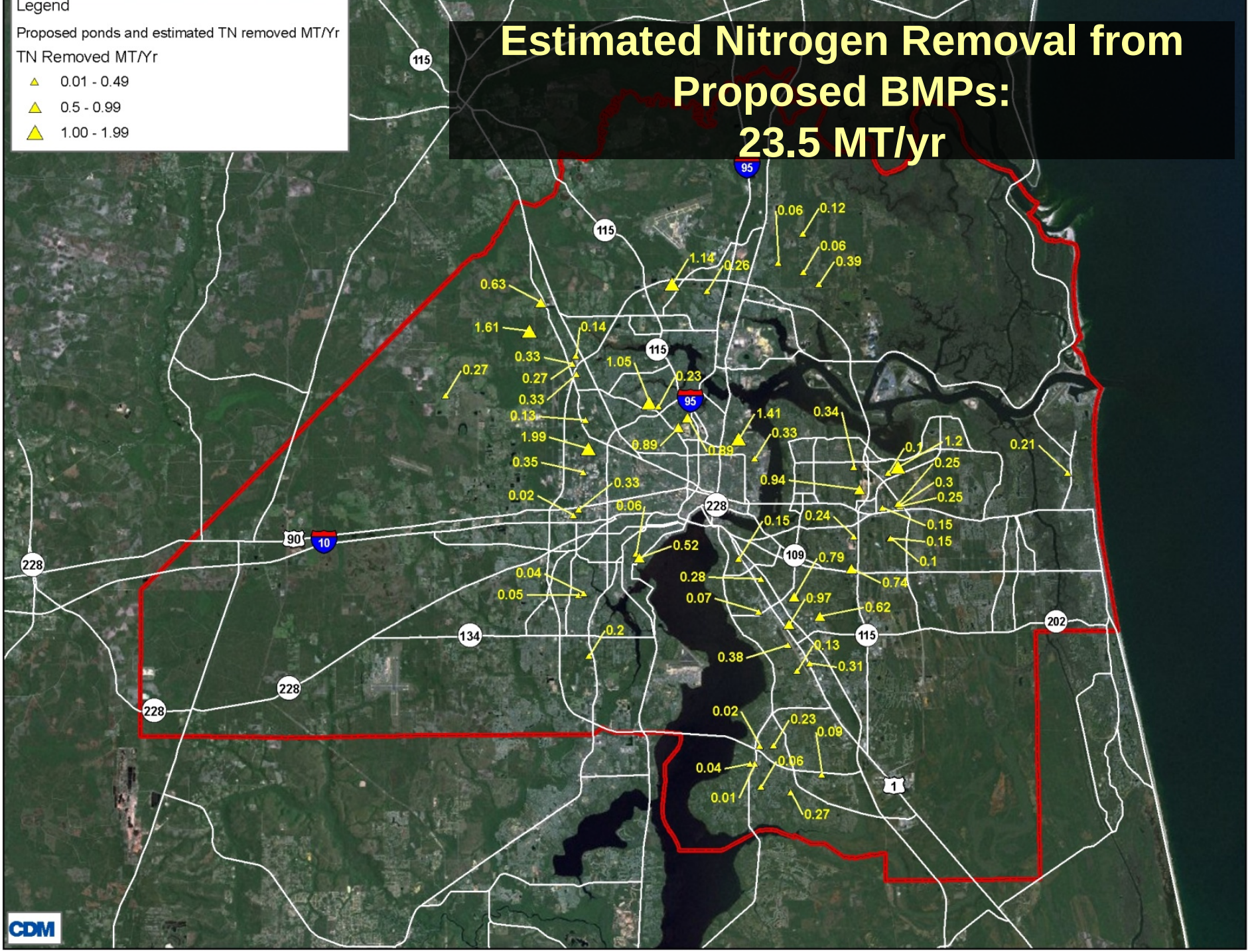


Capital Project Selection

- **Through the Project Selection Matrix, the MSMP has identified over 40 projects countywide**
  - **Projects will continue to be vetted through outreach to the public, River Accord partners, and elected officials**
  - **Projects will be introduced and funded through the Jacksonville Stormwater Utility CIP program**

			Total Benefits	Cost	Cost/Benefit
Julington	1A	2ac RSF + 2-5ft CMP + veg (opt)	0.58	$1,000,000	$1,730,014
Dunn	3B	New Berlin RSF with Veg	0.79	$1,400,000	$1,763,831
Ortega	1B	RSF with Vegetation	0.26	$513,000	$1,958,469
LSJRU	1A	Philips Hwy Pond	0.55	$1,100,000	$1,992,379
LSJRU	A1B1	Close McCoy Crk Blvd, Channel Improvements Myrtle to Outfall	1.04	$2,800,000	$2,702,559

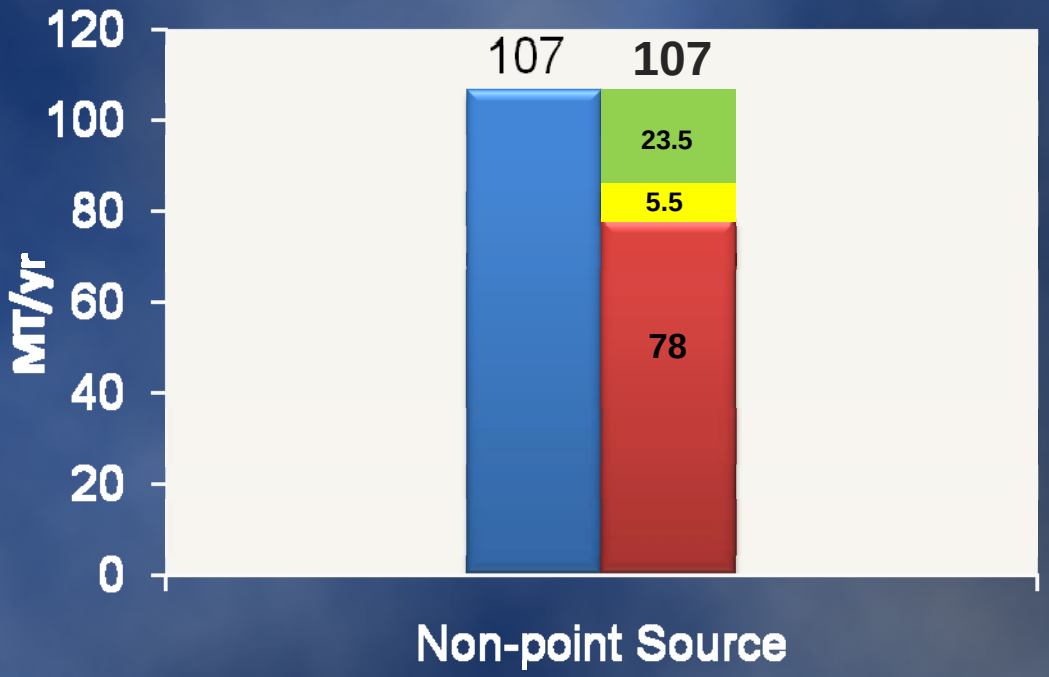
Estimated Nitrogen Removal from Proposed BMPs: 23.5 MT/yr



Water Quality Toolbox

- Septic Tank Phase-Out = 78 MT/yr
- Non-structural BMPs = 5.5 MT/yr
- Stormwater Projects = 23.5 MT/yr

= 107 MT/yr



Conclusion

In order to meet the commitment of The River Accord and establish a new vision for stormwater management, the city has:

- Taken a proactive role to create and prioritize projects that address both water quality and water quantity concerns
- Established a dedicated source of funding to improve stormwater management
- Developed new flood maps
- Coordinated MSMP efforts with State Agencies
- Created the means to test future projects against established metrics

Questions