Watch out MS4s!

FSA 2021 Annual Conference

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11:00 AM to 11:45 AM

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Presentation Overview

- BMAP Process, Nutrient Sources, and Load Allocations
- MS4 BMAP Obligations
- Costs of Atmospheric Deposition
- Alternative Treatment of Atmospheric Deposition
- Examples from Lower St. Johns River and Tampa Bay

Basin Management Action Plan (BMAP)

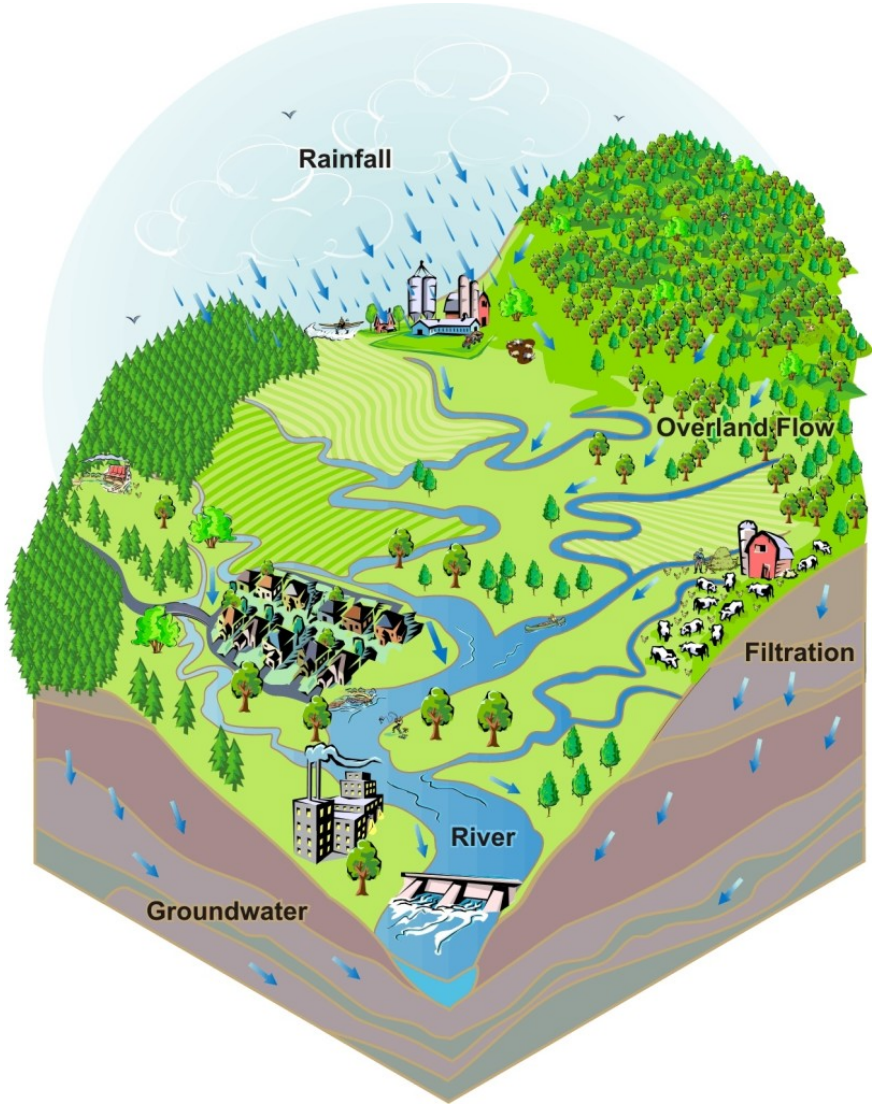
- BMAP Overview
  - A framework for restoring water quality
  - Developed by local stakeholders and agencies
  - Identifies projects, strategies, and actions designed to reduce pollution and meet established total maximum daily loads (TMDLs)

- Load Allocations (LA) vs. Waste Load Allocation (WLA)
  - LA: non-point source and background sources (i.e., atmospheric)
  - WLA: point sources (i.e., wastewater, MS4s)

BMAP Load Source Categories

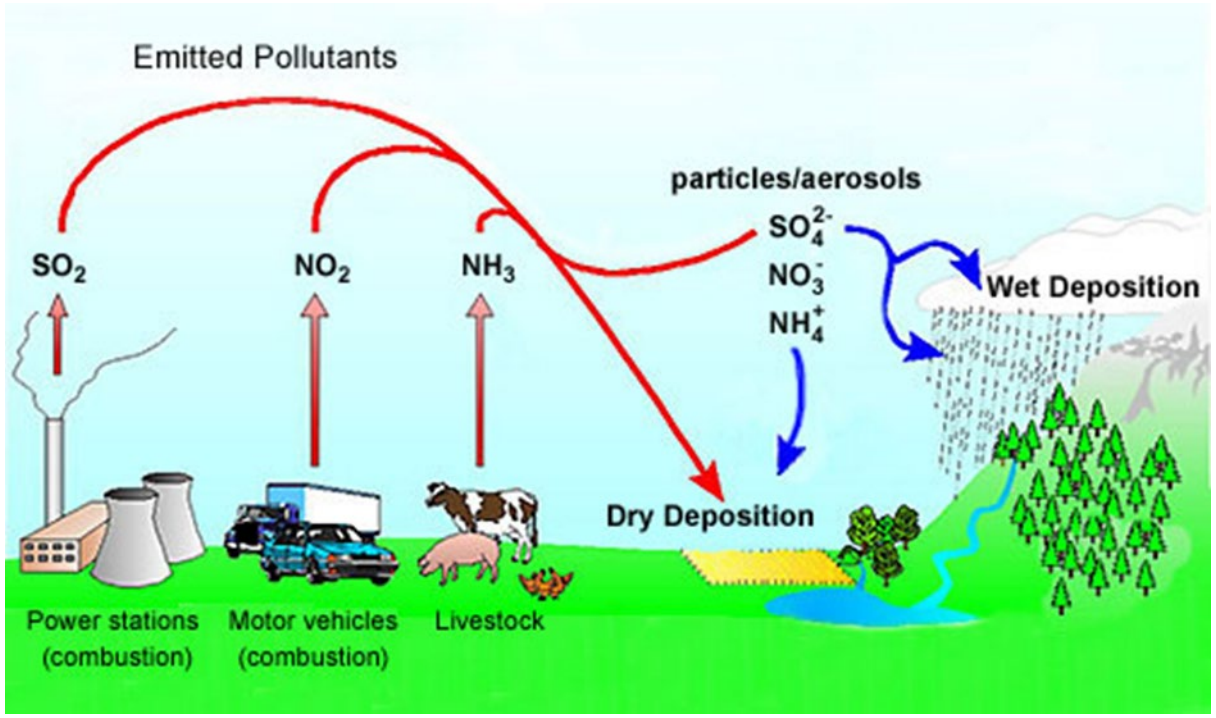
- Controllable Loads
  - Urban stormwater (MS4s)
  - Agricultural operations
  - Wastewater treatment facilities
  - Septic systems

- Uncontrollable Loads
  - Natural lands
  - Groundwater
  - Atmospheric deposition



Anthropogenic Sources of Nutrients from Atmospheric Deposition

- Internal combustion engines (cars, trucks, ships, airplanes)
- Coal-fired power plants
- Industrial operations
- Biomass combustion
- Fertilizer production
- Agricultural operations



NPDES Phase I MS4 Permit Requirements

1. **For water bodies within an adopted DEP TMDL and Basin Management Action Plan (BMAP).**

   a. BMAP Adopted:

   In accordance with Section 403.067, F.S., NPDES permits must be consistent with the requirements of adopted TMDLs. Therefore, when a Basin Management Action Plan (BMAP) and/or an implementation plan for a TMDL for a water body into which the permitted MS4 discharges the pollutant of concern is adopted pursuant to Section 403.067(7), F.S., the MS4 operator must comply with the adopted provisions of the BMAP and/or implementation plan that specify activities to be undertaken by the permittee during the permit cycle.

NPDES Phase II MS4 Permit Requirements

B. Requirements for Total Maximum Daily Loads and/or Reasonable Assurance Plans to Address Impaired Waters Under Section 403.067, F.S. [40 CFR §122.34(c)]

The permittee shall address the implementation of Total Maximum Daily Loads (TMDL) and Reasonable Assurance Plans (RAP) in accordance with Section 403.067, F.S.

1. Basin Management Action Plans (BMAPs) and Reasonable Assurance Plans (RAPs)

a. Adopted BMAPs or RAPs

If the permittee discharges stormwater to a waterbody within the boundary of a Department-adopted BMAP or RAP in accordance with Section 403.067, F.S., the permittee shall comply with the adopted provisions of the BMAP or RAP that specify activities to be undertaken by the permittee.

b. BMAPs and RAPs in Development

Upper Ocklawaha BMAP

Total Phosphorous (lb/yr)

Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TP	MS4 Required Reduction
				MS4	Other	Atm Deposition	Other				
Lake Harris	22,192	12,386	9,806	3,295	9,091	5,422	4,384	18,302	3,890	27%	1,035
Lake Denham	3,316	2,383	933	328	2,055	77	855	1,307	2,008	14%	277
Lake Roberts	306	203	104	73	130	37	66	220	86	36%	31
Marshall Lake	683	624	60	377	247	40	20	214	470	60%	284
Lake Yale	3,692	1,640	2,052	693	947	1,443	609	2,844	848	42%	358
Trout Lake	1,998	1,586	412	514	1,072	30	382	521	1,477	32%	479
Lake Carlton	478	291	187	121	170	118	69	195	283	42%	118
Upper Ocklawaha Basin	32666	19113	13553	5401	13712	7167	6385	23604	9062	28%	2581

Total Phosphorous (lb/yr)

Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TP	MS4 Required Reduction	AD % of Controllable TP	AD Required Reduction	Change of MS4 Required Reductions
				MS4	Other	Atm Deposition	Other							
Lake Harris	22,192	17,808	4,384	3,295	14,513	0	4,384	18,302	3,890	19%	720	30%	1,184	-315
Lake Denham	3,316	2,460	855	328	2,132	0		1,307	2,008	13%	268	3%	63	-9
Lake Roberts	306	240	66	73	168	0		220	86	30%	26	16%	13	-5
Marshall Lake	683	664	20	377	287	0		214	470	57%	267	6%	28	-17
Lake Yale	3,692	3,083	609	693	2,390	0		2,844	848	22%	191	47%	397	-168
Trout Lake	1,998	1,616	382	514	1,102	0		521	1,477	32%	470	2%	27	-9
Lake Carlton	478	409	69	121	288	0		195	283	30%	84	29%	82	-34
Upper Ocklawaha Basin	32,666	26,280	6,385	5,401	20,879	0	4,384	23,604	9,062	21%	2,025	27%	2,471	-556

Orange Creek BMAP

Total Phosphorous (lb/yr)

Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TP	MS4 Required Reduction
				MS4	Other	Atm Deposition	Other				
Newnans Lake	23,923	15,502	8,421	1,246	14,256	3,223	5,198	10,924	12,999	8%	1,045
Lochloosa Lake	15,054	9,603	5,451	1,667	7,936	4,248	1,203	9,932	5,122	17%	889
Orange Lake	27,296	20,993	6,303	945	20,048	2,941	3,362	15,262	12,034	5%	542

Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TP	MS4 Required Reduction	AD % of Controllable TP	AD Required Reduction	Change of MS4 Required Reductions
				MS4	Other	Atm Deposition	Other							
Newnans Lake	23,923	18,725	5,198	1,246	17,479	0	5,198	10,924	12,999	7%	865	17%	2,237	-180
Lochloosa Lake	15,054	13,851	1,203	1,667	12,184	0	1,203	9,932	5,122	12%	616	31%	1,571	-273
Orange Lake	27,296	23,934	3,362	945	22,989	0	3,362	15,262	12,034	4%	475	12%	1,479	-67

Total Nitrogen (lb/yr)

Waterbody	Baseline TN	Controllable TN	Uncontrollable TN	Controllable TN		Uncontrollable TN		TMDL	Total Reductions Needed	MS4 % of Controllable TN	MS4 Required Reduction
				MS4	Other	Atm Deposition	Other				
Newnans Lake	288,523	243,194	45,329	11,217	231,977	6,446	38,883	85,470	203,053	5%	9,366
Lochloosa Lake	391,817	302,324	89,493	13,266	289,058	72,825	16,668	172,318	219,499	4%	9,631

Waterbody	Baseline TN	Controllable TN	Uncontrollable TN	Controllable TN		Uncontrollable TN		TMDL	Total Reductions Needed	MS4 % of Controllable TN	MS4 Required Reduction	AD % of Controllable TN	AD Required Reduction	Change of MS4 Required Reductions
				MS4	Other	Atm Deposition	Other							
Newnans Lake	288,523	249,640	38,883	11,217	238,423	0	38,883	85,470	203,053	4%	9,124	3%	5,243	-242
Lochloosa Lake	391,817	375,149	16,668	13,266	361,883	0	16,668	172,318	219,499	4%	7,762	19%	42,610	-1,870

Lake Jesup BMAP

Total Phosphorous (lb/yr)

Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TP	MS4 Required Reduction			
				MS4	Other	Atm Deposition	Other							
Lake Jesup	68,724	59,124	9,600	24,217	34,907	9,600	0	41,821	26,903	41%	11,019			
Waterbody	Baseline TP	Controllable TP	Uncontrollable TP	Controllable TP		Uncontrollable TP		TMDL	Total Reductions Needed	MS4 % of Controllable TN	MS4 Required Reduction	AD % of Controllable TP	AD Required Reduction	Change of MS4 Required Reductions
				MS4	Other	Atm Deposition	Other							
Lake Jesup	68,724	68,724	0	24,217	44,507	0	0	41,821	26,903	35%	9,480	14%	3,758	-1,539

Total Nitrogen (lb/yr)

Waterbody	Baseline TN	Controllable TN	Uncontrollable TN	Controllable TN		Uncontrollable TN		TMDL	Total Reductions Needed	MS4 % of Controllable TN	MS4 Required Reduction			
				MS4	Other	Atm Deposition	Other							
Lake Jesup	600,396	516,396	84,000	329,421	186,975	84,000	0	514,204	86,192	64%	54,984			
Waterbody	Baseline TN	Controllable TN	Uncontrollable TN	Controllable TN		Uncontrollable TN		TMDL	Total Reductions Needed	MS4 % of Controllable TN	MS4 Required Reduction	AD % of Controllable TN	AD Required Reduction	Change of MS4 Required Reductions
				MS4	Other	Atm Deposition	Other							
Lake Jesup	600,396	600,396	0	329,421	270,975	0	0	514,204	86,192	55%	47,291	14%	12,059	-7,693

FSA / UF 2011 Report

Separation and/or Recovery Method	Median Cost ($/lb)		
	TN	TP	PM
BMP Treatment Train[a]	935	32,600	26
FL Database for BMPs[b]	1,900	10,500	41
Screened Hydrodynamic Separator (HS)[c]	3,730 (1,280 - 14,860)	9,210 (3,170 - 36,680)	4 (1 - 13)
Baffled Hydrodynamic Separator (HS)[c]	3,020 (1,280 - 14,860)	7,450 (3,170 - 36,680)	3 (1 - 13)
Street Sweeping	165	257	0.10
Catch Basin Cleaning[d]	1,016	1,656	0.70

Costs to Stakeholders are Significant!

			Removal Cost Estimates			
BMAP	Parameter	Change (lb/yr)	Structural BMPs	Treatment Train	Hydrodynamic Separators	Street Sweeping
Lake Jesup	TN	7693	$14,616,700.00	$7,192,955.00	$23,232,860.00	$1,269,345.00
	TP	1539	$16,159,500.00	$50,171,400.00	$11,465,550.00	$395,523.00
Newnans Lake	TN	242	$459,800.00	$7,889,200.00	$1,802,900.00	$62,194.00
	TP	180	$342,000.00	$5,868,000.00	$1,341,000.00	$46,260.00
Lochloosa Lake	TN	1870	$3,553,000.00	$60,962,000.00	$13,931,500.00	$480,590.00
	TP	270	$513,000.00	$8,802,000.00	$2,011,500.00	$69,390.00
Orange Lake	TP	67	$127,300.00	$2,184,200.00	$499,150.00	$17,219.00
Lake Harris	TP	315	$598,500.00	$10,269,000.00	$2,346,750.00	$80,955.00
Upper Ocklawaha	TP	556	$1,056,400.00	$18,125,600.00	$4,142,200.00	$142,892.00

What about the Indian River Lagoon?

- TMDL Development
  - Atmospheric load not considered significant
  - TMDL targets developed without atmospheric deposition (regression)
  - Reductions applied to the watershed load only
- BMAP Reductions Consistent with TMDL
- Are Atmospheric Loads Really Insignificant?

Nutrient Load from Atmospheric Deposition in the IRL

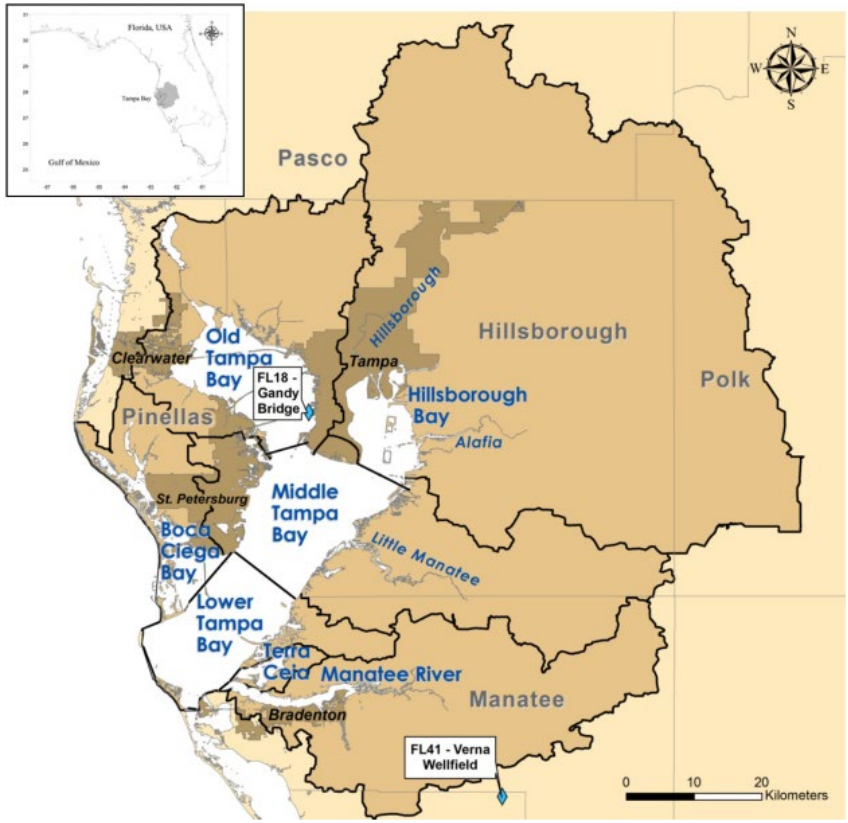
Indian River Lagoon BMAP and Segments	TN	TP
North		
IR1-3 (Project Zone A)	40%	13%
IR4+IR5 (Project Zone A)	35%	7%
IR6-7 (Project Zone B)	36%	7%
IR8+IR9-11 (Project Zone B)	27%	4%
Subtotal	**34%**	**7%**
Central		
IR12+IR13+IR14-15 (Project Zones A and SEB)	8%	1%
IR16-20, IR21 (Project Zone B)	7%	1%
Subtotal	**7%**	**1%**
Banana		
BR1-2 (Project Zone A)	37%	7%
BR3-5+BR7 (Project Zone B)	44%	8%
BR6 (Project Zone B)	25%	3%
Subtotal	**38%**	**7%**
Total	**19%**	**3%**

Strategies and Solutions

- Reimagine atmospheric deposition as a controllable source
  - Evaluate options for reducing atmospheric deposition
  - Periodically reassess atmospheric deposition to track progress
- Credit stakeholders for conversion to electric or hybrid fleets
- Include potential sources of atmospheric deposition (e.g., power plants, industry) as stakeholders
- Credit reductions in emissions

Examples

- Tampa Bay Study
- Lower St. Johns River Nutrient BMAP



Tampa Bay Region Atmospheric Chemistry Experiment (BRACE)

- BRACE Goals
  - Improve estimates of direct and indirect atmospheric N deposition to Tampa Bay
  - Apportion atmospheric N between local, regional, and remote sources
  - Assess impact of utility controls on N deposition to Tampa Bay
- Results and Conclusions
  - Atmospheric N a significant percent of annual loading to the bay
    - Direct: 14% to 32%
    - Total (direct + indirect): 35% to 70%
    - Dry deposition – 67%; wet deposition – 33%

Tampa Bay Region Atmospheric Chemistry Experiment (BRACE)

- Results and Conclusions
  - Mobile sources in the watershed contribute disproportionally greater N than power plant sources
  - Emissions within the watershed contributed 50% of N load to the watershed, 42% of load to the bay
  - Regulatory drivers (2002 to 2010) decreased atmospheric N by 49 metric tons
  - Control of atmospheric N both within and outside the watershed is important for maintaining the health of Tampa Bay

Lower St. Johns River Nutrient BMAP

- Seminole Electric stack improvements
  - Surface water discharge TN load reduction needed
  - Reduction required = 13,891 lb TN
  - Reduction achieved = 33,402 lb TN
- Excess credits of 19,511 lb TN allocated to urban stormwater stakeholders
- Savings to stakeholders?

Lower St. Johns River Nutrient BMAP

$35 Million

Summary

- Atmospheric deposition is a controllable source of nutrients
- BMAPs should target atmospheric deposition for reduction
- MS4s should not be burdened with reductions for direct atmospheric deposition
- Increased cost of including direct atmospheric deposition in required reductions is **significant**

Questions?