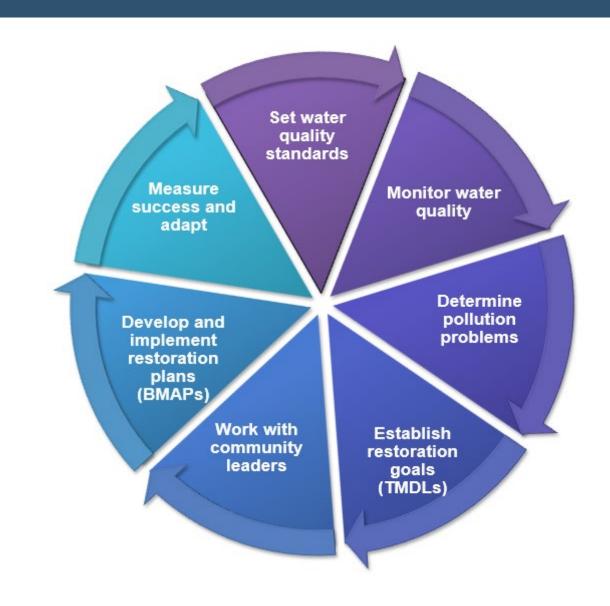# WATER QUALITY RESTORATION AND ASSESSMENT

- Standards.

- Monitoring.

- Assessment.

- TMDL development.

- Restoration plans.

  - Basin management.

    action plan (BMAPs).

TOTAL MAXIMUM DAILY LOADS
TMDLS

- TMDLs are water quality restoration targets.

- TMDLs must be developed for verified Impaired waters.

- Maximum amount of a pollutant that can be introduced into a waterbody without causing exceedances of water quality standards.

A TMDL IS DEFINED AS

The maximum amount of a pollutant that a water body can receive and still maintain its designated uses (e.g., drinking, fishing, swimming, shellfish harvesting).

TMDL = WLA Wastewater + WLA NPDES Stormwater + LA + MOS

WLA = **W**aste **L**oad **A**llocations – Includes **Wastewater Facilities** and **NPDES MS4 Stormwater Discharges**

LA = **L**oad **A**llocation to non-point sources

MOS = Margin of Safety

Under section 303(d) of the federal Clean Water Act and the Florida Watershed Restoration Act, TMDLs must be developed for *impaired* waters.

DESIGNATED USES
Water Quality Standards

- Drinking water.

- Primary contact recreation.

- Secondary contact recreation.

- Protection of ecosystems.

HUMAN HEALTH

APPLICABLE BACTERIA CRITERIA

Bacteriological Parameter	Surface Water Classification	Criterion
Enterococci	Class II and Class III Marine	Most Probable Number (MPN) or Membrane Filter (MF) counts (number/100 ml) shall not exceed a monthly geometric mean of 35 nor exceed the Ten Percent Threshold Value (TPTV) of 130 in 10% or more of the samples during any 30-day period.
E. coli	Class I and Class III Fresh	MPN or MF counts (number/100 ml) shall not exceed a monthly geometric mean of 126 nor exceed the Ten Percent Threshold Value (TPTV) of 410 in 10% or more of the samples during any 30-day period.
Fecal Coliform	Class II	MPN or MF counts shall not exceed a median value of 14 with not more than 10% of the samples exceeding 43 (for MPN) or 31 (for MF).

PRIOR TMDL APPROACH

- TMDL reports developed for individual or small groups of waterbodies.

- Hazen 90th percentile method* used in the percent reduction calculation to meet criteria.

  * uses a nonparametric formula to determine percentiles

NEW TMDL APPROACH

- Consolidated report covering all new bacteria impairments.

- Will be completed every two years in the fiscal year following the adoption of the Biennial Assessment.

- Hazen 90th percentile method used in the percent reduction calculation to meet criteria.
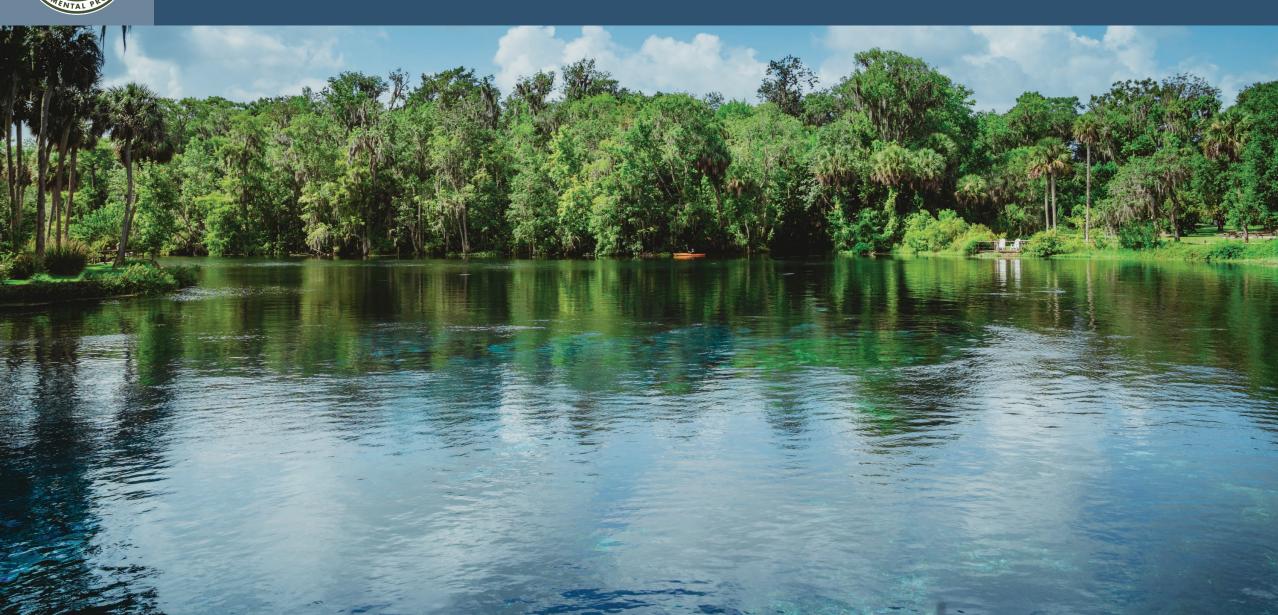
SCHEDULE OF NEW APPROACH AND BIENNIAL ASSESSMENT

Year	Biennial Assessment	Bacteria TMDL
2022	█	
2023		█
2024	█	
2025		█
2026	█	
2027		█

BENEFITS OF NEW TMDL APPROACH

- Clear and predictable process for TMDL development.

- Known schedule for TMDL adoption.

- Standard reduction calculation methodology.

- Designed to reduce the time necessary to begin implementation of restoration activities after waterbodies are identified as impaired.

- For Class I, II, and III waters impaired for exceeding the TPTV applicable to Enterococci, *Escherichia coli*, and Fecal Coliform Bacteria criteria, the 90th percentile value and percent reduction for each impairment are derived.

- For Class II waters impaired based on exceeding the Fecal Coliform Bacteria criterion of 14 counts/100 mL, the script calculates the percent reduction in the existing median value.

- Most recent 10 years of data are used in calculating the 90th percentile and median values.
- Percent reductions were calculated for waterbodies with at least 3 years of data and 20 samples taken in the last 10 years, with at least 5 samples collected during the months of June through September.
- The daily median value was used for stations with multiple samples collected on the same day.

USING THE HAZEN METHOD

- Used by USEPA to develop TMDLs

- Data are ranked (ordered) from highest to lowest result.

- The percentile value of each ranking (data point) is calculated using:

$$\text{Percentile} = \frac{\text{Rank} - 0.5}{\text{Total \# of Samples Collected}}$$

- If the 90th percentile value is not generated, it is calculated by interpolation.

- Allowable concentration is the criterion.

- Calculate Hazen method non-parametric 90th percentile.

- Calculate percent reduction from 90th percentile to the TPTV value from the criteria.

$$Needed\ \%\ Reduction = \frac{Existing\ 90th\ Percentile\ Concentration - Allowable\ Concentration}{Existing\ 90th\ Percentile\ Concentration}$$

Only applicable to Class II fecal coliform impairments:

- 14 counts/ml.

The percent reduction from the median count to meet the criteria is calculated as:

Needed % Reduction = $\dfrac{(\text{Existing Median Concentration} - 14) \times 100}{\text{Existing Median Concentration}}$

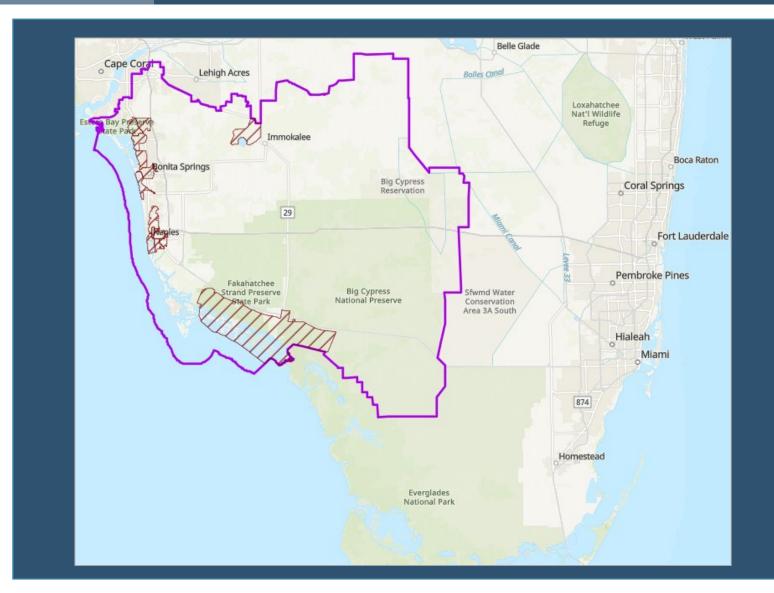If waterbody listed based on TPTV and Median value the percent reduction set at most stringent (highest) value.

EVERGLADES WEST COAST BASIN
PILOT STUDY TMDL PROJECT

- Focus on the Everglades West Coast Basin.

- Serves as the template for the new approach to document bacteria TMDLs throughout the state.

EVERGLADES WEST COAST BASIN
IMPAIRED WATER SEGMENTS

Waterbody Name	WBID	Classification	Applicable Bacteriological Quality Criteria
Cocohatchee River	3259A	II	Enterococci
Naples Bay (Coastal Segment)	3278R4	II	Enterococci
Estero River (Marine Segment)	3258D1	III-M	Enterococci
Gordon River (Marine Segment)	3278R5	III-M	Enterococci
Haldeman Creek (Lower)	3278R1	III-M	Enterococci
Imperial River (Marine Segment)	3258EB	III-M	Enterococci
Mullock Creek (Marine Segment)	3258C4	III-M	Enterococci
Rock Creek	3278R3	III-M	Enterococci
Spring Creek (Marine Segment)	3258H2	III-M	Enterococci
Cow Slough	3278E	III-F	*Escherichia coli*
Gordon River Extension	3278K	III-F	*Escherichia coli*
Haldeman Creek (Upper)	3278R2	III-F	*Escherichia coli*
Mullock Creek	3258C2	III-F	*Escherichia coli*
Naples Bay (Coastal Segment)	3278R4	II	Fecal Coliform

BACTERIA
TMDLS

- TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity or other appropriate measure.

- Fecal Indicator Bacteria (FIB) TMDLs are expressed as concentration-based (counts/100mL) restoration targets, consistent with the expression of the bacteriological criteria.

- Percent reductions in existing concentrations necessary to meet the targets are calculated for each impaired water segment.

IMPAIRED WATER SEGMENTS
BACTERIA DATA SUMMARIES AND REDUCTIONS

WBID	Water Segment Name	Water-body Class	Fecal Indicator Bacteria	Existing Condition: No. of Exceedances/No. of Samples[1]	Existing Condition Bacteria Count Mean (counts/100ml)[1]	Existing Condition Bacteria Count Median (counts/100ml)[1]	Existing Condition Bacteria Count 90th Percentile (counts/100ml)[1]	TMDL Target	% Reduction to Meet TMDL Target
3278E	Cow Slough	3F	E. coli	15/45	475	248	1300	≤ 410 Counts / 100 mL	68
3278K	Gordon River Extension	3F	E. coli	21/115	406	119	842	≤ 410 Counts / 100 mL	51
3278R2	Haldeman Creek (Upper)	3F	E. coli	35/104	492	170	1414	≤ 410 Counts / 100 mL	71
3258C2	Mullock Creek	3F	E. coli	30/89	495	261	1482	≤ 410 Counts / 100 mL	72
3259A	Cocohatchee River	2	Enterococci	124/855	108	10	190	≤ 130 Counts / 100 mL	31
3258D1	Estero River (Marine Segment)	3M	Enterococci	171/245	463	270	1160	≤ 130 Counts / 100 mL	88
3278R5	Gordon River (Marine Segment)	3M	Enterococci	44/171	139	73	296	≤ 130 Counts / 100 mL	56

[1] The existing condition is represented by the data collected in the last 10 years (2011-2020).

IMPAIRED WATER SEGMENTS
BACTERIA DATA SUMMARIES AND REDUCTIONS

WBID	Water Segment Name	Water-body Class	Fecal Indicator Bacteria	Existing Condition: No. of Exceedances/No. of Samples[1]	Existing Condition Bacteria Count Mean (counts/100ml)[1]	Existing Condition Bacteria Count Median (counts/100ml)[1]	Existing Condition Bacteria Count 90th Percentile (counts/100ml)[1]	TMDL Target	% Reduction to Meet TMDL Target
3278R1	Haldeman Creek (Lower)	3M	Enterococci	62/172	230	63	689	≤ 130 Counts / 100 mL	81
3258EB	Imperial River (Marine Segment)	3M	Enterococci	165/295	517	194	1733	≤ 130 Counts / 100 mL	92
3258C4	Mullock Creek (Marine Segment)	3M	Enterococci	35/193	188	42	335	≤ 130 Counts / 100 mL	61
3278R4	Naples Bay (Coastal Segment)	2	Enterococci	61/466	83	10	193	≤ 130 Counts / 100 mL	32
3278R3	Rock Creek	3M	Enterococci	68/164	342	85	800	≤ 130 Counts / 100 mL	83
3258H2	Spring Creek (Marine Segment)	3M	Enterococci	138/307	421	104	1414	≤ 130 Counts / 100 mL	90
3278R4	Naples Bay (Coastal Segment)	2	Fecal Coliform	108/343	72	18	220	≤ 43 Counts / 100 mL	80
3278R4	Naples Bay (Coastal Segment)	2	Fecal Coliform	NA[2]	72	18	220	≤ 14 MPN / 100 mL	22

[1] The existing condition is represented by the data collected in the last 10 years (2011-2020).
[2] The exceedance frequency is not applicable, as the long-term median value is compared with the criterion (target).

TMDL EXPRESSION
EWC FIB IMPAIRMENTS

Parameter	TMDL (counts/100mL)	WLA for Wastewater (counts/100mL)	WLA for NPDES Stormwater (counts/100mL)	LA (counts/100mL)	MOS
E. coli Bacteria	410 (for MPN or MF counts)[1]	Must meet permit limits	410 for areas covered by MS4 Permit	410	Implicit
Enterococci Bacteria	130 (for MPN or MF counts)[1]	Must meet permit limits	130 for areas covered by MS4 Permit	130	Implicit
Fecal Coliform Bacteria	31 (for MF counts)[1]	Must meet permit limits	31 for areas covered by MS4 Permit	31	Implicit
Fecal Coliform Bacteria	43 (for MPN counts)[1]	Must meet permit limits	43 for areas covered by MS4 Permit	43	Implicit
Fecal Coliform Bacteria	14 (for MPN or MF counts)[2]	Must meet permit limits	14 for areas covered by MS4 Permit	14	Implicit

1. The TMDL applies to impaired waterbodies where the data exceed the applicable ten percent threshold value criterion in Subsection 62-302.530(6), F.A.C.
2. The TMDL applies to impaired waterbodies where the median value of the data exceed the applicable criterion in Subsection 62-302.530(6), F.A.C.
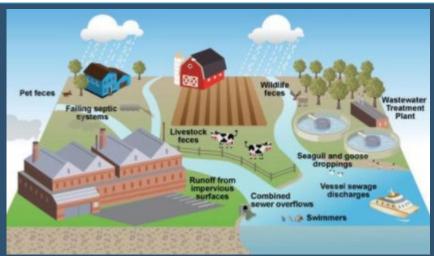
TOTAL MAXIMUM DAILY LOADS
IMPLEMENTATION

NPDES PERMIT REQUIREMENTS

- Wastewater facilities must meet permit limits.
- MS4 (stormwater) develop restoration plans, refer to DEP's Restoring Bacteria-Impaired Waters Toolkit.

OTHER WATER QUALITY INITIATIVES

- SWIM Plans.
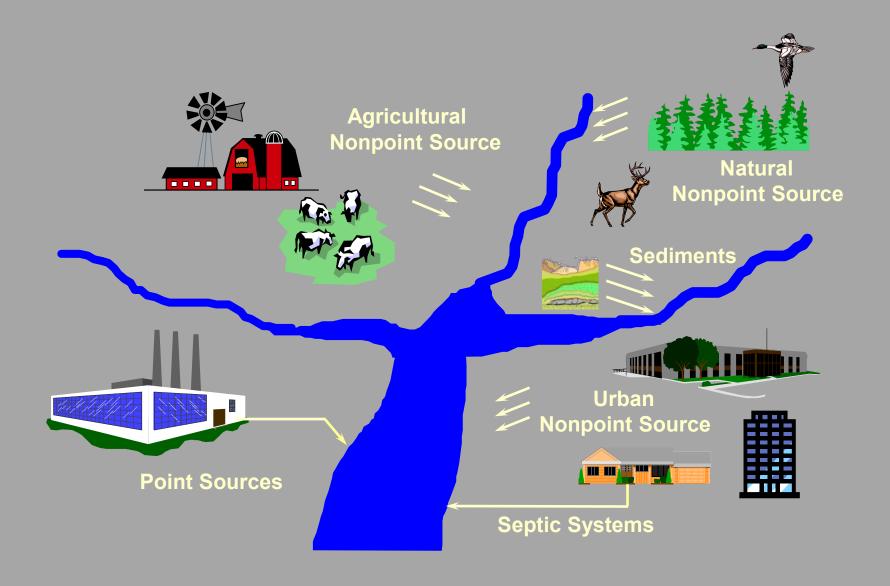- Basin management action plans (BMAPs).
- Stakeholder-driven efforts.

TOTAL MAXIMUM DAILY LOADS
TIMELINES

PILOT STUDY BACTERIA TMDLS

- Public workshop on draft pilot TMDLs – Held March 2022.
- Discuss comments with stakeholders/Revise document – Ongoing.
- Second public workshop – July 2022.
- Rule adoption – Fall 2022.

CONSOLIDATED BACTERIA TMDLS

- Begin after EWC Pilot TMDL has been completed.
- Initial public workshop on draft TMDLs throughout Florida – November 2022.
- Address stakeholder comments/revise document – Winter 2023.
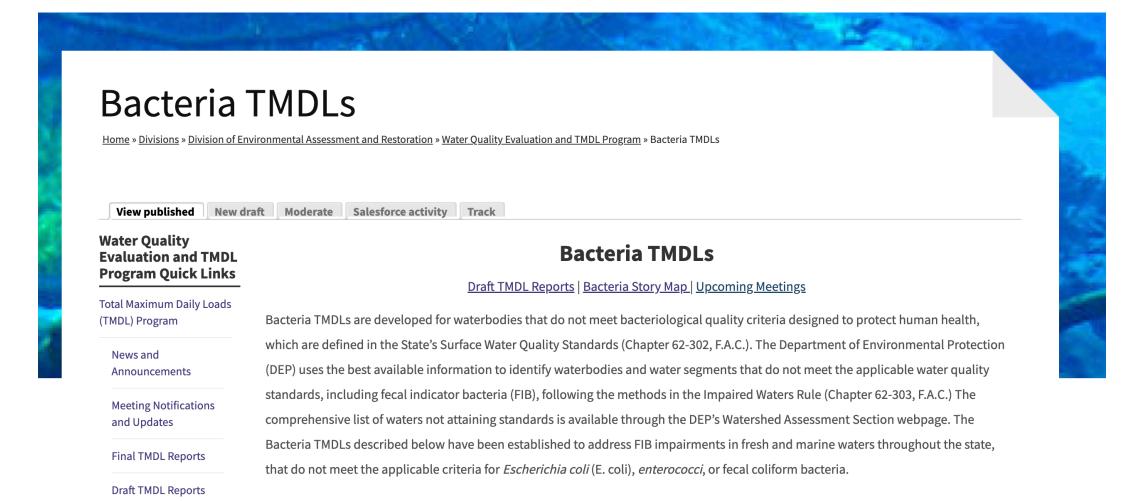- Rule adoption – Spring 2023.

- Present TMDL derivation approach.

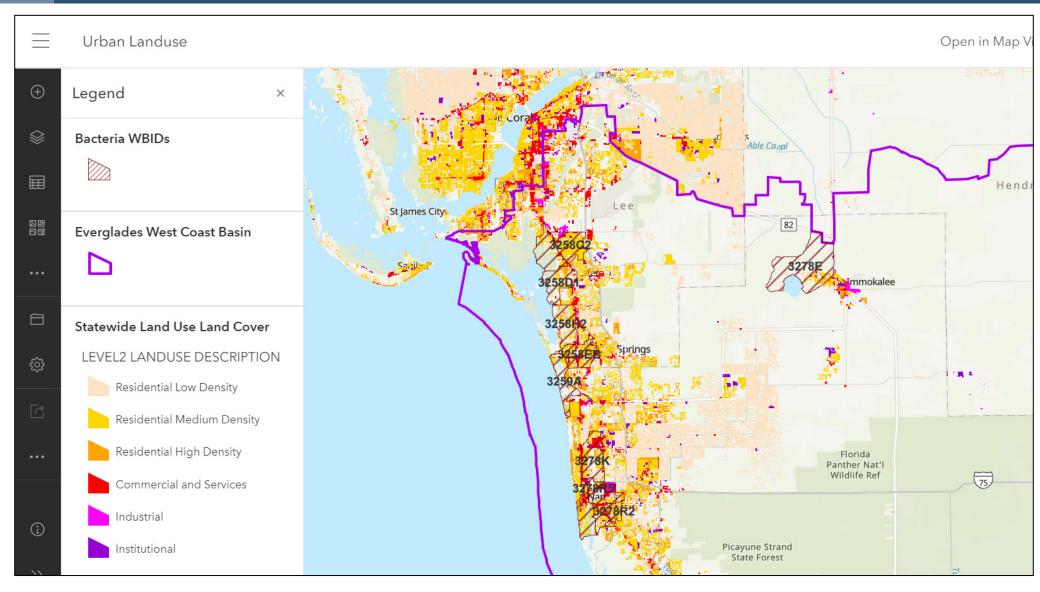- Continue outreach and engagement with stakeholders.

TOTAL MAXIMUM DAILY LOADS
SUPPORTING MATERIALS

[Bacteria TMDLs | Florida Department of Environmental Protection](#)

STORY MAP

CONTACTS

TMDL DEVELOPMENT

Ansel Bubel
Administrator - Water Quality Evaluation
and TMDL Program
Kenneth.Weaver@FloridaDEP.gov
850-245-8414

TMDL IMPLEMENTATION – MS4

Borja Crane-Amores
Administrator-MS4 program
Borja.CraneAmores@FloridaDEP.gov
850-245-7520

THANK YOU