



BACTERIA TOTAL MAXIMUM DAILY LOADS (TMDLS) UPDATE EVERGLADES WEST COAST BASIN

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Division of Environmental Assessment and Restoration
Florida Department of Environmental Protection
Ft. Myers, FL | April 4, 2024

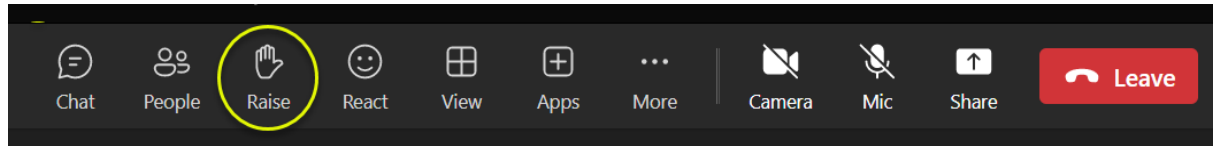


HOUSEKEEPING

Attendee Participation - Time will be granted for attendees to ask questions and provide comments.

Teams Attendees:

- Questions and comments may be provided verbally via the **Raise** hand icon.



- The host (DEP) will individually unmute attendees (with hands raised) at assigned times during the workshop.
- Attendees will also need to unmute themselves on their computer or phone (if calling in).

Phone Attendees:

- Attendees who wish to speak can press star * and 5 to raise hand.
- The host (DEP) will unmute attendees at assigned times to ask questions and provide comments.
- When acknowledged, attendees can press star * and 6 to unmute their phone line. To mute press star * and 6, again.
- To deactivate press star * and 5, again to lower hand.

Notes:

- Attendees will not be able to use video or camera functions.
- Please ensure your camera and mic are turned off.
- Before speaking, please state your full name and affiliation.
- Today's presentation is being recorded and will be provided on an FTP site after the workshop.



FEDERAL TMDL PROGRAM RESPONSIBILITIES

The Federal Clean Water Act (1972) established requirements for states in Section 303(d).

States must:

- Assess and provide lists of their impaired waters to the U.S. Environmental Protection Agency (EPA).
- Develop TMDLs for impaired waters.
- Identify pollutant reductions for point and nonpoint sources.



FLORIDA WATERSHED RESTORATION ACT

Section 403.067, Florida Statutes (F.S.) - established a state framework for identifying impaired waters, developing TMDLs and developing and implementing restoration plans:

- Authorizes DEP to develop and adopt TMDLs and restoration plans in collaboration with stakeholders and other governmental entities.
- Authorizes the Florida Department of Agriculture and Consumer Services (DACS) to work with agriculture to implement BMPs.



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.
<i>E. coli</i>	Class I and Class III Fresh	MPN or MF counts shall not exceed a monthly geometric mean of 126 nor exceed the 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 (MPN) or 31 (MF).



TOTAL MAXIMUM DAILY LOAD

A TMDL is defined as:

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

$$\text{TMDL} = \text{WLA Wastewater} + \text{WLA NPDES Stormwater} + \text{LA} + \text{MOS}$$

WLA = Waste Load Allocations – Includes **Wastewater Facilities** and **NPDES MS4 Stormwater Discharges**

LA = Load Allocation to nonpoint sources

MOS = Margin of Safety

Under Section 303(d) of the federal Clean Water Act and section 403.067, F.S., TMDLs must be developed for impaired waters.

NPDES – National Pollutant Discharge Elimination System

MS4 – Municipal Separate Storm Sewer System



BACTERIA TOTAL MAXIMUM DAILY LOADS

- 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 for each water segment.



BACTERIA TMDL COMPONENTS

WBID	Waterbody Segment Name	Water-body Class	Parameter	TMDL (TPTV of MPN or MF counts/ 100mL)	WLA for Waste-water counts/ 100mL)	WLA for NPDES Storm-water (Percent Reduction)	LA (Percent Reduction)
3278D	Cocohatchee (Inland Segment)	III-F	<i>E. coli</i>	410	Must meet permit limits	33	33

410 Restoration target (criterion) – The main objective for TMDL implementation is to reduce bacteria sources to meet the applicable criterion.



BACTERIA TMDL COMPONENTS

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3278D	Cocohatchee (Inland Segment)	III-F	<i>E. coli</i>	410	Must meet permit limits	33	33

Must meet permit limits Permit effluent limitations for bacteria serve as the WLA for wastewater facility discharges. The state requires all NPDES-permitted wastewater point source dischargers to meet bacteria criteria contained in subsection 62-302.530(6), Florida Administrative Code (F.A.C.), and the disinfection requirements of section 62-600.440, F.A.C.



BACTERIA TMDL COMPONENTS

WBID	Waterbody Segment Name	Water-body Class	Parameter	TMDL (TPTV of MPN or MF counts/ 100mL)	WLA for Waste-water counts/ 100mL)	WLA for NPDES Storm-water (Percent Reduction)	LA (Percent Reduction)
3278D	Cocohatchee (Inland Segment)	III-F	<i>E. coli</i>	410	Must meet permit limits	33	33

33 Percent reductions of surface water current condition bacteria counts necessary to meet the applicable criterion is used to express the NPDES stormwater WLA and nonpoint source LA. The percent reductions are intended to provide an estimate of the magnitude of reductions necessary to achieve the applicable criterion.



BACTERIA TMDL MARGIN OF SAFETY

Implicit MOS is applied, based on the following conservative assumptions:

- Upstream and tributary bacterial concentrations are at the maximum allowable limit (i.e., criterion);
- Although all sources are provided an allocation at the applicable water quality criterion, not all sources discharge at this maximum allocation at the same time;
- There is no bacteria die-off accounted for, when bacteria concentrations diminish downstream from their source; and,
- All wastewater sources must meet both the applicable TPTV and geometric mean (as single sample maxima) at all times.



TMDL OUTREACH AND COORDINATION

- Held public workshop in Fort Myers on March 29, 2022, and received comments on the FIB TMDLs for the Everglades West Coast Basin documented in the 2022 report.
- Coordinated with the EPA Region IV Office on the TMDL development approach.
- Made revisions to the TMDL documentation (report and StoryMap) based on feedback from stakeholders and EPA.
- Provided FIB TMDL development presentation at the Florida Stormwater Association semi-annual conferences in 2022.
- Held joint meetings between several DEP programs and local governments in the basin to address their comments and questions on the 2022 draft report and TMDL implementation.



BACTERIA TMDL DOCUMENTATION

Bacteria TMDLs Update: Everglades West Coast Basin



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- The map displays the Everglades West Coast region, bounded by a thick pink line. A red line runs horizontally across the middle of the map, separating the northern and southern parts of the region. The area is divided into several counties: Lee, Hendry, Collier, Monroe, and Broward. Key locations and features include:
- Counties:** Lee, Hendry, Collier, Monroe, and Broward.
 - Cities/Towns:** Cape Coral, Lehigh Acres, Immokalee, and Unit Springs.
 - Wildlife Refuges and Preserves:** J. N. Ring National Wildlife Refuge, Big Cypress National Preserve, Big Cypress Reservation, Holey Land Wildlife Management Area, and Everglades National Park.
 - Highways:** State Road 29 is shown running north-south through the center of the region.
 - Water Bodies:** The Gulf of Mexico is visible on the left side of the map.



TMDL DOCUMENTATION

Content:

- TMDL reports similar in structure those prepared in the past.
- Includes general bacteria source descriptions and a link to geographic information (statewide data layers) provided in a StoryMap.
- Existing bacteria conditions and percent reductions calculated using common analysis methodology.
- Bacteria analysis results and other relevant information documented in appendices.



POTENTIAL BACTERIA SOURCES

- Degraded sewer infrastructure.
- Sanitary sewer overflows.
- Failing on-site sewage treatment and disposal systems (OSTDS).
- Transient camps.
- Direct illicit connections from homes or businesses.
- Improper management of agricultural animal waste.
- Mismanagement of biosolids and animal manure land application.
- Solid waste storage and disposal.
- Marinas and vessel anchorage locations.
- Pet waste.
- Wildlife.



STORYMAP

- ArcGIS online web application.
- Includes Geographic Information Systems (GIS) layers to aid in identifying potential bacteria sources throughout the state.
- Resource for all stakeholders.
- Continually updated based on new data.

The background of the lower section is a photograph of a natural landscape. It shows a body of water, likely a canal or a lake, surrounded by dense green vegetation and trees. The water is calm, reflecting the surrounding greenery. The sky is overcast.

Everglades West Coast Basin Bacteria TMDL StoryMap

For more information please contact Kevin O'Donnell at: Voice:
850-245-8469 Email: Kevin.ODonnell@FloridaDEP.gov

Ronald Hughes - February 2024



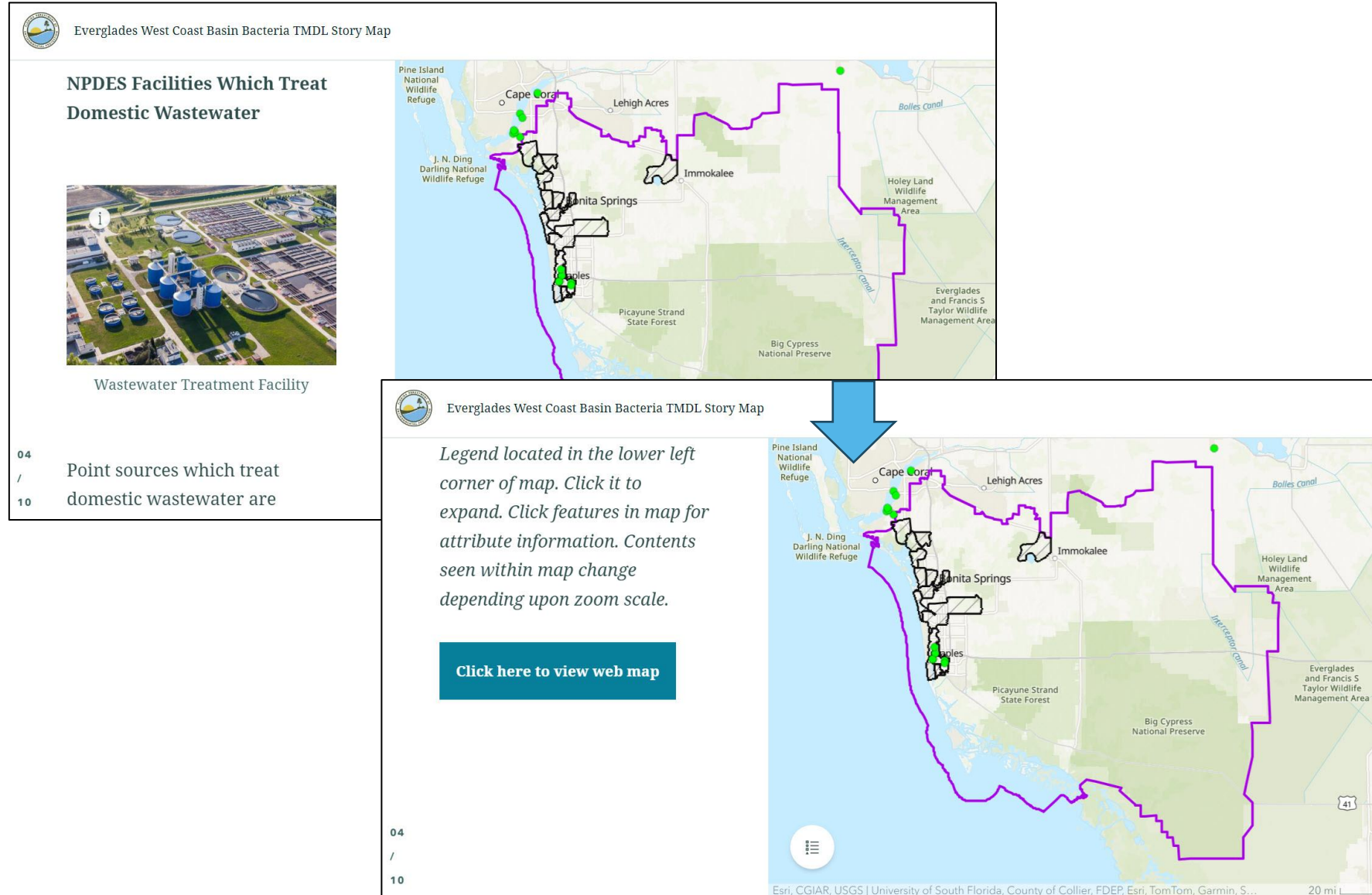
STORYMAP DATA LAYERS

- Impaired waterbody segment (WBIDs).
- Bacteria sampling stations. (**NEW**)
- Urban land use.
- NPDES domestic wastewater facility outfalls.
- On-site sewage treatment and disposal systems (OSTDS).
- Septage application sites.
- Biosolids (wastewater residuals) application sites.
- Cropland, pasture, and concentrated animal feeding operations (CAFOs).
- Boat anchorages.
- NPDES stormwater MS4 permit areas. (**NEW**)



STORYMAP NAVIGATION

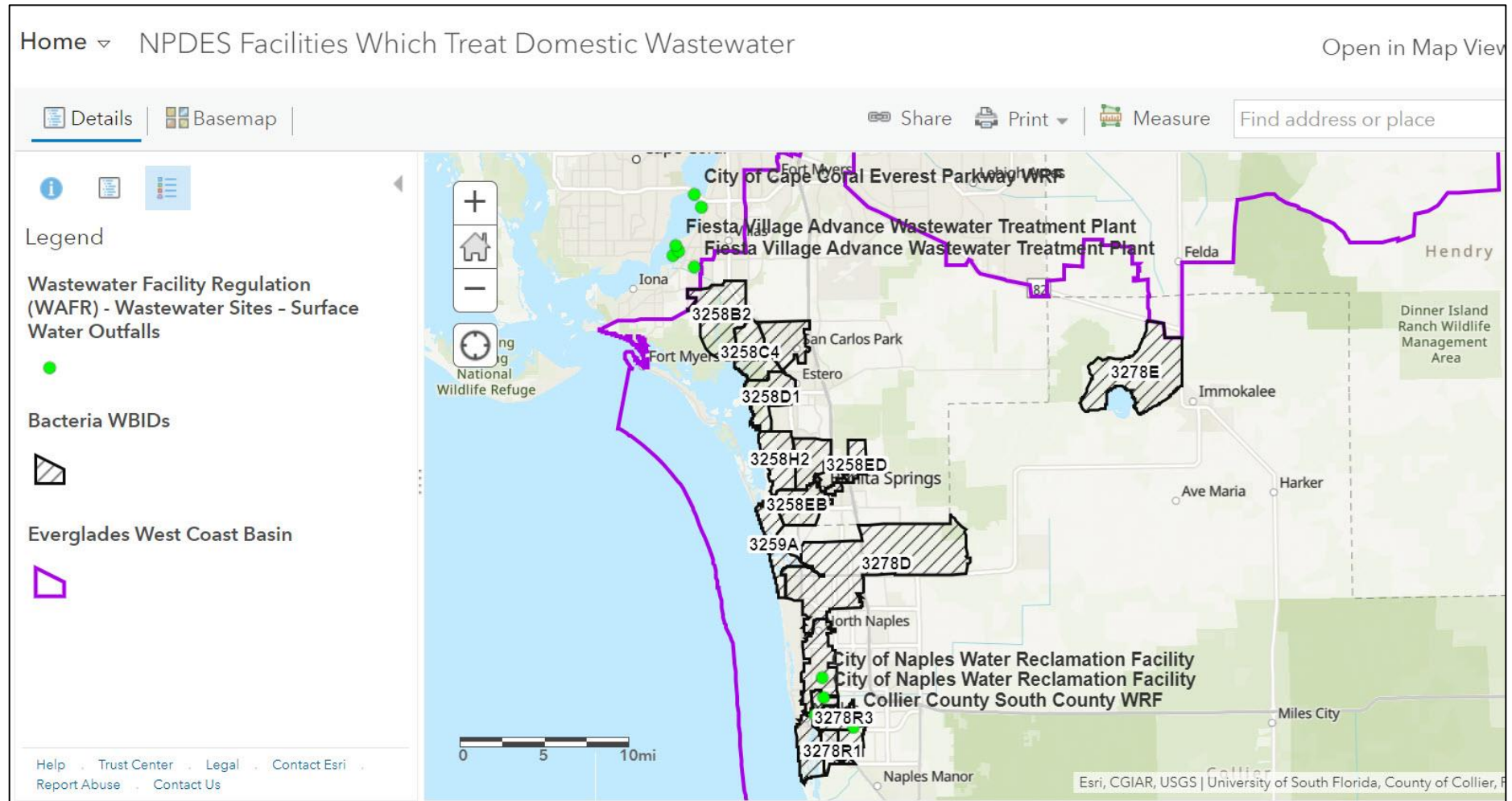
- The StoryMap reflects the status of bacteria TMDLs and potential sources of bacterial contributions as of Jan. 2024.
- As you scroll through the StoryMap, tips are provided for viewing the available geographic information.





STORYMAP NAVIGATION

Capability to zoom in to select areas for identifying data layer features.





BACTERIA TMDL CALCULATIONS

- The waterbody specific TMDL calculations are based on a minimum number of samples in a 10-year period that are representative of current conditions. The 10-year period (2013-2022) is the same for all water segments.
- For Class I, II, and III waters impaired for exceeding the TPTV applicable to Enterococci, *E. coli*, and Fecal Coliform Bacteria criteria, the Hazen method was used to determine the 90th percentile value that was applied in calculating the percent reduction needed to meet criterion.
- The 90th percentile is also referred to as the 10 percent exceedance event because it will be exceeded with the probability of 0.10, which is consistent with the 10 percent threshold value expression of the criteria.
- For Class II waters impaired based on exceeding the Fecal Coliform Bacteria median count criterion of 14 counts/100 mL, the existing median value of results is used in calculating percent reductions.



DATA SUFFICIENCY CHECK

- Data collected in the defined 10 years are used in calculating the 90th percentile and median values.
- Percent reductions were only calculated for waterbodies with at least three years of data and 20 samples taken in the last 10 years, with at least five samples collected during the months of June through September.
- The daily median value was used for multiple station results collected on the same day.



90TH PERCENTILE CALCULATION

HAZEN METHOD

- Used by EPA to develop TMDLs.
- Hazen method described in Hunter, 2002.

Applied Microbiology (34): 283–286.

- The Hazen equation for determining the rank equivalent to the 90th percentile in a data set is as follows:

$$\text{Hazen } (r) = \frac{1}{2} + P \cdot n / 100$$

r = rank of the relevant percentile

n = number of data points in the data set

P = percentile value (90th in this case)

- To determine the 90th percentile value in a data set, all the available results are ranked (ordered) from the lowest to the highest, and the result that equates to the Hazen rank identifies the 90th percentile.
- If no results equate to the 90th percentile value, it is calculated by interpolation using rank of results below and above 90th percentile.



CALCULATION OF TPTV REDUCTIONS

- Allowable concentration is the criterion.
- Apply Hazen method non-parametric 90th percentile concentration.
- Calculate percent reduction from 90th percentile to the ten percent threshold value (TPTV) from the criteria:

$$\text{Needed \% Reduction} = \frac{(\text{Existing 90}^{\text{th}} \text{ Percentile Concentration} - \text{Allowable Concentration}) * 100}{\text{Existing 90}^{\text{th}} \text{ Percentile Concentration}}$$



CALCULATION OF MEDIAN REDUCTIONS

CLASS II

- Only applicable to Class II fecal coliform impairments exceeding 14 counts/ml.
- The percent reduction from the median value to meet the criteria is calculated as:

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

- If waterbody is impaired based on exceeding the TPTV and median value fecal coliform criteria, the percent reduction set at most stringent (highest) value.



TMDLS FOR FRESHWATER SEGMENTS

WBID	Waterbody Segment Name	Water-body Class ¹	Parameter	TMDL (TPTV of MPN or MF counts / 100mL)	WLA for Waste-water (counts/ 100 mL)	WLA for NPDES Storm-water (Percent Reduction)	LA (Percent Reduction)
3278D	Cocohatchee (Inland Segment)	III-F	<i>E. coli</i>	410	Must meet permit limits	33	33
3278E	Cow Slough	III-F	<i>E. coli</i>	410	Must meet permit limits	72	72
3278K	Gordon River Extension	III-F	<i>E. coli</i>	410	Must meet permit limits	45	45
3278R2	Haldeman Creek (Upper)	III-F	<i>E. coli</i>	410	Must meet permit limits	60	60



TMDLS FOR FRESHWATER SEGMENTS

WBID	Waterbody Segment Name	Water-body Class ¹	Parameter	TMDL (TPTV of MPN or MF counts / 100mL)	WLA for Waste-water (counts/ 100 mL)	WLA for NPDES Storm-water (Percent Reduction)	LA (Percent Reduction)
3258ED	Leitner Creek	III-F	<i>E. coli</i>	410	Must meet permit limits	83	83
3258C2	Mullock Creek	III-F	<i>E. coli</i>	410	Must meet permit limits	59	59
3258F	Oak Creek	III-F	<i>E. coli</i>	410	Must meet permit limits	77	77
3258H3	Spring Creek	III-F	<i>E. coli</i>	410	Must meet permit limits	35	35



TMDLs for Marine Segments

WBID	Waterbody Segment Name	Water-body Class	Parameter	TMDL (TPTV of MPN or MF counts/100mL)	WLA for Wastewater (counts/100mL)	WLA for NPDES Stormwater (Percent Reduction)	LA (Percent Reduction)
3259A	Cocohatchee River	II	Enterococci	130	Must meet permit limits	29	29
3258D1	Estero River (Marine Segment)	III-M	Enterococci	130	Must meet permit limits	89	89
3278R5	Gordon River (Marine Segment)	III-M	Enterococci	130	Must meet permit limits	57	57
3278R1	Haldeman Creek (Lower)	III-M	Enterococci	130	Must meet permit limits	81	81
3258B2	Hendry Creek	III-M	Enterococci	130	Must meet permit limits	94	94
3258EB	Imperial River (Marine Segment)	III-M	Enterococci	130	Must meet permit limits	94	94



TMDLS FOR MARINE SEGMENTS

WBID	Waterbody Segment Name	Water-body Class	Parameter	TMDL (TPTV of MPN or MF counts/100mL)	WLA for Wastewater (counts/100mL)	WLA for NPDES Stormwater (Percent Reduction)	LA (Percent Reduction)
3258C4	Mullock Creek (Marine Segment)	III-M	Enterococci	130	Must meet permit limits	68	68
3278R4	Naples Bay (Coastal Segment)	II	Enterococci	130	Must meet permit limits	31	31
3278R4	Naples Bay (Coastal Segment)	II	Fecal Coliform	43 MPN	Must meet permit limits	76	76
3278R3	Rock Creek	III-M	Enterococci	130	Must meet permit limits	89	89
3258H2	Spring Creek (Marine Segment)	III-M	Enterococci	130	Must meet permit limits	92	92



TMDL IMPLEMENTATION

NPDES Permit Requirements:

- Wastewater facilities must meet permit limits.
- MS4 (stormwater) develop restoration plans: refer to DEP's Restoring Bacteria-Impaired Waters Toolkit [link to document is located in Chapter 7 of the report].

Collection Systems and Transmission Facilities Rule:

- Collection and transmission systems must be maintained and operated in accordance with Rule 62-604.500, F.A.C., so that sanitary overflows or leaks do not cause or contribute to violations of the applicable FIB criteria.

Other water quality initiatives:

- Stakeholder driven efforts.
- Surface water improvement and management (SWIM) plans.
- Basin management action plans (BMAPs).
- Site-specific focus.
- New initiatives.



TMDL DOCUMENTATION UPDATES

NOTABLE REVISIONS

Chapter 3 – Water Quality Assessment and Identification of Pollutants of Concern

- Included diagram of the bacteria assessment process.
- Added basin map showing impaired WBIDs addressed in the report.
- Added close-up maps of the impaired waterbodies with hydrography features.

Chapter 4 - Assessment of Sources

- Revised information about potential bacteria sources.
- Updated StoryMap.
- Adding data layers for bacteria sampling stations and NPDES stormwater MS4 permit areas.

Chapter 5 - Determination of Assimilative Capacity

- Included more detail about the percent reduction calculation method to meet the bacteria criteria/TMDL targets.
 - Updated the current condition period to 2013-2022.
 - Provided the raw data for the current condition period and an example TMDL calculation using the Hazen method.
- Incorporated new water segments impaired for bacteria during the Biennial Assessment (2022-24).



TMDL DOCUMENTATION UPDATES

NOTABLE REVISIONS

Chapter 6 - Determination of Loading Allocations

- Added in methodology for calculating bacteria loads:
$$\text{Daily Load (counts/day)} = \text{Criterion} \times \text{Volumetric Flow} \times \text{Conversion Factor}$$
- The TMDL expressions are based on the applicable bacteriological criterion and the percent reduction in existing condition colony counts needed to meet the criterion.

Chapter 7 - Next Steps: Implementation Plan Development

- Revised chapter language to emphasize the resources (e.g., DEP Toolkit, DACS Agriculture BMP manuals) and mechanisms (regulatory and non-regulatory) available to address sources of bacteria pollution.



IMPAIRED WATER SEGMENTS ADDRESSED IN UPDATED REPORT

*** New Segment
Impairment Listings.**

Waterbody Name	WBID	Classification	Applicable Bacteriological Quality Criteria
Cocohatchee (Inland Segment)*	3278D	III-F	<i>E. coli</i>
Cocohatchee River	3259A	II	Enterococci
Cow Slough	3278E	III-F	<i>E. coli</i>
Estero River (Marine Segment)	3258D1	III-M	Enterococci
Gordon River (Marine Segment)	3278R5	III-M	Enterococci
Gordon River Extension	3278K	III-F	<i>E. coli</i>
Haldeman Creek (Lower)	3278R1	III-M	Enterococci
Haldeman Creek (Upper)	3278R2	III-F	<i>E. coli</i>
Hendry Creek*	3258B2	III-M	Enterococci



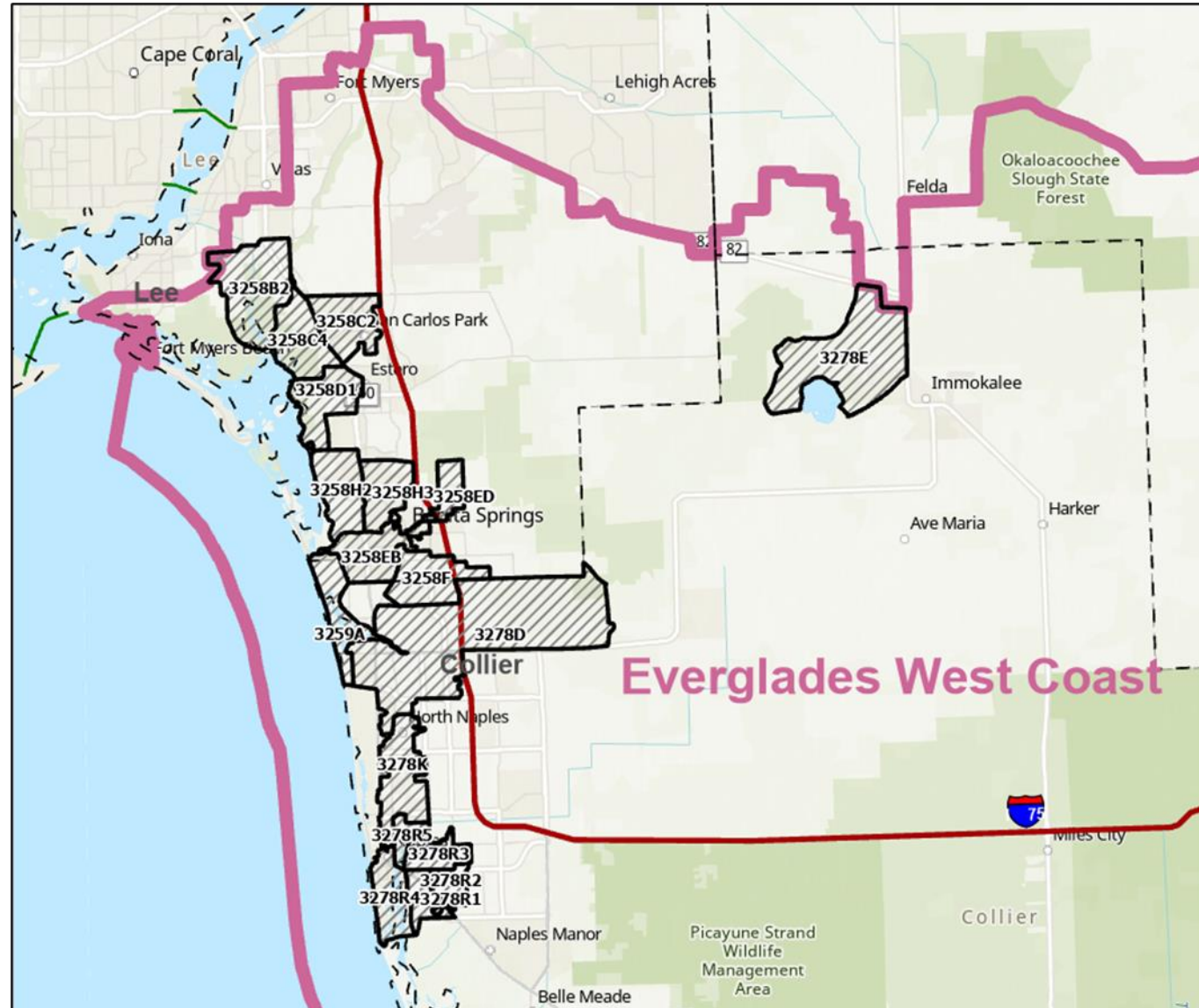
IMPAIRED WATER SEGMENTS ADDRESSED IN UPDATED REPORT

* New Segment
Impairment Listings.
** Sufficient Data in the
Updated Current Period
(2013-2022).

Waterbody Name	WBID	Classification	Applicable Bacteriological Quality Criteria
Imperial River (Marine Segment)	3258EB	III-M	Enterococci
Leitner Creek*	3258ED	III-F	<i>E. coli</i>
Mullock Creek	3258C2	III-F	<i>E. coli</i>
Mullock Creek (Marine Segment)	3258C4	III-M	Enterococci
Naples Bay (Coastal Segment)	3278R4	II	Enterococci/Fecal Coliform
Oak Creek**	3258F	III-F	<i>E.coli</i>
Rock Creek	3278R3	III-M	Enterococci
Spring Creek (Marine Segment)	3258H2	III-M	Enterococci
Spring Creek*	3258H3	III-F	<i>E. coli</i>



IMPAIRED WATER SEGMENTS IN UPDATED REPORT





FORMAL PUBLIC COMMENTS

Please state:

- Full Name.
- Affiliation.
- Comment or Question.





STAKEHOLDER INVOLVEMENT

DEP will accept written comments on the Revised Draft Report and StoryMap through **April 19, 2024**.

Please address all comments and questions to:

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Draft Report



NEXT STEPS

- Review public comments after the formal comment period.
- Proceed with rule adoption of Everglades West Coast Basin FIB TMDLs.
- Submit TMDLs to EPA for review and approval.
- Develop and propose regional bacteria TMDLs for a second basin.
 - The latest plan is to progress through the state and develop TMDLs in reports covering bacteria impairments using a basin or other regional approach.

THANK YOU



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