Florida Department of Environmental Protection

Nutrient TMDL Development for Caloosahatchee River Basin: Path Forward

October 11, 2017





Agenda

1. Introductions

2. Highlights and overview of modeling

3. TMDL development approach
   - Tributaries
   - Estuary

4. Public comments

5. Adjourn

Updates

- Last public meeting February 21
- Stakeholder comments on modeling
- Model updates
- Input on target setting

Water Quality Restoration

- Standards
- Monitoring
- Assessment
- **TMDL development**
- Basin management action plan (BMAP)

Implemented on a rotating basin approach…

Total Maximum Daily Loads

We call them **TMDLs**

- TMDLs are water quality restoration thresholds produced for waterbodies that are “impaired”, which means that they do not meet water quality standards

- They serve as the legal basis for future restoration action (federal CWA, state WRA), particularly for permitted entities. Adopted as state rules.

Fact: FL has 409 TMDLs adopted to date

Total Maximum Daily Loads

A **TMDL** is generally 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)

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

TMDLs constitute the site-specific numeric interpretation of the narrative nutrient criterion set forth in Paragraph 62-302.530(90)(b), F.A.C., that will replace the otherwise applicable numeric nutrient criteria in Subsection 62-302.531(2), F.A.C.

Federal Clean Water Act

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 EPA
- Develop TMDLs for impaired waters
- Identify pollutant reductions and allocations
- Develop implementation plans

Watershed Restoration Act

The Watershed Restoration Act of 1999* established a framework for identifying impaired waters, developing TMDLs, and developing and implementing restoration plans:

- Authorizes FDEP to do these tasks
- Authorizes FDACS to work with agriculture to implement best management practices (BMPs)

**Section 403, Florida Statutes*

Caloosahatchee River Basin TMDL Development

Source: Wikimedia Commons

Models

HSPF: Hydrological Simulation Program Fortran

- Watershed model
- Land processes
- Stream geochemistry

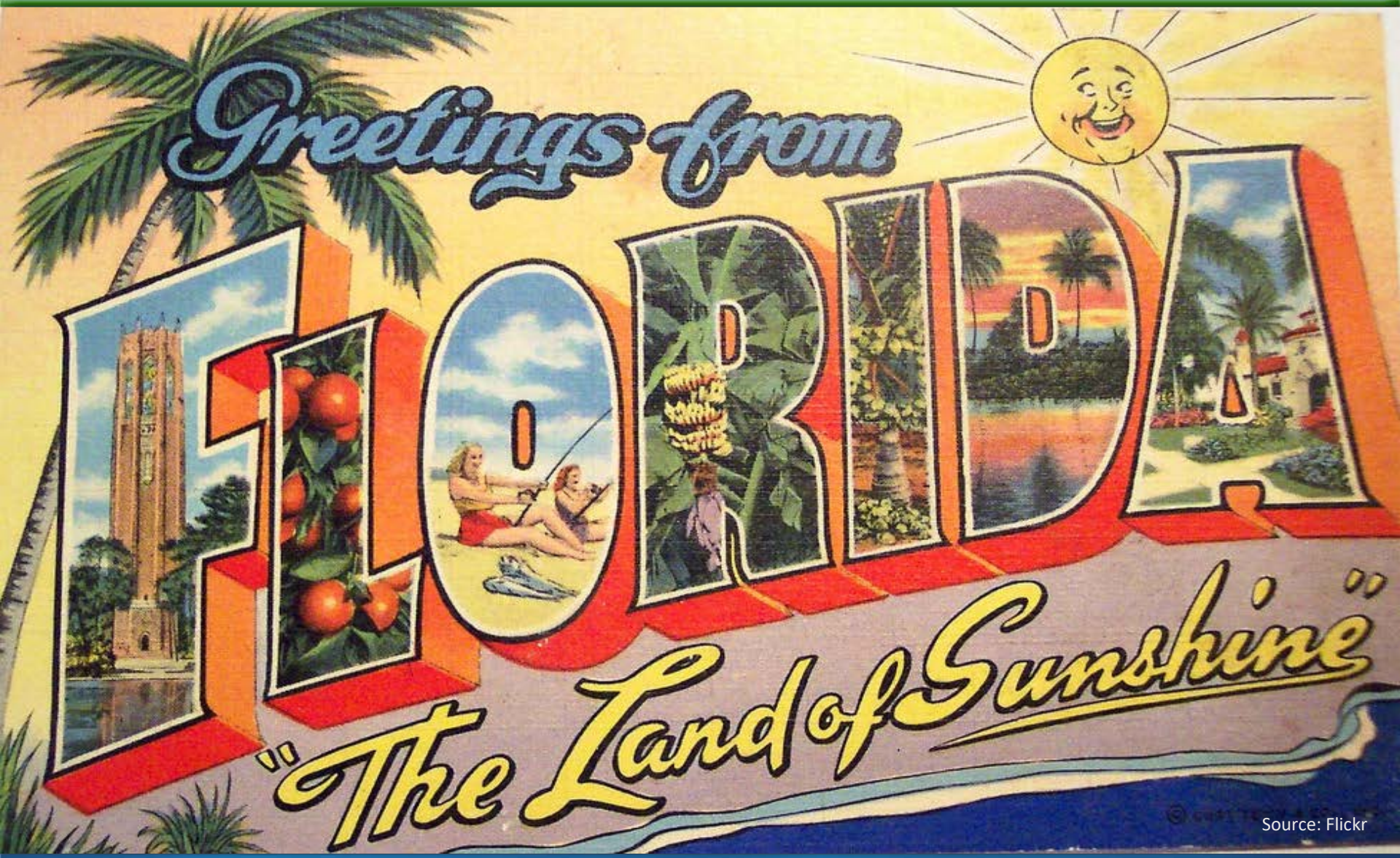
EFDC: Environmental Fluid Dynamics Code

- Estuary model
- 3-dimensional hydrodynamics
- Estuary geochemistry

Models

- 2009 Model – TMDL development
- 2014 Model – revision in response to stakeholders' concerns
- 2017 Model – revision to address tributary impairments and revisit estuary TMDL

Tributaries



Source: Flickr

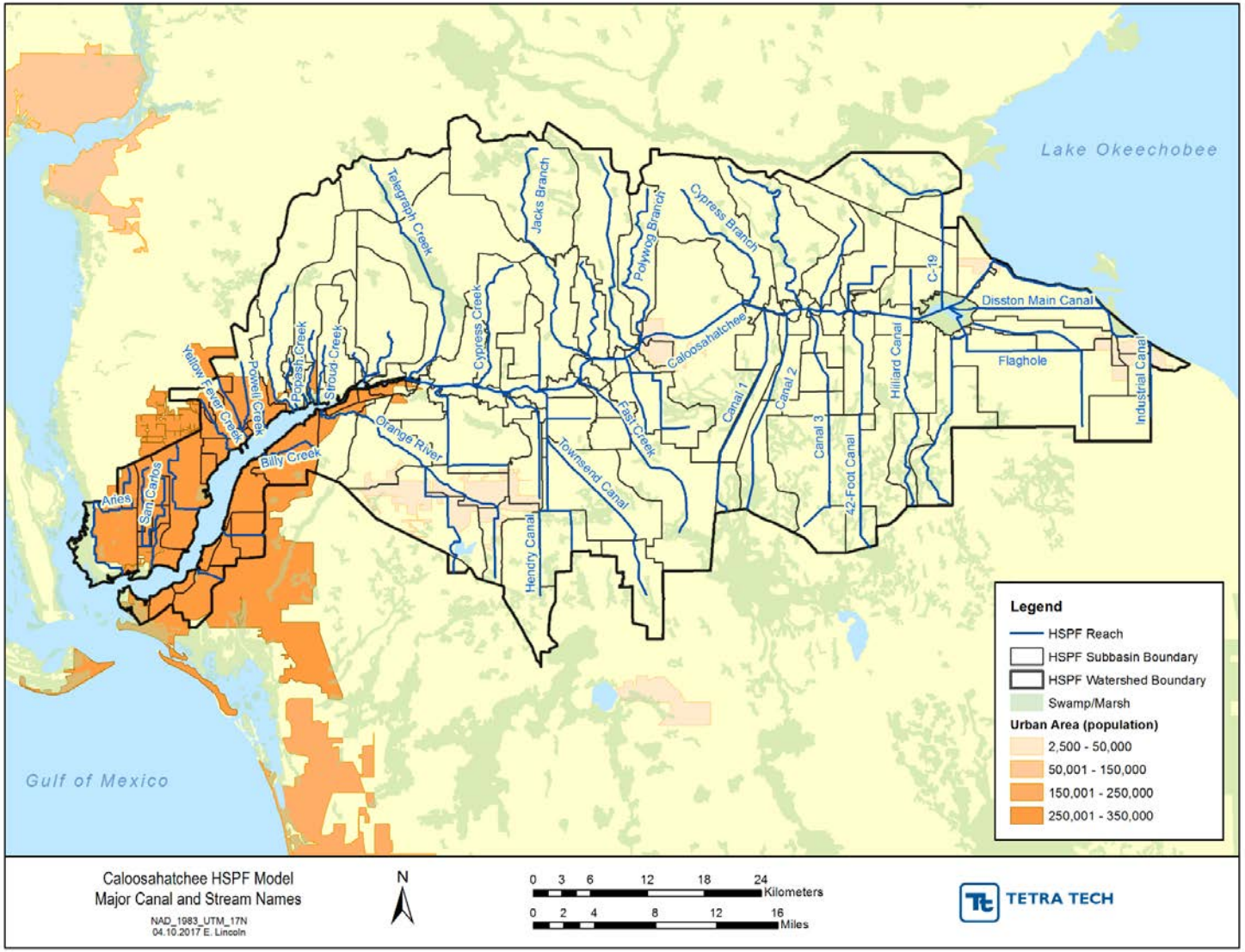
Tributary Criteria

Dissolved Oxygen (saturation)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Chlorophyll *a* (µg/L)
No more that 10% of obs < 0.38	1.54	0.12	20

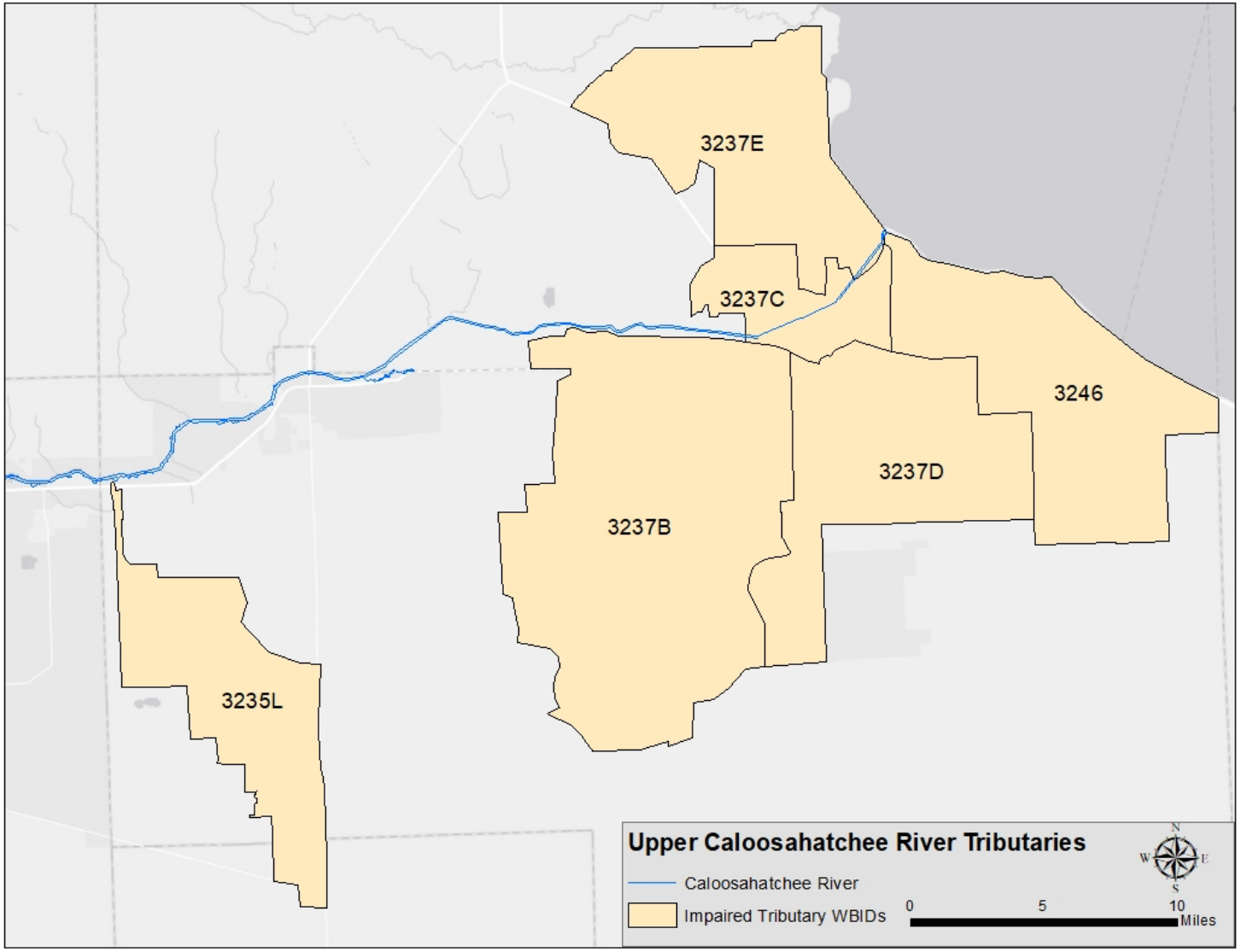
Tributary Impairments

Waterbody	WBID	Verified Impairments
S4 Subbasin	3246	DO, TN, chlorophyll *a*, macrophytes
C19 Subbasin	3237E	DO, TN, macrophytes
Ninemile Canal	3237D	DO, BOD, macrophytes
Lake Hicpochee	3237C	DO, BOD
Long Hammock	3237B	DO, macrophytes
Townsend Canal	3235L	DO, TP, macrophytes

2017 HSPF Model Area



Tributary Impairments



Tributaries Path Forward

- Clipped HSPF model
- Focused
- Faster
- Investigate causative pollutant(s)

New model complete
Early 2018

Draft TMDL
Spring-Summer 2018

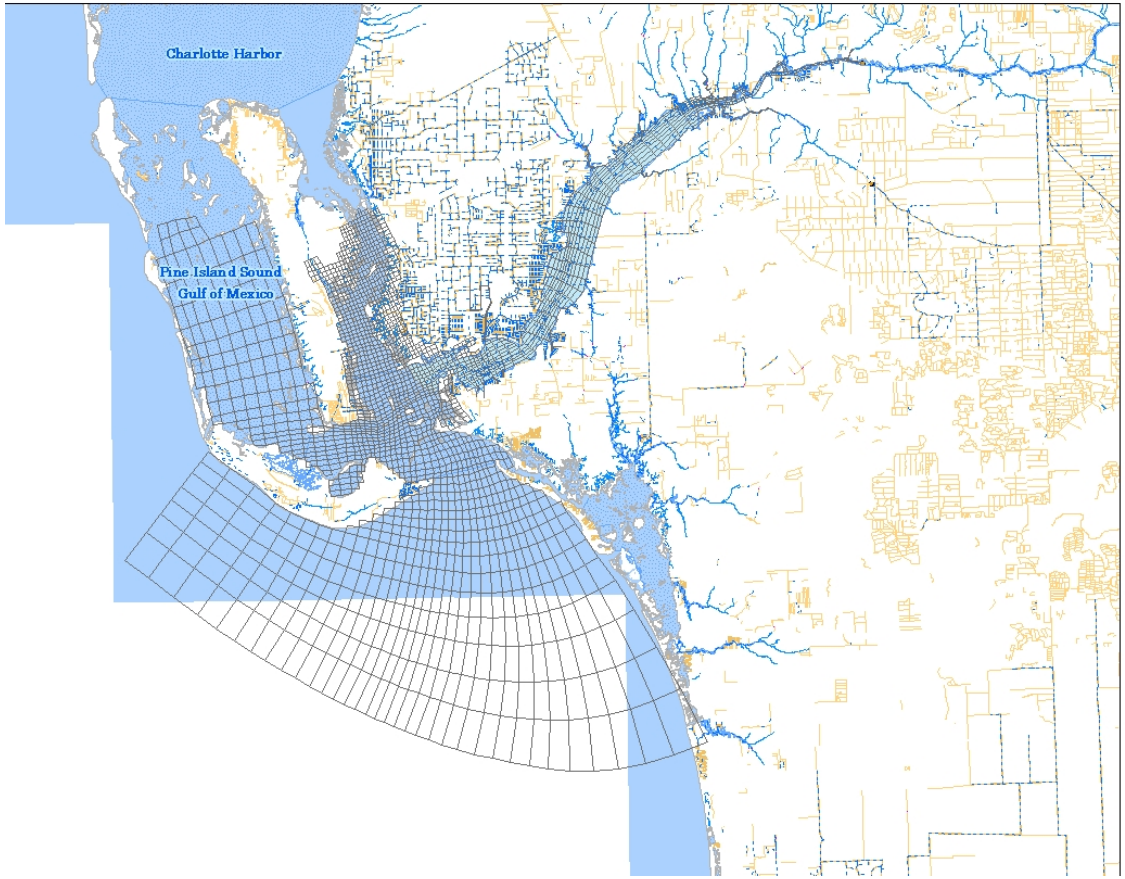
Estuary

EFDC Model

- V1 Final Report May 2017

- V2
  - Chlorophyll *a*
  - Carbon
  - Total suspended solids
  - Light extinction

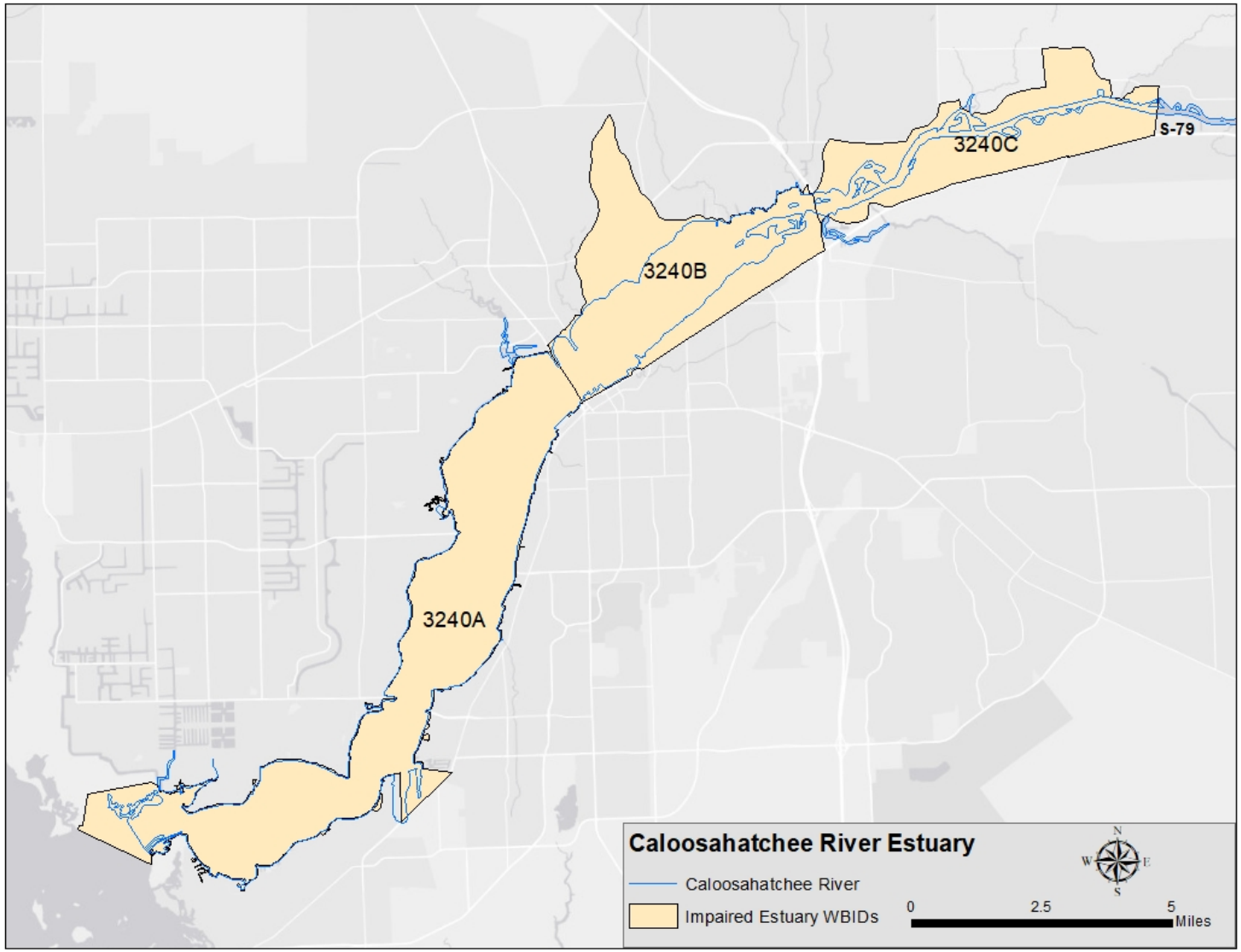
- V3
  - Chlorophyll *a*
  - Total suspended solids



Why Revisit TMDL?

- Support current and future restoration activities
- Revised HSPF and EFDC models as better tools
- More recent data
- Determine more refined target
- Address numeric nutrient criteria (NNC)

Estuary Impairments



Estuary Criteria

Section	WBID	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Chlorophyll *a* (µg/L)
Upper Estuary	3240C	0.82*	0.086	4.2
Middle Estuary	3240B	0.67*	0.055	6.5
Lower Estuary	3240A	0.50*	0.040	5.6
San Carlos Bay	3240O	0.44	0.045	3.7

Section 62-302.532 F.A.C.

*TMDL

Estuary Impairments

Section	WBID	Verified Impairments	Parameters exceeding current criteria (information purposes only)
Upper Estuary	3240C	TN, chlorophyll *a*	TP, TN*, chlorophyll *a*
Middle Estuary	3240B	TN	TP, TN*
Lower Estuary	3240A	TN	TP, TN*
San Carlos Bay	3240O	none	none

Section 62-302.532 F.A.C.

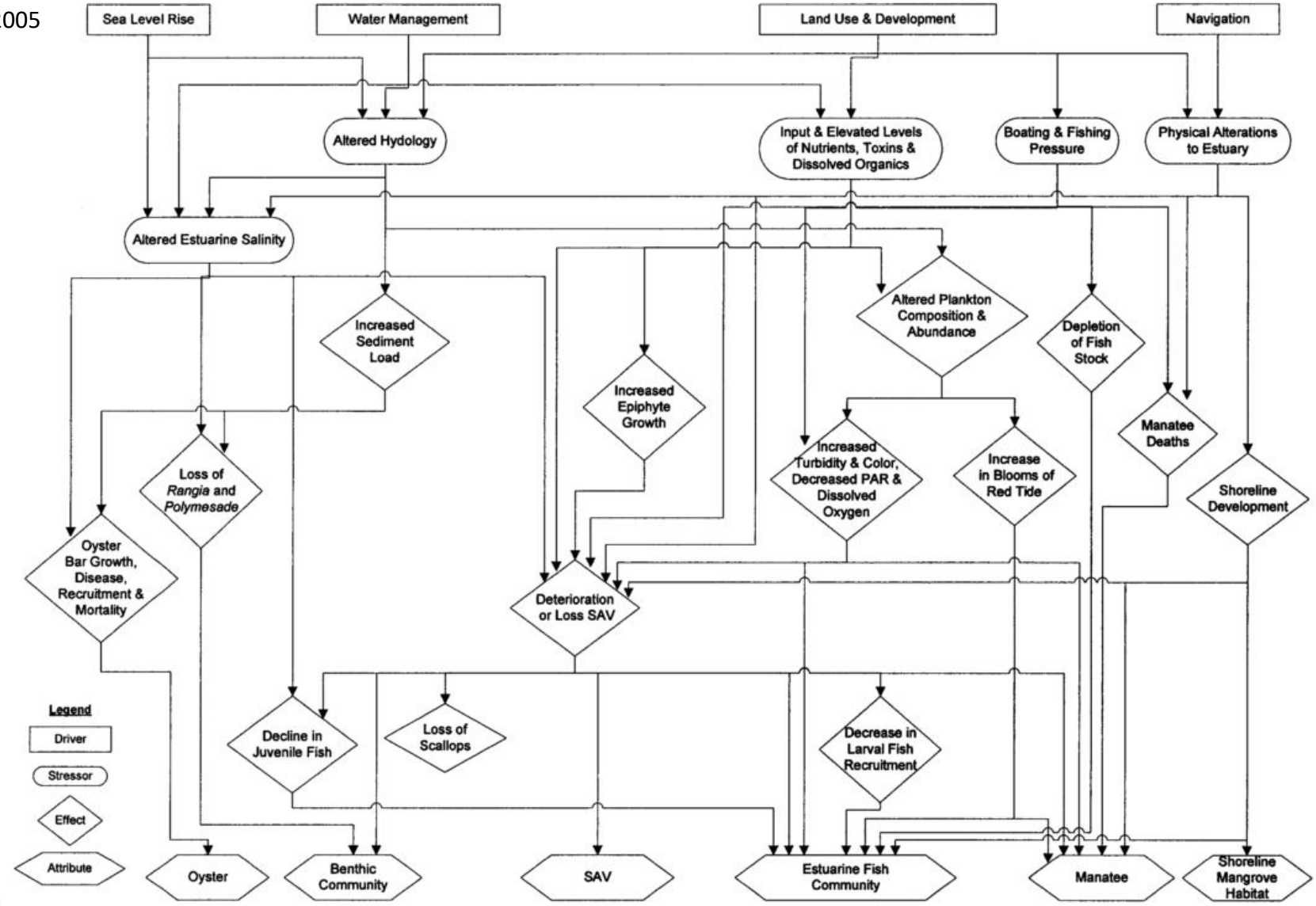
*Concentration data suggest TN exceeding TMDL criteria

Parameters of Concern to Stakeholders

- Chlorophyll *a*
- Submerged aquatic vegetation
- Flow
- Light availability
- Suspended sediment
- Color

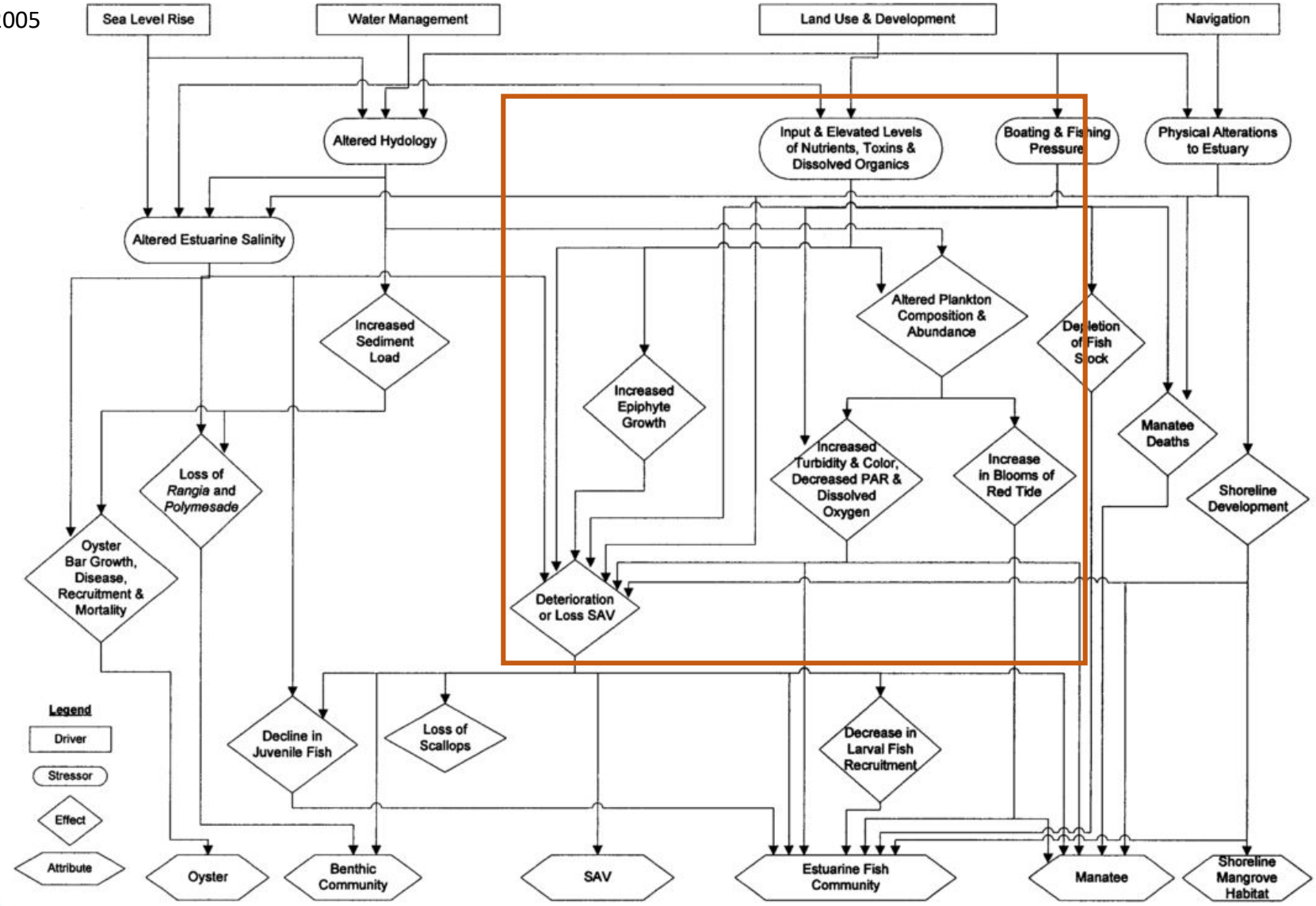
Conceptual Ecological Model

Barnes, 2005



Conceptual Ecological Model

Barnes, 2005



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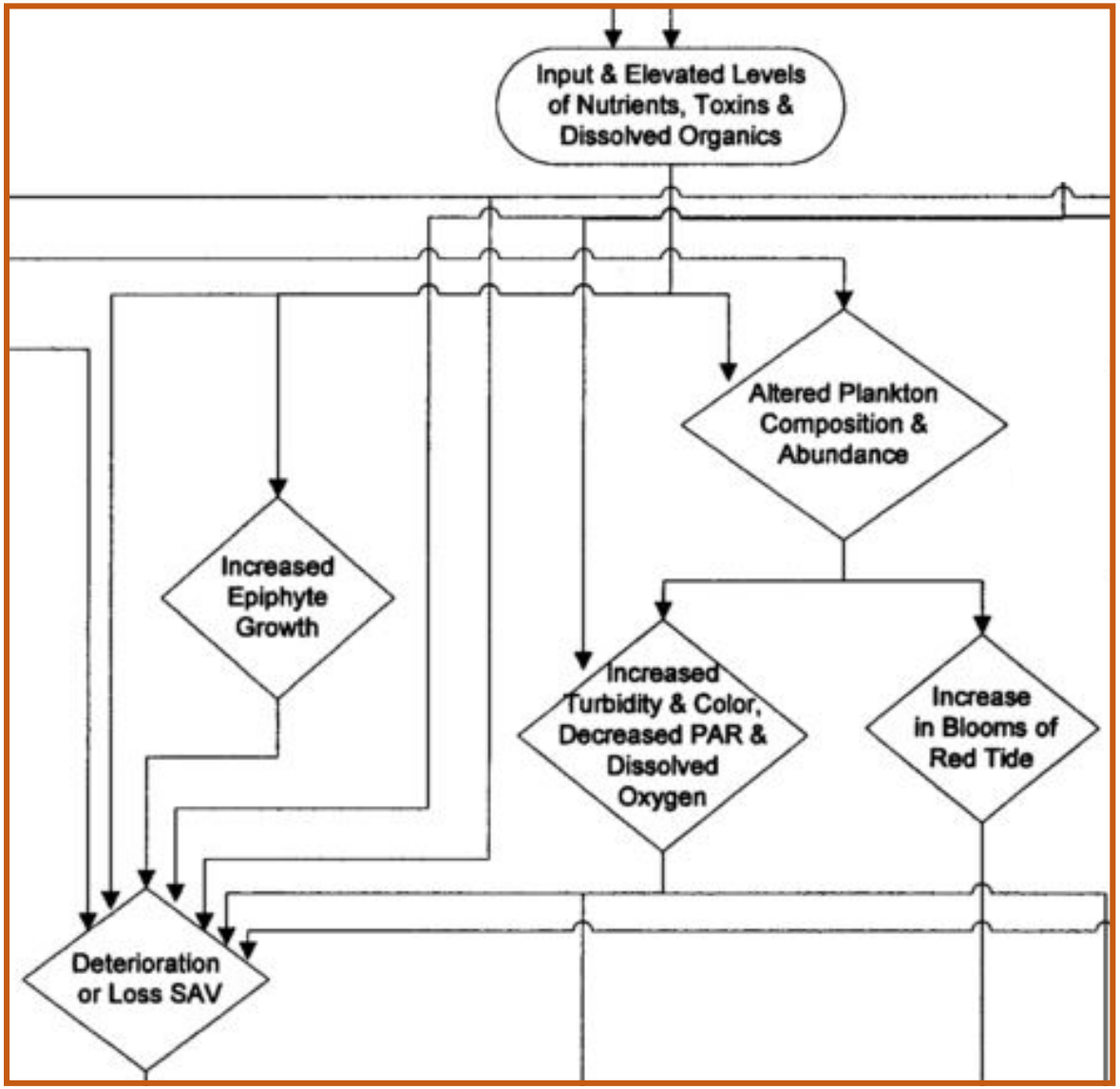

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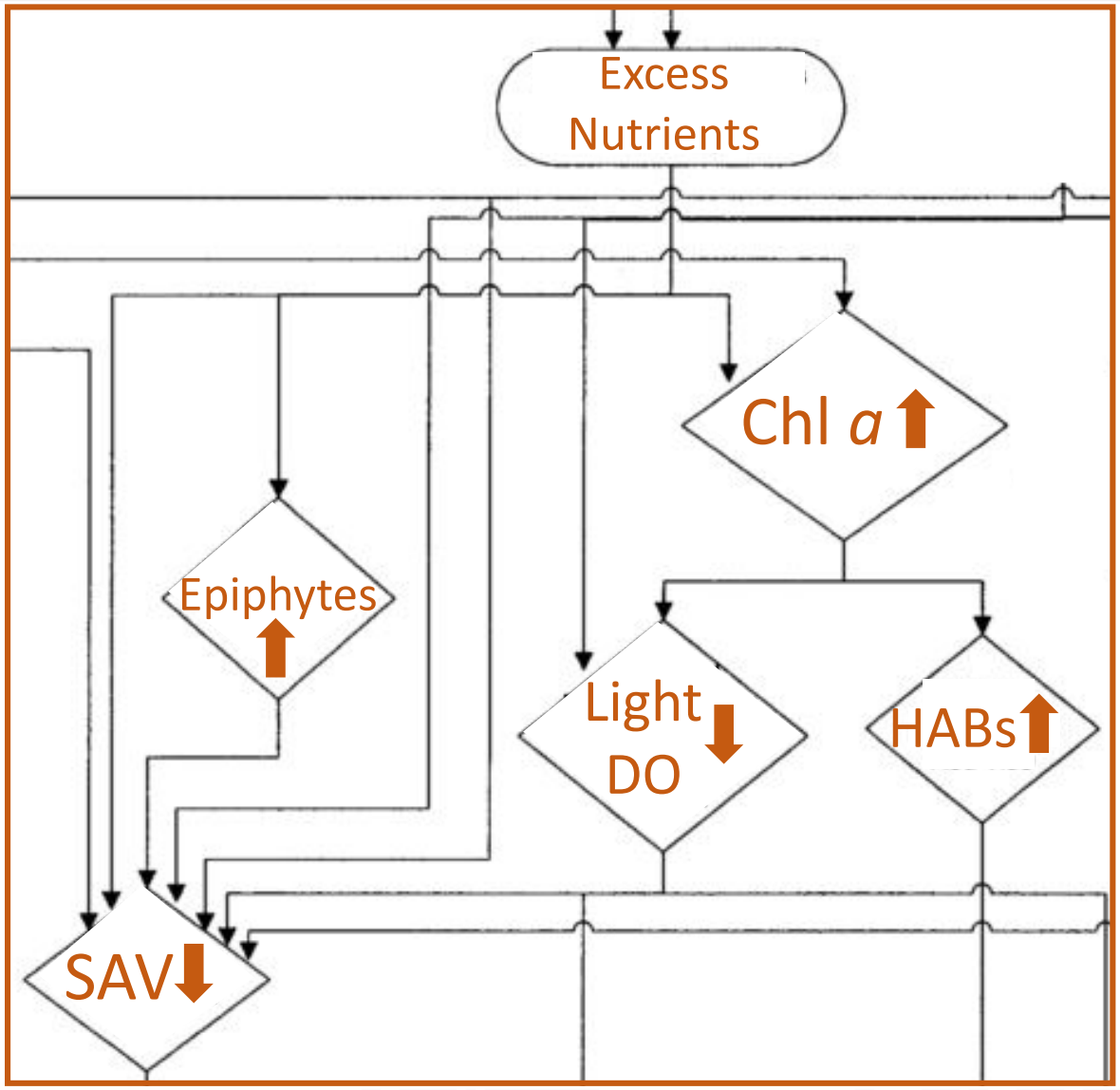
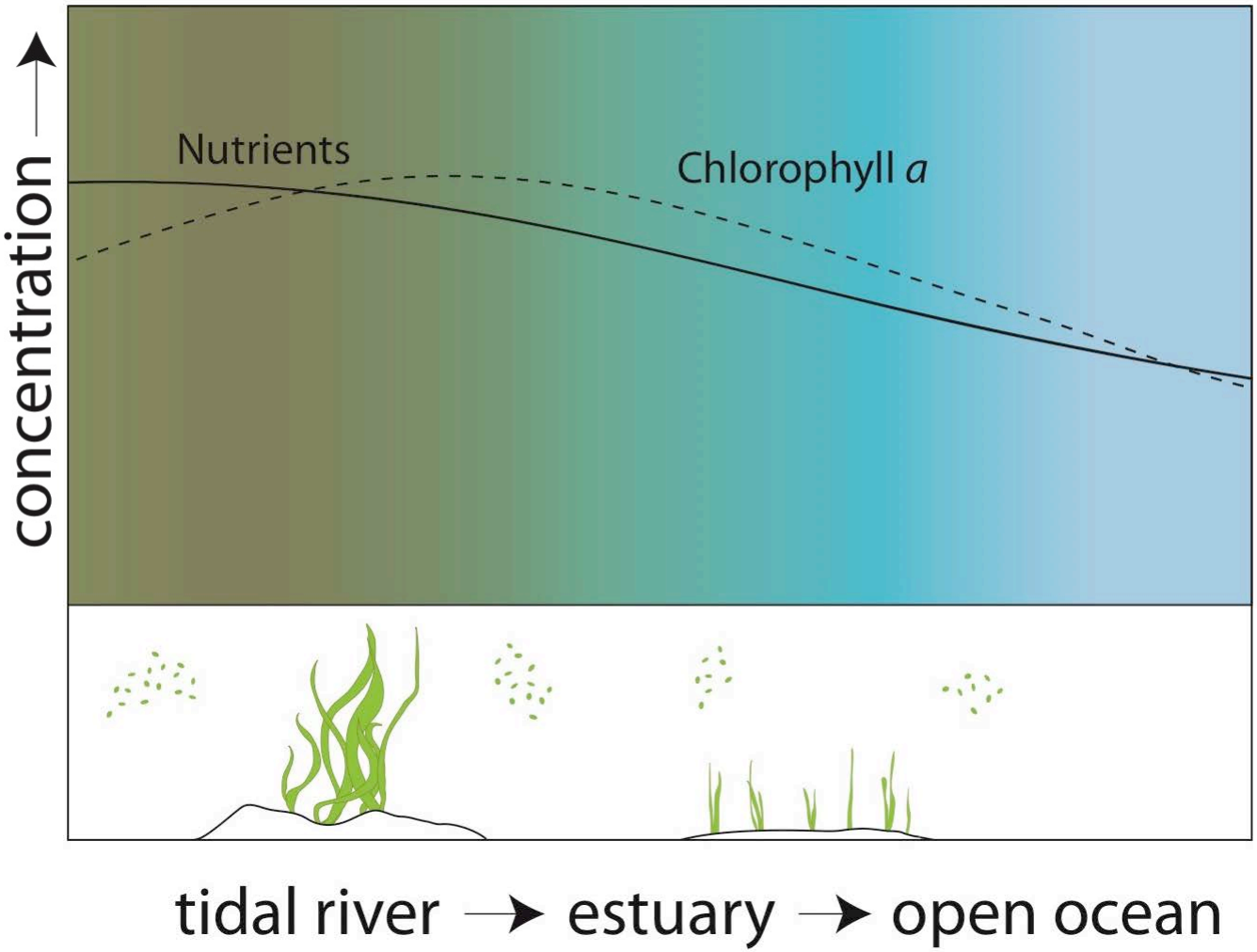
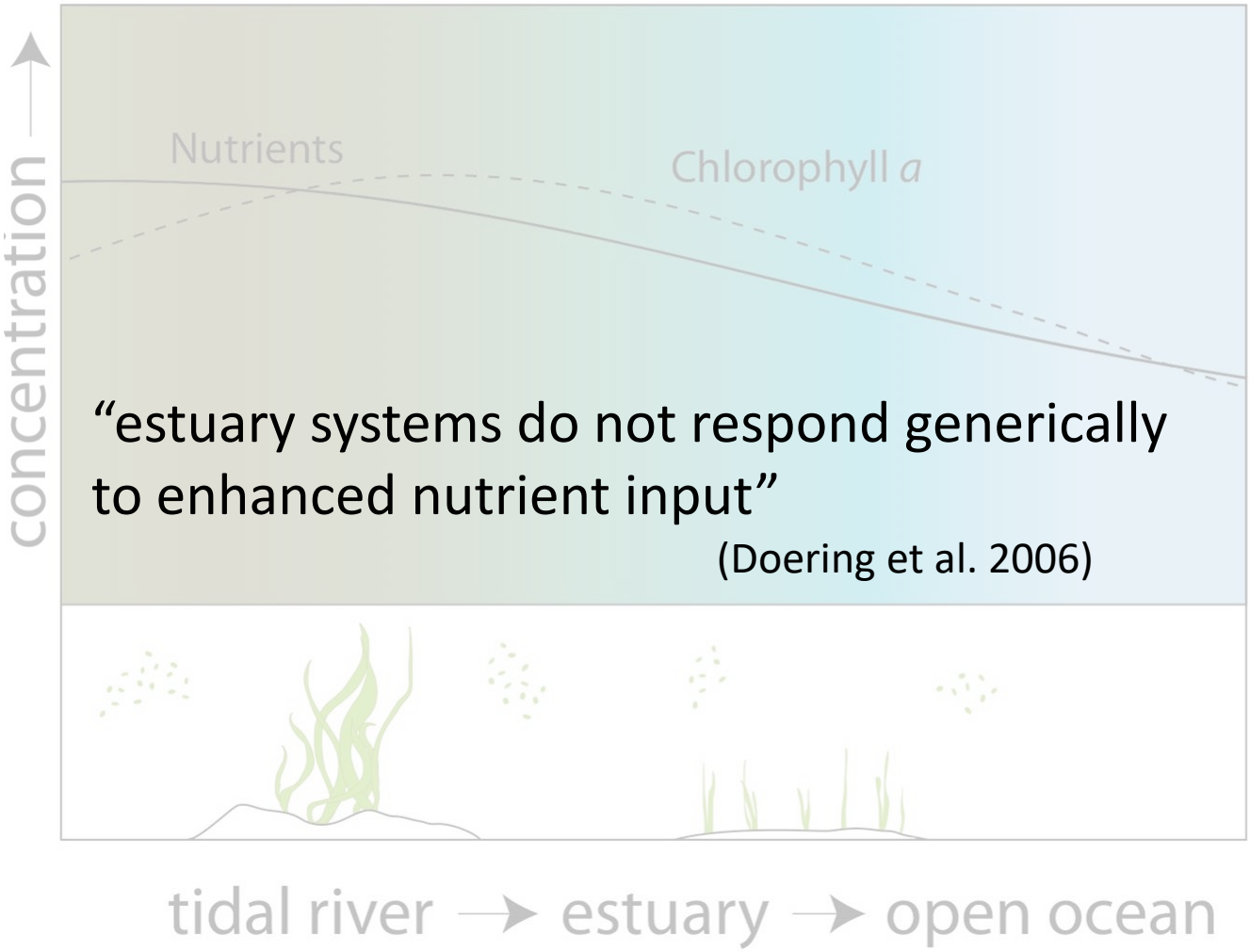


Estuary


concentration
Nutrients
Chlorophyll *a*
tidal river → estuary → open ocean

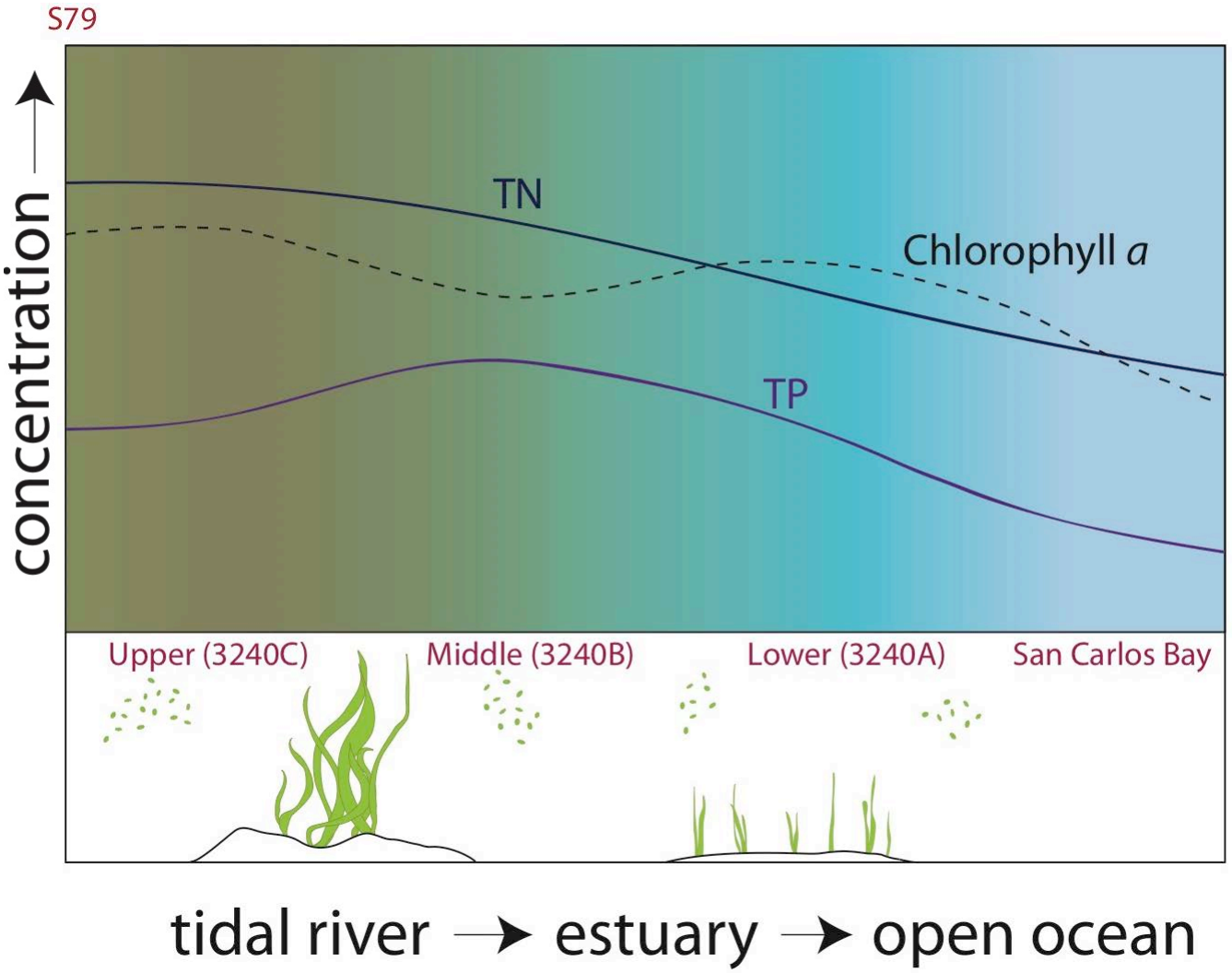
Estuary



"estuary systems do not respond generically to enhanced nutrient input"

(Doering et al. 2006)

Caloosahatchee River Estuary



Estuary Target Considerations

- The influence of chlorophyll *a* on light attenuation generally increases downstream and in drier years (Buzzelli et al. 2014)
- WBID specific
- Legally bound to abide by NNC
- Acknowledge multiple stressors
- Opportunity to derive meaningful management strategies

Estuary Path Forward

- EFDC model scenarios
- Investigate multiple stressors

Analyses complete
Early 2018

Draft TMDL
Spring-Summer 2018

We Need Your Help

Comments due by October 25, 2017

on the following:

- TMDL approach and modeling (tributaries & estuary)
- Local water quality issues, data, and projects that might influence the TMDL development
- Identification of key stakeholders who will help us during the restoration process

Caloosahatchee modeling files can be found here:
http://publicfiles.dep.state.fl.us/DEAR/BMAP/Caloosahatchee/CaloosahatcheeTMDL/Final_Files_June2017/ModelFiles/

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Formal Public Comment

Oh meet me at the estuary.

-Richard Walters, *Dandelion*

Photo by P.Lindgren via Wikimedia Commons

Thank you

Oh meet me at the estuary.

-Richard Walters, *Dandelion*

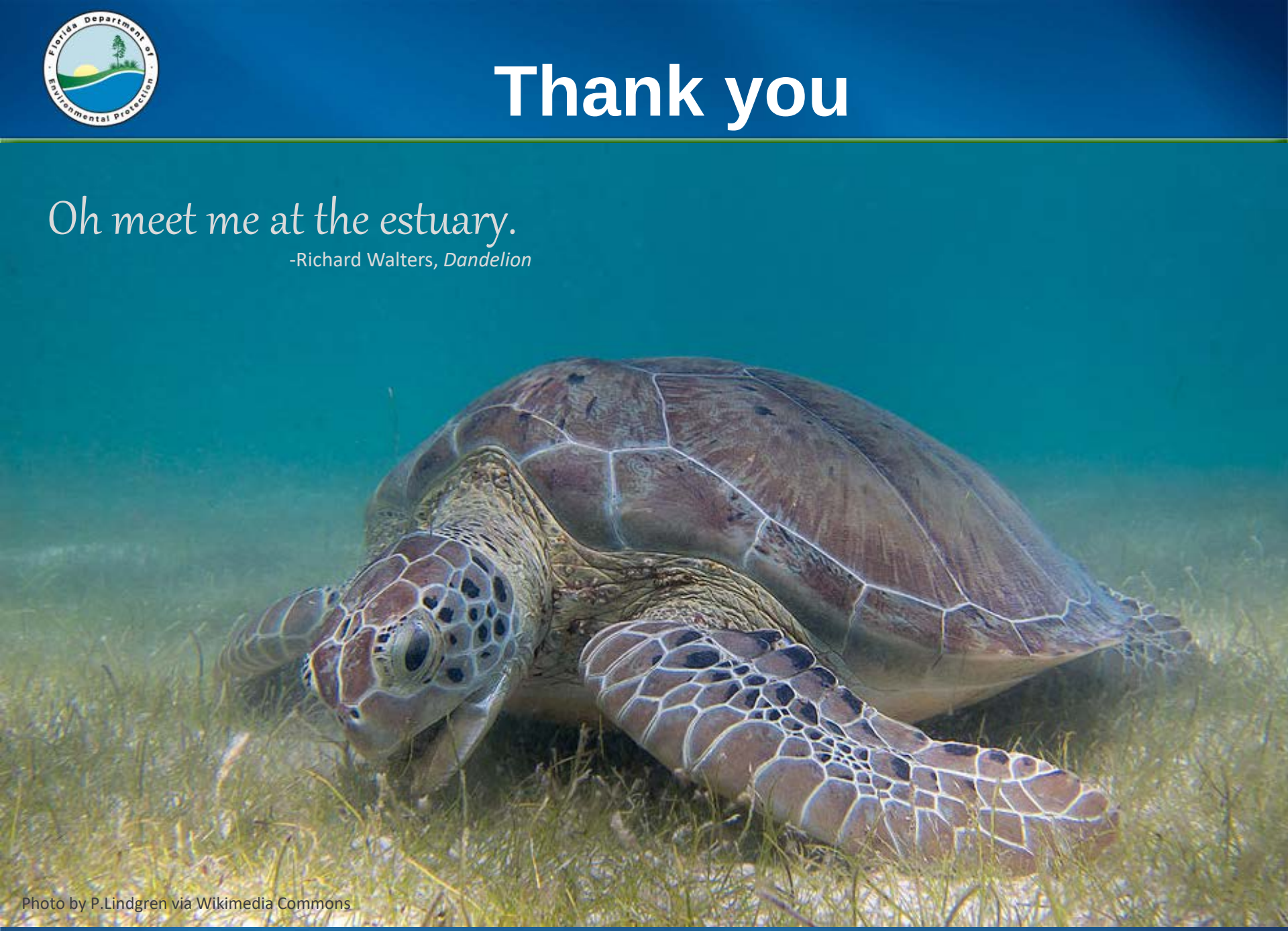

Photo by P.Lindgren via Wikimedia Commons

References

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- Barnes, T. (2005). Caloosahatchee Estuary Conceptual Ecological Model. *Wetlands*, *25*(4).
- Doering, P. H., Chamberlain, R. H., Haunert, K. M. (2006). Chlorophyll A and its use as an indicator of eutrophication in the Caloosahatchee Estuary, Florida. *Florida Scientist, 69,* 51–72.