

Cape Fear River Partnership

# A National Perspective on Nutrient Criteria Development

Clifton F. Bell | May 24, 2017



# Nutrients Affect Water Bodies In Very Different Ways than Toxics



## Toxics

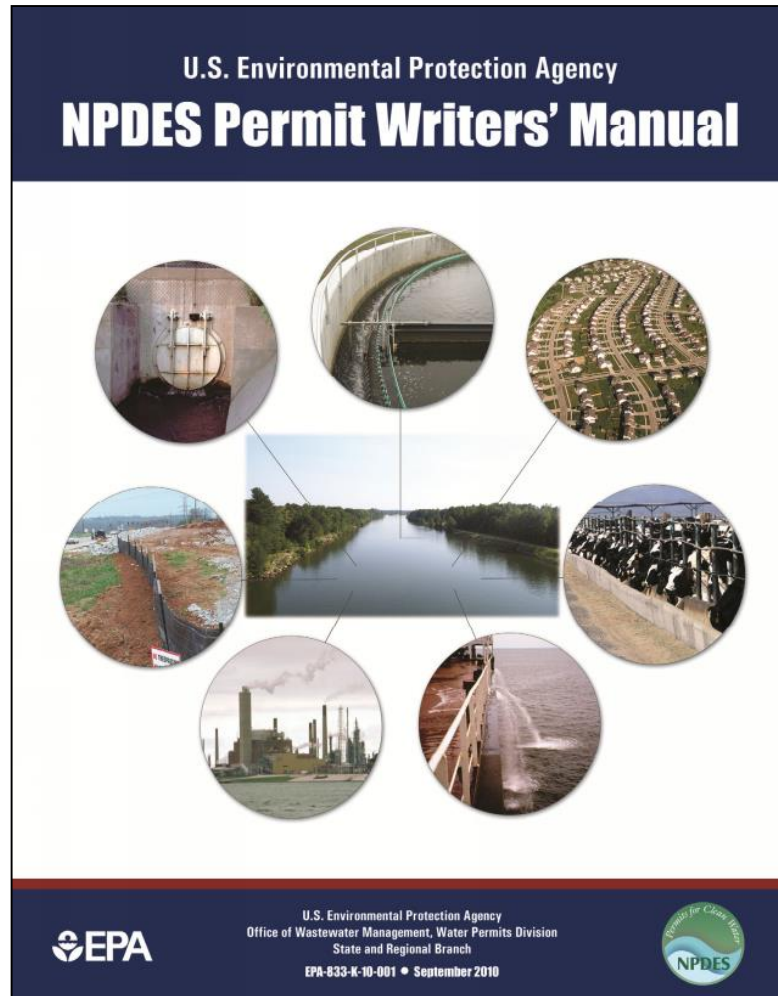
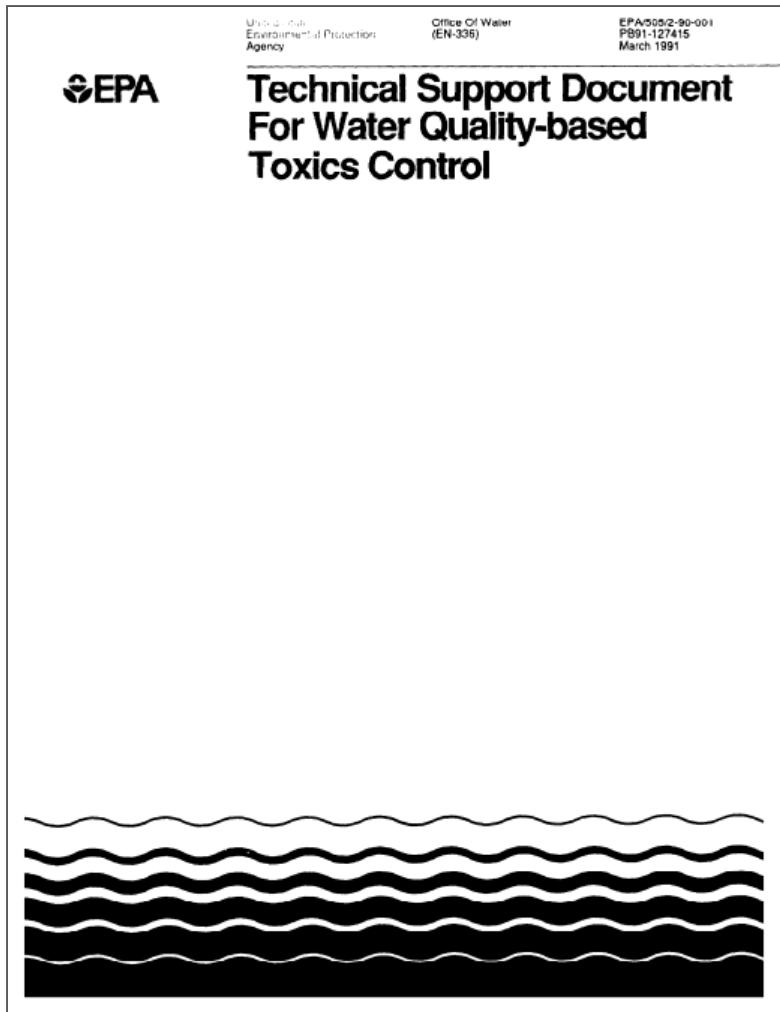
- Direct
- Acute & chronic
- Dose-response
- Threshold-based
- Based on bioassays



## Nutrients

- Indirect
- Gradational
- Sometimes cumulative or load-based
- Water-body specific
- Aesthetic
- Tradeoffs

# But NPDES permitting guidance is toxics-based.



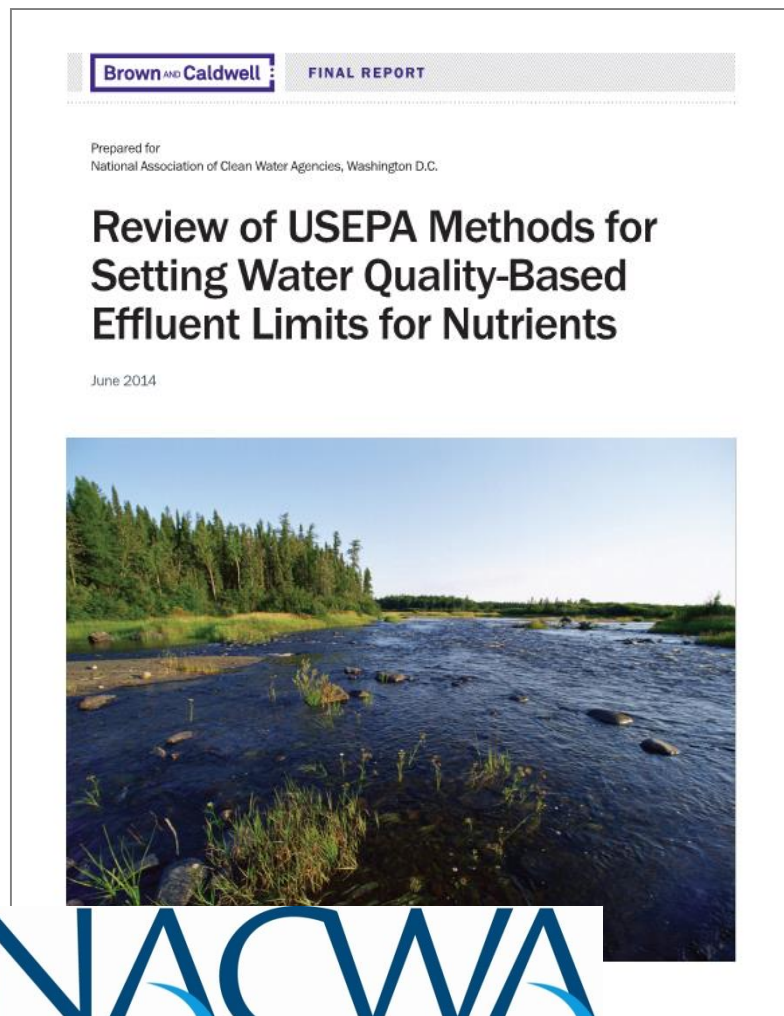


# Real world example to illustrate the point

- Aerated lagoon discharging to small river/bay
- No eutrophication problems noted
- Numeric nutrient criteria with undocumented technical basis
- Permitted exactly as (4-day) chronically toxic constituents
- Projected compliance cost: >\$20,000 per household



# Both States and Utility Organizations Are Finding Better Ways



# A “Wish List” for Nutrient Planning & Permitting Frameworks





My name is \_\_\_\_\_

I live in \_\_\_\_\_

I am \_\_\_\_\_ years old

I have been: Naughty Nice

My wish list is:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Thank You Santa,  
Love,  
\_\_\_\_\_

# Set Criteria/Goals with Emphasis on Response Variables

## Chesapeake Bay TMDL



United States  
Environmental Protection Agency

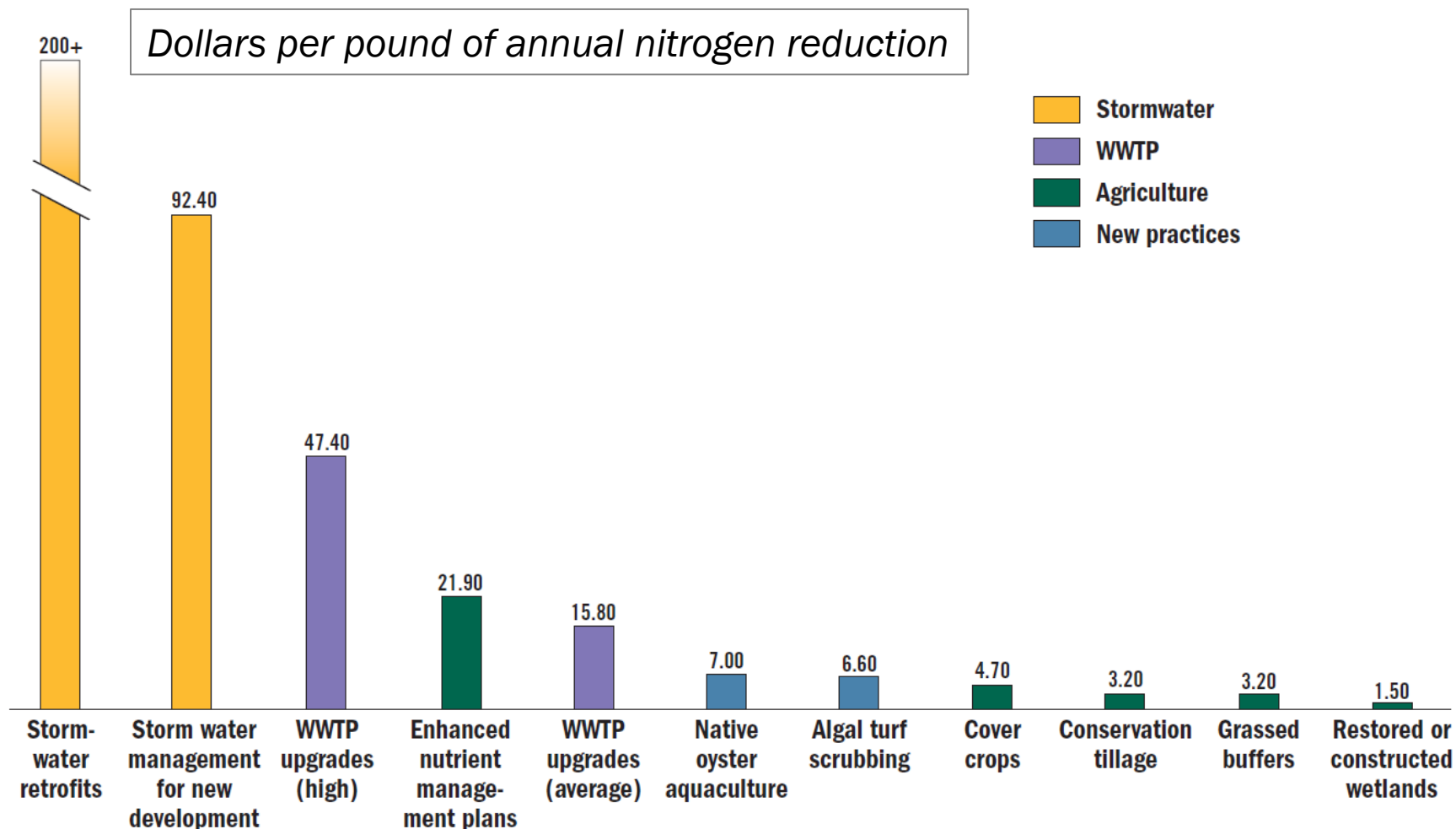
Office of Water  
Mail Code 4305T

EPA-820-F-13-039  
September 2013

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*Guiding Principles on an Optional Approach for  
Developing and Implementing a Numeric Nutrient Criterion  
that Integrates Causal and Response Parameters*

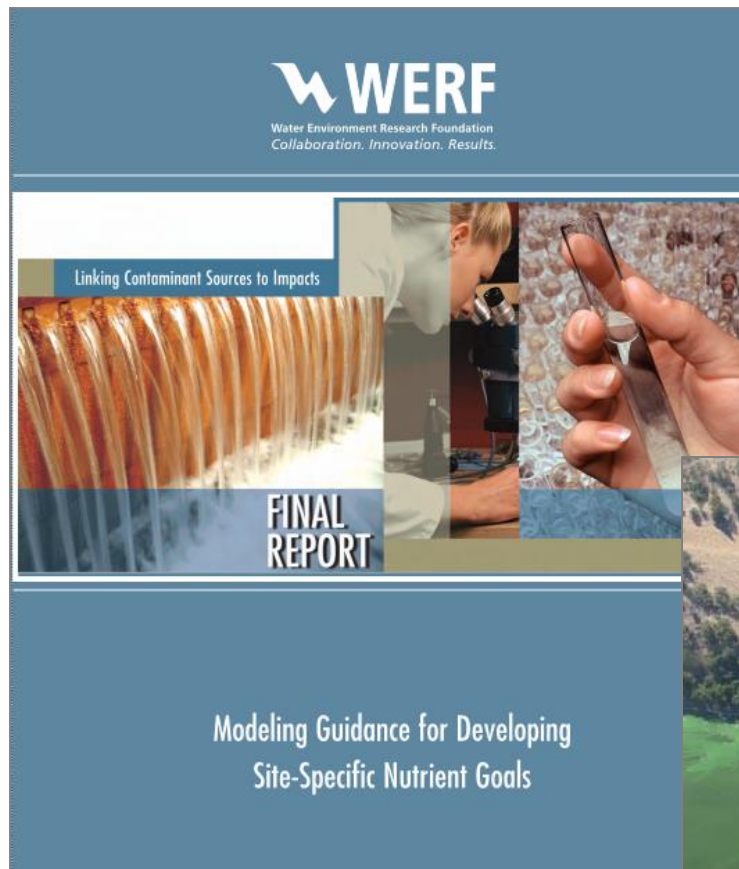
# Use Equitable Watershed-Based Planning Processes



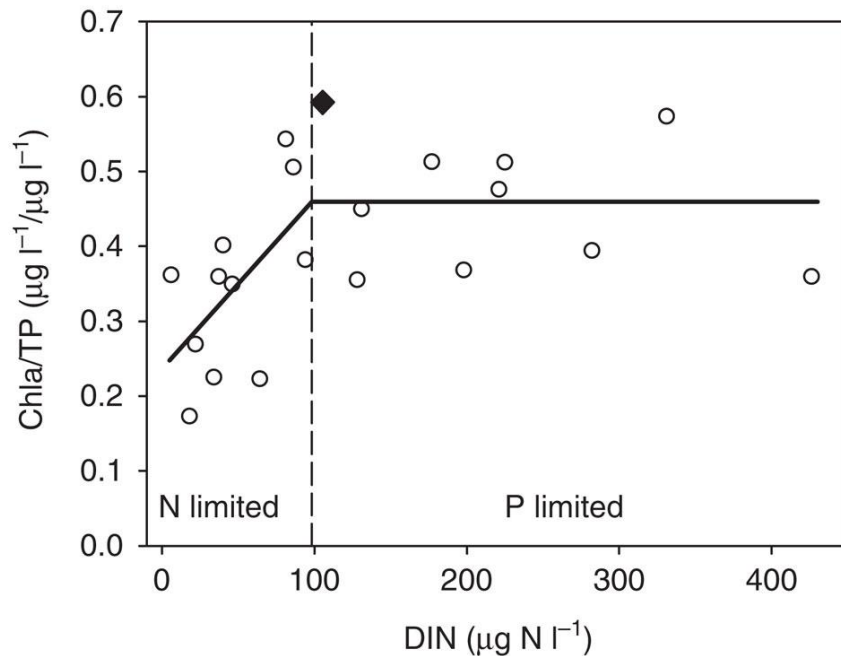
Source: Jones and others, 2010



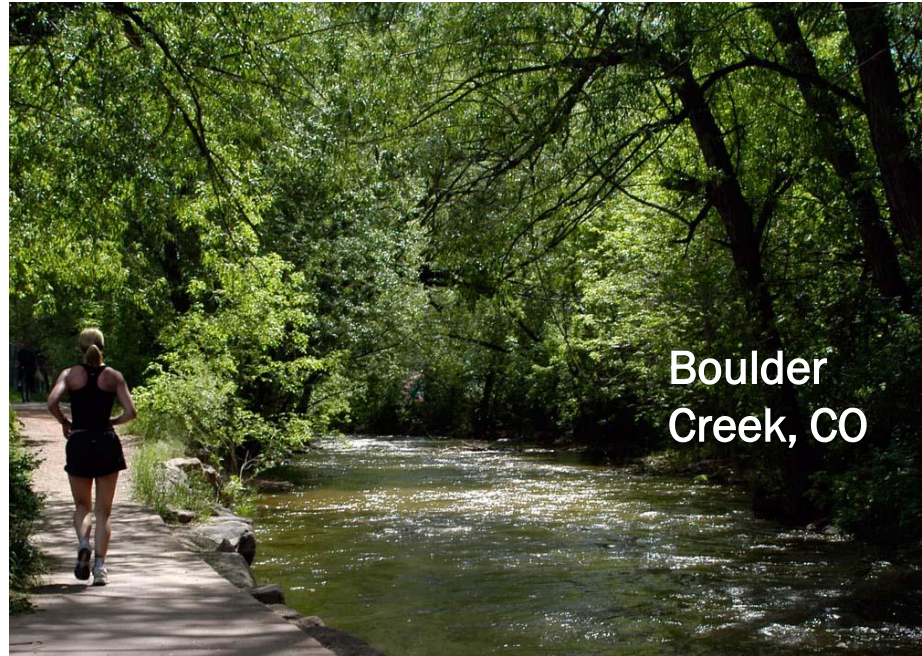
# Allow Water Body-Specific Criteria



# Consider Preferential Nutrient Controls



(from Camarero and Catalan, 2012)



# Use Longer Averaging Periods than with Toxics



Rivers  
& Streams

$\int$  *Weeks*



Lakes &  
Reservoirs

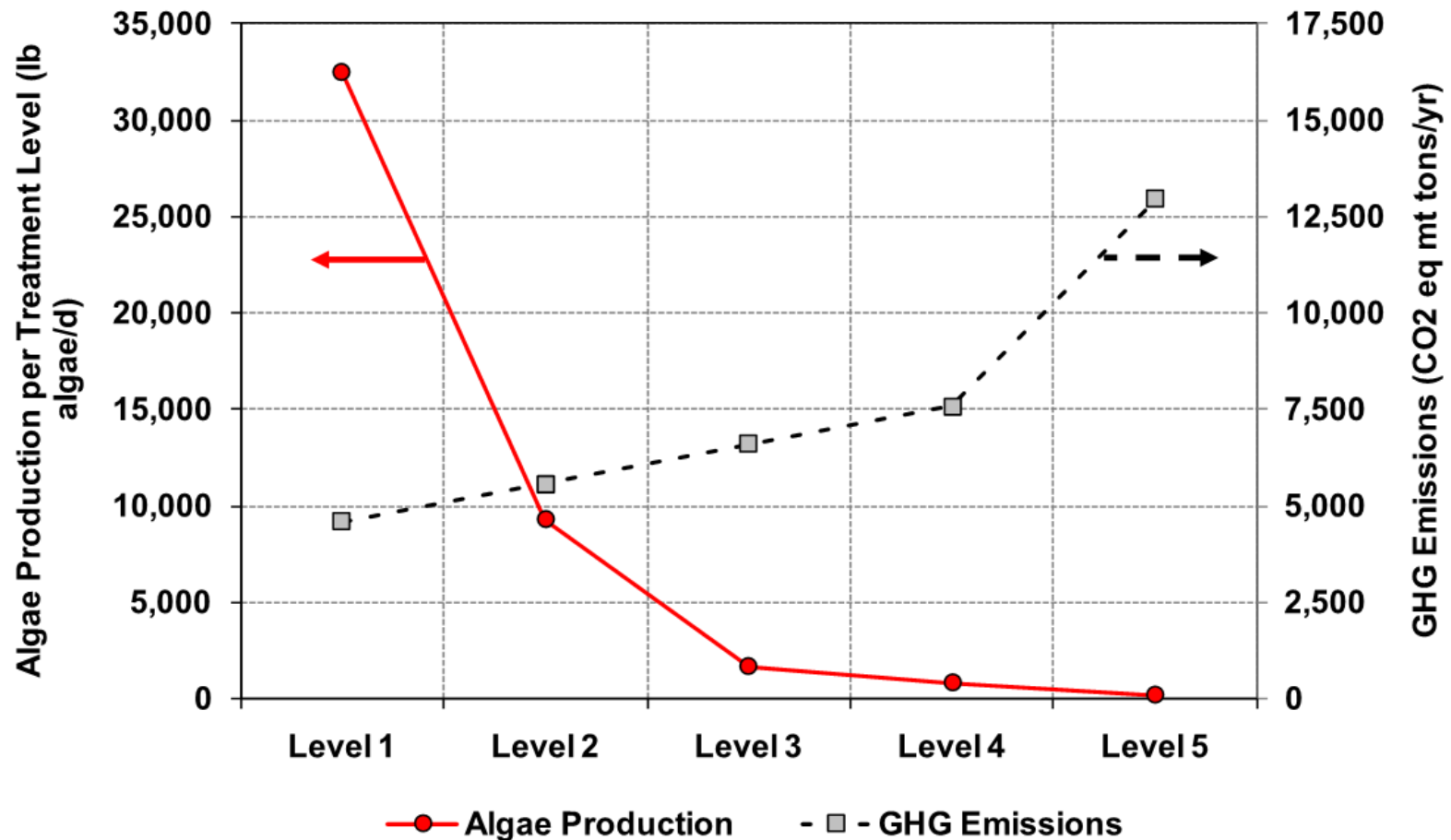
$\int$  *Months – Year +*



Estuaries

$\int$  *Months – Year +*

# Consider Diminishing Returns of Stringent Treatment Tiers



Source: Reardon and others, 2011