Overview of Recent Federal Actions on Nutrient Regulation and the Need to Force EPA to Employ Scientifically Defensible Methods

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National Guidelines on Aquatic Life Criteria Development

- Water quality criteria must ensure use protection "**with a small probability of considerable overprotection or under-protection**."
- It is not enough that the criterion is the best estimate given the available data. Criteria should be derived "**only if adequate appropriate data are available** to provide reasonable confidence that it is a good estimate."
- All decisions should be based on a **thorough knowledge of aquatic toxicology** and criteria decisions must be altered if there is a substantial probability of over or under protection of aquatic organisms and their uses

Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses (USEPA, January 1985)

EPA End Run: Assumed Macroinvertebrate Relationship

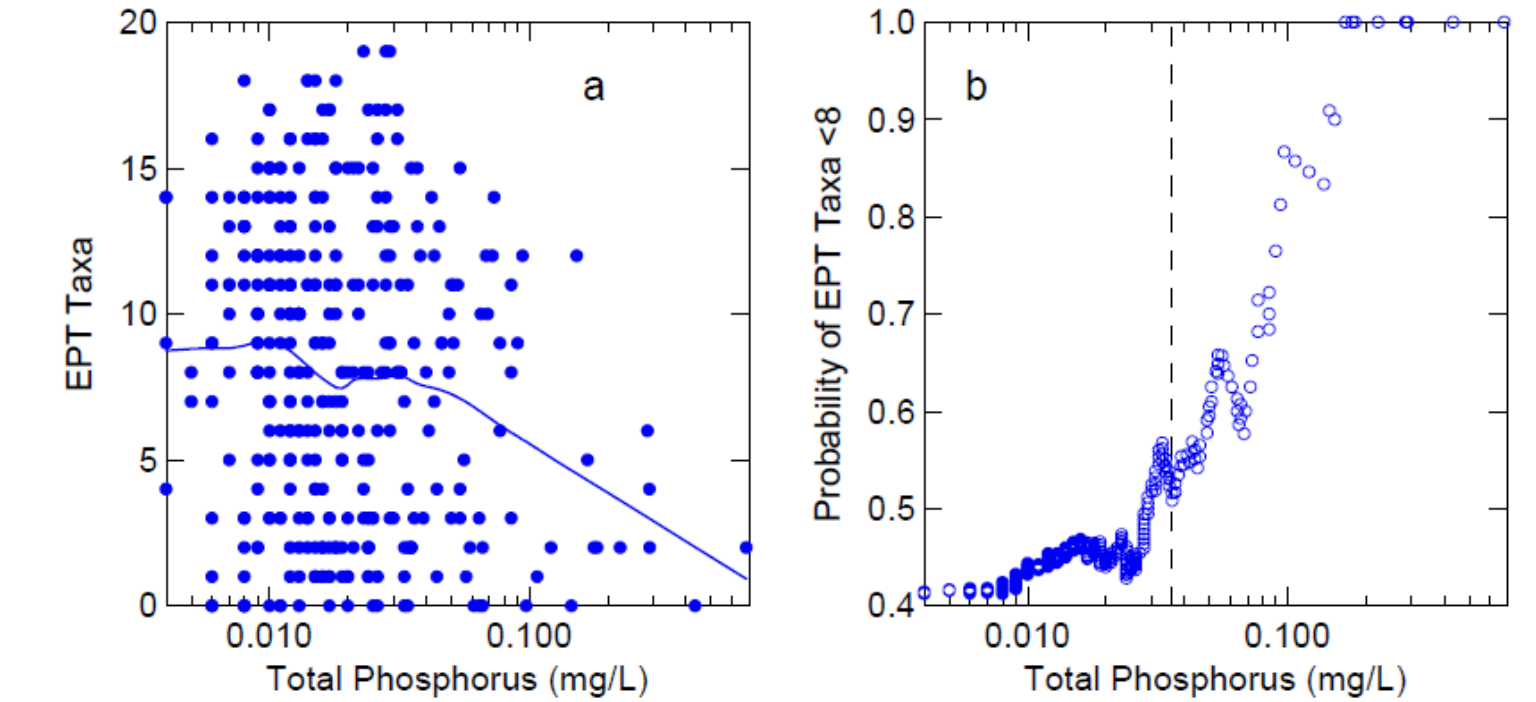


Figure 6 - Response of EPT taxa metric to the phosphorus gradient in the Northern Piedmont Ecoregion. Figure on the right shows the conditional probability of having fewer than 8 EPT taxa as TP concentrations increase.

Development of Nutrient Endpoints for the Northern Piedmont Ecoregion of Pennsylvania: TMDL Application (Paul and Zheng, 2007)

Consideration of Factors Influencing Nutrient Dynamics/Impairment Metric, SAB Report

- For criteria that meet EPA's stated goal of "protecting against environmental degradation by nutrients," the underlying causal models must be correct. ***Habitat condition is a crucial consideration in this regard (e.g., light [for example, canopy cover], hydrology, grazer abundance, velocity, sediment type) that is not adequately addressed in the Guidance***. Thus, a major uncertainty inherent in the Guidance is accounting for factors that influence biological responses to nutrient inputs. ***Addressing this uncertainty requires adequately accounting for these factors in different types of water bodies***. (at 36,37)

- Numeric nutrient criteria developed and implemented without consideration of site specific conditions can lead to management actions that may have negative social and economic and unintended environmental consequences without additional environmental protection. (at 37)

Science Advisory Board Conclusions

- The stressor-response approach cannot be used in isolation to develop technically defensible water quality criteria.
- Statistical significance does not equal biological significance.
- To be scientifically defensible, empirical methods must address confounding and co-varying parameters.
- Single variable stressor-response relationships that explain a substantial amount of variation are likely to be uncommon for most aquatic ecosystems (in particular, streams).

SAB Final Report on "Review of Empirical Approaches for Nutrient Criteria Derivation (April 27, 2010)

Post SAB – Forget the Science

- Independent Applicability
  - Regulate both TN and TP regardless of actual need
- Reference Waters or 1976 Red Book "Criteria" (0.1 mg/l TP)
  - Valid approach to derive criteria to protect designated uses
- Weight of Evidence/Literature *proves* Cause and Effect
- Impairment Listings Irrelevant – Apply Narrative Standard
  - Impose TN/TP limits wherever ambient concentrations are high, regardless of actual impairment
- Even negligible statistical significance is sufficient to support criteria derivation

Claimed Universal Demonstration of Cause and Effect

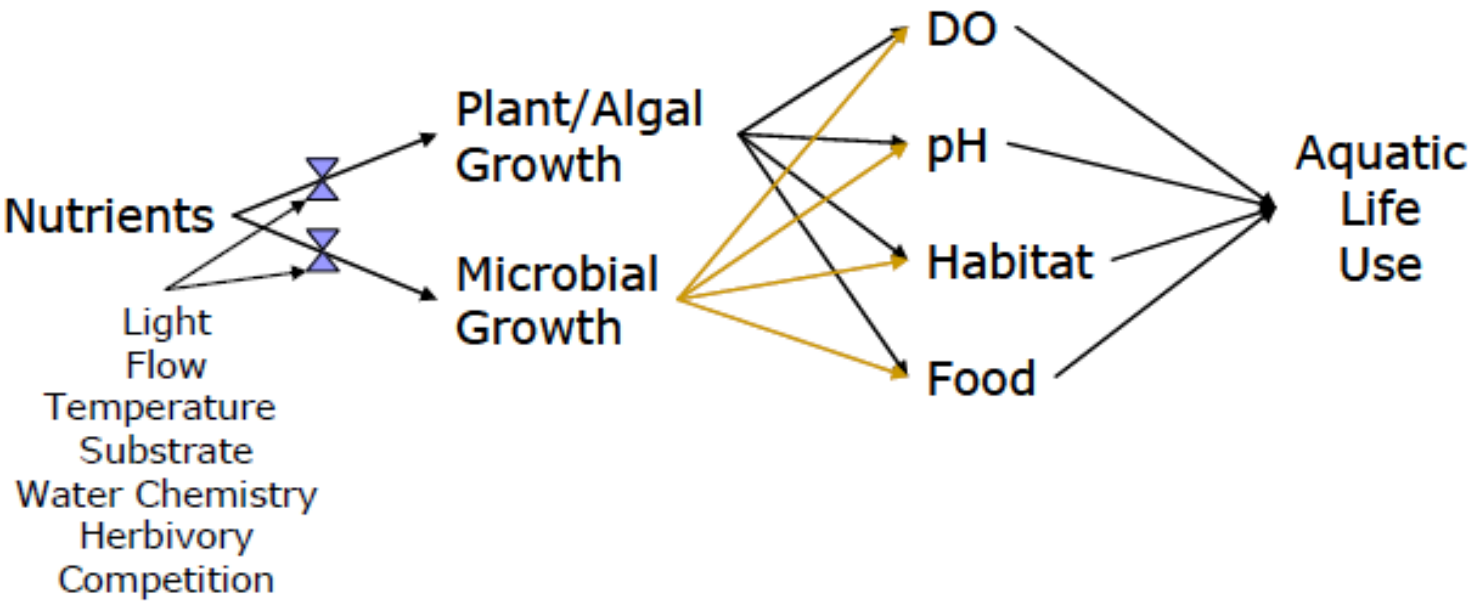
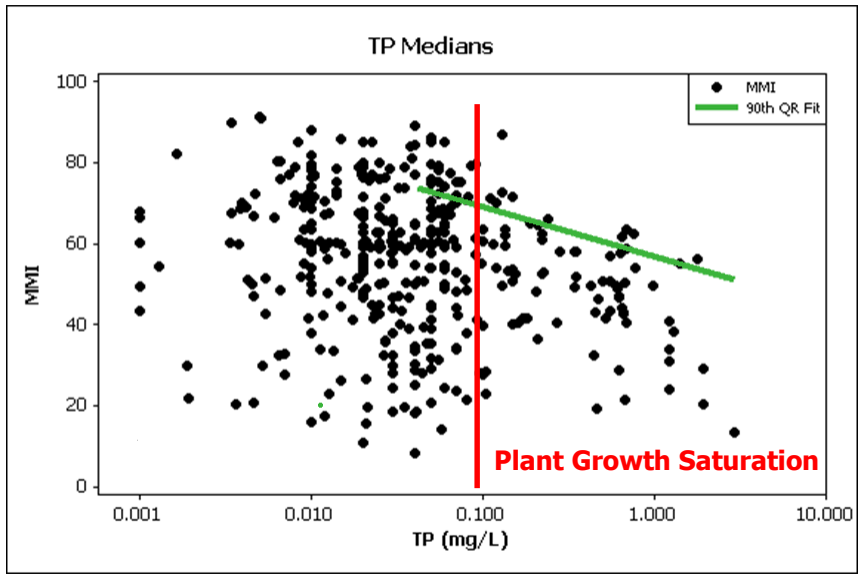


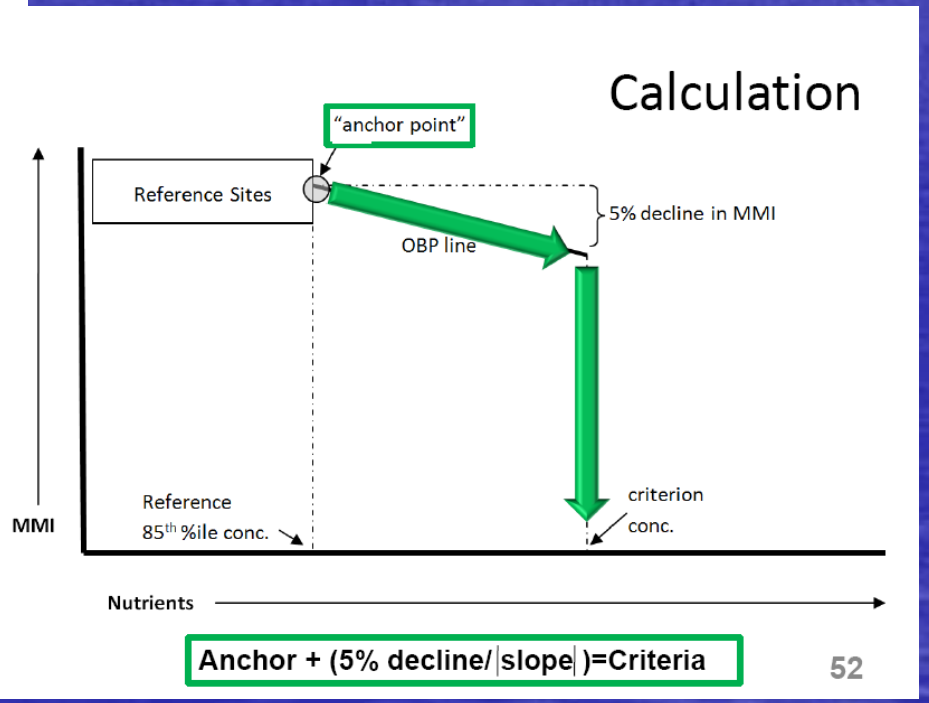
Figure 1 – Simplified diagram illustrating the causal pathway between nutrients and aquatic life use impacts. Nutrients enrich both plant/algal as well as microbial assemblages, which lead to changes in the physical/chemical habitat and food quality of streams. These effects directly impact the insect and fish assemblages. The effects of nutrients are influenced by a number of other factors as well, such as light, flow, and temperature.

Development of Nutrient Endpoints for the Northern Piedmont Ecoregion of Pennsylvania: TMDL Application (Paul and Zheng, 2007)

Inadequate Science Continues (Colorado, 2012)



Existence of wedge shape shows "cause and effect"



Impairment Cause Irrelevant
(Pennsylvania, 2010)

Nutrient TMDL imposed on concrete-lined channel to protect macroinvertebrates

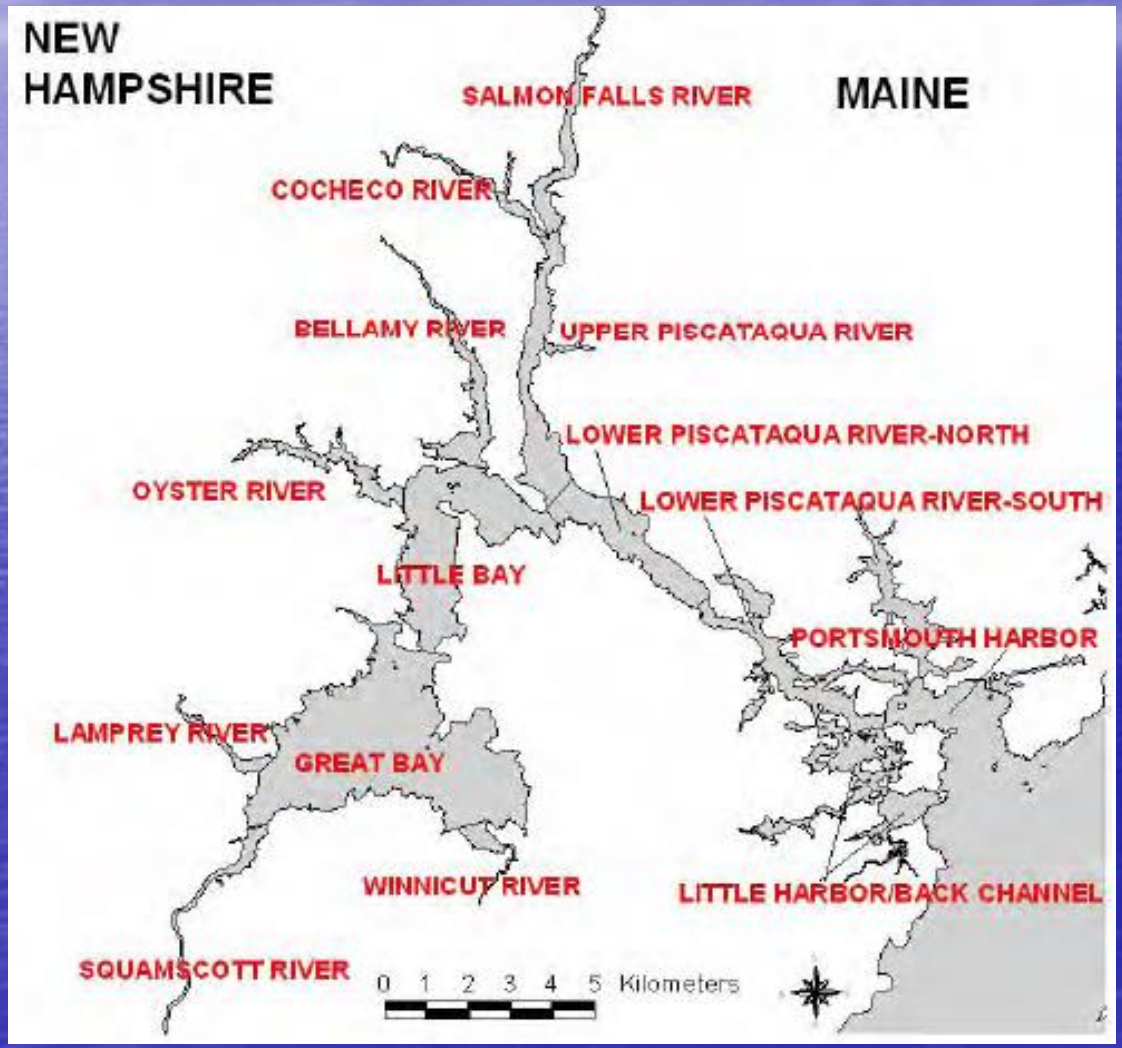
Great Bay Estuary Nutrient Debacle

Can it get any worse than this?

- No demonstrated TN Impairment
- No Adopted WQS
- 3 mg/l TN Limits (85% NPS)
- Entire analysis a fabrication

Assessment Zones in the Great Bay Estuary

(New Hampshire DES, 2009)



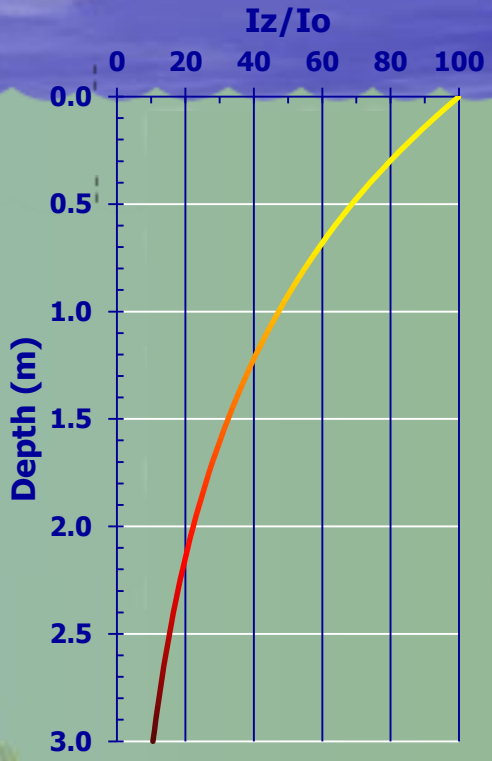
Factors Affecting Available Light for Eelgrass Growth

Incident Light

Suspended Algae

Color

TSS/ Turbidity



Epiphytes

Eelgrass

macroalgae

- Any increase in nitrogen concentrations has apparently not resulted in increased phytoplankton blooms. The only increasing trend for chlorophyll-a was observed at a station with very low concentrations already. Moreover, a probabilistic survey of the estuary in 2002-2003 found only 1.6% of the estuary to have chlorophyll-a concentrations greater than 20 ug/L.

Morrison et al 2008 (EPA Funded)

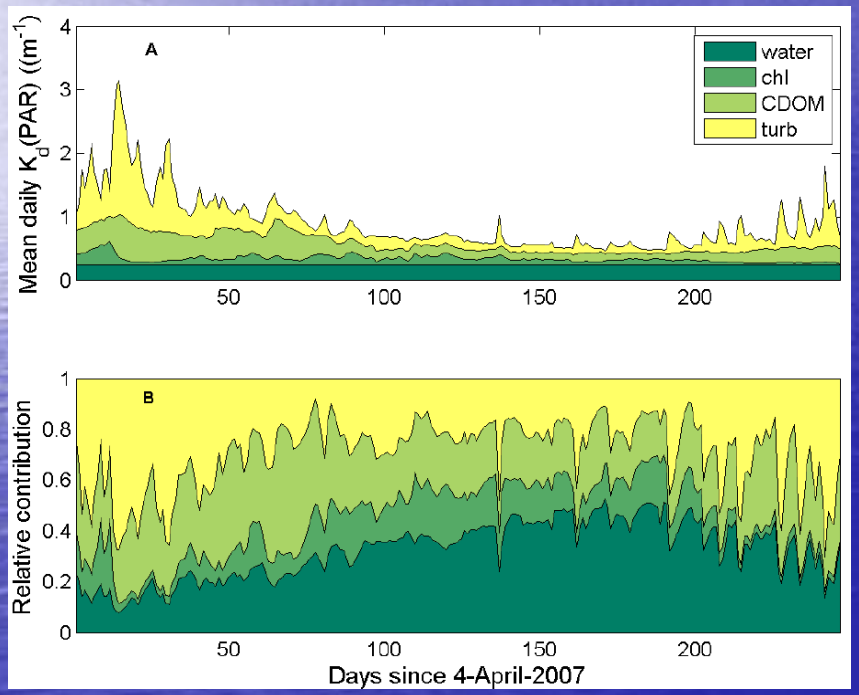
- CDOM and Turbidity primary factors controlling transparency
- CDOM is naturally occurring

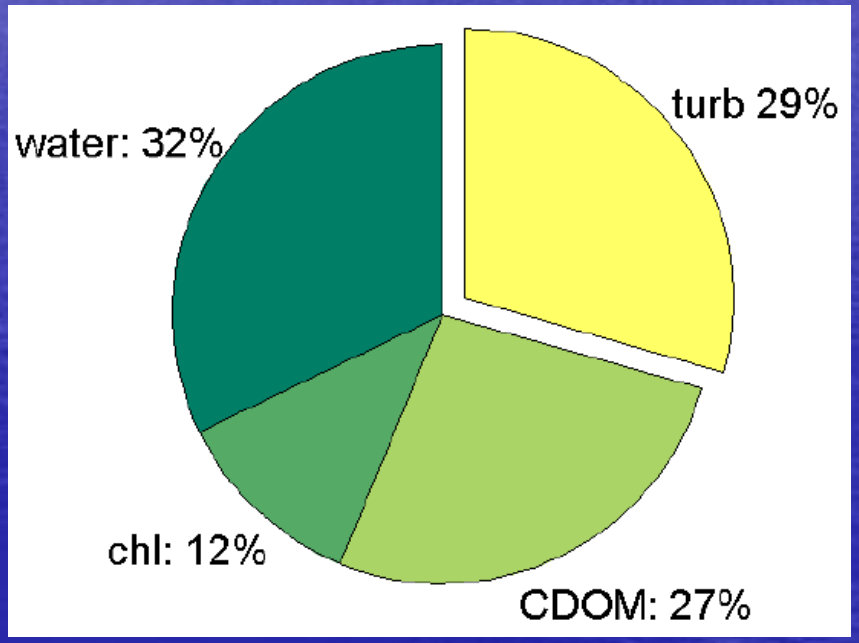
"These results suggest that the water clarity in Great Bay, Little Bay and Lower Piscataqua River was sufficient for the growth of eelgrass. The virtual absence of eelgrass from all but Great Bay suggests that other processes apart from light restricted growth are important for limiting eelgrass survival."

Conclusion section page 51

Contributions to Kd (PAR) measured at the Great Bay Buoy – TN Effects Negligible

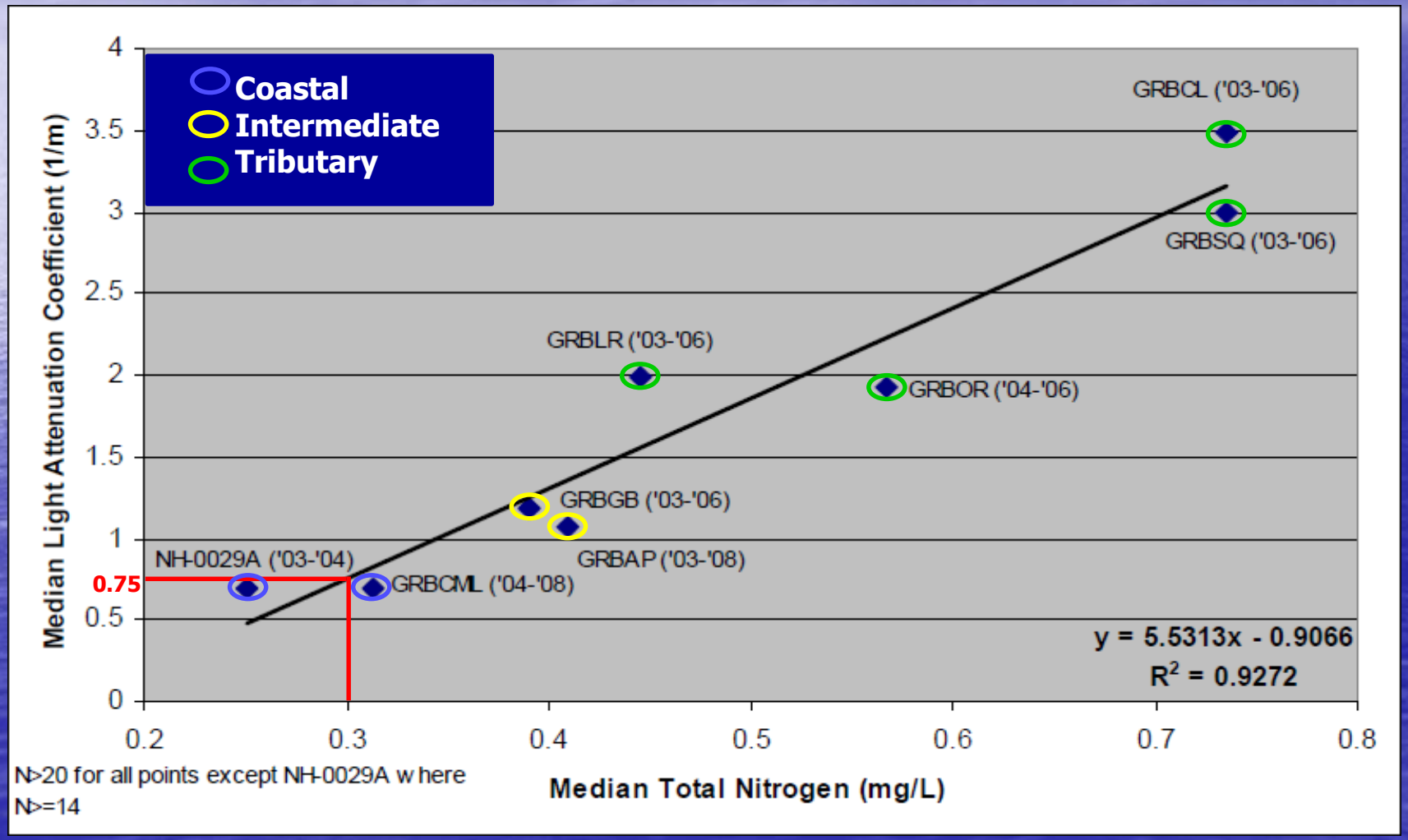
(From Morrison et al, 2008)





EPA's Solution: Pretend None of the Prior Analyses Occurred, Create New Graphs that "Prove" Nutrient Control is Required and Don't Tell Any of That to Your Peer Review Team

Acceptable Estuary Evaluation
(New Hampshire, 2011)



EPA/DES Recognized Problem (No Cause/Effect)

"The comment that seems the hardest to refute is that nitrogen is correlated with light attenuation. Nitrogen was not proven to be the causative agent for light attenuation. Moreover, nitrogen is a component of all of the factors causing attenuation (phytoplankton, CDOM, particulate organic matter) so a correlation would be expected"

11/19/2008 Email - P. Trowbridge to J. Latimer (USEPA) on Draft Criteria Approach presented to TAC

Stressor-Response Evaluation (Florida, 2010)

- Acknowledged that no significant relationship could be found between nutrients and invertebrates in streams
- Used Reference Waters and claimed impairment above reference levels
- Court Decision (2012): Reference approach "Arbitrary and Capricious"

EPA's 2012 Florida Stream WQS Proposal

It got worse

Worse than the original SAB graphs:

Multiple stream types; No habitat controls, No relevant biological or statistical metrics – but why?

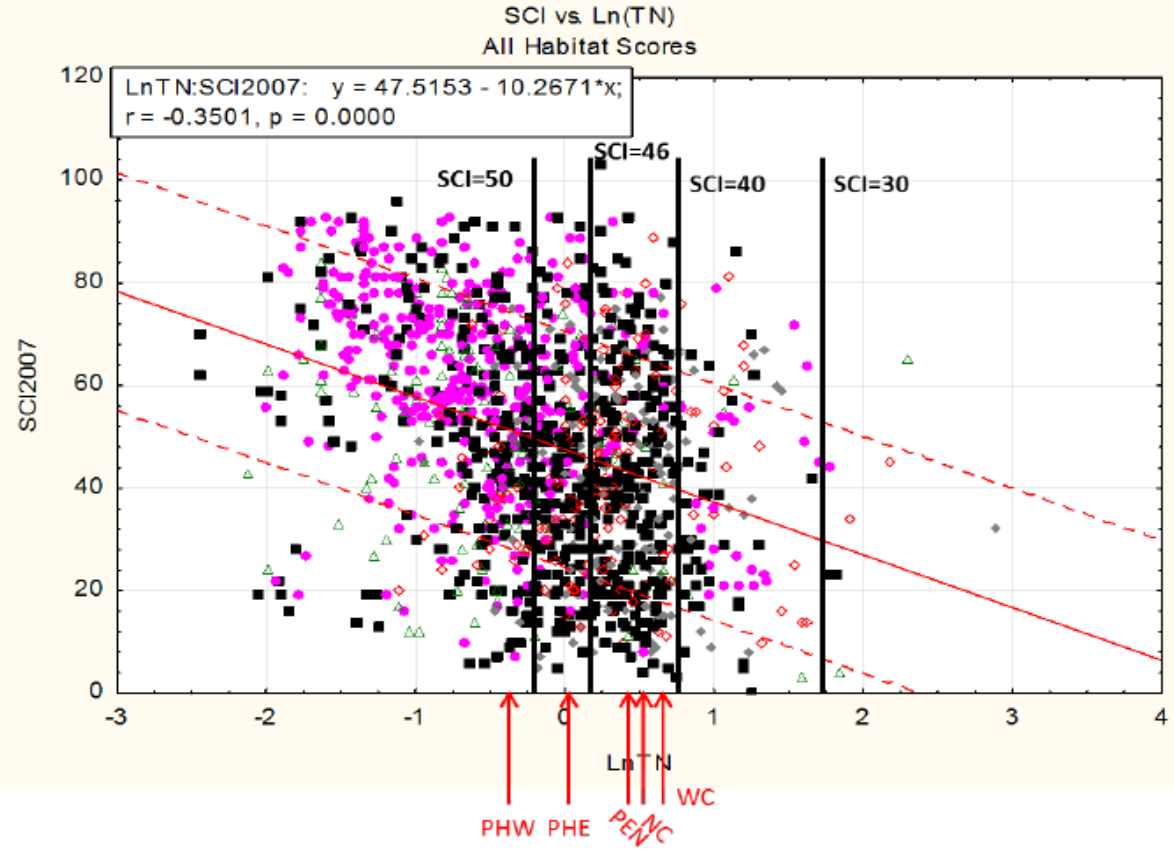
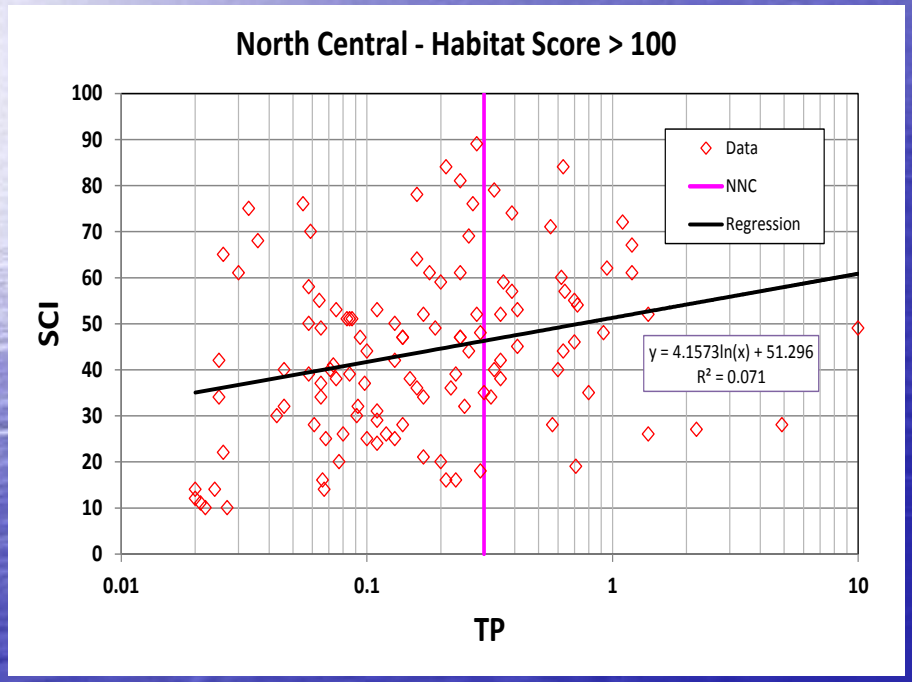
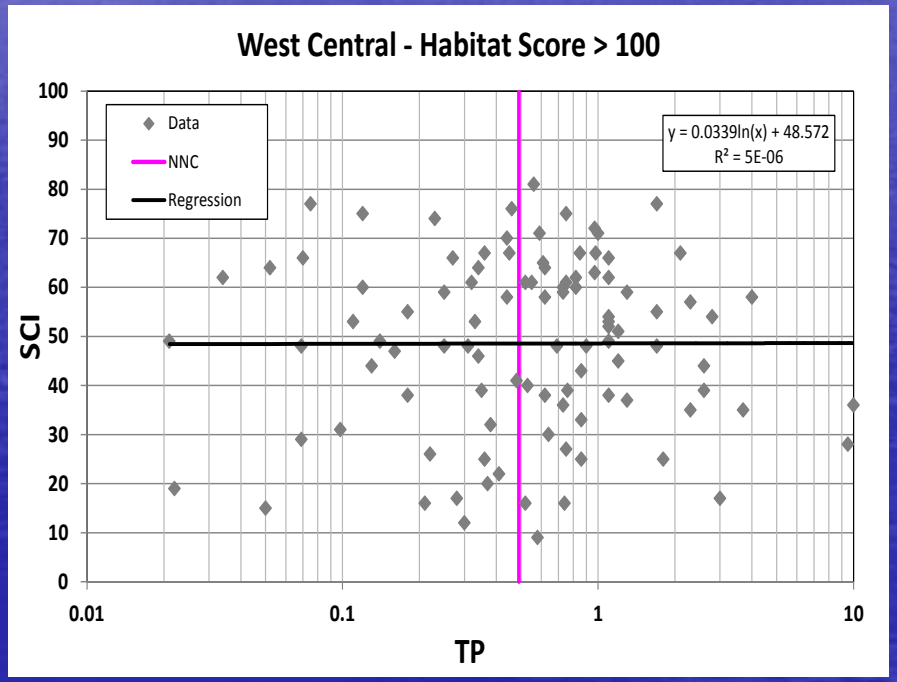


Figure 1-37. SCI versus Ln(TN), 2006–2011 data, relationship for all regions combined. Linear fit is shown. Panhandle West: pink closed circle, pink line; Panhandle East: green open triangle, green line; Peninsula: black closed square; North Central: red open diamond, red line; West Central: gray closed diamond, gray line.

Ignored Required Stressor Resp. Methods because gave unfavorable answer





This isn't just bad – its criminal

Ignored No Excessive Algal Growth:
Regulating at 3 ug/l chl ‘a’ ?

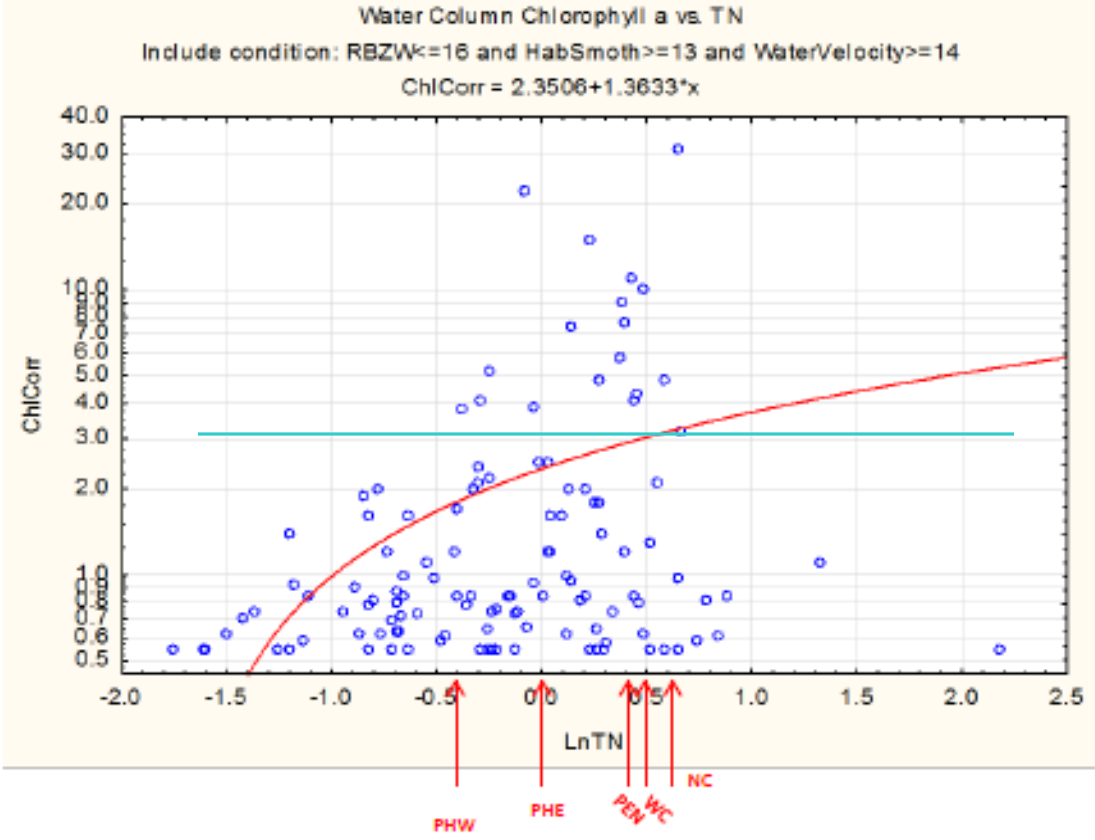


Figure 1-42. Plot of TN vs. water column chl-a (ChlCorr), corrected for phaeophytin (ppb). Sites were screened for RBZW, habitat smothering (HabSmoth) and water velocity habitat conditions. The red line is a linear fit. Also shown are the Florida stream TN criteria values (in red with arrows) for each nutrient region. PHW: Panhandle West, PHE: Panhandle East, PEN: Peninsula, NC: North Central, WC: West Central.

Ignored No Projected DO Impact

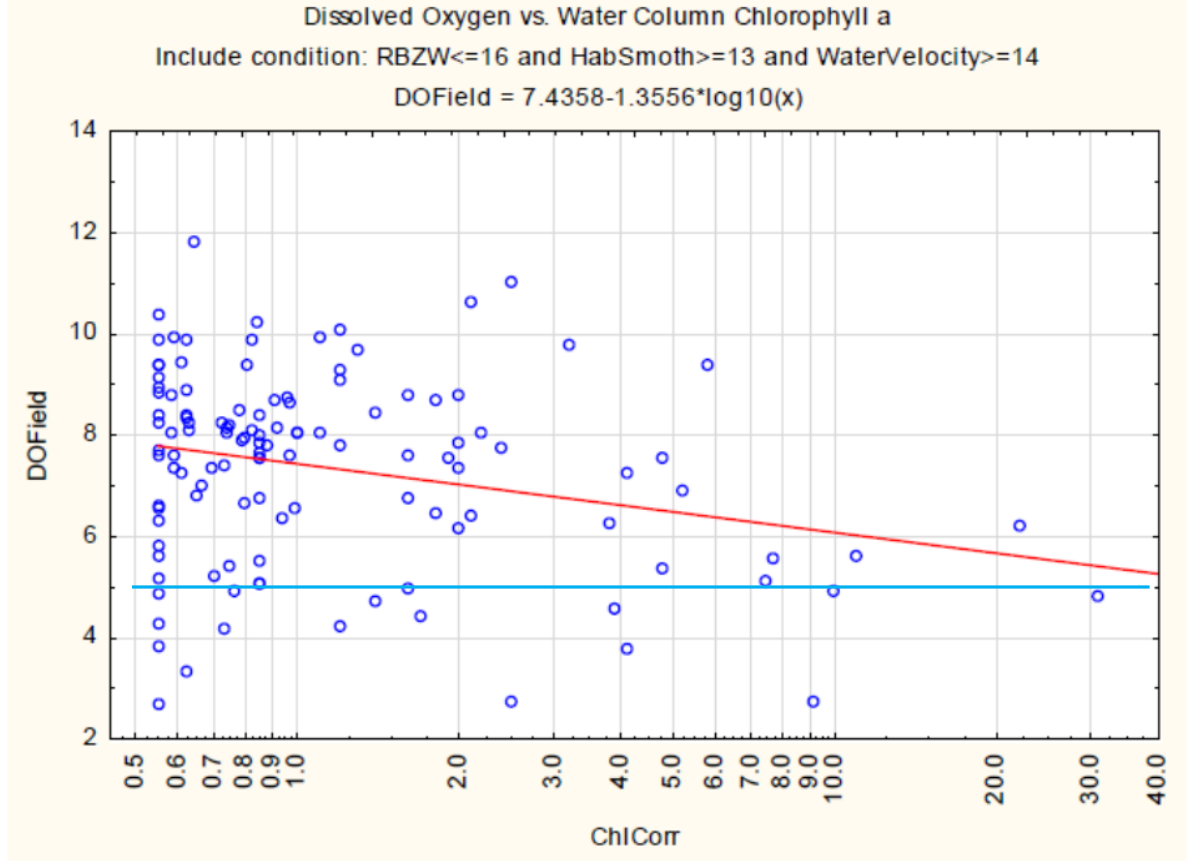
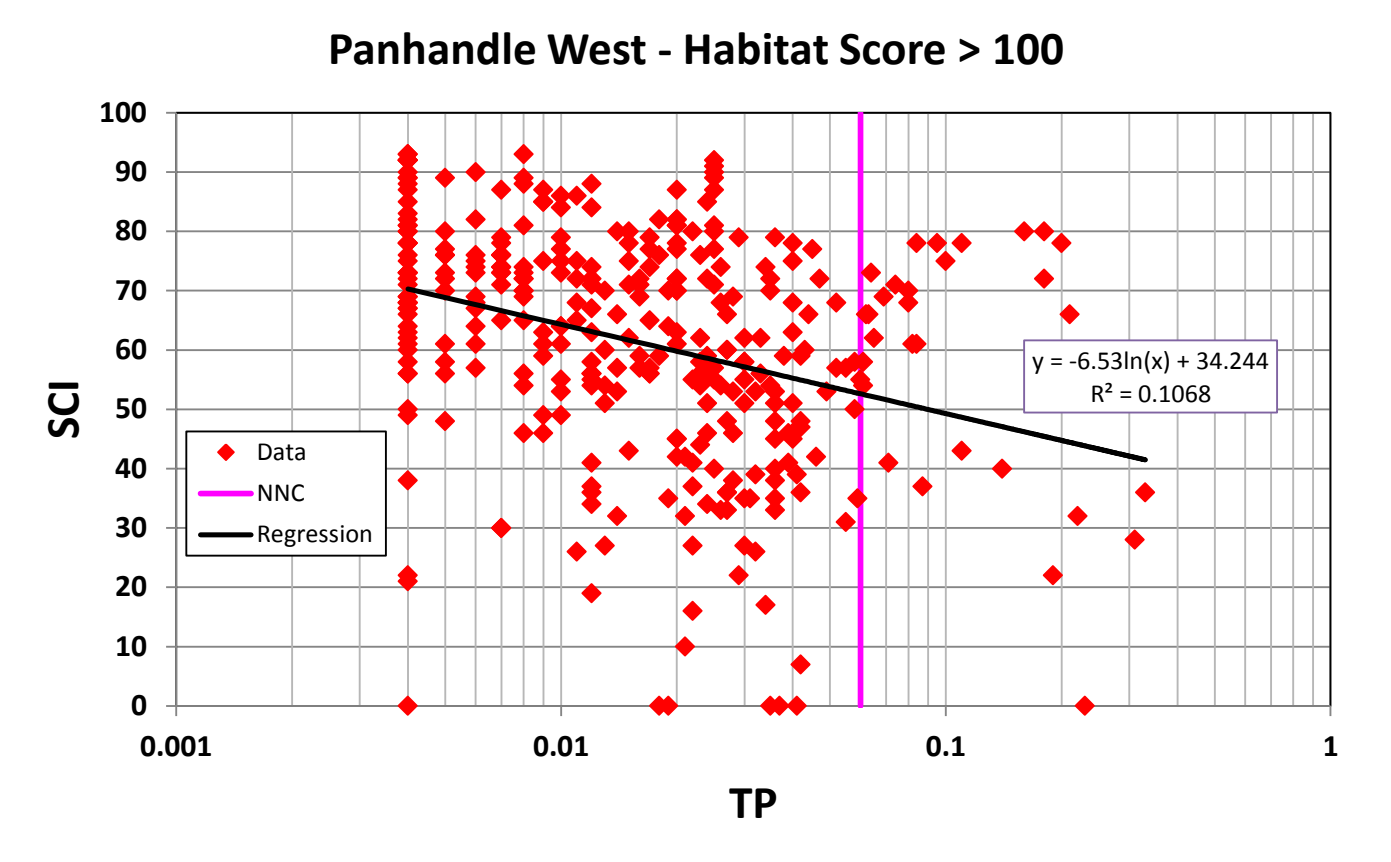


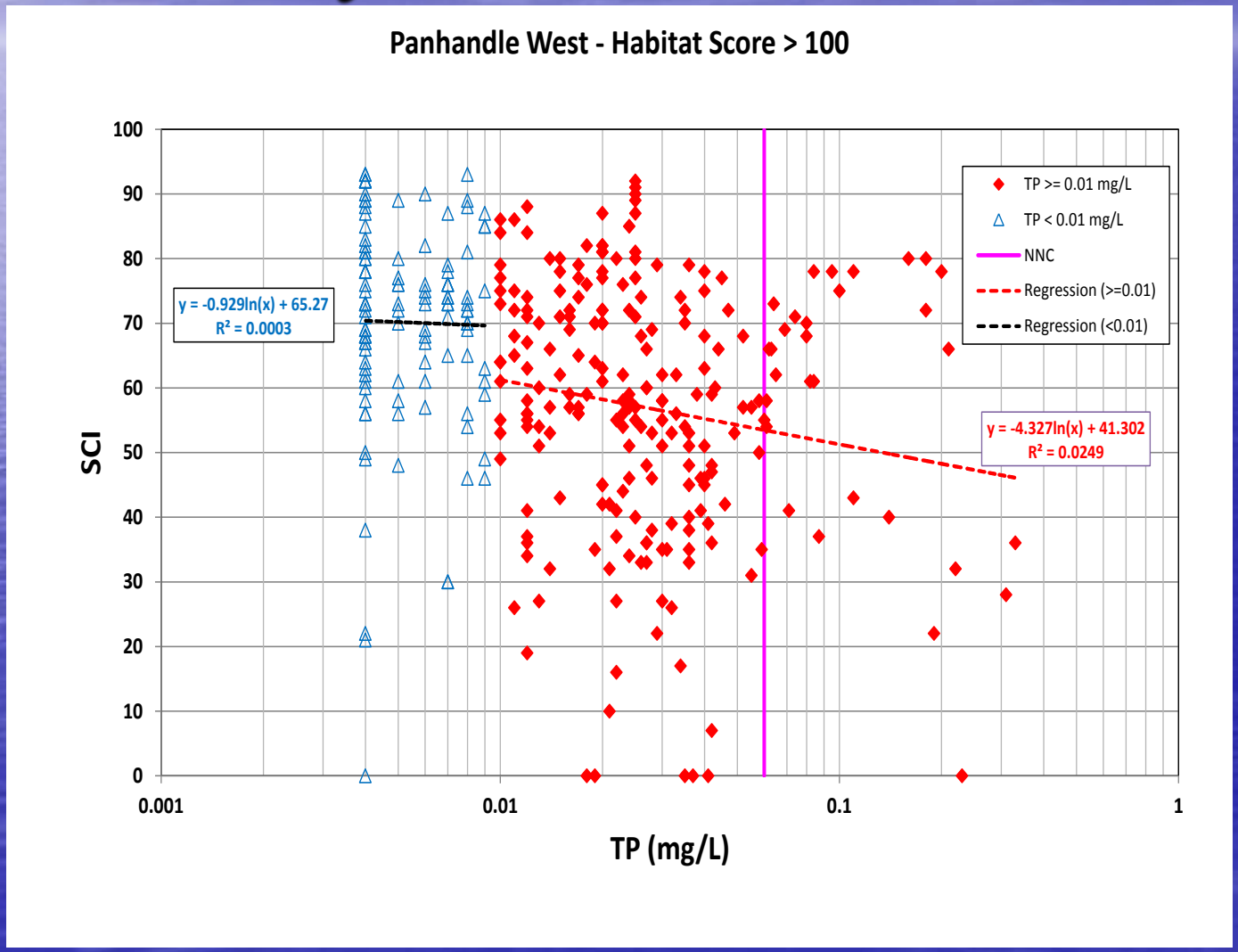
Figure 1-43. Plot of field collected DO (mg/L) vs. water column chl-a (ChlCorr), corrected for phaeophytin (ppb). Sites were screened for RBZW, habitat smothering (HabSmoth) and water velocity habitat conditions. The red line is a linear fit.

Claimed "substantial relationship"

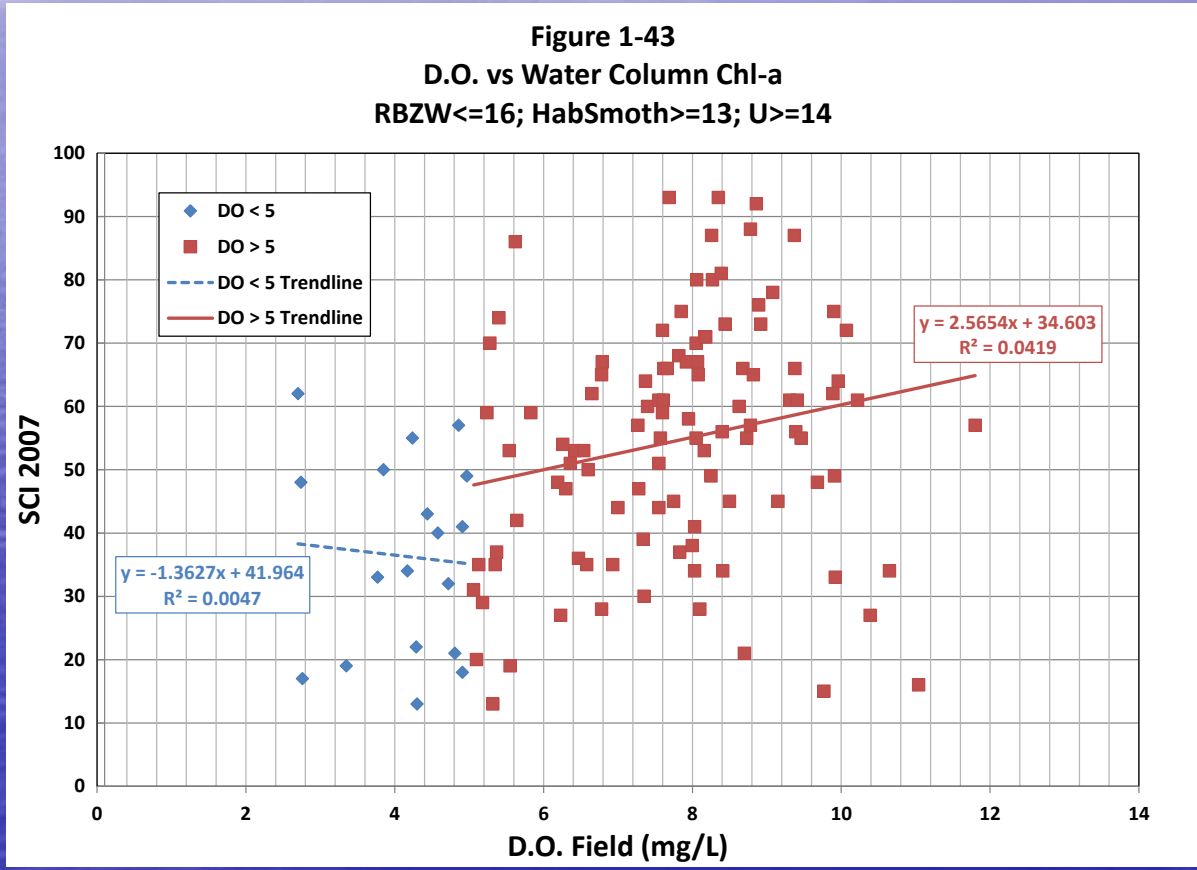
Meaningless r^2 - 90% Unexplained Variation



It Actually Gets Worse: Analyses are an Artifact



All the Analyses are an Artifact



We are taking action, we want NACWA's full support

- EPA's analyses, supported by its consultants, are wholesale scientific fraud
- They don't care what the science shows – the ends justify the means
- Latest narrative criteria implementation mandate will take this malfeasance nationwide
- Contacting all relevant Cong. Committees
- Seeking SAB/NAS Round #2

GOAL: Declare EPA's methods not scientifically defensible

FOR MORE INFORMATION

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