



Status of Numeric Nutrient Criteria Development



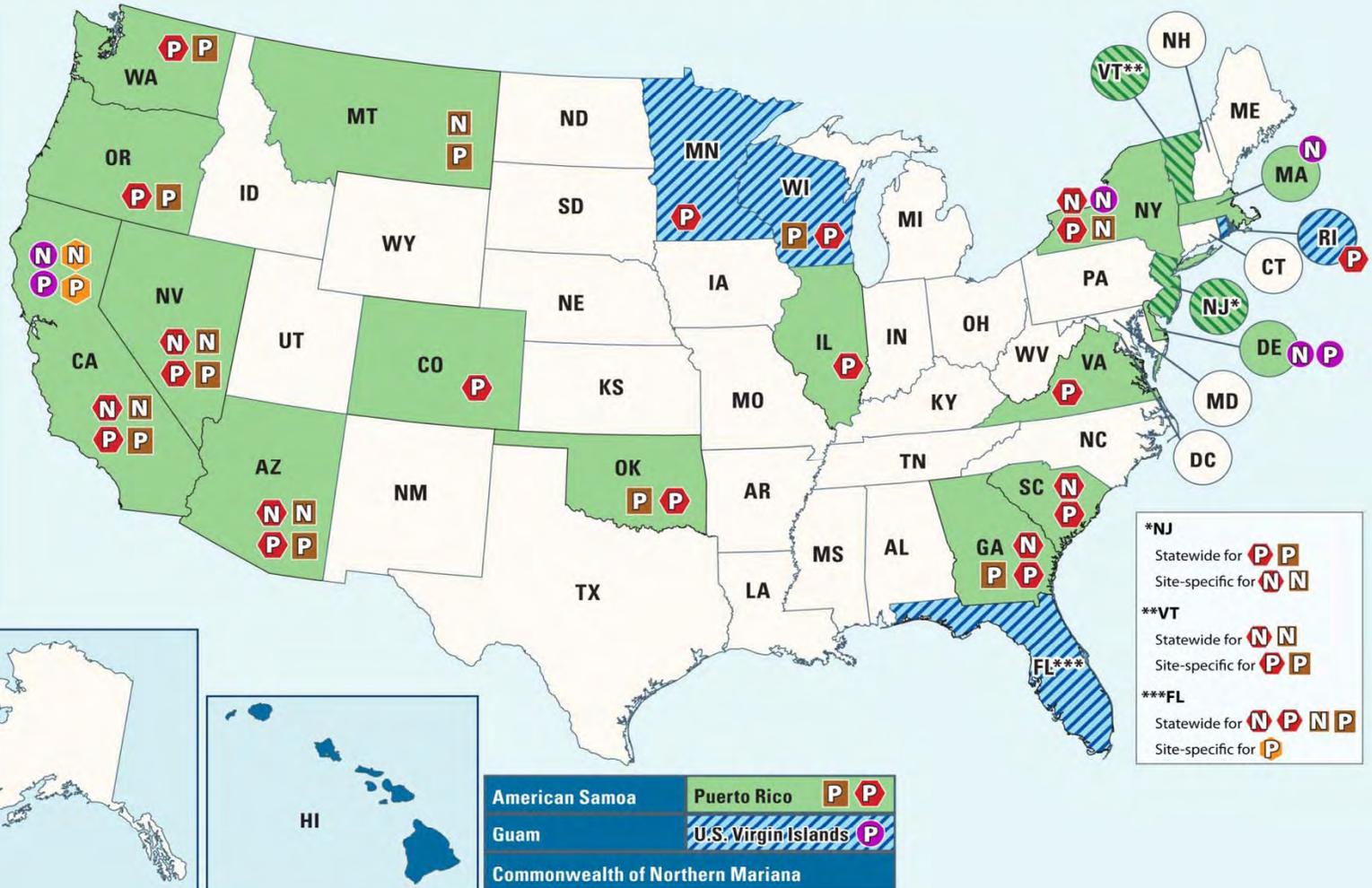
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Progress Toward Clean Water Act Adopted Numeric Nutrient Criteria

Legend

- Nutrient (N & P) criteria for all waters
- Statewide nutrient criteria for at least one class of waterbodies
- Statewide and site-specific nutrient criteria for different nutrient parameters
- Some site-specific nutrient criteria
- No nutrient criteria
- N N for rivers/streams
- P P for rivers/streams
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- N N for wetlands
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- N N for estuaries
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***NJ**
 Statewide for P P
 Site-specific for N N

****VT**
 Statewide for N N
 Site-specific for P P

*****FL**
 Statewide for N P N P
 Site-specific for P

Statutory and Regulatory Framework

- ▶ **CWA section 304(a)**
 - ▶ EPA shall develop and publish criteria for water quality that accurately reflect the latest scientific knowledge
- ▶ **40 CFR part 131.11(a)**
 - ▶ States must adopt water quality criteria that protect the designated use; these must be based on sound scientific rational
- ▶ **40 CFR part 131.10(b)**
 - ▶ State water quality standards must provide for the attainment and maintenance of the water quality standards of downstream waters
- ▶ **CWA section 303(c)**
 - ▶ EPA must approve or disapprove new or revised State water quality standards; EPA can also make determinations whether new or revised standards are necessary

Advantages of Numeric Nutrient Criteria

- ▶ **Most States have narrative criteria**
 - ▶ *“Nutrients shall not result in excess algal growth or other undesirable impacts (e.g., odor, scum).”*
 - ▶ *“In no case shall nutrient concentrations in a body of water be altered so as to cause an imbalance in natural populations of aquatic flora or fauna.”*
- ▶ **Numeric criteria are easier to implement for:**
 - ▶ *Monitoring, Assessment and Listing (Impaired Waters List)*
 - ▶ *Pollutant Limits (NPDES permits)*
 - ▶ *Remediation (TMDLs)*
 - ▶ *Across watershed partnerships*

EPA's National Nutrient Criteria Program

- ▶ **1998: National Nutrient Strategy**
 - ▶ Created national and regional nutrient criteria programs
 - ▶ Emphasized science and creating technical capacity in developing numeric nutrient criteria
- ▶ **Published Technical Guidance Manuals**
 - ▶ Rivers/Streams - 2000
 - ▶ Lakes/Reservoirs - 2000
 - ▶ Estuaries and Coastal - 2001
 - ▶ Wetlands - 2007
 - ▶ Stressor-Response Approaches - 2010
- ▶ **Published Nutrient Criteria Recommendations 2000-01**
 - ▶ By Ecoregion: 13 Rivers/Streams, 12 Lakes/Reservoirs, 1 Wetland
 - ▶ Reference approach; Utilized ambient monitoring data

EPA's National Nutrient Criteria Program

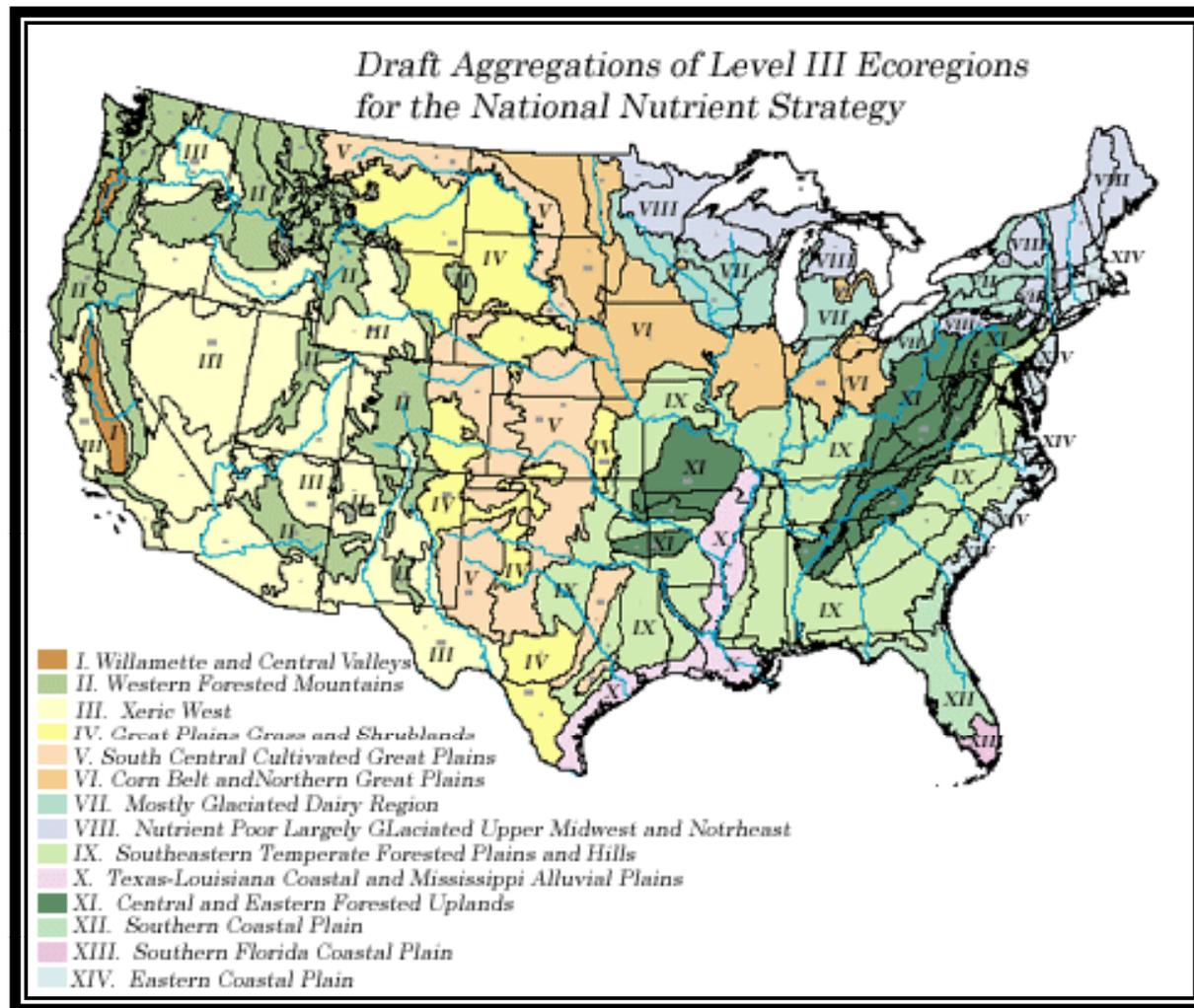
▶ 2001: OST policy memo

- ▶ Requested that each State develop a plan to outline their schedule for adopting numeric nutrient criteria
- ▶ States could prioritize waters (threatened or impaired)
- ▶ States should consider impairment of downstream waters
 - ▶ 46 States have Mutually Agreed Upon Plans; 12 don't have schedules
 - ▶ Defined EPA's expectations for numeric criteria

▶ 2007: OWV policy memo

- ▶ Encouraged States to accelerate their efforts to adopt numeric nutrient criteria
- ▶ Recommended that States focus first on high priority waters
- ▶ Committed to providing direct assistance to States

EPA's CWA 304(a) Ecoregional Criteria



EPA's 304(a) 2000-01 Ecoregional Criteria Recommendations for Lakes and Reservoirs

Parameter	II	III	IV	V	VI	VII	VIII	IX	XI	XII	XIII	XIV
TP µg/L	8.75	17.00	20.00	33.00	37.5	14.75	8.00	20.00	8.00	10.00	17.50	8.00
TN mg/L	0.10	0.40	0.44	0.56	0.78	0.66	0.24	0.36	0.46	0.52	1.27	0.32
Chl <i>a</i> µg/L	1.90	3.40	2.00	2.30	8.59	2.63	2.43	4.93	2.79	2.60	12.35	2.90
Secchi (m)	4.50	2.70	2.00	1.30	1.36	3.33	4.93	1.53	2.86	2.10	0.79	4.50

EPA's 304(a) 2000-01 Ecoregional Criteria Recommendations for Rivers and Streams

Parameter	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIV
TP µg/L	47.00	10.00	21.88	23.00	67.00	76.25	33.00	10.00	36.56	128.00	10.00	40.00	31.25
TN mg/L	0.31	0.12	0.38	0.56	0.88	2.18	0.54	0.38	0.69	0.76	0.31	0.90	0.71
Chl <i>a</i> µg/L	1.80	1.08	1.78	2.40	3.00	2.70	1.50	0.63	0.93	2.10	1.61	0.40	3.75
Turbidity FTU/ NTU	4.25	1.30	2.34	4.21	7.83	6.36	1.70	1.30	5.70	17.50	2.30	1.90	3.04

How to Derive Numeric Nutrient Criteria?

- ▶ **Multiple approaches available**
 - ▶ Classification
 - ▶ Reference Condition Approaches
 - ▶ Stressor-Response Approaches
 - ▶ Scientific Literature and Expert Judgment
 - ▶ Mechanistic Models
 - ▶ Multiple Lines of Evidence

Classification of Waters: Reduces Variability

▶ Lakes

- ▶ Designated Uses: recreation, potable water, fishing
- ▶ Residence Time: long or short
- ▶ Geochemical Factors: color, alkalinity

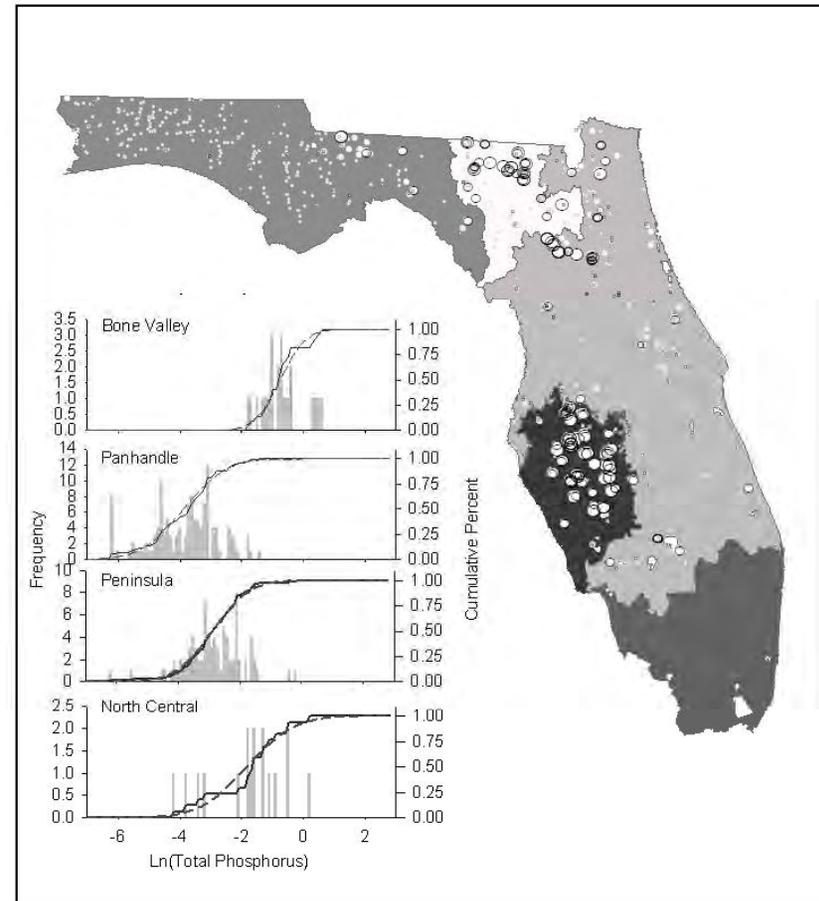
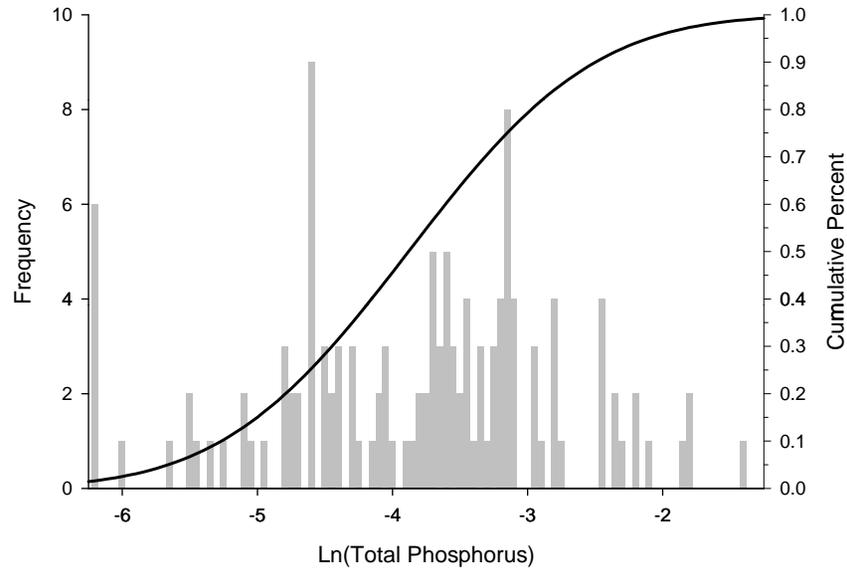
▶ Streams

- ▶ Designated Uses: warm or cold water fishery
- ▶ Stream Order: wadeable, non-wadeable
- ▶ Geochemical Factors: color, geology

Reference Condition Approaches

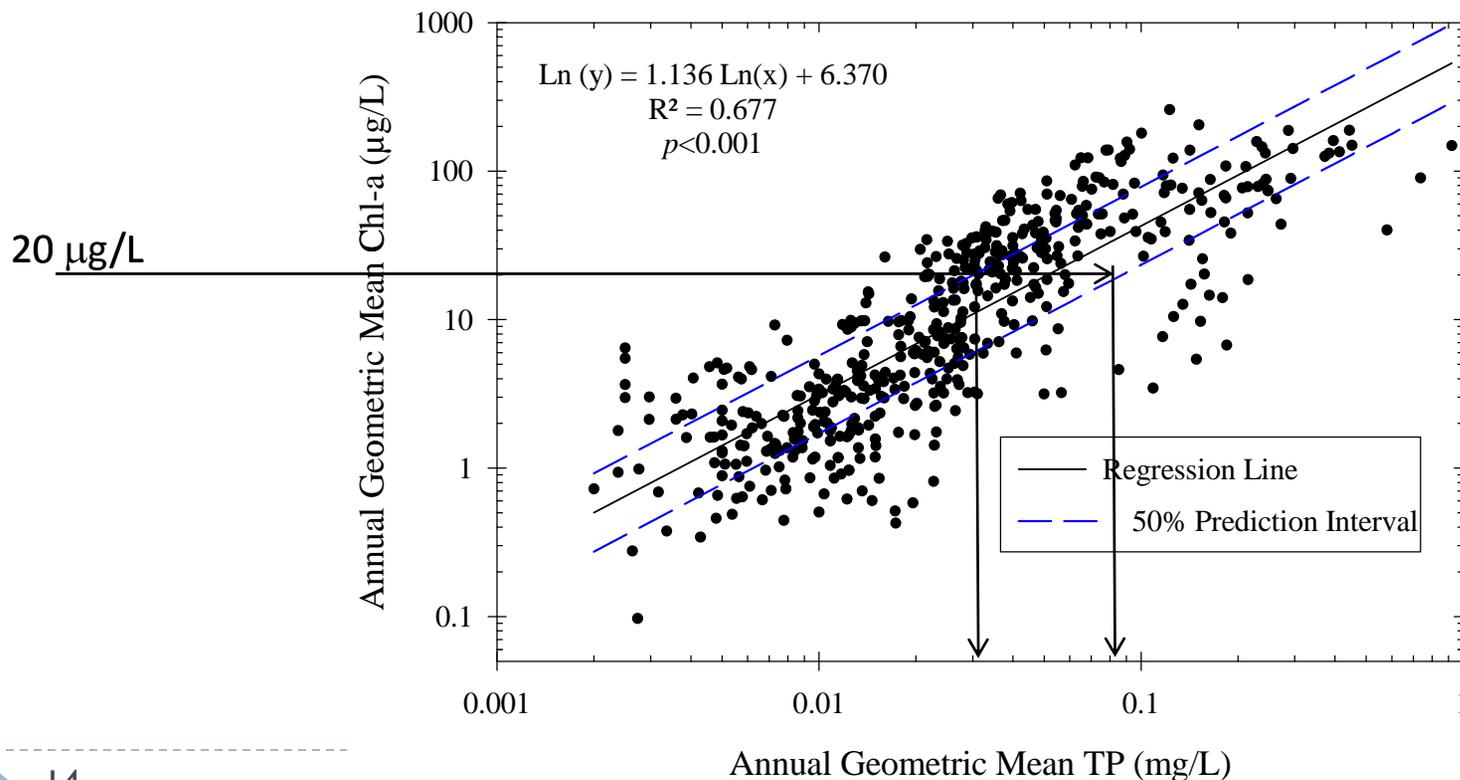
- ▶ Use concentration data from selected Reference Waters
 - ▶ Similar waterbodies or historical condition of site
 - ▶ Paleolimnological information (indicators in sediment cores)
 - ▶ Historical data
 - ▶ Areas with minimal human disturbance in surrounding land use
 - ▶ Modeled reference conditions
- ▶ Select an upper percentile of the distribution of data to reflect the confidence that these reference sites are representative of conditions that support designated uses (guidance used 75th percentile)

Examples of Statistical Distributions



Stressor-response Approaches

- ▶ Determine TN or TP criterion concentrations from prediction intervals of the regression with chl-a
- ▶ Need a target chl-a concentration



Technical Approaches range in terms of level of complexity

- Scientific literature

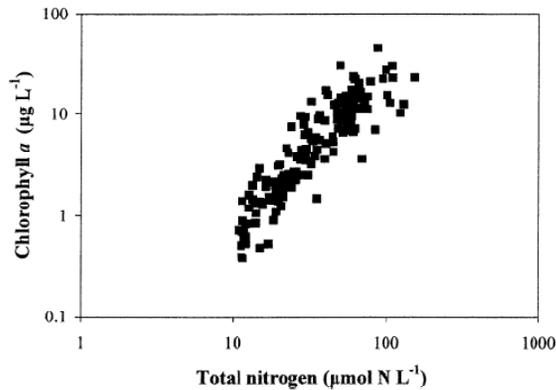


Fig. 1. Relationship between annual mean Chl *a* and annual mean TN concentrations in estuarine and coastal marine ecosystems.

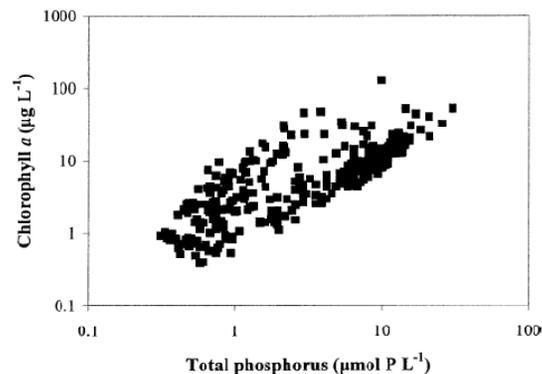
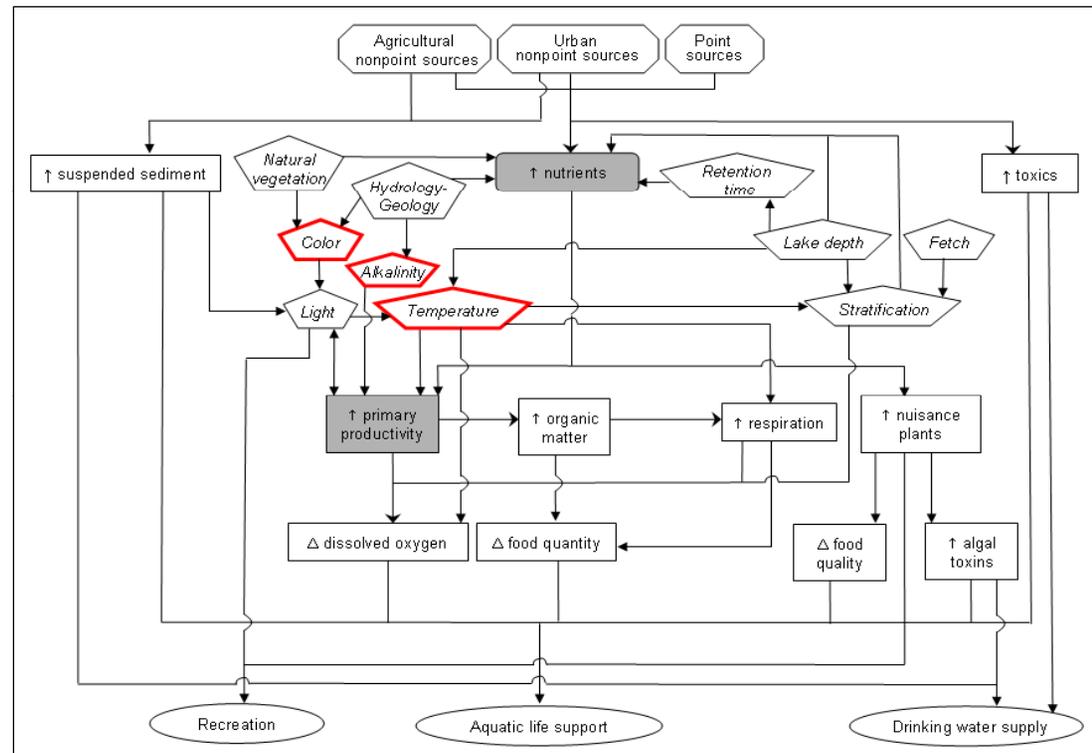
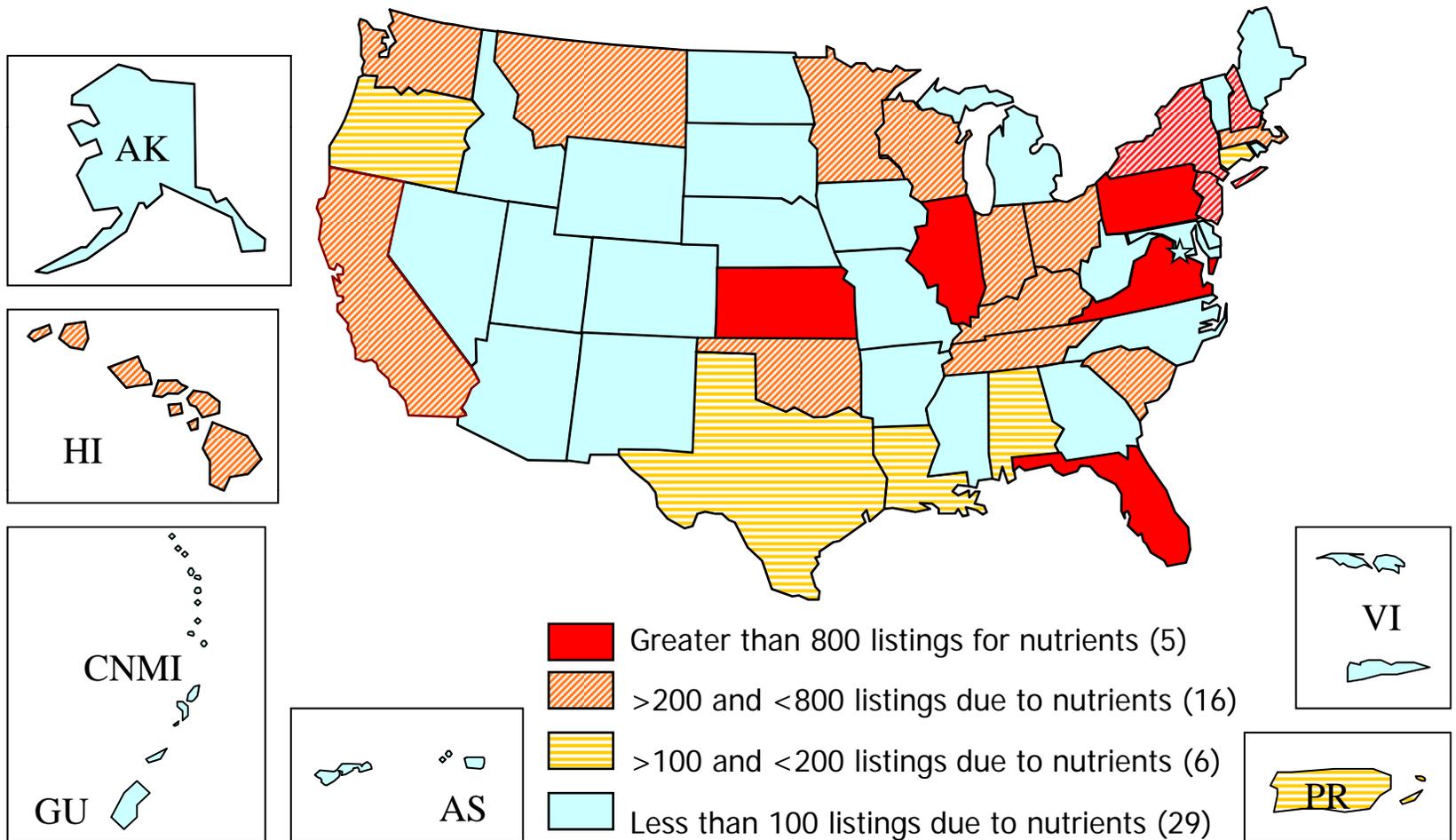


Fig. 2. Relationship between annual mean Chl *a* and annual mean TP concentrations in estuarine and coastal marine ecosystems.

- Mechanistic modeling



CWA section 303(d) Listed Nutrient-related Impairments

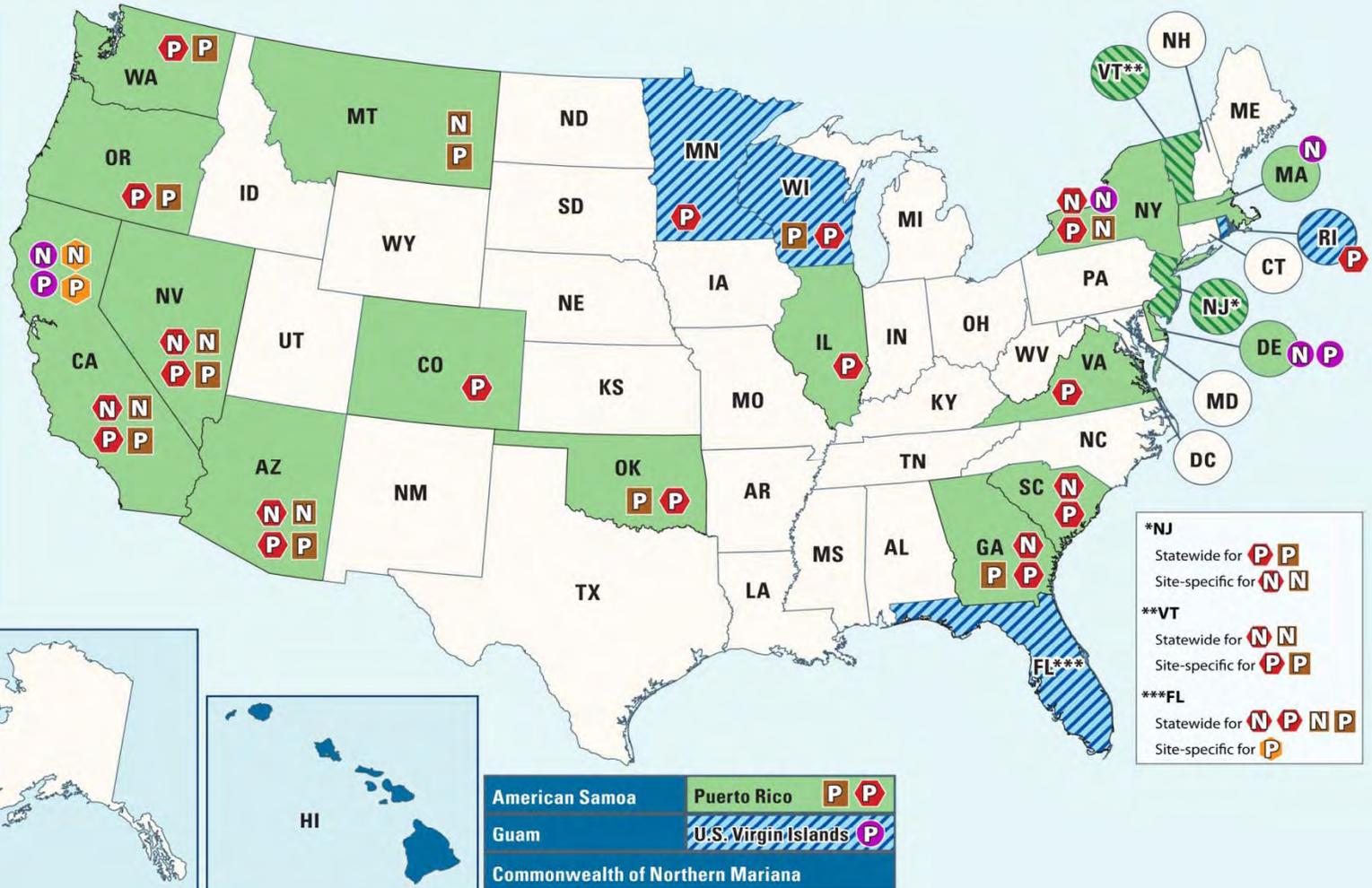


Based on information in Expert Query (ATTAINS) as of 10/23/2009. Of 75,675 impairments nationwide, 15,101 (20%) are due to nutrient-related defined as 'nutrients, organic enrichment/oxygen depletion, noxious plants, algal growth, and ammonia'. This data is based on the most recent 303(d) list data available in ATTAINS.

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2009 Inspector General Report

- ▶ **EPA Needs to Accelerate Adoption of Numeric Nutrient Water Quality Standards**
 - ▶ States have been slow to adopt numeric nutrient criteria
 - ▶ EPA needs to ensure that States consider the impact of nutrient pollution on downstream waters in other States
 - ▶ EPA did not adequately monitor and measure program progress to support accountability
- ▶ **Corrective Action Plan**
 - ▶ Develop list of selection factors to prioritize States
 - ▶ Revise internal Program Activity Measures
 - ▶ Revise nutrient criteria website
 - ▶ Publish biennial Progress Reports

Current Events

- ▶ **Federal rulemaking effort in Florida**
 - ▶ CWA section 303(c)(4)(B) determination that numeric criteria were needed for Class I, II and III lakes, streams, estuaries and coastal waters
 - ▶ Final numeric criteria were established in November 2010 for lakes and most flowing waters, effective March 2012
 - ▶ Second phase of rulemaking to establish numeric criteria for estuaries, coastal waters and southern inland flowing waters will be final in August 2012
- ▶ **Federal TMDL for Chesapeake Bay in 2010**
- ▶ **Ongoing State Partnerships in Mississippi River Basin**

Litigation and Petitions

- ▶ **Mississippi River Basin Petition – July 2008**
 - ▶ For numeric criteria for all 50 States, or as a start the 10 stem states: MN, WI, IL, IA, MO, AR, KY, TN, MS, LA
 - ▶ Sierra Club Petition in support with 40,000+ signatures
- ▶ **Notice of Intent to Sue**
 - ▶ Wisconsin – Fall 2009
 - ▶ Kansas – Spring 2010
 - ▶ Missouri – Summer 2010
- ▶ **NRDC petition to redefine secondary treatment**

Current Efforts to Support States

- ▶ Continuing to build technical capacity for criteria development
 - ▶ N-STEPS (Nutrient Scientific Technical Exchange Partnership and Support)
 - ▶ <http://n-steps.tetrattech.ffx.com/>
 - ▶ Or just google, n steps
 - ▶ Analyzing State data sets
 - ▶ Peer reviews of State draft criteria
 - ▶ Webcasts on technical approaches
 - ▶ Online bibliography of scientific journal articles

Questions?

- ▶ For more information:

- ▶ <http://water.epa.gov/scitech/swguidance/waterquality/standards/criteria/aqlife/pollutants/nutrient/index.cfm>
- ▶ Or just google, EPA Nutrients.