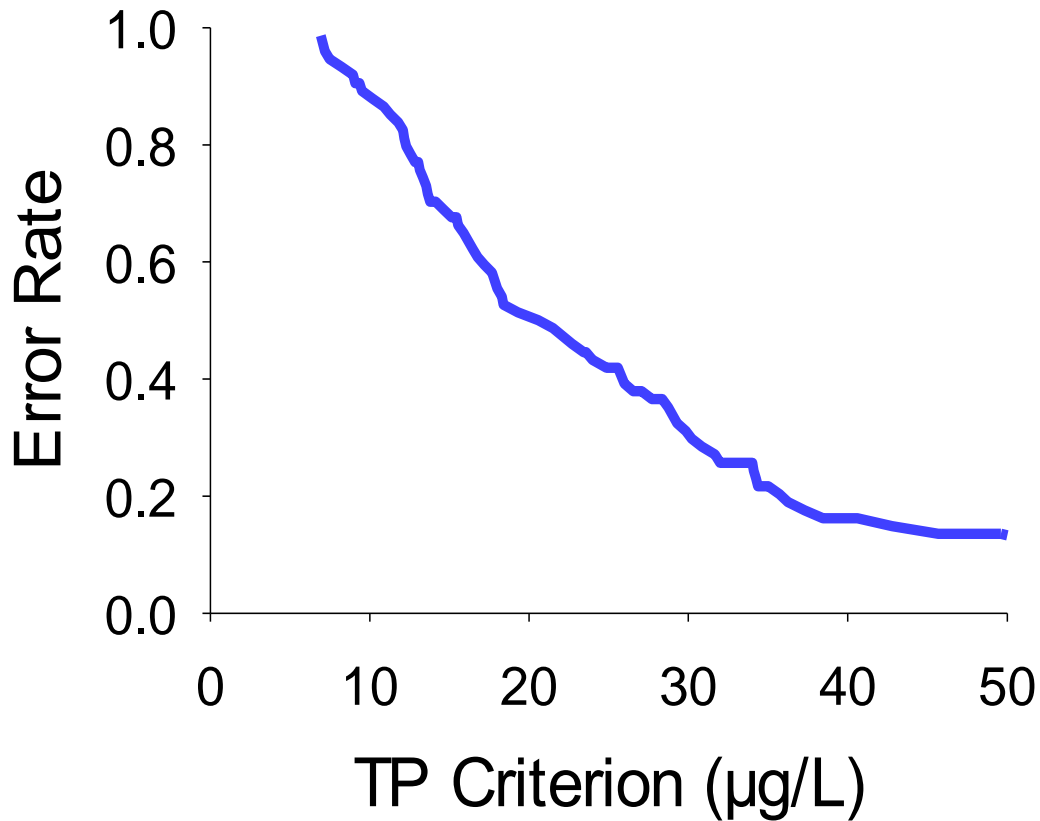


# Nutrient Criteria Approach

- Examine likelihood of impairment with increasing P levels.
- Calculate the risk of false positive or false negative decision-calls along the gradient of phosphorus.
- Similar to a “confusion matrix” approach used in the health sciences.

# We calculate the proportion of time impairment is indicated given a phos. criterion



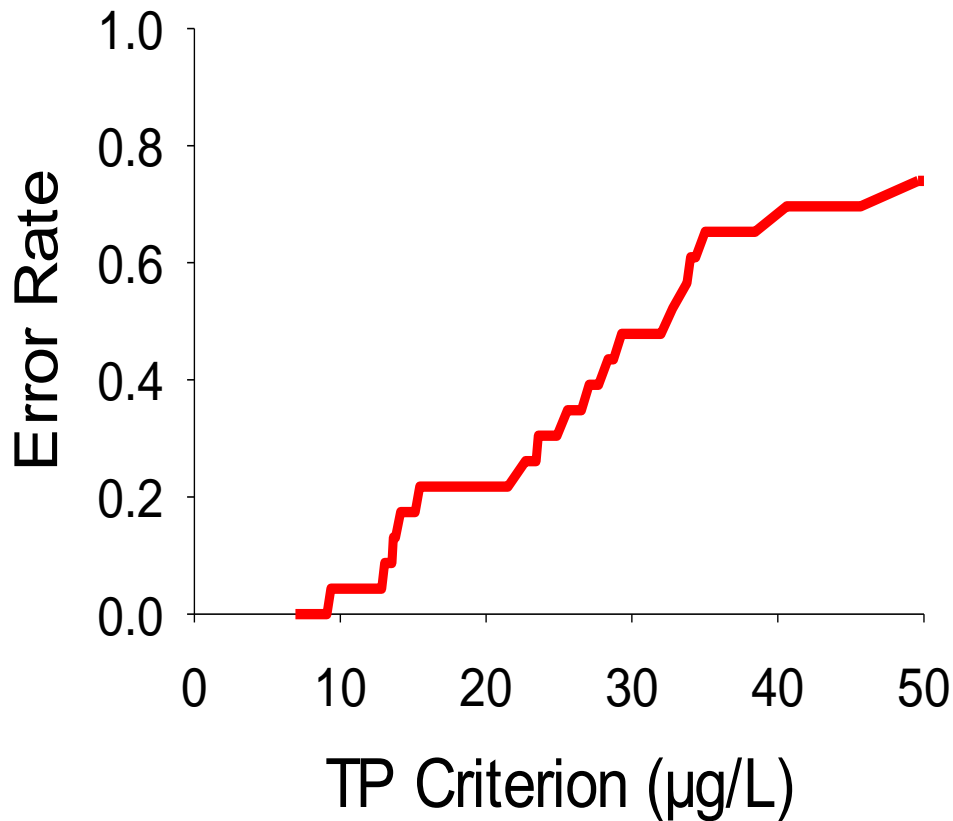
## ***False positive:***

- We call it bad when it is not
- “Error” means as making the wrong call
- Notice the steady decline in error.
- Where do you draw the line?

## Consequences:

- Require nutrient control technology where it is not needed.
- Manage the wrong subwatersheds of NPS nutrients.
- Cost people lots of \$\$ for no reason.

We calculate the proportion of instances impairment is indicated given a phos. criterion



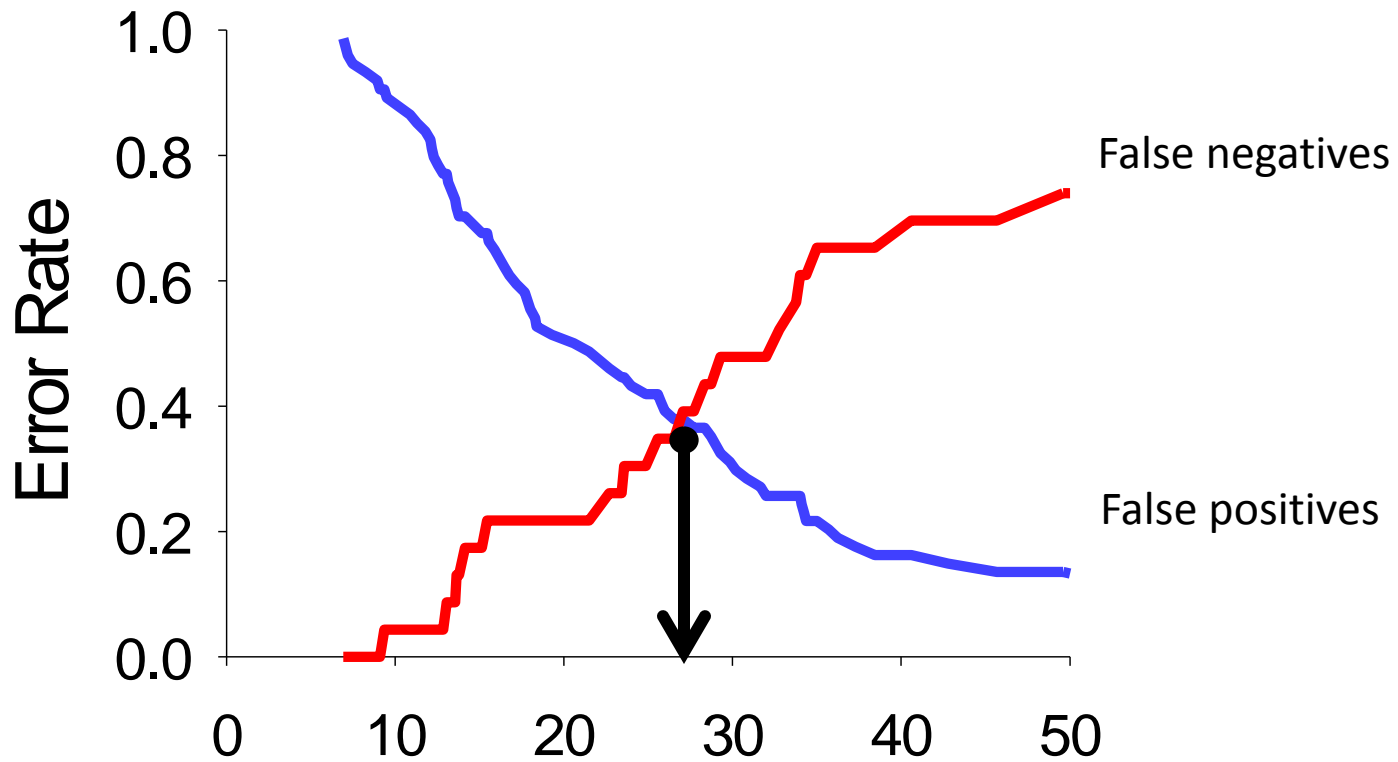
***False negatives:***

- We call it good when it is not
- “Error” means as making the wrong call
- Notice the steady rise in error.
- Where do you draw the line?

Consequence:

- Miss important pollution issues
- Allow impairments to perpetuate
- Fail to take management action where it is needed

# Minimizing false positive and false negative impairment determinations



# Error rate of 40% is too high

- Fundamental problem with nutrient criteria:
  - Either way you balance error, there still is a lot of error.
  - Should the state require multimillion dollar expenditures to fix a nutrient impairment when we are 40% likely to be wrong?
  - Can the state ignore a problem if we are 60% sure impairment exists?
  - There needs to be verification!

# Rule Structure Example

In all Class B waters except for segments within Lake Champlain and Lake Memphremagog, compliance with nutrient criteria shall be achieved either by compliance with the nutrient concentration values in Table 5 **or** by compliance with all nutrient response conditions in Table 5.

	Small, High- Gradient Streams	Medium, High- Gradient Streams	Warm- Water, Medium- Gradient Streams	Lakes and Reservoirs	All Other Waters
<b>Nutrient Concentrations</b>					
Total Phosphorus ( $\mu\text{g/L}$ )	12	15	27	18	
<b>Nutrient Response Conditions</b>					
Secchi Disk Depth (meters)				2.6	
Chlorophyll-a ( $\mu\text{g/L}$ )				7.0	
pH	Not to exceed 8.5 standard units.				
Turbidity	Consistent with the criteria in Section 3-04 B.1 of these rules.				
Dissolved Oxygen	Consistent with the criteria in Section 3-04 B.2 of these rules.				
Aquatic Biota, Wildlife, and Aquatic Habitat	Consistent with the criteria in Section 3-03 B.4 of these rules, implemented according to the numeric thresholds established in the Vermont Department of Environmental Conservation Biocriteria for Fish and Macroinvertebrate Assemblages in Vermont Wadeable Streams and Rivers - Implementation Phase, dated February 10, 2004 or as more recently updated.				

# Nutrient Criteria Decision Framework

	Phosphorus $\leq$ Criterion	Phosphorus $>$ Criterion
All Response Conditions Met	<b>A</b>	<b>B</b>
Not All Response Conditions Met	<b>C</b>	<b>D</b>

## Proposed Vermont Nutrient Criteria Decision Framework

<b>Assessment and Listing Decisions</b>	
<b>A. Phosphorus concentration less than or equal to criterion. All nutrient response conditions met.</b>	
	<b>Not impaired by nutrients.</b> Rotational basin monitoring on an approximate five-year schedule will be conducted.
<b>B. Phosphorus concentration greater than criterion. All nutrient response conditions met.*</b>	
	<b>Not impaired by nutrients.</b> Annual monitoring will be conducted for phosphorus concentration and all nutrient response conditions at sites affected by permitted discharges. Rotational basin monitoring on an approximate five-year schedule will be conducted at other sites.
<b>C. Phosphorus concentration less than or equal to criterion. Not all nutrient response conditions met.</b>	
	<b>Impaired, but not necessarily by nutrients.</b> Site will be studied to determine the cause of impairment. If found to be impaired by nutrients, an alternate (lower), site-specific nutrient criterion may need to be established for permitting purposes.
<b>D. Phosphorus concentration greater than criterion. Not all nutrient response conditions met.</b>	
	<b>Impaired by nutrients.</b> Annual monitoring will be conducted for phosphorus concentration and all nutrient response conditions at sites affected by permitted discharges.

\* If data are unavailable for any applicable response condition, then the waterbody would be assessed as impaired by nutrients, pending further data collection.



## Proposed Vermont Nutrient Criteria Decision Framework

### Discharge Permitting Decisions

#### **A. Phosphorus concentration less than or equal to criterion. All nutrient response conditions met.**

If a new or increased discharge is proposed, the permit will limit the phosphorus concentration increase according to the anti-degradation policy. No new or increased phosphorus discharge would be permitted that would cause the phosphorus concentration to be greater than the criterion. If a current discharge has reasonable potential to produce a phosphorus concentration above the criterion value, then annual monitoring will be conducted at the site for phosphorus concentration and all nutrient response conditions. If response conditions are worsening or indicate a likelihood that an impairment will develop, more stringent permit limits will be applied in order to prevent the impairment.

#### **B. Phosphorus concentration greater than criterion. All nutrient response conditions met.**

If a new or increased discharge is proposed, the permit will limit the effluent phosphorus concentrations and loads to the existing amounts or less. If response conditions are worsening or indicate a likelihood that an impairment will develop, more stringent permit limits will be applied in order to prevent the impairment.

#### **C. Phosphorus concentration less than or equal to criterion. Not all nutrient response conditions met.**

If the site is determined not to be impaired by nutrients but a new or increased discharge is proposed, the permit will limit the nutrient increase according to the anti-degradation policy. In no case will amounts be permitted that would cause the phosphorus concentration criterion to be exceeded. If the site is determined to be impaired by nutrients, then more stringent permit limits will be applied in order to correct the impairment.

#### **D. Phosphorus concentration greater than criterion. Not all nutrient response conditions met.**

More stringent permit limits will be applied in order to correct the impairment. A Total Maximum Daily Load (TMDL) designed to achieve the phosphorus concentration criterion may be required.

# Process to move forward with the VT WQS changes.

- Stakeholder outreach:
  - WQAC
  - Rollout to State/Fed Agencies
  - Rollout to affected parties
  - Individual sector specific meetings
- Initiate public rulemaking
  - Takes 9 months
  - ICAR → Rulemaking Process → LCAR