

The Role of Biological Indicators in Florida's NNC

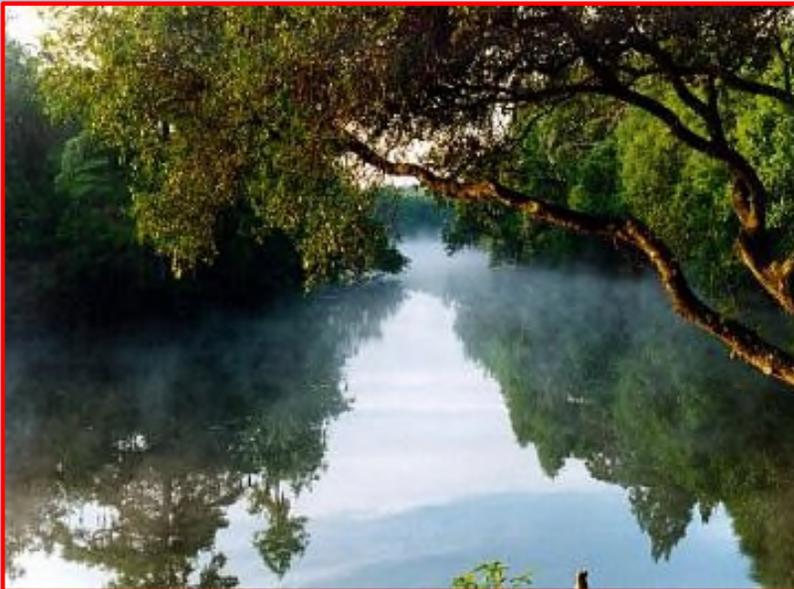
Daniel Hammond
Senior Consultant





Estuaries – “Hold the Line” Strategy

Lakes – Nutrient/Chlorophyll-a
Relationship



Rivers/Streams – Biological Indicators

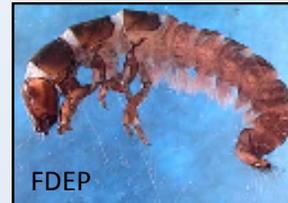
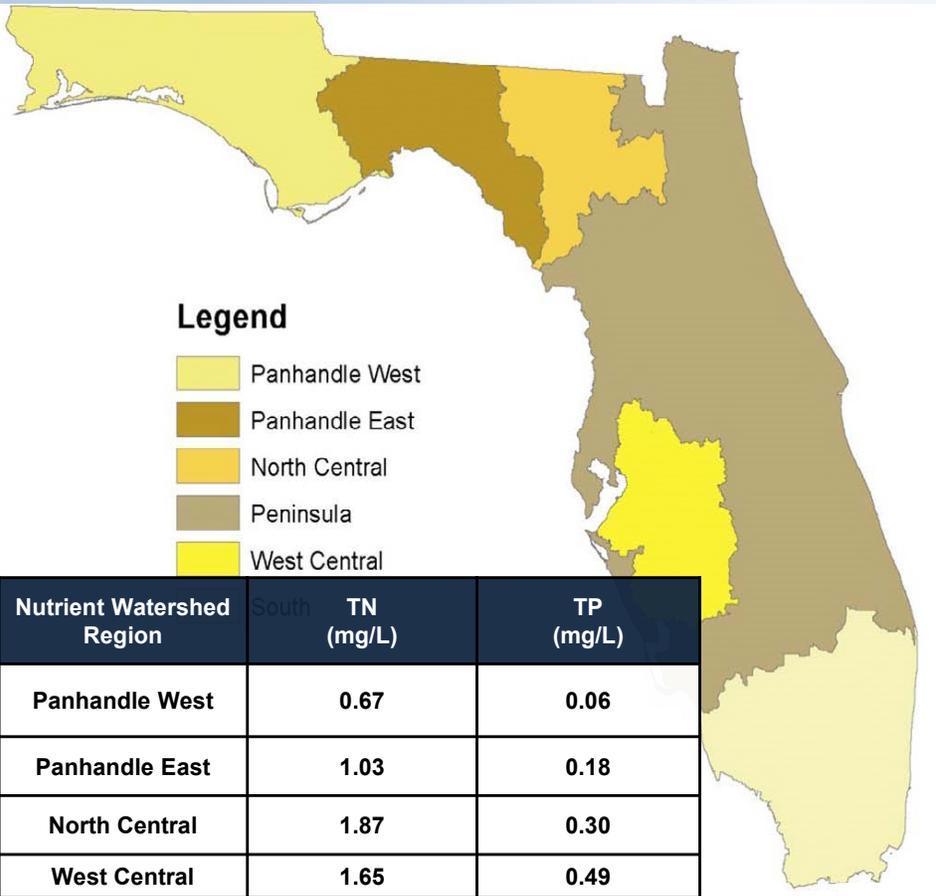
Chlorophyll-a



Linear
Vegetation
Survey



Rapid Periphyton Survey



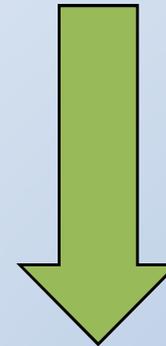
Stream Condition Index

Floral Metrics



Nutrient Thresholds

Stream Condition Index



Attains Nutrient Standard

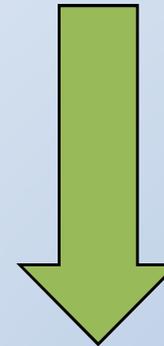
Attains Nutrient Standard

~~Floral Metrics~~



Nutrient Thresholds

Stream Condition Index



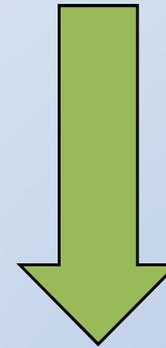
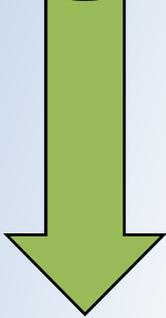
Does Not Attain

Does Not Attain

Floral Metrics

Nutrient Thresholds

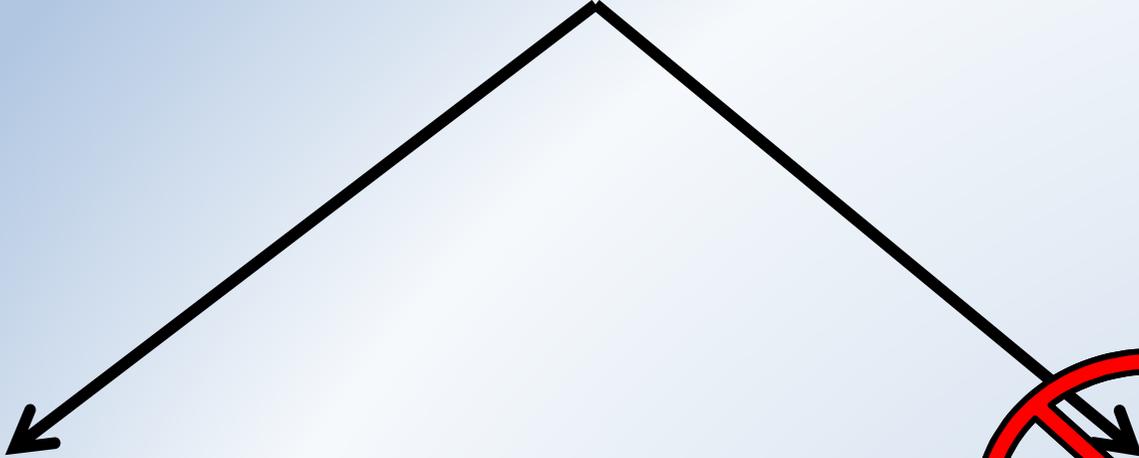
Stream Condition Index



Does Not Attain

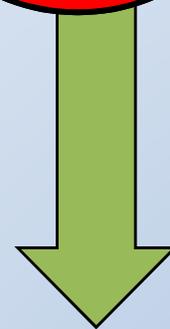
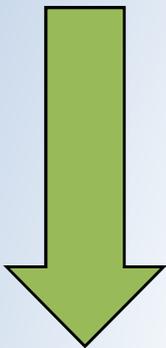
Attains Nutrient Standard

Floral Metrics



Nutrient Thresholds

Stream Condition Index



Attains Nutrient Standard

Does Not Attain



Chlorophyll-a



Linear
Vegetation
Survey

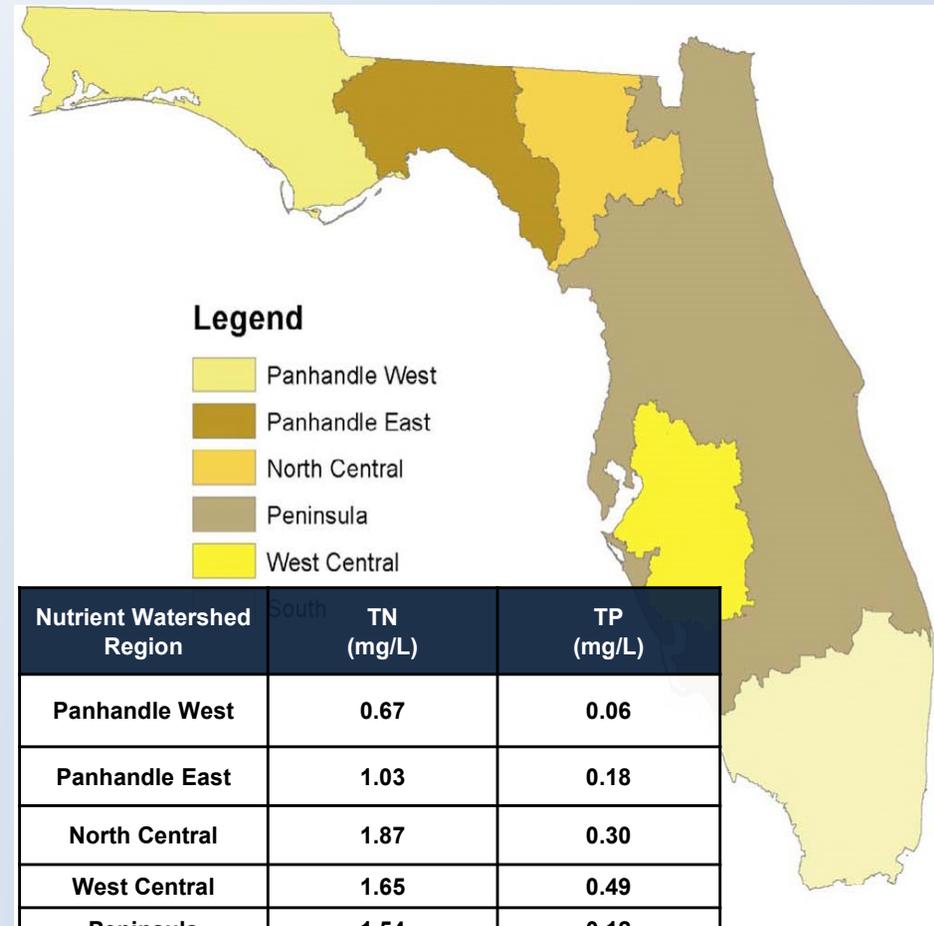


Rapid Periphyton Survey

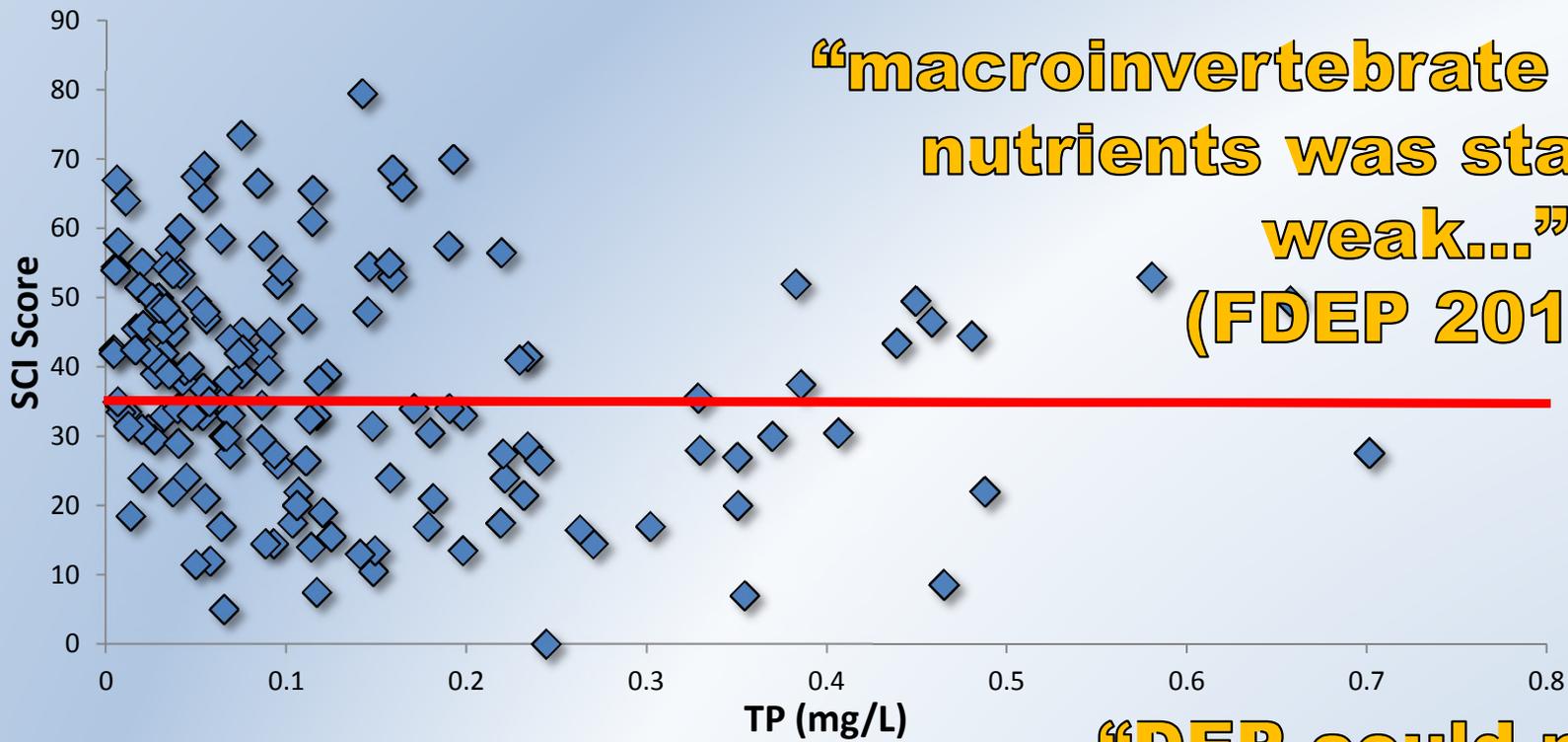


Floral Metrics and Nutrient Thresholds

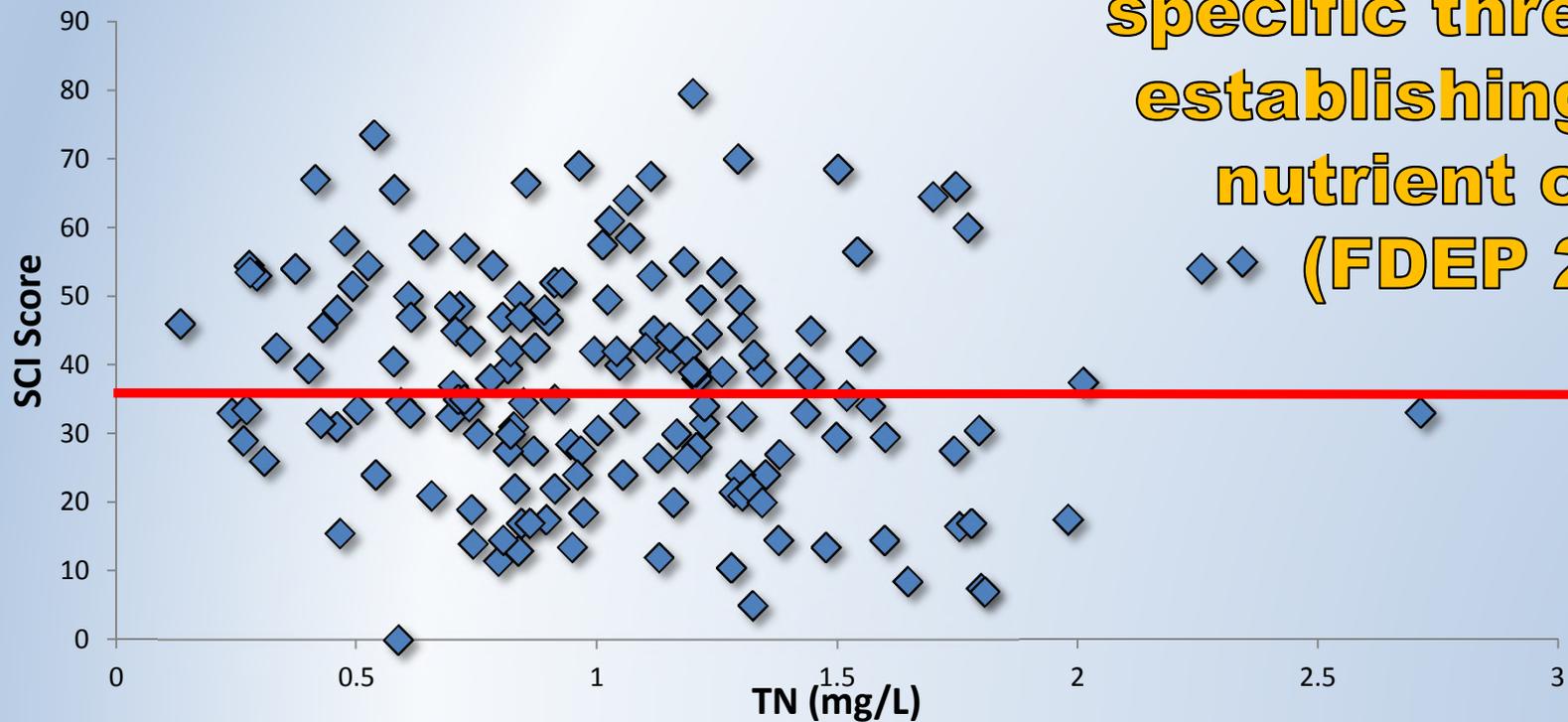
- Reference System Approach
- No Causal Relationship Established



- > Exotic aquatic vegetation not greater than 25%**
- > Mean C of C score greater than 2.5**
- > Benthic algae coverage of 6 mm or greater not more than 25%**
- > Benthic algae species is not nuisance or undesirable (if more than 20 % coverage observed)**
- > Annual geometric mean chlorophyll-a less than 20 $\mu\text{g/L}$**
 - Between 3.2 and 20 $\mu\text{g/L}$ – site specific conditions must indicate nutrients not an issue**
 - No increasing trend observed**



**“macroinvertebrate response to nutrients was statistically weak...”
(FDEP 2012)**



**“DEP could not identify specific thresholds for establishing numeric nutrient criteria”
(FDEP 2012)**

...If the biology of the system is ok, then nutrients must not be causing a problem.

If the numeric interpretation of the narrative nutrient criterion is exceeded, then nutrients shall be identified as the causative pollutant unless a stressor identification study links the adverse biological effects to causal factor(s) other than nutrients.

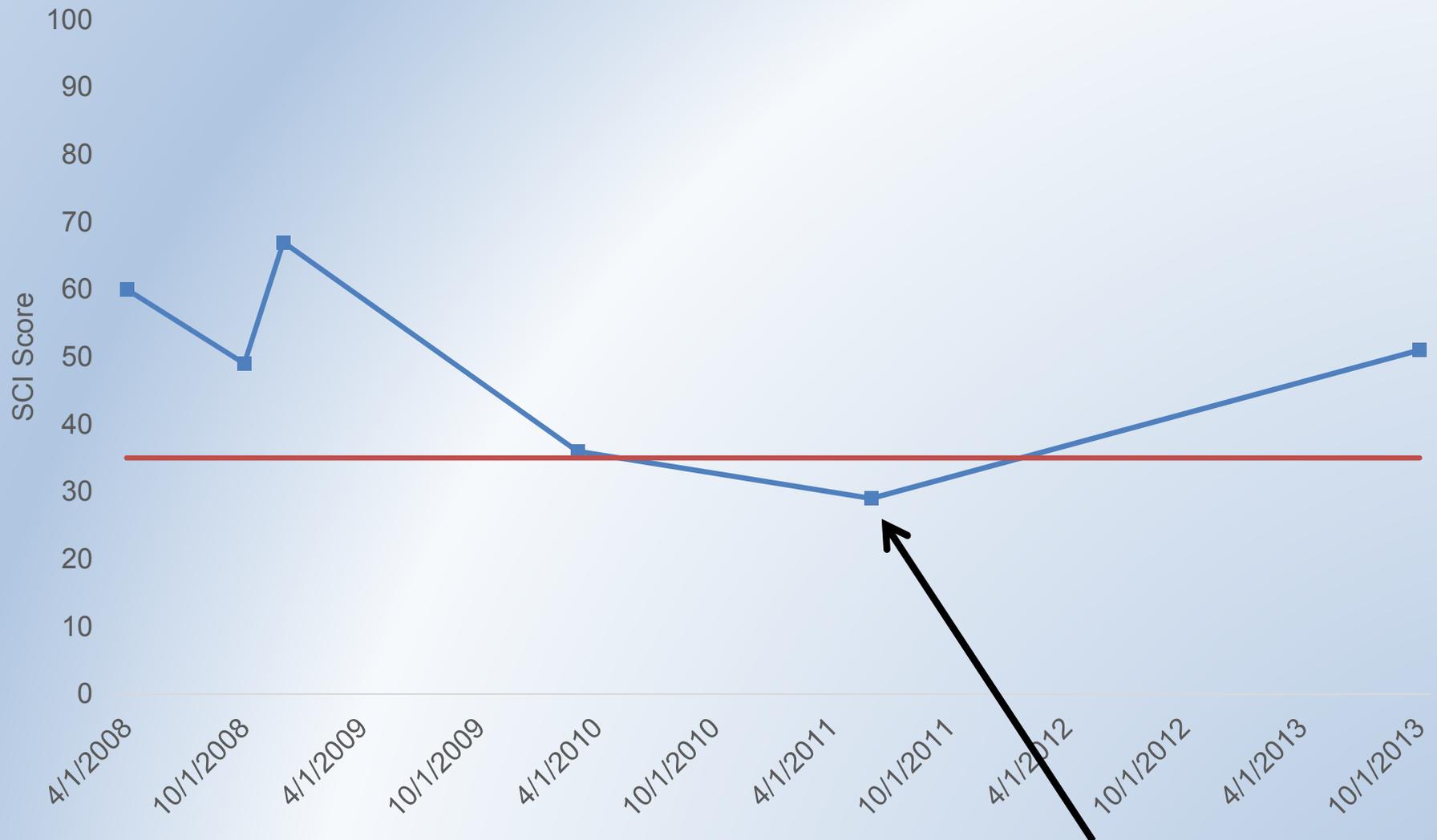
62-303.430(5)(b)2., F.A.C.

A photograph of two workers in a river. They are wearing white hard hats, safety glasses, and life jackets. They are kneeling in the water, focused on a white container they are holding together. The river is surrounded by dense green trees and vegetation. The scene is brightly lit, suggesting a sunny day.

Data Quality

Data Integrity

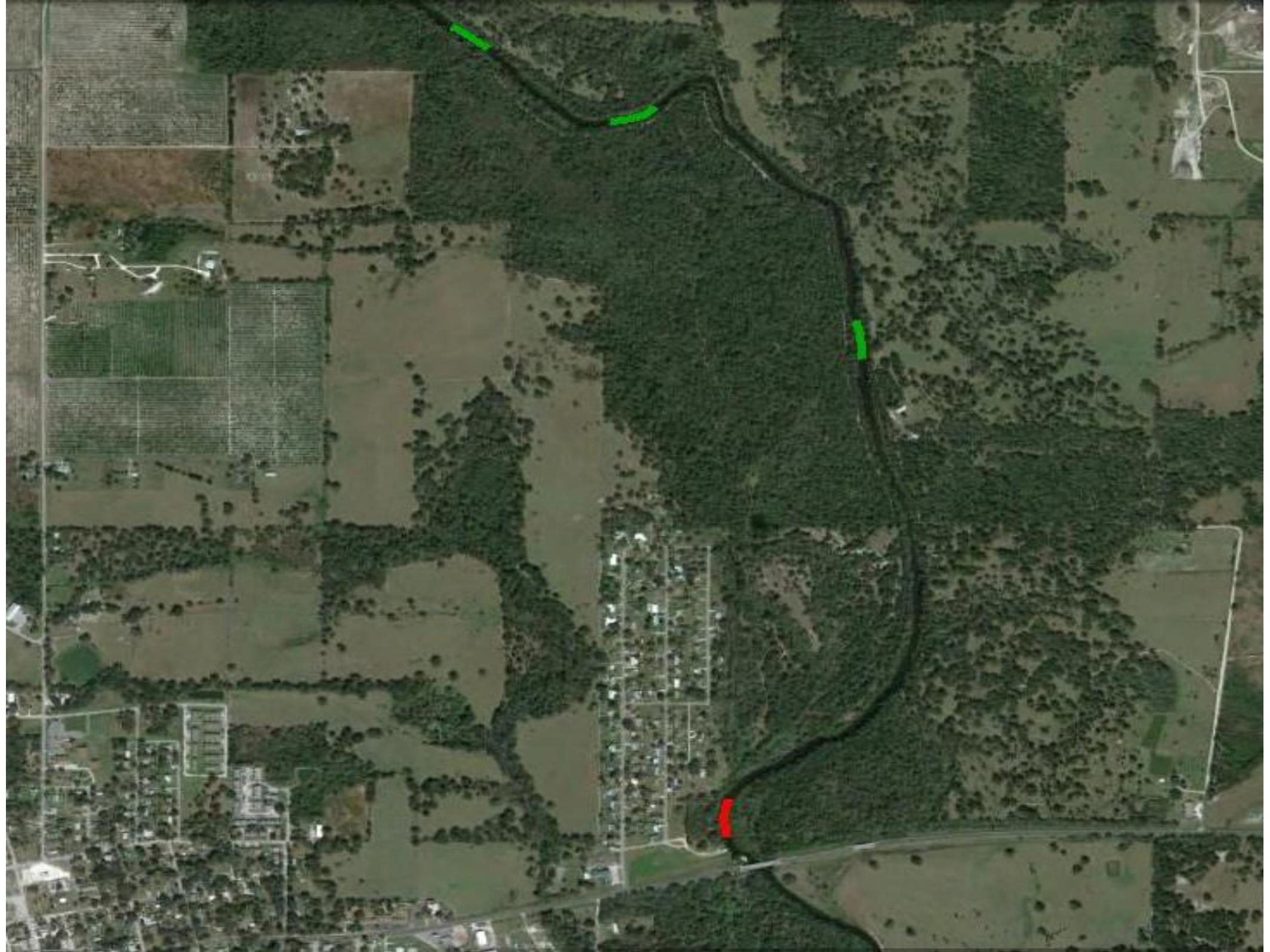
**You have the power to make a good site fail,
but you cannot make a bad site pass!**



**Stream below 7Q10
flow during sampling**

An aerial photograph showing a residential neighborhood on the left, a large wooded area in the center, and a road on the right. A red line is drawn through the wooded area, indicating a survey path. The text "Linear Vegetation Survey" is overlaid on the image.

Linear Vegetation Survey

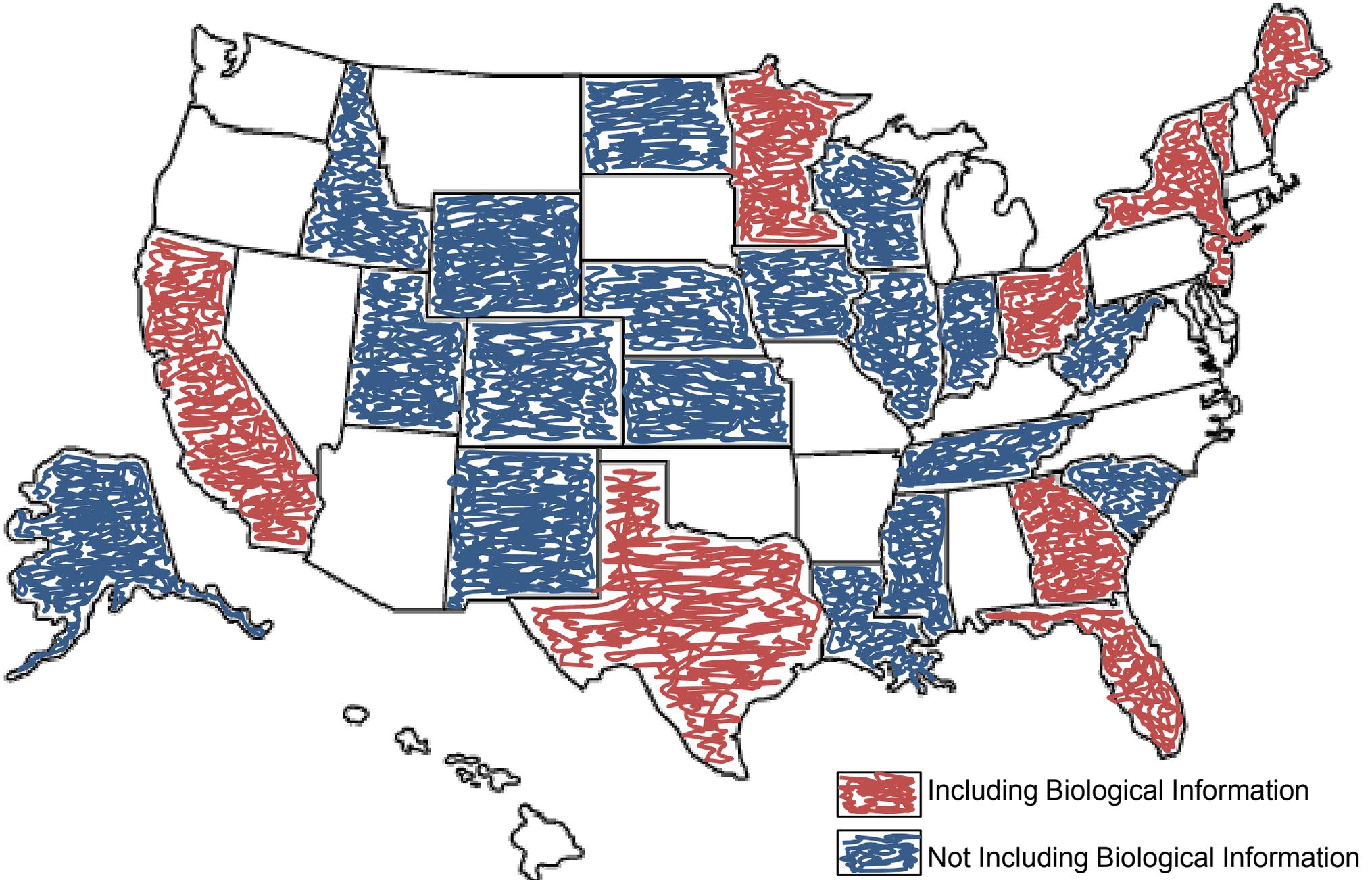


An aerial photograph of a forested area. A road runs diagonally from the top left towards the bottom right. A red line is drawn on the road, indicating a survey site. In the upper left, there are some buildings and a parking lot. The text 'Rapid Periphyton Survey' is overlaid in the upper right quadrant.

Rapid Periphyton Survey

January 2011	Fail
February 2011	Pass
March 2011	Fail
May 2011	Pass
June 2011	Fail
August 2011	Pass

NNC Progress



Lessons Learned

- > Florida's NNC compliance linked to biological sampling judgment – not nutrients**
- > Indicators based on general waterbody health are insufficient**
- > Implementation issues burden stakeholders**
- > Biological indicators must show valid relationship with nutrient effects**

FDEP Rule

EPA Rule

55%

31%

**EPA's rule would have resulted in fewer
waterbodies listed as impaired!**

The difference is the biological information.