DEVELOPING NUMERIC NUTRIENT CRITERIA FOR SOUTHWEST FLORIDA TIDAL CREEKS

PART 2: CREEK SELECTION AND SAMPLING DESIGN

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PRESENTATION OVERVIEW

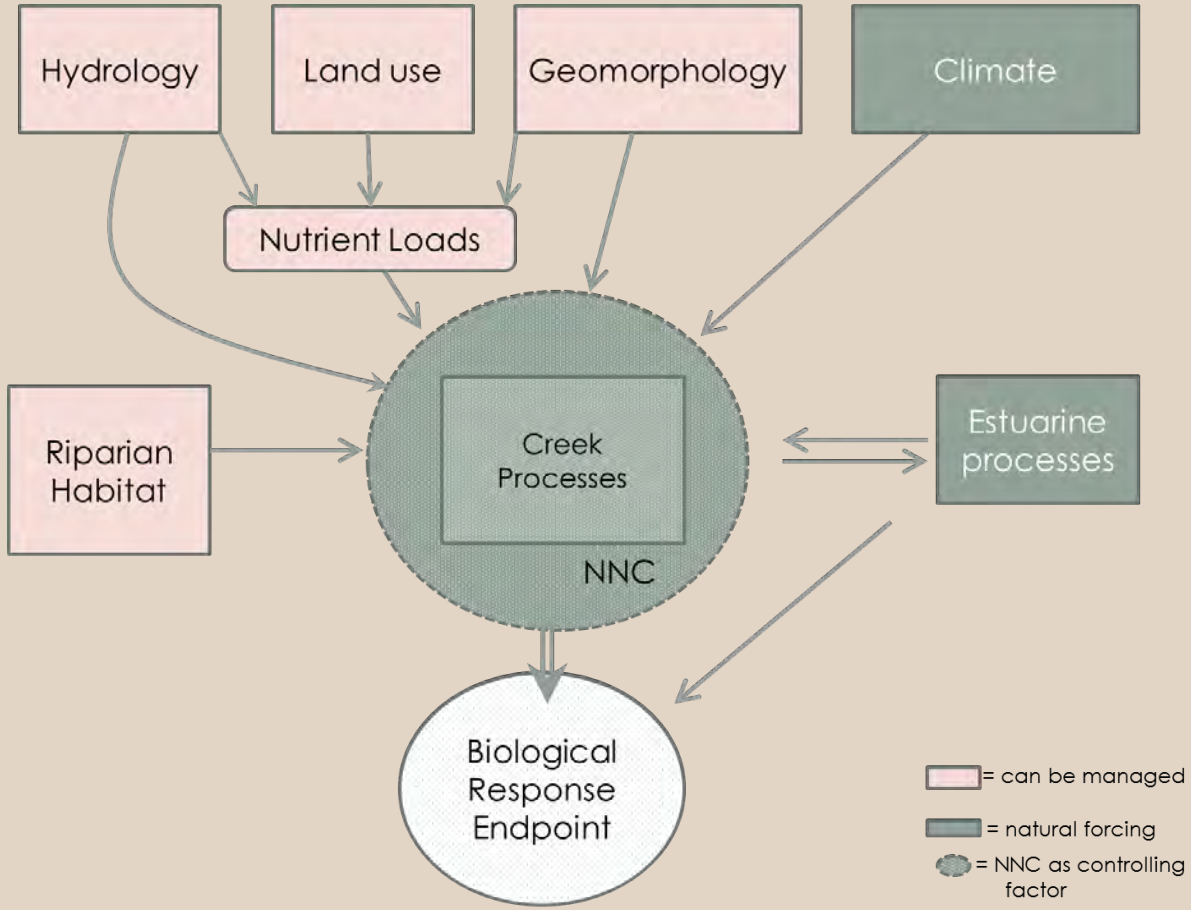
- Provide details on creek selection and study design for sampling effort
- Briefly summarize first three project tasks:
  - Project goals
  - Conceptual models
  - Data compilation

GOALS

- This project aims to develop management level water quality targets and thresholds (standards) for tidal creeks. That is, science based management, not strictly a research project
- The proposed standards will likely be expressed as some statistic representative of an annual expectation (e.g., annual geometric average or threshold exceedance value)
- Compliance assessment framework should include allowances for natural variability and uncertainty

CONCEPTUAL MODELS

- Watershed Management



Watershed Inputs

- Instream Processes

- Biological Responses

RESPONSE ENDPOINTS

- Response endpoints are:
  - Fish abundance, distribution, community structure
  - Water column chlorophyll
  - Benthic algal chlorophyll content
  - Dissolved oxygen

COMPILATION OF EXISTING DATA

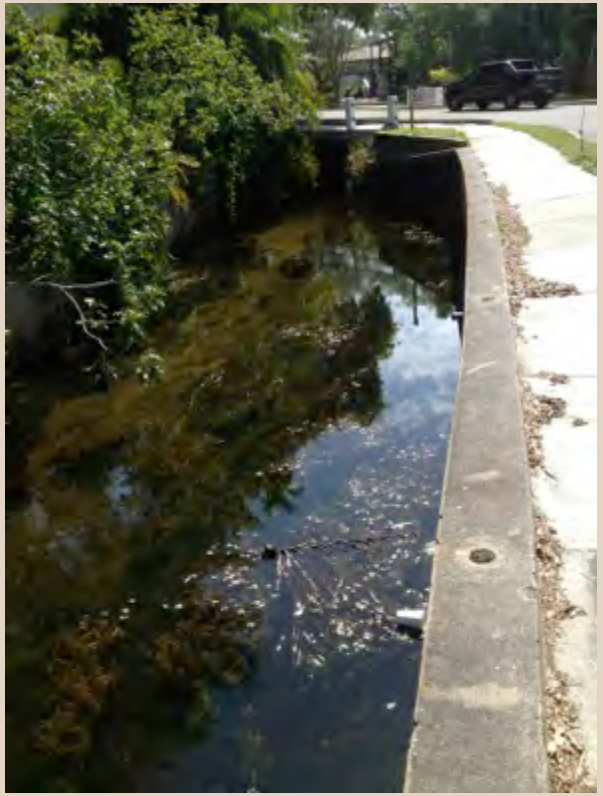
Table 4-1. Summary of existing information available for Southwest Florida tidal creeks.			
	Tampa Bay	Sarasota Bay	Charlotte Harbor
Hydrography Data			
USGS NHD Hydrography	✓	✓	✓
Tidal Extent	✓	✓	✓
USGS Stream Flow Gages	✓ -	✓ -	✓ -
NWS Rainfall gages	✓	✓	✓
Watershed Data			
NEP Watershed and Basin Boundaries	✓	✓	✓
USGS Topography	✓	✓	✓
Water Management District Land Use Land Cover	✓	✓	✓
Water Management District Mangrove/Salt Marsh Cover	✓	✓	✓
Modified Shorelines	✓ -	✓ -	✓ -
Structures	✓ -	✓ -	✓ -
Water Quality Data			
Ambient Creek Water Quality Data	✓ -	✓ -	✓ -
Ambient Tidal River and Bay Water Quality Data	✓	✓	✓
Previous Tidal Creek Studies	✓ -	✓ -	✓ -
NEP Nutrient Loadings Information	✓	✓	✓
Biological Data			
FWC FIM Estuary Data	✓	✓	✓
FWC Tidal Tributaries Data	✓ -		✓ -
Previous Tidal Creek Studies	✓ -	✓ -	✓ -
FDEP Charlotte Harbor Tidal Creek Macroinvertebrates			✓
Sarasota Tidal Creek Index		✓	

TASKS COMPLETED

- Identified our population of tidal creeks (N=306)
- Adopted our conceptual models
- Compiled existing information
- Recognized the need for a classification scheme in order to select a subset for additional sampling (n=16)

CLASSIFICATION

- Why Classify Creeks:



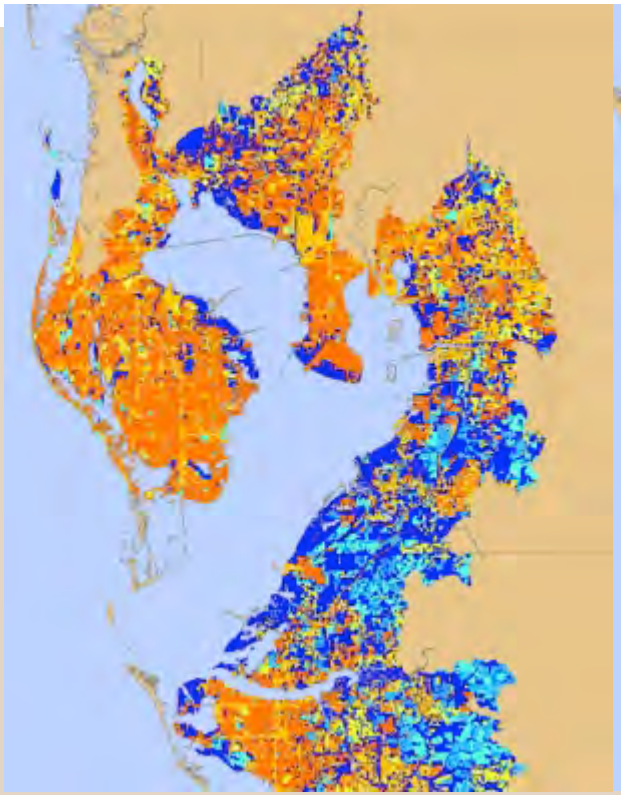
Tidal Creeks in SW Florida range from relatively "natural" systems to mosquito ditches and urban stormwater conveyances.

CREEK CLASSIFICATION METRICS

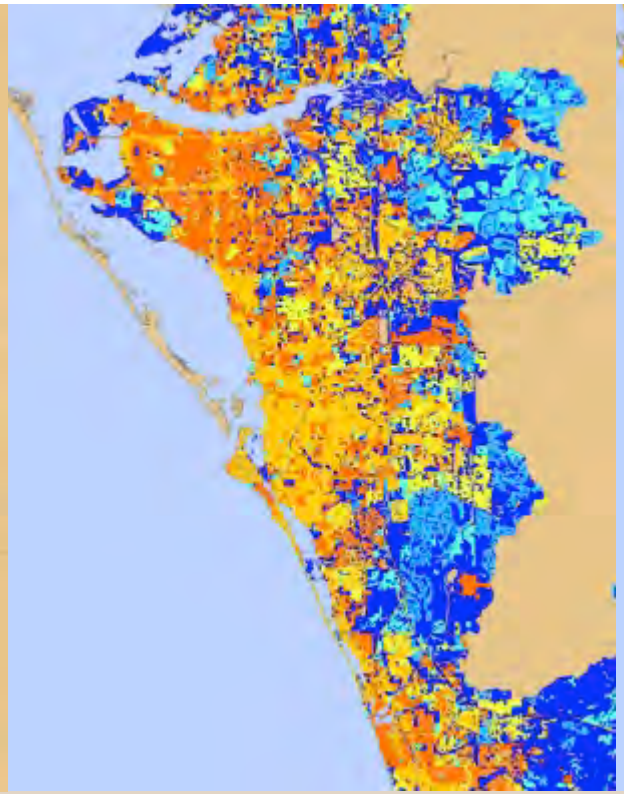
- Landscape Development Index scores
- Nutrient Loading Estimates
  - TN
  - TP
  - H_2O
- Unit Area Loads
- Hydrologic Soils Group
- Elevation
- Distance to Nearest Pass

- Note: Did not use WQ concentration data

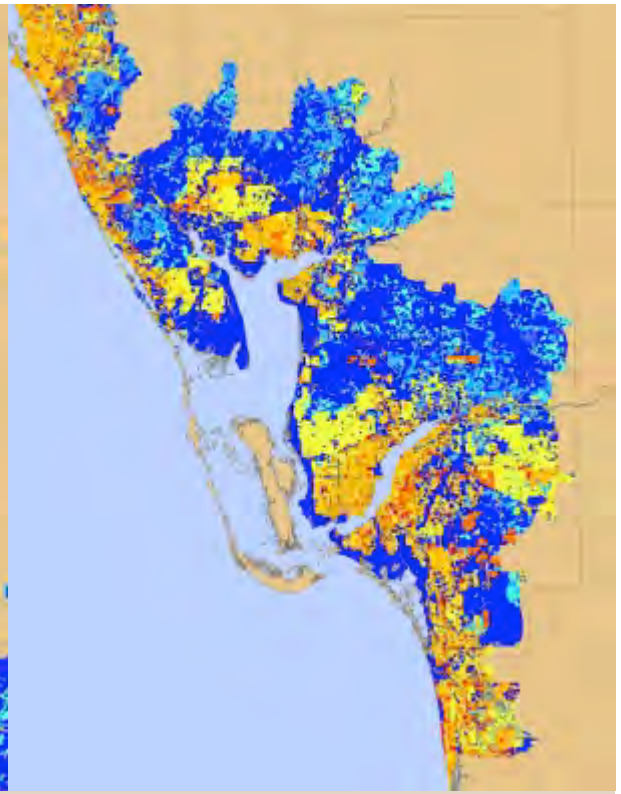
LDI: WITHIN HUC BASINS



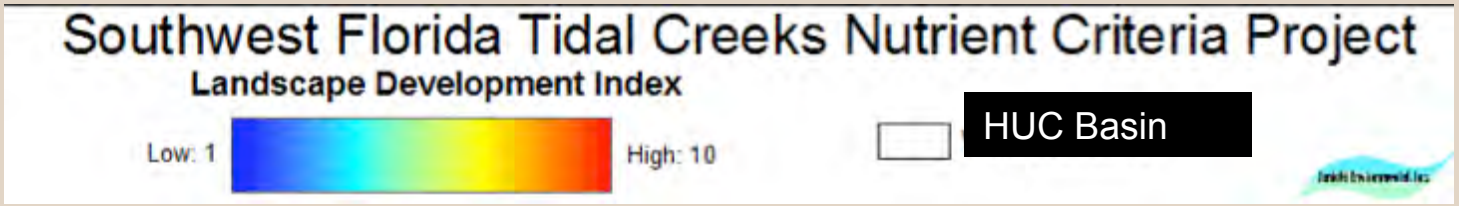
Tampa Bay



Sarasota Bay



Charlotte Harbor



HIERARCHICAL CLUSTERING

Data Matrix

Creek	LDI	HSG A	Slope	UAL	P Mean
CC01	2.71	0.00	0.03	0.69	632.72
CC02	4.49	0.13	0.06	0.74	632.72

Standardize

$$\frac{x - \mu}{\sigma}$$

Similarity

$S_{ij} = \frac{P+N}{T}$

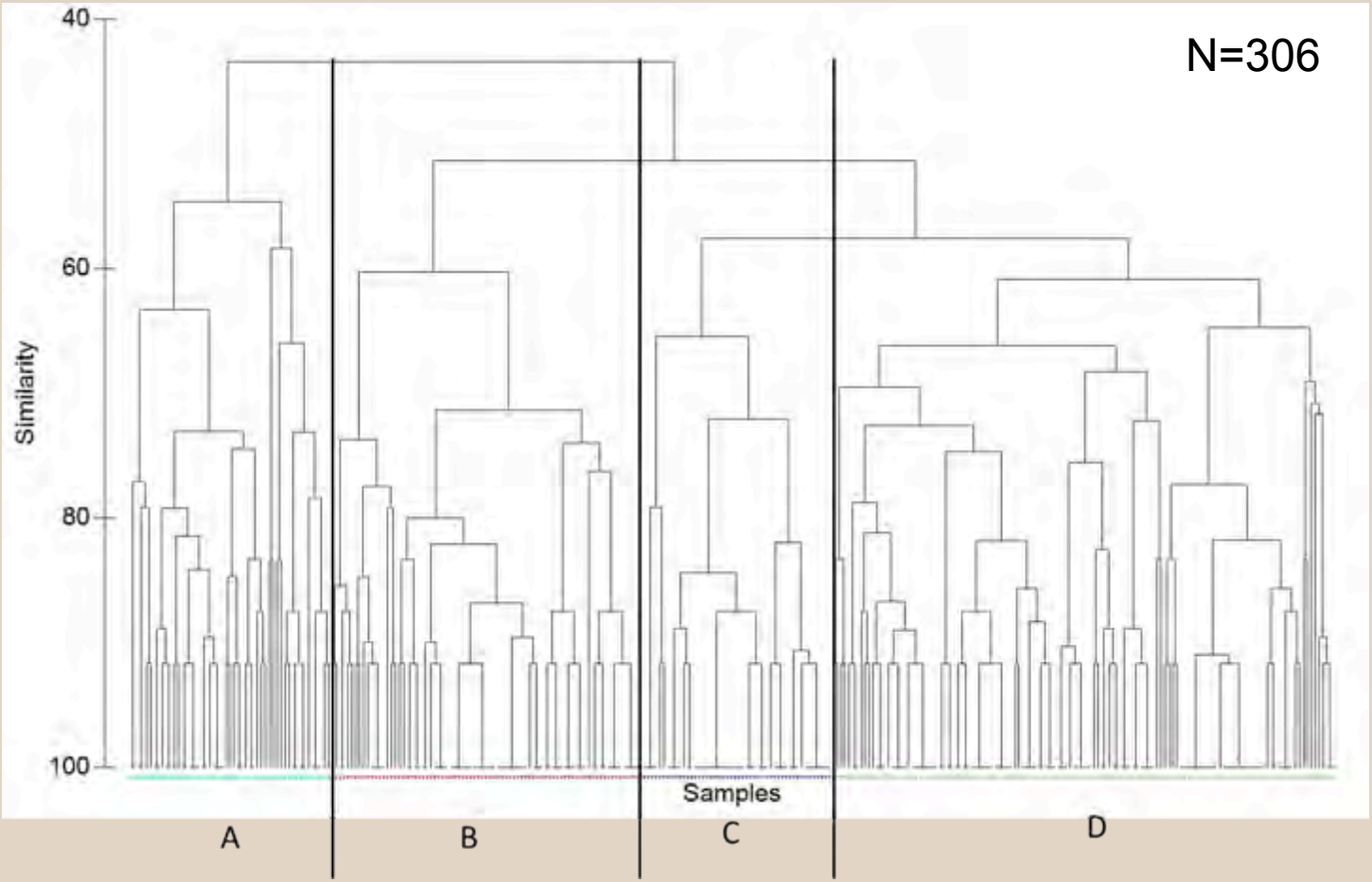
P = + for both

N = - for both

T = Total #

	CC01	CC02	CC03	CC04	CC05	CC06	CC07	CC08
CC01								
CC02	83							
CC03	75	75						
CC04	61	75	100					
CC05	75	75	100	100				
CC06	58	58	83	83	83			
CC07	41	58	83	83	75	100		
CC08	58	58	83	83	61	100	100	
CC09	58	58	83	83	83	100	100	100
CC10	67	67	92	92	92	75	75	75
CC100	50	67	75	75	75	58	58	58

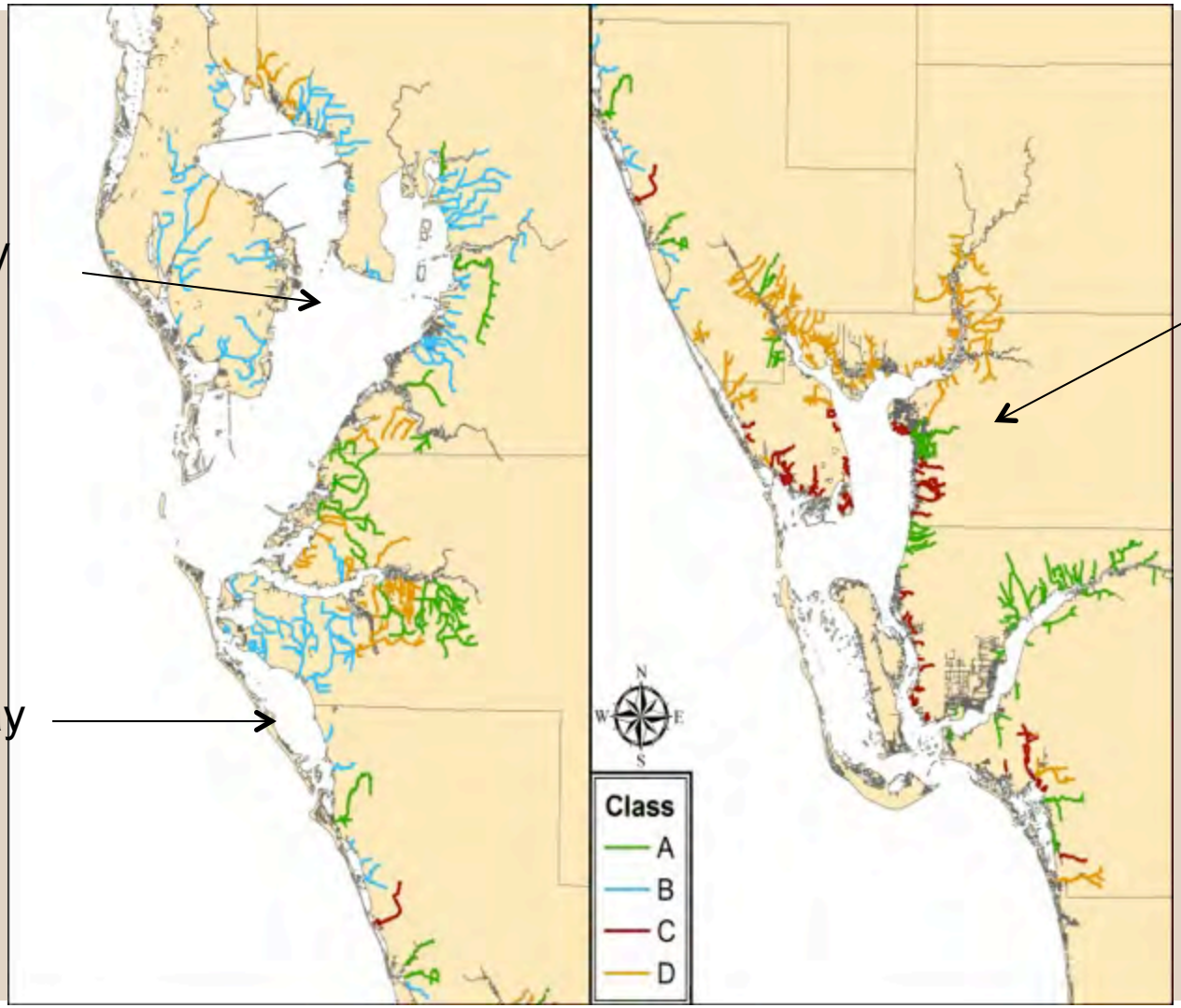
RESULTS OF CLASSIFICATION



CLASS DESCRIPTION

- Class A creeks were the longest creeks with the highest nutrient loadings
- Class B creeks had the highest proportion of A soils and the highest LDI scores
- Class C creeks had the lowest LDI scores and the highest proportion of B soils
- Class D creeks had the lowest soil P concentrations and were closer to passes

DISTRIBUTION OF CREEK CLASSES



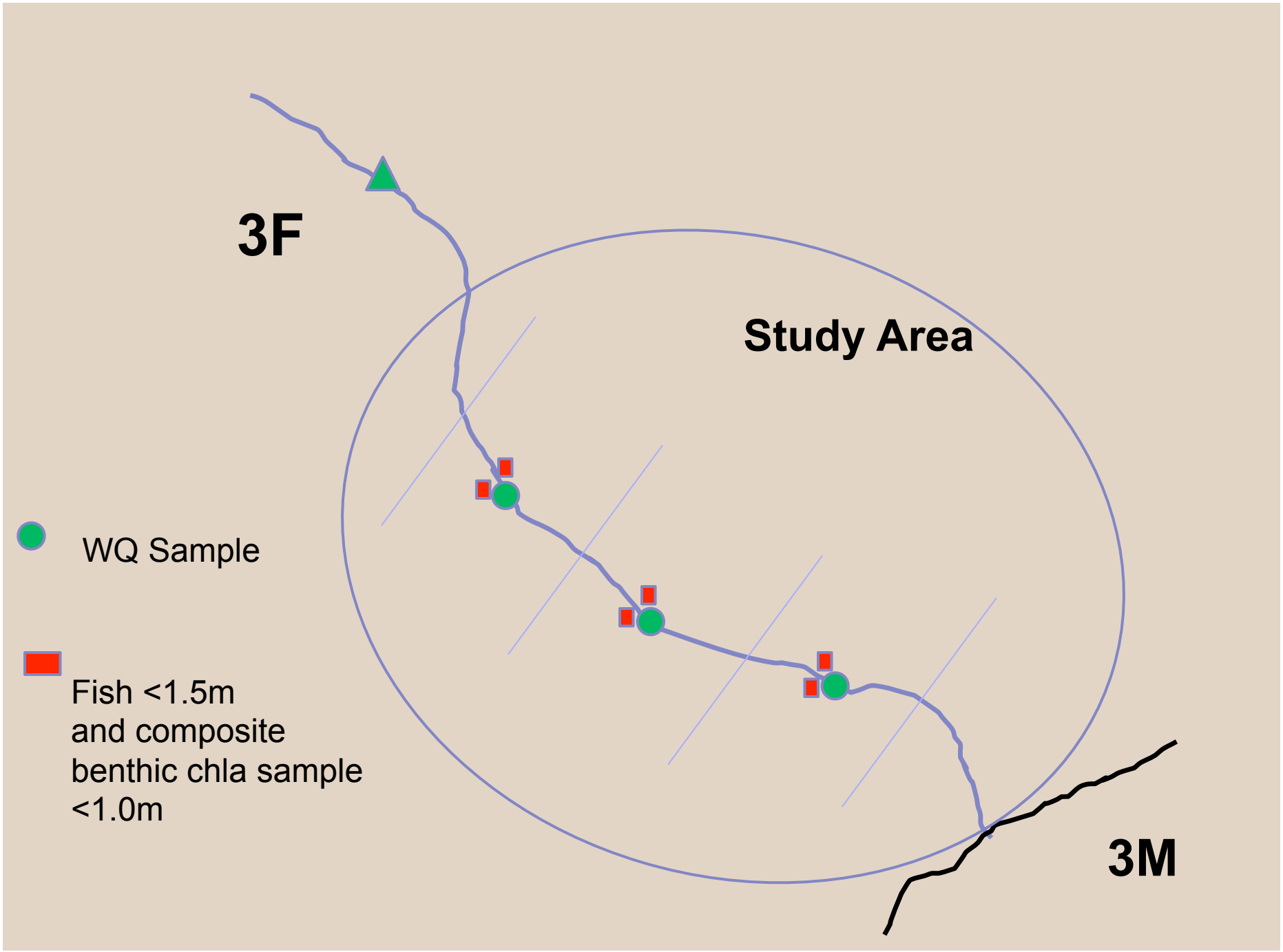
FINAL SELECTION (16 CREEKS)

- Final selection based on:
  - Four creeks in each class
  - Random selection within class
  - Collective knowledge
  - Reconnaissance
  - Logistics

SAMPLING DESIGN

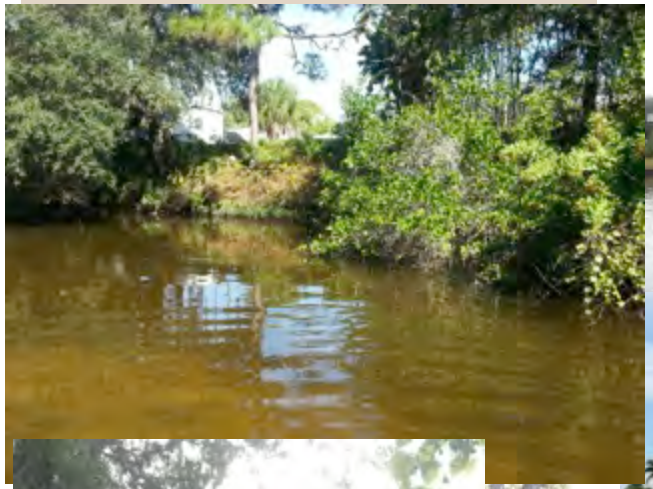
SAMPLING DESIGN

- Based on feedback from Joint NEP Working Group:
  - Sampling effort will be balanced across creek classes
  - Sampling effort will be balanced across strata within a creek
  - Each creek will include a WQ sampling location above the expected tidal head to capture contributing freshwater source

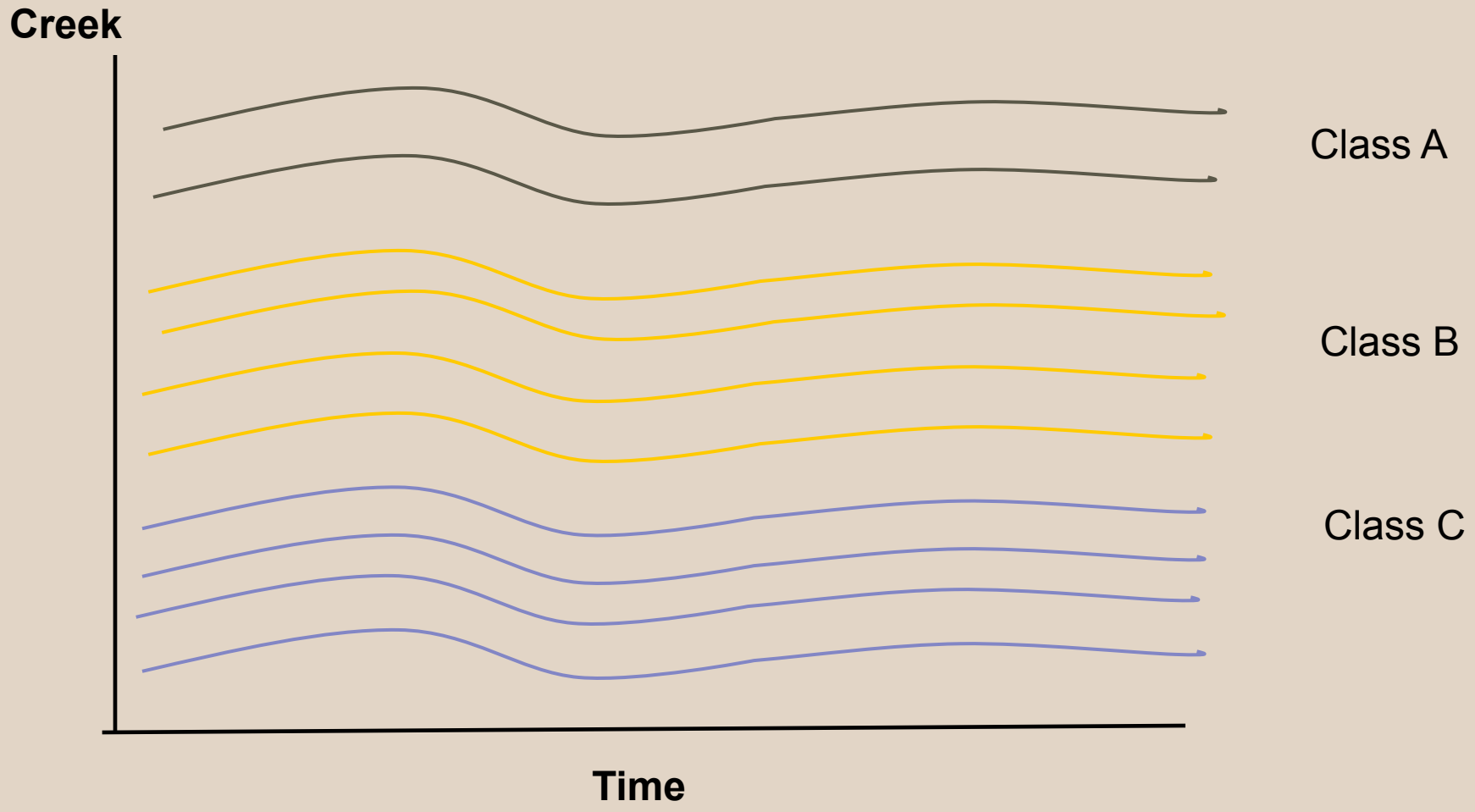

3F
Study Area
WQ Sample
Fish <1.5m
and composite
benthic chla sample
<1.0m
3M

OUR DESIGN IS

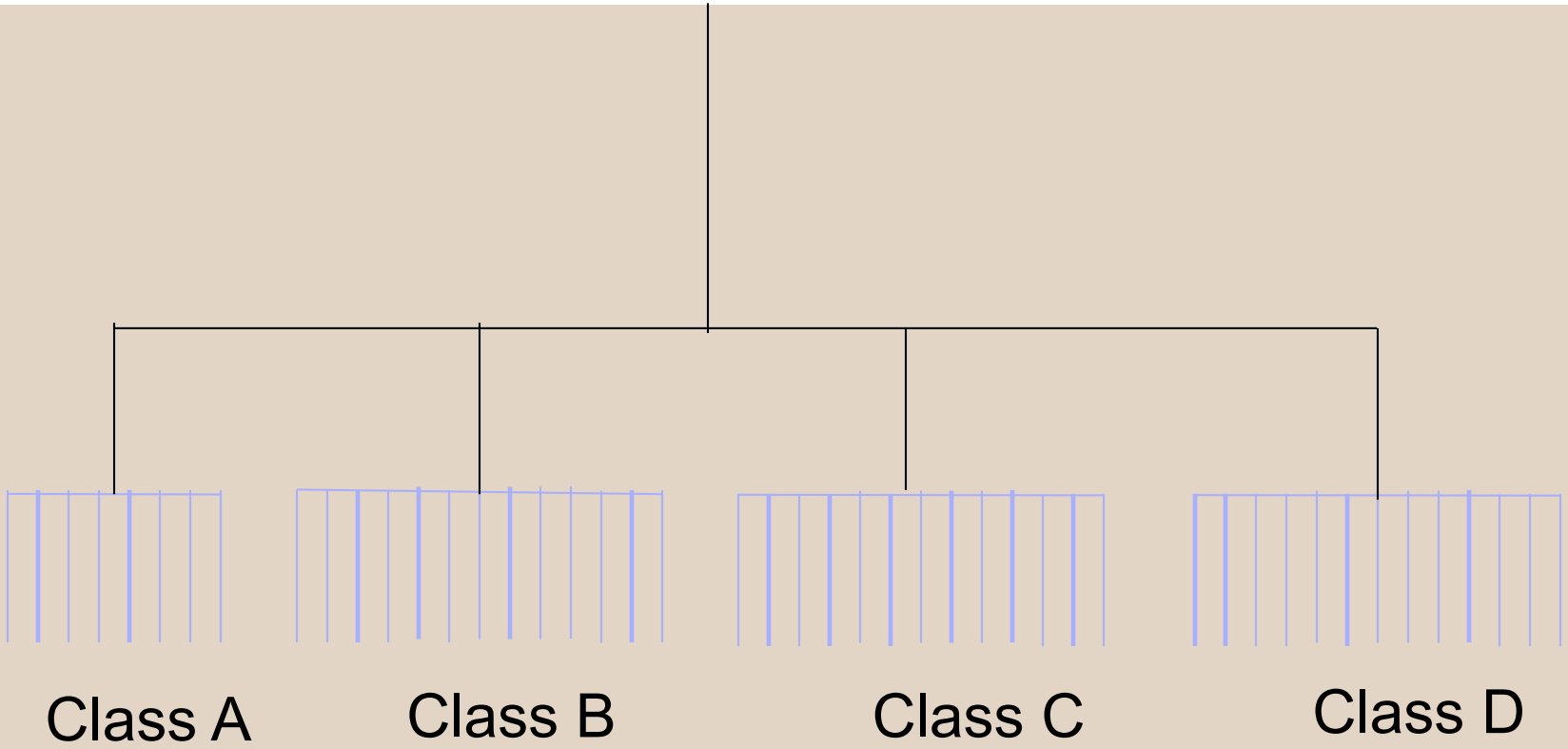
OBSERVATIONAL



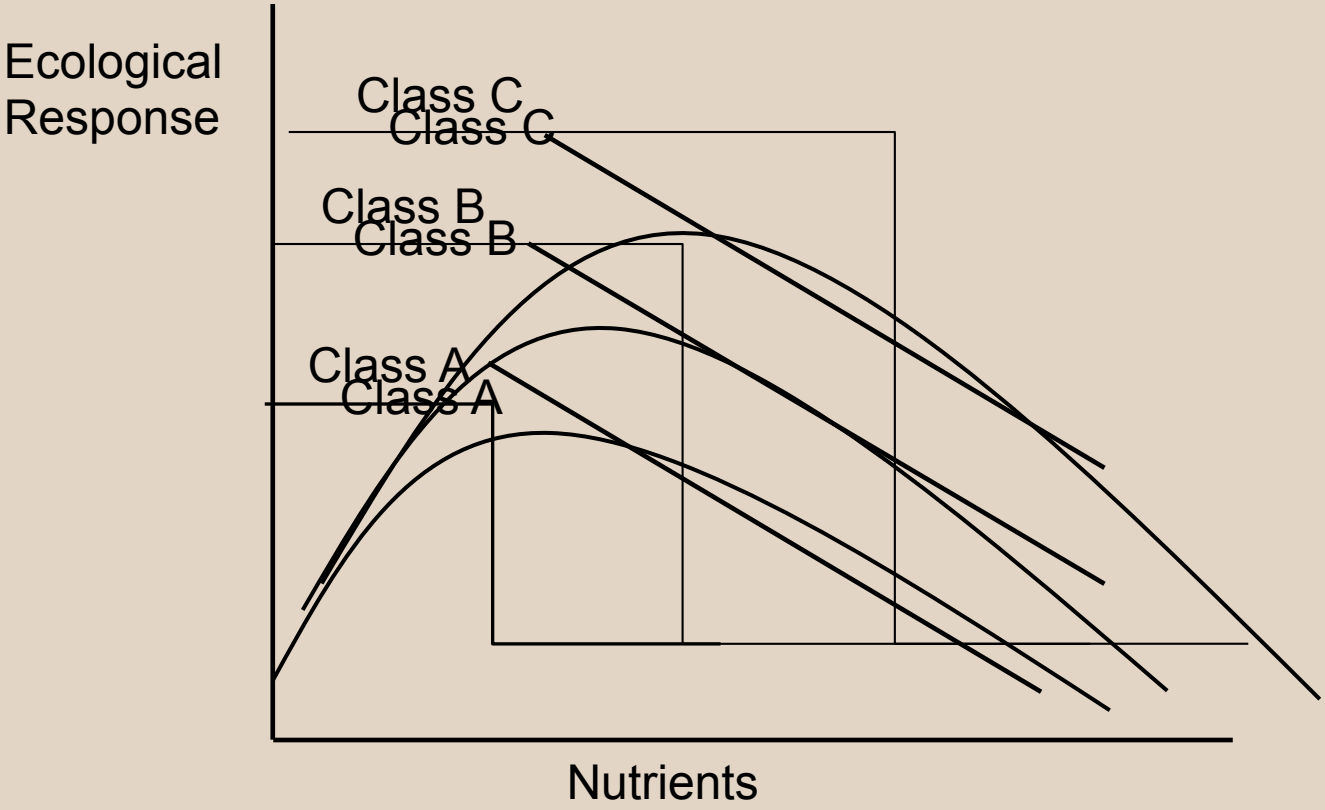
LONGITUDINAL



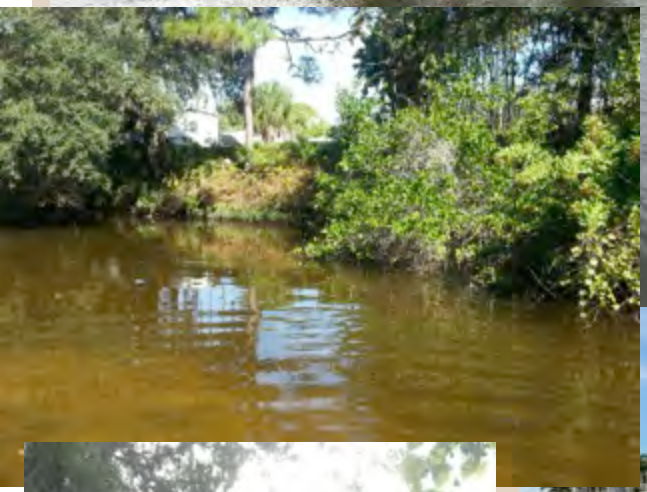
HIERARCHICAL

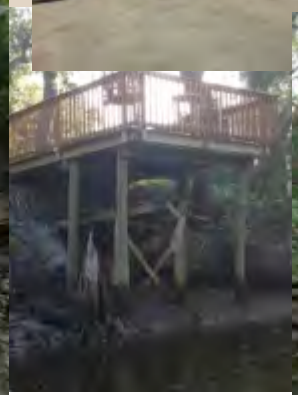


ECOLOGICAL RESPONSE



Relationship between nutrient delivery, assimilation and export may vary due to physical habitat alteration, landscape development, etc.



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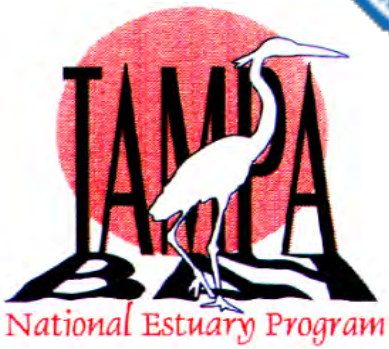
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Janicki Environmental, Inc.


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